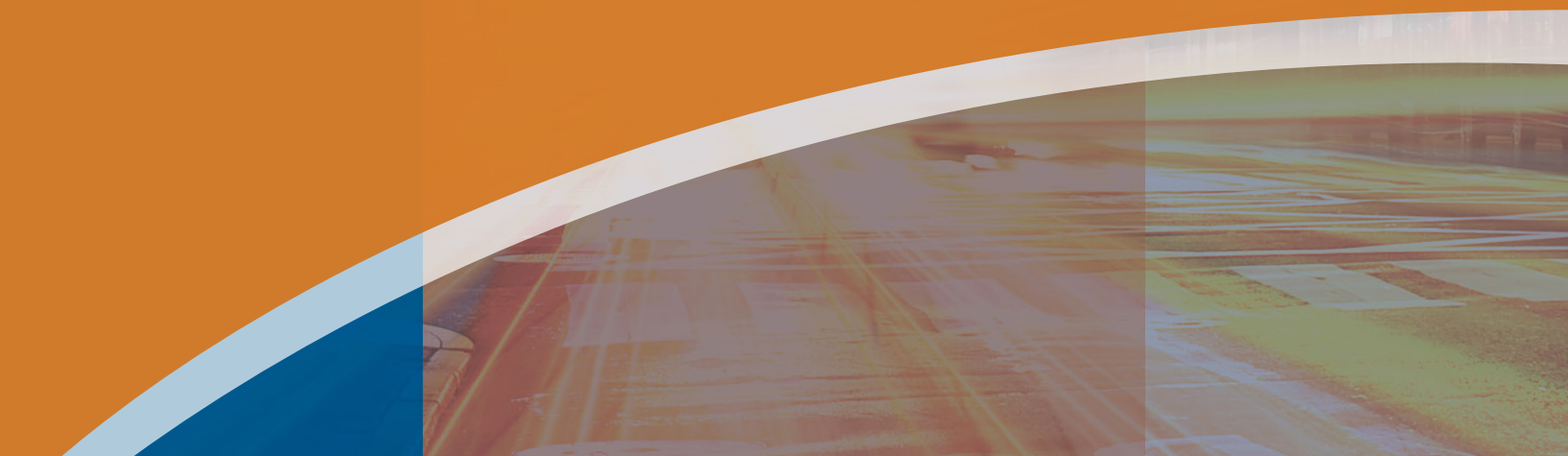
Improving Business Processes for

More Effective Transportation Systems Management and Operations

SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO



Notices

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of information contained in this document.

The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of this document.

Quality Assurance Statement

The Federal Highway Administration (FHWA) provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

Cover Picture Source: Crestock

Technical Report Documentation Page

1. Report No. FHWA-HOP-16-018	**2. Government Accession No.**	**3. Recipient's Catalog No.**
4. Title and Subtitle **Improving Business Processes for More Effective Transportation Systems Management and Operations**		**5. Report Date** **January 2016** **6. Performing Organization Code**
7. Author(s) Lisa Burgess, Thomas Fowler, Amy Minowitz, and Louis Neudorff		**8. Performing Organization Report No.**
9. Performing Organization Name And Address Kimley-Horn and Associates, Inc. 7740 N. 16th Street, Suite 300 Phoenix, AZ 85020 Under contract to CH2M. CH2M is under contract to American Association of State Highway Transportation Officials (AASHTO)		**10. Work Unit No. (TRAIS)** **11. Contract or Grant No.** DTFH6110H00008
12. Sponsoring Agency Name and Address Federal Highway Administration, Office of Operations 1200 New Jersey Avenue, SE Washington, DC 20590		**13. Type of Report and Period Covered** Final Report **14. Sponsoring Agency Code** FHWA-HOP

15. Supplementary Notes

The task manager for FHWA is Wayne Berman.

16. Abstract

Many agencies are shaping their Transportation Systems Management and Operations (TSMO) programs to more effectively address those planned and unplanned events that affect road and travel conditions and can have an effect on overall system reliability. Business processes, in the context of TSMO, refers to activities such as planning, programming, agency project development processes, and those organizational aspects that govern various technical or administrative activities (such as training, human resource management, or agreements). Business processes get at the heart of many of the organizational issues that can influence TSMO. This primer presents business processes across several TSMO areas, including traffic incident management, planned special event traffic management, road weather management, work zones, and freeway traffic management. Case studies in each area illustrate where agencies have made concerted changes to their respective business processes, and modified aspects such as contracting, training, resource allocation, planning and other business processes. The primer also highlights available tools and resources to help assess business processes, provides strategies for engaging the right stakeholders, and provides a guide to next steps.

17. Key Words Transportation Systems Management and Operations, TSMO, business process, improving processes, planning, programming, budgeting for operations.	**18. Distribution Statement** No restrictions

19. Security Classif. (of this report)	**20. Security Classif. (of this page)**	**21. No. of Pages**	**22. Price**
Unclassified	Unclassified	60	Free

Form DOT F 1700.7 (8-72) **Reproduction of completed page authorized**

SI* (Modern Metric) Conversion Factors

APPROXIMATE CONVERSIONS TO SI UNITS				
SYMBOL	**WHEN YOU KNOW**	**MULTIPLY BY**	**TO FIND**	**SYMBOL**
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: volumes greater than 1000 L shall be shown in m^3				
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2,000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC

APPROXIMATE CONVERSIONS TO SI UNITS				
SYMBOL	**WHEN YOU KNOW**	**MULTIPLY BY**	**TO FIND**	**SYMBOL**
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa
APPROXIMATE CONVERSIONS FROM SI UNITS				
SYMBOL	**WHEN YOU KNOW**	**MULTIPLY BY**	**TO FIND**	**SYMBOL**
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb

APPROXIMATE CONVERSIONS TO SI UNITS				
SYMBOL	**WHEN YOU KNOW**	**MULTIPLY BY**	**TO FIND**	**SYMBOL**
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
TEMPERATURE (exact degrees)				
^{o}C	Celsius	1.8C+32	Fahrenheit	^{o}F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

Contents

List of Tables

List of Figures

Chapter 1. Introduction

1.1 Managing Congestion with Transportation Systems Management and Operations

Congestion and delay on the road network are common attributes in today's transportation systems, particularly in urban areas and often during peak driving times such as morning or afternoon commutes. When travel conditions are worse than expected (from random or unusual circumstances like a crash, work zones, planned special events (PSEs), or bad weather), these conditions directly affect the networks' reliability that travelers may have come to expect. An important focus for many local and state transportation agencies, as well as the Federal Highway Administration (FHWA), is to better manage and operate a transportation system to improve travel reliability.

A strong link exists between how the transportation system is managed and operated, and how reliable it is to the users of the system (for example, motorists and shippers).[1] To fully appreciate and build on this link, decision makers and agency managers must understand that the effectiveness and long-term sustainability of any Transportation Systems Management and Operations (TSMO) strategy depends on the supportive nature of the agency's business processes devoted to implementing TSMO programs.

Transportation Systems Management and Operations (TSMO) is defined as integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve security, safety, and reliability of the transportation system management.

TSMO is focused on actively managing and improving the transportation network by bringing together partner agencies, systems, and operational strategies as part of an integrated program and overall operational philosophy. Examples of TSMO strategies include traffic incident management (TIM), road weather management, and freeway traffic management.

Many agencies are shaping their TSMO programs to more effectively address those planned and unplanned events that affect road and travel conditions and can have an effect on overall system reliability. Through improved business processes, practices, and policies, agencies can collaborate and implement more effective operations strategies that help minimize the effects of those events on the transportation system. This Primer, which has been developed under the Second Strategic Highway Research Program (SHRP2) L01 (Businesses Processes for Reliability), provides information on these business practices as they relate to the aforementioned TSMO strategies.

[1] Second Strategic Highway Research Program (SHRP2). 2013. *A Framework for Improving Travel Time Reliability.* SHRP2 L17 Final Report. Available at http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2prepubL17.pdf. June. [Note: This publication asserts that reliability can be improved through the application of TSMO strategies, because these strategies focus directly on the root causes of unreliable travel, such as incidents, weather impacts, and work zones.]

Operational strategies alone will not solve the congestion management challenge. Effective business processes must be a key part of the institutional environment necessary to support and enable a wide range of TSMO program elements and priorities.

1.2 Business Processes

1.2.1 Why Focus on Business Processes?

Effective business processes are essential in supporting an effective and sustainable TSMO program. They reflect leadership support, internal and external cooperation, and fiscal efficiency and responsibility, as well as placing a priority on an overall "customer service" approach. Business processes for TSMO are different than for traditional transportation agency functions of design, construction, and maintenance. Many agencies today face budget challenges, staffing and resource shortfalls, increased competition for project dollars, and potential customer satisfaction issues because of increasing travel delays experienced on transportation networks.

The key to innovative partnering strategies, purposeful strategic planning for short- and long-term system management needs, identifying resource requirements and how those resource needs could be addressed is through effective business processes. Research shows that agencies with strong commitments to business processes—such as programming, procurement, staffing, planning, and collaboration—have demonstrated benefits of improved system management and operations.[2]

1.2.2 The Role of Business Processes in a TSMO Program

Business processes, in the context of TSMO, refers to activities such as planning, programming, agency project development processes, and those organizational aspects that govern various technical or administrative activities (such as training, human resource management, or agreements). Business processes get at the heart of many of the organizational issues that can influence TSMO. In many cases, the business process elements go beyond the day-to-day operational activities, and require broader institutional support and involvement. Aspects such as training, contracting, and procurement, or information technology policies, might be well outside of the sphere of influence or control of the groups that are involved in the hands-on, daily transportation system operations and management.

Business processes are challenging because no two agencies or regions are alike. Each agency has its own institutional policies, rules, culture, and structure. Although some standards are in place that help to promote consistency (such as procurement requirements), each agency executes its processes differently. As a result, when looking at business processes, each agency may have a set of unique requirements and approaches and a unique set of stakeholders that will need to be involved.

Business processes, like planning, programming, training, or establishment of partnerships and agreements, are fundamental to the success of operational and management activities.

[2] Second Strategic Highway Research Program (SHRP2).2012. *Institutional Architectures to Improve Systems Operations and Management*. SHRP2 L06. SHRP2 Report S2-L06-RR-1. Available at http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2_S2-L06-RR-1.pdf. Prepared by Parsons Brinckerhoff, Delcan, Philip J. Tarnoff, George Mason University School of Public Policy, and Housman and Associates. Prepared for Transportation Research Board, Second Strategic highway Research Program, Washington, D.C.

The lack of effective business processes for TSMO can also hinder an agency's ability or readiness to advance to more complex and proactive operational strategies (such as variable speed limits, advance traffic management and information systems, and dynamic parking management). Without the right procurement processes, partnering commitments, sustainable funding, internal awareness and support, an agency would have limited capacity to implement more complex TSMO programs and activities.

1.2.3 Benefits of Improved Business Processes

The following are several benefits in implementing improved business processes into transportation systems:

- Developing an integrated TSMO Program Plan that addresses key business processes can enable the identification and prioritization of key needs, projects, partnerships, implementation strategies, and planning level costs, which can be used to quantify TSMO budget and resource needs, as well as leverage planned capital improvements.
- Allocating resources, both funding and staff, can be more effectively targeted to priority operation needs.
- Creating procurement processes and strategies that respond to the unique needs of TSMO can streamline acquisition and implementation and result in cost savings to agencies and operations programs.
- Procuring improved and sustainable alignment of equipment, staff, and resources can help to more effectively manage and operate the system over time.

1.2.4 Impacts of Ineffective Business Processes

The following are ineffective business processes that can impact transportation systems planning:

- Limiting or having no business plan for TSMO will result in ad-hoc and incremental implementation of technology and equipment, with little consideration for longer-term needs.
- Lacking a defined or sustained budgeting process limits the ability to deploy needed solutions.
- Providing unstructured training programs can overlook key partners and result in uncoordinated responses to incidents on roadways.
- Not integrating system or strategy performance information into operations can limit the effectiveness of equipment and staff investments.

1.2.5 Business Process Improvement Examples from Other Industries

Two case studies—United Parcel Service (UPS) and Charleston (South Carolina) Water Systems (CWS), a water utility company—provide a successful example of how improved and integrated key business processes helped them reach their goals. Both case studies provide evidence that considering and analyzing underlying business processes can and do work to improve operations and produce monetary and efficiency benefits to the organization.

1.2.5.1. United Parcel Service

In 2011, UPS underwent a business processes transformation to shift from being a primarily U.S.-based, small package-focused business to becoming an end-to-end global operation that can handle the needs of companies worldwide. UPS took a variety of approaches to ensure that their business and management processes were compatible with their new vision and goal. One initiative was to create a centralized process group called the Program Management Group – Process Center for Excellence, whose task was to ensure that the company stayed process-oriented. This group also was tasked with documenting, reviewing, and standardizing processes. They also worked with the American Productivity and Quality Center to become experts at benchmarking. As a result, they developed a framework known as the Core Process Framework. Their goal for this framework was to have metrics and scorecards available so they could benchmark UPS process management against what other companies were doing, so they may continually improve and elevate their process maturity. UPS changed their business plan and approach by implementing a 'We Love Logistics' campaign to emphasize that the company was explicitly aware of the full set of logistics behind their end-to-end process of package transport in the global arena.

As a result of these efforts to become—and be seen as—process-oriented, UPS now operates in 200 countries and has vastly expanded their shipping capabilities. They have established their process analysis as a core value in the company and trained more than 700 of their employees worldwide in creating process maps for analysis and process improvements. Overall, their focus on business process improvements has allowed them to outgrow the confines of the small-package business and become a truly globalized company.

1.2.5.2. Charleston Water System

CWS oversees one water treatment plant and two wastewater treatment plants in South Carolina that serve approximately 400,000 customers. CWS was treating excess water in its wastewater collection system because rain and groundwater were entering the system through cracks and cross-connections. CWS set out to address the problem by improving predictive maintenance and investigations so that effective infrastructure improvements could be made. To achieve this goal, CWS used a combination of management frameworks and business practice tools to analyze their water treatment system and ultimately reduce waste and improve their operations' overall efficiency and effectiveness.

CWS applied different components of Lean Six Sigma process and project efficiency toolkits.[3] For example, they implemented mentoring and training programs for a multidisciplinary project team to ensure the team properly understood the Lean Six Sigma processes. They also established process goals and metrics—including value stream mapping, statistical process quality control and variation analyses, cause-and-effect diagrams, and root-cause analysis problem solving—to measure progress and results of their process changes. By using these process tools and analyses, CWS recommended improvements that were implemented and subsequently adopted within CWS operations. After CWS implemented the recommended improvements, the company was able to increase its wastewater treatment capacity by

[3] Lean Six Sigma comprises process improvement and process efficiency approaches that promote more efficient, streamlined ways to collaborate, reduce lags in projects and process implementation, and improve how tasks and work are accomplished.

2.62 million gallons per day and see a savings of $1.3 million per year in operations and maintenance costs. CWS also realized a $9.17 million fee savings from their increased treatment capacity. The efforts to provide their operations with better performance data has helped CWS reach its goals of reducing waste and improving overall efficiency and effectiveness, which resulted in large-scale annual savings.

1.3 Primer Focus and Audience

This primer is focused on helping transportation agencies accomplish the following goals:

- Understand the importance of creating and developing sustainable business processes to effectively advance TSMO as a mainstream, core agency function.
- Assess agency business processes related to TSMO, and identify their unique requirements.
- Identify constraints and gaps within agencies' current business processes.
- Engage the right stakeholders to identify needs and develop actions and strategies that can improve business processes to support more effective TSMO programs.

This primer will help readers understand the context and role of business processes in a TSMO program. The primer differentiates supporting business processes—including program planning, procurement, and resource allocation—from those operational activities typically associated with TSMO, yet it makes a firm connection between business processes and operations functions.

The following audiences will benefit from the concepts presented in this primer:

- *Agency transportation operations managers*—These managers have programmatic authority to prioritize reliability-focused strategies within operations programs and budgets, assign and supervise staff responsible for operations, and coordinate with agency and partner peers to evaluate broader business process issues and work toward solutions.
- *Agency traffic engineering managers*—These managers are close to the day-to-day operations, systems, and staff that operate various traffic management programs. They can identify gaps and deficiencies, facilitate collaboration, and help elevate issues that require funding, resources, or departmental approval for changes.
- *Transportation planners*—Planners typically focus on broader regional issues and longer term transportation system needs. This important audience can help effect change by modifying planning and programming processes to better support longer-term operational needs. Planners often coordinate with multiple groups, entities, or agencies and can help identify cross-jurisdictional business process gaps.

Because this primer highlights different nonrecurring congestion business process issues, it also benefits multiple stakeholders within an agency. The primer also benefits agency partners, including transportation system maintenance managers, regional planning organizations, senior law enforcement representatives (particularly those involved in TIM and PSE programs), and those entities involved in agency administrative functions, including contracting and procurement, information technology, and training.

1.4 Primer Organization

This primer is organized into the following key sections:

- *Chapter 1: Introduction*—This chapter defines business processes in the TSMO context and sets the stage for their role in supporting the institutional components of TSMO activities. This chapter also provides examples of companies from other industries that improved or better coordinated their own business processes.
- *Chapter 2: Business Process Development*—This chapter provides some guidance and methods for agencies to begin to identify business process issues, as well as strategies for stakeholder engagement in the process.
- *Chapter 3: Traffic Incident Management; Chapter 4: Work Zones; Chapter 5: Planned Special Events; Chapter 6: Road Weather Management; and Chapter 7: Traffic Management.* These chapters outline business process issues in the context of specific operational activities. Each chapter presents case studies of agencies or regions that have helped elevate the effectiveness of their TSMO programs or activities by addressing certain business processes to promote more effective system operations. Each chapter also provides example questions to consider in identifying specific business process issues, as well as stakeholders who could or should be involved to help address them.
- *Chapter 8: Checklist for Getting Started*—This is a one-page quick guide for agencies to use to begin evaluating their business processes. It provides recommendations for assembling available plans and documents, guidance on identifying the right stakeholders, types of forums that are conducive to business process discussions, and recommended steps in the process.
- *Chapter 9: Available Resources to Support Business Process Improvements*—This chapter provides information on related tools, guidance, and publications to support agencies in their business process analysis and improvement strategies.

Chapter 2. Business Process Development

Lack of effective business processes is often at the core of any operational challenge. Keeping in mind the institutional focus of business processes—such as strategic and program planning, programming, contracting, procurement, and project management activities—it may not always be obvious that an operations challenge is largely attributed to gaps in, or lack of, effective business processes. Strong business process development relies on two important actions: 1) Identifying Business Process Issues, and 2) Engaging the Right Stakeholders.

2.1 Identifying Business Process Issues

Agencies can begin identifying key business process issues in several ways. One effective way is asking the right questions. Capability maturity model frameworks for various Transportation Systems Management and Operations (TSMO) approaches and strategies[4] can help provide prompting questions to focus the discussion on business processes, including their strengths, weaknesses, and gaps. Chapters 3 through 7 of this primer also provide the reader with some example business process issues.

Another method of identifying key business process issues involves analyzing operational activities and identifying weaknesses or gaps where potential business process issues could affect their effectiveness. For this kind of analysis, discussions typically focus on a specific problem with incidents or work zone operations, road weather management, information sharing, or other operational issue and associated "breakdowns" in effective operations. These issues can be addressed as part of an after-action review or debrief. Getting the right stakeholders involved in these analyses will provide valuable information about different TSMO partner perspectives, activities, and potential constraints.

Business process issues or weaknesses can often be addressed in a cost-effective manner; a process improvement does not always need to translate into a major capital expenditure. Process change can be a challenge for agencies, simply because such change could affect several groups or divisions, as well as require modifications to long-established processes and levels of authority.

As part of these discussions, key questions should be asked that can help identify various issues and whether or not a business process could be improved to help address them. Table 1 provides examples these types of questions, in the context of various stages of an event response. At each stage in this example, various business process issues and considerations are presented that could enable more effective operations actions (right column). This example uses response steps that would be consistent with responses to an incident or weather event.

[4] FHWA has developed several capability maturity model frameworks to support improvements at the program level, including Traffic Management, Traffic Incident Management, Planned Special Events, Work Zone Management, Road Weather Management, and Traffic Signal Management. These are available on the FHWA website.

Table 1. Examples of business process-related questions.

Example Event-driven Operations Actions	Response Actions	Example Business Process Issues Impacting Operation
» Visual identification » Notification from other entity » Large-scale weather event with advanced notice	**Agency Notified of Event**	» *Are there policies or directives that outline responsibilities for major events?* » *Are lines of communication among agencies clearly established?* » *Does the agency have access to available real-time incident/event/threat information?*
» Implement standard operating procedures » Initiate other notifications » Mobilize response teams » Activate traveler alert systems and processes	**Initiate Response**	» *Are there documented Standard Operating Procedures?* » *Do partners know their roles and responsibilities?* » *Have agencies trained together for response strategies?*
» Monitor status of response » Monitor impacts on transportation network » Implement or adjust operational strategies as needed » Initiate other notifications	**Monitor Event Status and Update Response**	» *Do partner agencies have access to response status?* » *Are processes in place to escalate response levels?* » *Who is authorized to request additional resources?*
» Notify of event conclusion » Update system entries » Adjust operating system to normal operating status » Remove or update traveler alert notification » Document and archive event and response details	**Event Conclusion and Restoration**	» *Are there established processes for after-event debriefings?* » *How are event or response details captured and shared?* » *Is there a process to review and update Standard Operating Procedures (SOPs)?* » *How are performance metrics updated?*

Visualizing steps from an operations standpoint can identify the synergies between operations activities and business processes that can enable or improve those activities. Involving multiple stakeholders and their perspectives in the discussion can raise awareness of issues that might not otherwise have been identified within traditional operations roles or functions.

An important aspect in identifying business processes is that the business process issues or weaknesses can often be addressed in a cost-effective manner; process improvement does not always translate into capital expenditure. The following are examples of relatively cost-effective process improvements:

- Establish a new line of communication among partners.
- Develop a new agreement.
- Modify construction review processes to include operations representatives.
- Revise operating procedures.
- Increase collaboration with agency and metropolitan planning organization (MPO) functions to integrate TSMO priorities into established agency and regional programming processes.

More effort-intensive business process changes would include the following:

- Develop a TSMO strategic or implementation plan.
- Revise procurement or contracting language.
- Implement a performance management program that aligns with goals and objectives and with budgeting and resource allocation processes.

***E-Tool**: This helpful tool was developed by SHRP2 and FHWA to support groups and individuals wanting to assess and improve TSMO-related business processes. The E-Tool includes excerpts and examples from original SHRP2 research, to help provide context for the different stages of business process analysis, change, and implementation. Users are guided through the seven steps identified in the SHRP2 research, beginning with identifying the causes and influences for business processes, all the way through the steps to assess, develop, and implement business process changes. The E-Tool allows users to capture key points at each stage, and generates a summary of the discussions and action items identified for implementing changes to TSMO business processes. The link for accessing the E-Tool is provided in Chapter 9 – Available Resources.*

2.2 Engaging the Right Stakeholders

Once specific issues are identified at the operations level, engaging the right stakeholders is important. The specific stakeholders to get involved depend on the specific issues that need to be addressed.

Business process stakeholders may be outside of the typical operations stakeholders and partners and could include representatives from any of the following groups:

- Information technology
- Construction and project development
- Maintenance
- Safety

- Capital program planning and project development
- Statewide, regional, and metropolitan planning
- Long-range planning
- Traffic engineering and control
- Traffic Incident Management (could be multiagency)
- Legal and policy
- Human resources
- Procurement
- External partners for operations (for example, neighboring agencies, enforcement and emergency service providers, or other affected agencies)
- Contractors that serve in key roles
- System vendors or operators
- Venue managers (for Planned Special Events)
- Others to be determined based on priority issues and outcomes

In many cases, these stakeholders will require focused outreach to engage them in discussions that will influence change or modify supportive business processes. The following are some strategies that can help engage nontraditional stakeholders:

- Initiate one-on-one conversations to get them involved, state the case and issues, and explain why they are important to the conversation and outcomes.
- Convene a workshop that involves the appropriate stakeholders to allow multiple perspectives to be shared and partners to collaborate on specific actions, strategies, and next steps. This will also help identify any additional constraints and promote discussion on how to mitigate or resolve those constraints.
- Follow up on issues discussed, action items identified, and next steps. Effectively document issues and action items to help keep all stakeholders focused on the issues and required actions, particularly for those business processes that might take some time to modify or resolve.

Chapters 3 through 7 focus on business processes within several core TSMO strategies, particularly for managing nonrecurring congestion. Operations activities—and their supportive business processes—vary widely from region to region or from state to state. The examples provide a starting point for agencies to examine their operational processes and potential business process improvements. Case studies provide examples of successful business process changes initiated in other areas, as well as the impetus for examining the need for changing or modifying business processes. Chapters 8 and 9 provide helpful resources for agencies to use as part of their business process improvement strategies.

Chapter 3. Traffic Incident Management

3.1 Traffic Incident Management Business Processes

Traffic Incident Management (TIM) consists of a planned and coordinated multiagency process to detect, respond to, and clear traffic incidents so that traffic flow may be restored as safely and quickly as possible.[5] TIM includes notifying proper responders to arrive at the scene, assisting involved motorists and conducting necessary investigations, minimize travel disruptions and delays, and restore the roadway to normal conditions (as shown in Figure 1). Effective TIM also involves planning, preparing, and developing procedures to educate and inform motorists of crashes and any associated restrictions. Several regions have active TIM coalitions or programs that bring together a wide range of partners from the TIM community, including law enforcement, transportation officials, emergency responders, towing providers, and information providers and disseminators.

Figure 1. Photo. Example of incident management activities.
(Source: Florida Department of Transportation)

TIM is one of the core strategies within Transportation Systems Management and Operations (TSMO) to help preserve capacity and improve the reliability and safety of the transportation system. Established TIM programs, have proven to be low cost and cost effective, produce results in a short amount of time, and result in economic, mobility, reliability, and safety benefits.

[5] Federal Highway Administration (FHWA). Undated. *Traffic Incident Management.* Accessed at http://ops.fhwa.dot.gov/eto_tim_pse/about/tim.htm. Accessed March 12, 2014. Federal Highway Administration, Emergency Transportation Operations.

The following business processes are integral to the success of TIM programs:

- Establishing strategic goals and objectives
- Funding and programming for program and strategies
- Contracting and procurement processes to support programs and strategies
- Establishing a link between TIM, operations, and the regional and statewide transportation plans
- Measuring performance based on TIM objectives
- Maintaining a relationship of performance management and measures with regional and statewide TSMO performance management programs
- Providing policies to enable program objectives and partnerships

The following are guiding questions that can be used to identify business process issues and potential action items for improving TIM business processes. These questions can apply to several partners involved in TIM:

- On a routine basis, are TIM needs collectively assessed, reviewed, and acted on?
- Are funds available for TIM activities?
- Are multiagency, multidiscipline incident debriefings held?
- Do multiple participating agencies formally plan or participate in the planning and training for TIM activities?
- Do standardized TIM response systems (protocols) exist?
- Is TIM performance measured and then used to influence and/or improve operations?
- Are performance-based contracts, agreements, guidelines, and/or specifications used for TIM? Is there an opportunity to do so?
- Does agency leadership understand TIM, and is leadership aware of the link between TIM and TSMO?
- Is agency leadership actively involved in TIM program decisions?
- Is the TIM program supported by a succession plan, or is it dependent on a limited number of champions?

For example, if responses are inconsistent between partner agencies that are part of the same TIM program, then implementing an interagency training program to give all agencies the same information and training methods would be beneficial. FHWA's National TIM Responder Training Program has helped to standardize multiagency TIM training in areas around the country.

Table 2 outlines potential business process challenges for various elements of TIM. These challenges can be examined during the course of incident management operational discussions

that would identify potential limitations or issues that can be addressed through improving corresponding business processes.

Table 2. Traffic incident management business process challenges.

Traffic Incident Management Program Elements	Traffic Incident Management Potential Business Processes Challenges
Coordinated Partnership	• Consensus on incident management priorities, goals, and objectives is not achieved or documented. • Formal agreement for mutual aid or coordinated incident response is not reached. • Traffic Incident Management (TIM) partners provide inconsistent or limited participation. • Program direction is at risk of being lost if champions leave or transition to different roles. • TIM is not integrated into agency core mission. • Multiagency incident debriefings are not part of the standard process.
Training	• Coordinated training or multiagency training among TIM partners is lacking. • TIM training has limited or no funding. • No formal training program (such as the FHWA National TIM Responder Training) is in place. • New TIM techniques or processes are unable to be integrated into established agency training programs.
Funding	• TIM funding is not sustainable. • Funding commitments or funding levels vary among incident management partners. • Ability to procure needed tools, technologies, or integration for more effective TIM or coordinated communications during TIM are limited.
Response and Management	• Interoperable communications among partners are not in place because of funding or policy limitations. • Communication processes do not include all required partners. • Response and on-scene procedures are not defined, documented, or known by all partners.
Performance Improvements	• Goals, objectives, and associated performance measures for incident management are not defined, tracked, or reported. • Policies limit effective sharing and reporting of TIM-related data. • Performance data needs are not defined or identified. • Lack of a coordinated performance monitoring strategy limits effectiveness. • Performance data are not used to identify needed process improvements.

3.2 Traffic Incident Management Business Process Case Studies

3.2.1 Joint Operations Policy Statement Encourages Innovative Approaches to Collaborating on Effective Incident Management Strategies in Washington State

This case study addresses the following TIM business processes:

- Policies to enable program objectives and partnerships
- Strategic goals and objectives and corresponding strategies

The State of Washington has developed one of the most comprehensive and effective incident response programs in the United States. Washington State Department of Transportation (WSDOT) and the Washington State Patrol (WSP) are the two primary agencies responsible for incident response on highways in Washington State. WSDOT and WSP have a long history of working together to improve incident response and reduce incident clearance times.

In 2002, WSDOT and WSP developed a Joint Operations Policy Statement (JOPS) Agreement that formalized each agency's roles and responsibilities for freeway operations, including incident response. This document is signed by the Washington State Secretary of Transportation and the Chief of the WSP and is updated each year. It now includes the Washington Fire Chiefs. The JOPS Agreement clearly defines how incident response will be conducted in Washington State, identifies a specific employee from both WSDOT and WSP responsible for each program, and sets program performance measures.

Having this coordinated policy has elevated the importance of collaboration, as well as made each of the partners accountable for achieving a set of standard, consistent objectives. This agreement also provides an important policy to support future programs that help the TIM program. For example, the "Instant Tow" program is one of the innovative approaches used by Washington State to streamline response to freeway incidents. The Instant Tow program changed WSP's policy for rotational tow dispatch and on-scene verification before calling for tow support. With Instant Tow, agreements are established that outline required timeframes and required equipment for tow operators. It is estimated that the new program saves up to 15 minutes in tow response time. This translates into several million dollars saved in delay and wasted fuel, as well as improves the safety for responders and travelers by reducing clearance time.

3.2.2 Florida Road Ranger Program Expands Using Alternative Funding Sources

TIM business processes addressed in this case study are as follows:

- Funding for program and strategies
- Contracting and procurement processes to support programs and strategies

The Florida Road Ranger program uses private tow vendors and sponsors to deliver a freeway service patrol program throughout the state of Florida. The Road Ranger program includes the participation of Florida Department of Transportation (FDOT), Florida Highway Patrol (FHP), private service patrol providers, and private sponsors. The Road Ranger program is coordinated

through the FDOT Central Office and operated by the FDOT districts and the Florida Turnpike Enterprise. The program began in 2000 and at that time was completely funded by the State of Florida. Because of budget cuts, FDOT was forced to look for funding or consider reducing the hours and miles of service covered by the Road Ranger program. As a result, FDOT successfully established a sponsorship program to provide supplemental funding to the Road Ranger program through corporate sponsorship. This marked a significant change at FDOT but one that made financial sense in terms of being able to sustain and expand this important incident response program. With the additional sustainable funding from outside sources, the Road Ranger program was able to grow from a local program that was only offered in a few districts into a statewide program with deployments in every district.

Chapter 4. Work Zones

4.1 Work Zone Business Processes

Work zones are defined as any construction activities that result in physical changes to the highway environment, such as reductions in the number or width of travel lanes, lane shifts, lane diversions, and temporary road closures.[6] Work zones will often reduce the capacity or flow of the roadway because of lane closures, work activity, or ingress and egress of construction vehicles, and they can experience higher crash rates. Managing traffic in work zones (see Figure 2) is necessary to minimize delays and maintain access to and around the site, ensure the safety of motorists and workers, and ensure that the work is completed effectively and as quickly as possible.

Figure 2. Photo. Example of work zone management activities.
(Source: Michigan Department of Transportation)

Work zone management strategies are often complex and can change frequently based on varied circumstances such as the space needed for work operations, funding, weather, and the roles of the various agencies involved. Work zones can present challenges for the larger transportation network in terms of their effects on alternate routes, transit operations on routes with a work zone, or multiple concurrent events in the work zone area or corridor.

Work zones can last for several months or a few days, depending on the construction or maintenance activity. Long-term work zones, such as for major reconstruction projects, provide an opportunity for improved coordination among affected agency partners, more lead-in time for planning, and typically result in more regular communications among partners about work zone changes through construction partnering meetings. Furthermore, there are opportunities for more sustained motorist awareness and education campaigns for those longer-term work zone activities, although day-to-day changes in work zones still require specific onsite mitigation measures and motorist safety messages. Those activities with a limited duration impact might not have the same level of advanced coordination among affected partners or the same level of motorist information about the work zone or restrictions.

[6] Second Strategic Highway Research Program (SHRP2). 2011. *Integrating Business Processes to Improve Travel Time Reliability*. SHRP2 Report S2-L01-RR-1. Available at http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2_S2-L01-RR-1.pdf. Prepared by Kimley-Horn and Associates, Inc. in association with PB Consult. Prepared for Transportation Research Board, Second Strategic Highway Research Program, Washington D.C.

Business processes affect work zones at every stage—from initial considerations during the project development and planning stage, to the transportation management plan (TMP) developed during design, procurement and contracting processes, as well as during work zone implementation and active work zone activities.

The following are business processes for work zones:

- Contracting strategies to enable effective and efficient implementation
- Planning processes
- Coordination involving multiple divisions or groups
- Program plan and review processes
- Performance measures, metrics, and data informing practices and procedures
- Documented procedures, including planning, implementation, and conflict resolution
- Management policies

The Work Zone Safety and Mobility Rule (69 Federal Register 5462) provides provisions and guidance for states to address work zone safety and mobility at the policy level and throughout the planning, design, and implementation process. Agencies develop their respective work zone policies and guidance based on this rule. It also requires agencies to conduct a process review, at least every 2 years, with the goal of assessing the effectiveness of its work zone program and the effect on safety and mobility of work zones. The intent of the process review is to improve work zone processes, procedures, and training through a multidisciplinary review, input, and analysis. This review provides an opportunity to examine key business processes associated with the various stages of work zone planning, implementation, and evaluation. Outcomes of work zone performance and safety assessments can help to identify important considerations that could result in improved coordination and communication processes, contractor requirements, and updates to agency processes or policy.

The following are some guiding questions that can be used to identify issues and potential action items to improve work zone business processes. These questions, based on the work zone business process framework and work zone process review, can apply to several partners involved in work zone planning, implementation, coordination, and evaluation:

- Are the project significance and needs known and considered throughout the project development process?
- Are the user costs considered during the decision-making process?
- Are procedures in place to use innovative contracting strategies to address work zone needs? Are there certain projects (large/complex) that warrant extra consideration?
- Are contractor requirements and agency work zone policies aligned?
- Are TMPs developed, and do they provide strategic support during the project development process?
- How are work zone safety and mobility performance measures tracked and incorporated into process improvements?
- How are multiple projects coordinated to achieve work zone management objectives? If so, does this process include methods for addressing conflicts?

- Is there a process for developing and distributing training for work zone management?
- Is there a formalized process for succession planning and cross-training for work zone management within the agency?
- Are there established processes for coordination among divisions and/or offices within the agency (for example, design and traffic, construction, transportation management center) with respect to work zone management? Are the right staff involved at the right stage?
- How is the work zone management policy implemented and evaluated throughout the agency?

An example of a change in business process to help improve work zone management would be to ensure that changes in work zone configuration are communicated to all parties involved, rather than just those onsite. Staff, such as operations, can help disseminate information regarding work zones and manage roadway capacity. Failure to inform all parties of changes would hinder effective roadway management.

Another example of a business process is to consider managing work zone(s) on a regional scale at the planning stage, especially in identifying possible conflicts with concurrent work zones nearby (such as on parallel routes and modes). Transportation Systems Management and Operations (TSMO) strategies could also be used on other corridors, to help facilitate any additional traffic flow that may divert to avoid the work zone. Taking a holistic view and coordinating regionally would help bring about the most effective management.

Table 3 outlines potential business process challenges for various elements of work zone management. These challenges can be identified during work zone planning and operational discussions regarding potential limitations or issues that can be addressed through improving the corresponding business processes.

Table 3. Work zone business process challenges.

Work Zone Program Elements	Work Zone Potential Business Processes Challenges
Planning	• Work zone needs, issues, and constraints are not identified early in the project development process. • Project cost estimates and budget do not include (adequate) funding for traffic management. • Affected partners or agencies are not involved in work zone planning or TMP development. • The established work zone policy does not adequately specify requirements for work zone plans and/or TMPs. • Work zone planning and design do not involve staff from operations to identify potential operational issues or modifications to operational strategies as a result of the work zone. • No standard process is used for modeling potential effects of large-scale or long-term work zones. • Potential concurrent events in the work zone area (such as a recurring special event or other work zones nearby) are not adequately addressed in the early planning stages. • Adoption of innovations or changes is hindered because no established process is used for evaluating new devices, technologies, or processes that could reduce work zone duration or impacts.

Table 3. Work zone business process challenges. (continued)

Work Zone Program Elements	Work Zone Potential Business Processes Challenges
Contracting, Procurement, and Contract Administration	• Selected project delivery method does not adequately capture requirements for work zones. • Innovative or alternative contracting methods are not routinely considered or are only reserved for major projects. • Safety and mobility metrics are not clearly identified in the contractor requirements. • Schedule incentives in the contractor requirements do not adequately address safety and mobility requirements. • Lack of knowledge of options available to the agency may limit different project delivery methods and their potential impacts on work zones. • Training may be inadequate for contracting staff on the different delivery performance-based methods and the relationship to work zone requirements or contract administration.
Implementation and Monitoring	• Current processes do not adequately involve or inform affected agency groups, such as operations. • Processes for notifying other affected agencies of work zones or changes in work zones are not in place or are not consistent. • No policy exists that enables off-peak work hours for contractors or maintenance staff to limit disruptions to travel lanes during peak hours. • No process or technologies are available to update motorist information systems as work zone configurations change. • Established processes and procedures do not adequately address work zone incident management or contingency planning (for a conflicting event). • Work zone performance measures are not established, or no process exists for collecting data and assessing the measures. • Regular communications about work zone performance are not consistent during project review meetings.

4.2 Work Zone Business Process Case Studies

4.2.1 Work Zone Traffic Control Modeling Provides Valuable Insight to Construction Staging and Scheduling in Michigan

Work zone business processes addressed in this case study are as follows:

- Planning processes
- Coordination involving multiple divisions or groups

Michigan Department of Transportation (MDOT) has established processes for using modeling to evaluate the impacts of upcoming work zones and to develop work zone traffic control plan alternatives. Traditionally, long- and short-range planning activities and project-specific work zone planning functions do not intersect; however, in this case, some innovative analysis from the MDOT Planning Division was able to provide valuable input to the group implementing a significant project work zone on Interstate 75 (I-75) through metropolitan Detroit.

MDOT was able to leverage an existing model to analyze the potential impacts of the I-75 Ambassador Bridge Gateway Project to develop network microsimulation models years before construction started. The model was originally developed as a tool for helping facilitate MDOT project funding decisions for southeast Michigan. MDOT Metro Region Planning repurposed the model and applied it to work zone modeling of the I-75 Ambassador Bridge Gateway Project. This marked the first time that network microsimulation had been used in an operations analysis, as opposed to planning applications. The model also had to consider numerous planned closures of I-75 and surrounding roads both because of the I-75 Ambassador Bridge Gateway Project and other planned construction projects.

Using this tool, MDOT Region Construction and Engineering staff were able to see the work zone's influence on the surrounding network and see how different closure and traffic control scenarios would affect mobility on other corridors. As a result, the work zone mobility plan was developed considering impacts beyond the work zone. Model outputs were also used to inform the public outreach and involvement strategy, traffic incident management (TIM) planning, and traveler information program. This change in business processes brought together groups that did not typically collaborate on work zone planning and implementation. It also provided MDOT with delay measures based on project design and construction staging, as well as informed operation processes for other corridors affected by the work zone.

4.2.2 Maryland Work Zone Performance Management Program Uses New Data Sources to Monitor and Analyze Work Zone Impacts

Work zone business processes addressed in this case study are as follows:

- Coordination involving multiple divisions and groups
- Program plan and review processes
- Performance measures, metrics, and data informing practices and procedures

The Maryland State Highway Authority (MDSHA) wanted to use probe data already integrated into the Regional Integrated Transportation Information System (RITIS) to help measure work zone performance, as well as to improve work zone planning and management. To reach this goal, they contracted with the University of Maryland Center for Advanced Transportation Technology to develop a real-time performance monitoring tool specifically for work zones. This project would also help the MDSHA assess the traffic impacts of upcoming projects.

One of the main outcomes of the project was a real-time performance dashboard that computes mobility performance measures for active work zones from RITIS probe data and displays it on dashboard in the MDSHA website. The RITIS data include information from fixed sensors and a third-party probe data provider. Computed performance measures included mobility measures such as delay, congestion, and queue length, and programmatic performance measures, such as number of days when queuing occurred, average queue during and length, and vehicle/hours of delay.

Chapter 5. Planned Special Events

5.1 Planned Special Events Business Processes

Planned special events (PSEs) can bring rapid fluctuations in roadway demand from what is typically seen in an area; therefore, it can be a challenge when an agency is seeking to maintain or improve travel-time reliability. PSEs can include recurring events, such as seasonal sporting events or concerts, or annual events such as marathons or parades. They can also be one-time specific events, such as political conventions or the Super Bowl. In all cases, PSEs cause areas to experience greater-than-normal traffic flows in and out of the area, potentially during a compressed timeframe. They are often accompanied by lane or road closures, detours, and parking overflow, all of which need to be considered to manage traffic to and from the event and reduce its impacts on local traffic and travel.

Successfully executing PSE traffic management requires extensive planning and coordination in addition to actual day-of execution. Preplanning activities may include multiagency and multijurisdictional coordination for operations involving police and emergency services or transit availability. Preplanning may also include plans to disseminate traveler information through the media or other outlets to inform people about upcoming changes to traffic flow (as seen in Figure 3). Post-event debriefings can provide valuable lessons learned to incorporate into future PSE strategies. For those recurring events, such as those at fixed venues that occur on a fairly regular schedule (for example, sporting events at arenas and annual parades), event planning and day-of-event activities might become somewhat routine. Operational partners will some historical experience and established roles and relationships and “lessons learned” are typically applied from past events at that location.

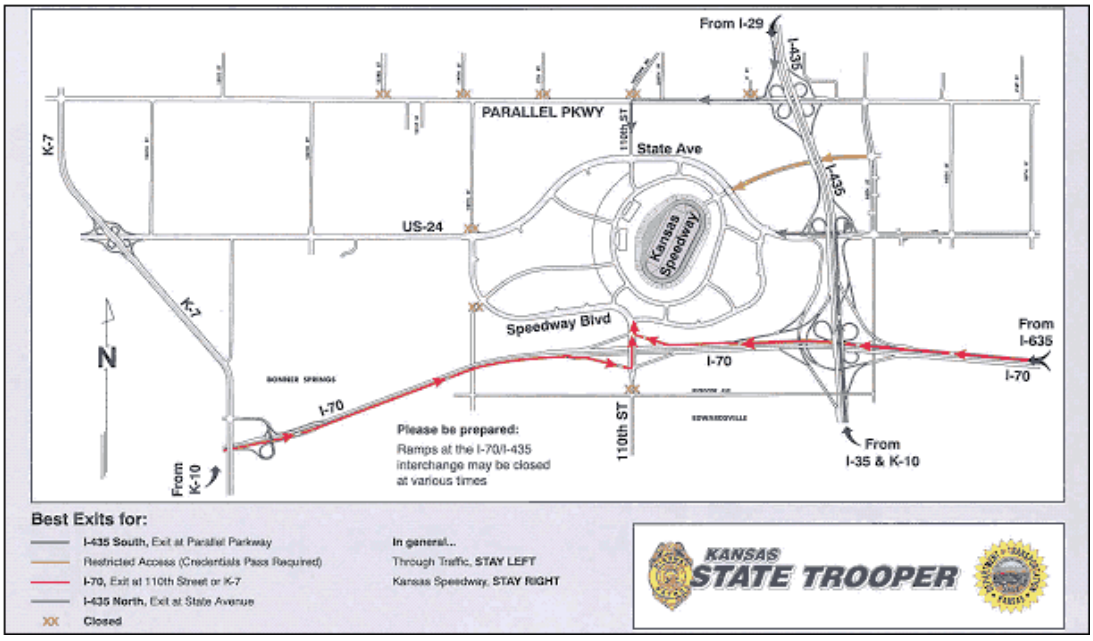


Figure 3. Map. Example of planned special event information.
(Source: Kansas Department of Transportation)

A unique kind of special event is a national special security event (NSSE), which is designated by the Secretary of Homeland Security and led by the Secret Service. NSSEs are often characterized by the presence of certain factors, such as anticipated attendance by U.S. officials and foreign dignitaries, and event size and significance.[7] In the cases of an NSSE, the Secret Service coordinates advance planning and liaison for venue and air space security, training, communications, and security credentialing. They also coordinate and conduct liaisons with other federal, state, and local agencies, primarily law enforcement entities that are relevant for the operations. Examples of NSSEs include presidential nominating conventions, presidential inaugurations, or gatherings of many heads of state (for example, North Atlantic Treaty Organization, Group of Twenty, and Asia-Pacific Economic Cooperation).

Business processes for PSEs span each stage of the process, from early planning, coordination, and event management strategy development to day-of-event traffic management and post-event debriefings. Furthermore, these business processes span several different partners, and each partner is responsible for allocating some level of resources to plan for, manage and execute, or follow up on special event traffic management activities.

Key business processes for PSEs include the following:

- Program plan
- Budgeting
- Resource management
- Contracting and procurement for resource needs
- Informed programming and resource needs through lessons learned

The following are some guiding questions that can be used to identify business process issues and potential action items to improve business processes related to PSEs. These questions, based on the PSE business process framework, can apply to several partners involved in planning and managing special event traffic:

- Are mechanisms in place to effectively plan for special events? Do plans correspond to unique event needs?
- Do agency budgets adequately account for resource needs to support PSEs? Are effort levels and resources identified?
- Do strategies require equipment or resources from other departments, and can the needed resources be acquired?
- Is the traffic and guidance information provided to the public consistent among those entities that are disseminating the information? Is there a central resource for traveler information for PSEs? Is there a single public information officer to provide a single, coordinated message to the public?

[7] Congressional Research Service (CRS). 2009. *National Special Security Events*. CRS Report for Congress. Available at http://www.fas.org/sgp/crs/natsec/RS22754.pdf. Accessed on March 12, 2014. Prepared by Shawn Reece, Analyst in Emergency Management and Homeland Security Policy. March 24.

- Are resources within agency departments responsible for PSE-related transportation operations?
- Do partners have access to real-time operations information to better manage special events in real time?
- Do partners know other partners' roles and responsibilities? Are these roles and responsibilities documented or otherwise agreed to?
- Is formal, multiagency training for PSEs available to key partners?
- Are event metrics tracked and is performance information applied to future event planning?
- Are lessons learned captured and documented through after-action reports and/or post-event debriefings and used to modify or improve traffic management strategies for future events?

Most business process issues affect pre- and post-PSE stages, where stakeholder involvement and up-front planning and strategy development activities occur. Limited or fragmented processes in the early stages of planning can impact day-of operational activities. Potential risks in PSE planning include lack of involvement of the right stakeholders in the event planning process or not providing partners with critical information to support their resource allocation for event traffic management. Another potential risk is having multiple sources of traveler information without a clear plan for consistent messaging disseminated by the media, transportation agencies, or event venues or promoters. Important business process considerations for PSEs include processes for coordination and agreements, preparing clear plans and procedures (including contingencies), and identifying and allocating adequate agency funds for needed equipment and resources. Documenting and applying lessons learned to future events is also an important business process consideration.

Table 4 outlines potential business process challenges for different stages of PSE traffic management. These challenges can be examined during the course of planning for PSEs or after-action reviews to identify potential limitations or issues that can be addressed through improving the corresponding business processes.

Table 4. Planned special event business process challenges.

PSE Elements	PSE Potential Business Processes Challenges
Preplanning	• Planning for Planned Special Events (PSEs) does not include all key partners. • Roles and responsibilities are not documented and distributed to all partners involved in PSE traffic management. • Specific resource, staff, or equipment needed to support a PSE traffic management strategy is not identified or included within agency budgets. • Appropriate buy-in from agency managers is not received for required resources to support event traffic management strategies. • Impacts (such as work zones) on event route corridors or event adjacent corridors are not forecasted or factored into event traffic management strategies. • A consistent motorist information strategy is not developed and shared with all partners. • Cost recovery strategies are not discussed or explored to offset agency resource requirements.
Event Strategy Implementation (Event Management)	• Roles and responsibilities that were not communicated to all partners lead to miscommunications in the field. • Lack of consistent or centralized motorist information messages provides conflicting information to travelers. • Local traffic is impacted as a result of event traffic ingress and egress. • Partners lacking access to real-time information are not able to effectively respond to traffic needs. • Contingency plans were not developed to account for changes in operations as a result of an incident or other unforeseen effects on event routes. • Traffic incident management (TIM) plans were not developed for specific PSE phases.
Post-Event Debriefing	• Real-time performance information during event ingress and egress was not collected and is not available for post-event analysis. • Key partners were not part of a formal post-event debriefing. • Lessons learned to incorporate into future events are not captured or documented. • Costs for resources and equipment are not tracked and/or documented to be able to better budget resources for future events exists.

5.2 Planned Special Event Business Process Case Studies

5.2.1 Kansas Speedway Special-Event Traffic Management Planning Reduces Patrol Resource Requirements for On-Scene Traffic Management

PSE business processes addressed in this case study are as follows:

- Planning and program plan
- Resource management
- Lessons learned to inform programing and resource needs

In 2001, the Kansas Speedway opened for its first major NASCAR race. With attendance exceeding 110,000 people, the event set a record as the largest single-day sporting event in the history of Kansas. Attendance has continued to grow and now exceeds 135,000 for most major races. The traffic control strategies to handle these major events were the result of years of planning between the Kansas Speedway, Kansas Highway Patrol (KHP), Kansas Department of Transportation (KDOT), and the Kansas City Police Department.

By collaborating on improved traffic management and operations processes, KHP and KDOT in partnership with local agencies, were able to implement several operations and coordination improvements that minimized delays during traffic ingress and egress on race days. Both KHP and KDOT have access to cameras to monitor traffic approaching the race and leaving the parking lots. Local agencies were involved in the planning and are part of a real-time communications strategy on event days to share information through the Web Emergency Operations Center.

By developing coordinated plans and implementing connectivity among key agencies, traffic control plans have resulted in reducing the number of KHP troopers required to monitor traffic in the field (from 25 to 14), a significant cost and resource allocation benefit to the KHP.

5.2.2 Special Event Cost Management Strategy Results in Improved Cost Tracking and Asset Allocation in Los Angeles, California

This case study addressed the following PSE business processes:

- Programming and budgeting
- Resource management
- Contracting and procurement for resource needs
- Informed program and resource needs through lessons learned

The City of Los Angeles (City) hosts several major special events each year. With a complex network of freeways, arterials, and event venues, attention to cost and resource requirements with the volume of events hosted in the region is an essential component of the City's business processes. Recognizing that the City was recovering very minimal costs from event organizers, a special task force assessed true costs to the City.

The Los Angeles Department of Transportation has a Special Event Traffic Operations Division (the Division) with assigned staff to PSEs; these staff are experienced in cost needs and cost

planning requirements. By carefully documenting event costs (including traffic control and traffic management, security, and other elements), the Division was able to justify an increase in the allocated budget to support effective event operations. Further, the Division also develops individual cost estimates for events and completes an after-action review of actual costs. Event planning costs are also are included.

Several permanent venues (such as the Dodger Stadium and Staples Center) have established contracts with the City so that reimbursement costs are handled appropriately for recurring events. This attention to budget detail helps ensure that the required resources to support special events in the City are included in annual budgeting processes.

Chapter 6. Road Weather Management

6.1 Road Weather Management Business Processes

Weather events and their impacts on roads are often viewed as sources of nonrecurring congestion that can affect the safety, productivity, and reliability of roadways. Inclement weather (seen in Figure 4), can negatively affect driver behavior and vehicle and roadway performance, and these can increase risks of crashes, cause vehicle delay because of reduced speeds, reduce roadway capacity, or result in roadway closures. Weather effects are not constrained by artificial boundaries (jurisdictions), and they can occur on all types of roadways, including both urban and rural roads. Weather effects also span town, county, and state borders, which pose unique challenges for managing large-scale weather events like snow, floods, wind, fog, and heavy rain.

Figure 4. Photo. Example of weather management.
(Source: Virginia Department of Transportation)

Effective road weather management includes multistate coordination and complex cooperation and partnerships between traffic operations, maintenance units, and public safety departments. Strategies for road weather management include advisory, control, and treatment strategies.[8]

Advisory strategies provide advance notice and up-to-date information about roadway conditions to transportation managers and travelers so that management and traveling can be planned accordingly. Control strategies regulate roadway capacity and traffic flow by reducing

[8] Federal Highway Administration (FHWA). 2014. *What are the Benefits of Using Road Weather Management Strategies?* Available at http://ops.fhwa.dot.gov/weather/q2_benefits.htm. Accessed March 12, 2014. U.S. Department of transportation, Federal Highway Administration, Office of Operations.

vehicle speed and volume. Treatment strategies minimize or eliminate weather impacts, such as applying sand or salt to icy roads to improve traction.

All three strategies will involve business processes to effectively implement and manage roadways in inclement weather. Moreover, business processes would address management activities and operational strategies before the weather event (during evacuations), during the event (treatment), and following the event (when returning to "normal" as soon as possible following the weather-based disruptions).

Often, road weather management is largely the responsibility of maintenance units, because they typically have access to real-time information from road weather sensors, are responsible for the equipment used in weather response, and have staff resources who are trained in responding to road weather events. Operations staff, such as those at a Transportation Management Center, also have a key role in monitoring road conditions. They issue notifications through traveler information systems, implement traffic control strategies, or directly coordinate with or request support from other entities during a road weather event. Large-scale events will likely involve public safety and law enforcement, and partner transportation agencies (within a region or across state lines), as well as the media to help broadcast alerts and warnings to the public.

Key business processes for road weather management are as follows:

- Program plan
- Funding and resource needs identified as part of program budget
- Defined roles and responsibilities
- Performance outcomes informing program needs
- Framework or agreements for multiagency coordination

Several strategies and processes within road weather management leverage similar relationships and response coordination for traffic incidents or work zones. Modifying or changing business processes for road weather management will typically extend to multiple groups or partner agencies to be effective.

The following are guiding questions that can be used to identify business process issues related to road weather management:

- Is specific funding identified for agency road weather management programs?
- How are emergency funds allocated for responding to sustained or significant annual weather events?
- Are processes and assets scalable to address needs when complexity and scale of response increases?
- Is there a strategic plan for road weather management within the agency?
- How are Transportation Systems Management and Operations (TSMO)-related technologies and centers kept operational during major weather events, including back-up plans and capabilities?

- Do procurement or contracting processes support acquiring new equipment or enhancing existing equipment and resources for road weather management?
- How are multiagency partners engaged in the planning for road weather response strategies? Are these strategies and partnerships documented or formalized in an agreement?
- Are lines of communication established within the agency for large-scale responses to road weather events? Are similar lines of communication with external partners involved in the response?
- Can agencies actively influence traffic and travel behavior—via TSMO strategies and supporting technologies—before, during, and immediately following a road weather event?
- Are processes in place to share real-time weather data with operations staff and divisions?
- Do staff have resources, such as decision support tools, to implement specific responses to different weather events?
- Are road weather management performance metrics incorporated into future planning needs, including staff resource needs?
- Are training opportunities for road weather management available to agency or partner staff?
- Are processes available to integrate road weather management into broader corridor operations strategies and procedures?

Examples of where failed business processes lead to ineffective road weather management includes situations where information regarding weather management strategies, such as road closures or detours, is limited or not shared between states. This can result in some travelers not being aware of a closed road and the creation of extensive traffic delays. Similarly, availability and sharing of data within and between agencies are imperative for effective roadway management (for example, between traffic operations center and maintenance unit or between state departments of transportation).

Table 5 outlines potential business process challenges for various stages of road weather management. These challenges can be examined during the course of road weather strategy planning or weather event debriefings to identify potential limitations or issues that can be addressed through improving the corresponding business processes.

Table 5. Road weather management business process challenges.

Road Weather Management Elements	Road Weather Management Potential Business Processes Challenges
Program Planning	• A road weather management plan (or similar strategy) is not in place or does not fully address activities before, during, and immediately following a weather event. • Roles and responsibilities are not documented or distributed to all entities involved in road weather management. • Multiagency road weather coordination planning and training are not routinely conducted or updated based on lessons learned. • Annual budgets are insufficient for unplanned or extreme weather seasons. • No process exists for adequately maintaining (including "hardening") the equipment so it can remain operational during a weather event or for replacing equipment essential to road weather management. • Annual budgeting processes do not capture the full range of staff or contractor resources required. • Planning for enhancing the road weather program over time is limited. • Coordination between operations and maintenance staff to clearly define roles and responsibilities is minimal.
Strategy Implementation	• Communications among multiple partners involved in road weather response are neither consistent nor do they have clear lines of authority. • Adequate supplies of needed road weather treatments are not available because of budget shortfalls or unexpected delays. • Lack of a communication plan leads to conflicting information being provided to travelers through multiple channels (such as agencies and media). • Contingency plans are not in place to address multiple impacts of weather events. • Real-time weather data are not available to all divisions or groups that need it for their operations and response decision-making. • Decision are made ad-hoc with limited scenario planning, training, or decision support capabilities.
Post-Event Documentation and Debriefings	• No consistent procedure for multiagency debriefings following significant weather event response is available. • Resources used are not well documented or accounted for, which limits lessons learned from being applied to future weather event planning. • Statistics and performance metrics are not captured to be able to better inform resource needs or changes to strategies for future weather events.

6.2 Road Weather Business Process Case Studies

6.2.1 Improved Coordination on I-80 Provides More Advanced Notice to Travelers and Freight Movers of Winter Closures in Nevada and California

Road weather management business processes addressed in this case study are as follows:

- Defined roles and responsibilities
- Framework or agreements for multiagency coordination

Managing traffic on Interstate 80 (I-80) during winter conditions—and, in particular, during "traffic holds" at the California/Nevada state line—has been the basis of several key planning strategies between the Nevada Department of Transportation (NDOT) and California Department of Transportation (Caltrans), as well as law enforcement from both states.

For Nevada, the need to inform westbound travelers (particularly freight travelers in winter) has been the impetus for NDOT installing traveler information infrastructure (including dynamic message signs, warning beacons, and highway advisory radio) in advance of key decision points along westbound I-80 to allow travelers to choose an alternate route. Freight drivers can either decide to find allowable parking at suitable off-highway facilities further east on I-80 or use alternate routes to reach their westbound destinations. Multistate coordination with Utah and Wyoming means that significant traffic holds lasting several hours will initiate notifications as far east as Wyoming.

During winter months, Caltrans opens its Winter Operations Center in Kingvale so that resources can be based near the I-80 corridor to better respond to weather-related conditions and incidents during winter. Caltrans and NDOT also have established agreements and policies for traffic holds at the state line when winter weather makes it unsafe for freight to travel over the mountain pass. Winter operations needs determine the staff resource requirements for both agencies. Caltrans uses temporary employees to help with chain requirements on I-80 during the winter driving season. Historical data from prior driving seasons are used to estimate resource needs (staff and funding), and Caltrans budgets annually for staff hours and housing at the Kingvale Winter Operations Center.

6.2.2 Maintenance Decision Support System Helps Winter Maintenance Budget in Indiana

Road weather management business processes addressed in this case study are as follows:

- Funding and resource needs identified as part of program budget
- Performance outcomes informing program needs

The Indiana Department of Transportation (INDOT) uses a maintenance decision support system (MDSS) to integrate relevant weather forecasts, winter maintenance rules of practice, and maintenance resource data to recommend appropriate road treatment strategies during winter weather. INDOT underwent program pilot testing in 2002, as part of a pooled study with other states (North and South Dakota, Minnesota, and Iowa) using a federal prototype MDSS. INDOT implemented the program statewide in 2008 and 2009, which required significant changes in INDOT's winter maintenance procedures and the mindset of employees.

An important part of the MDSS program is the outreach plan. INDOT developed and provided training to winter maintenance personnel throughout the state using the MDSS. INDOT also developed and implemented change management strategies to understand how the program will affect a large organization and communicated the reasons for the change throughout the organization to gain early acceptance of MDSS at all levels. Implementing the MDSS has led to significant fiscal and resource benefits for INDOT, including savings of more than $12 million from reducing salt use by more than 228,000 tons (40.9 percent) and close to $1.4 million by reducing overtime compensation by 58,000 hours (27.5 percent).

Chapter 7. Traffic Management

7.1 Traffic Management Business Processes

Traffic management encompasses several strategies often focused on in urban areas. The freeway system (and other limited-access facilities) is the backbone of a regional transportation network, providing connectivity to other freeways as well as arterial systems. Many agencies across the United States have implemented some level of traffic management and operations system, ranging from basic freeway and traffic monitoring capabilities to 24/7 traffic management centers, ramp management, active traffic management systems (shown in Figure 5), or integrated corridor management systems. The focus of this chapter is on freeway traffic management.

Figure 5. Photo. Example of freeway active traffic management.
(Source: Washington State Department of Transportation)

Similar to the other strategies previously discussed, freeways and freeway operations pose several challenges where effective planning and procurement processes ensure viability of equipment and system investments. The inability to replace or update equipment and systems could limit an agency's ability to implement more responsive strategies, such as active traffic management or integrated corridor management. Staff, whether agency or contracted, also need the training, expertise, and authority to be able to implement more demand-responsive strategies based on network conditions. The absence of a comprehensive operations plan or strategic plan represents key business processes that could hinder the overall effectiveness of a freeway operations program.

Within the full range of traffic management, business processes have a few common denominators: equipment and infrastructure in the field to monitor and control traffic; integrated systems to facilitate monitoring and control; and staff resources to monitor the network and implement strategies. In addition, operational policies, such as ramp management (coordinating policy and operations with adjacent arterial corridors), and traffic incident

management (such as quick clearance practices) can also influence freeway and traffic management and operations.

The supporting business processes also vary widely, and range from strategic planning to coordinating among partners for operations and effective equipment procurement and lifecycle management practices. As such, business processes will be somewhat unique to each agency or region.

Key business processes for traffic management include the following:

- Program plan and priorities
- Budget and programming to support program needs
- Program alignment to agency and regional transportation mission, goals, and objectives
- Coordination among program planning to other key planning activities (such as a long-range plan)
- Process to integrate regional- and network-based operations strategies (such as active traffic management and integrated corridor management)
- Performance outcomes to influence program plan and programming

The following are guiding questions that can be used to identify business process issues and potential action items related to traffic management business processes:

- Is a formal and collaborative process available to support traffic management system planning, programming, or budgeting?
- Are priorities established for traffic management, and are these priorities reviewed and updated over time?
- Is there alignment between agency mission, goals, and objectives, and traffic management goals, objectives, and priorities?
- Are goals and objectives for traffic management coordinated and supported by a performance monitoring program, including the establishment of performance measures derived from outcome objectives?
- Do traffic management priorities reflect immediate needs and longer term or regional transportation objectives?
- Are there corridor-specific traffic management processes or priorities established, considering unique corridor characteristics?
- Do the needs of operations programs, such as traffic incident management, road weather management, planned special event management, or work zone management, provide input to traffic management activities or strategies?
- Are traffic management priorities established using a network-based approach (such as integrated corridor management)?

- Is there institutional initiative or support to advance new Transportation Systems Management and Operations (TSMO) strategies and approaches in your traffic management program?
- How integral is life-cycle management to the traffic management program? Are needs for longer-term systems operations or expanded TSMO strategies able to integrate into formal planning and programming processes?

Traffic operations are typically handled by one agency in a region, although in some areas there could be multiple traffic and freeway operators (such as areas with tollways or turnpikes operated by entities other than the state's DOT). However, freeways represent a significant part of most regional transportation systems, so operations and management are most effective when they consider the freeways interactions with other modes and systems, such as transit and arterials. Examples of some gaps in business processes that impact freeway management and operations include lack of coordination with other transportation agencies, limited strategic planning for system operations or future system expansions, firewalls or stovepipes within organizations that limit effective coordination across multiple divisions and departments, and reluctance to examine new TSMO strategies to elevate the current level of freeway operations.

Table 6 identifies potential business process challenges at various stages of a traffic management program. These challenges can be examined as part of program reviews or strategic planning discussions to identify potential limitations or issues that can be addressed through improving the corresponding business processes.

Table 6. Traffic management business process challenges.

Traffic Management Program Elements	Traffic Management Potential Business Processes Challenges
Planning and Programming	• No short-term or long-range strategic plan exists for the traffic management program. • Traffic management priorities are not developed collaboratively with key partners or with a network perspective. • Budget planning for traffic management enhancements does not factor in new strategies or approaches. • Traffic management system life-cycles and asset management needs are not adequately addressed in agency budgets. • Mainstreaming traffic management capabilities into capital programming (such as for traditional capacity enhancements or rehabilitation projects) is not always considered. • Coordination between agency planning processes and operations program priorities or activities is limited. • Agency programming cycles and planning horizons do not provide enough flexibility for near-term traffic management initiatives or needs.

Table 6. Traffic management business process challenges. (continued)

Traffic Management Program Elements	Traffic Management Potential Business Processes Challenges
System Operations	• Traffic management processes have limited coordination with other partner operating processes (for example, law enforcement and arterial management agencies). • Operations are largely static or by time of day and are not always able to respond to actual traffic conditions. • Operations strategies are not scalable. • Traffic management strategies do not incorporate decision-support tools or system performance data or analysis. • Coordination among centers or systems in a region for traffic management is limited, particularly in a real-time context. • Operational gaps are not addressed as part of the traffic management program, leading to business-as-usual operations approaches. • Policy constraints limit implementation of more active traffic management strategies. • Staff capabilities or skill sets are not aligned with traffic management performance needs. • Training in advanced TSMO strategies for freeway traffic management is limited or unavailable. • Outcome objectives have not been developed. • Few or no performance measures—based on objectives—have been established and adopted for freeway operations.
Asset Management	• A preventive maintenance program is nonexistent or is not adequate to address reliability of traffic management assets. • Priorities compete within the agency for maintenance resources. • System maintenance, repair data, and device performance trends are not routinely used to inform budgeting processes. • Maintenance and asset management responsibilities are distributed among multiple groups or divisions. • Coordination between freeway operations staff and maintenance staff is limited. • Processes are not in place to accurately track and analyze device and equipment performance, which could provide valuable inputs to budgeting and life-cycle planning.
Expansion and Enhancement	• Strategic planning for system expansion or future needs is limited. • New strategies are not easily integrated into current freeway operations and management program. • Viable funding sources are not in place to address operational needs of system expansion (such as training for new strategies).

7.2 Traffic Management Business Process Case Studies

7.2.1 Colorado Elevates TSMO as an Essential Function and Establishes New Units to be Responsive to Corridor Management Priorities

Traffic management business processes addressed in this case study include the following:

- Budget and programming to support program needs
- Program alignment to agency mission, goals, and objectives
- Coordination among program planning to other key planning activities (that is, long-range plan)
- Process to integrate region- and network-based operations strategies (that is, active traffic management, integrated corridor management)

The Colorado Department of Transportation (CDOT) has gone through a significant organizational change and recently implemented a Division of TSMO, which helps recognize and elevate TSMO to a core function within CDOT but also necessitated a close look at how to sustain and manage a TSMO division that did not have a business model internally to do so. CDOT realigned and consolidated operations within its department to be more responsive to corridor management needs and priorities; previously, these functions had been distributed across multiple divisions and regions.

One of the earliest activities of the new TSMO Division was to develop a reorganization action plan. Within this plan, CDOT identified which specific functions would now be part of the new TSMO Division (for example, Intelligent Transportation System operations, high-occupancy vehicle and high-occupancy toll maintenance, freeway courtesy patrol and heavy tow programs, fiber network operations and maintenance), as well as what changes in reporting structure would happen at the regions to allow for direct lines of reporting to the TSMO Director.

The TSMO Division also created three new units to respond to CDOT's corridor management priorities: Corridor Management, Incident Management, and Event Management. This represents a high-impact organizational change to better equip CDOT's focus on TSMO. Although this is a relatively new division at CDOT and a very recent reorganization action plan, CDOT is using outputs from this effort to identify regional and headquarters resource and staffing needs to support its TSMO objectives, inform performance measures, and streamline coordination between operations and maintenance needs. By articulating these key TSMO needs within one document, the Division can make a solid business case to CDOT for resource, budgeting, and process improvements.

7.2.2 Maryland's Coordinated Highways Action Response Team Business Plan and Business Processes Emphasize Implementation-Ready Projects to Improve Freeway Operations

The following traffic management business processes are addressed in this case study:

- Program plan and priorities
- Budget and programming to support program needs
- Program alignment to agency mission, goals, and objectives
- Coordination among program planning to other key planning activities (that is, long-range plan)
- Performance outcomes that influence planning and programming

The Maryland State Highway Administration Coordinated Highways Action Response Team (CHART) has a long history of strategic and tactical planning to guide investments in Intelligent Transportation System (ITS) and freeway operations, resource needs, and freeway incident management. CHART was among the first programs to develop a business plan that outlined key objectives, operational needs, and deployment and implementation priorities. CHART also has integrated its line-item budget needs for TSMO into the Maryland Statewide Transportation Improvement Program and the Maryland Department of Transportation Consolidated Transportation Program.

CHART derives its program, resource, budget and maintenance needs from a comprehensive process that considers key stakeholder and committee input, ITS architecture, and its ongoing performance monitoring and management program. Although most TSMO plans and programs are focused on near-term operation needs, CHART has developed a unique non-constrained deployment plan, which outlines a vision of how CHART should be operating several years into the future. This non-constrained deployment plan identifies key priorities, planning-level cost estimates, and implementation strategies and essentially provides an opportunity-based project list. As opportunities arise, such as close-out funding or federal grant funding, key opportunities can be advanced.

CHART has expanded with the support of top management at Maryland State Highway Administration in large part to the compelling business case CHART makes for the network improvements. Using the annual performance management program, CHART has demonstrated benefits in reducing incidents, reducing delay, improving incident response to freeway incidents, and improving customer service through enhanced traveler information.

Chapter 8. Checklist for Getting Started

This chapter provides some guidance to begin evaluating business processes and developing action plans to address business process improvements.

8.1 Assemble Available and Relevant Documents

- Planning documents—strategic plans, long-range plans, Transportation Systems Management and Operations (TSMO) plans, congestion management processes, transportation improvement plans, capital improvement plans, state transportation improvement plans (and the organizational entities responsible for managing those processes), and Intelligent Transportation System (ITS) architecture
- Internal organization—organizational chart, lines of communications, levels of authority
- Agency mission statement, goals, and outcome objectives
- Performance measures and data—trends, outputs, outcome measures
- Agreements, policies, and guidelines
- Project development resources—manuals, review processes, standards
- Any past reviews
- Available sources of funds (existing and future)
- Expenditures and available financial reports (relevant to TSMO program elements)

8.2 Identify Stakeholders—Who Needs to Be at the Table?

- Identification of a champion and core team of partners
- Availability of key stakeholders
- Level of authority of key stakeholders to influence process change
- Champions at management level for implementing process changes
- Appropriate external partners (for example, law enforcement, local transportation agencies, MPOs, key contractors and consultants)

8.3 Facilitate Forum for Examining Business Processes

- Workshop or series of working sessions
- Timing aligned with important agency processes, such as strategic plan update, major project planning, or other appropriate activity
- Structured discussion using appropriate capability maturity model framework

8.4 Develop Action and Strategy Plans for Improving or Enhancing Business Processes

- Key actions (for example, 'low-hanging fruit', outreach, additional research)
- Timeline for identified accomplishments
- Partners and resources needed to accomplish the tasks
- Strategy for assessing effectiveness of business process change
- Methods to monitor and track TSMO activities

Chapter 9. Available Resources to Support Business Process Improvements

The Second Strategic Highway Research Program (SHRP2), American Association of State Highway and Transportation Officials (AASHTO), Federal Highway Administration (FHWA), and other national entities have developed a suite of tools and resources to help agencies examine and improve their business processes to support improved Transportation Systems Management and Operations (TSMO). The entities described herein are available to assist state and local agencies and their partners.

9.1 AASHTO TSMO Guidance

(http://aashtoTSM&Oguidance.org/)

AASHTO created this web-based guidance to help transportation agency managers improve the performance and effectiveness of their transportation systems management and operations (TSMO) activities. This guidance is an online tool that uses self-evaluation and best practices that managers can use to identify key programs, processes, and institutional preconditions to achieve effective TSMO. The foundation of the guidance is that effective TSMO requires special technical and business processes, organizational structures, and relationships, and it guides users through an evaluation framework to identify an agency's capabilities in six key processes and institutional dimensions using a capability maturity model structure. Based on the evaluation results, the guidance suggests 'next step' action plans that will help an agency improve the levels of agency capability to develop and implement more effective TSMO.

9.2 FHWA Business Process Frameworks

FHWA developed several business process frameworks that agencies can use to assess various aspects of their operations programs. These frameworks are to be used to facilitate a group discussion focused on traffic incident management (TIM), work zones, planned special event (PSE) management, road weather management, traffic management, and traffic signal management. The frameworks were developed based on a similar structure and approach to the AASHTO TSMO guidance and the associated capability maturity model (CMM) structure. Agency self-assessment is also available, along with recommended strategies on how to improve capabilities within those operational areas.

9.3 One-Day Workshops

Building from the AASHTO and FHWA resources noted previously, FHWA's capability maturity workshop and business process workshop are aimed at facilitating a multi-perspective assessment of business process issues and gaps. It also identifies priority action items to address those gaps. A capability maturity workshop provides broader agency group discussion, with business processes as one of six dimensions that are assessed. A TSMO business process workshop focuses on business processes within specific operations areas, such as TIM, work zones, road weather management, PSEs, and freeway traffic management. A TSMO business

process workshop also introduces additional tools to discuss specific action items. These tools are described herein.

9.4 Second Strategic Highway Research Program Materials

9.4.1 SHRP2 Guidance and Case Studies (L01)

(http://www.fhwa.dot.gov/goshrp2/Solutions/Available/L06_L01_L31_L34/Organizing_for_Reliability_Tools)

SHRP2's *Integrating Business Processes to Improve Travel Time Reliability (L01)* is a guide developed to assist transportation agency managers in assessing and integrating key business processes for transportation systems operations to improve travel-time reliability. The guide also provides best practices and case studies from around the world to exemplify how agencies are using business processes at both a programmatic and institutional level to help improve traffic flow and travel-time reliability with respect to four challenging areas: TIM, work zone management, PSE management, and weather operations and management. The guide proposes a seven-step integration approach to analyze, implement, document, and institutionalize business processes to guide managers to better understand and improve their businesses processes for transportation management.

9.4.2 SHRP2 Organizing for Reliability Tools (L06)

(http://www.transportationops.org/research/institutional-architectures-improve-systems-operations-and-management)

SHRP2's *Institutional Architectures to Improve Systems Operations and Management (L06),* provides research and guidance relating to the institutional characteristics of TSMO, including culture, organizations, and staffing, resource allocation, and partnerships that facilitate effective management of nonrecurring congestion. The research evaluates current practices in systems management and operations, as well as the institutional features that are associated with the more effective programs. The research also introduces a CMM that helps agencies connect the necessary institutional changes that will increase levels of business maturity. This capability maturity model is recommended to identify strengths and weaknesses in an agency's business processes and is based on self-evaluation. The model also provides subsequent guidance for agencies to undergo changes in their institutional architecture with the goal of developing more effective TSMO programs.

9.4.3 SHRP2 Presentation Materials: "Operations in the 21st Century – Meeting Customer Needs and Expectations" (L31)

(FHWA site at http://www.fhwa.dot.gov/goshrp2/Solutions/Available/L06_L01_L31_L34/Organizing_for_Reliability_Tools; or AASHTO SHRP2 site at http://shrp2.transportation.org/Pages/Reliability.aspx)

These presentation materials help support a capability maturity model by engaging an agency's senior leadership and decision makers (for example, DOT secretary or chief executive officer, chief engineer, budget and programming director, maintenance head, and other executive staff). Two presentations are available: one for Departments of Transportation (DOTs) and one

for Metropolitan Planning Organizations (MPOs). The DOT presentation is geared towards senior managers and focuses on the value of mainstreaming operations as a core mission, business practice, and investment priority in their respective agencies. The MPO presentation is best suited for MPO officials and board members and provides information on the value of mainstreaming operations as a core component and investment priority in the regional transportation planning process.

9.4.4 SHRP2 eTool for Business Processes to Improve Travel-Time Reliability (L34)

(http://www.fhwa.dot.gov/goshrp2/Solutions/Available/L06_L01_L31_L34/Organizing_for_Reliability_Tools)

As a follow-up to the research undertaken in *Guidance and Case Studies (L01*), *eTool for Business Processes to Improve Travel-Time Reliability (L34)* was developed as an interactive eTool that transportation agencies can use to evaluate their current business processes and identify and remove barriers to implementing and maintaining improved processes to advance operations for improving travel-time reliability. The eTool is intended to help users identify business processes that will improve operations of their highway systems. It also provides examples of how to undertake the recommended business processes. The eTool can be used to succinctly capture key action items and next steps.

U.S. Department of Transportation
Federal Highway Administration
Office of Operations (HOP)
1200 New Jersey Avenue, SE
Washington, DC 20590

Office of Operations Web Site
www.ops.fhwa.dot.gov

February 2016
FHWA-HOP-16-018