SHRP2

STRATEGIC HIGHWAY RESEARCH PROGRAM

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

Regional Operations Forum

Setting the Stage

The Transportation Environment is Changing

- Increased reliance on information and technology
- Technology also offers opportunities – enhanced operations and regional multi-modal integration
- Increasing customer needs and expectations
- Growing emphasis on outcomes and performance measurement
- MAP 21 requirements
- Reduced financial resources

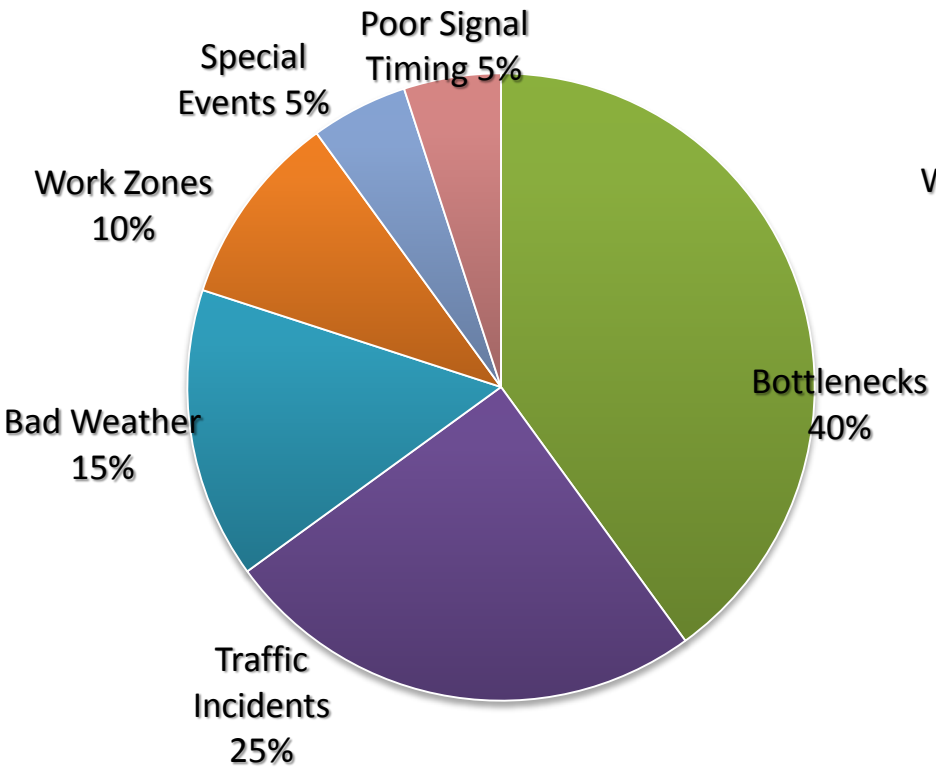
What is TSM&O?

Transportation Systems Management and Operations

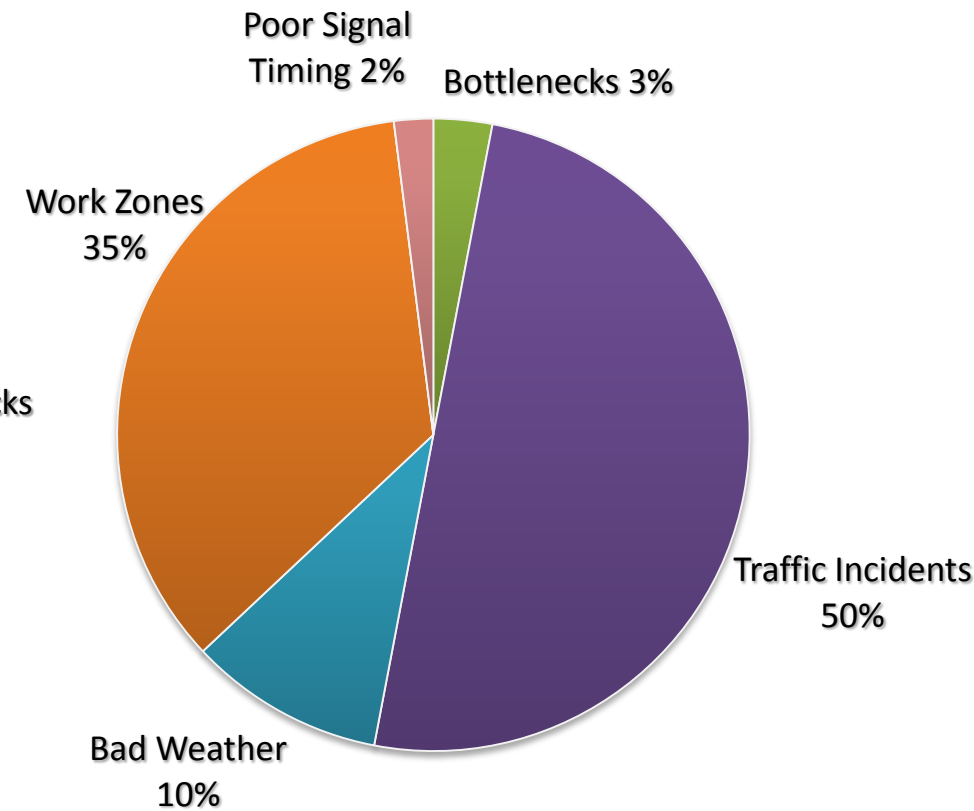
- “Integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects” (MAP 21)

- Regional integration an important consideration
  - Many strategies are multi-modal
  - All require inter-agency collaboration, including coordinating with enforcement and first responders

Why Bother? Causes of Congestion



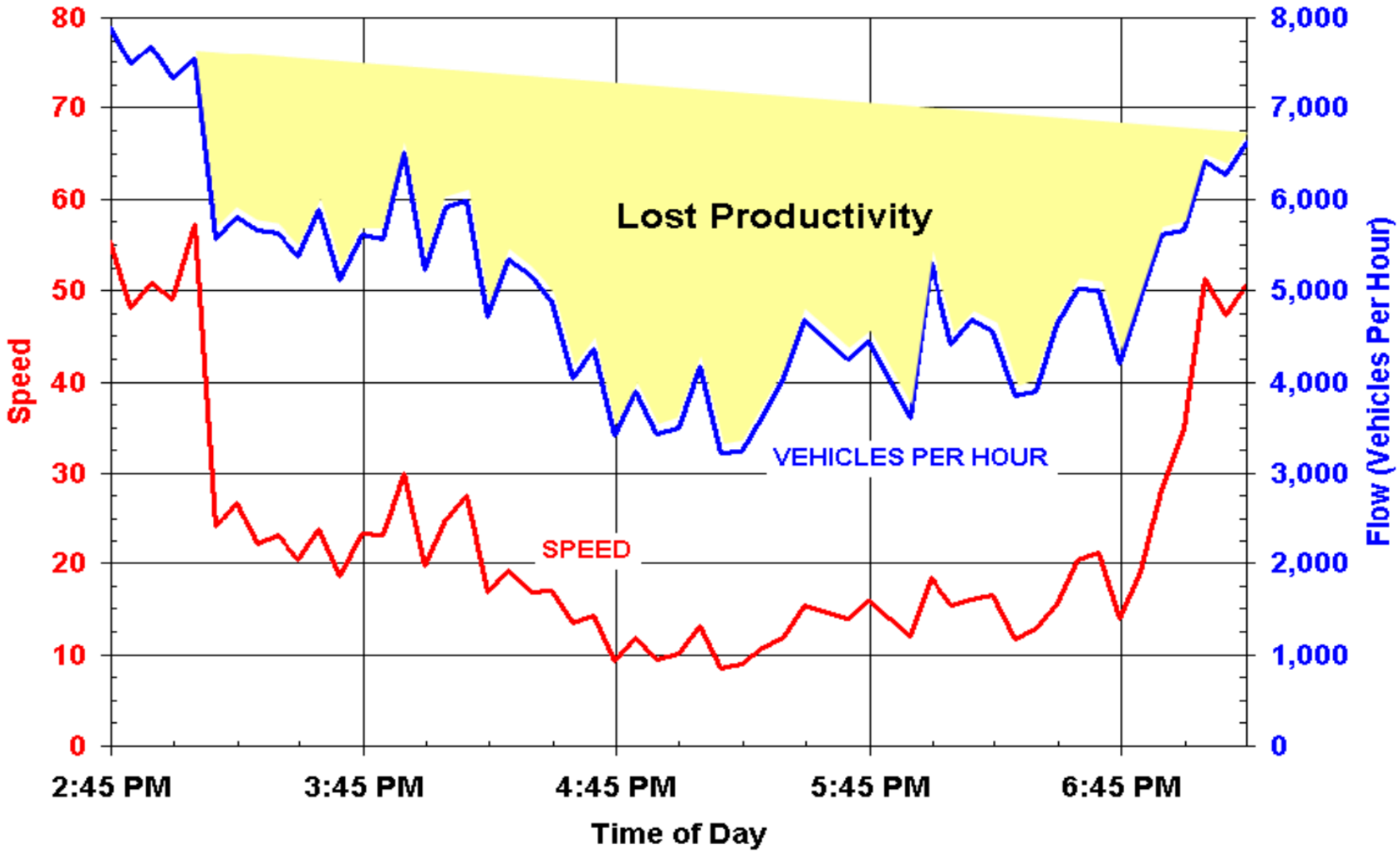
URBAN



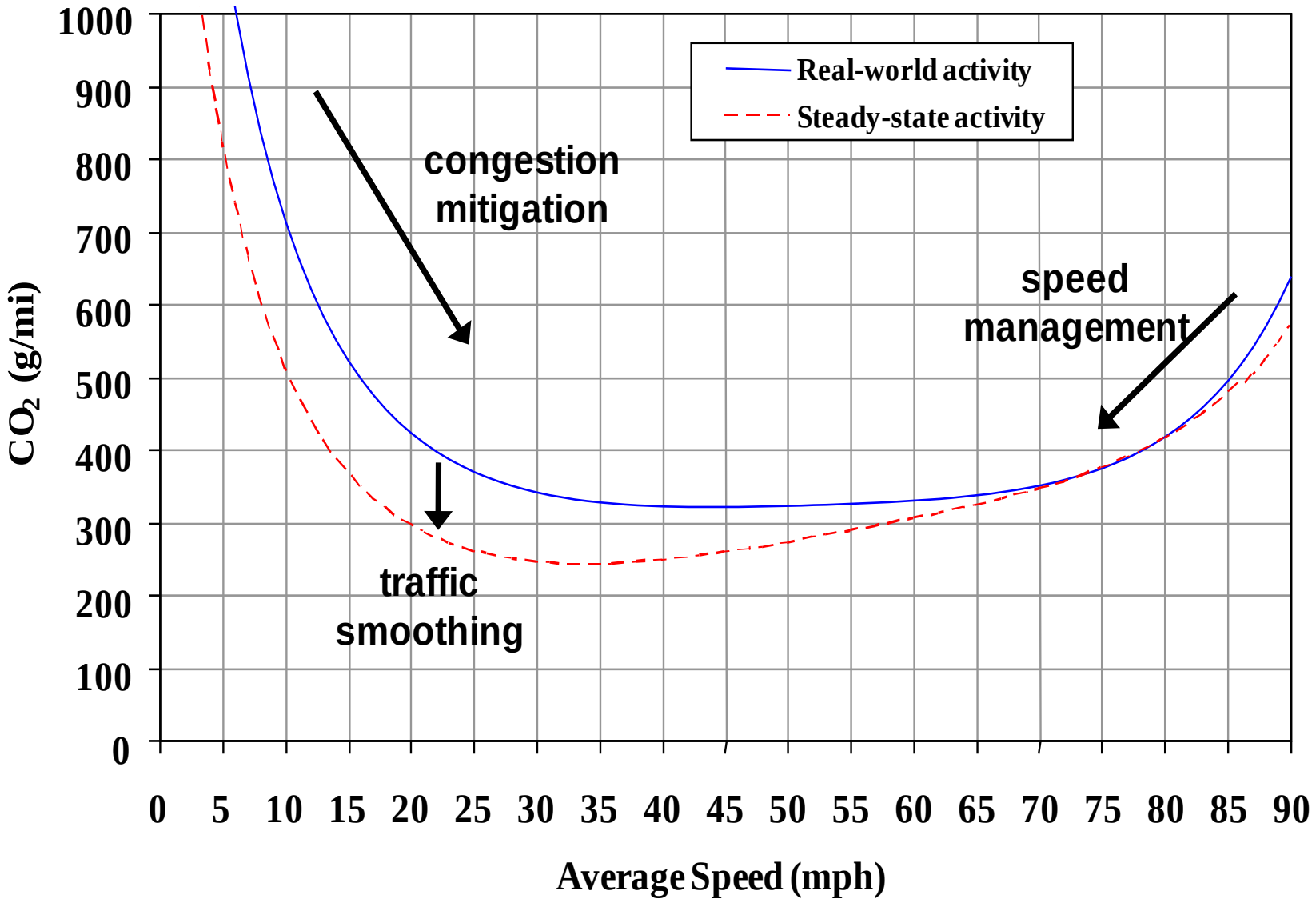
RURAL

Majority of delay/most unreliability due to "non-recurring" events NOT addressed by new capacity

Why Bother?: Unmanaged Traffic Impacts with Limited Capacity Options



Why Bother?: TSMO and GHG Reductions



Research & Experience: Explanation of More/Less Effective TSMO Activities

- Key Finding
  - Surprise!! It *wasn't* (primarily) $$
  - What it was: Whether TSM&O was treated as a formal "program" (like DOT's legacy programs)

- ***What are the characteristics of the conventional DOT formal "program"?***

How TSM&O Requires Different Capabilities from "Legacy" Programs

Legacy Programs

(project dev./maint)

- Clear mission
- Program/plan/budget
- Processes standardized
- Stable technology
- Clear Performance (cost and schedule)
- Staff roles clear/coordinated
- Roles/relationships established

TSM&O (Typical)

- Mission fuzzy
- No formal program/budget
- Processes champion-dependent
- Dynamic technology
- Some PM (outputs) not outcomes
- Stovepiping
- External collaboration challenge

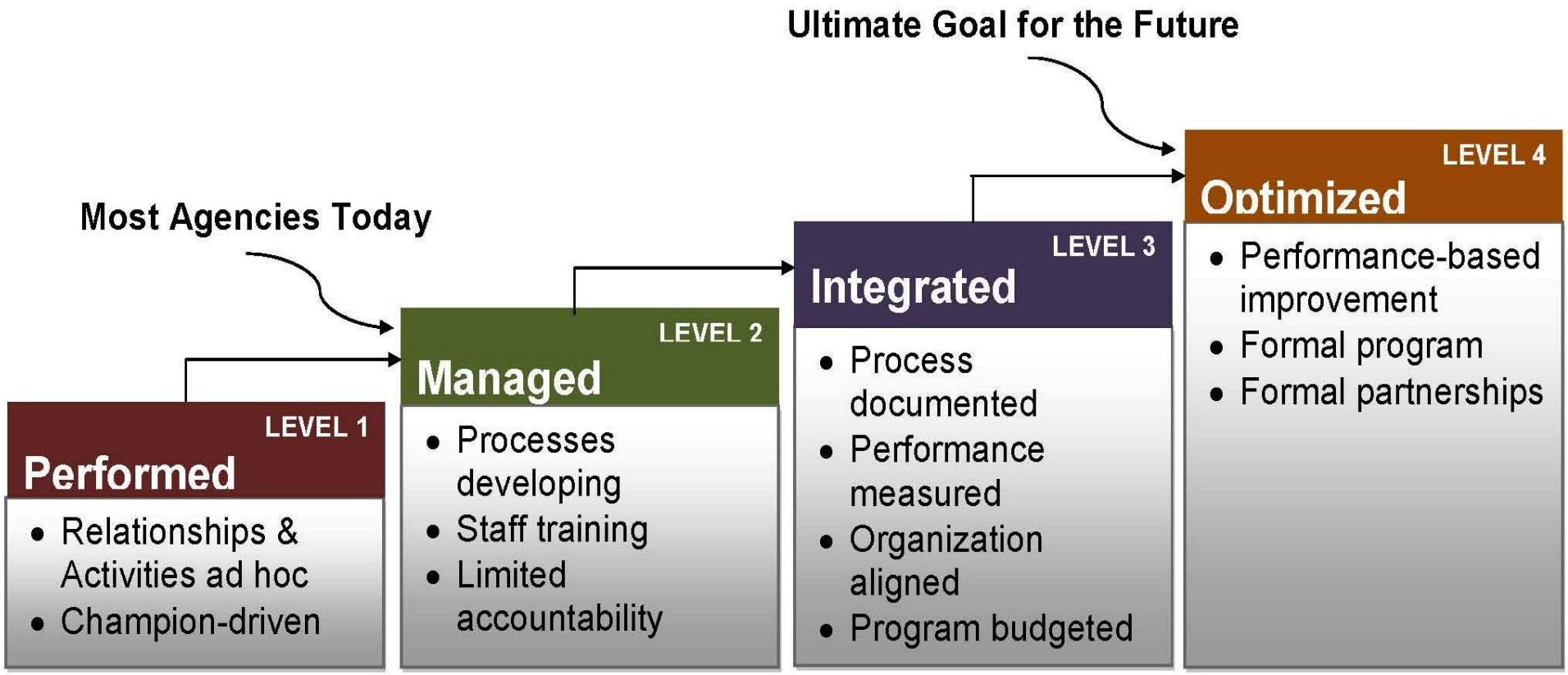
The "Dimensions" of Capability

- Business and technical processes support strategies
- Organization and relationships support processes

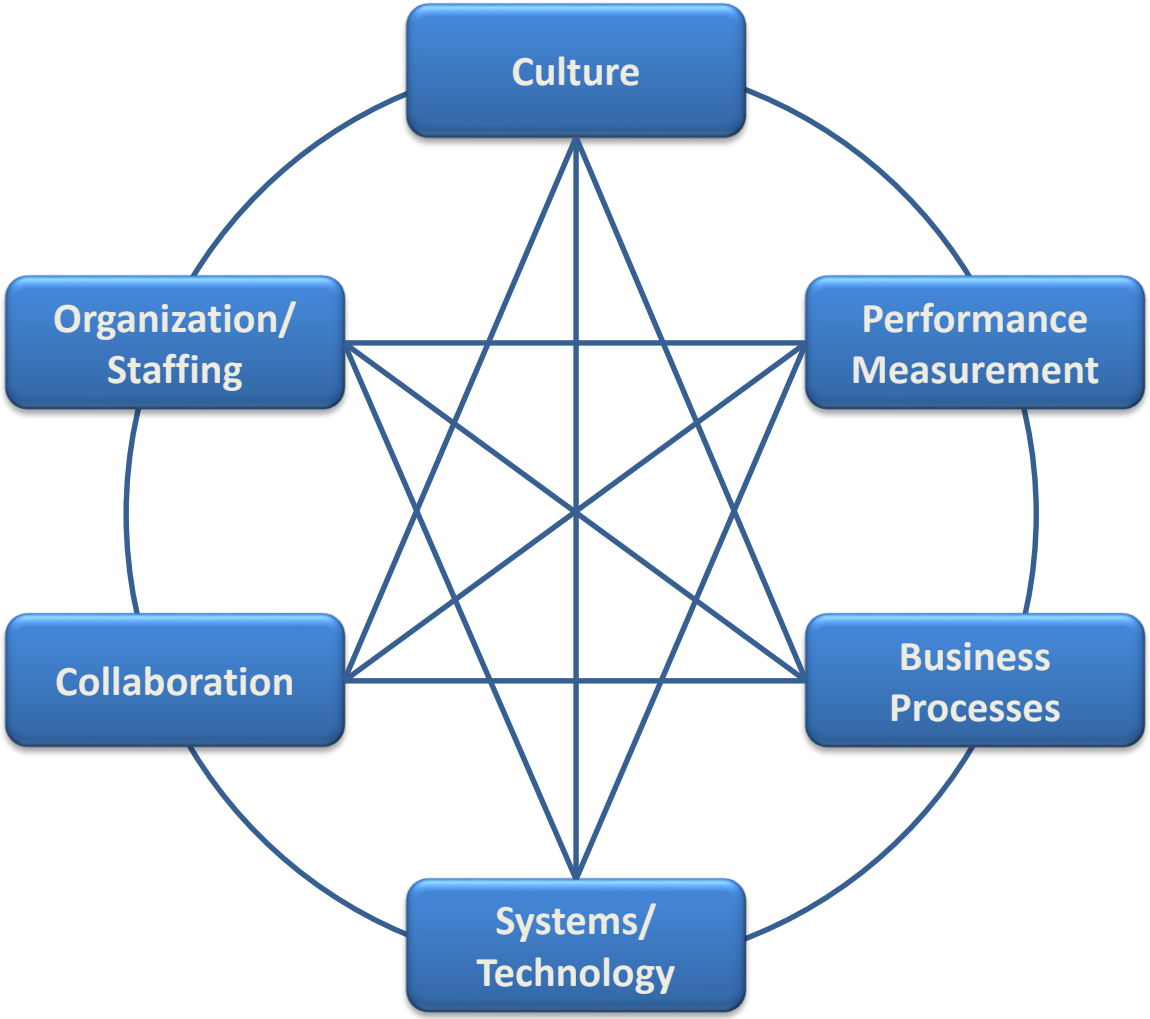
What YOU said: – Needed capabilities you identified: How it Relates to this Capability Maturity Discussion

Agency Challenges you Identified	Dimensions of Agency Capability
TSMO Maintenance funding, asset management	Planning & Programming
Technology upgrades, standards & interoperability issues	Systems & Technology
Making the "Business Case" for TSM&O with key stakeholders	Performance/Culture
Culture – agency legacy, public/policy understanding, support	Culture
Internal stove-piping (coordination problems)	Organization/Collaboration
HQ vs. district/regional point of view	Organization, Culture
Focus on "sustainability" – urban and rural	Planning & Programming
Device interoperability and procurement	Systems & Technology
Lack of strategic plan, program	Planning & Programming
New forms of relationships with CMAs, locals, PSAs	Collaboration
Staffing shortfalls, retirement, recruitment, retention	Organization & Staffing
Lack of support for adequate, flexible funds	Culture/Planning & Programming

Levels of Capability Maturity



Synergism among Dimensions

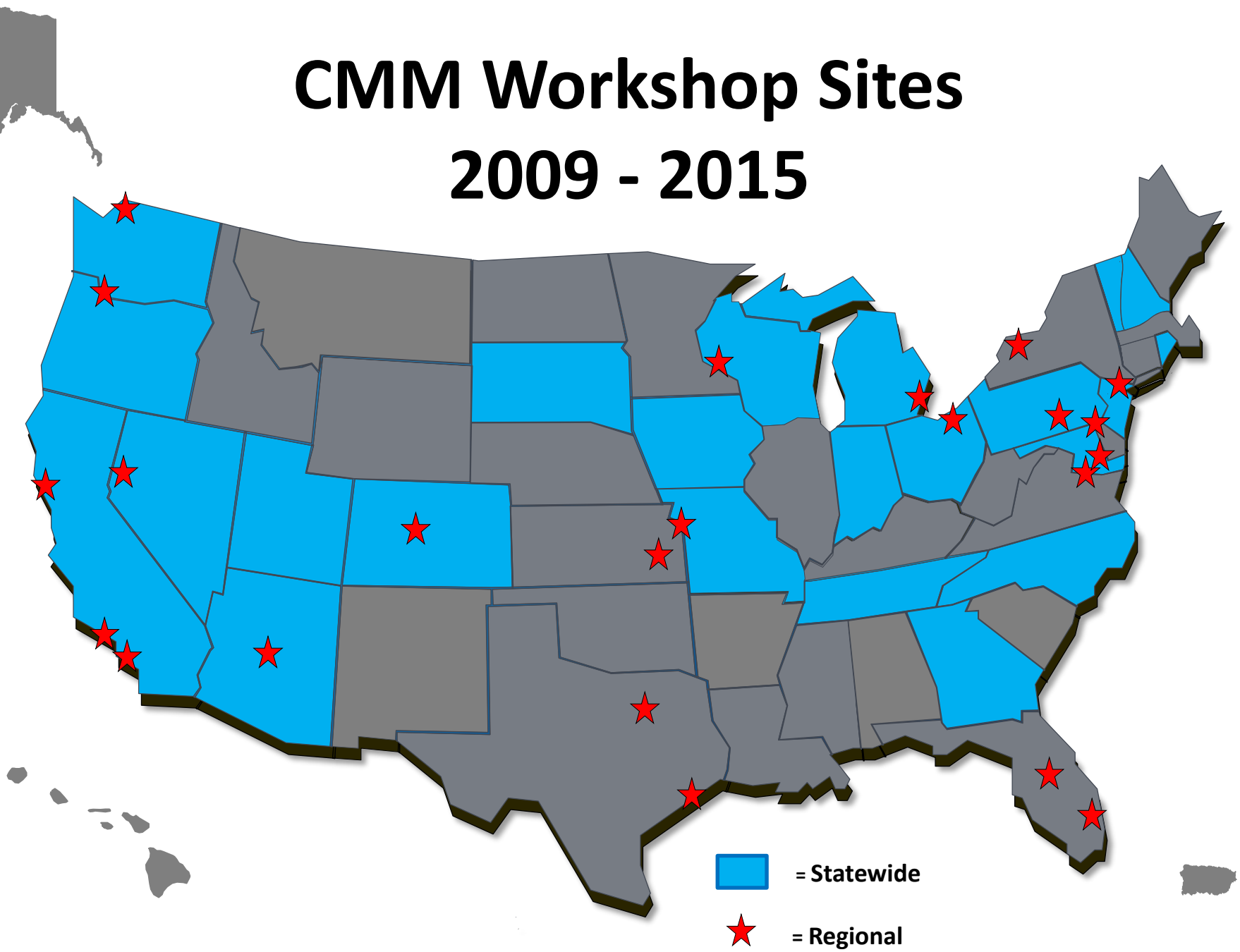


Why We Are Here:
Importance of Agency "Capabilities" to Effectiveness to Overall TSM&O Program

Example: ICM:

- ✓ Shared Business Case
- ✓ Incremental program planning
- ✓ Performance management (and in real time)
- ✓ Staff technical/management capabilities: technology/conops/arch/DSS
- ✓ Clear agency unit authorities and responsibilities
- ✓ Multi-jurisdictional alignment/collaboration (MOUs, training)
- ✓ Multiple networks (arterials as well as freeways, transit)
- ✓ Interoperable communications
- ✓ Legislative authorization
- ✓ Sustainable funding
- ✓ Clear lines of responsibility/command
- ✓ Pre-defined procedures/protocols
- ✓ Private sector involvement/management

CMM Workshop Sites
2009 - 2015



Lessons Learned

- Continuous capability improvement to support more effective programs is key target
- Processes and institutional or organizational arrangements are critical pre-conditions to improving effectiveness
- They cut across all strategy applications in a program – at most scales
- The lowest capability dimension is usually the one that is holding you back
- Resources are key constraint – but many key improvements are not costly – they require assessment and management

Workshop Capability Self-Assessments

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

State of the Practice

Business Processes

- Few statewide or MPO TSMO plans or budgets
- Program planning discouraged – lack funding/ program status
- TSM&O not integrated into project development process
- Planners don’t know operations and operators don’t plan

Business Processes Implementation Plans

- Define/develop TSM&O “program plan”
  - Business case
  - Capabilities improvements
  - Strategic objectives/investments
- Start at corridor/regional level
- Improve TSM&O planning methods/capacities
- Integrate TSM&O into statewide plan/program
- Insert TSM&O into project development process

State of the Practice

Systems and Technology

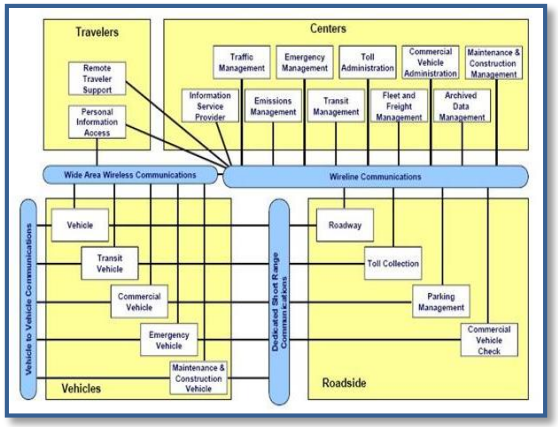
- Architectures/Concepts of Operations exist – need updating/documentation
- New applications, technologies require ConOps updates, new partners, raise interoperability challenges
- Heavy dependence on consultants
- Challenge of coordination with State Information Technology (IT) departments
- Conventional procurement processes often inappropriate

Systems and Technology Implementation Plans

- Update statewide and regional architectures in keeping with new applications, technologies, and partners

- Consider implications of Integrated Corridor Management and Connected Vehicle applications

- Develop cooperative task force approach to working with State IT agencies



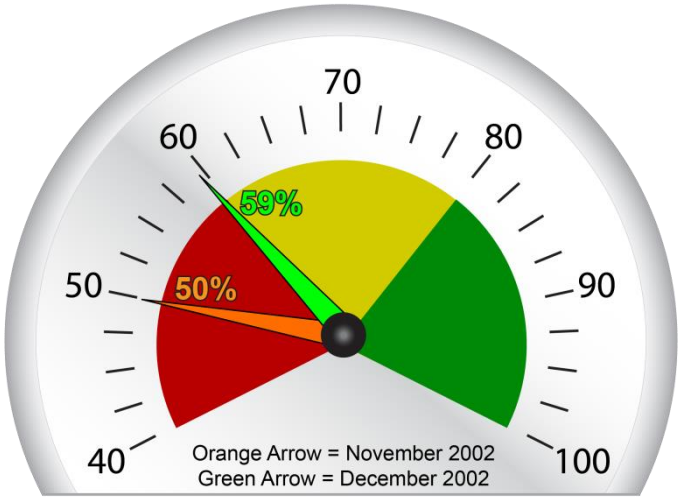
State of the Practice
Performance Measurement

States aware of MAP-21 PM requirements – developing measures, but:

- Measures largely output (events) – *not* customer outcomes
- Data and analytic challenges impede progress
- Measures not used for improving effectiveness (beyond incidents/weather)
- Limited performance-based program accountability (internal or external)

Performance Measurement Implementation Plans

- Create comprehensive performance measurement system with
  - Definitions and measures
  - Related data and analytics
  - Targets



- Incorporate PM in planning and programming processes
- Identify/support internal “clients” for use of measurement
- Use PM business case to communicate benefits of TSM&O to upper management and the public

State of the Practice

Culture

- Legacy civil engineering culture with a capital project orientation
- "Can't build our way out of congestion" accepted but TSM&O business case not widely understood
- Few agencies using operational objectives at policy level
- TSMO not a "program" – no line item budget/division status
- New technology raising profile of TSMO (and public expectations)

Culture Implementation Plans

- Develop and communicate business case to top management
- Conduct internal (non-TSMO) staff familiarization
- Convene internal group to set TSMO vision and priorities
- Develop outreach program to familiarize public with TSMO role/benefits

State of the Practice

Organization and Staffing

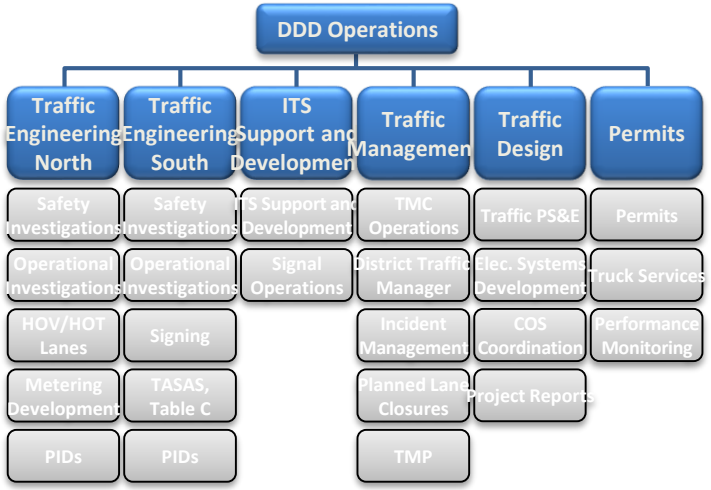
- TSMO functions stovepiped – engineering vs. operations
- Variation in degree of centralization vs. decentralization
- Middle manager "champions" 2 to 3 levels down in headquarters/regions
- TSMO staff small, not a career path, training limited
- Technical capacities difficult to recruit/retain, often outsourced

Organization and Staffing Implementation Plans

- Modify organizational structure to clarify authority/responsibility

- Identify in core capacities needed (vs. outsourcing)

- Ascertain needed skills positions, training/mentoring resources



- Establish career paths and competitive conditions of employment

State of the Practice
Collaboration

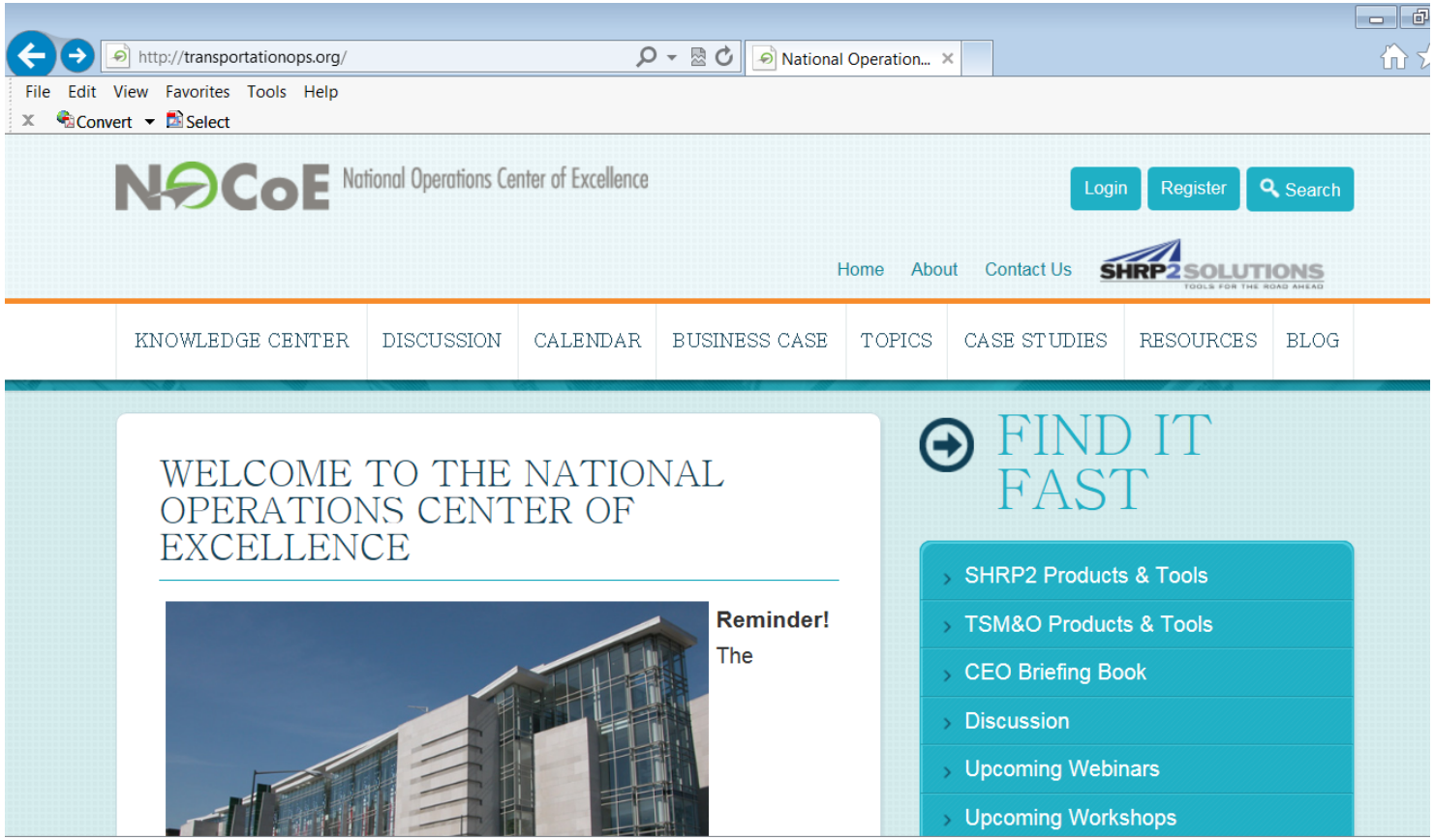
- Staff recognize criticality of external collaboration
- Some formal agreements developed but interagency collaboration is substantially informal
- Need for alignment regarding performance objectives, needed capacities, and resources
- Co-location and co-training have a positive impact
- Outsourcing widely used and increasing for technical functions

Collaboration Implementation Plans

- Execute/renew agreements with public safety agencies for Incident Management
- Establish forum to improve interagency relationships
- Use corridor projects as pilot for new collaborative operational strategies
- Participate in peer exchanges to share effective public-private partnership arrangements
- Identify more effective forms of public/private partnerships

National Operations Center of Excellence

- www.transportationops.org



FHWA Planning and Organizing for Operations

http://www.ops.fhwa.dot.gov/plan4ops/focus_areas/organizing_for_

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Planning for Operations

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- Analysis and Performance Measurement
- Regional Collaboration and Coordination
- Organizing for Operations
- Congestion Management Process (CMP)
- Regional Concept for Transportation Operations (RCTO)
- How Does Planning for Operations Relate To ...

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KEY RESOURCES

Creating an Effective Program to Advance Transportation System Management and Operations: Primer (HTML, PDF 3.1MB)

E-tool for Business Processes to Improve Travel Time Reliability (SHRP-2 LE-34 e-Tool)

Organizing for Operations

Organizing for operations involves making transportation systems management and operations (TSM&O) a central part of an agency's mission and institutional structure. This is accomplished by advancing TSM&O programs and projects within the agency. A specific guidance framework has been developed to help transportation agencies improve the effectiveness of their TSM&O activities. The framework, the "Operations Capability Improvement Process," is based on self-evaluation regarding the key process and institutional capabilities required from a transportation agency (or group of agencies) to achieve effective TSM&O.

This framework is adapted from a concept developed in the information technology (IT) industry called the "Capability Maturity Model," which has been tailored to the transportation community. It is based on self-evaluation regarding the key process and institutional capabilities required from a transportation agency (or