Workshop #1004: Ballroom C

Preparing, Conducting, and Summarizing the Results – Assessing Traffic Management Systems

Sunday
January 7, 2024
9:00am – noon

Sponsoring Committees and Organizations:

- ITS Committee (ACP15)
- TRB Freeway Operations Committee (ACP20)
- TRB Traffic Signal Systems Committee (ACP25)
- TRB Joint Subcommittee on Active Traffic Management (ACP 20-5)
- TRB Artificial Intelligence and Advanced Computing Applications Committee (AED50)
- TRB Regional Transportation Systems Operation (RTSMO) Committee ACP 10)
- Traffic Management Center Pooled Fund Study
- American Association of Highway and Transportation Officials (AASHTO) Committee on Transportation System Operations ITS Work Group
- International Bridge, Tunnel and Turnpike Association (IBTTA)
- European Association of Operators of Toll Road Infrastructures (ASECAP)
- ERTICO Innovation Platform Traffic Management 2.0 Work Group

Welcome

Introductions, Workshop Purpose, and Desired Outcomes

Jon Obenberger

TRB ITS Committee
FHWA Office of Safety and Operations
Research and Development

9:00 - 9:05am:	**Welcome**
9:05 - 9:55am:	Session 1 – Overview
9:55 - 11:00am:	Session 2 – Breakout Discussion
11:00 - 11:40am:	Session 3 – Breakout Results
11:40 - 11:50am:	Session 4 – Action Planning
11:50am - Noon:	Session 5 – Next Steps

Workshop Agenda:

9:00am – 9:05am	• **Welcome**: Introductions, Workshop Purpose, and Desired Outcomes
9:05am – 9:55am	• **Session 1**: Overview - Preparing, Conducting, and Summarizing the Results - Assessing Traffic Management Systems
9:55am – 10:50am	• **Session 2**: *Interactive Breakout Session*
10:50am – 11:00am	• *Break*
11:00am – 11:40am	• **Session 3**: Discuss Breakout Session Results
11:40am – 11:50am	• **Session 4**: Action Planning: Identify Topics for Research or Industry Consideration and Collaboration
11:50am – noon	• **Session 5**: Immediate Next Steps and Sponsors' Perspectives

Session 1: Overview – Preparing, Conducting, and Summarizing the Results - Assessing Traffic Management Systems (TMSs)

Moderator: Jianming Ma *(TxDOT)*

Note-taker: Fanis Papadimitriou (*Attica Tollway Operations Authority – Athens, Greece)*

Presentations:

- Assessing TMSs, Pete Marshall, *D2 Traffic Technologies* [10 min]
- Preparing for and Conducting a TMS Assessment, Dan Lukasik, *Parsons* [10 min]
- Assessing TMSs Capabilities and Performance, John MacAdam, *MacAdam Consulting* [10 min]
- Identifying Opportunities and Approaches for Improving TMSs, Matt Junak, *HNTB* [10 min]

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Framing the Discussion: Preparing, Conducting, and Summarizing the Results - Assessing TMSs

Jianming Ma
Texas DOT, AASHTO CTSO Research Work Group Co-chair

Session 1 Presentations:

1 | Assessing TMSs

2 | Preparing for and Conducting a TMS Assessment

3 | Assessing TMSs Capabilities and Performance

4 | Identifying Opportunities and Approaches for Improving TMSs

Section 1: Overview

Preparing for and Assessing the Capabilities and Performance of Agency's TMSs

Purpose:

- **Frame** the value proposition
- **Identify** potential issues, methods, and information to consider
- **Introduce** *information* to provide a basis around topics to be discussed in breakout group discussions to occur in Session 2

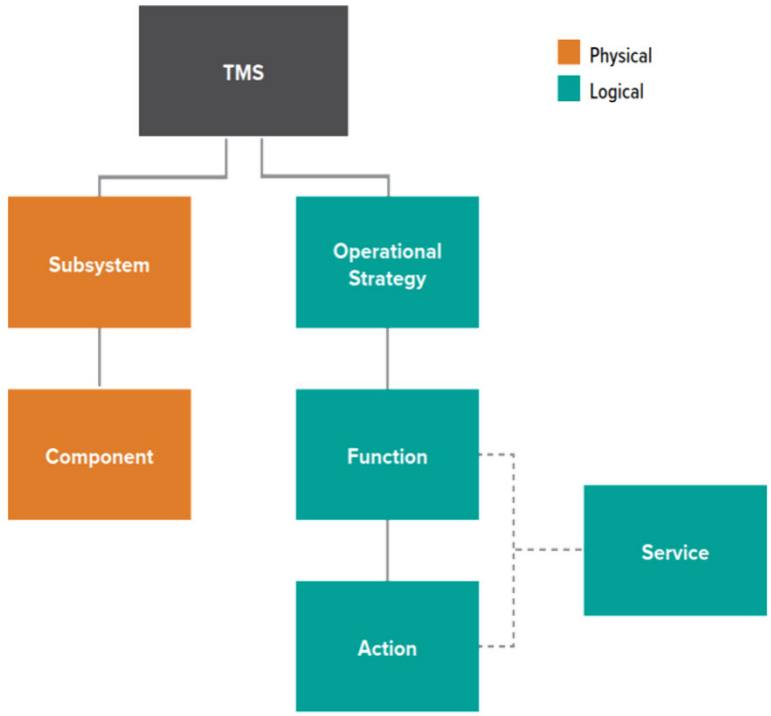
Outcomes:

- ***Clear understanding*** of the meaning and intent of each of the three framing topics:
  1) preparing for and conducting a TMS assessment
  2) assessing TMS capabilities and performance
  3) identifying opportunities and approaches for improving TMSs
- ***Shared appreciation*** and the importance of these three topics
- ***Awareness of "sample" list of issues*** to consider with preparing for, conducting, and assessing the capabilities and performance of an agencies TMS

Framing the Discussion

What is unique about assessing TMSs?

- Resources typically do not exist to support reporting, assessing, and benchmarking performance
- Initiatives need to facilitate assessing the:
  - Day-to-day management and operation, maintenance, repair, and management of all assets and resources
  - Staff, policies, procedures, support resources, and operational issues
  - TMS planning, design, implementation, and system life-cycle:
    - TMS capabilities
    - TMS performance
    - TMS capacity
    - TMS geographical scope and reach
  - TMS sharing and using data with external sources and stakeholders



Source: FHWA

Framing the Discussion

Should agencies consider conducting an assessments of their TMSs in addition to other TSMO assessments agencies are conducting?

Existing Dimensions or Process Improvement Areas	
Dimensions or Process Areas	*What is it? What does it do?*
1. Business Process	Plans, Programs, Budget
2. Systems & Tech	Approach to Building Systems
3. Performance Measurement	Use of Performance Measures
4. Workforce	Improving Capability of Workforce
5. Culture	Changing Culture and Building Champions
6. Collaboration	Improving Working Relationships

Examples of CMM assessments agencies are conducting:

- Active Management Cycle
- Traffic Management
- Active Demand Management
- Traffic Incident Management
- Planned Special Events
- Traffic Signal Management
- Work Zone Traffic Management
- Road Weather Management

Source: FHWA

Framing the Discussion

What might be agency motivations for assessing TMSs?

- Provides a means for assessing:
  - System effectiveness and reliability
  - How a TMS is being managed and operated
  - Implications of operational decision making
  - Condition of TMS assets
- Provides basis for:
  - Improving how TMSs are being managed and operated
  - Identifying opportunities to improve TMS capabilities and performance
  - Exploring implications of changing the way a TMS is managed and operated
  - Creating baseline to compare future capabilities and performance
  - Engaging key stakeholders to build/maintain support for improvements or allocation of resources
  - Enhancing how assets are being managed (e.g., operations, maintenance, repair, replacement)
  - Identifying and prioritizing needed improvements

Framing the Discussion: Assessing TMSs

Pete Marshall
D2 Traffic Technologies

Session 1 Presentations:

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Framing the Discussion

An ***Assessment*** is a formal, structured process for identifying current levels of capabilities and performance.

Use an established process or framework for conducting assessments

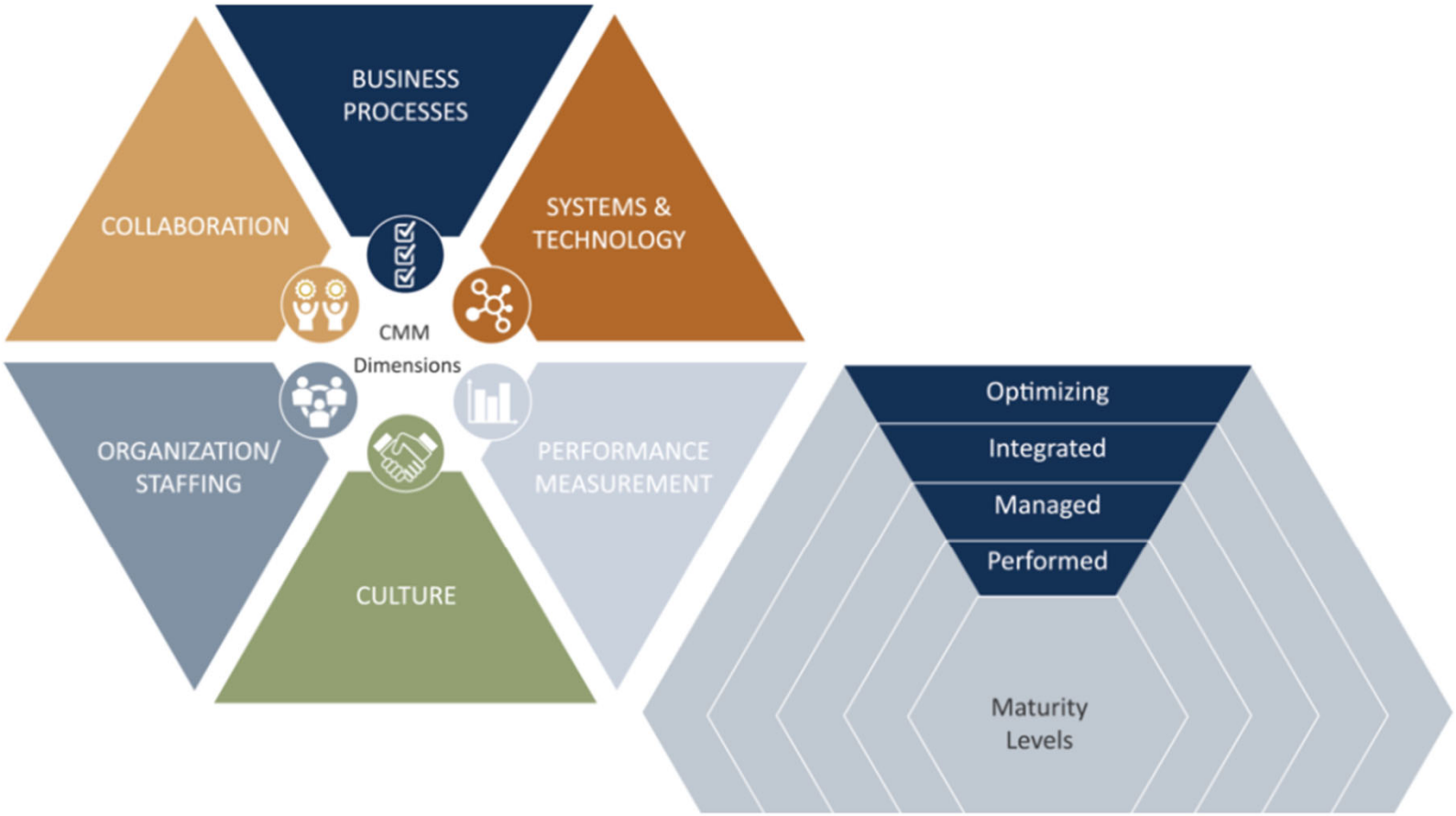
Involve key stakeholders in process

Outputs of assessments can be used to:

- **Identify enhancements to improve performance**
- **Develop consensus around needed improvements**
- **Identify immediate priorities for action or changes**
- **Identify opportunities for future improvements**

Framing the Discussion

AASHTO-FHWA Capability Maturity Model (CMM) framework:



Source: FHWA

Framing the Discussion

What other dimensions might agencies consider when assessing TMSs?

Existing Dimensions or Process Improvement Areas	
Dimensions or Process Areas	*What is it? What does it do?*
Business Process	Plans, Programs, Budget
Systems & Technologies	Approach to Building Systems
Performance Measurement	Use of Performance Measures
Workforce	Improving Capability of Workforce
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Missing Process Improvement Areas	
Dimensions or Process Areas	*What is it? What does it do?*
Management & Operation	Managing and Operating Daily
Maintenance & Repair	Conducting Daily Maintenance and Repairs
Sharing and Using Data	Policies, procedures, agreements, and activities to enable the sharing and use of data with sources external to TMS

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Possible Process Improvement Areas to Assess TMSs	
Dimensions or Process Areas	*What is it? What does it do?*
1. Business Process	Plans, Programs, Budget
2. Systems & Technologies	Approach to Building Systems
3. Performance Measurement	Use of Performance Measures
4. Workforce	Improving Capability of Workforce
5. Culture	Changing Culture and Building Champions
6. Collaboration	Improving Working Relationships
7. Management & Operation	**Managing and Operating Daily**
8. Maintenance & Repair	**Conducting Daily Maintenance and Repairs**
9. Sharing and Using Data	**Activities to enable sharing and use of data with sources external to TMS**

Source: FHWA

Framing the Discussion

What dimensions and subdimensions to consider when assessing TMSs?

Level 4. Optimizing
Level 3. Integrated
Level 2. Managed
Level 1. Performed

Planning and Operational Focused Dimensions					*Technical Focused Dimensions*			
Business Processes	*Culture*	*Collaboration*	*Workforce*	*Systems and Technology*	*Sharing and Using Data*	*Performance*	*Management and Operations*	*Maintenance & Repairs*
•TMS Program and Plan •TMS & Plan Integrated into Agency Plans & Programs •Programming & Budget •Operating Policies & Procedures	•Visibility TMS Program w/in Agency Strategic Plans •TMS Program Integrated into TSMO & Agency Program Plans & Funding	•Agency Collaboration •Third party relationships	•Organizational structure & governance •Staff Development •Staff recruitment •Staff development & retention plans	•Subsystem, components, and devices •System mutli-year plan •System design •Inventory assets & resources	•Data Sharing •Data Exchange Procedures, Agreements, APIs, & Data Formats •Using Data From Other Sources •Interoperability	•Data collection •Performance Measures •TMS Monitoring •TMS Asset Monitoring	•Service Level & Resiliency •TMS Oper. Capabilities •TMS Asset Impact •High avail. / remote ops	•Asset Documentation •Configuration Management •Maintenance request management •TMS feature roadmap

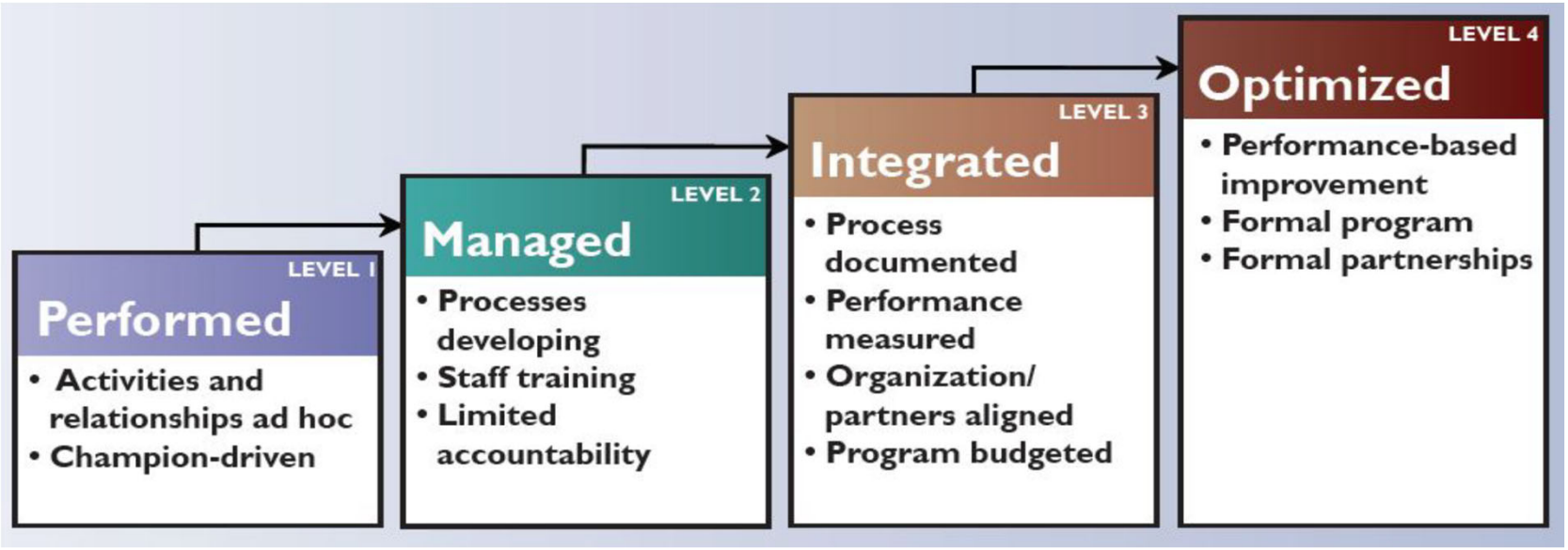
Source: FHWA

Framing the Discussion

What issues to consider in support of assessing the capabilities of dimensions?

Once you know your Capability Maturity Levels, consider:

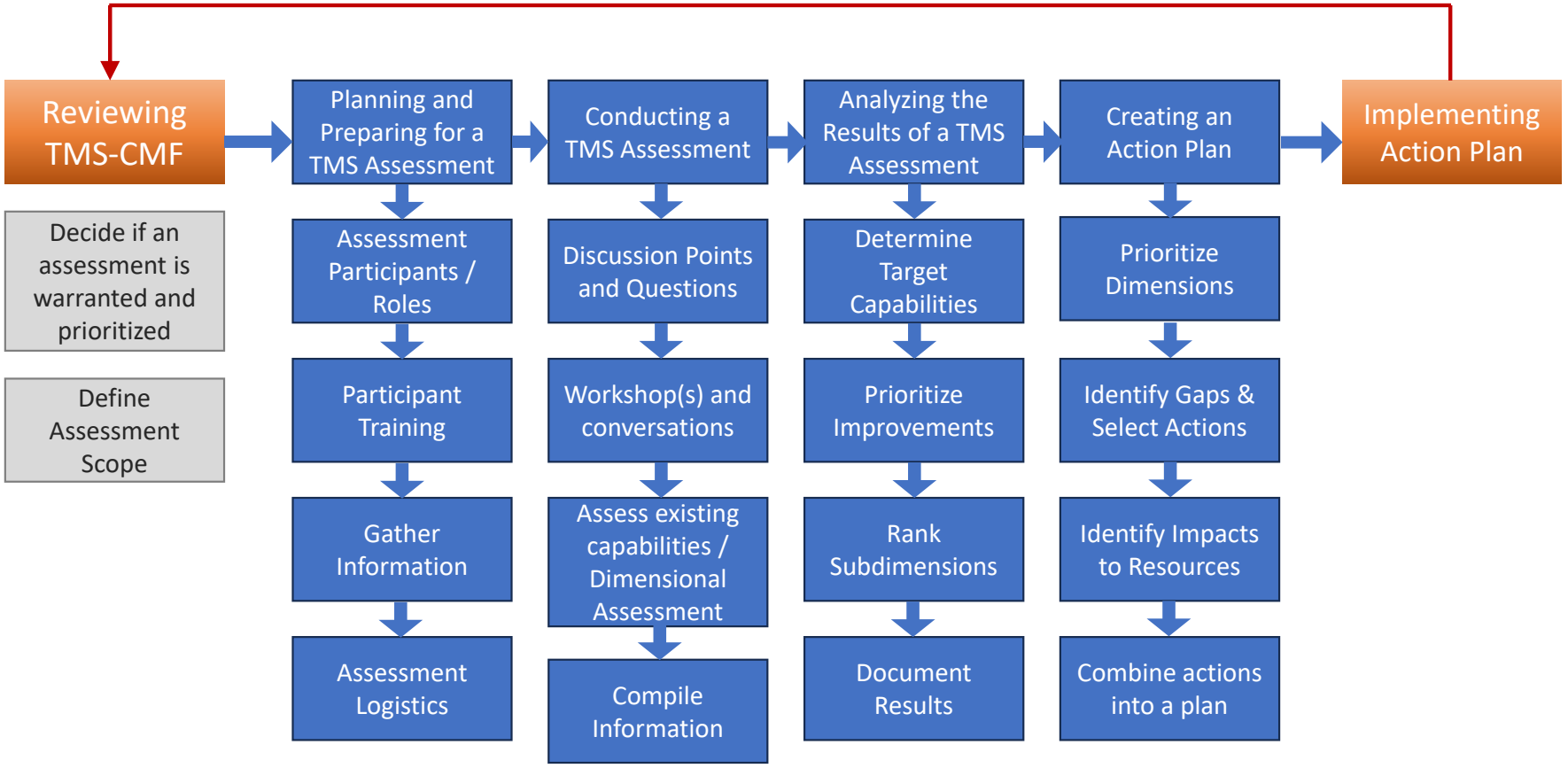
- *Where are the highest priorities for improvement?*
- *Are there areas for early action ("low-hanging fruit")?*
- *What projects are important but may take more time and resources?*



Source: FHWA

Framing the Discussion

What process might agencies follow when preparing for or assessing TMSs?



Framing the Discussion

What to consider when identifying opportunities for TMS improvements?

Assessing TMSs provides information to support efforts to identify the needs of the next generation agency TMS system

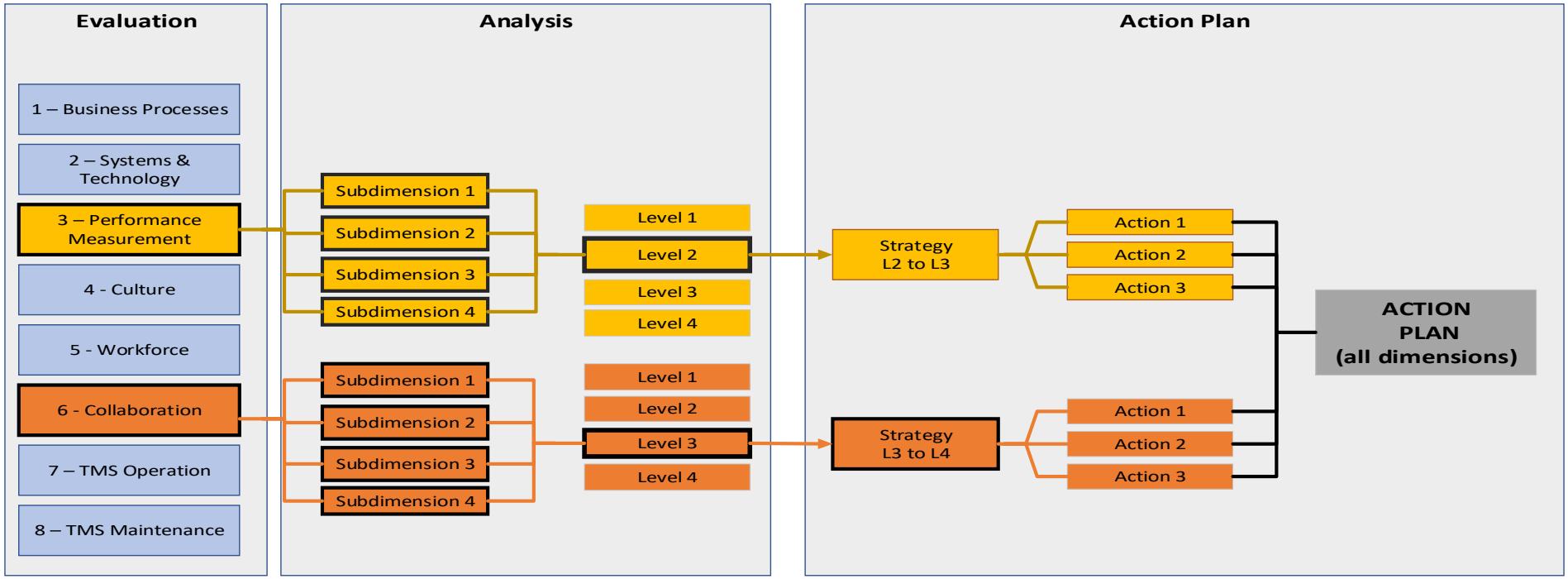
Planning and plans identifying strategic directions and future capabilities

Modular and expandable subsystems (e.g., software, data) to adjust to or meet evolving future

Resources to support TMS (e.g., plan, design, manage, operate, maintain, repair)

Framing the Discussion

EXAMPLE: identifying, evaluating, and prioritizing possible TMS improvements



Source: FHWA

Framing the Discussion

Examples of resources to support conducting TMS assessments:

1. FHWA's capability maturity framework (CMF) https://ops.fhwa.dot.gov/tsmoframeworktool/index.htm
2. FHWA self-assessment resources for specific TSMO Program Areas or strategies
3. **FHWA developing new resources for TMS assessments – finishing in 2024-2025**
4. Using Capability Maturity Frameworks for TSMO Program Advancement: Case Studies and Lessons Learned, FHWA. https://ops.fhwa.dot.gov/publications/fhwahop19011/index.htm
5. Traffic Management Capability Maturity Framework Tool, FHWA. https://ops.fhwa.dot.gov/tsmoframeworktool/tool/traffic_mgmt/index.htm
6. Resources to Support Traffic Management Capability Maturity Framework Users. https://ops.fhwa.dot.gov/tsmoframeworktool/available_frameworks/traffic.htm
7. Business Process Frameworks for Transportation Operations, FHWA. https://ops.fhwa.dot.gov/tsmoframeworktool/index.htm
8. Traffic Management Capability Maturity Framework – Fact Sheet, FHWA. https://ops.fhwa.dot.gov/publications/fhwahop16026/index.htm

Assessing TMSs – Framing the Discussion:

Thank you!

Preparing for and Conducting a TMS Assessment

Dan Lukasik
Parsons

Session 1 Presentations:

1 | Assessing TMSs

2 | Preparing for and Conducting a TMS Assessment

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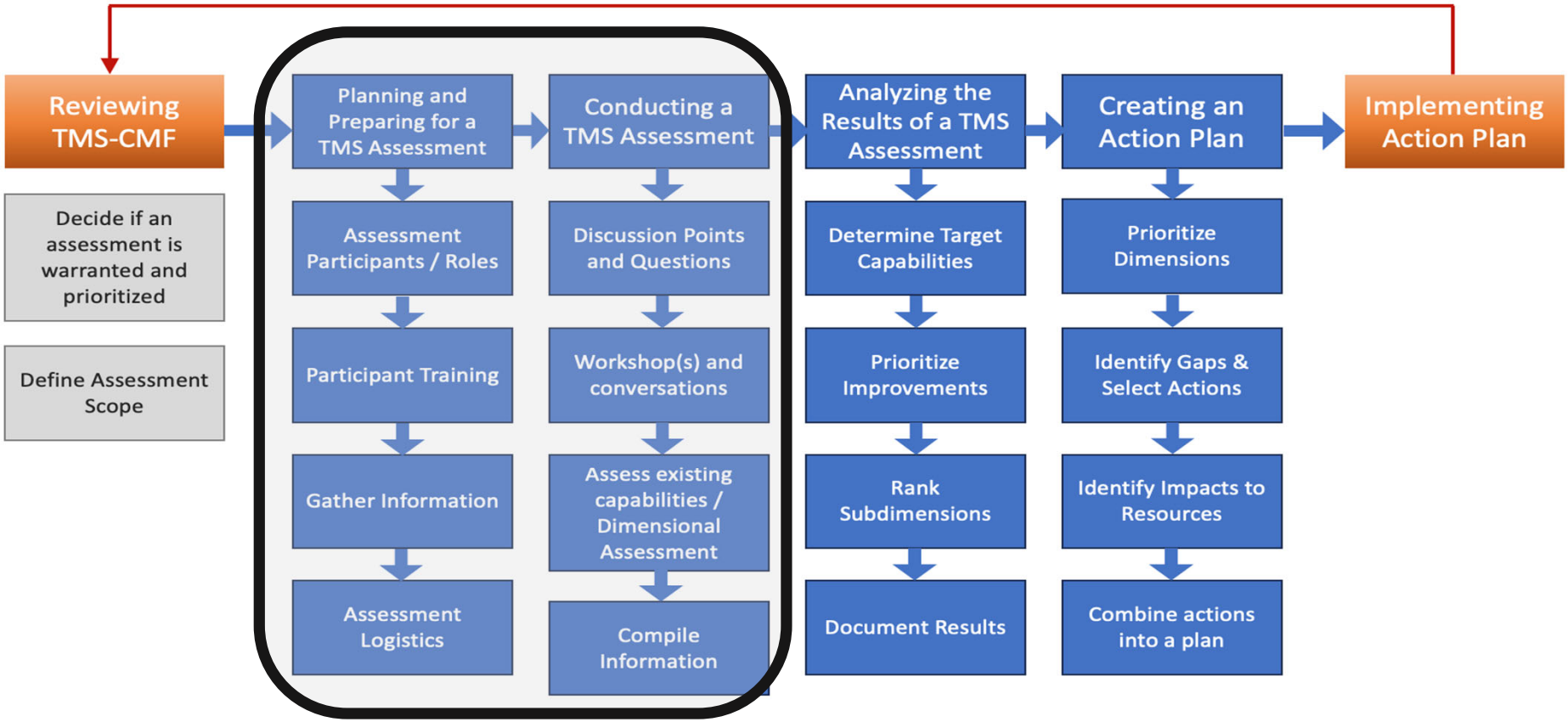
Preparing for and Conducting a TMS Assessment

Possible *assessment process and activities* to consider:



Source: FHWA

Preparing for and Conducting a TMS Assessment

Contemplating conducting an assessment – examples of issues to consider:

- Build agency support to conduct assessment
- Identify stakeholders to include in assessment process
- Determine timing
- Prepare for how to conduct the assessment
- Plan on how to use the assessment results
- Prepare stakeholders to participate in assessment
- Identify agency resources and information needed (e.g., goals, performance measures, links to agency strategic plans, condition of TMS assets, etc.)
- Obtain resources to conduct assessment

Preparing for and Conducting a TMS Assessment

Conducting an assessment— examples of issues to consider getting started:

- Identify information needed to conduct assessment
- Identify and incorporate key stakeholders
- Agree on process to follow with conducting the assessment
- Determine key issues and actions to be considered in the assessment
- Collect and compile information needed
  - Pull information from other relevant assessments (e.g., TSMO, traffic signal timing, active traffic management) and plans (e.g., Agency TSMO Plan, Regional Plans, TMS Plans)
  - Compile information needed to support the assessment
- Determine which analyses to conduct, and outputs to produce

Preparing for and Conducting a TMS Assessment

Examples of information to compile and analyze to support assessing each TMSs Dimension, Subdimension, or Capabilities:

- TMS day-to-day:
  - Maintenance, repairs, and asset management
  - Operation (e.g., center, performance, active management)
  - IT, security, emergencies, and support other systems (e.g., remote operations)
- Staffing TMSs (e.g., plans, policies, resources, scheduling, contractors)
- Policies, procedures, and tools to support managing and operating TMS
- Inclusion of TMS plans, requirements, and resources into agency or TSMO policies, programs, plans, initiatives, services, or efforts
- Planning, design, development, and implementation of TMS
- Planning and plans for an agency's next generation of TMS or improvements

Preparing for and Conducting a TMS Assessment

Examples of issues to consider when assessing performance of TMSs:

- What goals, objectives, or questions need to be addressed or answered?
- What measures are needed to support the assessment?
- Are these measures directly or indirectly produced by available data and/or information?
- What data does the TMS need to collect, use, or make available to support the desired assessment procedure in the future?
- Do you have the resources to collect, compile, and manage desired data and information?
- Are the TMS performance measures and supporting data elements integrated into TSMO planning, programs, and agency strategic plans?

Preparing for and Conducting a TMS Assessment

Subdimensions – *define, describe, and what to assess*?

- Identify and describe dimension (e.g., TMS lifecycle processes, TSMO program and plans, agency programs and plans)
- Identify and describe possible sub-dimensions
- Develop framework to assess tiers of capabilities to assess dimensions and subdimensions
- Measure and identify current capabilities or performance
- Identify possible or desired future capability levels

	Level 1	Level 2	Level 3	Level 4
Dimension				
SubDimension 1				
SubDimension 2				
SubDimension 3				

Source: FHWA

Dimensions or Process Areas	*What Is It?*
1. Business Process	*Plans, Programs, Budget*
2. Systems & Technologies	*Approach to Designing, Developing, and Implementing Systems*
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9. Sharing and Using Data	Activities to enable sharing and use of data with sources external to TMS

Source: FHWA

Preparing for and Conducting a TMS Assessment

Example: Systems & technology dimension - *where are we today?*

Today's TMSs

Focused on improving the safety, efficiency, and predictability of travel on the surface transportation system, using:

- Field devices
- ITS infrastructure
- Communications media
- Information technology
- Operations personnel
- Operational strategies and control plans
- Active management and control of traffic
- Operations centers

Technology Challenges Facing Today's TMSs

- Limited ability to share information internally within agency, with other systems or public
- Limited ability to capture or use data from emerging sources or 3rd parties
- Capabilities or resources lacking to automate system functions or use of operational strategies
- Operating environment, software, or components are difficult to modify, replace, or integrate new or emerging technologies or devices
- Adding functions, services or technologies may require replacing or upgrading system due to limitations with how system was designed

Source: FHWA

Preparing for and Conducting a TMS Assessment

Example: Systems & technology dimension - *where can we go tomorrow?*

Technology Advances

- Emerging sources of data
- Sharing and using data with travelers using mobile devices
- Innovative technologies and tools to analyze data
- Advanced computing capabilities
- Open source, agency-owned and off-the-shelf software
- Enhanced capabilities of ITS and traffic control devices
- Ability to share information with other systems and public
- Etc.

→

Next-Generation of an agencies TMS:

- Improvements to existing capabilities and entirely new functions or services
- Real-time decision-making, with highly automated operation, to proactively manage and control traffic
- Coordinating and sharing of information with other systems and service providers to improve safety and mobility
- Modular components and expandable platforms, will be easier for agencies to manage, operate, maintain, and modify to meet evolving future needs
- Etc.

→

Possible functions or services to consider for the next-generation of agencies TMS:

- Monitor, calculate, and predict
- Propose, select, and implement
- Automate management and operation
- Expand service area
- Enhance ability to share information with different systems, agencies, or service providers

Source: FHWA

Identifying Improvement Opportunities

EXAMPLE: Systems & technology dimension - *what are possible improvements?*

- Focus on approaches to planning, developing, or building TMS:
  - Ensure agency and stakeholder needs are addressed
  - Planning for and developing plans identifying, scoping, and estimating needs and costs for improvements
  - Follow systems engineering principles—to develop and trace requirements, establish a concept of operations, etc.
- Other issues to consider:
  - Technical feasibility
  - Operational feasibility
  - Condition of assets
  - Economic feasibility
  - Current and anticipated funding
  - Current and anticipated staff and contract support
  - Planning, plans, and planned improvement projects

Dimensions or Process Areas	*What Is It?*
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Source: FHWA

Preparing for and Conducting a TMS Assessment

Examples of TMS specific resources available to support conducting assessments:

1. Configuration Management for TMSs
2. TMC Information Technology Security
3. Recovery and Mitigation for TMCs
4. TMC Operator Requirements and Position Descriptions
5. Virtual TMC Development
6. Regional, Statewide, and Multi-State TMC Concept of Operations and Requirements
7. TMC Performance Dashboards
8. Performance Measure and Health Index of ITS Assets
9. Consideration of Current and Emerging TMC Data
10. Procuring, Managing, & Evaluating Performance of Contracted TMC Services
11. TMC Staffing and Scheduling for Day-to-Day Operations

* All of these resources are available via the TMC PFS website: https://tmcpfs.ops.fhwa.dot.gov/completedproj.htm

Preparing for and Conducting a TMS Assessment

Thank you!

Assessing TMSs Capabilities and Performance

John MacAdam
MacAdam Consulting

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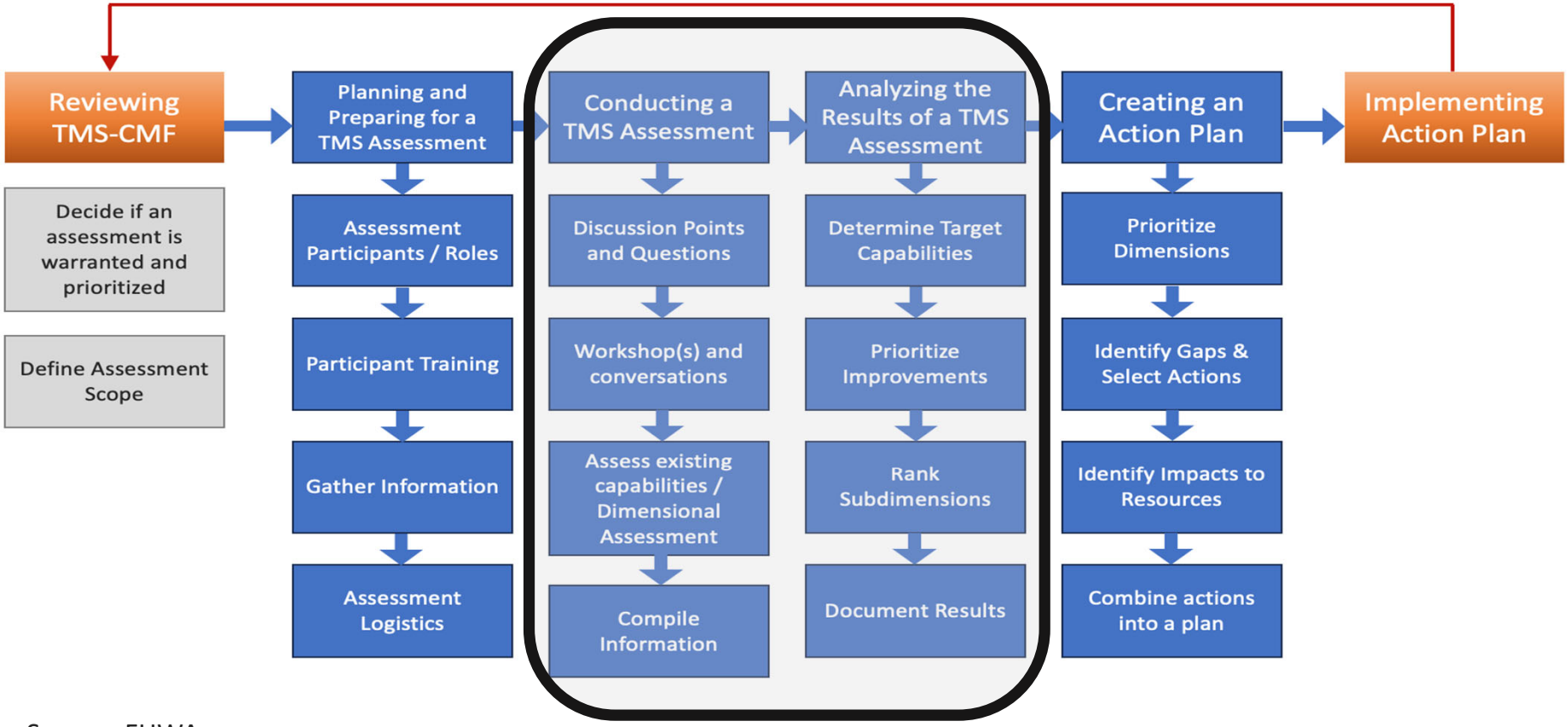
Assessing TMSs Capabilities and Performance

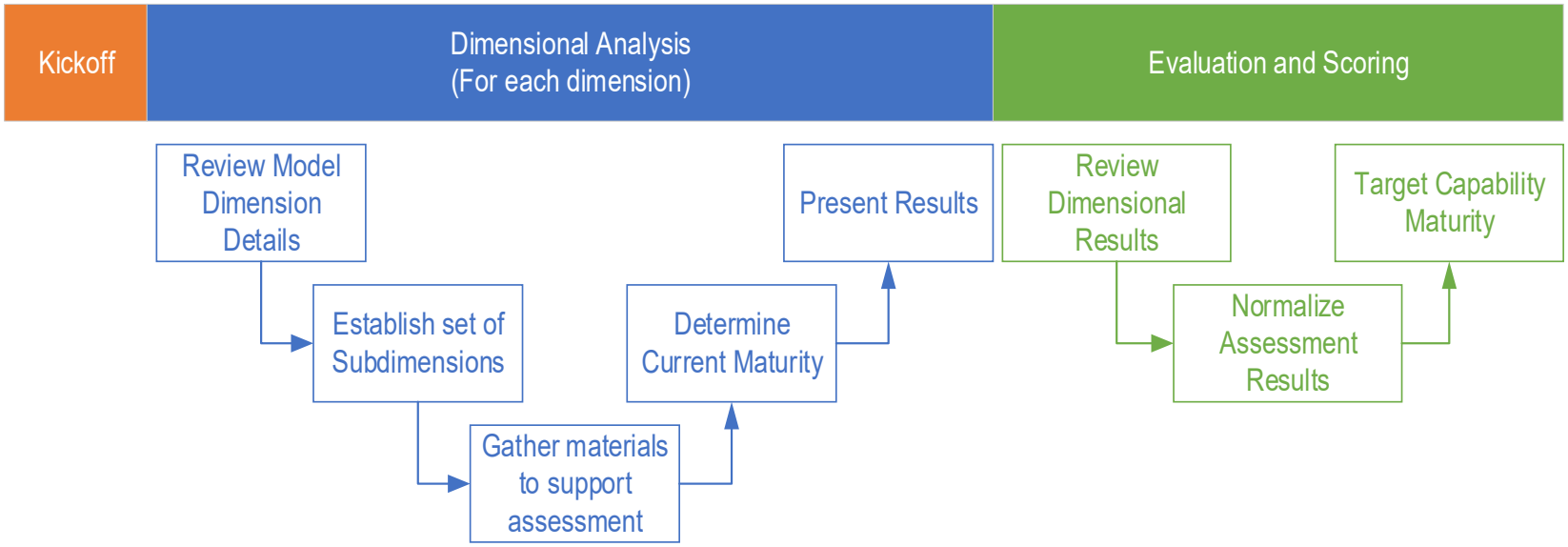
What might you consider with assessing TMS capabilities and performance?



Source: FHWA

Preparing for and Conducting a TMS Assessment

What issues to consider with assessing TMSs dimensions and sub-dimensions?



Source: FHWA

Assessing TMSs Capabilities and Performance

Dimension 1: *Business Process* – Possible TMS Sub-dimensions to consider

- TMS Program
- TMS Program Plan
- TMS proposed improvements incorporated into agency TSMO Program and Plan
- TMS resource needs incorporated into agency TSMO Program and agency process to prioritize and allocate resources
- Planning process established to identify needs and scope TMS improvements prior to obtaining approval for funding or procuring projects
- Policies governing the management and operation of TMS
- Procedures supporting the management and operation of TMS

Assessing TMSs Capabilities and Performance

EXAMPLE: Business Process improvements

Potential improvements could involve:

- Integrating TMS as a TSMO element in State/ Agency Long Range Plans and Regional Transportation Plans
- Establishing a multi-year TMS development plan
- Improving processes for identifying, budgeting, and programming funding
- Improving processes for planning and programming resources for TMS day-to-day operations, maintenance, and repairs
- Developing/improving an asset management process
- Improving clarity of organizational structure and administrative processes

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Source: FHWA

Assessing TMSs Capabilities and Performance

Dimension 2: *Systems and Technologies* – Possible TMS Sub-dimensions

- Software subsystem
- Data subsystem
- TMS design
- Managing TMS assets
- TMS inventory
- Data management plans, capabilities, resources, and activities
- Configuration management
- Transition plans and activities

Assessing TMSs Capabilities and Performance

EXAMPLE: Systems & Technology improvements

- Focus on approaches to planning and building systems
  - Ensure agency and stakeholder needs are addressed
  - Follow systems engineering principles—to develop and trace requirements, establish a concept of operations, etc.
- Other issues to consider:
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Sharing and Using Data	Activities to enable sharing and use of data with sources external to TMS

Source: FHWA

Analyzing the Results of a TMS Assessment

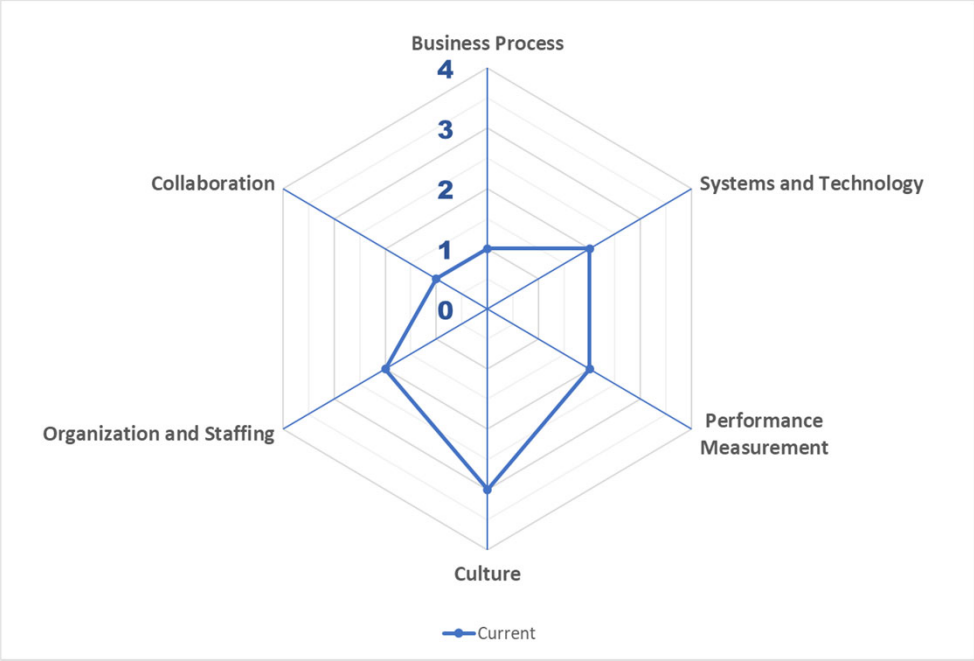
Systems & Technology Dimension – *what is current maturity level?*

Sub-Dimension	Level 1 Performed	Level 2 Managed	Level 3 Integrated	Level 4 Optimizing
Design, develop, and implement TMS improvements	Systems and technology approaches for TMS ConOps, Requirements, Structure, and Strategic Plan are ad-hoc and outside of systematic systems engineering.	System engineering is consistently employed for TMS ConOps, Requirements, Structure, and Strategic Plan, promoting the use of systems architecture standards and increasing interoperability. However, the level of documentation and training may still be limited	Systems and technology for TMS ConOps, Requirements, Structure, and Strategic Plan are standardized, documented, and interoperable. Staff is trained and educated on current and emerging technologies impacting TMS capabilities, ensuring a strong understanding of systems engineering principles and practices.	Systems and technology for TMS ConOps, Requirements, Structure, and Strategic Plan are continually upgraded and optimized to improve performance. The agency ensures that system engineering practices are adapted to support continuous improvement and maintain high levels of interoperability and standardization.
Software Subsystem	Minimal collaboration exists between TMS and IT groups. TMS may not be prioritized within IT operations	Some cooperation between IT group and TMS group. Some alignment on standards, practices, and system support.	TMS and IT technologies in alignment. Good collaboration for TMS-related tests, deployments, support, and enhancements.	Full cooperation and collaboration between TMS and IT groups. Each is involved in all major technology decisions for the TMS. TMS seen as a top priority system with IT resources supporting current and future enhancements.
Data Subsystem	TMS group uses proven technologies for the TMS. R&D is minimal. Any emerging technologies are usually met with skepticism.	TMS group acknowledge emerging technologies but adopts a "wait and see" attitude letting others deploy and approve	TMS group actively monitors emerging technologies and runs pilots to evaluate and test selected innovations	Proactive approach to R&D. The agency actively pursues advancements in technology and is an early adopter.

Source: FHWA

Analyzing the Results of a TMS Assessment

Summarizing existing capabilities of TMS dimension capabilities:



- Spider Diagram Format
- Visualize existing capability maturity across all dimensions

Source: FHWA

Analyzing the Results of a TMS Assessment

EXAMPLE: Systems & Technology Dimension improvements:

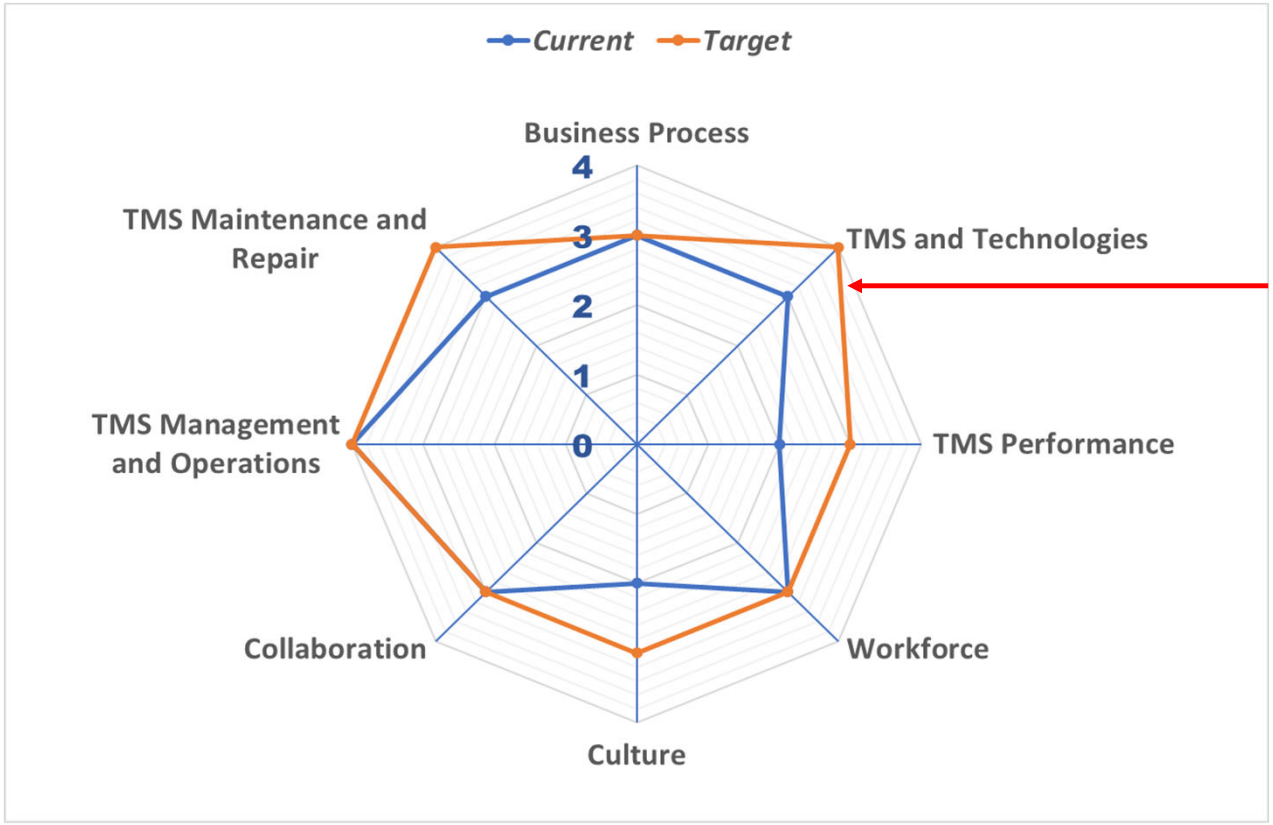
Identifying opportunities to advance capabilities for sub-dimensions and dimensions

Design, Develop, and Implement TMS Improvements			
Achieving Level 1	Achieving Level 2	Achieving Level 3	Achieving Level 4
Actions to Get to the Next Level			
	Introduce systems engineering into TMS program planning	Develop tools to support adoption of standard system engineering process	Constantly review and refine processes
	Introduce systems engineering into TMS development projects	Develop procedures to support adoption of standard system engineering process	Maintain adaptability and responsiveness to technology changes or advancements
		Develop training to support adoption of standard system engineering process	
Key Stakeholders			
	TMS champions	IT Staff Policy staff Systems integrators	IT Staff Policy staff Systems integrators

Source: FHWA

Analyzing the Results of a TMS Assessment

How do we translate assessment results into action planning?



Identifying existing and desired future capability levels across these dimensions provide the basis to identify and prioritize opportunities for improvements

Source: FHWA

Assessing TMSs Capabilities and Performance

Thank you!

Identifying Opportunities and Approaches for Improving TMSs

Matt Junak
HNTB

Session 1 Presentations:

1 | Assessing TMSs

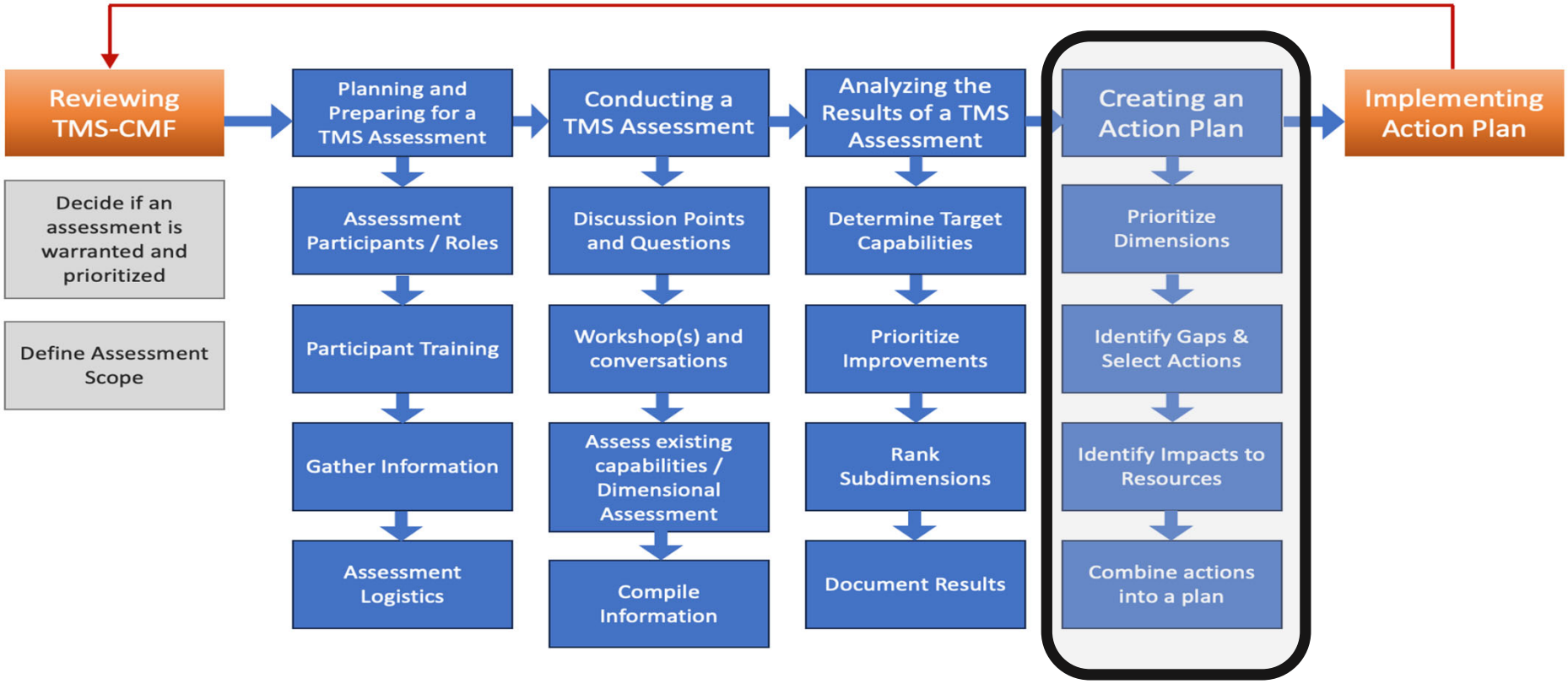
2 | Preparing for and Conducting a TMS Assessment

3 | Assessing TMSs Capabilities and Performance

4 | Identifying Opportunities and Approaches for Improving TMSs

Identifying Improvement Opportunities

TMS Assessments - Action Planning and Plans:



Identifying Improvement Opportunities

Action Planning and Plans:

- What are the outcomes you are trying to influence?

- What are the key aspects of the improvement process?
  - Get stakeholder buy-in
  - Establish awareness of current capabilities
  - Identify opportunities for improvement
  - Develop a sound basis to prioritize resources and actions
  - Identify projects to pursue for improvements

Time-based Categories:

Immediate changes could include: control plans used for different events, plans to add or improve the use of operational strategies and control plans, or change operational practices.

Near-term changes could include: changes in operations, changes in policies and procedures, or adjusting allocation of resources and practices for maintenance or repair of assets

Long-term changes could include: build long-term agency support for TMS; grow funding; develop multi-year plan for next-gen TMS; obtain resources to improve the capabilities and performance of TMS; and integrate TMS plans and needs into other agency plans and planning processes

Identifying Improvement Opportunities

Identifying, prioritizing and selecting improvements - issues to consider:

Identify purpose, needs, gaps, and scope of proposed projects

Consider prioritizing both present and future needs

Compare TMS goals and performance measures to outcomes of proposed improvements

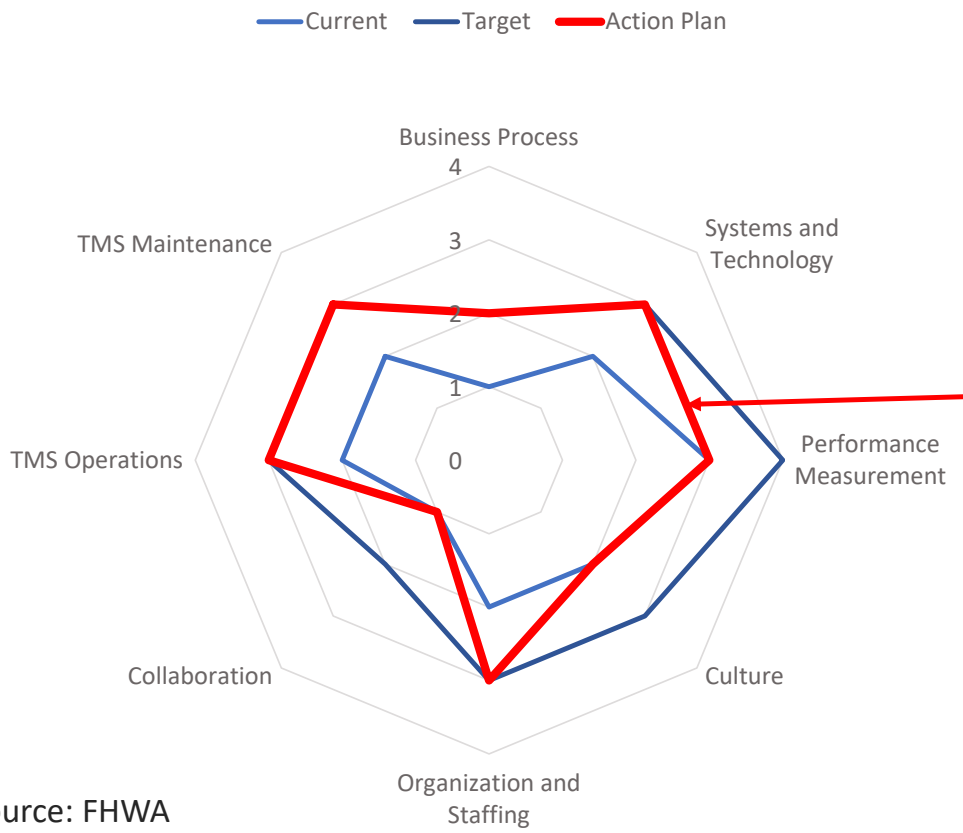
Connect project outcomes to vision, goals, and long-range plans

Match proposed TMS funding needs to eligible funding sources

Identify resources needed to support managing, developing, implementing, testing, accepting, and initiating

Identifying Improvement Opportunities

Prioritizing improvement opportunities in TMS action plans:

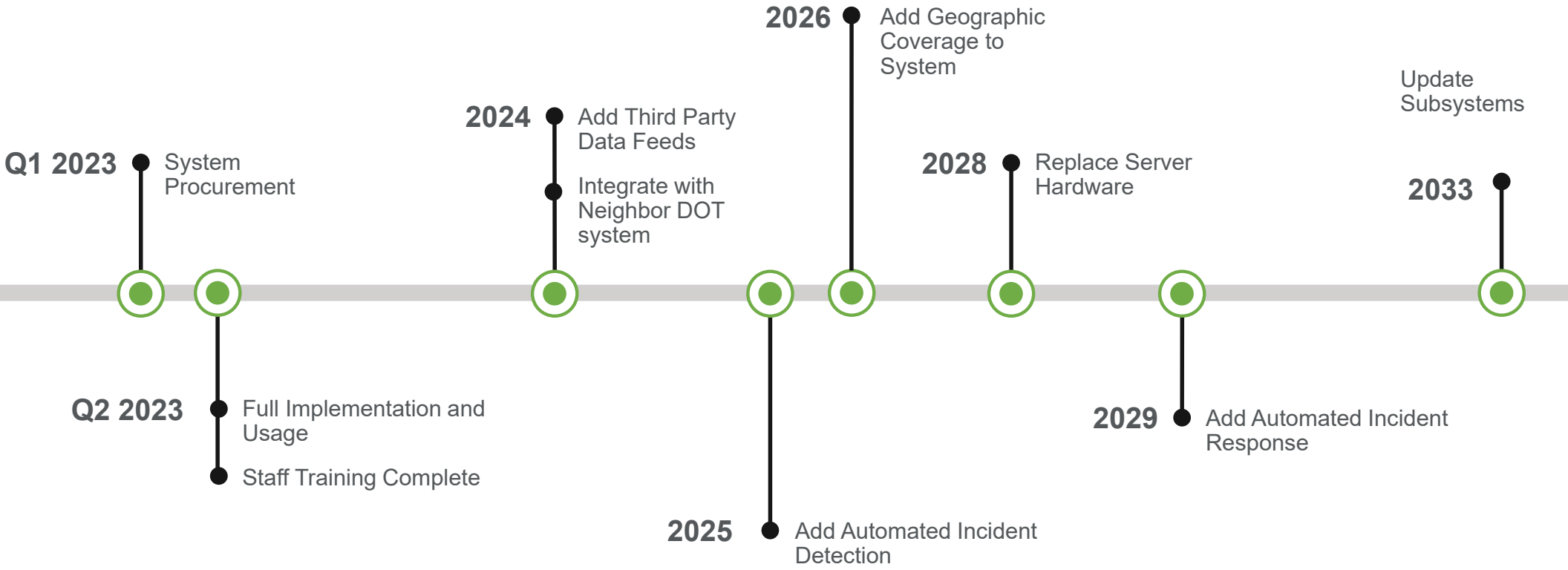


Source: FHWA

Identifying existing and desired future capability levels across these dimensions provide the basis to identify and prioritize opportunities for improvements

Identifying Improvement Opportunities

Prioritizing improvement opportunities in TMS action plans:



Source: FHWA

Identifying Improvement Opportunities

Improvement opportunities identified in TMS assessments:

Prepare procedures, control plans, and actions for specific events or scenarios

Identify and obtain staff or contract support with the knowledge, ability and support resources to support TMSs

Plan and obtain resources needed for improvements

Plan and develop plans for the next generation of the agency's TMS

Develop staffing plan and obtain resources to improve scheduling of staff and support resources to meet the TMS's operational needs

Identifying Improvement Opportunities

Scoping proposed improvement projects:

- Identify physical changes needed
- Decide other enhancements to support proposed changes
- Consider what items to include
- Plan for needed funding:
  - Capital expenditures for improvement projects
  - Operating expenditures and resources to support improvement project and operation of TMS

Identifying Improvement Opportunities

- Adjustments to agency or TMS operating policies and procedures
- Changes to TMS operations procedures, operator tasks, or support services
- Updates to TMS inventory, documentation, and information to include in configuration management process
- Changes to asset management, maintenance, or repair actions
- Implementation coordination, resources, and support

Framing the Discussion

Examples of Opportunities to Integrate TMS Assessment Results into Agency Processes and Plans:

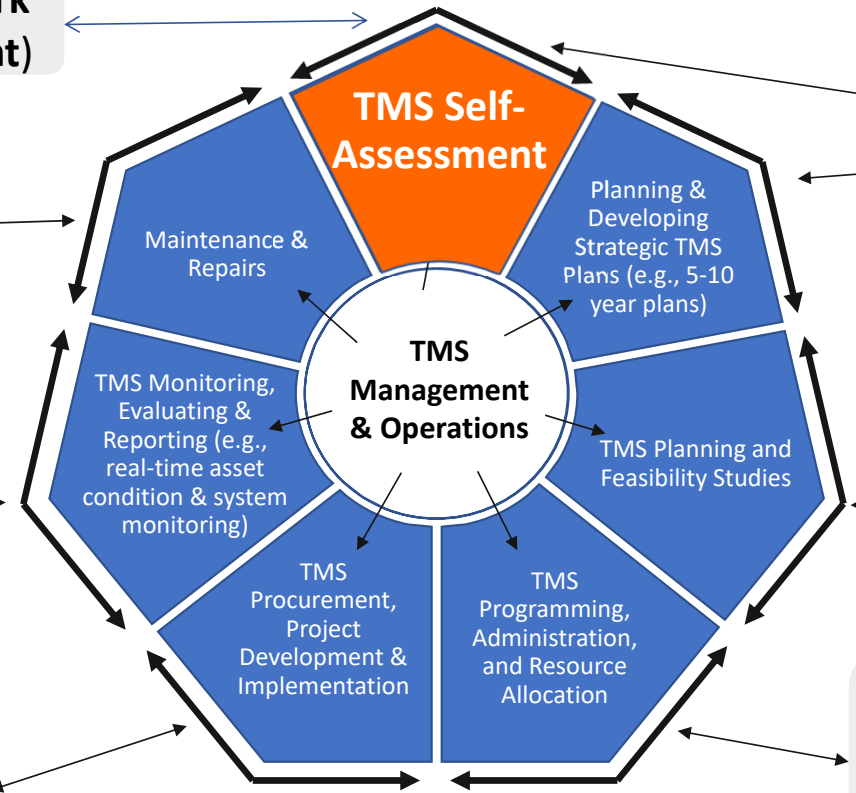
Agency Processes & Plans:

Capability Maturity Framework for TSMO (Traffic Management)

Conducting Daily Maintenance and Repairs

Facilities Performance Monitoring and Reporting, TMS Asset Monitoring and Reporting, TMS Asset Performance Evaluation, TMS Program and Plan

Design, Development and Procurement of Projects (e.g., systems engineering), TMS Program and Plan, Agency or Regional ITS Architecture



Source: FHWA

Agency Processes & Plans:

Agency Strategic Plan, TSMO Program and Plan, TMS Program and Plan, MPO TSMO or ITS Plan, Agency or Regional ITS Architecture

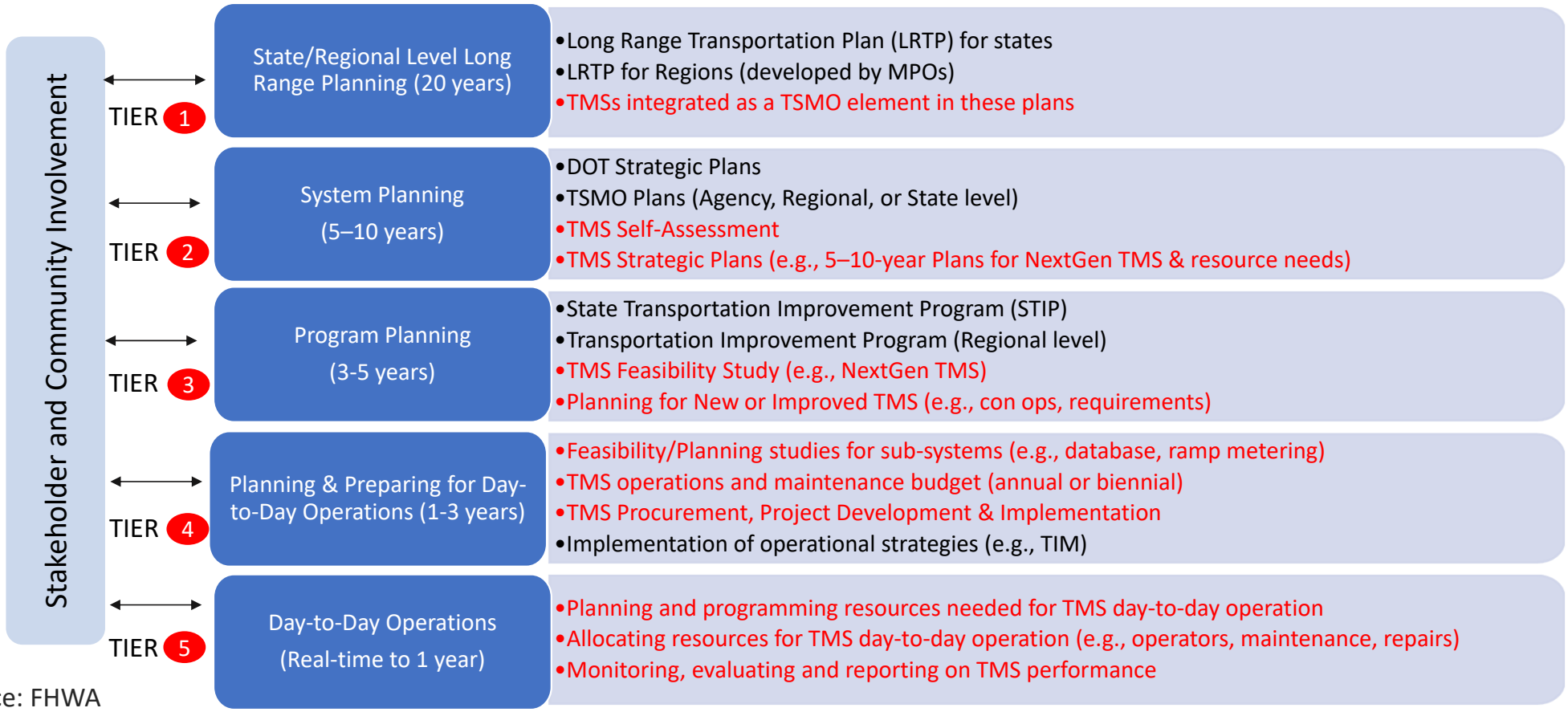
Planning & Design of TSMO Initiatives, Operational Strategies, or ITS Projects (feasibility study, planning study), Agency or Regional ITS Architecture

TSMO Project Selection & Prioritization, TMS Improvement Projects, Allocating Resources for Maintenance and Operations, TMS Program and Plan, Agency or Regional ITS Architecture

Identifying Improvement Opportunities

EXAMPLE: Incorporate needed TMS improvements into agency processes and plans

Red text = opportunities to incorporate TMSs into agency planning processes and plans



Source: FHWA

Identifying Opportunities and Approaches for Improving TMSs

Questions?

Thank you!

Session 2: Breakout Discussion

Identifying Issues to Consider, Successful Practices, & Resources

Moderators: Susanna Zammataro (*International Road Federation – Geneva, Switzerland)*

Session 2 Format:

9:55-10:00	Introduction & instructions
10:00-10:45	Participate in breakout discussions
10:50-11:00	Health break, rejoin workshop and transition to Session 3

9:00 - 9:05am:	Welcome
9:05 - 9:55am:	Session 1 – Overview
9:55 - 11:00am:	**Session 2 – Breakout Discussion**
11:00 - 11:40am:	Session 3 – Breakout Results
11:40 - 11:50am:	Session 4 – Action Planning
11:50am - Noon:	Session 5 – Next Steps

Session 2: Breakout Discussion

Purpose:

- Participate in group discussion, sharing ideas, and experiences regarding one of the following topics:
    1) Preparing for and Conducting a TMS Assessment
    2) Opportunities for Improvements – TMS Assessment Action Plans
    3) TMS CMF Dimensions 1 & 2 (Business Process + TMS & Technologies)
    4) TMS CMF Dimensions 3 & 4 (Performance + Workforce)
    5) TMS CMF Dimensions 5 & 6 (Culture + Collaboration)
    6) TMS CMF Dimensions 7, 8, 9 (Mgmt. & Ops. + Maintenance & Repair + Sharing/Using Data)

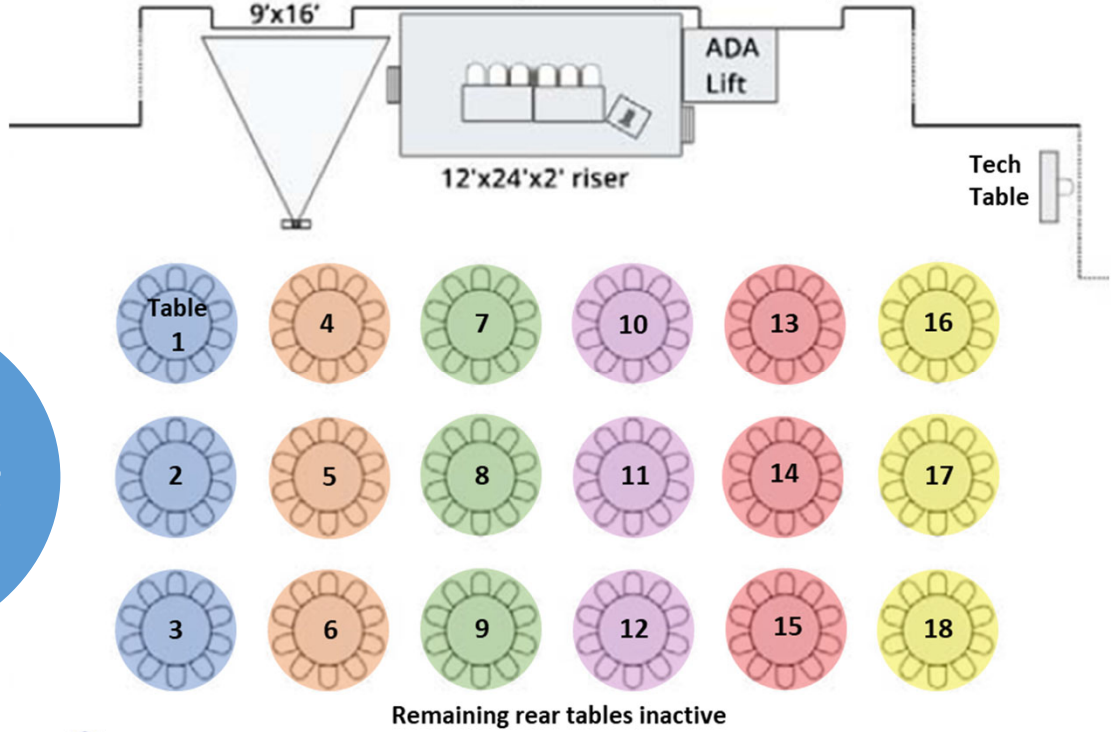
Outcome:

- Identify key issues to consider, successful practices (e.g., agency name and report), or resources (existing or needed) to support the assessment process or CMF dimensions.

Session 2: Overview & Steps

1. Check the discussion topic assigned to your table
2. Identify /Confirm Notetaker
3. Identify a Facilitator & Reporter
4. Notetaker accesses pre-crafted PPT file to capture discussion points in notes
5. Conduct table discussion for 40 minutes
6. Notetaker captures discussion points on file provided
7. Agree and highlight the group's top 3 results for issues, practices and resources
8. In Session 3, Reporter has **2 minutes** to **report on the group's top 2** (out of 3) issues, practices and resources

Session 2: Breakout Discussion— Room Map

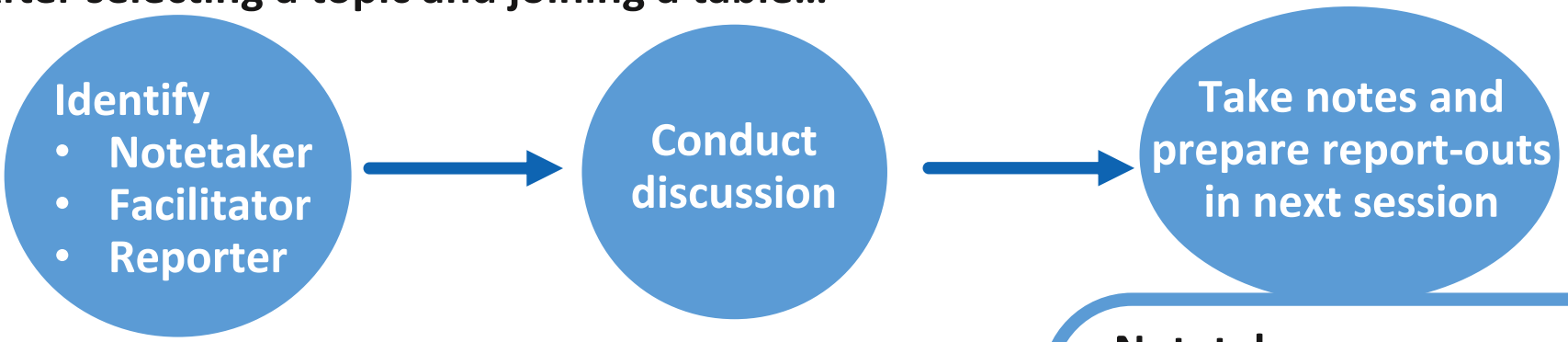


Begin by selecting a topic

Table 1 – 3	Topic 1: Preparing for & Conducting a TMS Assessment
Table 4 – 6	Topic 2: Opportunities for Improvements – TMS Assessment Action Plans
Table 7 – 9	Topic 3: TMS CMF Dimensions 1 & 2 (Business Process + TMS & Technologies)
Table 10 – 12	Topic 4: TMS CMF Dimensions 3 & 4 (Performance + Workforce)
Table 13 – 15	Topic 5: TMS CMF Dimensions 5 & 6 (Culture + Collaboration)
Table 16 – 18	Topic 6: TMS CMF Dimensions 7, 8, 9 (Mgmt. & Ops. + Maintenance & Repair + Sharing/Using Data)

Session 2: Breakout Discussion—Instructions

After selecting a topic and joining a table…



- **Session 2 discussion is 40 minutes**
- **Session 2 ends 10:50 AM**
- ***Break for 10 min***
- **Session 3 begins 11:00 AM**

Notetakers:
Record the top 3 results for each discussion item

Reporters:
Report the top 2 results for each discussion item
Extra results may be used for duplicative report-outs

Session 2: Breakout Discussion—Instructions

Topic 1 (Tables 1 – 3)

Preparing for and Conducting a TMS Assessment

- Are there any changes needed to the assessment process or steps?
- What information may be needed?
- What issues might be considered?
- What resources or support may be needed?
- Are there any successful practices right now?

Topic 2 (Tables 4 – 6)

Opportunities for Improvements – TMS Assessment Action Plans

- What are some possible steps to include in a TMS action plan?
- Are there best practices for developing a TMS action plan?
- What other topics should be considered for the TMS action plan?

Topics 3 to 6 (Tables 7 – 18)

TMS CMF Dimensions

- Are any additional dimensions needed to assess a TMS?
- What subdimensions should agencies consider when assessing each dimension?
- What information and analysis may be needed to support assessing each dimension and supporting subdimension?
- What are other issues we need to consider?

Session 3: Breakout-Session Results

Moderator: Les Jacobson (*LNJ Transportation Consulting*)

Notetakers: Matt Junak *(HNTB)*, Phil Masters *(Parsons)*, Heng Wei *(University of Cincinnati)*

9:00 - 9:05am:	Welcome
9:05 - 9:55am:	Session 1 – Overview
9:55 - 11:00am:	Session 2 – Breakout Discussion
11:00 - 11:40am:	**Session 3 – Breakout Results**
11:40 - 11:50am:	Session 4 – Action Planning
11:50am - Noon:	Session 5 – Next Steps

Session 3: Breakout-Session Results

Purpose:

Share the key ideas identified in your group discussion

Outcome:

Identify high value findings discussed or identified for 6 discussion topics –

1) **Preparing for and Conducting a TMS Assessment**
2) **Opportunities for Improvements**: TMS Assessment Action Plans
3) **TMS CMF Dimensions 1 & 2**: Business Process + TMS & Technologies
4) **TMS CMF Dimensions 3 & 4**: Performance + Workforce
5) **TMS CMF Dimensions 5 & 6**: Culture + Collaboration
6) **TMS CMF Dimensions 7, 8, 9**: Mgmt. & Ops. + Maintenance & Repair + Sharing/Using Data

Session 3: Breakout-Session Results

Instructions:

- Reporters to now report out on group discussion results.
- Facilitator will call on groups in topic number order
- Each table reports on their Top 2 results

*Please be concise: each table has 2 minutes for initial report-outs

Session 4 : Action Planning—Identify Topics for Research or Actions for Industry Consideration and Collaboration

Moderator: Raj Ponnaluri (*Florida DOT*)

Notetakers: Mark Muriello (*International Bridge, Tunnel and Turnpike Association* – IBTTA)

9:00 - 9:05am:	Welcome
9:05 - 9:55am:	Session 1 – Overview
9:55 - 11:00am:	Session 2 – Breakout Discussion
11:00 - 11:40am:	Session 3 – Breakout Results
11:40 - 11:50am:	**Session 4 – Action Planning**
11:50am - Noon:	Session 5 – Next Steps

Session 4: Action Planning

Purpose:

- Identify actions for workshop co-sponsors to consider advancing

Outcomes:

- Actions or activities the co-sponsoring TRB Technical Committees or organizations could advance after the workshop
- Topics for possible research projects or resources to develop to assist public agencies setting strategic direction for TMSs, planning and plans to support TMS improvements, and identifying needed TMS improvements and resources.

Session 4: Action Planning

Possible Activities for Sponsoring TRB Committees and Organizations to Advance

1. ***Conduct workshop during 2025 TRB Annual Meeting***. Possible topics to consider:
   - Sharing and Using Different Types of Data in Traffic Management Systems (TMS).
   - Methods to Identify Staffing Needs and Developing or Updating Staffing Plans for TMSs.
   - Enabling the Sharing and Use of Open-Source or Agency Owned Software or Application Programming Interfaces.
   - Preparing for and Virtually Managing and Operating TMSs.
   - Data Subsystems and Data Management Plans for TMSs.
2. Facilitate the ***sharing of information*** on ***TMS portal of National Operations Center for Operations Excellence website***: https://transportationops.org/traffic-management-systems-and-centers
3. ***Join*** and contribute funds to ***TMC Pooled Fund Study*** to support developing resources to support agencies improving TMS capabilities and performance (Extended to April 2027):
   - Completed, current & planned new projects: https://tmcpfs.ops.fhwa.dot.gov
   - Process conducted annually to identify and prioritize, develop, and select proposals for new projects (e.g., 3 new projects in 2024, 15 proposals to consider for 2024)

Session 4: Action Planning

Possible Activities for Sponsoring TRB Committees and Organizations to Advance

4. Facilitate the sharing of information and highlight practices – ***NOCoE TMS webinar series***:
   - Identify topics for future webinars.
   - Promote planned TMS webinars and identify agencies and possible speakers for anticipated webinars in 2024-2025:
     1. Locating Incidents Outside Surveillance Areas
     2. Using Geofencing to Actively Monitor, Collect, and Share Information
     3. Opportunities for TMSs to Share Information on Incidents
     4. TMSs Role With Using Variable Speed Limits (VSL) During Adverse Weather Events
     5. TMSs Actively Managing and Operating Part-time Shoulder Use
     6. Methods and Tools to Estimate Staffing Needs
     7. TMCs Actively Managing the Use of Queue Warning Messages on Freeways
     8. Performance of Staff Managing and Operating TMSs
5. Support the planning and participate in the ***5th International Symposium on Freeway and Tollway Operations*** the ***last week of June, 2025*** (Marrakech, Morrocco)
6. Explore partnerships to propose, sponsor, and conduct research to advancing TMSs:
   - Data Management Plans, Practices, and Data Subsystems for TMSs, *Selected for 2024 NCHRP Program*
   - Integrating New Software Subsystems and Software Within Evolving TMSs, *Submitted for 2025 NCHRP Program*
   - Other topics identified by TMC Pooled Fund Study or other groups (e.g., TRB ITS Committee)

7. Any other topics for workshop co-sponsors to consider?

Session 5: Immediate Next Steps and Sponsors' Perspectives

Moderator: Jon Obenberger

(FHWA Office of Safety and Operations Research and Development)

Co-Sponsoring Committee/Organization Representatives:

- Beverly Kuhn (TRB Freeway Operations Committee)
- Edward Smaglik (TRB Traffic Signal Systems Committee)
- Yinhai Wang (TRB AI and Advanced Computing Applications Committee)
- Lisa Burgess & Dan Lukasik (TRB Joint Subcommittee on Active Traffic Management)
- Nicole Ivanov (TRB Regional Transportation Systems Mgmt. & Opps. Committee)
- Raj Ponnaluri (AASHTO Committee on TSO, ITS Work Group)
- Alex Wassman (Traffic Management Center Pooled Fund Study)
- Malika Seddi (ASECAP)
- Mark Muriello (International Bridge, Tunnel and Turnpike Association - IBTTA)
- Martin Russ & Johanna Tzanidaki (ERTICO Innovation Platform TM 2.0)

9:00 - 9:05am:	Welcome
9:05 - 9:55am:	Session 1 – Overview
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11:00 - 11:40am:	Session 3 – Breakout Results
11:40 - 11:50am:	Session 4 – Action Planning
11:50am - Noon:	**Session 5 – Next Steps**

Session 5: Immediate Next Steps

- Workshop planning team will update the action plan and advance the proposed activities with sponsors.
- Action plan will be included in workshop summary.
- Workshop summary to be added to the NOCoE TMS Portal: https://transportationops.org/traffic-management-systems-and-centers