Performance Management Implementation Concerns, Issues, and Challenges

Final Report

Prepared for

The National Cooperative Highway Research Program
Transportation Research Board
of
The National Academy of Sciences, Medicine, and Engineering

Prepared by

Spy Pond Partners, LLC
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Disclaimer

NCHRP Project 20-24(127)

Performance Management Implementation Concerns, Issues, Challenges

Final Report

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Executive Summary

TPM Action Plan Overview

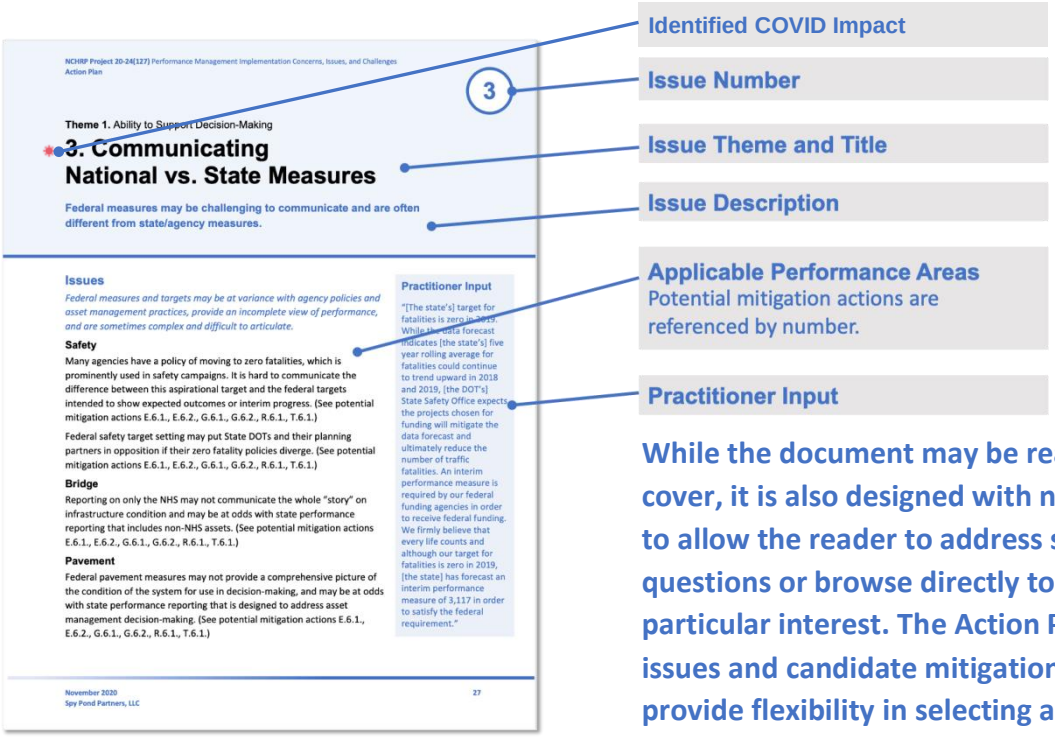
The purpose of this Transportation Performance Management (TPM) Action Plan is to inform efforts by state and regional transportation agencies to implement and improve TPM practices – and to identify opportunities to further improve these practices in the future.

The plan is organized around a set of 18 priority issues and related mitigation actions, identified through practitioner outreach efforts. Seven issues are identified as being high criticality.

Most Critical Issues	Issue Description
Limited Experience Modeling and Forecasting	Some agencies have limited experience predicting the federal measures. In some cases, agencies lack practical approaches and methods concerning how to make future predictions. While some State DOTs may have established methods to predict outcomes of programming decisions for highway safety, bridge and pavement, predictive capabilities are less mature in the other areas.
Control of Investment Decisions	States must set National Highway System (NHS) targets but in some cases, performance is driven by local decisions. Conversely, MPOs have limited control over state investments and infrastructure owned by cities, transit agencies and counties.
Communicating National vs. State Measures	Federal measures may be challenging to communicate and are often different from state/agency measures.
Coordination with Owners	Coordination with external stakeholders may be needed for setting targets. This process can be complex and require significant resources to ensure effective outcomes.
Resourcing TPM	Limited resources are available for TPM. A focus on federal reporting requirements may reduce resources otherwise devoted to state performance management programs. This challenge may be heightened where federal and state TPM data, measures, methods, or processes diverge.
Timing of Project/Program Development Timeframe	The federal targets are set for periods shorter than the typical transportation agency planning/programming cycle.
External Communication and Coordination	DOTs and transit agencies have limited incentives to share data and analyses with other stakeholders (e.g., FHWA, FTA, and MPOs) beyond what is required by regulation.

Plan Organization

The Action Plan has been developed to facilitate a rapid understanding of each issue and its associated implications, potential mitigation actions, and relative criticality. Each issue in the Action Plan presents the following information.



Identified COVID Impact

Issue Number

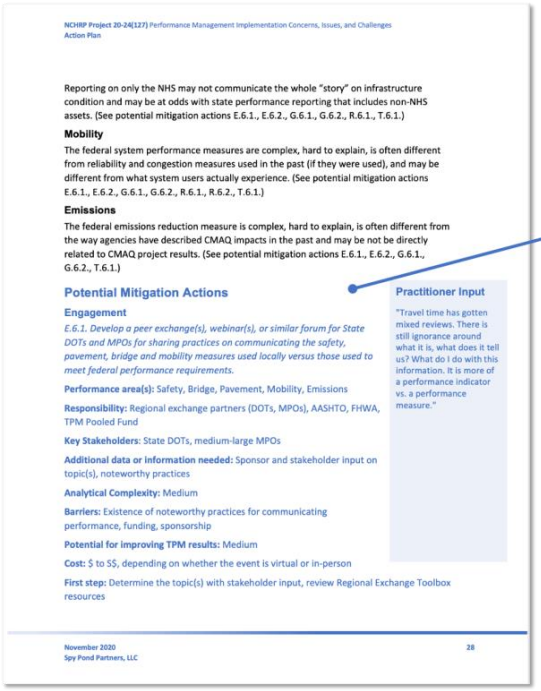
Issue Theme and Title

Issue Description

Applicable Performance Areas
Potential mitigation actions are referenced by number.

Practitioner Input

While the document may be read cover-to-cover, it is also designed with navigation aides to allow the reader to address specific questions or browse directly to topics of particular interest. The Action Plan groups issues and candidate mitigation actions to provide flexibility in selecting among issues and challenges, mitigation strategies, or performance measurement areas.

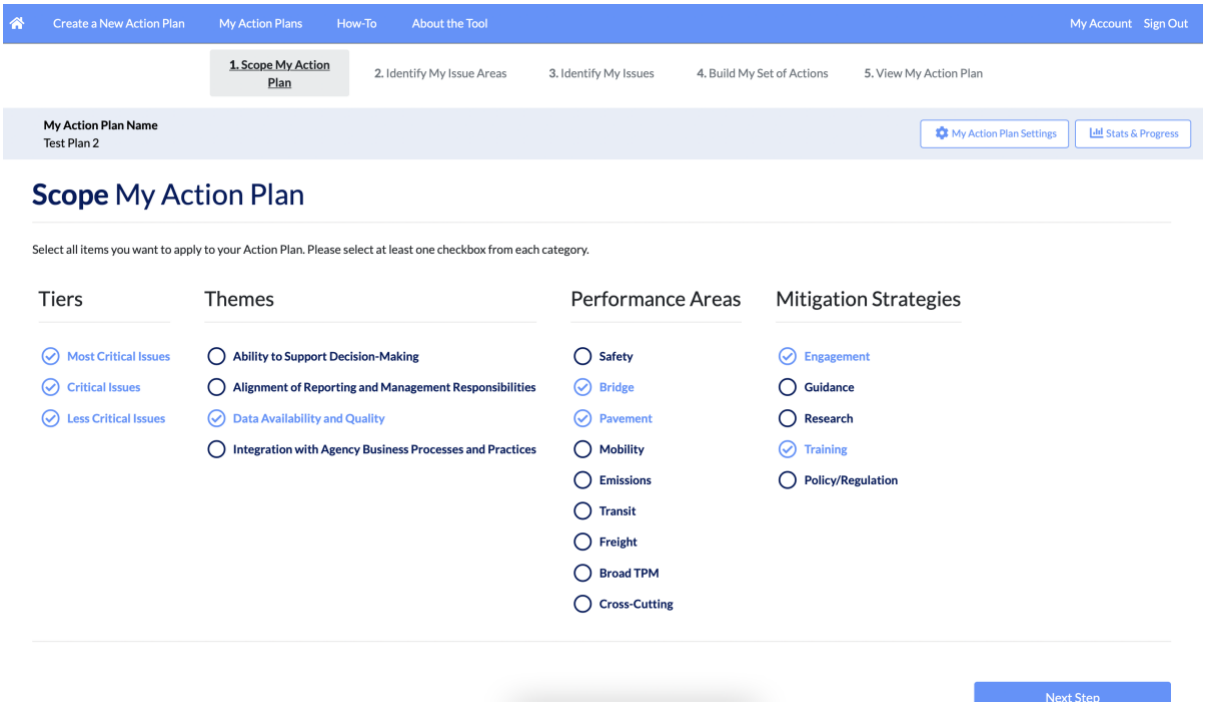


Potential Mitigation Actions
Potential mitigation actions are grouped by mitigation strategy and are numbered for reference.

Practitioners can use the Action Plan to identify issues of interest, pick out pertinent mitigation actions from a connected set of candidates, and tailor an individualized plan of action with a structure for capturing the desired outcomes, potential benefits, associated costs, responsible parties, and other factors.

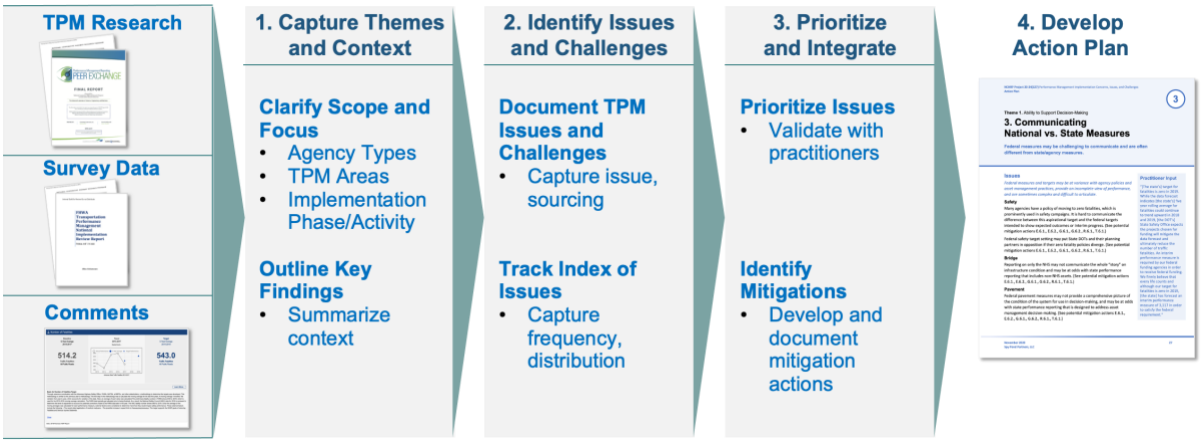
The TPM Action Planner

A linked web-based tool, the TPM Action Planner, provides practitioners with the ability to specify more detailed values to help understand the relative costs and benefits of a potential mitigation action.



The Research Approach

The Action Plan, developed through NCHRP Project 20-24(127), is built on a review of TPM practice and phased practitioner outreach.



1. Introduction

Project Overview

Background

Transportation performance management (TPM) is a well-established practice at transportation agencies across the United States. For many years, agencies have made investments in the development of performance measures, collection and management of data, and implementation of management systems to better understand and improve system performance.

After more than a decade of steady progress, transportation agencies have reached a critical moment in advancing TPM practice. Federal performance management regulations initiated by the Moving Ahead for Progress in the 21st Century Act (MAP-21) established a new paradigm of nationally-coordinated performance measurement, target setting, and reporting across a range of domains including safety, asset management, multimodal mobility and air quality, and transit. State departments of transportation (DOTs), metropolitan planning organizations (MPOs), and transit agencies have responded – meeting the challenge by prioritizing advancement in areas including data collection, measure calculation, target setting, coordination and communication, and performance-based planning.

These advances have required significant investment on the part of state DOTs and other transportation agencies. Organizations including the Federal Highway Administration (FHWA), the American Association of Transportation Officials (AASHTO), and the Transportation Research Board (TRB) have also worked extensively to assist agencies in implementation: fostering the dissemination and adoption of successful practices, promoting performance management concepts, and helping develop improved tools and approaches. Yet practitioners also recognize that performance management implementation is a process of continuous improvement and many real issues and challenges remain to be resolved.

Project Context

This document, developed through the National Cooperative Highway Research Program (NCHRP) Project 20-24(127), builds on a review of TPM practice and phased practitioner outreach to identify, synthesize, and prioritize common challenges and issues associated with TPM implementation. It presents a TPM Action Plan designed to help agencies meet these challenges; the Action Plan is described in the following sections.

Research Objectives

The objectives of NCHRP Project 20-24(127) are to document (beyond anecdotal discussions alone) concerns, issues and challenges DOTs and other government agencies have encountered in implementing federal transportation performance management (TPM) regulations in order to develop a set of related products:

1. A prioritized set of these concerns, issues and challenges.
2. A framework for assessing the level of effort of associated with related data collection and analysis efforts.
3. An action plan for transportation professionals, including AASHTO and FHWA staff, to support future improvements in transportation system performance management practices.

Project Scope and Tasks

The research is structured into the following eleven tasks:

Task 1. Kickoff Meeting. A web conference was held with the NCHRP project panel to discuss the research plan, technical approach, work schedule, and research-product review procedures. A memorandum documented the discussions and key decisions made and incorporating the meeting briefing materials.

Task 2. Information Gathering and Review. The team reviewed and assessed available published documents and agency and practitioners reports describing concerns, issues and challenges DOTs and other transportation agencies have encountered in implementing federal performance management regulations. Based on this review and assessment, the team developed a technical memorandum presenting (a) a synthesis of the findings and (b) an interview plan for agencies and staff to be contacted for follow-up information in subsequent project tasks.

Task 3. Issues and Implementation Level-of-Effort Frameworks. In this task, the team developed analysis frameworks for characterizing and presenting transportation agencies' (a) performance management implementation concerns, issues and challenges as they relate to agency business processes and specific dimensions of TPM; and (b) the level of effort necessary to address these challenges. The frameworks were developed such that they were suitable for application to agencies at various levels of TPM practice maturity and for the range of implementation activities likely to be encountered by agencies initiating and improving their TPM practices. An interim report was prepared summarizing the research findings and activities to-date.

Task 4. Agency Interviews. The team then executed the interview plan developed in Task 2, conducting face-to-face and web-based interviews. Each interview was documented in an interview summary report.

Task 5. Prioritized Issues List. Based on the preceding tasks, the team developed a descriptive list of concerns, issues and challenges DOTs and other government transportation agencies have encountered in implementing TPM conforming to current and leading standards of practice and federal performance management regulations. This list reflected the agencies' assessments of the relative importance of these issues and challenges and was organized according to the TPM Issues Framework developed in Task 3. A technical memorandum was prepared summarizing the results of this task.

Task 6. Action Plan. In this task, the team developed an integrated action plan for agencies to address priority TPM implementation challenges, including guidance on determining the implementation level of effort for TPM data collection and analysis and an ordered set of action items and recommendations for improving an agency's TPM practices. The results were summarized in an interim report.

Task 7. Establish Repeatable Update Process. In this task, the team worked directly with stakeholders to define a repeatable process for the AASHTO Committee on Performance-Based Management (CPBM) to efficiently update the analysis and results on a periodic basis, establishing a master set of issues, prioritization approach, and communications channels that would meet CPBM needs.

Task 8. Update Issues List. In this task, the team facilitated a series of working web-based meetings in order to revise the issues list with new and updated challenges, including those related to COVID-19. This effort also included updating the issue prioritization and set of mitigation efforts. A revised Action Plan and Issues List was prepared that captured these findings.

Task 9. Update Tool. The team updated the web-based tool developed under Part 1 with additional functionality to support CPBM annual review and ongoing updates necessary for identifying new issues and challenges and scoping additional mitigation actions. The updated tool was demonstrated to AASHTO CPBM.

Task 10. Support Tool Transition. In this task the team developed final process documentation linked to the tool, providing guidance on its use and addressing frequently asked questions. The documentation describes both basic user and administrative user functions, illustrated with images of the tool's screens.

Task 11. Final Report This final report for the project presents the TPM Action Plan and associated key products. Promotional material that communicates the value to stakeholders of the TPM Action Plan is also included.

Document Overview

This is the Final Report for NCHRP Project 20-24(127) — "Performance Management Implementation Concerns, Issues, and Challenges." It summarizes the objectives, scope, methodology and deliverables of the project. It also presents a TPM Action Plan that can be read as a standalone document.

- **This section (Section 1)** includes the project context, the research scope and tasks, and a summary of the Final Report organization.
- **Section 2** introduces the TPM Action Plan.
- **Section 3** presents the full TPM Action Plan developed through this project.
- **Section 4** presents next steps including TPM Action Planner stewardship and potential enhancements.
- **Appendix A** lists the acronyms and abbreviations used throughout this document
- **Appendix B** includes the TPM Action Planner User Guide and Administrative User Guide.
- **Appendix C** presents the process by which the TPM Action Plan is periodically updated by AASHTO CPBM.

2. About the Action Plan

This section describes the TPM Action Plan, including the issues and the mitigation actions, the issue prioritization approach, and the organization of the plan. The next section presents the action plan. A final section introduces a companion action planning web-based application, the TPM Action Planner that helps make it easier to navigate the plan and also includes features to augment and further customize the issues and actions.

How to Use this Action Plan

While this document may be read cover-to-cover, it is also designed with navigation aids to allow the reader to address specific questions or browse directly to topics of particular interest. This document organizes the issues and candidate mitigation actions to provide flexibility to select among issues and challenges, mitigation strategies, and performance measurement areas. Agency professionals, as well as AASHTO and FHWA staff, can identify areas of interest among the prioritized issues, investigate specific mitigation approaches, or consider a combination of these in exploring the plan. The three summary tables in Section 2 include links to facilitate navigation within the document.

There are several ways specific audiences may wish to use this resource.

- **Agency practitioners and regional planning partners** facing a TPM issue or challenge may scan the index or tables in Section 2 to identify a matching issue, and then use this document to reference the connected set of candidate mitigation actions. They may choose to prioritize the mitigation actions based on based on the anticipated cost or complexity, applicable performance area(s), or their agency's existing organizational priorities and other factors, and may work collaboratively to more fully specify the costs and potential benefits.
- **An AASHTO or TRB Committee, Subcommittee or Topic-Area Work Group** developing research statements, an event-based workshop, or an organizational or strategic plan, may refer to Table 2.3 for all candidate mitigation strategies within a particular mitigation type and prioritize among candidate mitigation actions within that type.
- **FHWA, FTA, AASHTO and other organizations** may use this document to identify prioritized issues and their associated candidate mitigation actions to prioritize capacity-building efforts to advance TPM implementation. Depending on their area(s) of expertise, staff from these agencies and organizations may use Table 2.2 to direct their efforts at resolving issues within specific performance areas or related to specific TPM processes.

TPM Action Plan Overview

The purpose of this TPM Action Plan is to inform efforts by state and regional transportation agencies to implement and improve transportation performance management practices – and to identify opportunities to further improve these practices in the future.

The plan is organized around a set of 18 priority issues and a related set of mitigation actions. Practitioners can use this Action Plan to identify issues of interest, pick out pertinent mitigation actions from a connected set of candidates, and tailor an individualized plan of action with a structure for capturing the desired outcomes, potential benefits, associated costs, responsible parties, and other factors.

TPM Issues

The 18 priority issues, grouped within four high-level themes, are shown in Table 2.1. The issues are organized into three tiers:

- Tier 1. Most Critical Issues
- Tier 2. Critical Issues
- Tier 3. Less Critical Issues

The tiers are derived from a composite criticality index, used to individually evaluate the urgency and importance of each issue.

Table 2.1 Summary of Prioritized Issues

Number	Issue	Theme	Description	Identified COVID Impact
Tier 1. Most Critical Issues				
1	**Limited Experience Modeling and Forecasting**	Ability to Support Decision-Making	Some agencies have limited experience predicting the federal measures. In some cases, agencies lack practical guidance concerning how to make future predictions. While some State DOTs have established methods to predict outcomes of programming decisions for highway safety, bridge and pavement, predictive capabilities are less mature in the other areas.	

Number	Issue	Theme	Description	Identified COVID Impact
2	**Control of Investment Decisions**	Alignment of Reporting and Management Responsibilities	States must set National Highway System (NHS) targets but in some cases performance is driven by local decisions. Conversely, MPOs must set targets but have limited control over state investments and infrastructure owned by cities, transit agencies and counties. Further, funding uncertainty is a challenge for target-setting.	
3	**Communicating National vs. State Measures**	Ability to Support Decision-Making	Federal measures may be challenging to communicate and are often different from state/agency measures.	
4	**Coordination with Owners**	Alignment of Reporting and Management Responsibilities	Coordination with external stakeholders may be needed for setting targets. This process can be complex and require significant resources to ensure effective outcomes.	
5	**Resourcing TPM**	Integration with Agency Business Processes and Practices	Limited resources are available for TPM. A focus on federal reporting requirements may reduce resources otherwise devoted to state performance management programs. This challenge may be heightened where federal and state TPM data, measures, methods, or processes diverge.	
6	**Timing of Project/Program Development Timeframe**	Integration with Agency Business Processes and Practices	The federal targets are set for periods shorter than the typical transportation agency planning/programming cycle.	
7	**External Communication and Coordination**	Integration with Agency Business Processes and Practices	DOTs and transit agencies have limited incentives to share data and analyses with other stakeholders (e.g., FHWA, FTA, and MPOs) beyond what is required by regulation.	
Tier 2. Critical Issues				

Number	Issue	Theme	Description	Identified COVID Impact
8	**New Collection Requirements**	Data Availability and Quality	Several specific data collection issues have arisen since the implementation of federal TPM requirements that present challenges to agencies.	
9	**Ability to Quantify Impacts and Outcomes**	Alignment of Reporting and Management Responsibilities	It can be difficult to quantify the impacts of a given investment in terms of the federal measures.	
10	**Suitability to Drive Investment Decisions**	Ability to Support Decision-Making	The federal measures are intended for characterizing overall conditions of the system rather than for evaluating specific investments. Agencies need to quantify additional measures to support decision-making.	
11	**Internal Communication and Coordination**	Integration with Agency Business Processes and Practices	In many cases agencies lack historical data needed to help analyze performance trends.	
12	**Alignment of State and Federal Calendars**	Integration with Agency Business Processes and Practices	Data and targets are required at different times from one another and often conflict with State calendars, disrupting the programming process.	
Tier 3. Less Critical Issues				
13	**Accommodating Incomplete Baseline and Historical Data**	Data Availability and Quality	Internal communication and coordination can be hindered by the fact that specialized expertise is often needed to support TPM, working against the concept of TPM as a cross-cutting activity.	
14	**Differences from Established Data Sets**	Data Availability and Quality	Differences between the data sets used for the federal measures and other data sets complicate efforts to use the measures and targets.	
15	**Motivation to Set Pessimistic Targets**	Alignment of Reporting and Management Responsibilities	Agencies may have incentives to set overly pessimistic targets. This may be due to limitations in data, forecasting capabilities, concerns about the measures, and the way targets are used in the regulations.	

Number	Issue	Theme	Description	Identified COVID Impact
16	**Reliance on Partners' Resources, Tools and Knowledge**	Data Availability and Quality	It may often be cost prohibitive for MPOs that wish to set their own targets to develop analytical capabilities required to support target setting. It can also be challenging for agencies to pool resources for analysis.	
17	**Reliance on Thresholds**	Ability to Support Decision-Making	Certain measures are calculated using threshold values. Small changes in how the measures are defined may have a significant impact on the calculations.	
18	**Data Availability and Quality Issues**	Data Availability and Quality	For both agency data and standard data sets, data gaps and data quality issues complicate interpretation and target setting.	

These issues span six performance management areas: safety, bridge, pavement, mobility, emissions, and transit. Federal performance reporting requirements align with these categories as shown in Table 2.2.

Table 2.1 Alignment with Federal Performance Reporting Requirements

TPM Area	Federal TPM Area	Federal TPM Measures
Safety	Highway Safety	Number of fatalities – all public roads Rate of fatalities per 100 million VMT – all public roads Number of serious injuries – all public roads Rate of serious injuries per 100 million VMT – all public roads Number of nonmotorized fatalities and nonmotorized serious injuries – all public roads
Bridge	Bridge Condition	Percentage of NHS bridges in good condition Percentage of NHS bridges in poor condition
Pavement	Pavement Condition	Percentage of pavements in good condition –- Interstate Percentage of pavements in poor condition –- Interstate Percentage of pavements in good condition – non-Interstate NHS Percentage of pavements in poor condition – non-Interstate NHS
Mobility/ System Performance	Performance of the NHS	Percentage of the person- miles traveled on the Interstate that are reliable Percentage of the person- miles traveled on the non-Interstate NHS that are reliable
	CMAQ Traffic Congestion	Annual hours of peak-hour excessive delay per capita – NHS UZA +1M/200k Population in nonattainment/maintenance areas Percent of non-single-occupancy-vehicle travel – NHS UZA +1M/200k Population in nonattainment/maintenance areas
	Freight Movement	Truck Travel Time Reliability Index – Interstate
Emissions	On-Road Mobile Source Emissions	Total emissions reduction – CMAQ funded projects in nonattainment/maintenance areas
Transit	Transit Infrastructure Condition	Revenue Vehicles that Exceed Useful Life Benchmark Non-Revenue Vehicles that Exceed Useful Life Benchmark Rail Guideway Under Performance Restriction Facilities in Marginal or Poor Condition

The performance areas primarily applicable to each issue are shown in Table 2.3. The action plan in Section 3 specifies each issue in greater detail.

Table 2.3 Issues by Performance Area

Issue	Safety	Bridge	Pavement	Mobility	Emissions	Transit
Tier 1. Most Critical Issues						
Limited Experience Modeling and Forecasting	●	●	●	●	●	●
Control of Investment Decisions	●	●	●		●	●
Communicating National vs. State Measures	●	●	●	●	●	
Coordination with Owners and Responsible Parties	●	●	●	●		●
Resourcing TPM			●	●		
Timing of Project/Program Development Timeframe	●	●	●	●	●	●
External Communication and Coordination	●	●	●	●	●	●
Tier 2. Critical Issues						
New Collection Requirements			●	●		
Ability to Quantify Impacts and Outcomes	●			●	●	
Suitability to Drive Investment Decisions	●	●	●	●	●	●
Internal Communication and Coordination	●	●	●	●	●	●
Alignment of State and Federal Calendars	●	●	●	●	●	●
Tier 3. Less Critical Issues						
Accommodating Incomplete Baseline and Historical Data			●	●	●	
Differences from Established Data Sets	●	●	●	●		
Motivation to Set Pessimistic Targets	●		●	●	●	
Reliance on Partners' Resources, Tools and Knowledge		●	●	●		
Reliance on Thresholds		●	●			●
Data Availability and Quality Issues	●	●	●	●	●	●

Candidate Actions

Candidate mitigations actions are identified for each issue in the Action Plan. Five mitigation strategies are defined: Engagement, Guidance, Research, Training, and Policy/Regulatory activities.

- **Engagement** is specified if the activity requires facilitating communication between different stakeholders, such as conducting discussions with FHWA or local agencies to improve TPM-related processes.
- **Guidance** is used for cases where the activity involves preparing supplemental or improved guidance documents.
- **Research** addresses areas where separate research work is needed to gather information, perform analysis or develop a recommendation, including for new data or software tools.
- **Training** is specified if the activity includes development of training materials.
- **Policy/Regulatory** refers to changes in regulations, generally at the federal level.

Each potential mitigation action is further specified and scoped according to elements of a level-of-effort framework. The framework identifies a set of factors to be evaluated and quantified for each potential mitigation activity to help a practitioner determine what the outcomes of a given activity might be and the level of effort involved. Table 2.4 shows the correspondence between the 18 issues and the complete set of 95 mitigation actions.

Table 2.4 Issues by Mitigation Strategies

Issue	Engagement	Guidance	Research	Training	Policy/ Regulatory
Tier 1. Most Critical Issues					
Limited Experience Modeling and Forecasting	•	•	•	•	
Control of Investment Decisions	•	•	•		•
Communicating National vs. State Measures	•	•	•	•	
Coordination with Owners and Responsible Parties	•	•	•	•	
Resourcing TPM	•	•		•	
Timing of Project/Program Development Timeframe	•		•		•
External Communication and Coordination	•	•	•	•	
Tier 2. Critical Issues					
New Collection Requirements	•	•	•		

Issue	Engagement	Guidance	Research	Training	Policy/ Regulatory
Ability to Quantify Impacts and Outcomes	•	•	•	•	
Suitability to Drive Investment Decisions	•	•	•	•	•
Internal Communication and Coordination	•	•			
Alignment of State and Federal Calendars	•	•			•
Tier 3. Less Critical Issues					
Accommodating Incomplete Baseline and Historical Data	•		•	•	
Differences from Established Data Sets	•		•	•	•
Motivation to Set Pessimistic Targets	•	•	•		•
Reliance on Partners' Resources, Tools and Knowledge	•	•	•	•	
Reliance on Thresholds			•		•
Data Availability and Quality Issues		•	•		•

The plan characterizes mitigation actions according to a framework with several features for each of the candidate mitigation actions. These features can support implementation teams in connecting their issues with candidate mitigation actions, prioritizing candidate mitigation actions and developing implementation approaches.

- **Performance area(s)** indicates which of the following performance areas are addressed: Safety, Bridge, Pavement, Mobility, Emission, and Transit. Cross-cutting issues are also indicated.
- **Responsibility** assigns the primary implementation role for the mitigation action to one or more of: State DOTs, MPOs, regional exchange partners, AASHTO, FHWA, the Federal Transit Agency (FTA) and other organizations and groups.
- **Key Stakeholders** are the interested groups whose needs the mitigation action is addressing, including one or more of: State DOTs, regional planning partners (MPOs and transit operators)
- **Additional data or information needed** are the implementation team's supplementary inputs needed to carry out the selected mitigation action, for example: data, case examples, information about existing gaps, etc.

- **Analytical Complexity** is a categorical value assigned to the expected simplicity or complexity in examining the issue or concern to develop and execute the implementation approach for the mitigation action. A Low value is assigned to candidate mitigation actions with an existing mitigation conduit, related to a non-technical activity or disseminating existing information. A Medium value is assigned to technical issues with a relatively higher level of effort, such as conducting a modest research project. A High value is assigned to technical topics with a complicated implementation path, such as developing an IT solution.
- **Barriers** are the primary obstacles to carrying out the mitigation action, such as a lack of noteworthy practices, a lack of funding or other resources, or assignment of sponsorship.
- **Potential for improving TPM results** refers to the possibility of the mitigation action to have an impact on TPM outcomes. It is a qualitative value including: Low (unlikely to have a significant impact or likely to have only a short-term impact), Medium (somewhat likely to have an impact that may be significant or broad), and High (very likely to have a significant or broad impact)
- **First step** is the initial activity needed to get started with carrying out the mitigation action (assuming the responsibility is determined)

Note that this document specifies certain values for a Policy/Regulatory Action differently from the other mitigation types. Specifically, the mitigation features **Analytical Complexity** and **Barriers** are denoted N/A. Likewise the **Costs** associated with implementation are assigned TBD. A detailed determination of these values would be a necessary first step for further consideration or eventual implementation of any policy or regulatory change. Additionally, the potential mitigation strategies are for consideration only – not every strategy will be appropriate for every agency, nor will every agency, stakeholder, or designated owner agree with every potential mitigation strategy.

This action plan has been developed with a streamlined format and structure designed to provide flexibility to match differing agency contexts and to facilitate its application within the TPM community. For the mitigation actions, this means that certain values are not specified in the plan, but are instead meant to be determined by the practitioner on an individual basis:

- **Timeframe.** Agency and organizational resources vary widely, impacting the timeline for implementing a mitigation action. Also, many candidate mitigation actions are scalable, so this format provides options for individual agency, regional or national solutions, as appropriate.
- **Prioritization.** While the issues are organized according to the three priority tiers, mitigation actions are not further ranked for each issue. This format is intended to

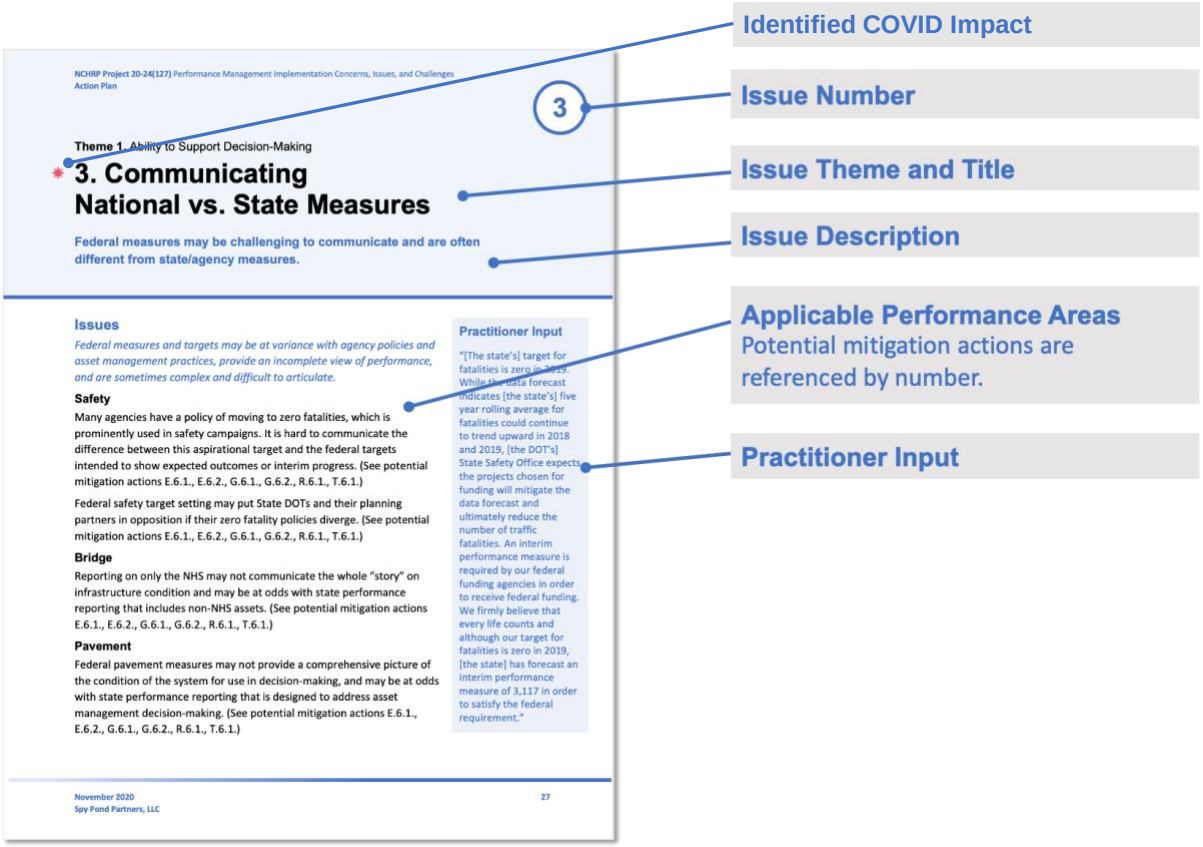
provide flexibility in prioritizing the candidate mitigations based on practitioners' own objectives and needs.

- **Milestones.** Actions are characterized at a high-level, applicable across a variety of agency contexts. As such, the plan does not attempt to provide every step or milestone toward implementation. Instead, it provides practitioners a means to consider and evaluate the resources needed, the timeline, costs, barriers and the first step to get the team started in developing the implementation approach.

A companion web based TPM Action Planner has been developed to support the ability to provide custom values for potential mitigation actions within these and other categories.

Action Plan Organization

The Action Plan has been developed to facilitate a rapid understanding of each issue and its associated implications, potential mitigation actions, and relative criticality. Each issue in the Action Plan presents the following information.

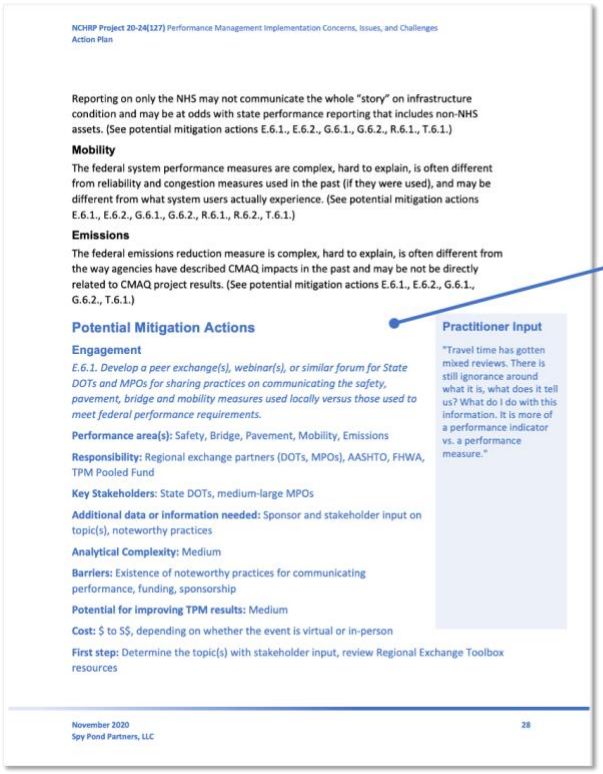


In the action plan, mitigation strategies are indexed according to an abbreviated code indicating the strategy type and the issue number where

E = Engagement, G = Guidance, R = Research, T = Training, P = Policy/Regulatory

For example, the code **E.6.1** is interpreted as **Issue 6, Engagement Strategy 1**

And the code **G.12.3** is interpreted as **Issue 12, Guidance Strategy 3**



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Action Plan

Reporting on only the NHS may not communicate the whole "story" on infrastructure condition and may be at odds with state performance reporting that includes non-NHS assets. (See potential mitigation actions E.6.1., E.6.2., G.6.1., G.6.2., R.6.1., T.6.1.)

Mobility

The federal system performance measures are complex, hard to explain, is often different from reliability and congestion measures used in the past (if they were used), and may be different from what system users actually experience. (See potential mitigation actions E.6.1., E.6.2., G.6.1., G.6.2., R.6.1., R.6.2., T.6.1.)

Emissions

The federal emissions reduction measure is complex, hard to explain, is often different from the way agencies have described CMAQ impacts in the past and may be not be directly related to CMAQ project results. (See potential mitigation actions E.6.1., E.6.2., G.6.1., G.6.2., T.6.1.)

Potential Mitigation Actions

Practitioner Input

"Travel time has gotten mixed reviews. There is still ignorance around what it is, what does it tell us? What do I do with this information. It is more of a performance indicator vs. a performance measure."

Engagement

E.6.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs for sharing practices on communicating the safety, pavement, bridge and mobility measures used locally versus those used to meet federal performance requirements.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices for communicating performance, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to $$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

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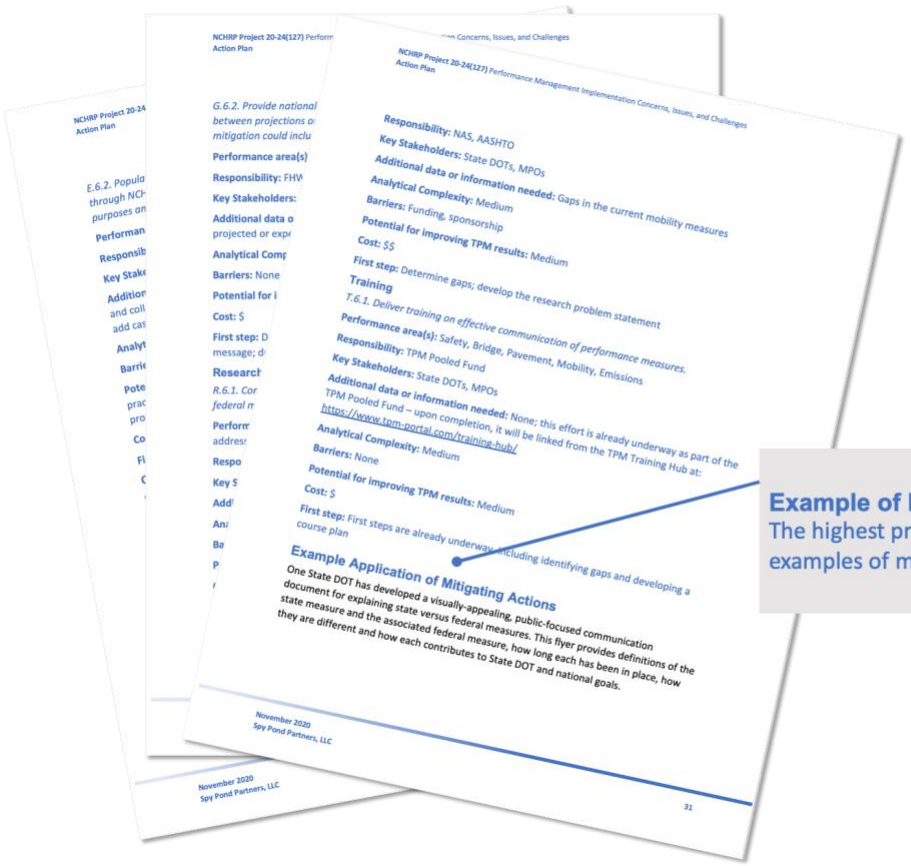
Potential Mitigation Actions
Potential mitigation actions are grouped by mitigation strategy and are numbered for reference.



NCHRP Project 20-24(127) Performance Management Implementation Concerns, Issues, and Challenges
Action Plan

Responsibility: NAS, AASHTO
Key Stakeholders: State DOTs, MPOs
Additional data or information needed: Gaps in the current mobility measures
Analytical Complexity: Medium
Barriers: Funding, sponsorship
Potential for improving TPM results: Medium
Cost: $$
First step: Determine gaps; develop the research problem statement

Training

T.6.1. Deliver training on effective communication of performance measures.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions
Responsibility: TPM Pooled Fund
Key Stakeholders: State DOTs, MPOs
Additional data or information needed: None; this effort is already underway as part of the TPM Pooled Fund – upon completion, it will be linked from the TPM Training Hub at: https://www.tpm-portal.com/training-hub/
Analytical Complexity: Medium
Barriers: None
Potential for improving TPM results: Medium
Cost: $
First step: First steps are already underway, including identifying gaps and developing a course plan

Example Application of Mitigating Actions

One State DOT has developed a visually-appealing, public-focused communication document for explaining state versus federal measures. This flyer provides definitions of the state measure and the associated federal measure, how long each has been in place, how they are different and how each contributes to State DOT and national goals.

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Example of Mitigating Actions
The highest priority issues include examples of mitigating actions.

3. TPM Implementation Concerns, Issues, and Challenges
Action Plan

1

Theme 1. Ability to Support Decision-Making

1. Limited Experience Modeling and Forecasting

Some agencies have limited experience predicting the federal measures. In some cases, agencies lack practical approaches and methods concerning how to make future predictions or to model desired performance. While some State DOTs have established methods to predict outcomes of programming decisions for highway safety, bridges and pavement, forecasting and modeling capabilities are often less mature in mobility, emissions and transit performance areas.

Issues

Some agencies are challenged to make future predictions and model desired performance.

Safety

There are no standard approaches for modeling and forecasting safety performance. (See potential mitigation actions E.1.1., G.1.1, R.1.1., R.1.2., T.1.1., T.1.2.)

Bridge

Agencies have bridge management systems but may not have used them for modeling and forecasting, or may rely on trend analysis rather than modeling for target setting. (See potential mitigation actions E.1.2., G.1.1., R.1.1., T.1.1., T.1.2.)

Pavement

Agencies have pavement management systems but may not have utilized them for modeling and forecasting, or may rely on trend analysis rather than modeling for target setting. (See potential mitigation actions E.1.2., G.1.1., R.1.1., T.1.1., T.1.2.)

Mobility

There are no standard approaches for modeling and forecasting for mobility. Some agencies lack experience performing system-wide modeling and

Practitioner Input

"While the 2 years of data show a drop in the index (becoming more reliable), this is not enough data to be confident in its continuation."

"[The DOT's] internal performance metric is very similar to the Federally required performance measures, however, [The DOT] only establishes targets for Poor bridges. This is due to lack of forecasting and analysis capabilities for establishing Good targets."

forecasting for system performance measures. (See potential mitigation actions E.1.3., G.1.1., R.1.1., R.1.2., T.1.1., T.1.2.)

Emissions

There are no standard approaches for modeling and forecasting. Some agencies lack experience performing system-wide modeling and forecasting for emissions measures. (See potential mitigation actions E.1.3., G.1.1., R.1.1., R.1.2., T.1.1., T.1.2.)

Transit

Some agencies have transit management systems but may not have utilized them for forecasting or may rely on trend analysis rather than modeling for target setting. (See potential mitigation actions E.1.2., G.1.1., R.1.1., T.1.1.,T.1.2.)

Potential Mitigation Actions

Engagement

E.1.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs to share practices for modeling and forecasting future safety performance.

Performance area(s): Safety

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices for predicting or setting desired future safety performance, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources at: tpm-portal.com/ret/

E.1.2. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs, MPOs and transit operators to share practices in the use of management systems for modeling and forecasting future bridge, pavement and other asset performance.

Practitioner Input

"PM3 tools... are great but are suited to reporting. It's hard to apply these to investment decisions. For example, when looking at a corridor, it's not clear where to put treatments or what treatments will actually affect the measure. If anything, COVID has made this worse."

Performance area(s): Bridge, Pavement, Transit

Responsibility: Regional exchange partners (DOTs, MPOs, transit operators), AASHTO, FHWA, Pooled Fund

Key Stakeholders: State DOTs, MPOs, transit operators

Additional data or information needed: Stakeholder input on topics

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices in using management systems for predicting or setting future performance, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources at: tpm-portal.com/ret/

E.1.3. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs to share practices in modeling and forecasting for mobility and emissions measures.

Performance area(s): Mobility, Emissions

Responsibility: Regional exchange partners (DOTs, medium-large MPOs), TPM Pooled Fund, AASHTO, FHWA

Key Stakeholders: State DOTs, MPOs, transit operators

Additional data or information needed: Stakeholder input on topics, noteworthy practices

Analytical Complexity: Medium-High

Barriers: Existence of noteworthy practices for predicting or setting desired mobility and emissions performance, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources at: tpm-portal.com/ret/

Guidance

G.1.1. Draft guidebook, practicum or collection of noteworthy practices on developing and implementing sketch planning approaches for forecasting and modeling.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs, transit operators

Additional data or information needed: Information about existing data sets for the selected performance area(s)

Analytical Complexity: Medium-High

Barriers: Funding

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether there is existing information that can be used to develop the guidance

First step: Evaluate existing sketch planning resources

Research

R.1.1. Conduct research on new national data sets and methods for forecasting and modeling.

Performance area(s): Depending on whether data sets or methods are explored, this potential mitigation could affect Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the research)

Additional data or information needed: Information about existing data sets for the selected performance area(s)

Analytical Complexity: High

Barriers: Funding, sponsorship

Potential for improving TPM results: High

Cost: $$$ to $$$$, depending on the scope of the research, including one-time costs associated with dataset or tool development, as well as ongoing costs to manage and access the data using IT systems

First step: Develop the research problem statement

R.1.2. Conduct research on forecasting and modeling approaches that incorporate significant externalities.

Performance area(s): Safety, Mobility, Emissions

Responsibility: NAS, AASHTO, FHWA

Key Stakeholders: State DOTs, MPOs (depending on the scope of the research)

Additional data or information needed: Understanding of the externalities affecting the selected performance area(s)

Analytical Complexity: Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Medium

Cost: $$ to S$$, depending on the scope of the research

First step: Develop the research problem statement

Training

T.1.1. Promote existing training to understand forecasting and modeling approaches, methods, tools and the use of management systems for forecasting and modeling.

Performance area(s): This potential mitigation could affect one or more of Safety, Bridge, Pavement, Mobility, Emissions, Transit, or it could apply broadly to TPM

Responsibility: TPM Pooled Fund, AASHTO, FHWA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the training)

Additional data or information needed: Knowledge of existing training in this area

Analytical Complexity: Low

Barriers: Existence of appropriate training delivery platform, subject knowledge necessary to develop targeted training

Potential for improving TPM results: Low-Medium, depending on the scope of the training

Cost: $

First step: Investigate existing training related to forecasting and modeling

T.1.2. Develop technical training on forecasting and modeling that incorporates one or more of the following: the impacts of projects, scenario planning, and statistical approaches for building forecasting and modeling capacity.

Performance area(s): This potential mitigation could affect one or more of Safety, Bridge, Pavement, Mobility, Emissions, Transit, or it could apply broadly to TPM

Responsibility: AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the training)

Additional data or information needed: Information about current technical training priorities in forecasting and modeling

Analytical Complexity: Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the training is online or in-person, and whether it impacts one or more agencies

First step: Determine existing knowledge gaps

Example Application of Mitigating Actions

One State DOT has developed a target setting method using historical data to predict future safety performance and trends. Using a statistical approach based on existing data has several benefits. It provides the agency with practice in testing and discussing confidence levels with limited data and using an historical, data-informed target setting process for prediction. It is a feasible approach when the aim is to predict future performance rather than for influencing desired targets. However, the agency has noted several long-term issues with this approach. In this example, the data used for projecting performance trends is not linked to the agency's planning and programming documents. It requires a minimal level of modeling knowledge and assumes that past results can be used to predict the near-term future.

2

Theme 2. Alignment of Reporting and Management Responsibilities

2. Control of Investment Decisions

States must set National Highway System (NHS) targets but in some cases performance is driven by local investment decisions. Conversely, MPOs may choose to set their own targets but may have limited control over State DOT investments and infrastructure, as well as facilities owned by towns/townships, cities, counties and transit agencies. Further, funding uncertainty is a challenge for target-setting.

Issues

Agencies may be responsible for setting targets for assets outside their ownership and management responsibility.

Safety

Local safety investments may not be coordinated with State DOTs but may impact state investment decisions necessary to meet safety targets. (See potential mitigation actions E.2.1., G.2.1., R.2.1., R.2.2., P.2.1.)

Bridge

In some states, limited bridge data may be available to State DOTs for predicting conditions for non-State NHS assets (e.g., maintenance activity and costs). (See potential mitigation actions E.2.1., G.2.1., R.2.1., R.2.2., P.2.1.)

MPOs and local agencies may have limited insight into State DOT data collection and analysis methods that are the basis for State DOT investment decisions. (See potential mitigation actions E.2.1., G.2.1., R.2.1, R.2.2., P.2.1.)

Pavement

In some states, limited pavement data may be available to State DOTs for predicting conditions for non-State NHS assets (e.g., maintenance activity and costs). (See potential mitigation actions E.2.1., G.2.1., R.2.1., R.2.2., P.2.1.)

Practitioner Input

"Local NHS pavement funding expected depends on the extent that local agency owners fund NHS pavement relative to non-NHS segments."

"Challenge to address poor condition NHS pavement and bridges owned by non-state entities."

"We don't have control over other bridge owners… which have some very large bridges that could easily skew our condition performance targets."

MPOs and local agencies may have limited insight into State DOT data collection and analysis methods that are the basis for State DOT investment decisions. (See potential mitigation actions E.2.1., G.2.1., R.2.1., R.2.2., P.2.1.)

Mobility

State DOTs and MPOs face challenges in setting targets for annual hours of peak hour excessive delay and percent of non-SOV travel measures when an urbanized area crosses into multiple states and/or MPOs. (See potential mitigation actions E.2.1., G.2.1., R.2.1., R.2.2., P.2.1.)

Emissions

Organizational responsibility for programming CMAQ funded projects is often separate from the responsibility for setting emissions targets and data may not be shared among planning partners. (See potential mitigation actions E.2.1., G.2.1.,R.2.1., R.2.2., P.2.1.)

Transit

There are special challenges in coordinating investment decisions among State DOTs, cities and transit agencies, especially multi-state MPOs. (See potential mitigation actions E.2.1., R.2.1., R.2.2., P.2.1.)

Potential Mitigation Actions

Engagement

E.2.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs, MPOs and transit operators to share information on collaboration models, with a focus on best practices in developing processes and policies.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices for collaboration models, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

Guidance

G.2.1. Draft guidebook, practicum or collection of noteworthy practices on standard criteria and formats for data sharing between DOTs, MPOs, and transit operators.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions

Responsibility: FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs, transit operators

Additional data or information needed: Information about existing standard criteria and formats data sharing for the selected performance area(s)

Analytical Complexity: Medium-High

Barriers: Funding

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether there is existing information that can be used to develop the guidance

First step: Evaluate existing data sharing resources

Research

R.2.1.Research the means to support common data resources for all planning partners.

Performance area(s): Depending on whether data sets or methods are explored, this potential mitigation could affect Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: FHWA, NAS, AASHTO

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the research)

Additional data or information needed: Information about existing data sets for the selected performance area(s)

Analytical Complexity: High

Barriers: Funding/ongoing cost to provide the data, sponsorship

Potential for improving TPM results: High

Cost: $$$ to $$$$, depending on the scope of the research, including one-time costs associated with dataset or tool development, as well as ongoing costs to manage and access the data using IT systems

First step: Develop the research problem statement

R.2.2. Research the impact of defining and implementing a consolidated network for TPM reporting at the statewide or regional level.

Performance area(s): Depending on whether data sets or methods are explored, this potential mitigation could affect Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: Regional Planning Partners, FHWA, NAS, AASHTO

Key Stakeholders: Regional Planning Partners, State DOTs, MPOs, transit operators (depending on the scope of the research)

Additional data or information needed: Information about existing data sets for the selected performance area(s)

Analytical Complexity: High

Barriers: Funding/one-time development costs, ongoing maintenance costs, sponsorship

Potential for improving TPM results: High

Cost: $$$ to $$$$, depending on the scope of the research, including one-time costs associated with dataset or tool development, as well as ongoing costs to manage and access the data using IT systems

First step: Develop the research problem statement

Policy Change or Regulatory Action

P.2.1. Assess the costs and benefits of providing the option to set targets only for assets owned and maintained by the agency.

Performance area(s): Depending on the scope of the change, this potential mitigation could affect Safety, Bridge, Pavement, Emissions, Mobility, Transit

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Data to determine the costs and benefits of setting targets only for assessed owned and maintained by the agency for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the change

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

Example Application of Mitigating Actions

One State DOT has a long history of sharing statewide pavement, safety and GIS data with their planning partners. This agency recently expanded access to this data through an external website that allows the MPOs and RTPAs/RPCs to manipulate and analyze data on their system. This provides the DOT and their partners the ability to view the same real-time data and use it to meet their distinct agency goals and objectives.

3

Theme 1. Ability to Support Decision-Making

3. Communicating National vs. State Measures

Federal measures may be challenging to communicate and are often different from state/agency measures.

Issues

Federal measures and targets may be at variance with agency policies and asset management practices, provide an incomplete view of performance, and are sometimes complex and difficult to articulate.

Safety

Many agencies have a policy of moving to zero fatalities, which is prominently used in safety campaigns. It is hard to communicate the difference between this aspirational target and the federal targets intended to show expected outcomes or interim progress. (See potential mitigation actions E.3.1., E.3.2., G.3.1., G.3.2., R.3.1., T.3.1.)

Federal safety target may be inconsistent or conflict with measures established by the state or other planning partners, especially if these entities have zero fatality policies.. (See potential mitigation actions E.3.1., E.3.2., G.3.1., G.3.2., R.3.1., T.3.1.)

Bridge

Reporting on only the NHS may not communicate the whole "story" on infrastructure condition and may be at odds with state performance reporting that includes non-NHS assets. (See potential mitigation actions E.3.1., E.3.2., G.3.1., G.3.2., R.3.1., T.3.1.)

Pavement

Federal pavement measures may not provide a comprehensive picture of the condition of the system for use in decision-making and may be at odds with state performance management and reporting that is designed to address asset management decision-making. (See potential mitigation actions E.3.1., E.3.2., G.3.1., G.3.2., R.3.1., T.3.1.)

Practitioner Input

"[The state's] target for fatalities is zero in 2019. While the data forecast indicates [the state's] five year rolling average for fatalities could continue to trend upward in 2018 and 2019, [the DOT's] State Safety Office expects the projects chosen for funding will mitigate the data forecast and ultimately reduce the number of traffic fatalities. An interim performance measure is required by our federal funding agencies in order to receive federal funding. We firmly believe that every life counts and although our target for fatalities is zero in 2019, [the state] has forecast an interim performance measure of 3,117 in order to satisfy the federal requirement."

Reporting on only the NHS may not communicate the whole "story" on infrastructure condition and may be at odds with state performance reporting that includes non-NHS assets. (See potential mitigation actions E.3.1., E.3.2., G.3.1., G.3.2., R.3.1., T.3.1.)

Mobility

The federal system performance measures are complex, hard to explain, is often different from reliability and congestion measures used in the past (if they were used) and may be different from what system users actually experience. (See potential mitigation actions E.3.1., E.3.2., G.3.1., G.3.2., R.3.1., R.3.2., T.3.1.)

Emissions

The federal emissions reduction measure is complex, hard to explain, is often different from the way agencies have described CMAQ impacts in the past and may not be directly related to CMAQ project results. (See potential mitigation actions E.3.1., E.3.2., G.3.1., G.3.2., T.3.1.)

Potential Mitigation Actions

Engagement

E.3.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs for sharing practices on communicating the safety, pavement, bridge and mobility measures used locally versus those used to meet federal performance requirements.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices for communicating performance, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

Practitioner Input

"Travel time has gotten mixed reviews. There is still ignorance around what it is, what does it tell us? What do I do with this information? It is more of a performance indicator vs. a performance measure."

"For pavement, combining quantitative metrics (IRI, rutting/faulting, cracking) into a qualitative metric produces what can be non-representative results. Each of these component measures align with specific pavement traits, needs, treatments and resources. However, the overall qualitative pavement metric, generated by combining these component measures in a subjective manner, no longer reflects specific pavement traits that are actionable. Further, the overall metric is constructed to inflate "% Fair" pavement in a manner that is misleading and may be counter to engineering-based asset management strategies. This is a regulatory issue as the construct of the measure is contained in regulation."

First step: Determine the topic(s) with stakeholder input, review TPM Portal Regional Exchange Toolbox resources

E.3.2. Populate the existing AASHTO Communicating Performance website (developed through NCHRP 20-24(93)B02) with additional case examples demonstrating the definitions, purposes and uses of state performance measures versus federal measures.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Case studies, practice review, mechanism to solicit and collect is available at: http://communicatingperformance.com, and the marginal cost to add case examples is very low

Analytical Complexity: Low

Barriers: None

Potential for improving TPM results: Low-Medium, depending on the Delta between practitioners already using the tools and the additional users reached through the promotional activities

Cost: $

First step: conduct a web search and reach out to agencies for additional examples

Guidance

G.3.1. Provide guidance, including case examples, on the effective communication of performance measures for various purposes. Include topics such as framing communication messages for making measures meaningful and communicating targets.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions

Responsibility: TPM Pooled Fund, FHWA, AASHTO

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about existing communication practices, including framing messages and communicating targets

Analytical Complexity: Low-medium, depending on the scope

Barriers: Funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on existing information and case examples that can be used to develop the guidance

First step: Evaluate existing practices and related research

G.3.2. Provide national (FHWA) examples to states on communicating the difference between projections or expected outcomes versus targets. Deliverables of this potential mitigation could include templates, an add-on to the PMF or visualizations.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions

Responsibility: FHWA

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about the differences between projected or expected outcomes and targets and how each may be used

Analytical Complexity: Low

Barriers: None

Potential for improving TPM results: Low

Cost: $

First step: Determine the information gap and appropriate medium to communicate the message; draft the guidance

Research

R.3.1. Conduct a broad, national (FHWA) review (at a future date) of the effectiveness of federal measures and whether they are having the intended results.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions, or this could broadly address each of the TPM areas

Responsibility: TPM Pooled Fund, FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Data from the mid-period reporting results

Analytical Complexity: Medium

Barriers: None

Potential for improving TPM results: Medium-High

Cost: $

First step: Develop the research problem statement

R.3.2. Analyze gaps in current mobility measures and recommend the next set of measures that may be better.

Performance area(s): Mobility

Responsibility: NAS, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Gaps in the current mobility measures

Analytical Complexity: Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Medium

Cost: $$

First step: Determine gaps; develop the research problem statement

Training

T.3.1. Deliver training on effective communication of performance measures.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: None; this effort is already underway as part of the TPM Pooled Fund – upon completion, it will be linked from the TPM Training Hub at: https://www.tpm-portal.com/training-hub/

Analytical Complexity: Medium

Barriers: None

Potential for improving TPM results: Medium

Cost: $

First step: First steps are already underway, including identifying gaps and developing a course plan

Example Application of Mitigating Actions

One State DOT has developed a visually appealing, public-focused communication document for explaining state versus federal measures. This flyer provides definitions of the state measure and the associated federal measure, how long each has been in place, how they are different and how each contributes to State DOT and national goals.

4

Theme 2. Alignment of Reporting and Management Responsibilities

4. Coordination with Owners and Responsible Parties

Coordination with external stakeholders may be needed for setting targets. This process can be complex and require significant resources to ensure the appropriate parties are included in target setting discussions to achieve effective outcomes.

Issues

Transportation agencies face challenges in coordinating with each other given the cross-disciplinary nature of TPM target-setting. It may be necessary in some cases to coordinate among one or more State DOTs, one or more MPOs, corporations, Park Service owners, municipal and county owners.

Safety

There may be data accuracy issues with some safety data, and as a result some State DOTs may be reluctant in sharing safety data with their MPOs. This may complicate target setting. (See potential mitigation actions E.3.1., G.4.1., G.4.2., R.4.2.)

Bridge

When a significant number of bridges are owned by others or when there are multiple owners, it may greatly increase the complexity of the coordination challenge, particularly in the case of multi-state MPOs. Additionally, agencies do not typically manage bridge assets according to whether they are on the NHS. (See potential mitigation actions E.4.1., G.4.1., G.4.2., R.4.1.,R.4.2., T.4.1.)

MPOs do not own local bridges. (See potential mitigation actions E.4.1., G.4.1., G.4.2.,R.4.2., T.4.1.)

Pavement

When a significant number of assets are owned by others or when there are multiple owners, it may greatly increase the complexity of the coordination challenge, particularly in the case of multi-state MPOs. Additionally, transportation agencies do not typically manage

Practitioner Input

"Huge challenge being a bi-state MPO as not each state shares data, has similar information available, similar tools, same level of analysis or the SME's (subject matter experts) to help us understand their data."

pavements according to whether they are on the NHS. (See potential mitigation actions E.4.1., G.4.1., G.4.2., R.4.1.,R.4.2., T.4.1.)

MPOs do not own local NHS pavements. (See potential mitigation actions E.4.1., G.4.1., G.4.2., R.4.2., T.4.1.)

Mobility

There are multiple owners to coordinate with on mobility, especially on Non-SOV and PHED measures. Issues may arise with post-processing of data and a lack of GIS data. Additionally, there are challenges coordinating on data with multi-state MPOs on mobility measures. (See potential mitigation actions E.4.1., G.4.1.,G.4.2., R.4.2.)

Transit

There are special challenges in coordinating on target setting among State DOTs, cities and transit agencies, especially multi-state MPOs. (See potential mitigation actions E.4.1., G.4.1., G.4.2., R.4.2.)

Potential Mitigation Actions

Engagement

E.4.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs, MPOs and transit operators for sharing information on collaboration models, with a focus on data sharing tools.

Performance area(s): Safety, Bridge, Pavement, Mobility, Transit

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs, transit operators

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices for collaboration among planning partners, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

Guidance

G.4.1. Provide guidebook, practicum or collection of noteworthy practices on developing data sharing agreements.

Performance area(s): Safety, Bridge, Pavement, Mobility, Transit

Responsibility: FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs, transit operators

Additional data or information needed: Information about existing data sharing agreements

Analytical Complexity: Medium-High

Barriers: Funding

Potential for improving TPM results: Medium

Cost: $ to S$, depending on the value of existing information that can be used to develop the guidance

First step: Evaluate existing data sharing agreements and related research

G.4.2. Develop a guide for state agency and MPO collaboration methods and timelines.

Performance area(s): This potential mitigation could affect one or more of Safety, Bridge, Pavement, Mobility, Transit or it could apply broadly to TPM

Responsibility: AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the guide

Additional data or information needed: Information about the state of practice in state agency and MPO collaboration methods and timelines.

Analytical Complexity: Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$

First step: Determine existing knowledge gaps

Research

R.4.1. Develop research statements based on the research needs identified in NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset

Practitioner Input

"We get new targets from two states and those targets are different. We have elected to treat our region as a whole rather than setting targets for the two state counties differently. One state has a much more aggressive target reduction than the other state, so it made sense for us to set our own targets. Another factor that complicates the issue is that our safety coalition has more counties in its service area than the MPO has in its MPO area. We have elected to maintain a constant percent reduction goal rather than maintain the same outer year annual target. Because one state is maintaining the annual target in the outer year the percent reduction is increasing. Ours has remained the same. We are able to stay consistent with the Regional Blueprint and the RTP, TIP by doing this. I suspect that we will continue to do this through the foreseeable future. One state and the MPO will begin to look very different in a few years."

Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published).

Performance area(s): Bridge, Pavement

Responsibility: NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Results of *NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published)*

Analytical Complexity: Low

Barriers: Funding, sponsorship

Potential for improving TPM results: High

Cost: $, to develop the initial research problem statements based on the current research (the cost of the actual research is unknown until the project results have been published and disseminated)

First step: Review the recommendations and develop the research problem statement(s)

R.4.2. Research the means to support common data resources for all stakeholders.

Performance area(s): Depending on whether data sets or methods are explored, this potential mitigation could affect Safety, Bridge, Pavement, Mobility, Transit

Responsibility: NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the research)

Additional data or information needed: Information about existing data sets for the selected performance area(s)

Analytical Complexity: High

Barriers: Funding, sponsorship

Potential for improving TPM results: High

Cost: $$$ to $$$$, depending on the scope of the research, including one-time costs associated with dataset or tool development, as well as ongoing costs to manage and access the data using IT systems

First step: Develop the research problem statement

Training

T.4.1. Disseminate the results of NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when 1).

Performance area(s): Bridge, Pavement

Responsibility: TPM Pooled Fund, AASHTO, FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Results of NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published)

Analytical Complexity: Low

Barriers: None

Potential for improving TPM results: Low-Medium

Cost: $

First step: Review the recommendations and develop the promotional plan

Example Application of Mitigating Actions

One State DOT with several MPOs in three different states conducts monthly webinars with their planning partners, including their MPOs, RPCs and the other neighboring State DOTs. These webinars include various topics related to performance-based planning and TPM and provide capacity-building opportunities for all parties involved through the sharing of training opportunities, successful practices, case examples and templates. They also provide valuable insight for MPOs into all of their respective DOTs' data collection methods, target setting approaches, investment strategies and reporting outcomes. Over time, these webinars may help the MPOs make important decisions about setting their own targets.

Another State DOT provided resources to allow its municipalities to follow the state SHSP template format to make downstream coordination and alignment on target setting for safety much easier.

5

Theme 4. Integration with Agency Business Processes and Practices

5. Resourcing TPM

Limited resources may be available within State DOTs to carry out TPM activities. A focus on federal reporting requirements may reduce resources otherwise devoted to state performance management programs. This challenge may be heightened where federal and state TPM data, measures, methods, or processes diverge.

Issues

Agencies' limited resources make it challenging to meet new TPM requirements in addition to supporting existing programs.

Pavement

Agencies generally have pavement management systems but their application to federal TPM may require significant additional development funding or special technical expertise. Many MPOs lack technical skills to carry out sufficient data analytics and predictive modeling for highway infrastructure measures necessary for meeting federal TPM requirements. (See potential mitigation actions E.5.1., E.5.2., G.5.1., G.5.2, T.5.1., T.5.2.)

Mobility

Agencies may lack needed technical expertise for resourcing system performance measures in-house. (See potential mitigation actions E.5.1., E.5.2., G.5.1., G.5.2., T.5.1., T.5.2.)

Potential Mitigation Actions

Engagement

E.5.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs for sharing information on the efficient and effective resourcing of TPM.

Performance area(s): Pavement, Mobility

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Practitioner Input

"These new requirements have required additional investments with the goal to improve performance. This seems counterintuitive as resources and staff are directed to compliance which takes away from spending on improving performance."

"With the availability of data nationally to NHTSA, FHWA and FTA, why require transportation agencies to calculate performance measures? Federal agencies can use to calculate them and allow transportation agencies to set targets and to report progress. [The agency] is spending its limited resources to contract with CATT lab to calculate PM3 measures."

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices for efficient and effective resourcing of TPM, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

E.5.2. Continue promoting to the TPM community the existing tools to streamline TPM implementation, including the TPM Benchmarking Tool, TPM Toolbox and Communicating Performance Website.

Performance area(s): Pavement, Mobility

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: None, the existing tools are already available at:

- TPM Benchmarking Tool: https://benchmarking.tpm-portal.com/
- TPM Toolbox: https://www.tpmtools.org
- Communicating Performance Website: http://communicatingperformance.com

Analytical Complexity: Low

Barriers: Whether the information needed can be located on the existing sites

Potential for improving TPM results: Low-Medium, depending on the Delta between practitioners already using the tools and the additional users reached through the promotional activities

Cost: $, since the tools are already available and assuming the marginal cost to information is very low

First step: develop the promotional plan

Practitioner Input

"COVID-19 also had an impact on data collection. Initially, revenues were down and this necessitated reductions in data collection. This impacted pavement data collection, traffic counts, and a range of other areas."

Guidance

G.5.1. Develop templates and job aids to facilitate carrying out TPM activities, including practitioner examples that agencies have found useful.

Performance area(s): Pavement, Mobility

Responsibility: FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about existing noteworthy practices, templates and jobs aids in implementing TPM

Analytical Complexity: Medium-High

Barriers: Funding

Potential for improving TPM results: Medium

Cost: $ to S$, depending on the value of existing information that can be used to develop the guidance

First step: Evaluate existing practices, resources and related research

G.5.2. Provide guidebook, practicum or collection of noteworthy practices on developing data business plans to streamline processes and optimize resourcing for TPM.

Performance area(s): Pavement, Mobility

Responsibility: FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about existing data business plans that have been used to streamline processes and optimize resourcing

Analytical Complexity: Medium-High

Barriers: Funding

Potential for improving TPM results: Medium

Cost: $ to S$, depending on the value of existing information that can be used to develop the guidance

First step: Evaluate existing processes, data business plans and related research

Training

T.5.1. Develop technical training and webinars specific to TPM activities that have been identified as difficult to carry out using existing resources and skill sets, including (1) Data Collection, (2) Data Analytics, (3) Predictive Modeling and Forecasting, (4) Using TPM for Decision-Making, and (5) Target Setting.

Performance area(s): Pavement, Mobility

Responsibility: TPM Pooled Fund, AASHTO, FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Specific information about TPM activities that are difficult to carry out (refer to the FHWA National Implementation Review Survey Results and Report), current technical training priorities in (1) Data Collection, (2) Data Analytics, (3) Predictive Modeling and Forecasting, (5) Using TPM for Decision-Making, and (5) Target Setting

Analytical Complexity: Low-Medium, depending on the scope of the training effort and existing resources

Barriers: Funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the training is online or in-person, and whether it impacts one or more agencies

First step: Determine existing knowledge gaps in each of the TPM activities

T.5.2. Develop an online Communicating Performance training series.

Performance area(s): Pavement, Mobility

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: None; this effort is already underway as part of the TPM Pooled Fund– upon completion, it will be linked from the TPM Training Hub at: https://www.tpm-portal.com/training-hub/

Analytical Complexity: Medium

Barriers: None

Potential for improving TPM results: Medium

Cost: $

First step: First steps are underway, including identifying gaps and developing a course plan

Example Application of Mitigating Actions

One State DOT has leveraged its Governor's Continuous Improvement Initiative to develop a Lean Management System for (1) standardizing its processes and developing a baseline for future performance challenges, (2) measuring its performance and (3) integrating incremental process streamlining to help the agency set the stage for performance success. The DOT has used the statewide continuous improvement as a means for garnering support for integrating TPM implementation in a focused way into its business processes.

6

Theme 4. Integration with Agency Business Processes and Practices

6. Timing of Project/Program Development Timeframe

The federal targets are set for periods shorter than the typical transportation agency planning/programming cycle.

Issues

Federal TPM targets reflect a short-term time horizon which may diminish their utility for guiding investment decisions but demonstrate progress toward long-term goals.

Cross-cutting

All of the federal targets are set for periods shorter than the typical planning/programming cycle. Agencies often rely on trends rather than explanatory variables in setting targets. In many cases, targets may be predictions of what will happen given decisions that have already been made but of limited use in actually making decisions. (See potential mitigation actions E. 6.1., R.6.1., P.6.1., P.6.2.)

Potential Mitigation Actions

Engagement

E.6.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs, MPOs and transit operators for sharing information on addressing effective use of explanatory variables in TPM target setting, given existing reporting schedules and timeframes.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, FTA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs, transit operators

Practitioner Input

"The schedule of TPM activities is out of sequence with the planning process. The horizon year for targets (2-year, 4-year) is shorter than the horizon for most programs (TIPs and STIPs). This means targets are generally being set for a particular year AFTER programming decisions have already been made. It's very difficult to turn around and explain how a program will achieve performance target when the targets were set after funding decisions were made."

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices on addressing the effective use of explanatory variables, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

Research

R.6.1. Develop a white paper to shift focus on what 2-4 year timeframes are well-suited for (for example, identification of performance gaps, progress toward longer term goals)

Performance area(s): Depending on whether data sets or methods are explored, this potential mitigation could affect Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: NAS, FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the White Paper)

Additional data or information needed: Information about the implications of 2- and 4-year targets relative to longer-term targets, examples of how short-term targets show progress toward performance goals and ways agencies have maximized the utility of various target-setting time horizons

Analytical Complexity: Low

Barriers: Funding, sponsorship

Potential for improving TPM results: Low-Medium

Cost: $$ to $$$, depending on the scope of the research

First step: Develop the research problem statement

Policy and Regulatory

P.6.1. Assess the costs and benefits of establishing a target setting time period and align the timing of measurement reporting so measures and targets can be used in a meaningful way for making planning and programming decisions in alignment with other agency processes.

Performance area(s): Depending on the scope of the change, this potential mitigation could affect Safety, Bridge, Pavement, Mobility, Emissions or Transit or it could apply broadly to TPM.

Responsibility: FHWA and FTA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Information about the optimal target setting time period and timing of measurement reporting so measures and targets can be used in a meaningful way for making planning and programming decisions in alignment with other agency processes for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the change

Cost: TBD

First step: Perform a survey of existing planning and programming calendars for each of the affected performance measure areas and determine whether there is an optimal target setting time period and report timing; determine the regulatory and process steps necessary to make the change

P.6.2. Assess the costs and benefits of establishing a policy statement that short term targets are indicators of progress toward national goals, whereas mid-term and longer-term targets are useful programmatically for internal decision-making

Performance area(s): Depending on the scope of the change, this potential mitigation could affect Safety, Bridge, Pavement, Mobility, Emissions or Transit or it could apply broadly to TPM

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Information about the intended outcomes of short-term targets for the selected performance area(s) and the benefits of longer target setting timeframes

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on whether federal and local goals could be achieved as a result of modifying short-term targets

Cost: TBD

First step: Investigate messaging the intended outcomes of the short-term targets and possible alternative target setting timeframes; determine the regulatory and process steps necessary to communicate the policy direction.

Example Application of Mitigating Actions

One State DOT recently refined its process for setting safety targets to incorporate “influencing factors" controllable through transportation investments. They adjusted their 2021 targets to reflect a defined set of external factors, the anticipated benefits of recently completed and currently programmed projects, and the impact of validated 2019 data on the baseline measurement period projection.

Practitioner Input

"Short term targets are not realistic to be able to plan and program for these measures. Having annual FHWA safety, FTA safety and FTA asset management targets does not allow for any meaningful review of trends. Go to 5-year targets since it’s based on a 5-year average for FHWA safety. Likewise, 2 year targets for the PM2 and PM3 are too short for infrastructure; go to 10 year targets on PM2 and 5 years on PM3"

“Because of the relatively short-term nature of the targets, the methodology being utilized focuses on historical information and creates a forecast based on trends.”

7

Theme 4. Integration with Agency Business Processes and Practices

7. External Communication and Coordination

DOTs and transit agencies have limited incentives to share data and analyses with other stakeholders (e.g., FHWA, FTA, and MPOs) beyond what is required by the federal regulations.

Issues

TPM requires unprecedented levels of coordination and data sharing practices, which have the potential to provide value and insights beyond simply reporting to meet federal requirements.

Cross-cutting

Coordination on TPM, Performance-Based Planning and Programming (PBPP), and Transportation Asset Management (TAM) may provide new opportunities for State DOTs, transit agencies and their planning partners to come together for developing collaborative relationships around shared goals.

Inconsistent guidance may exist among FHWA and Federal Transit Agency (FTA) division offices. This inconsistency may lead to different practices, which may be problematic for multi-state MPOs when working with different State DOT partners. (See potential mitigation actions E.7.1., G.7.1., R.7.1. (except bridge and pavement))

Pavement

The National Performance Measurement Research Dataset (NPMRDS) dataset provides extensive data at no cost to agencies, which has untapped potential for enhancing target setting and use for developing STIPs, TIPs, STLRPs, and MTPs. The dataset could also provide justification for increased project or program funds. (See potential mitigation actions E.7.2., T.7.1., T.7.2.)

Practitioner Input

"Inconsistency between FHWA/ FTA division offices – this is especially problematic for bi-state MPOs who have one FHWA/ FTA division accepting what the MPO proposed and the other FHWA/ FTA division office requiring them to go beyond the actual planning requirements."

Mobility

The NPMRDS dataset provides extensive data at no cost to agencies, which has untapped potential for enhancing target setting and use for developing STIPs, TIPs, STLRPs, and MTPs. The dataset could also provide justification for increased project or program funds. (See potential mitigation actions E.7.2., T.7.2.)

Potential Mitigating Actions

Engagement

E.7.1. Develop a webinar series highlighting successful examples of State DOT collaboration and coordination with planning partners.

Performance area(s): Cross-cutting

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about existing case examples

Analytical Complexity: Low

Barriers: None

Potential for improving TPM results: Medium

Cost: $

First step: Find case examples and potential speakers, develop webinar plan

E.7.2. Develop a webinar(s), or similar forum to share the benefits and uses of NPMRDS more broadly than for meeting federal reporting requirements.

Performance area(s): Pavement, Mobility, potentially other performance areas

Responsibility: TPM Pooled Fund in collaboration with the UMD CATT Lab

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about existing case examples

Analytical Complexity: Low

Barriers: None

Potential for improving TPM results: Low-Medium

Cost: $

First step: Find case examples and potential speakers, develop webinar plan

Guidance

G.7.1. Provide protocols, tools, and examples of data sharing agreements, templates and job aids.

Performance area(s): Cross-cutting

Responsibility: State DOTs, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about existing data sharing agreements, templates and job aids

Analytical Complexity: Medium-High, depending on whether the materials are being developed by an individual State DOT or for the benefit of multiple State DOTs with a shared interest in the material

Barriers: Sponsorship, possibly funding, depending on the scale of the effort

Potential for improving TPM results: Medium

Cost: $ to S$, depending on the value of existing information that can be used to develop protocols, tools, and examples of data sharing agreements, templates and job aids and the scale of the effort

First step: Evaluate existing protocols, tools, agreements, templates and job aids related to data sharing

Research

R.7.1. Conduct a synthesis of existing collaboration processes among State DOTs and their planning partners for performance areas other than infrastructure measures.

Performance area(s): Cross-cutting (except bridge and pavement)

Responsibility: NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the research)

Additional data or information needed: Information about existing collaboration processes, possibly leveraging the approach used for developing the research statement for NCHRP Project 20-25, Synthesis Topic 51-05, “Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations”

Analytical Complexity: Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Low; additional value would be achieved through dissemination of the research findings and subsequent activities

Cost: $$, assuming the project is undertaken as a typical synthesis project

First step: Develop the research problem statement

Training

T.7.1. Disseminate the results of NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published).

Performance area(s): Pavement

Responsibility: TPM Pooled Fund, AASHTO, FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Results of NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published)

Analytical Complexity: Low

Barriers: None

Potential for improving TPM results: Low-Medium

Cost: $

First step: Review the recommendations and develop the promotional plan

T.7.2. Develop technical assistance on use of the NPMRDS.

Performance area(s): Pavement, Mobility

Responsibility: TPM Pooled Fund in collaboration with the UMD CATT Lab

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about existing case examples

Analytical Complexity: Medium

Barriers: None

Potential for improving TPM results: Low-Medium

Cost: $

First step: Determine gaps; develop a project plan and outline

Example Application of Mitigating Actions

One State DOT developed templates that MPOs could use to incorporate performance measures and targets into their MTPs. These templates provide sample language that could be adapted for use by MPOs for establishing their own targets (for pavements and bridges).

8

Theme 3. Data Availability and Quality

8. New Collection Requirements

Several specific data collection issues have arisen since the implementation of federal TPM requirements that present challenges to agencies.

Issues

There are various issues in the data collection approach and data sets that remain unresolved.

Pavement

Changes in the NHS may complicate use and interpretation of the measures. In addition, some established agency philosophies and existing methods for collecting data and measuring cracking differ from that required to meet federal performance reporting requirements. These data changes may make trend analysis difficult. (See potential mitigation actions E.8.1., G.8.1., R.8.1., R.8.2., R.8.3.)

Mobility

Changes in the NHS, in addition to changes in data vendors, TMC definitions, and coverage, complicate use and interpretation of the NPMRDS. Also, agency mobility measures before MAP-21 and Fixing America's Surface Transportation Action (FAST) varied widely among states and did not use the same data as that required to meet federal performance reporting requirements. (See potential mitigation actions E.8.1., G.8.1., R.8.2., R.8.3.)

Practitioner Input

"The federal rule requires a new methodology to measure rut depth and cracking. That methodology is a departure from the methods currently used by the Department where the crack rating is a combination of lengths and severities and is not comparable to the FHWA cracking percent."

Potential Mitigation Actions

Engagement

E.8.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs for sharing information on data collection practices, focused on pavement and mobility measures.

Performance area(s): Pavement, Mobility

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices on data collection practices, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

Guidance

G.8.1. Develop templates and job aids to facilitate data collection and data management for TPM.

Performance area(s): Pavement, Mobility

Responsibility: State DOTs, FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about existing noteworthy practices, templates and jobs aids in facilitating data collection for TPM

Analytical Complexity: Medium

Barriers: Sponsorship, possibly funding, depending on the scale of the effort

Potential for improving TPM results: Medium

Cost: $ to S$, depending on the value of existing information that can be used to develop protocols, tools, and examples of data sharing agreements, templates and job aids and the scale of the effort

First step: Evaluate existing templates and job aids related to data collection

Research

R.8.1. Conduct research to evaluate alternative methods of federal pavement measure quantification; summarize and assess the correlation between specific state and federal measures.

Performance area(s): Pavement

Responsibility: NAS, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Gaps in the current pavement measures and information about alternative measures used by agencies

Analytical Complexity: Medium-High

Barriers: Funding, sponsorship

Potential for improving TPM results: Low

Cost: $$

First step: Determine gaps and alternatives; develop the research problem statement

R.8.2. Conduct a synthesis project on existing data collection practices, with a goal of determining data issues in need of additional research.

Performance area(s): Pavement, Mobility

Responsibility: NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the research)

Additional data or information needed: Information about existing data collection practices

Analytical Complexity: Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Low; additional value would be achieved through dissemination of the research findings and subsequent activities

Cost: $$, assuming the project is undertaken as a typical synthesis project

First step: Develop the research problem statement

R.8.3. Perform an analysis of the mid-period performance reporting results to determine transient implementation issues related to data collection versus persistent issues in need of mitigation.

Performance area(s): Pavement, Mobility

Responsibility: TPM Pooled Fund, FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Data from the mid-period reporting results

Analytical Complexity: Medium

Barriers: None

Potential for improving TPM results: Medium-High

Cost: $

First step: Develop the research problem statement

Example Application of Mitigating Actions

One State DOT was unable to reconcile their historical pavement cracking results with the new federal measures. In response, the agency extrapolated the new measures for pavement cracking to develop an initial set of federal targets. Because of the limitations presented by having limited historic data, the agency set conservative targets to mitigate risk for the initial mid-period performance report, with a goal to revisit these targets after gaining experience with and trust in the new measures.

9

Theme 2. Alignment of Reporting and Management Responsibilities

9. Ability to Quantify Impacts and Outcomes

It may be difficult to quantify the impacts of a given investment in terms of the federal measures, especially in the areas of safety, mobility and emissions.

Issues

Many agencies are challenged to predict how a given investment impacts performance for safety, mobility and emissions measures.

Safety

The impact of safety investments can be difficult to predict due in part to exogenous factors such as economic activity, vehicle standards, and driver behavior. (See potential mitigation actions E.9.1., G.9.1., T.9.1.)

Mobility

The impact of congestion mitigation investments can be difficult to predict due to exogenous factors such as economic activity and changes in traveler behavior. (See potential mitigation actions E.9.1., E.9.2., G.9.1., R.9.1., T.9.1.)

Emissions

There are quantitative and qualitative benefits of emissions reductions that are not currently addressed in the federal measure. (See potential mitigation actions E.9.1., E.9.2., G.9.1., R.9.1., T.9.1.)

Potential Mitigation Actions

Engagement

E.9.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs for sharing information on using performance measures for decision making and making transportation investments.

Performance area(s): Safety, Mobility, Emissions

Practitioner Input

"At this time, it is difficult to relate actions to outcomes. This applies to system reliability and freight movement measures. This leads the target-setting process to rely on time series extrapolation as opposed to a forecasting model with explanatory variables."

"The measure lacks the ability to capture significant trends in program composition, particularly in two respects (1) the positive impact of CMAQ investments that extend beyond the initial obligation year but do not receive any quantifiable benefit in the Public Access system, and (2) the inability of the selected measure to recognize CMAQ projects that produce mainly qualitative benefits and are therefore not accounted for in the measure."

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices on using performance measures for decision making and investments, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

E.9.2. Develop a network and directory of national leaders in system performance/reliability and CMAQ measures.

Performance area(s): Mobility, Emissions

Responsibility: AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, large MPOs

Additional data or information needed: Contact information for national leaders in system performance/reliability and CMAQ measures

Analytical Complexity: Low

Barriers: Expert willingness to participate in the directory

Potential for improving TPM results: Low-Medium, depending on the group's level of participation

Cost: $, assuming the directory is posted on the TPM Portal at: tpm-portal.com

Guidance

G.9.1. Develop a roadmap for TPM implementation that emphasizes early and first steps for tying investments to performance.

Performance area(s): Safety, Mobility, Emissions

Responsibility: TPM Pooled Fund, State DOTs, FHWA, AASHTO

Key Stakeholders: State DOTs, large MPOs

Additional data or information needed: Post-project data from State DOTs demonstrating current linkages between actual investments and desired performance

Analytical Complexity: Medium

Barriers: Stakeholder buy-in, funding, sponsorship

Potential for improving TPM results: Medium-High

Cost: $$-$$$, depending on whether this strategy is being used at the individual State DOT level or is part of a larger scale effort to develop a roadmap that can be used for multiple states

First step: Evaluate pre- and post-project data from State DOTs showing actual investments and performance relative to agency or national goals; document the steps and strategies that were used to achieve positive results

Research

R.9.1. Conduct research on the use and gaps of predicting the impacts of investments with respect to federal measures. Recommend packages of actions and the next generation of measures for making operational decisions.

Performance area(s): Mobility, Emissions

Responsibility: NAS, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about current use and gaps in predicting the impacts of investments, information about potential next generation measures

Analytical Complexity: Medium-High

Barriers: Willingness of agencies to share data for the research, funding, sponsorship

Potential for improving TPM results: Medium-High

Cost: $$$

First step: Develop preliminary information about some of the use and gaps; develop the research problem statement

Training

T.9.1. Conduct training to improve State DOTs' ability to conduct system-level investment scenario analyses and to compare tradeoffs across projects and performance areas.

Performance area(s): Safety, Mobility, Emissions

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Agency-specific data; this effort could leverage and build upon online multi-objective decision analysis (MODA) training developed as part of the TPM Pooled Fund – linked from the TPM Training Hub at: https://www.tpm-portal.com/training-hub/

Analytical Complexity: Medium

Barriers: None

Potential for improving TPM results: Medium-High

Cost: $-$$, depending on any customization to the existing MODA training

First step: Identify any remaining gaps that the existing training does not address and developing a course plan

Example Application of Mitigating Actions

One agency has developed a tool through a federal grant to estimate the benefit of crash reduction features when applied to the worst segments on their transportation system. They recently conducted an analysis of the actual positive impacts of one project on fatal crashes, serious injuries, average speed of travel and traffic volumes. Notably, they reported that they achieved a 60 percent reduction in fatal crashes and a 46 percent reduction in serious injuries.

10

Theme 1. Ability to Support Decision-Making

10. Suitability to Drive Investment Decisions

The federal measures are intended for characterizing overall conditions of the system rather than for evaluating specific investments. Agencies often need to quantify additional measures to support decision-making.

The federal measures are often not appropriate or sufficient to drive transportation agency investment decisions.

Cross-cutting

The federal measures are best for providing a network-level snapshot of the system, whereas state performance measures are more suitable for making planning and programming decisions. (See potential mitigation actions E.10.1., G.10.1., P.10.1.)

Safety

Changes in performance result from a number of factors besides the impact of investments. Additional measures are needed for decision support. (See potential mitigation actions E.10.1., T.10.1., P.10.1.)

Bridge

Focusing on the percent poor may lead to suboptimal decision-making (worst-first) or create a conflict between the actual decisions made and the reporting of progress toward thresholds based on federal TPM requirements. (See potential mitigation actions E.10.1., G.10.2., G.10.3., R.10.1., P.10.1.)

Pavement

The pavement measure may not be suitable for driving asset-level decisions. Agencies typically prefer to quantify overall roadway conditions for programming and planning rather than relying on a distribution of pavement conditions for each 0.1 mile segment. Additionally, focusing on the percent poor may lead to suboptimal decision-making (worst-first). The 0.1 mile segments are contrary to the current focus on logical segments of pavement that would then lend themselves to pavement projects. Additionally, the pavement measure may be constructed to inflate % Fair

Practitioner Input

"The FHWA Pavement criteria are very limited in scope and does not give the same picture as our [ratings] utilized in our TAMP."

"The reduction in CO emissions (in kg/day) from federally funded CMAQ projects in years 2009-2017 displayed no clear pattern."

such that its results are not actionable in a manner consistent with established asset management strategies. (See potential mitigation actions E.10.1., G.10.2., G.10.3., R.10.1., P.10.1.)

Mobility

Changes in mobility performance results from a number of factors besides the impact of investment decisions. Additional measures are needed for decision support. (See potential mitigation actions E.10.1., G.10.2., R.10.1., P.10.1.)

Emissions

Changes in emissions performance results from a number of factors besides the impact of investment decisions, may not occur in the initial obligation year, or may be qualitative. Further, the specific CMAQ investments in a given year may have a significantly different impact on the various pollutant reduction calculations. Additional measures are needed for decision support. (See potential mitigation actions E.10.1., G.10.2., R.10.1., P.10.1.)

Transit

Individual assets may be in good repair even if they aren't classified as such. Other assets may require work even if classified as being in good repair. (See potential mitigation actions E.10.1., G.10.2., R.10.1., P.10.1.)

Potential Mitigation Actions

Engagement

E.10.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs, MPOs and transit operators for sharing information on using performance measures for decision support and making transportation investments.

Performance area(s): Cross-cutting, Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs, transit operators

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Practitioner Input

"The Percent of Pavements of the Interstate System in Poor Condition over a four-year period is impacted by investment level as well as by decisions about preservation versus rehabilitation. Solely focusing on minimizing "Percent of Pavements of the Interstate System in Poor condition" over a four-year period can lead to "worst-first" investment (many pavements resurfaced will be in "good" condition for a short period of time regardless of long-term performance). The targets set in this measure are the expression, in terms of the national performance, of the execution of the TAMP, following the best available understanding and application of asset management principles, and are not used to drive our investment strategy, with the possible exception of the constraint of minimum condition levels (5% Poor on the Interstate network) set forth in the CFR."

Barriers: Existence of noteworthy practices on using performance measures for decision support and making and transportation investments, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

Guidance

G.10.1. Provide content on communicating the differences between state and federal measures and cross-walking between state measures and federal measures and their uses.

Performance area(s): Cross-cutting

Responsibility: TPM Pooled Fund, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about existing practices in communicating the differences between federal measures and their uses

Analytical Complexity: Low-medium, depending on the scope

Barriers: Funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on existing information and case examples that can be used to develop the content

First step: Evaluate existing practices and related research

G.10.2. Develop a set of examples describing what different measures show, what decisions they may support, and the outcomes they could achieve.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: TPM Pooled Fund, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Existing case examples, including the differences they show, the decisions they support and the outcomes they have helped achieve

Analytical Complexity: Low-medium, depending on the scope

Barriers: Funding, sponsorship

Potential for improving TPM results: Low-Medium, depending on whether the case examples are applicable to other agencies

Cost: $ to S$, depending on existing information and case examples that can be used to develop the content

First step: Evaluate existing case examples

G.10.3. Develop a mechanism for establishing targets based on what can be predicted, and then create a crosswalk for federal reporting targets.

Performance area(s): Pavement, Bridge

Responsibility: State DOTs

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about methods used for establishing pavement and bridge targets used for planning and programming and potential mechanisms for cross walking the associated target conditions with federal report targets to ensure alignment

Analytical Complexity: Low-medium

Barriers: Sponsorship

Potential for improving TPM results: Low-medium

Cost: $ for gathering the information; any costs associated with implementing and maintaining a tool would be additional

First step: Document the two sets of information

Research

R.10.1. Conduct research to demonstrate a crosswalk that would show the impact of using federal measures for planning and programming. This research (or a separate effort) could demonstrate how to calculate national measures from more detailed state data. Develop a tool to demonstrate the crosswalk and the calculation.

Performance area(s): Safety, Bridge, Pavement, Mobility, Emissions, Transit

Responsibility: NAS, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about federal measures and measures used for planning and programming

Analytical Complexity: Medium-High

Barriers: Willingness of agencies to share data for the research, funding, sponsorship

Potential for improving TPM results: Low over the short term; additional benefits could be achieved through translation of the results and any resulting tools into practice

Cost: $$$

First step: Develop the research problem statement

Training

T.10.1. Conduct training and provide trust-building on various federal measures and how they can support decision making.

Performance area(s): Cross-cutting, assuming an evaluation would first be performed across all performance areas for federal measures that are also useful for making planning and programming decisions within agencies

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Data about federal measures that are suitable for making project and programming decisions

Analytical Complexity: Medium

Barriers: Suitability of federal measures to drive decision-making

Potential for improving TPM results: Low, assuming most agencies are already considering a menu of measures that are suitable for making their planning and programming decisions, regardless of whether those measures are also required for federal reporting

Cost: $-$$, depending on whether the training is online or in-person

First step: Identify any remaining gaps that the existing training does not address and developing a course plan

Policy and Regulatory

P.10.1. Facilitate dialogue between FHWA and the states on issues related to measure construction and implementation with the objective of better aligning measures with state decision making and regulatory intent. Revisit performance measure construction and/or provide flexibility on thresholds reported. Assess the impact of this change after a defined period.

Performance area(s): Depending on the scope of the change, this potential mitigation could affect Pavement, Mobility

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about the measures reported for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Potential ranges from low from the federal perspective – since it may make it more difficult to gain a national-level view of performance, to very high – if the measures can better align with intent, be more actionable, and provide better linkages between state and federal measures.

Cost: TBD

First step: Perform a survey of measures for each of the affected performance measure areas and determine feasibility; determine the regulatory and process steps necessary to make the change

Example Application of Mitigating Actions

One State DOT has changed its planning and programming process to incorporate TPM. This agency assesses projects based on their ability to meeting certain goals, including expansion, modernization and preservation. They weigh performance factors into this existing decision making process. For example, modernization projects are heavily weighted for their ability to achieve safety outcomes.

11

Theme 4. Integration with Agency Business Processes and Practices

11. Internal Communication and Coordination

Internal communication and coordination can be hindered by the fact that performance area expertise and program and project knowledge within each performance area are often needed to support TPM data collection, analysis and reporting, working against the concept of TPM as a cross-cutting activity across the agency.

Issues

Organizational silos and reliance on SMEs may hinder the provisioning of necessary data for TPM and/or development of TPM infrastructure.

Cross-cutting

In agencies where TPM functions are centralized but data is provided by subject matter staff, staff responsible for federal reporting may not have the technical knowledge to analyze data and often rely on subject matter experts (SMEs) for supporting the data mining and analysis function for some TPM measures. In agencies where TPM functions depend solely on business area SMEs, TPM is often viewed as an "extra reporting activity," which is contrary to the view of TPM as an enterprise management system. (See potential mitigation actions E.11.1., E.11.2., G.11.1., G.11.2., G.11.3.)

Practitioner Input

"We have siloes. Our process is centralized, but our decision-making is decentralized. Our regions make the decisions within a set of 'rules.'... Leveraging TPM to influence those decisions has been its biggest impact."

Potential Mitigation Actions

Engagement

E.11.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs for sharing information on using performance measures for decision making and making transportation investments and showcase examples of agencies that have developed effective agency-wide structures for supporting TPM.

Performance area(s): Cross-cutting

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices on using performance measures for decision making and investments, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources at: tpm-portal.com/ret/

E.11.2. Engage the FHWA Resource Centers in breaking down communication barriers within and across performance areas.

Performance area(s): Cross-cutting

Responsibility: FHWA Resource Centers

Key Stakeholders: State DOTs

Additional data or information needed: Information about existing communication barriers

Analytical Complexity: Low, but State DOT and FHWA resource center relationships vary and State DOT organizational issues could potentially be complex

Barriers: State DOT and FHWA Resource Center relationships, State DOT organizational structures

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the activities are currently within the scope of the FHWA Resource Center duties or planned activities

First step: Determine the extent and nature of the communication barriers

Guidance

G.11.1. Promote use of the Agency Capability Building (ACB) Portal's position descriptions (Developed through NCHRP 20-24(95), "Ensuring Essential Capability for the Future

Transportation Agency") to assist agencies in building job descriptions for emerging transportation fields, such as staff specializing in centralized data management and serving as liaisons with SMEs.

Performance area(s): Cross-cutting

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs

Additional data or information needed: Information about the type of job descriptions needed by agencies

Analytical Complexity: Low

Barriers: Availability of needed job descriptions

Potential for improving TPM results: Low-Medium, depending on the Delta between practitioners already using the tool and the additional users reached through the promotional activities

Cost: $, since a mechanism to view and submit job descriptions is already available at: https://www.agencycapability.com and assuming the marginal cost to add job descriptions is very low

First step: Develop a promotional plan (assuming the needed job descriptions are available)

G.11.2. Provide information about data packages that integrate different data sets so staff responsible for reporting do not have to rely as heavily on SMEs in separate business areas.

Performance area(s): Cross-cutting

Responsibility: State DOTs, FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs

Additional data or information needed: Information about existing data packages for integrating various data sets

Analytical Complexity: Low-medium

Barriers: Sponsorship

Potential for improving TPM results: Low-medium, depending on the scope of the integration

Cost: $ for gathering the information, any costs associated with implementing and maintaining a tool would be additional

Practitioner Input

"I'm pretty sure that there will always be a disconnect between what the feds are trying to get (network level summary analysis) verses what pavement management needs to do (project level selection analysis). I believe this is important to consider and perhaps provide commentary on this going forward with respect to this effort. High level managers have been confused on this matter and have wanted their staff to change what they were doing and adopt the new federal measures for their pavement management selection effort."

First step: Develop a list of available software solutions that fulfill data integration needs

G.11.3. Conduct a gap assessment using the FHWA TPM Assessment Tool at: https://assessment.tpmtools.org to determine actions to break down communication barriers.

Performance area(s): Cross-cutting

Responsibility: State DOTs, TPM Pooled Fund

Key Stakeholders: State DOTs

Additional data or information needed: Information about the agency's communication practices and maturity

Analytical Complexity: Low to conduct the assessment; additional analytical complexity may be needed to develop and implement an action plan to close gaps and move to the next level of maturity

Barriers: Knowledge of and agreement on the current level of communication maturity and agreement on who should participate in the assessment

Potential for improving TPM results: Low-Medium, depending on the currently gaps and the potential maturity gains

Cost: $ to conduct the assessment; additional cost may be needed to develop and implement an action plan to close gaps and move to the next level of maturity

First step: Determine the business areas or SMEs who will be part of the assessment and conduct the assessment with those designated individuals

Example Application of Mitigating Actions

One State DOT has created several new positions within the agency to coordinate "data herding" and liaise with various business areas responsible for providing data used for reporting federal performance measures. This ensures a single area in charge of reporting while holding the appropriate SMEs responsible for their contributions to the measures.

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Theme 4. Integration with Agency Business Processes and Practices

12. Alignment of State and Federal Calendars

Data and targets are required at different times from one another and often conflict with State calendars, disrupting the programming process.

Issues

The reporting calendar is misaligned with agency calendars for planning and programming, as well as other reporting deadlines, for example, NHTSA and FTA reporting timelines.

Cross-cutting

TPM requirements include numerous targets, data, plans and reporting timelines for each of the performance measurement areas in addition to State DOT, MPO, and transit-agency specific planning cycles and other reporting requirements. (See potential mitigation actions E.12.1., E.12.2., G.12.1., G.12.2., P.12.1., P.12.2. (Safety, Transit), P.12.3. (Safety, Pavement, Transit)

Potential Mitigation Actions

Engagement

E.12.1. Develop a peer exchange, webinar(s), or similar forum to showcase successful adjustments that have been made within State DOTs and MPOs to align their internal planning and programming processes with federal timelines.

Performance area(s): Cross-cutting

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs, transit operators

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Practitioner Input

"Some measures are annual, others are biennial or more, and we will be putting the targets into a plan that is updated every 5 years. So the targets could change before we can use the plan to achieve the prior set."

"Safety set over a year in August; PM2 over every 2 years; PM3 over every 2 years; Transit asset management every year in October; Many different TPM requirements that are not associated with each other."

"The targets, plans, data and reports have different due dates (NHTSA, FHWA, FTA) which is disruptive to the planning/ programming processes, not just for State DOTs but also MPOs and transit agencies. Streamline these due dates to align more closely with the processes."

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices in making successful adjustments that have been made within State DOTs and MPOs to align their internal planning and programming processes with federal timelines

Potential for improving TPM results: Low-medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

E.12.2. Facilitate the coordination between NHTSA and FHWA and between FHWA and FTA.

Performance area(s): Cross-cutting

Responsibility: FHWA, NHTSA, FTA

Key Stakeholders: State DOTs, transit agencies

Additional data or information needed: Information about gaps in coordinating

Analytical Complexity: Low, but relationships vary and organizational issues among the responsible groups could potentially be complex

Barriers: Relationships, organizational structures, openness to coordination

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the effort is currently within the scope of the agencies' duties and planned activities and whether an outside facilitator is needed

First step: Determine the extent and nature of the coordination gaps

Guidance

G.12.1. Promote the Calendar of TPM Deadlines on the TPM Portal.

Performance area(s): Cross-cutting

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs

Additional data or information needed: Agency contact information

Analytical Complexity: Low

Barriers: Assuming the information is current, there are none; the information is available at: https://www.tpm-portal.com/tpm-deadlines/

Potential for improving TPM results: Low-Medium, depending on the Delta between practitioners already using the tool and the additional users reached through the promotional activities

Cost: $, since the information is already available and assuming the marginal cost to add additional deadlines over time is very low

First step: Develop a promotional plan

G.12.2. *Update a*nd *enhance the functionality of the* TPM Timeline Tool available at: http://www.tpmtimeline.tpm-portal.com/ *on the TPM Portal* and promote the updated tool
Performance area(s): Cross-cutting

Responsibility: TPM Pooled Fund

Key Stakeholders: State DOTs

Additional data or information needed: Enhancements needed

Analytical Complexity: Low

Barriers: IT resources available to implement the enhancements

Potential for improving TPM results: Low-Medium, depending on the Delta between the current value of the tool to practitioners and the additional users using the enhanced tool

Cost: $, since basic information is already available and assuming the marginal cost to enhance the tool is not extensive

First step: Develop an implementation scope and plan

Policy and Regulatory

P.12.1. Facilitate dialogue between FHWA and the States to clearly define the impacts of these various reporting deadlines and work towards regulatory changes, where needed, to better align when reports are due. This effort should also assess the costs and benefits of permitting flexibility, i.e., "reporting windows" for submitting the required reports with the same frequency as stipulated, aligned with internal process timelines. Revisit the impact of this change after a defined period.

Performance area(s): Depending on the scope, this potential mitigation could affect Safety, Bridge, Pavement, Mobility, Emissions, Freight or Transit or it could apply broadly to TPM.

Responsibility: FHWA and FTA

Practitioner Input

"Eliminate 2 deadlines of HPMS data, make it all one date (either April or June) as it requires additional resource time for State DOTs as well as FHWA to verify the data. If changes are made to the HPMS program it would be beneficial to have before a couple of weeks before the deadline. Also, it would help to be able to run validations or tops faster closer to the deadline."

"Better coordination between NHTSA and FHWA and between FHWA and FTA to ensure they are not complicating the processes, due dates and reporting requirements."

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Data to determine the costs and benefits of providing flexibility for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

P.12.2. Assess the costs and benefits of making adjustments to the timeframes for the reporting requirements of other federal agencies (NHTSA, FTA, for example).

Performance area(s): Safety, Transit

Responsibility: FHWA and FTA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Data to determine the costs and benefits of adjusting reporting requirements of other federal agencies for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

P.12.3. *Reduce the number of deadlines for other data submittals (in HPMS, for example).*

Performance area(s): Safety, Pavement, Transit

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Data to determine the costs and benefits of reducing the number of deadlines for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

13

Theme 3. Data Quality and Reliability

13. Accommodating Incomplete Baseline and Historical Data

In many cases agencies lack previous data need to help analyze performance trends.

Issues

Agencies lack baseline data for pavement and mobility measures.

Pavement

A lack of baseline data is an issue for establishing projections and setting pavement measure targets. In some cases, there are new categories or methodologies, and in other cases the existing baseline data is not the same as the data needed to report on federal pavement measures. (See potential mitigation actions E.13.1., R.13.1., T.13.1.)

Mobility

A lack of baseline data is an issue for establishing projections and setting system performance measure targets for reliability, congestion and emissions reductions. (See potential mitigation actions R.13.1.)

Emissions

A lack of baseline data is an issue for establishing projections and setting system performance measure targets for reliability, congestion and emissions reductions. (See potential mitigation actions R.13.1.)

Potential Mitigation Actions

Engagement

E.13.1. Facilitate FHWA's expansion of HPMS samples to supply historical data for cracking.

Performance area(s): Pavement

Responsibility: FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs

Practitioner Input

"...major technological advances in pavement surface distress sensing, and methodology differences have made it impossible to use historical data using all three metrics (distress, rutting/faulting, and IRI). 2016 is the first year when new pavement-distress-collection equipment and technology produced data using current methods."

"[The DOT] used full extent (IRI, cracking, rutting or faulting) pavement condition data as the basis for target establishment. Since the baseline was determined by measuring IRI only the targets and the baseline are not directly comparable."

Additional data or information needed: Information about barriers to expanding HPMS samples to providing historical data for cracking

Analytical Complexity: Low-Medium

Barriers: Bureaucratic structures, system limitations

Potential for improving TPM results: Low, assuming the value of baseline information decreases as more years of new measurement data become available

Cost: $ to S$, depending on whether the effort is currently within the scope of FHWA's duties and planned activities and whether an outside facilitator is needed

First step: Develop technical and business requirements

Practitioner Input

"...Besides this being a new data set for many states, a change in data vendors for the National Performance Management Data Set (NPMRDS) in July 2017 meant there was little historical information to derive trends."

Research

R.13.1. Conduct research to demonstrate new methods for converting or correlating "old data" for performance measurement areas with new data that is available for federal measures. This scope could optionally be expanded to consider forecasting mechanisms and approaches more broadly.

Performance area(s): Pavement, Mobility, Emissions

Responsibility: State DOTs, NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sample legacy and new data

Analytical Complexity: Medium-High, depending on whether the materials are being developed by an individual State DOT or for the benefit of multiple State DOTs with a shared interest in the research

Barriers: Sponsorship, possibly funding, depending on the scope of the research

Potential for improving TPM results: Low, assuming the value of baseline information decreases as more years of new measurement data become available

Cost: $$ to $$$

First step: Develop a research statement

Training

T.13.1. Provide training on techniques to improve historical cracking samples.

Performance area(s): Pavement

Responsibility: FHWA

Key Stakeholders: State DOTs

Additional data or information needed: Data about historical cracking samples, information about sampling techniques

Analytical Complexity: Medium

Barriers: Existence of techniques that could improve historical cracking samples

Potential for improving TPM results: Low, assuming the value of baseline information decreases as more years of new measurement data become available

Cost: $-$$, depending on whether the training is online or in-person

First step: Identify needed information about sampling techniques and developing a course plan

14. Differences from Established Data Sets

Differences between the data sets used for the federal measures and other data sets complicate efforts to use the measures and targets.

Issues

There are divergences between historical data sets used by agencies and data sets used for meeting federal TPM requirements.

Safety

The Strategic Highway Safety Plan (SHSP) goals and federal reporting targets may be established using different reporting periods making it challenging for states to coordinate or reconcile SHSP and TPM targets. (See potential mitigation action P.14.1.)

Bridge

The federal measure is based on summary-level condition ratings rather than element condition data, which is also required for the NHS and is ostensibly more accurate. (See potential mitigation actions P.14.2.)

Pavement

Approaches for measuring pavement condition may vary from prior agency practice. (See potential mitigation actions E.14.1., R.14.1., T.14.1.)

Mobility

It can be difficult to align the network segments in the NPMRDS for any given year with those of prior years or other data sets. (See potential mitigation action P.14.1.)

Practitioner Input

"It should be noted that the above "projections" are not the same as the SHSP goals because the SHSP goals were based on the calendar years during the economic downturn, reduced VMT and lower numbers of crashes. The current projections are based on the most current crash data and VMT which has been steadily increasing."

"Changes in the number of TMCs and segment breaks have made the analysis difficult."

Potential Mitigation Actions

Engagement

E.14.1. Facilitate FHWA's expansion of HPMS samples to supply historical data for cracking.

Performance area(s): Pavement

Responsibility: AASHTO, FHWA

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about gaps in historical data

Analytical Complexity: Low

Barriers: Relationships, organizational structures, openness to coordination

Potential for improving TPM results: Low, assuming the value of baseline information decreases as more years of new measurement data become available

Cost: $ to S$, depending on whether the effort is currently within the scope of the agencies' duties and planned activities and whether an outside facilitator is needed

First step: Determine the extent and nature of the data gaps

Research

R.14.1. Conduct research to demonstrate new methods for converting or correlating "old data" with new data for pavement measures.

Performance area(s): Pavement

Responsibility: State DOTs, NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sample legacy and new data

Analytical Complexity: Medium-High, depending on whether the materials are being developed by an individual State DOT or for the benefit of multiple State DOTs with a shared interest in the research

Barriers: Sponsorship, possibly funding, depending on the scope of the research

Potential for improving TPM results: Low, assuming the value of baseline information decreases as more years of new measurement data become available

Cost: $$ to $$$

First step: Develop a research statement

R.14.3. Conduct research to assess the impact of year-to-year variation in TMCs and coverage in the NPMRDS.

Performance area(s): Mobility

Responsibility: State DOTs, NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: NPMRDS

Analytical Complexity: Medium-High, depending on whether the materials are being developed by an individual State DOT or for the benefit of multiple State DOTs with a shared interest in the research

Barriers: Sponsorship, possibly funding, depending on the scope of the research

Potential for improving TPM results: Medium, however it is noted that assessing the impact and potential for improvement is the purpose of the potential action.

Cost: $$ to $$$

First step: Develop a research statement

Training

T. 14.1. Provide training on techniques to improve historical cracking samples.

Performance area(s): Pavement

Responsibility: State DOTs, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about gaps and existing practices

Analytical Complexity: Low-Medium

Barriers: Funding, sponsoring

Potential for improving TPM results: Low, assuming gaps will close with experience and additional years of data

Cost: $-$$, depending on whether the training is online or in-person

First step: Identify any remaining gaps that the existing training does not address and developing a course plan

Policy and Regulatory

P.14.1. Assess the costs and benefits of making federal timeline changes to support timely data provisioning or alignment of TPM reporting calendar with schedules for providing standard data sets.

Performance area(s): Safety

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Data to determine the costs and benefits of adjusting federal timeline changes for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

P.14.2. Explore costs and benefits of a policy or regulatory change to provide target setting flexibility so existing requirements are aligned with agency practices

Performance area(s): Pavement, Bridge

Responsibility: FHWA

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Data to determine the costs and benefits of providing flexibility for target setting for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

15

Theme 2. Alignment of Reporting and Management Responsibilities

15. Motivation to Set PessimisticTargets

Agencies may have incentives to set overly pessimistic targets. This may be due to limitations in data, forecasting capabilities, concerns about the measures, and the way targets are used in the regulations.

Issues

Agencies may be challenged to avoid overly pessimistic targets.

Safety

Measure limitations related to significant externalities, misalignment of programming and project development timeframes, and concerns related to performance requirements and associated consequences may all combine to incentivize pessimistic target setting. (See potential mitigation actions E.15.1., G.15.1., R.15.1., P.15.1.)

Pavement

Measure limitations, misalignment of programming and project development timeframes, and concerns related to performance requirements and associated consequences may all combine to incentivize pessimistic target setting. (See potential mitigation actions E.15.1., G.15.1., R.15.1., P.15.1.)

Mobility

Measure limitations, programming and project development timeframes may combine to incentivize pessimistic target setting. (See potential mitigation actions E.15.1., E.15.2., G.15.1., R.15.1., P.15.1.)

Emissions

Measure limitations, programming and project development timeframes may combine to incentivize pessimistic target setting. (See potential mitigation actions E.15.1., E.15.2., G.15.1., R.15.1., P.15.1.)

Practitioner Input

"Why doesn't setting a more aggressive safety target come with increased financial resources to help achieve that target? We're also already programming projects out well past 2021 - it's not clear how those investments will improve safety next year."

"Safety is the PM over which we have the least control with engineering solutions so the MPO will most likely continue to be cautious in target setting."

"Conservative targets are recommended due to several factors that include data gaps to quantify benefits from certain measures and uncertainty in forecasting future reductions based on year-to-year variability in historical CMAQ funded project benefits."

Potential Mitigation Actions

Engagement

E.15.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs for sharing lessons learned and successful practices related to performance benchmarking.

Performance area(s): Safety, Pavement, Mobility, Emissions

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices on using performance measures for decision making and investments, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

E.15.2. Support the establishment of a network or directory of agency staff to build knowledge with respect to performance benchmarking for system performance and emissions measures.

Performance area(s): Mobility, Emissions

Responsibility: AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, large MPOs

Additional data or information needed: Contact information for national leaders in system performance/reliability and CMAQ measures, peer groups

Analytical Complexity: Low

Barriers: Expert willingness to participate in the directory and benchmarking efforts; Maintenance and upkeep of the directory as staff change roles, retire, etc.

Potential for improving TPM results: Low-Medium, depending on the group's level of participation

Practitioner Input

"COVID really brings up this issue related to the short-term time frames of some targets. Targets are short-term, 1- 2- 4-years. Our ability to impact the system on that time horizon approaches zero, quickly. No CEO wants to get a letter that implies they didn't do something right if [a target] isn't met. Our agency is more interested in a 10-year timeframe, and then asking where do we expect to be along the way."

Cost: $, assuming the directory is posted on the TPM Portal at: tpm-portal.com and the experts were able to leverage the existing TPM Benchmarking Tool at: https://benchmarking.tpm-portal.com/

Guidance

G.15.1. Prepare guidebook, practicum or collection of noteworthy practices on developing meaningful performance targets. The guidebook or practicum should address practical constraints and other limitations faced by TPM practitioners.

Performance area(s): Safety, Pavement, Mobility, Emissions

Responsibility: FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about existing practices and case examples, including information about the constraints, the adjustments agencies have made and the outcomes they have helped achieve

Analytical Complexity: Low-medium, depending on the scope

Barriers: Availability of best practices, funding, sponsorship

Potential for improving TPM results: Low-Medium, depending on whether the case examples are applicable to other agencies

Cost: $ to S$, depending on existing information and case examples that can be used to develop the content

First step: Evaluate existing case examples

Research

R.15.1. Conduct research to develop a target setting playbook.

Performance area(s): Safety, Pavement, Mobility, Emissions

Responsibility: State DOTs, NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about existing practices and case examples

Analytical Complexity: Medium-High, depending on whether the materials are being developed by an individual State DOT or for the benefit of multiple State DOTs with a shared interest in the research

Barriers: Sponsorship, possibly funding, depending on the scope of the research

Potential for improving TPM results: Low-Medium

Cost: $$ to $$$

First step: Develop a research statement

Policy Change or Regulatory Action

P.15.1. Explore costs and benefits of a policy or regulatory change to provide target setting flexibility so existing requirements are aligned with agency practices (for example, aspirational safety targets).

Performance area(s): Depending on the scope, this potential mitigation could affect Safety, Pavement, Mobility, Emissions

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Data to determine the costs and benefits of providing flexibility for the selected performance area(s). This may include supporting aspirational targets by removing penalties associated with significant progress determination.

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change(s). Note that the actions as described may entail modifications to both legislation and regulation.

16

Theme 3. Data Availability and Quality

16. Reliance on Partners' Resources, Tools, and Knowledge

There may be barriers to some MPOs developing the analytical and data science capabilities required to develop their own targets (should they opt to do so) or to fully understand statewide targets. It can also be challenging for agencies to pool resources and provide access to systems needed for analysis.

Issues

While TPM is an inherently collaborative process, MPOs often lack specific analytical capabilities, and may opt to support statewide targets by default rather than investing in the resources, systems and knowledge to set their own targets.

Bridge

MPOs may lack the technical skills to carry out some data analytics and predictive modeling for bridge measures. It is probably not necessary for smaller MPOs to invest in extensive new capabilities if they can reasonably assert that the TIP's programming and projects are supporting the statewide targets. If they opt to support statewide targets, they may desire additional insight into the target setting process. If they opt to set their own targets, they may need to rely on the State DOT or consultants to complete essential analyses. (See potential mitigation actions E.16.1.,G.16.1., R.16.1., T.16.1.)

Pavement

MPOs may lack the technical skills to carry out some data analytics and predictive modeling for pavement measures. It is probably not necessary for smaller MPOs to invest in extensive new capabilities if they can reasonably assert that the TIP's programming and projects are supporting the statewide targets. If they opt to support statewide targets, they may desire additional insight into the target setting process. If they opt to set their own targets, they may need to rely on the State DOT or consultants to complete essential analyses. (See potential mitigation actions E.16.1.,G.16.1., R.16.1., T.16.1.)

Practitioner Input

"It's more important to have resources at the State DOT to assist MPOs than to have MPO expertise in all areas. It's easier to have all info from States to be able to then internalize and analyze for [the MPO]."

"Need more structure on data analytics (NPMRDS [analytical support] costs too much); one State DOT purchased it, the other didn't so MPO spent over $100,000 by themselves trying to do analysis. This is not a good use of federal or state funds. It's better to have State purchase & share with all MPOs."

"Lack of national data for some measures is a challenge for transportation agencies who do not own the assets, as well as for MPOs who have to rely on State DOTs to provide data."

Mobility

MPOs may lack the technical skills to carry out some data analytics and predictive modeling for mobility measures. It is probably not necessary for smaller MPOs to invest in extensive new capabilities if they can reasonably assert that the TIP's programming and projects are supporting the statewide targets. If they opt to support statewide targets, they may desire additional insight into the target setting process. If they opt to set their own targets, they may need to rely on the State DOT or consultants to complete essential analyses. (See potential mitigation actions E.16.1., G.16.1., R.16.2.)

Potential Mitigation Actions

Engagement

E.16.1. Develop a peer exchange(s), webinar(s), or similar forum for State DOTs and MPOs for sharing lessons learned and successful practices of aligning incentives for organizations taking on new and different roles.

Performance area(s): Bridge, Pavement, Mobility

Responsibility: Regional exchange partners (DOTs, MPOs), AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Sponsor and stakeholder input on topic(s), noteworthy practices

Analytical Complexity: Medium

Barriers: Existence of noteworthy practices on using performance measures for decision making and investments, funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$, depending on whether the event is virtual or in-person

First step: Determine the topic(s) with stakeholder input, review Regional Exchange Toolbox resources

Guidance

G.16.1. Develop a guidebook, practicum or collection of noteworthy practices to help establish clear practices and standards for DOTs and other transportation agencies to pool resources for analysis, especially for issues that are not suitable for broader pooled fund mechanisms

Performance area(s): This potential mitigation could affect one or more of Bridge, Pavement and Mobility

Responsibility: AASHTO, FHWA, TPM Pooled Fund

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Information about the state of practice in state agency and MPO collaboration practices and standards

Analytical Complexity: Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Medium

Cost: $ to S$

First step: Determine existing gaps in practices and standards

Research

R.16.1. Develop research statements based on the research needs identified in NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published).

Performance area(s): Bridge, Pavement

Responsibility: NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Results of *NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published)*

Analytical Complexity: Low

Barriers: Funding, sponsorship

Potential for improving TPM results: High

Cost: $, to develop the initial research problem statements based on the current research (the cost of the actual research is unknown until the project results have been published and disseminated)

First step: Review the recommendations and develop the research problem statement(s)

R.16.2. Research to identify leading State DOTs and MPOs, demonstrate the value of strong coordination and identify implementable models of successful practices for State DOT and MPO collaboration for mobility.

Performance area(s): Mobility

Responsibility: NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, large MPOs

Additional data or information needed: Information about existing collaboration processes, possibly leveraging the approach used for developing the research statement for NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations"

Analytical Complexity: Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Low; additional value would be achieved through dissemination of the research findings and subsequent activities

Cost: $$-$$$

First step: Develop the research problem statement

Training

T.16.1. Disseminate the results of NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published).

Performance area(s): Bridge, Pavement

Responsibility: TPM Pooled Fund, AASHTO, FHWA

Key Stakeholders: State DOTs, MPOs

Additional data or information needed: Results of NCHRP Project 20-25, Synthesis Topic 51-05, "Practices for Coordinating Asset Management, Performance Management, and Monitoring between State Transportation Agencies and Metropolitan Planning Organizations" (when published)

Analytical Complexity: Low

Barriers: None

Potential for improving TPM results: Low-Medium

Cost: $

First step: Review the recommendations and develop the promotional plan

17

Theme 1. Ability to Support Decision-Making

17. Reliance on Thresholds

Certain measures are calculated using threshold values. Small changes in how the measures are defined may have a significant impact on the calculations.

Issues

Use of (categorical) thresholds in defining the measures for infrastructure and transit measures.

Bridge

Agencies may have formerly treated a bridge with a minimum condition rating of '6' as being in good condition. However, these are now assessed as being in fair condition. (See potential mitigation actions R.17.2.)

Pavement

The IRI thresholds for pavement result in a large fraction of pavement being classified as being in fair condition - much larger than that calculated using alternative measures. (See potential mitigation actions R.17.2., P.17.1.)

Transit

There are many questions about how to appropriately set useful life baseline (ULB) values for vehicles if using values other than the federal defaults (thresholds). (See potential mitigation actions R.17.1., R.17.2., P.17.1.)

Potential Mitigation Actions

Research

R.17.1. Conduct research to develop guidebook, practicum or collection of noteworthy practices on establishing ULB values.

Performance area(s): Transit

Responsibility: NAS, FHWA, FTA, State DOTs and Regional Partners

Key Stakeholders: State DOTs, transit agencies

Practitioner Input

"The 2-year target for the statewide percentage of deck area of bridges on the NHS classified as in Good condition has been set the same as our baseline value of 13.4%. The reason for this is two-fold; first, this is the first year that we are reporting Fair condition bridges as a 5 and 6 for the lowest NBI Condition Ratings for deck, super, sub, and culverts. As such, most of our projects that are already planned over the next two years are primarily addressing bridges that meet the old definition of Fair condition (NBI Condition Rating = 5) and Poor bridges. Second, while we have a fairly good understanding as to how many bridges will have a condition rating drop from a 6 to a 5 from inspection to the next, we have less confidence in our ability to predict how many bridges will have a condition rating drop from a 7 to a 6. A bridge can more easily become a 6 versus a bridge that is already 6 dropping to a 5."

Additional data or information needed: Information about existing practices in setting ULB values

Analytical Complexity: Low-Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Low, assuming agencies are able to use the default federal values

Cost: $$

First step: Develop the research problem statement

R.17.2. Conduct research to assess impact of thresholds and to identify detailed mitigation strategies for related issues.

Performance area(s): Bridge, Pavement, Transit

Responsibility: NAS, FHWA, FTA, State DOTs and Regional Partners

Key Stakeholders: State DOTs, transit agencies

Additional data or information needed: Sample performance data before and after the threshold was established

Analytical Complexity: Low-Medium

Barriers: Funding, sponsorship

Potential for improving TPM results: Low-Medium

Cost: $$

First step: Develop the research problem statement

Practitioner Input

We are finding the IRI threshold for "good" pavement is too stringent for non-interstate NHS. When we do preventive maintenance on some assets (even when this is the correct asset management treatment), IRI may not measure as "good" after the treatment based on current thresholds given the harsh northeast climate or issues such as manholes on urban roadways (comes out at the 0.1 mile segment level required reporting). Raising the IRI threshold to 120 for "good" on non-interstate pavements would help.

Policy Change or Regulatory Action

P.17.1. *Assess the costs and benefits of a policy* or regulatory *change to adjust thresholds, provide optionality, finer categories, or other modifications.*

Performance area(s): Bridge, Pavement, Transit

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Data to determine the costs and benefits of adjusting thresholds or making other modifications for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

Theme 3. Data Availability and Quality

18. Data Availability and Quality Issues

For both agency data and standard data sets, data lags, gaps and quality issues complicate interpretation and target setting.

Issues

All transportation agencies depend on data, and most also rely on standard data sets. With TPM, they may face challenges related to the quality of data sets, discrepancies in data collection timeframes for the same reporting year or missing data.

Cross-cutting

Agencies face challenges in reconciling discrepancies in data collection and reporting timeframes across standard data sets. (See potential mitigation actions P.18.1.)

Safety

There is a significant lag between when crashes occur and when the FARS is updated. Preliminary FARS data can be used for target setting. There are data quality issues related to partner/stakeholder implementation of the updated Suspected Serious Injury definition. (See potential mitigation actions P.18.1.)

Pavement

Post processing helps resolve some data quality issues but can be very expensive. Even with substantial data collection and post processing effort, agencies may find a large number of errors that must be corrected. In addition, only 5 percent of data can be missing (additional missing data counts as poor). (See potential mitigation actions G.18.1., R.18.1., R.18.2., P.18.1., P.18.2.)

Practitioner Input

Using 2-year-old data to set short term targets makes it challenging to be accurate; having inconsistent data (e.g., NPRMDS changing with a new contract) also makes it challenging to set meaningful targets with little history to review. Having FARS, NBI, HPMS, NTD, NPMRDS reflect the same dates (for 2019, should all be at least 2017 or current) would help.

"Fatality Values are based on the actual fatality numbers for 2009-2014 and the preliminary National Safety Council numbers for 2016 and 2017 as FARS data has been historically wrong due to numbers being reported before the entries are completed in final FARS. All serious injury numbers are based on State Crash Data. Annual VMT for 2016 and 2017 is derived from State Data as FARS has not reported these numbers

Mobility

There are gaps in the NPMRDS due to probe data gaps and other issues. ACS data may not provide sufficient Non-SOV measure. Lagging ACS data can make it challenging to report the Non-SOV measure. (See potential mitigation actions G.18.1., R.18.1., P.18.1.)

Potential Mitigation Actions

Guidance

G.18.1. Develop standard approaches for coordinating federal data sets to reflect common reporting years.

Performance area(s): Pavement, Mobility

Responsibility: FHWA, AASHTO, TPM Pooled Fund

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about existing practices in coordinating federal data sets for the selected performance area(s)

Analytical Complexity: Medium-High

Barriers: Funding

Potential for improving TPM results: Medium

Cost: $ to S$, depending on the complexity and feasibility of developing standard approaches that can be used across agencies

First step: Evaluate existing reporting year coordination approaches

Research

R.18.1. Conduct research to assess how to best use the NPRMDS and recommendations for strengthening the dataset. Research should address the impact of NPMRDS data gaps, best practices in merging other datasets with NPMRDS for analysis .

Performance area(s): Pavement, Mobility

Responsibility: State DOTs, NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information about the data gaps and impacts

Practitioner Input

"There are material gaps in probe data. For example, at the time targets were established, only fifty to sixty percent of the 15-minute time periods had probe readings between the hours of 6:00 a.m. and 8:00 p.m. on the Non-Interstate NHS."

"Our traffic volume projections may not reflect reality but are essential to forecasts and targets. We considered submitting what traffic would have been if [2020] was a normal year but ultimately decided we couldn't go down that road [and] rejected that idea."

Analytical Complexity: Medium-High, depending on whether the materials are being developed by an individual State DOT or for the benefit of multiple State DOTs with a shared interest in the research

Barriers: Sponsorship, possibly funding, depending on the scope of the research

Potential for improving TPM results: Low, assuming the gaps will decrease through experience and as more years of new NPMRDS data become available

Cost: $$ to $$$

First step: Develop a research statement

R.18.2. Conduct research on implementation of three-dimensional (3-D) data collection to identify top-down cracking and/or use of enhanced automated algorithms to address pavement data quality issues.

Performance area(s): Pavement

Responsibility: State DOTs, NAS, FHWA, AASHTO

Key Stakeholders: State DOTs, medium-large MPOs

Additional data or information needed: Information on alternatives ways of addressing pavement data quality issues

Analytical Complexity: Low-Medium, depending on whether the materials are being developed by an individual State DOT or for the benefit of multiple State DOTs with a shared interest in the research, ability to apply the alternative methods to federal measures

Barriers: Sponsorship, possibly funding, depending on the scope of the research

Potential for improving TPM results: Low-Medium, depending on whether the research closes currently data gaps or enhances the quality of future data collection

Cost: $$ to $$$

First step: Develop a research statement

Policy and Regulatory

P.18.1. Assess the costs and benefits of making federal timeline changes to support timely data provisioning or alignment of TPM reporting calendar with schedules for providing standard data sets.

Performance area(s): Depending on whether data sets or methods are explored, this potential mitigation could affect Safety, Pavement, Mobility, or it could apply broadly to TPM

Responsibility: FHWA

Key Stakeholders: State DOTs, MPOs, transit operators (depending on the scope of the modification)

Additional data or information needed: Data to determine the costs and benefits of adjusting federal timeline changes for the selected performance area(s)

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

P.18.2. Assess the costs and benefits of accommodating a higher percentage of missing data without assessing a penalty.

Performance area(s): Pavement

Responsibility: FHWA

Key Stakeholders: State DOTs

Additional data or information needed: Data to determine the costs and benefits of adjusting the acceptable percentage of missing data for the pavement performance area

Analytical Complexity: N/A

Barriers: N/A

Potential for improving TPM results: Low-medium, depending on the scope of the effort

Cost: TBD

First step: Gather information to conduct the assessment; determine the regulatory and process steps necessary to make the change

4. Next Steps

Next Steps

Overview

This section presents next steps for maintaining and extending the NCHRP Project 20-24(127) research products after the conclusion of the project. The TPM Action Plan developed through the project was updated at the conclusion of the project to reflect recent progress and priorities. The plan has been developed such that it can easily be updated on a regular basis as ongoing challenges are addressed and new priorities emerge. The following section addresses the ongoing stewardship of the TPM Action Planner.

Website Stewardship

The AASHTO CPBM Committee has agreed to take the lead in disseminating the products of this research and stewarding the use of the products. At the conclusion of NCHRP Project 20-24(127), the hosting and administration of the TPM Action Planner will be transferred to AASHTO. This transferal can be effected immediately upon the formal conclusion of the project, based on the priorities of AASHTO CPBM. In order to support this capability, the Action Planner has been developed and is currently maintained as a web application that can be integrated with the AASHTO TPM Portal. All files necessary for the ongoing maintenance of the resource access platform are currently collected online as part of the TPM Action Planner.

The Action Planner and each of its key components have been designed to be easily maintained and updated by AASHTO. The introductory guide included as an appendix to this report provides instructions on maintenance and upkeep and is also available directly via the site. These instructions have been drafted in a clear style and at a level of detail sufficient to ensure that site maintenance can be managed by non-technical staff, as appropriate.

Ongoing maintenance will help ensure the site kept is in good working order and that the contents of the site remain relevant, accurate, and up-to-date. Equally important to achieving this goal are efforts to promote the site to the DOT community. Whether lead by

AASHTO CPBM Committee, its subcommittees, corresponding TRB committees, AASHTO staff, or project team members, such effort could include: updates and demonstrations at committee meetings (e.g. AASHTO CPBM); outreach via established mailing lists (e.g. AASHTO TPM Technical Service Program, AASHTO CPBM); and more targeted outreach to practitioners who have previously registered an Action Planner account.

Appendix C presents the process documentation that captures how AASHTO CPBM will make periodic updates to the TPM Action Planner. Once the ongoing stewardship process is well established the Action Planner will require minimal maintenance. However, the value to practitioners of the Action Planner will increase as new challenges are added and the range of available mitigation approaches is expanded. Because the Action Planner is a database-driven web application, it is possible to load additional challenges and mitigation approaches with no system configuration, using a simple graphical interface. This option is available to any site user with administrative access.

Additional Features

One limitation of the TPM Action Planner is that the system is only configured to support TPM challenges within established performance management areas such as highway infrastructure condition, highway safety, transit infrastructure condition, etc. It is possible that, in the future, AASHTO CPBM will wish to capture TPM issues in challenges in additional performance areas related to topics such as greenhouse gas emissions, accessibility, or equity. While initial steps have been taken to allow the Action Planner to support additional performance areas without further development, fully supporting this functionality would require additional configuration on the part of a skilled technical administrator.

Appendix A. Acronyms and Abbreviations

AASHTO	**American Association of State Highway and Transportation Officials**
ACS	**American Community Survey**
AMPO	**Association of Metropolitan Planning Organizations**
CMAQ	**Congestion Mitigation and Air Quality**
CO	**Carbon Monoxide**
COVID-19	**Coronavirus Disease 2019**
DOT	**Department of Transportation**
FARS	**Fatality Analysis Reporting System**
FAST	**Fixing America's Surface Transportation**
FHWA	**Federal Highway Administrations**
FTA	**Federal Transit Agency**
HPMS	**Highway Performance Monitoring System**
IRI	**International Roughness Index**
MAP-21	**Moving Ahead for Progress in the 21st Century**
MPO	**Metropolitan Planning Organization**
MUCC/MMUCC	**Minimum Uniform Crash Criteria/ Minimum Model Uniform Crash Criteria**
NAS	**The National Academies of Sciences, Engineering and Medicine**
NBI	**National Bridge Inventory**
NCHRP	**National Cooperative Highway Research Program**
NIR	**National Implementation Review**

NHS	**National Highway System**
NHTSA	**National Highway Transportation Safety Administration**
Non-SOV	**Non-Single Occupancy Vehicle**
NPMRDS	**National Performance Management Research Data Set**
NTD	**National Transit Database**
PBPP	**Performance-Based Planning and Programming**
PHED	**Peak Hour Excessive Delay**
PM1	**Performance Measure Rule 1 (Safety)**
PM2	**Performance Measure Rule 2 (Pavement and Bridge Condition)**
PM3	**Performance Measure Rule 3 (System Performance, Freight and CMAQ)**
SHSP	**Strategic Highway Safety Plan**
SME	**Subject Matter Expert**
SOV	**Single Occupancy Vehicle**
State DOT	**State Department of Transportation**
TAM	**Transportation Asset Management**
TAMP	**Transportation Asset Management Plan**
TMC	**Transportation Management Center**
TPM	**Transportation Performance Management**
TRB	**Transportation Research Board**
TTRR	**Truck Travel Time Reliability**
ULB	**Useful Life Baseline**
VMT	**Vehicle Miles Traveled**

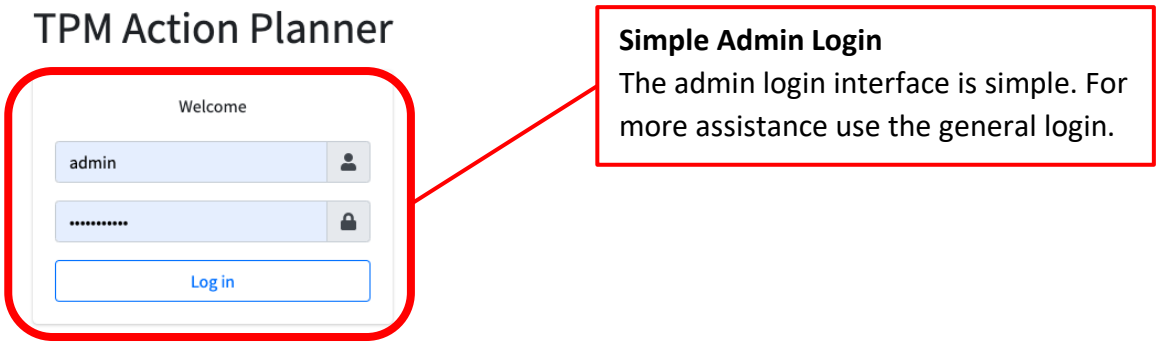
Appendix B. User Guide and Administrative User Guide

TPM Action Planner
User Guide

TPM Action Planner
Administrator Guide

Login Page

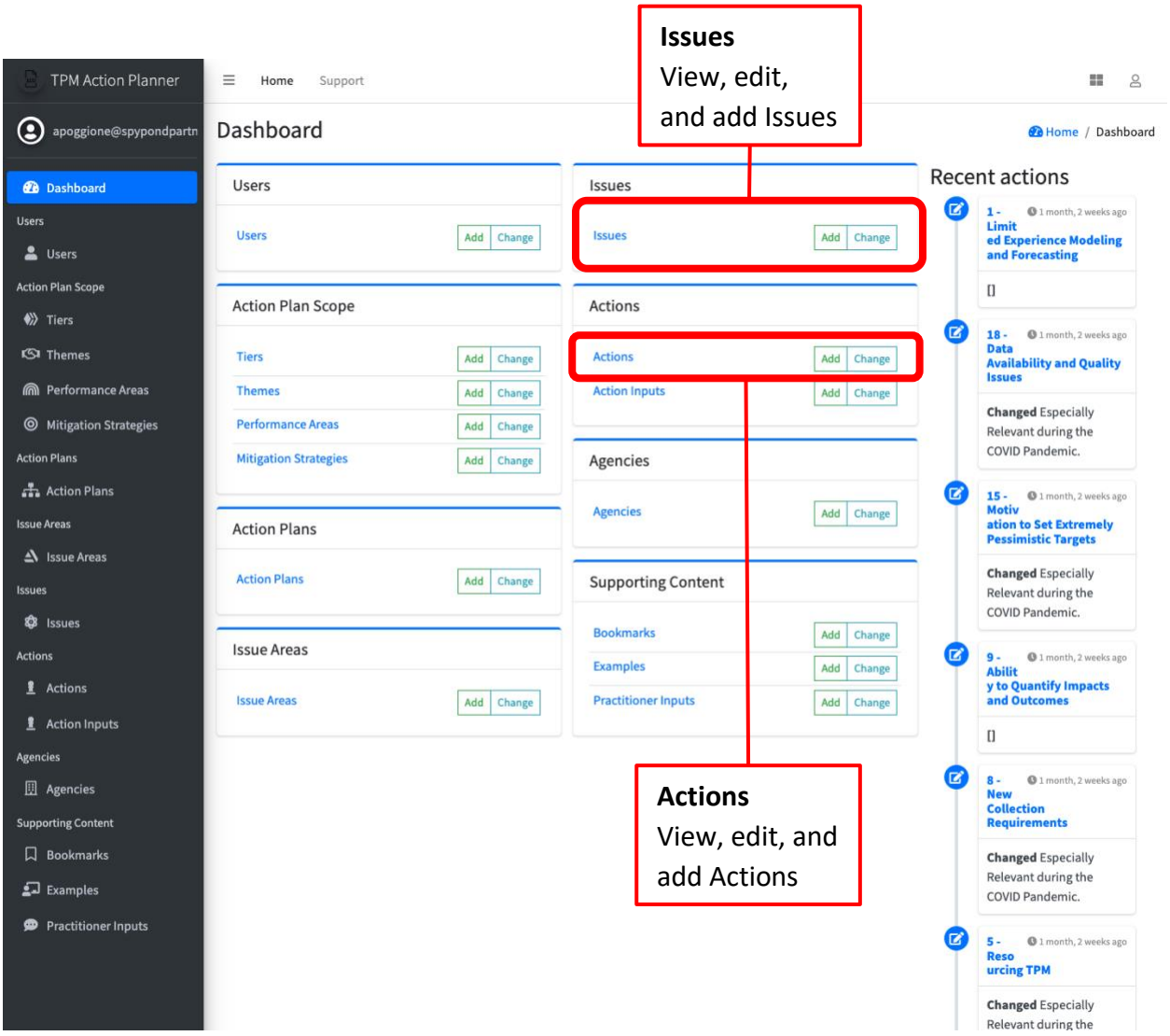
If you are an authorized admin user, you access the admin site by typing in the URL: https://tpm-action-plans.herokuapp.com/admin either before or after you have logged in. There is a simple login page if you are not logged in.



Admin Dashboard

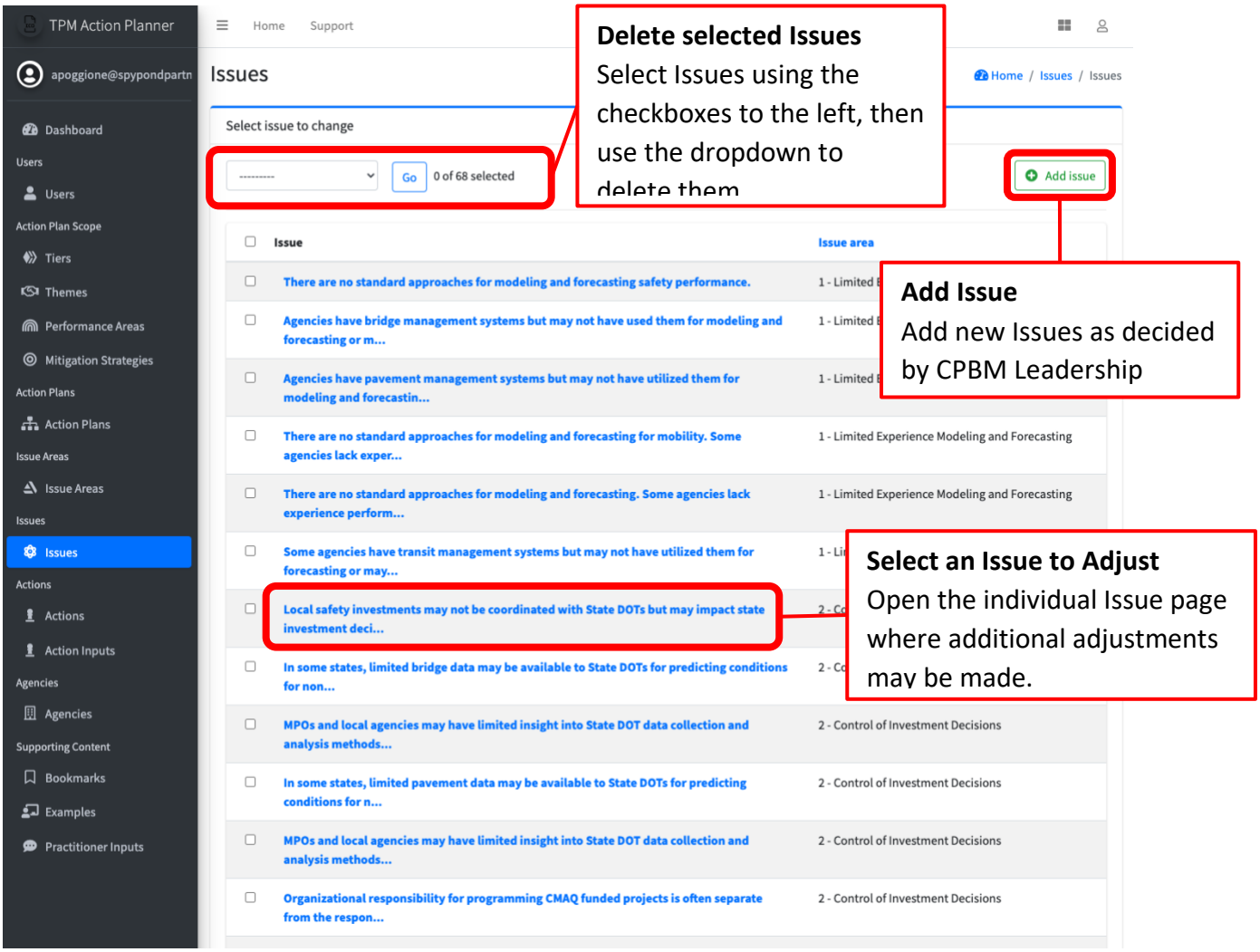
At first glance, the **Admin Dashboard** may appear crowded with options, but there are only a few areas you need to pay attention to in order to effectively manage and update the TPM Action Plan site.

The primary responsibilities include adding or adjusting **Issues**, updating Issue priorities, adding or modifying **Actions**. Additional admin abilities include adding and modifying **Issue Areas** and other scoping elements, as well as managing **Users**. These are shown in five sidebar menu items as well as panels in the main dashboard. Over the next few pages, you will walk through how to do each of these responsibilities.



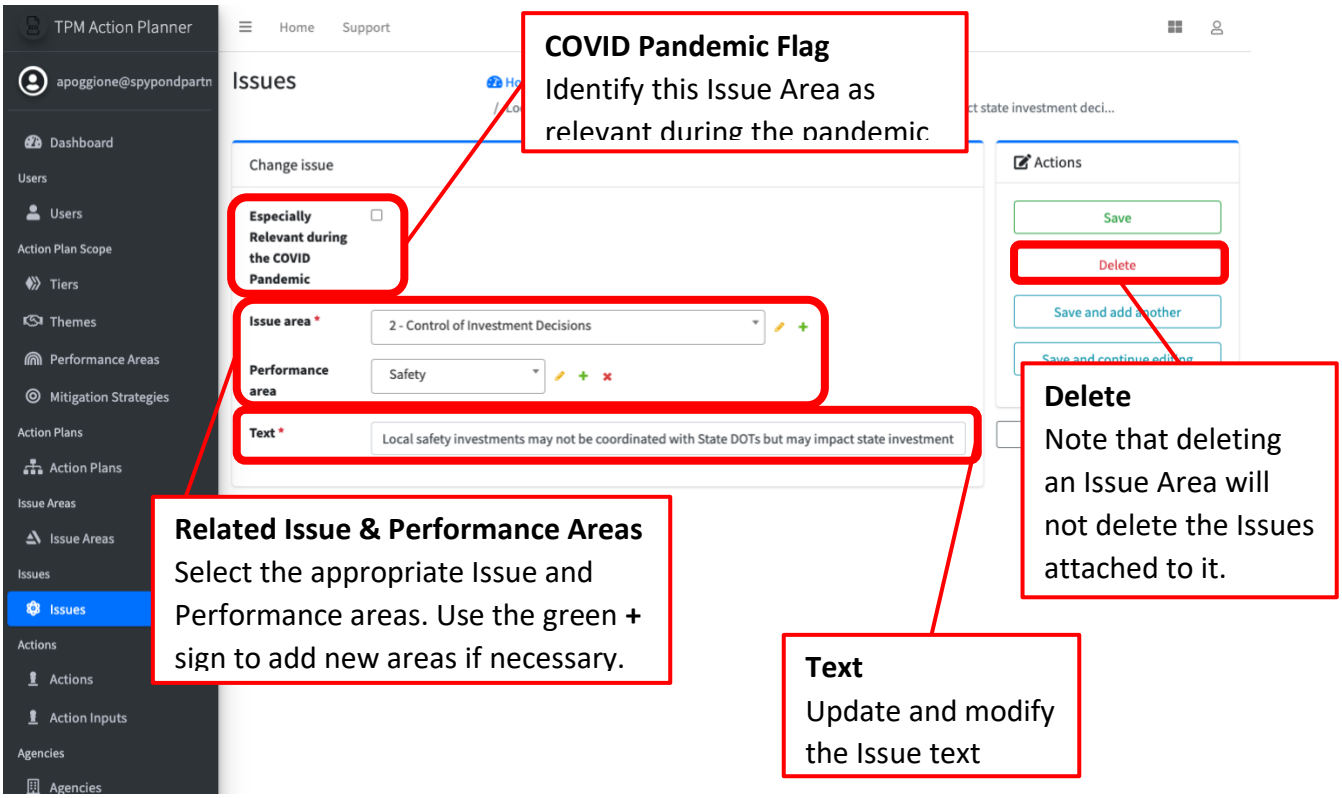
Issue Main Page

Each Issue is presented on the main page, ordered by priority number. From here, you may select an Issue to adjust, delete any old Issues, or add new Issues. The best way to find a specific Issue is to use Ctrl+F (or Command+F). The Issues are ordered by their Issue Area.



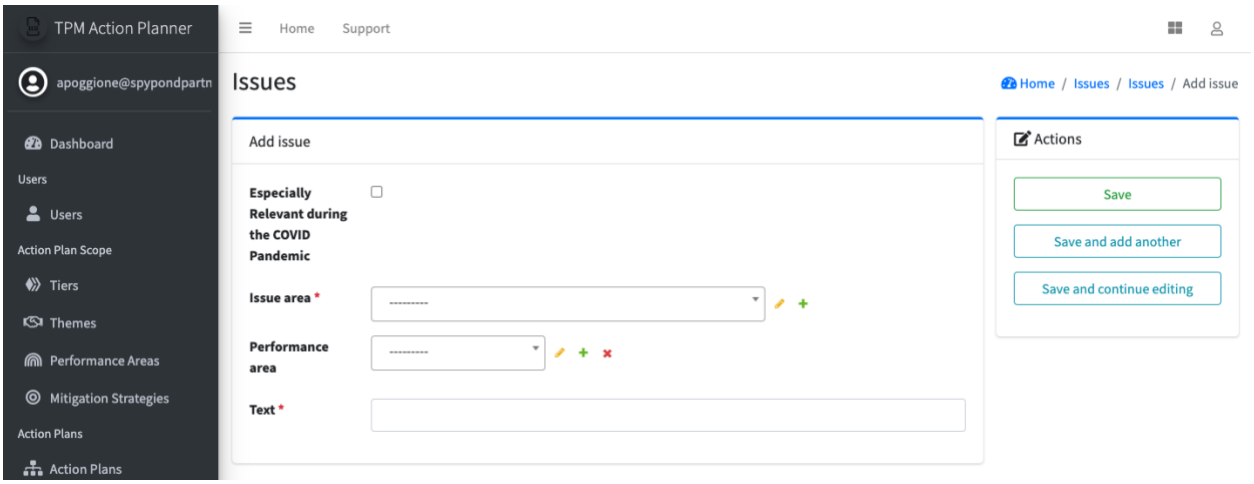
Editing Individual Issues

Every aspect of an individual issue may be updated from this page. Toggle whether the Issue is relevant in the COVID Pandemic, change the Issue or Performance area it falls under or add new areas where needed, and Modify the text describing the Issue. Similar changes may be made to the other elements of the TPM Action Plan tool, such as Issue Areas and Actions. When adding a new issue, the options are the same.

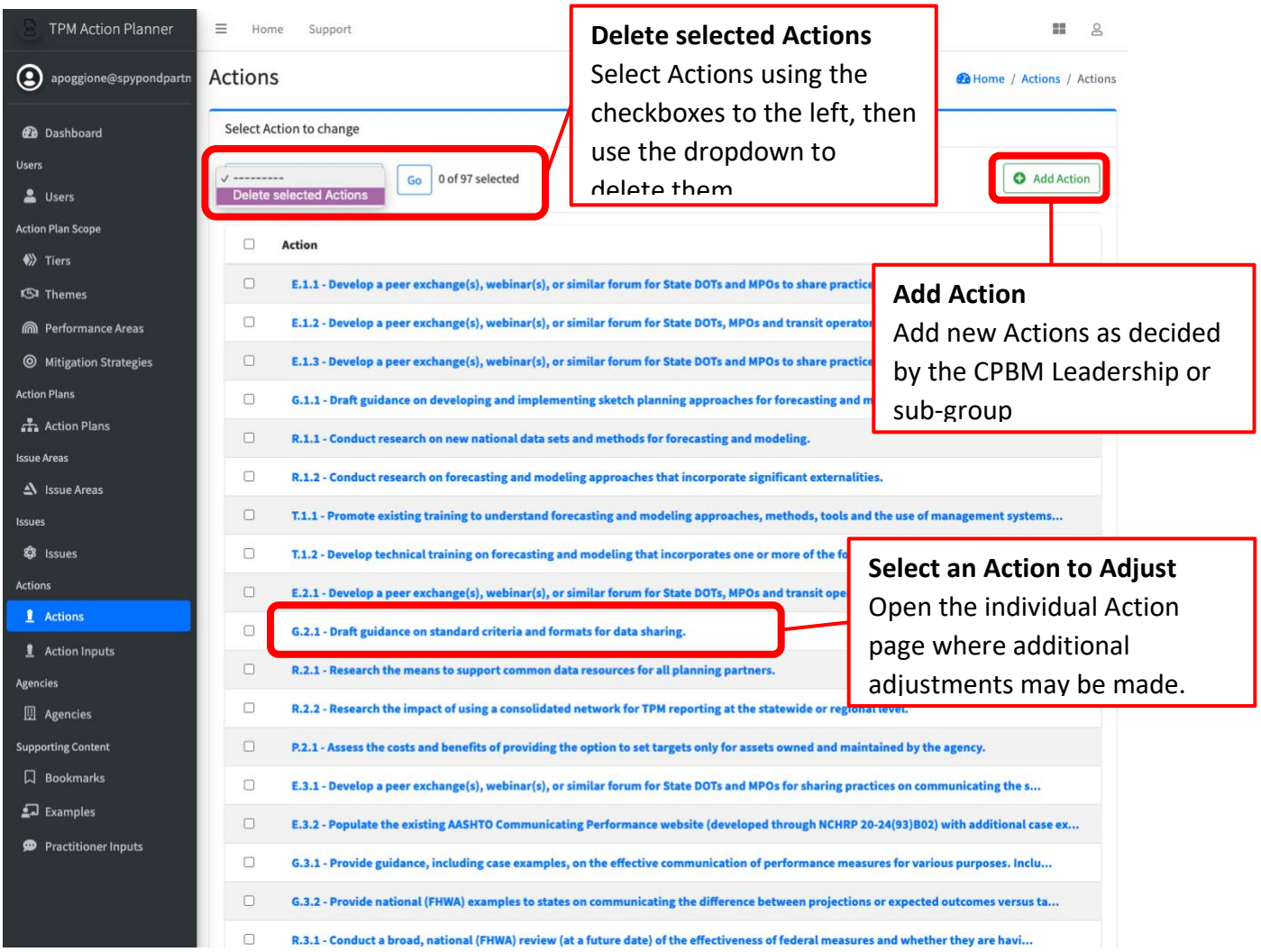


Adding Issues

The same options are available when adding a new Issue too.

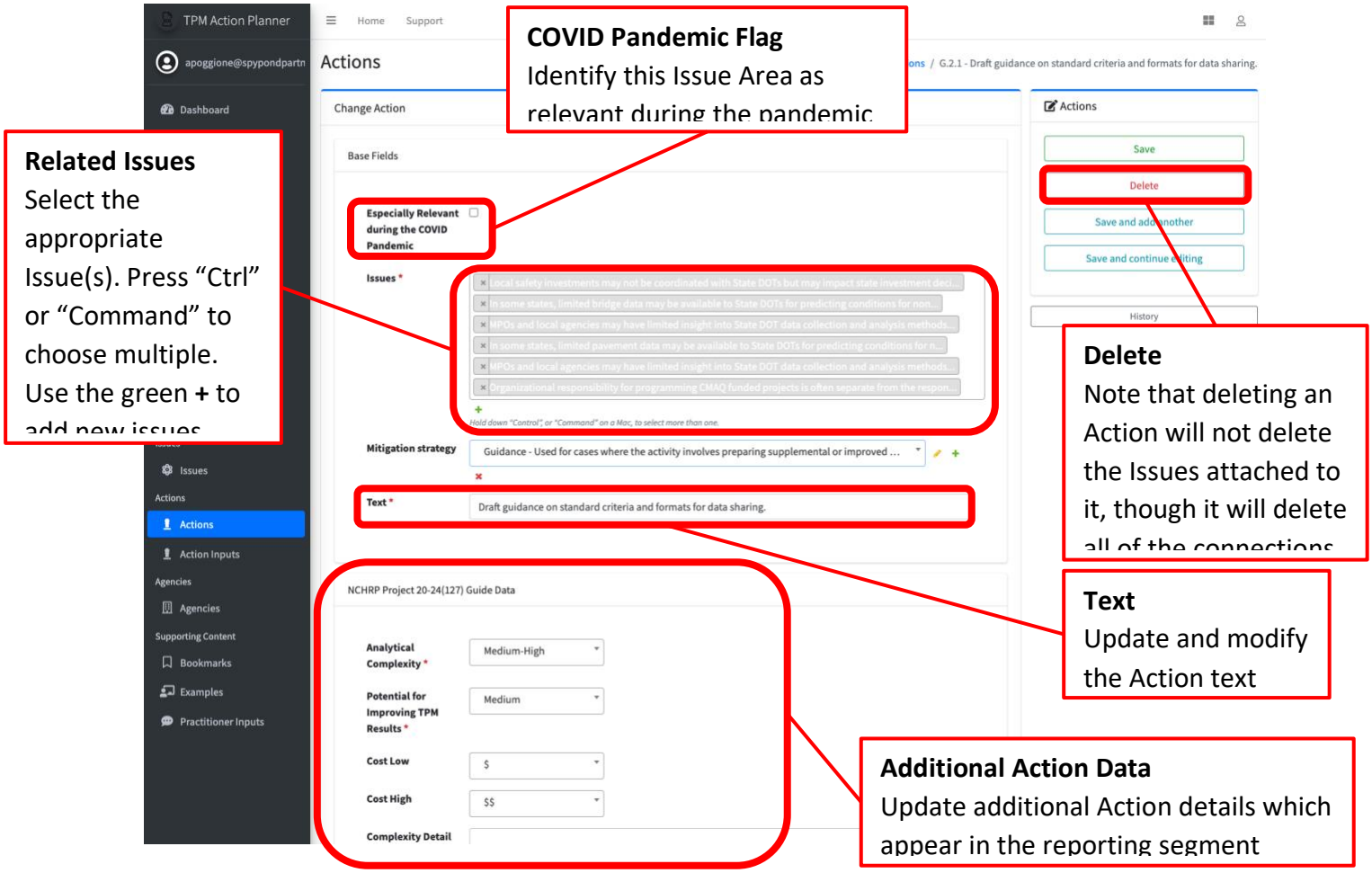

TPM Action Planner
Home
Support
apoggione@spypondpartn
Issues
Home / Issues / Issues / Add issue
Dashboard
Users
Users
Action Plan Scope
Tiers
Themes
Performance Areas
Mitigation Strategies
Action Plans
Action Plans
Add issue
Especially Relevant during the COVID Pandemic
Issue area *
Performance area
Text *
Actions
Save
Save and add another
Save and continue editing

Actions Main Page



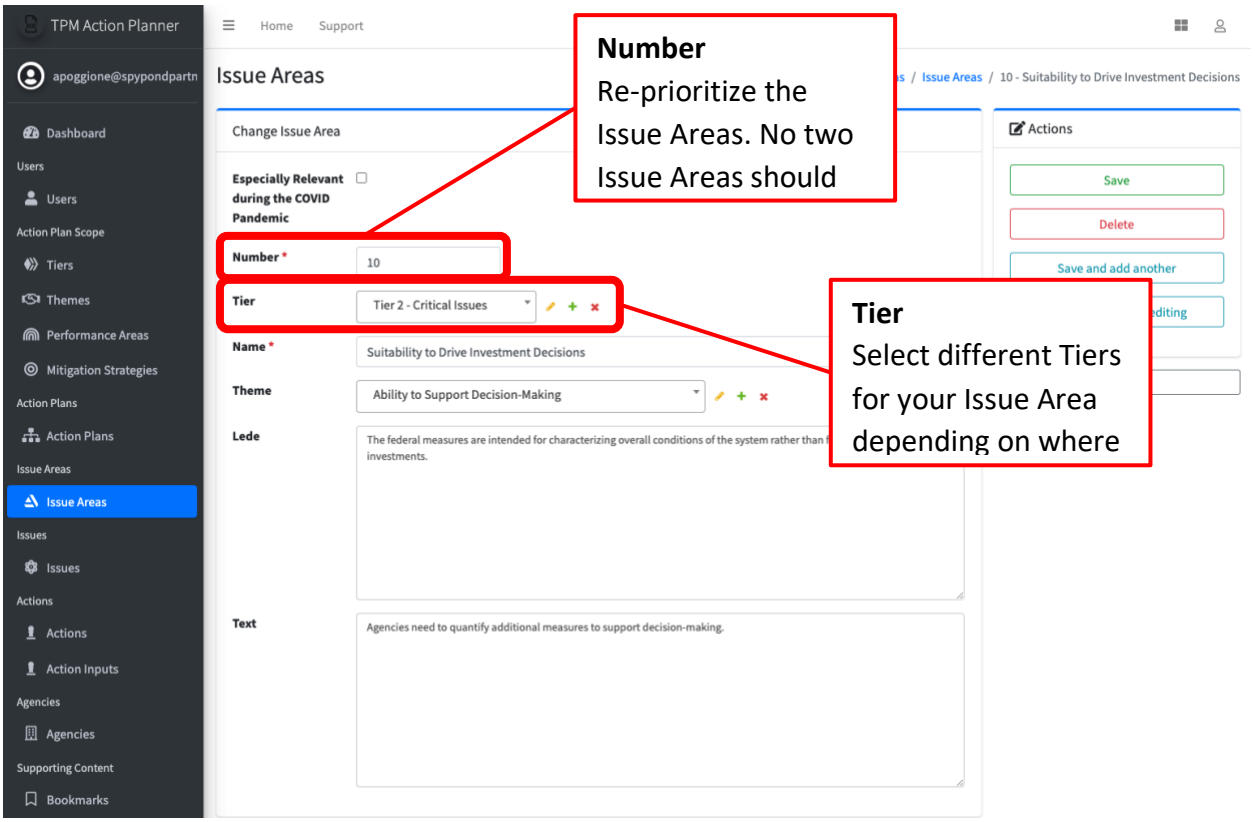
Editing Individual Actions

Modifying an Action is slightly more complex than Issues because they have additional fields attached for the purpose of reporting. Actions may also be linked to multiple Issues as shown below.



Update Issue Priorities

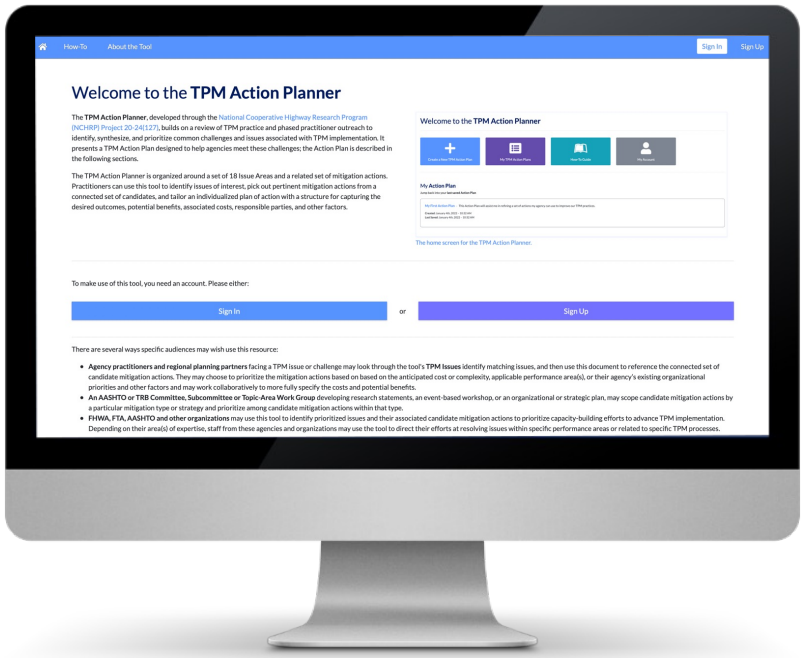
Issues are prioritized based on their Issue Area. Each Issue Area is assigned to a Tier: Most Critical, Critical, or Less Critical, and they are ranked from 1 to 18. To update the numbered prioritization of an Issue Area, each Issue Area must be individually reordered. To change the Tier an Issue Area falls under, simply select the new tier from the dropdown menu. Both of these changes are accessible on the Issue Areas individual page.



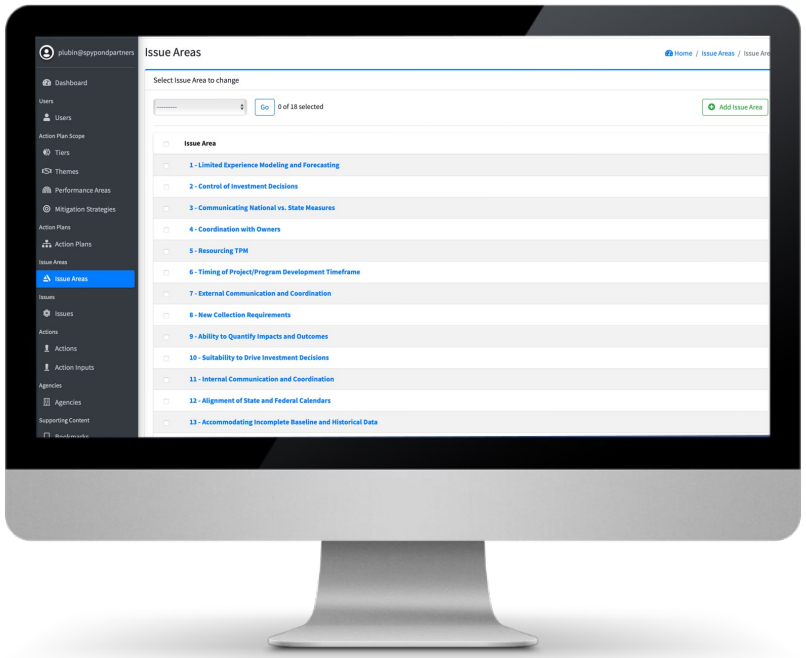
Appendix C. Update Process Documentation

TPM Action Planner – Annual Update Process

1. Review Context



2. Evaluate and Adjust



3. Communicate

April 24, 2022

TPM Action Planner – Annual Update Process

Document Purpose

The purpose of this document is to provide an overview of the update process for the Transportation Performance Management (TPM) Action Planner tool developed through the National Cooperative Highway Research Program (NCHRP) Project 20-24(127) *Transportation Performance Management Implementation Issues, Concerns, and Challenges*.

Update Process Overview

The update process comprises:

1) Reviewing content;
2) Evaluating and adjusting issues, priorities, and mitigation strategies; and
3) Communicating any changes to stakeholders.

What's in this Document

This document describes:

- The high-level process for updating the TPM Action Planner
- Who is responsible for each step in the process
- Questions the responsible party(ies) may wish to ponder when completing each step

A companion Administrative User Guide provides step-by-step instructions for an administrator to make changes on the site, including editing existing issues, adding new issues, changing issue priorities, and editing or adding mitigation strategies.

AASHTO CPBM Update Process for TPM Issues, Prioritization, and Communication Channels

	High-Level Process	Who is Responsible?	Questions to Ask	How?
1. Review Context	Identify new issue(s) for consideration	AASHTO CPBM Leadership Team (CPBM Leadership) with CPBM Membership input	• Are there any new candidate issues for consideration?	• Discuss potential new issues at regularly scheduled CPBM or AASHTO event
2. Evaluate and Adjust: Update Issues, Challenges, and Priorities	Determine whether/ how to incorporate new issues	CPBM Leadership or sub-group	• Are the candidate issues noteworthy enough to modify the base list of issues?	• Add or modify issue(s) as needed in action planner, based on discussion at CPBM Leadership meeting
	Reassess priorities	CPBM Leadership or sub-group	• Will any adjustments to the list change the timeframe/when issues need attention?	• Adjust priorities as needed based on discussion at CPBM Leadership meeting
	Adjust mitigation strategy(ies)	CPBM Leadership or sub-group with stakeholder input	• Are new strategies needed? • Should existing strategies be eliminated or modified?	• Adjust mitigation strategy(ies) based on discussion at CPBM Leadership meeting
3. Communicate	Communicate change(s) to stakeholders	CPBM Leadership with support from AASHTO Liaison	• Do specific, non-CPBM stakeholders need to be informed?	• Announce updated list at regularly scheduled CBPM or AASHTO event

AASHTO CPBM Update Process for TPM Issues, Prioritization, and Communication Channels

	High-Level Process	Who is Responsible?	Questions to Ask	How?
1. Review Context	Identify new issue(s) for consideration	AASHTO CPBM Leadership Team (CPBM Leadership) with CPBM Membership input	• Are there any new candidate issues for consideration?	• Discuss potential new issues at regularly scheduled CPBM or AASHTO event
2. Evaluate and Adjust	Determine whether/ how to incorporate new issues	CPBM Leadership or sub-group	• Are the candidate issues noteworthy enough to modify the base list of issues?	• Add or modify issue(s) as needed in action planner, based on discussion at CPBM Leadership meeting
2. Evaluate and Adjust	Reassess priorities	CPBM Leadership or sub-group	• Will any adjustments to the list change the timeframe/when issues need attention?	• Adjust priorities as needed based on discussion at CPBM Leadership meeting
2. Evaluate and Adjust	Adjust mitigation strategy(ies)	CPBM Leadership or sub-group with stakeholder input	• Are new strategies needed? • Should existing strategies be eliminated or modified?	• Adjust mitigation strategy(ies) based on discussion at CPBM Leadership meeting
3. Communicate	Communicate change(s) to stakeholders	CPBM Leadership with support from AASHTO Liaison	• Do specific, non-CPBM stakeholders need to be informed?	• Announce updated list at regularly scheduled CBPM or AASHTO event

Phase 1: Review context

High-level process
- Identify new issue(s) for consideration

Who is responsible?
- CPBM Leadership with CPBM membership input

Questions to ask
- Are there any new candidate issues for consideration

How to
- Discuss potential new issues at regularly scheduled CPBM or AASHTO event

Optional methods
- Polling
- Voting
- Issues submitted to action planning tool

Deliverable(s)
- List of potential new issues for consideration

Phase 1. Review Context

In the first phase, new issues are identified for consideration. The American Association of State Highway and Transportation Officials (AASHTO) Committee on Performance-Based Management (CPBM) Leadership will complete this phase with CPBM membership input.

As part of this process, CPBM Leadership will consider whether there are any new candidate issues for consideration. This could be accomplished by brainstorming, polling, voting, and discussing issues submitted to the action planning tool at a regularly scheduled CPBM or AASHTO event. Assuming new candidate issues are identified, the output of this exercise is a list of new potential issues for consideration.

AASHTO CPBM Update Process for TPM Issues, Prioritization, and Communication Channels

1. Review Context

2. Evaluate and Adjust

3. Communicate

High-Level Process	Who is Responsible?	Questions to Ask	How?
Identify new issue(s) for consideration	AASHTO CPBM Leadership Team (CPBM Leadership) with CPBM Membership input	• Are there any new candidate issues for consideration?	• Discuss potential new issues at regularly scheduled CPBM or AASHTO event
Determine whether/ how to incorporate new issues	CPBM Leadership or sub-group	• Are the candidate issues noteworthy enough to modify the base list of issues?	• Add or modify issue(s) as needed in action planner, based on discussion at CPBM Leadership meeting
Reassess priorities	CPBM Leadership or sub-group	• Will any adjustments to the list change the timeframe/when issues need attention?	• Adjust priorities as needed based on discussion at CPBM Leadership meeting
Adjust mitigation strategy(ies)	CPBM Leadership or sub-group with stakeholder input	• Are new strategies needed? • Should existing strategies be eliminated or modified?	• Adjust mitigation strategy(ies) based on discussion at CPBM Leadership meeting
Communicate change(s) to stakeholders	CPBM Leadership with support from AASHTO Liaison	• Do specific, non-CPBM stakeholders need to be informed?	• Announce updated list at regularly scheduled CBPM or AASHTO event

Phase 2: Evaluate and Adjust

High-level process

- Determine whether/how to incorporate new issue(s)
- Reassess priorities
- Adjust mitigation strategy(ies)

Who is responsible?

- CPBM leadership or sub-group with stakeholder input on mitigation strategy(ies)

Questions to ask

- Are the candidate issues noteworthy enough to modify the base list of issues?

How to

- Add or modify issue(s) as needed in action planner, based on discussion at CPBM Leadership meeting
- Adjust priorities as needed based on discussion at CPBM Leadership meeting
- Adjust mitigation strategy(s) based on discussion at CPBM Leadership meeting

Optional methods

- CPBM membership survey

Deliverable(s)

- Triaged issues
- New/Modified/Resolved issues
- Reassessed priorities
- List of new priorities
- Adjusted mitigation strategies
- List of new, modified and eliminated strategies
- Follow-up with the appropriate resources/stakeholders (AASHTO, FHWA, NCHRP, etc.)

Phase 2. Evaluate and Adjust

This phase begins with determining whether or how to incorporate the issues from Phase 1. Either AASHTO CPBM Leadership will complete this phase, or they may delegate it to a sub-group within CPBM. The responsibility for this task depends on the performance area or activities impacted. For example, issue updates due to a new reporting requirement may fall upon a sub-group consisting of the Policy and Rulemaking Workgroup and the Transportation Asset Management Subcommittee. For issues related to system mobility or emerging technologies (SMET), updates may require joint SMET Subcommittee involvement too.

If the candidate issues are selected for inclusion, then CPBM Leadership or the sub-group will add to or adjust the base issue list in the action plan. Edits will depend on discussion within the group and any input from the CPBM Leadership if this task is assigned to the CPBM sub-group. The group may optionally wish to use a member survey to gain additional insights. The output of this step is a triage of emerging topics and, if appropriate, a revised list of new or modified issues.

Phase 2. Evaluate and Adjust (continued)

Next, the CPBM Leadership or the sub-group will adjust the priorities within the existing list of TPM issues to advance the new issues based on discussions at a regular meeting of the CPBM Leadership. This step will ensure that the timeframes for addressing the issues are appropriate. The output of this step is either a validation of current priorities or a reprioritized list of issues.

After adding or adjusting the list of issues and completing any requisite changes in priorities, the CPBM Leadership or sub-group will add to or modify the mitigation strategies based on the methods most likely to resolve the new issues. They may engage affected stakeholders to provide input on the topic to ensure any proposed resolution meets their needs and validate those options at a CPBM Leadership meeting. Since impactful mitigation strategies change over time, this step may result in changes to overall mitigation strategies, including removing potential strategies. The output of this step is a confirmed or adjusted list of mitigation strategies, including any new, modified, or eliminated potential mitigation strategies.

At this stage, follow-up discussions with the appropriate stakeholders (AASHTO, FHWA, NCHRP, etc.) may be necessary to ensure concurrence and engagement to provide resources for achieving the mitigation strategies.

AASHTO CPBM Update Process for TPM Issues, Prioritization, and Communication Channels

1. Review Context

2. Evaluate and Adjust

3. Communicate

High-Level Process	Who is Responsible?	Questions to Ask	How?
Identify new issue(s) for consideration	AASHTO CPBM Leadership Team (CPBM Leadership) with CPBM Membership input	• Are there any new candidate issues for consideration?	• Discuss potential new issues at regularly scheduled CPBM or AASHTO event
Determine whether/ how to incorporate new issues	CPBM Leadership or sub-group	• Are the candidate issues noteworthy enough to modify the base list of issues?	• Add or modify issue(s) as needed in action planner, based on discussion at CPBM Leadership meeting
Reassess priorities	CPBM Leadership or sub-group	• Will any adjustments to the list change the timeframe/when issues need attention?	• Adjust priorities as needed based on discussion at CPBM Leadership meeting
Adjust mitigation strategy(ies)	CPBM Leadership or sub-group with stakeholder input	• Are new strategies needed? • Should existing strategies be eliminated or modified?	• Adjust mitigation strategy(ies) based on discussion at CPBM Leadership meeting
Communicate change(s) to stakeholders	CPBM Leadership with support from AASHTO Liaison	• Do specific, non-CPBM stakeholders need to be informed?	• Announce updated list at regularly scheduled CBPM or AASHTO event

Phase 3: Communicate

High-level Process

- Communicate change(s) to stakeholders

Who is responsible?

- CPBM leadership or sub-group

Questions to ask

- Do specific, non-CPBM stakeholders need to be informed?

How to

- Share update at regularly scheduled CPBM or AASHTO event

Optional methods

- Identify key stakeholders
- Determine communication methods
- Develop supporting communication materials

Phase 3. Communicate

The final phase of the TPM Action Planner update process is to communicate the TPM Action Plan changes to all stakeholders. CPBM Leadership will complete this step with support from the AASHTO Liaison. They will identify specific, non-CPBM stakeholders, who need to be informed of the new issues, priorities, mitigation strategies, and next steps. This information could be shared at a regularly scheduled CPBM or AASHTO event.

Optionally, the CPBM Leadership may want to identify the key stakeholders receiving the communications, identify the communication methods, and develop the outreach materials for dissemination.

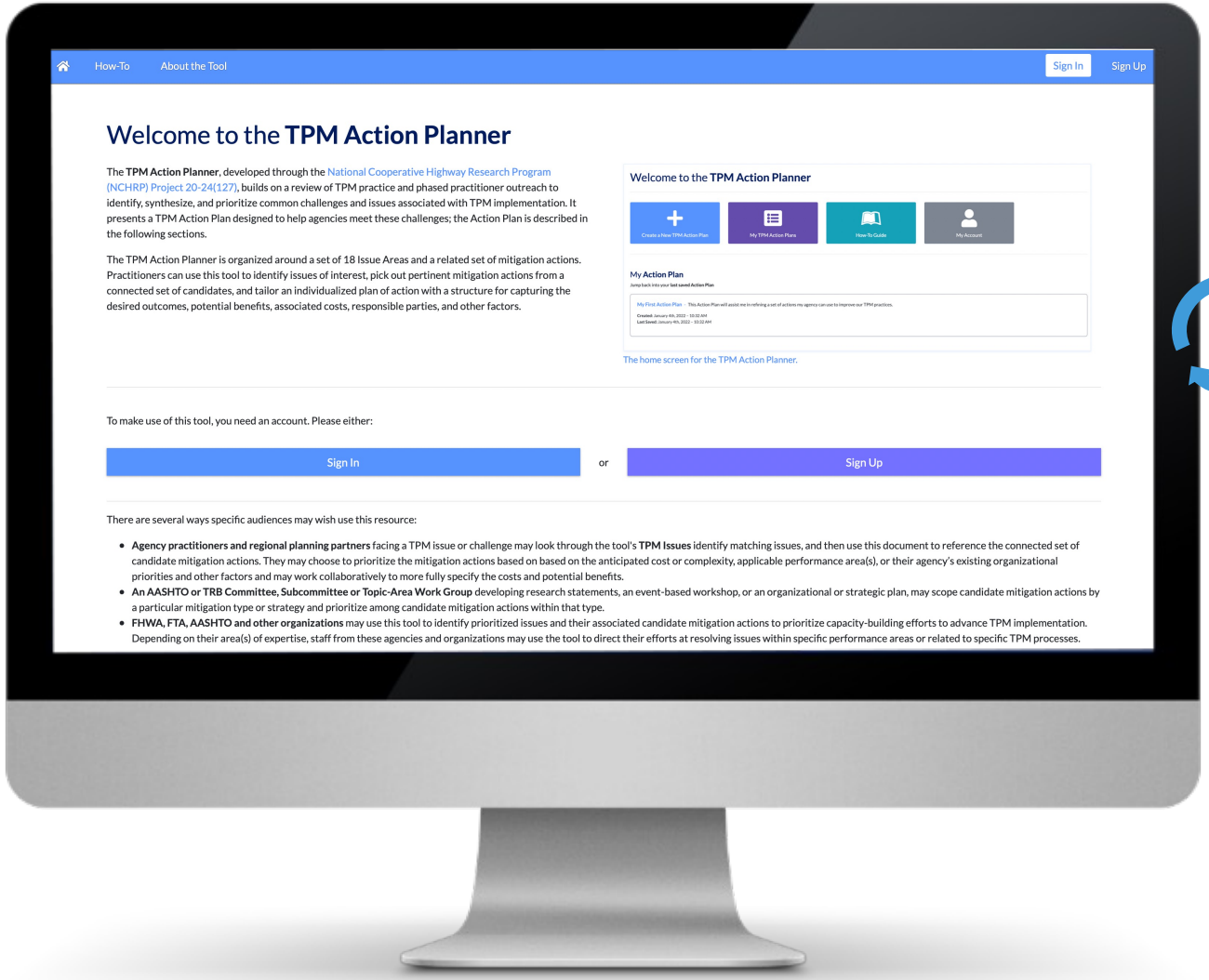
Potential Challenges

The TPM Action Planner will only be helpful to the extent it is supported by the TPM community and used to resolve common TPM issues. Several potential challenges could compromise the use of the Action Planner directly related to the update process. These include a lack of:

- Resources (time and people) to complete the update: could result in a stale set of prioritized TPM Issues or issues not mitigated timely.
- Traction on issues: could signal a need for updated issue prioritization.
- Stakeholder engagement around the update process: could lead to critical issues not being prioritized or mitigated.

To avoid these potential challenges, it may be helpful to establish a champion within CPBM Leadership to ensure a regular cycle of reviews and updates for the TPM Action Planner. The individual responsible for maintaining the TPM Action Planner will develop a cadence and schedule for keeping the issues, priorities, and strategies current and actionable. Since time and resources are limited, this individual may want to consider making frequent, minor adjustments to the TPM Action Plan rather than occasionally conducting a significant overhaul. This iterative approach may result in a more streamlined and manageable process for affected stakeholders and those responsible for making the updates.

TPM Action Planner – Annual Update Process



AASHTO CPBM Update Process for TPM Issues, Prioritization, and Communication Channels

High-Level Process	Who is Responsible?	Questions to Ask	How?
Determine new issue(s) for consideration	AASHTO CPBM Leadership Team with CPBM Membership input	• Are there any new candidate issues for consideration?	• Pull candidate items from online Action Planning Tool • Discuss at regularly scheduled CPBM or AASHTO event • Optional methods: polling, voting
Modify issues and challenges	AASHTO CPBM Leadership Team or sub-group	• Are the candidate issues noteworthy enough to modify the base list of issues?	• Discuss at leadership meeting whether issue(s) are noteworthy enough to require a modification • Options: modify or do not modify
Adjust priorities	AASHTO CPBM Leadership Team or sub-group	• Will the adjustments to the list change the timeframe/when issues need attention?	• Discuss at leadership meeting whether issue(s) warrant a re-evaluation of priorities • Options: adjust or do not adjust priorities • Optional methods: CPBM membership survey
Adjust mitigation strategy(ies)	AASHTO CPBM Leadership Team or sub-group with stakeholder input	• Should the mitigation strategies be adjusted? • What resources are needed? • Which stakeholders should be involved?	• Discuss at leadership meeting whether mitigation strategy(ies) require adjustment • Options: adust or do not adjust mitigation strategies • Follow-up activities: engage appropriate resources for national level activities - AASHTO, FHWA, NCHRP, etc.
Communicate change(s) to stakeholders	Matt Hardy (AASHTO) and AASHTO CPBM Leadership	• Who needs to be communicated with about the change? • When do they need to know? • How should they be informed? • Who will communicate the change÷	• List key stakeholders to communicate change(s) • Outline key message(s) • Determine appropriate communication method • Develop communication materials • Disseminate information via AASHTO distribution lists, subcommittee contacts, FHWA and TRB lists