



*Accelerating solutions for highway safety, renewal, reliability, and capacity*

# **Regional Operations Forum**

## **Planning for Operations**

TRANSPORTATION RESEARCH BOARD  
*OF THE NATIONAL ACADEMIES*

# What do our travelers want?

- Safe, seamless, and reliable travel across modes and jurisdictions
- Information about current travel conditions
- Timely information to make mode & route choices
- Efficient and reliable goods movement

***Consistency across modes & jurisdictional boundaries***

Expanding our roads and rails takes time and significant funding.



How can we make a difference in the way people and goods move in the region now?

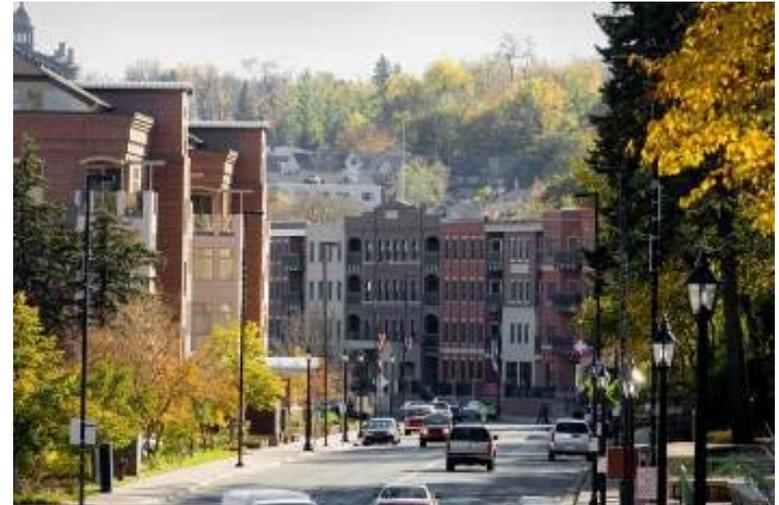
Maximize current investments  
in roads, bridges, rails, and  
transit systems with  
transportation systems  
management and operations  
(TSM&O) strategies.



# Coordinated Across the Region



Ensuring effective use of TSM&O strategies in a region requires a shift...



- Away from project-focused responses
- Toward a strategic, performance-based approach to planning for operations

# What is Planning for Operations?

- A joint effort between planners & operators to improve regional transportation system performance
- Focuses on integrating management & operations strategies in the transportation planning process
- Driven by objectives & performance measures
- Enhances regional decision-making process so that operations investments are on par with investments in construction & system preservation.

# HOW DO WE MAKE THE CASE FOR TSM&O IN THE PLANNING PROCESS?

What do you think is needed???

# Let's address some key ingredients to support by TSM&O program planning

1. A “business case” – how TSM&O relates to agency mission/goals to get buy in
2. Performance measures to gauge progress and use in real time
3. A road map for sustainable strategy application improvements related to problems
4. Clear concepts-of-operations(architecture) to identify systems needed and roles of partners
5. An organizational structure and staff capable of coordinated operational management
6. Budget for sustainable funding (put forward to “planners”)
7. New forms of collaboration: within DOT, among partners – recognizing differential capacities

# EXAMPLE: Making the Business Case: Aligning TSM&O with Agency Goals

## NCDOT

### OUR MISSION

*Connecting people and places safely and efficiently, with accountability and environmental sensitivity to enhance the economy, health and well-being of North Carolina.*

### OUR GOALS

- Make our transportation network **safer**
- Make our transportation network move people and goods more **efficiently**
- Make our infrastructure **last longer**
- Make our organization a place that **works well**
- Make our organization **a great place to work**

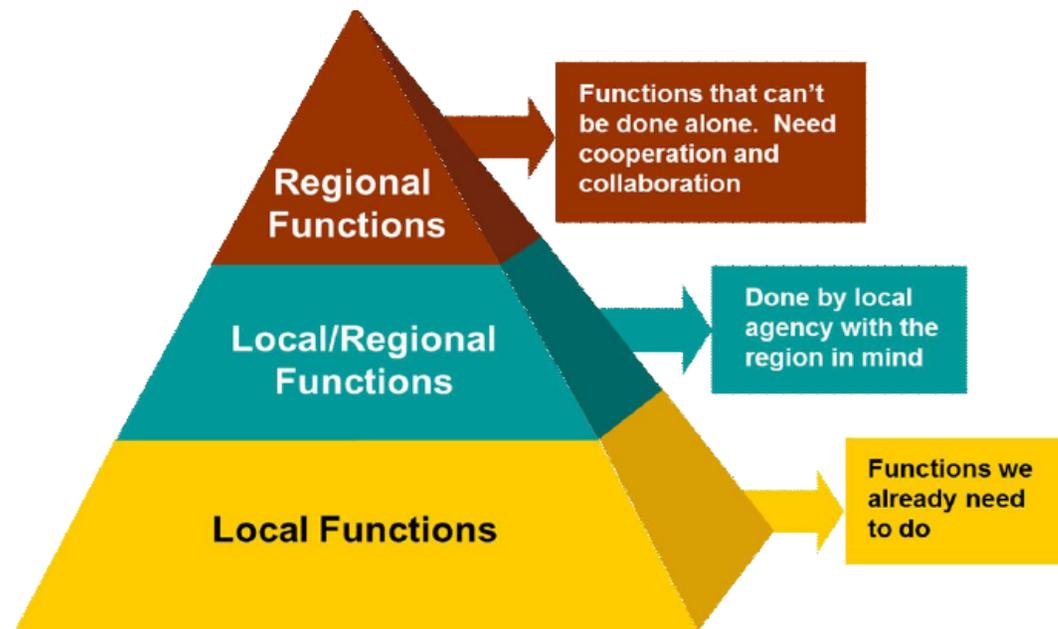
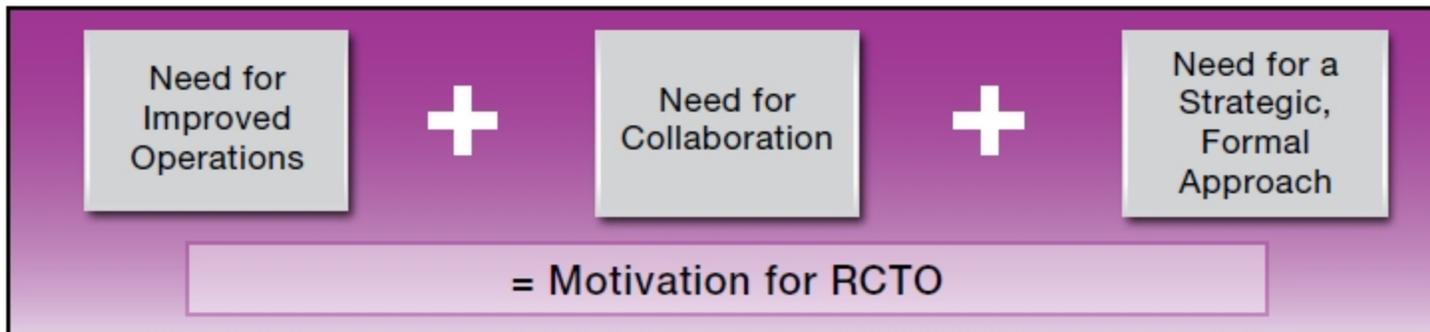
## TRAFFIC OPERATIONS MISSION

*Connecting people and places in North Carolina safely and efficiently on our roadways using traffic operations strategies to reduce congestion and improve traffic flow.*

## TRAFFIC OPERATIONS GOALS

- Improve safety & mobility on freeways and arterials
- Outcome focused (mobility & safety) versus output focused (ITS devices)
- **Consistent & Reliable** real-time traveler information to our customers
- **Consistency Statewide, Interoperability** Between Regions, & **Redundancy** in our system
- Optimize Use of Existing System Infrastructure
- **Accountability** via clearly defined & reportable Performance Measures for desired outcomes
- Ability when responding to Crises

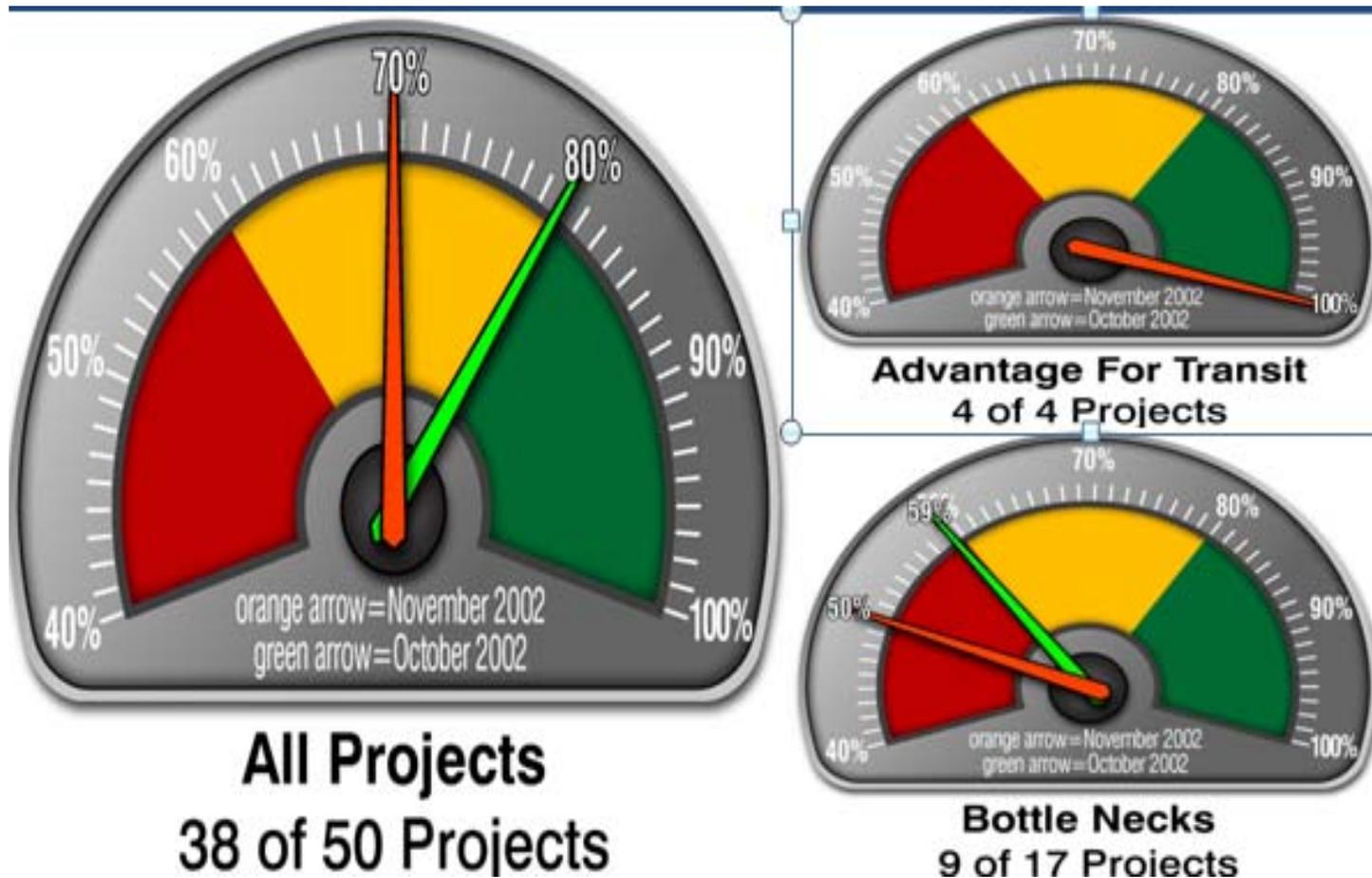
# EXAMPLE: Concept of Operations



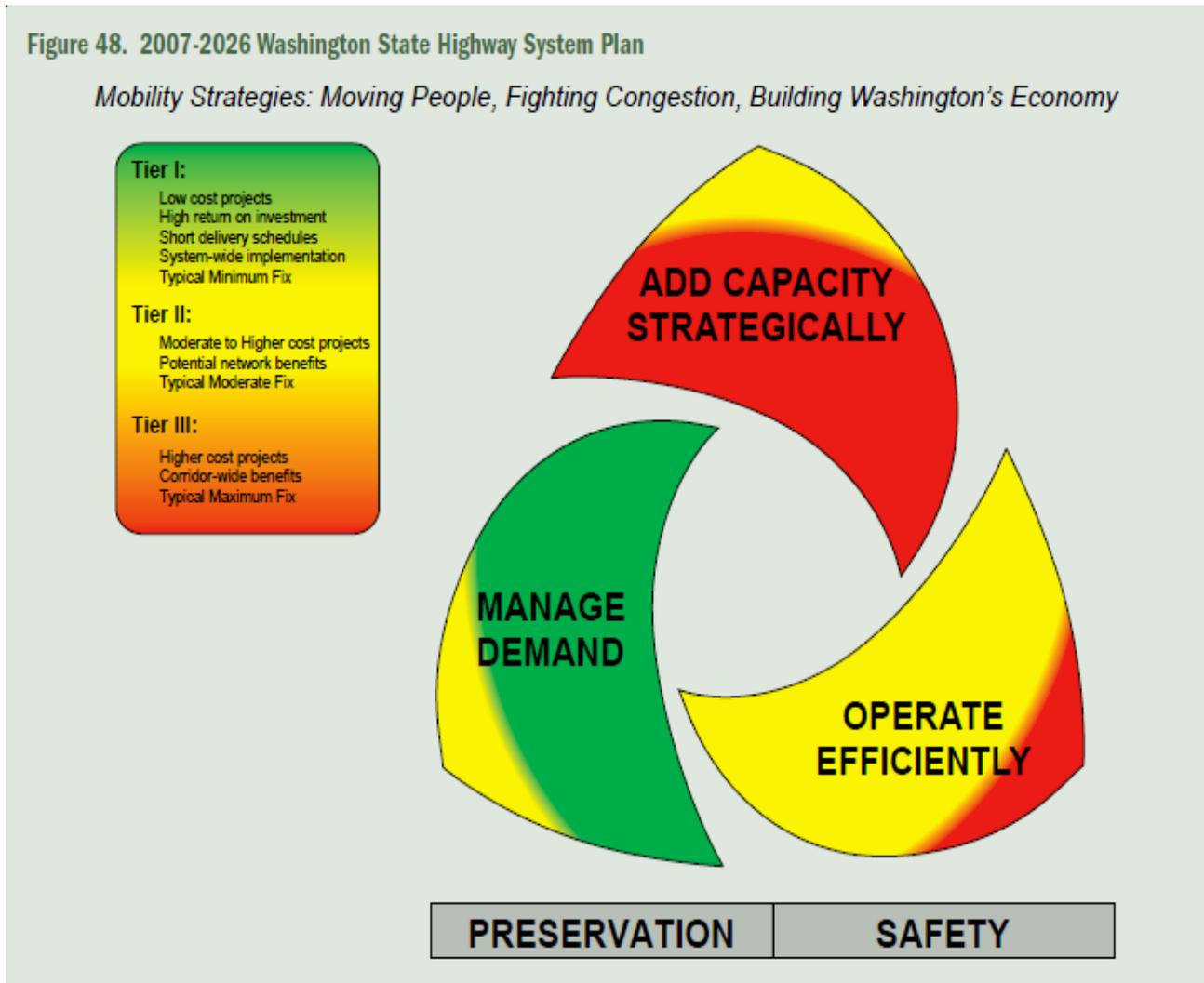
# EXAMPLE: Performance Measures to Gauge Progress

Stage of Planning Process	Examples	
<b>Operations Goal(s)</b>	Improve transportation system reliability / reduce unexpected traveler delay	
<b>Operations Objectives</b>	Reduce incident-based delay so that by 2010, travelers experience...	Improve transit system reliability so that by 2020, at least 95% of buses operate on-schedule...
<b>Performance Measures</b>	<ul style="list-style-type: none"> <li>• <b>Average incident duration (mean minutes per incident)</b></li> <li>• <b>Vehicle hours of non-recurring delay due to incidents</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Percentage of buses more than 5 minutes off schedule</b></li> <li>• <b>Number of bus breakdowns/ major delays</b></li> </ul>
<b>Strategies</b>	<ul style="list-style-type: none"> <li>• Traffic cameras and detection systems to identify incidents more quickly</li> <li>• Roving incident response teams</li> </ul>	<ul style="list-style-type: none"> <li>• GPS systems to track transit buses</li> <li>• Improved traveler information on transit services</li> </ul>
<b>Projects/ Implementation</b>	<ul style="list-style-type: none"> <li>• Install traffic cameras on Route X (2009)</li> <li>• Install variable message signs on Route X (2010)</li> <li>• Implement Incident Clearance Teams on Route X (2010)</li> </ul>	<ul style="list-style-type: none"> <li>• Install GPS locator system for bus system (2010)</li> <li>• Install “Next Bus” electronic signs along major commuter corridors (2011)</li> </ul>

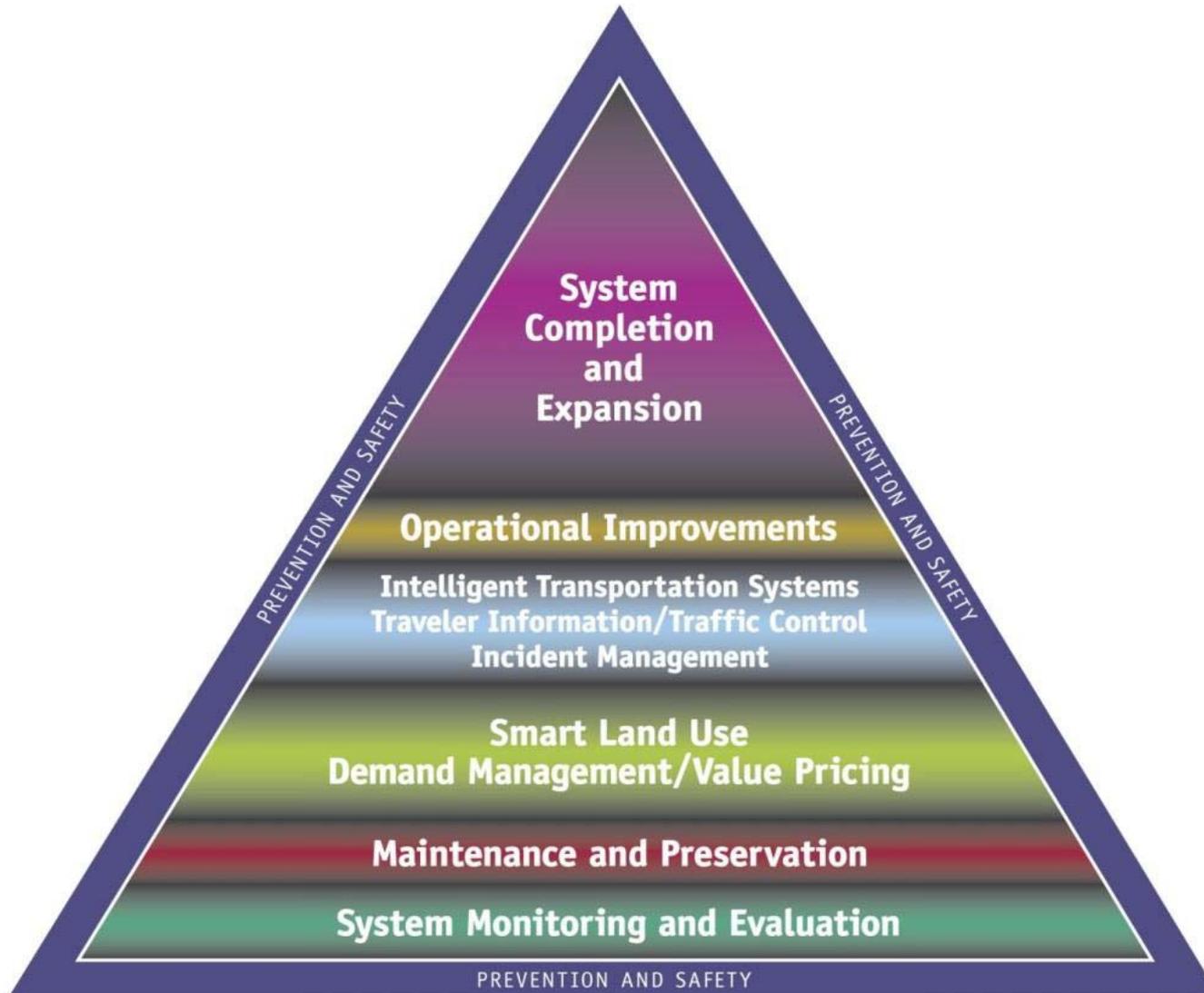
# EXAMPLE: Reporting Performance -- External



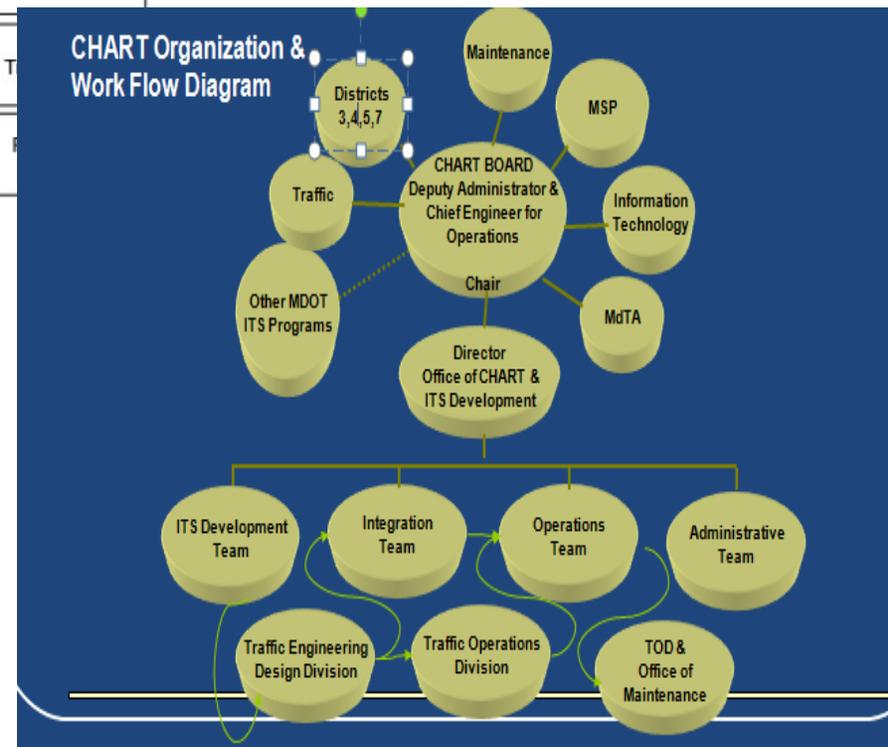
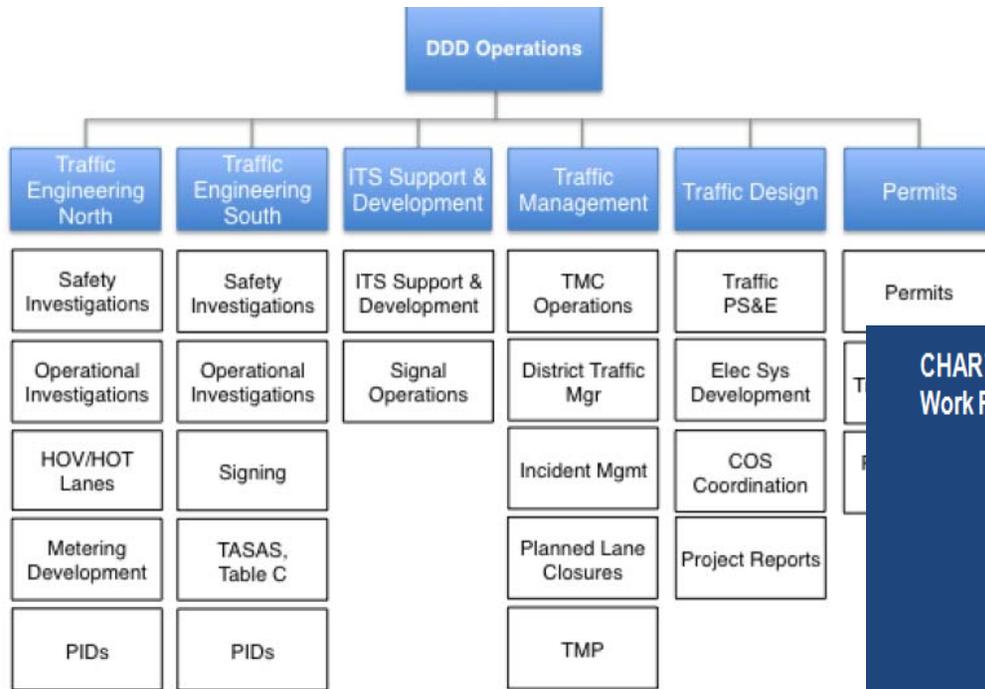
# EXAMPLE: Priorities of (new) Customer Service Culture



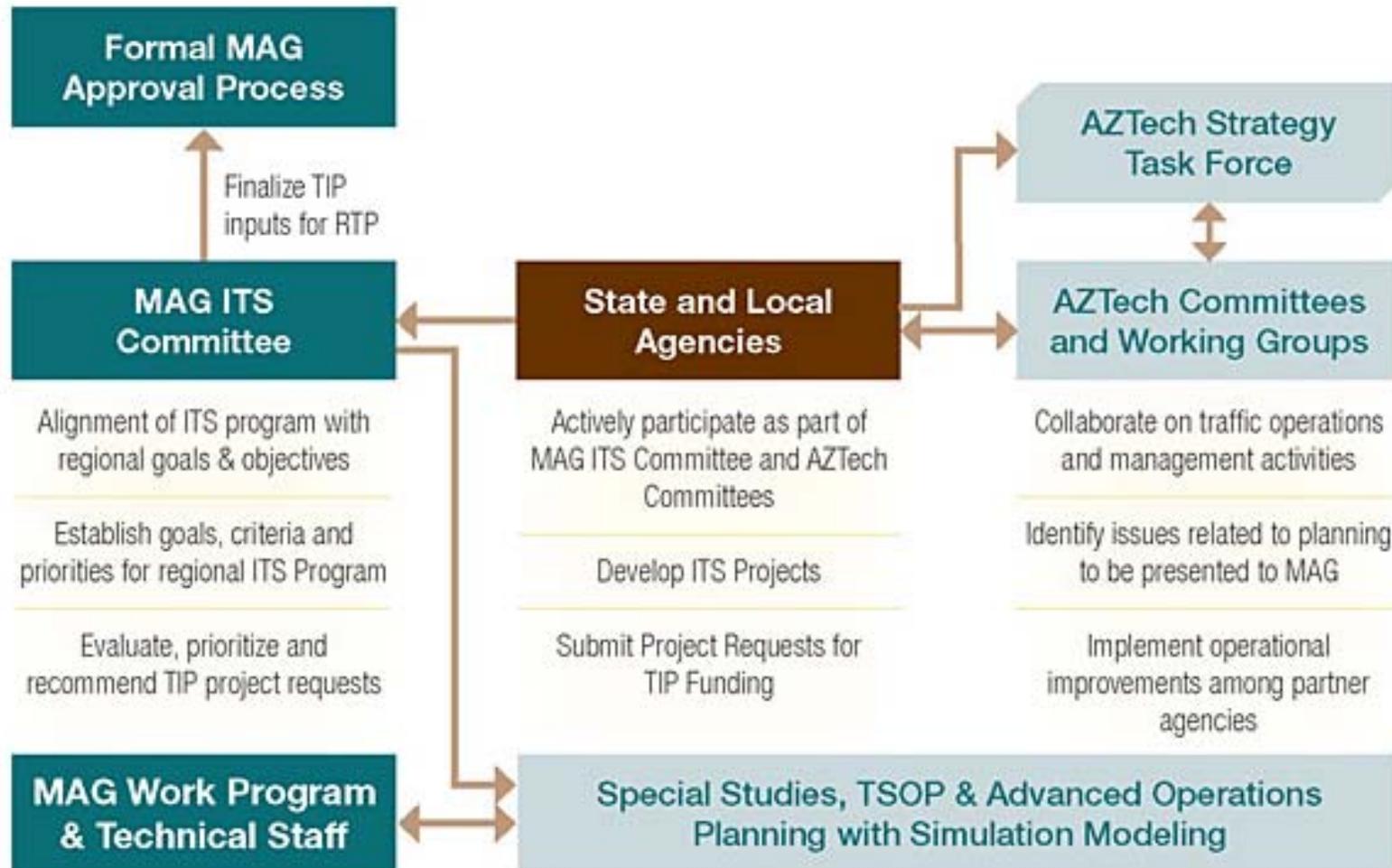
# EXAMPLE: Agency Focus



# EXAMPLE: Improving Organization and Staffing



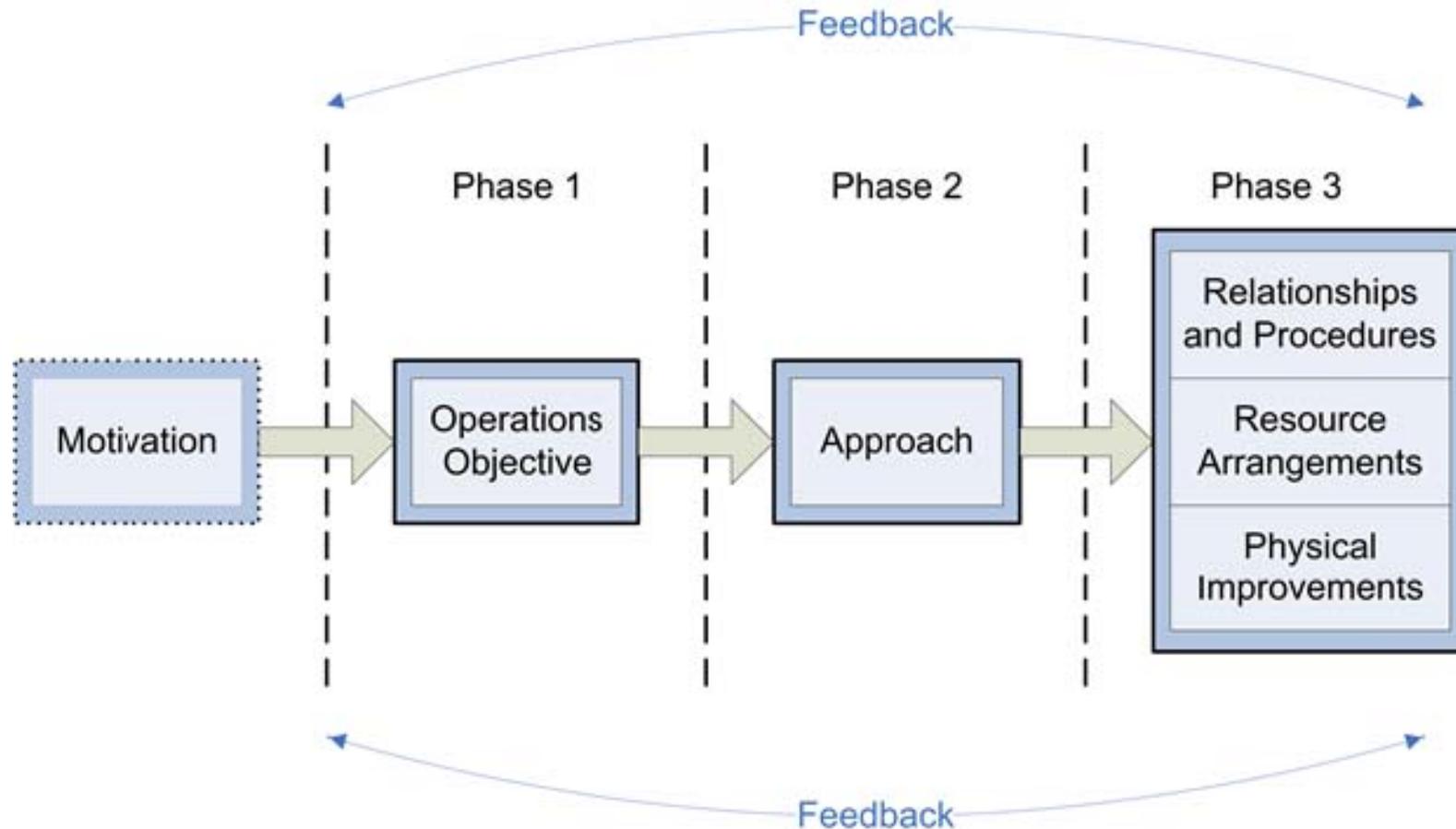
# EXAMPLE: Stakeholder Collaboration



# Why this “TSM&O Program Plan” as Compared to Conventional “Plan”

- Identifies the Mobility objectives, deficiencies with special attention to non-recurring congestion and related strategies
- Recognizes synergism among various TSM&O strategies
- Addresses all the procedures and related roles of participants to conduct TSM&O strategies
- Identifies *complete range of resources* required for effective operations – not just technology/capital, not just capital and maintenance, but also approach to staffing/training, conops, role definitions, real-time/field procedures and protocols , development/utilization of performance information
- Incorporates incremental approach

# Scope of the TSMO Program Plan Development



## TSMO Program Components

- **Relationships and Procedures:** Institutional arrangements, memoranda of understanding (MOUs), protocols, information sharing, etc.
- **Physical Improvements: Investments for** Facilities, equipment, systems, etc. needed to support and sustain TSMO functionality.
- **Resource Arrangements:** Sources and use of funding, staff, equipment, etc. to support and sustain TSMO capabilities.

# Who is Going to Do “Program Planning” – and Why?

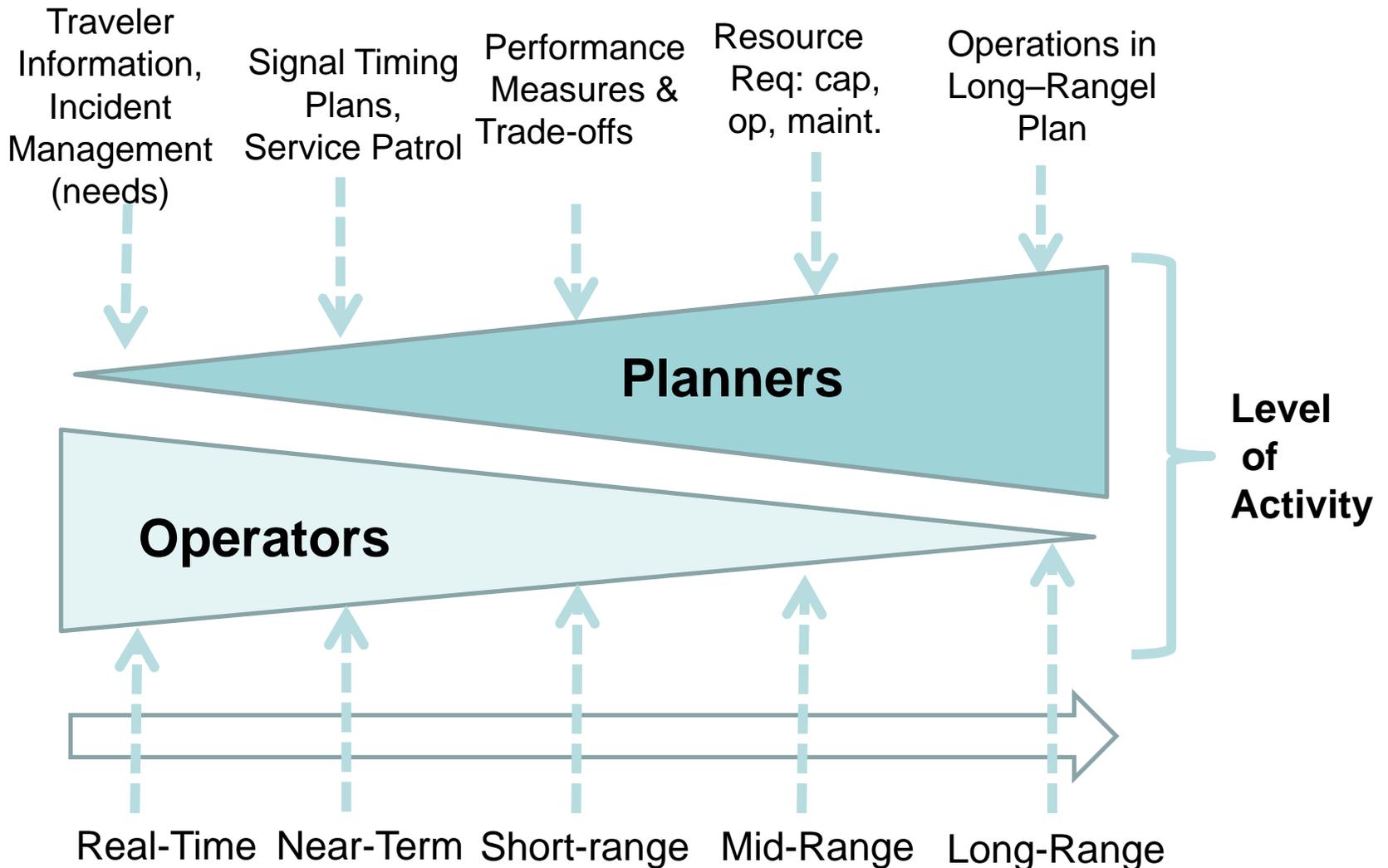
*“Planners” –in DOT HQ and MPOs?*

- Their focus is typically on major capital improvements for recurring congestion in future – federal \$\$ and federal requirements
- Most statewide and metro plans ignore TSM&O (**T**oo **S**mall to **M**atter)

*TSM&O managers/staff?*

- They know what is needed. But are not experienced planners
- They operate today’s system/manage disruptions
- Anyway, TSMO planning needs are not like conventional planning

# Operators/Planners Collaboration



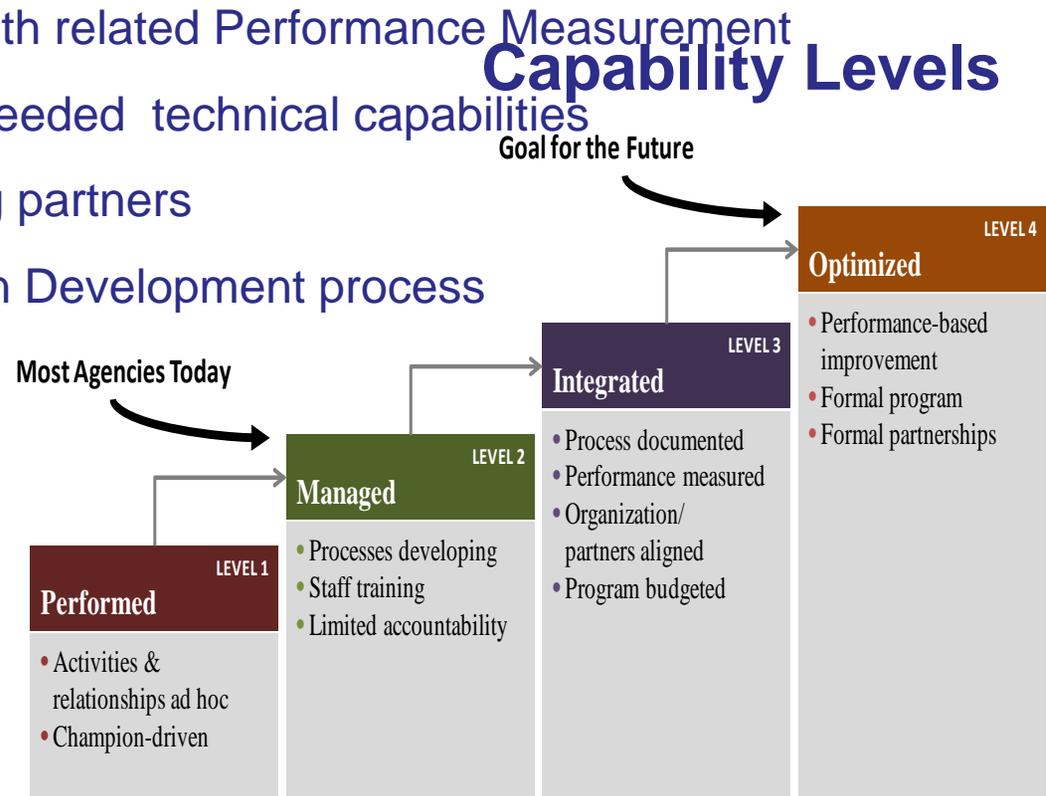
# Who Prepares a TSM&O Program Plan?

- Any serious DOT mission with strategies requires some kind of program plan for effective use of resources, improved TSM&O and sustainability
- Probably not DOT or MPO “Planners” who may not know much about TSM&O – and may not be encouraged by the policy environment they work in
- Therefore it is the TSM&O staff who need to be involved – working with planning staff, drawing on best practice examples
- Its up to you

# CMM for TSM&O Program Planning

## Capabilities Needed

1. Ability & resources to develop objectives, business case, “Program Plan”
2. Needs/ Deficiency Analysis/Evaluation to justify investment
3. Agency Commitment, goals with related Performance Measurement
4. Organization & Staff for with needed technical capabilities
5. Alignment/Cooperation among partners
6. Defined TSM&O Program Plan Development process



# THE CONTEXT FOR CONVENTIONAL STATEWIDE & REGIONAL COMPREHENSIVE PLANNING:

[FOR NON-PLANNERS.....]

# The Scope of Linking TSM&O strategic planning into the formal regional/statewide planning process



# Required Metro and State Planning Processes (for federal \$\$)

- Metropolitan Transportation Plan (MPOs, COGs)
  - 20-year horizon, 4-5 yr update
  - Fiscally constrained and include strategies/actions
  - Mostly Local Govt capital Projects
- Transportation Improvement Program (TIP)
  - 4 year allocation of funds

- Statewide Long-Range Plan
  - 20-year horizon
  - Minimum requirements
  - DOT capital projects
- Statewide Transportation Improvement Program (STIP)
  - 4 year Allocation to specific projects/programs

# Congestion Management Process (CMP)

- Required in areas with more than 200,000 (called “Transportation Management Area”)
- A systematic approach to
  - ✓ identify congestion & its causes
  - ✓ propose mitigation strategies
  - ✓ evaluate the effectiveness of implemented strategies

NOTE: Not a “plan” but can (usually doesn’t) feed projects & strategies directly to Metro/Statewide plans

# Conventional Corridor Planning at States and MPOs

- Agencies use to focus on needs of specific area/corridor
- For multipurpose corridor strategies: mobility, access, development
- Includes freeways, arterial, multimodal
- Some Statewide Long-Range Plans may be based on corridors
- Some MPOs lead corridor studies and/or organize CMP on corridor basis
- TSM&O version called “integrated corridor management” (ICM)

# New Context: MAP-21: Performance-Based Planning for States and MPOs

- Statewide/metropolitan planning processes will use a performance-based approach to decision making
- Statewide plan *should* & Metro plan *will* include performance measures, targets, performance report
- STIP will link investment priorities to performance targets in Plan to extent possible

# MAP-21

## **Subtitle B—Performance Management**

### **SEC. 1201. METROPOLITAN TRANSPORTATION PLANNING.**

Adds to USC 23 §134(h)(1)(D)

*“INTEGRATION OF OTHER PERFORMANCE-BASED PLANS.—A metropolitan planning organization shall integrate in the metropolitan transportation planning process, directly or by reference, the goals, objectives, performance measures, and targets described in other State transportation plans and transportation processes, as well as any plans developed under chapter 53 of title 49 by providers of public transportation, required as part of a performance based program.”*

# MAP-21: Performance Plans

- The listed performance plans are where states and MPOs can set targets and report on progress
  - **Long Range Plans (State/MPO) and STIP/TIP**
  - Asset Management Plan (*System Performance*)
  - CMAQ Performance Plan (*Traffic Congestion*)
  - State Freight Plans (*Freight*)
  - Strategic Highway Safety Plan (*Safety*)

# ***FAST ACT?***

# INTEGRATING TSM&O INTO THE CONVENTIONAL PLANNING PROCESS

# What TSM&O Managers Need to get “Planners” to do

## *Traditional Planning Process*

- Long-term planning focus
- Capital investment focused
- Project orientation
- Capacity-deficiency based
- Concern over environment
- Focus on limited links
- Recurring congestion only

## *Adjustments Needed for TSM&O*

- Add Short –term payoff perspective
- Include non-recurring congestion
- Substitutions of TSM&O for capacity
- Network wide applications
- Optimize operations/capacity investments
- Include Maintenance, staffing
- Uses Performance measures

TSM&O Managers Help Shift Planning Mindset

# Objectives-Driven, Performance-Based Approach

Transportation Plan includes:

- Goals & measurable objectives that advance operational performance outcomes of the transportation system
- Performance measures used to track progress toward objectives
- TSM&O strategies to meet the measurable objectives

***TSM&O strategies are programmed &  
implemented in collaboration with local  
agencies***

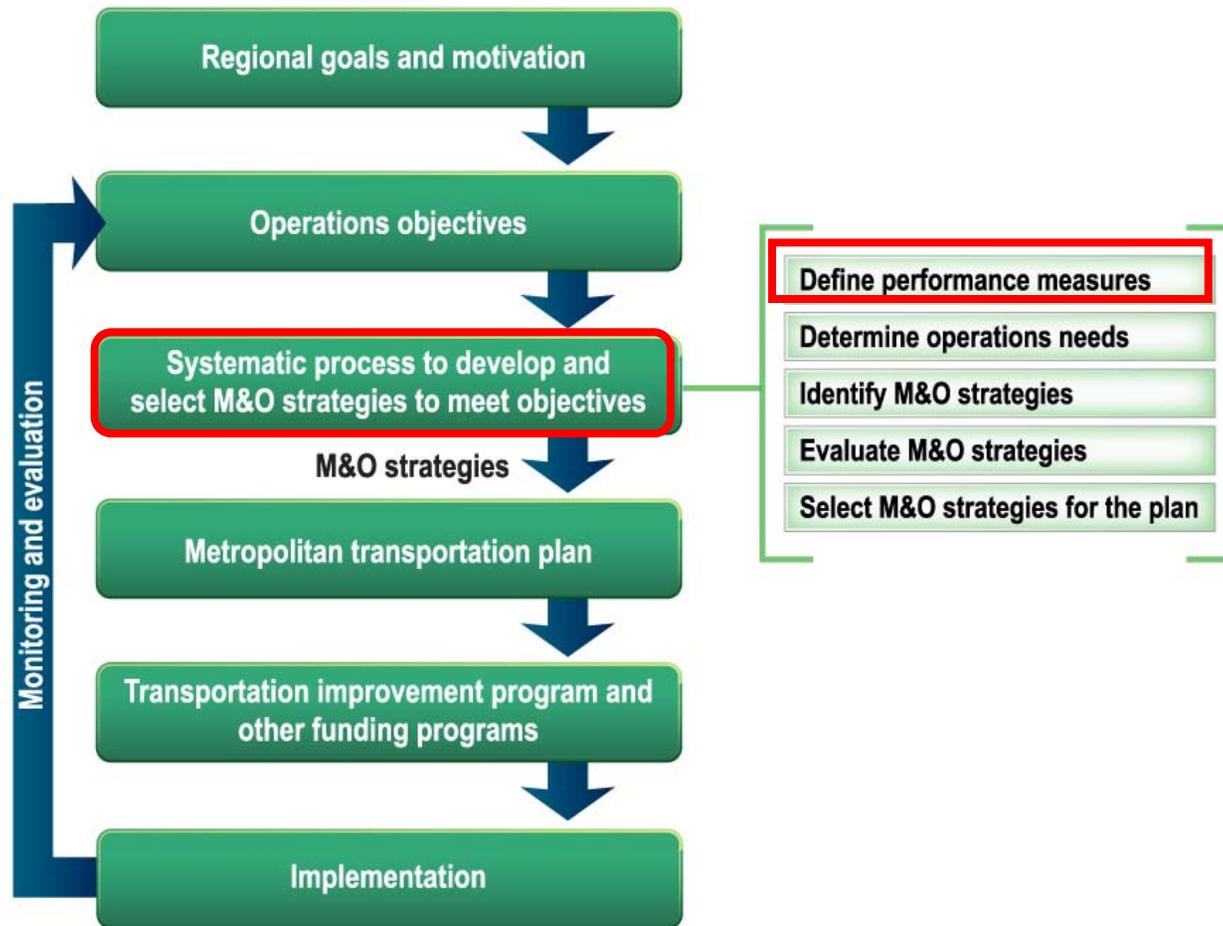
# Integrating TSM&O into Metro and Statewide Planning



## EXAMPLE: Operations Objectives

- Improve average travel time during peak periods by X percent by year Y.
- Reduce the average buffer time needed to arrive on-time for 95 percent of trips on [specified routes] by X minutes over Y years.
- Improve average on-time performance for specified transit routes/facilities by X percent within Y years.
- Reduce time between incident/emergency verification and posting a traveler alert to traveler information outlets (variable message signs, agency website, 511 system) by X minutes in Y years.
- Increase customer satisfaction rating of the timeliness, accuracy, and usefulness of traveler information in the region by W, X, and Z percent, respectively, over Y years.

# Performance Measures



# Performance Measures

- Indicators of how well transportation system is performing
- Provide adequate information on progress toward achieving objectives



- Developed collaboratively among planners and operators in the region

# **We need to address how the system operates and how various TSM&O strategies address system performance needs**

- Prioritize investments to achieve operations objectives and improve transportation system performance
- Invest in strategies that provide measurable results
- Demonstrate accountability through performance measures

# How is the CMP Related to Planning for Operations?

- CMP uses the same objectives-driven, performance-based approach with a focus on managing congestion
- Congestion mitigation strategies coming from the CMP are often TSM&O strategies
- CMP and planning for operations are frequently combined in regions

# Understanding Formal Programming (Agency-level)

- Process of selecting specific transportation projects
- Required by Federal and (usually) state law
- STIP (state) and TIP (Metro) allocate resources.
- Typically ongoing process with regular updates
- Needs identified, projects scoped/designed, funds matched

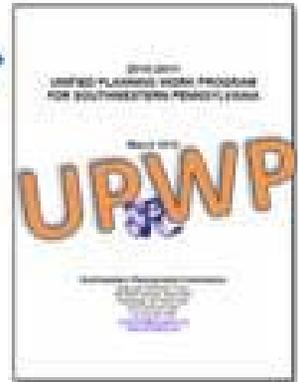
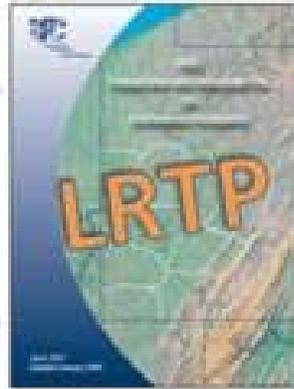
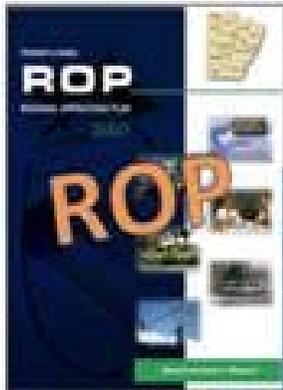
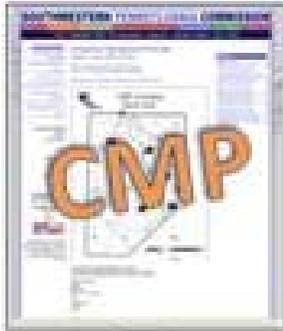
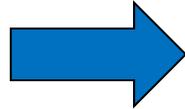
# Most Funding for TSM&O is not always Federal

- Usually project-oriented (not continuing program)
- Some piggy-backing on capital or maintenance projects
- TSM&O is eligible for Federal funds
  - Congestion Mitigation and Air Quality Improvement Program (CMAQ)
  - Highway Safety Improvement Program (HSIP)
  - National Highway Performance Program (NHPP)
  - Surface Transportation Program (STP)
  - Metropolitan Planning Funds
- But must compete with traditional highway projects from DOT backlog or local government priorities
- Innovative funding sources (e.g., public-private partnerships, tolls, congestion pricing)

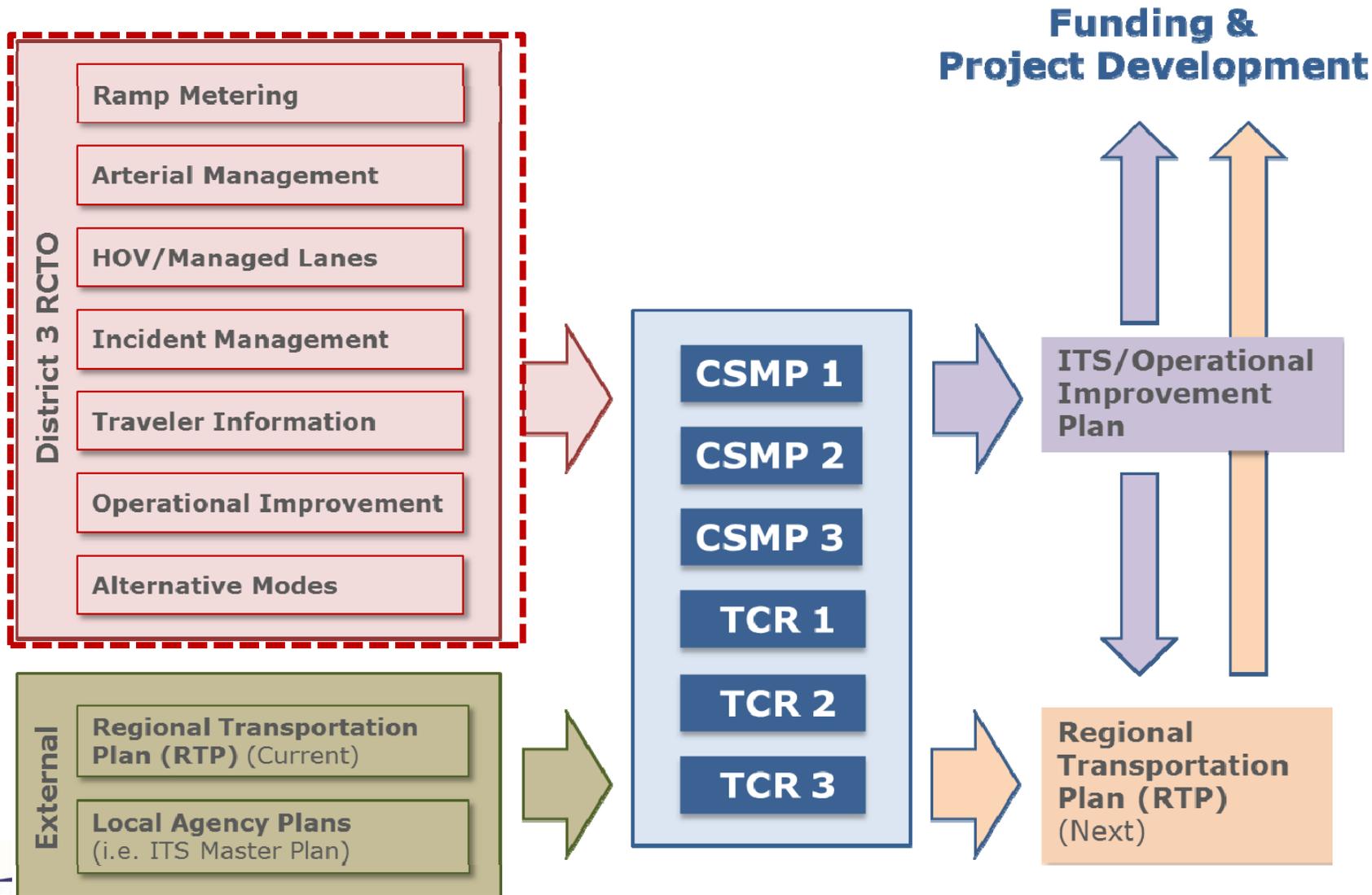
# Monitoring and Evaluation

- Benchmark metrics for current conditions
- Periodic reviews
  - Evaluate effectiveness of strategies, investments, and objectives on on-going basis
- Performance refinements
  - Efficiency
  - Safety
  - Reliability

TSM&O  
Program  
Plan



# EXAMPLE: D3 Operations Planning Process

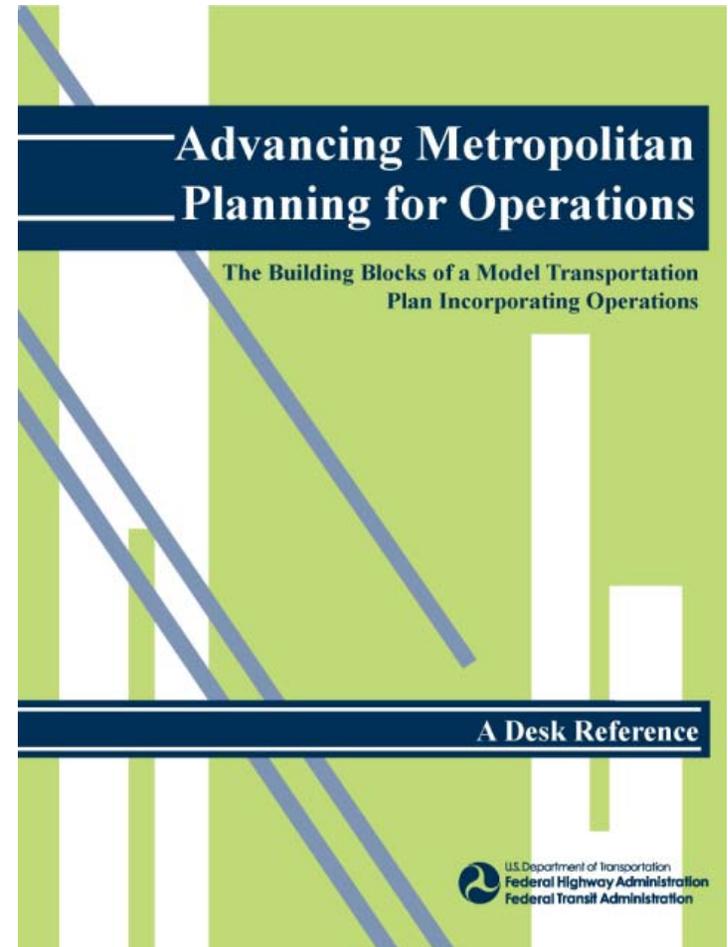


# Bottom Line

- If TSM&O is part of agency mission – and TSM&O strategies are being deployed/operated, it is best it has it's own program plan (just like other agency programs)
- This is new – to both TSM&O managers – and to planners
- There is new ground to be broken – in defining what should be in a TSM&O program plan, who does it, how it is done, etc.
- You can be part of the solution

# Planning for Operations Desk Reference

- Find numerous ideas for creating operations objectives
- Identify performance measures and data needed for tracking objective
- Find potential M&O strategies for reaching objectives
- View excerpts of a metropolitan transportation plan resulting from use of approach



# Resources: Analysis Tools

Resource	Link
Operations B/C Analysis TOPS-BC User's Manual (FHWA-HOP-13-041)	<a href="http://www.ops.fhwa.dot.gov/publications/fhwahop13041/fhwahop13041.pdf">http://www.ops.fhwa.dot.gov/publications/fhwahop13041/fhwahop13041.pdf</a>
Operations B/C Analysis Desk Reference (FHWA-JPO-12-028)	<a href="http://ops.fhwa.dot.gov/publications/fhwahop12028/fhwahop12028.pdf">http://ops.fhwa.dot.gov/publications/fhwahop12028/fhwahop12028.pdf</a>
ATM Feasibility and Screening Guide	<b>Coming soon!</b>
HCM and Operations Analysis of ATDM Strategies (FHWA-HOP-13-042)	<a href="http://www.ops.fhwa.dot.gov/publications/fhwahop13042/fhwahop13042.pdf">http://www.ops.fhwa.dot.gov/publications/fhwahop13042/fhwahop13042.pdf</a>
Evaluation of Operational and Safety Characteristics of Shoulders Used For Part-time Travel Lanes	<b>Coming soon!</b>
ICM Analysis, Modeling, and Simulation Guide (FHWA-JPO-12-074)	<a href="http://ntl.bts.gov/lib/50000/50600/50615/30B00211.pdf">http://ntl.bts.gov/lib/50000/50600/50615/30B00211.pdf</a>
ITS Benefits Database	<a href="http://www.itsbenefits.its.dot.gov/">http://www.itsbenefits.its.dot.gov/</a>



# Useful Publications:

## USDOT ([www.plan4operations.dot.gov](http://www.plan4operations.dot.gov))

- A Primer – Statewide Opportunities for Linking Planning and Operations
- Advancing Metropolitan Planning for Operations: An Objectives-Driven, Performance-Based Approach – A Guidebook
- Advancing Metropolitan Planning for Operations: Set Objectives, Measure Progress, See Results
- Advancing Metropolitan Planning for Operations: The Building Blocks of a Model Transportation Plan Incorporating Operations – A Desk Reference
- An Interim Guidebook on the Congestion Management Process in Metropolitan Transportation Planning
- Applying a Regional ITS Architecture to Support Planning for Operations: A Primer
- Creating an Effective Program to Advance Transportation Systems Management and Operations: Primer
- Delaware Valley Regional Planning Commission Philadelphia Metropolitan Region Case Study
- Developing Decision maker Support for Management and Operations at MetroPlan Orlando

# Useful Publications:

USDOT ([www.plan4operations.dot.gov](http://www.plan4operations.dot.gov))

- Getting More by Working Together – Opportunities for Linking Planning and Operations: A Reference Manual
- Management & Operations in the Metropolitan Transportation Plan: A Guidebook for Creating an Objectives-Driven, Performance-Based Approach
- Operations Benefit/Cost Analysis Desk Reference
- Regional Concept for Transportation Operations: A Tool for Strengthening and Guiding Regional Transportation Operations Collaboration and Coordination
- Regional Concept for Transportation Operations: The Blueprint for Action – A Primer
- Regional Transportation Operations Collaboration and Coordination: A Primer for Working Together to Improve Transportation Safety, Reliability, and Security
- The Collaborative Advantage: Realizing the Tangible Benefits of Regional Transportation Operations Collaboration
- The Regional Concept for Transportation Operations: A Practitioner's Guide
- Wilmington Area Planning Council New Castle County, Delaware and Cecil County, Maryland Case Study

# Useful Publications: SHRP2 Reliability

([www.trb.org/StrategicHighwayResearchProgram2SHRP2/Pages/Reliability\\_Projects\\_302.aspx](http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Pages/Reliability_Projects_302.aspx))

- Integrating Business Processes to Improve Reliability
- Establishing Monitoring Programs for Mobility and Travel Time Reliability
- Analytic Procedures for Determining the Impacts of Reliability Mitigation Strategies
- Incorporating Reliability Performance Measures in Operations and Planning Modeling Tools
- Incorporating Reliability Performance Measures into the Transportation Planning and Programming Processes
- Institutional Architectures to Advance Operational Strategies
- Evaluation of Cost-Effectiveness of Highway Design Features
- Incorporation of Travel Time Reliability into the Highway Capacity Manual
- Incorporation of Non-recurrent Congestion Factors into the AASHTO Policy on Geometric Design
- Feasibility of Using In-Vehicle Video Data to Explore How to Modify Driver Behavior that Causes Non-Recurring Congestion
- Evaluating Alternative Operations Strategies to Improve Travel Time Reliability
- Improving Traffic Incident Scene Management
- Archive for Reliability and Related Data

# Useful Publications: SHRP2 Reliability

([www.trb.org/StrategicHighwayResearchProgram2SHRP2/Pages/Reliability\\_Projects\\_302.aspx](http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Pages/Reliability_Projects_302.aspx))

- Design and Implement a System for Archiving and Disseminating Data from SHRP 2 Reliabilities and Related Studies/ Assistance to Contractors to Archive their Data for Reliability Projects
- Traveler Information and Travel Time Reliability
- Innovative IDEA Projects
- Assistance to Contractors to Archive Their Data for Reliability and Related Projects
- A Framework for Improving Travel Time Reliability
- e-Learning for Training Traffic Incident Responders and Managers
- Post-Course Assessment and Reporting Tool for Trainers and TIM Responders Using the SHRP 2 Interdisciplinary Traffic Incident Management Curriculum
- Validation of Urban Freeway Models
- e-Tool for Business Processes to Improve Travel Time Reliability
- Local Methods for Modeling, Economic Evaluation, Justification and Use of the Value of Travel Time Reliability in Transportation Decision Making
- Regional Operations Forums for Advancing Systems Operations, Management, and Reliability
- Pilot Testing of SHRP 2 Reliability Data and Analytical Products
- Reliability Implementation Support