Institutional Architectures to Advance Systems Management and Operations

SHRP2
STRATEGIC HIGHWAY RESEARCH PROGRAM

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

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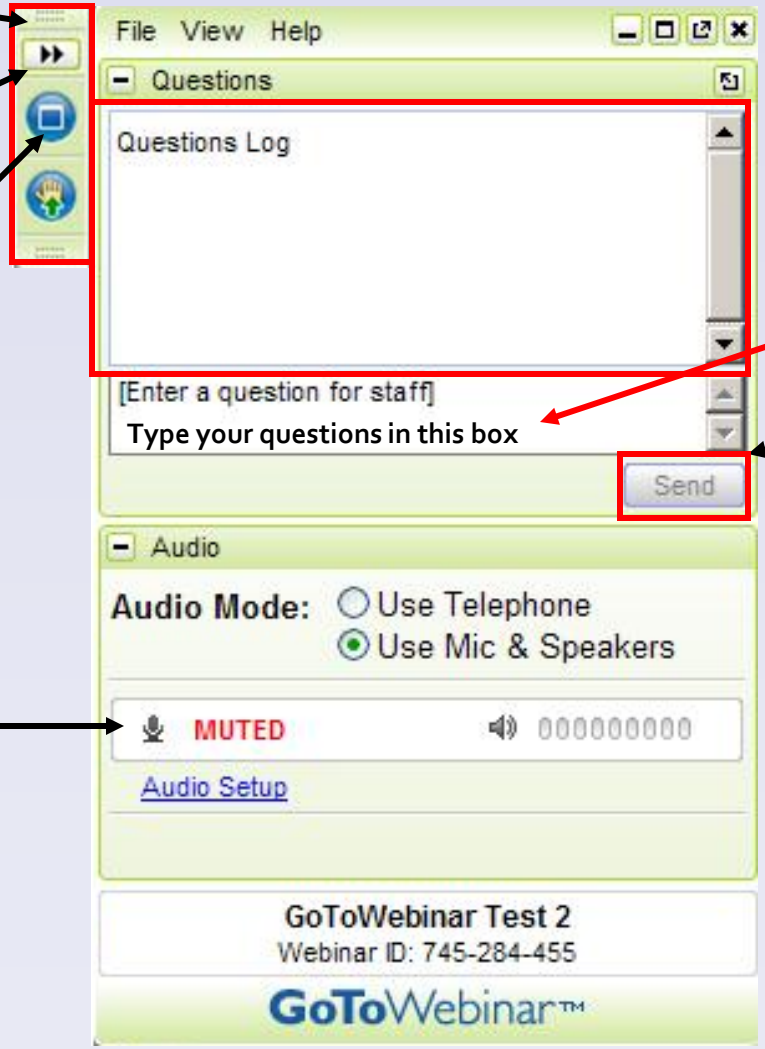

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Today's Participants

Moderator:

William Hyman, Transportation Research Board,
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Panelist:

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Agenda

- **SHRP 2 and L06 background (1-9)**
- L06 Focus and Objectives (11–15)
- L06 Research: State of Practice (16-19)
- L06 Guidance Framework (21-30)
- The Web-based Guidance Demo
- Question and Answer

SHRP 2 Background

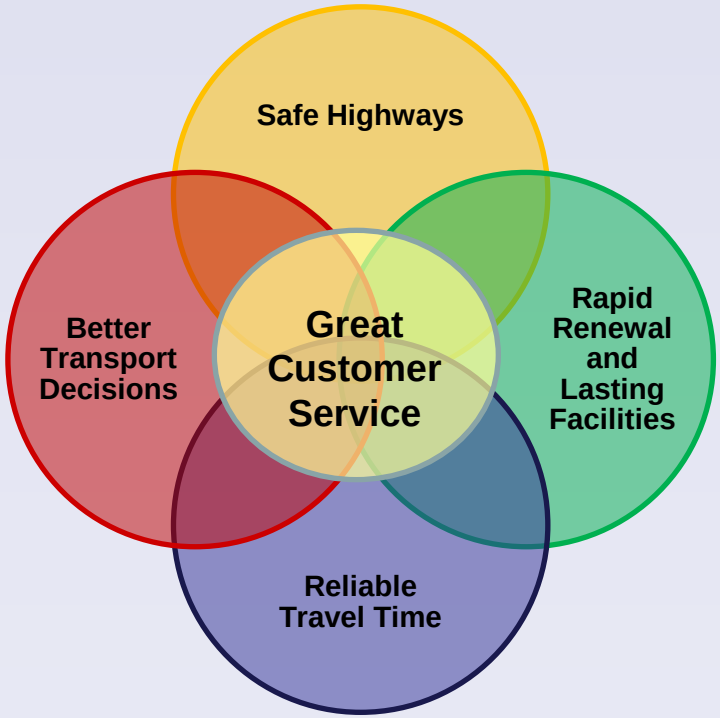
- Authorized in 2005 highway bill at $205 million over 4 years
- ~ $170 million spent over 7 years
  - Roughly $40 million targeted toward traffic congestion
  - Largest emphases on improving safety and renewing highways

SHRP 2 Background (cont.)

- Memorandum of understanding
  - Federal Highway Administration
  - American Associates of State Highway & Transportation Officials
  - National Research Council of the National Academies
- Administered by TRB under cooperative agreement with FHWA

Providing Outstanding Customer Service for the 21st Century

Safety ($51M)



Capacity ($21M)

Renewal ($32M)

Reliability ($20M)

The Reliability Focus Area

- Theme 1. Data, Metrics, Analysis, and Decision Support
- Theme 2. Institutional Change, Human Behavior, and Resource Needs
- Theme 3. Incorporating Reliability in Planning, Programming, and Design
- Theme 4. Fostering Innovation to Improve Travel Time Reliability
- Theme 5. Creating Synergy and Integration of Results

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L06 -- Objectives

- Provide a tool to help an agency continuously improve TSM&O effectiveness (performance)
- Self-evaluation–tailored to user's agency point-of-departure
- Guidance identifies incremental, manageable steps to improving effectiveness

L06 Research Focus

- Why are some agency TSM&O programs more effective than others? (= performance impact)
- Why do some programs seem to make progress while others plateau
- Identify critical components of/preconditions to improving effectiveness:
    - Organization/leadership
    - Processes
    - Relationships
- Incorporate good practice experience into guidance structure for range of agencies

L06 Products

1. Report
   - Survey of agencies TSM&O performance effectiveness
   - Identifies key dimensions determining effectiveness
   - Develop self-evaluation framework (Capability Maturity Model
2. Detailed guidance for each key institutional & process dimension
3. Develop outreach materials
4. Validation via State DOT/regional workshops
5. Provide basis for a web-based version (AASHTO)

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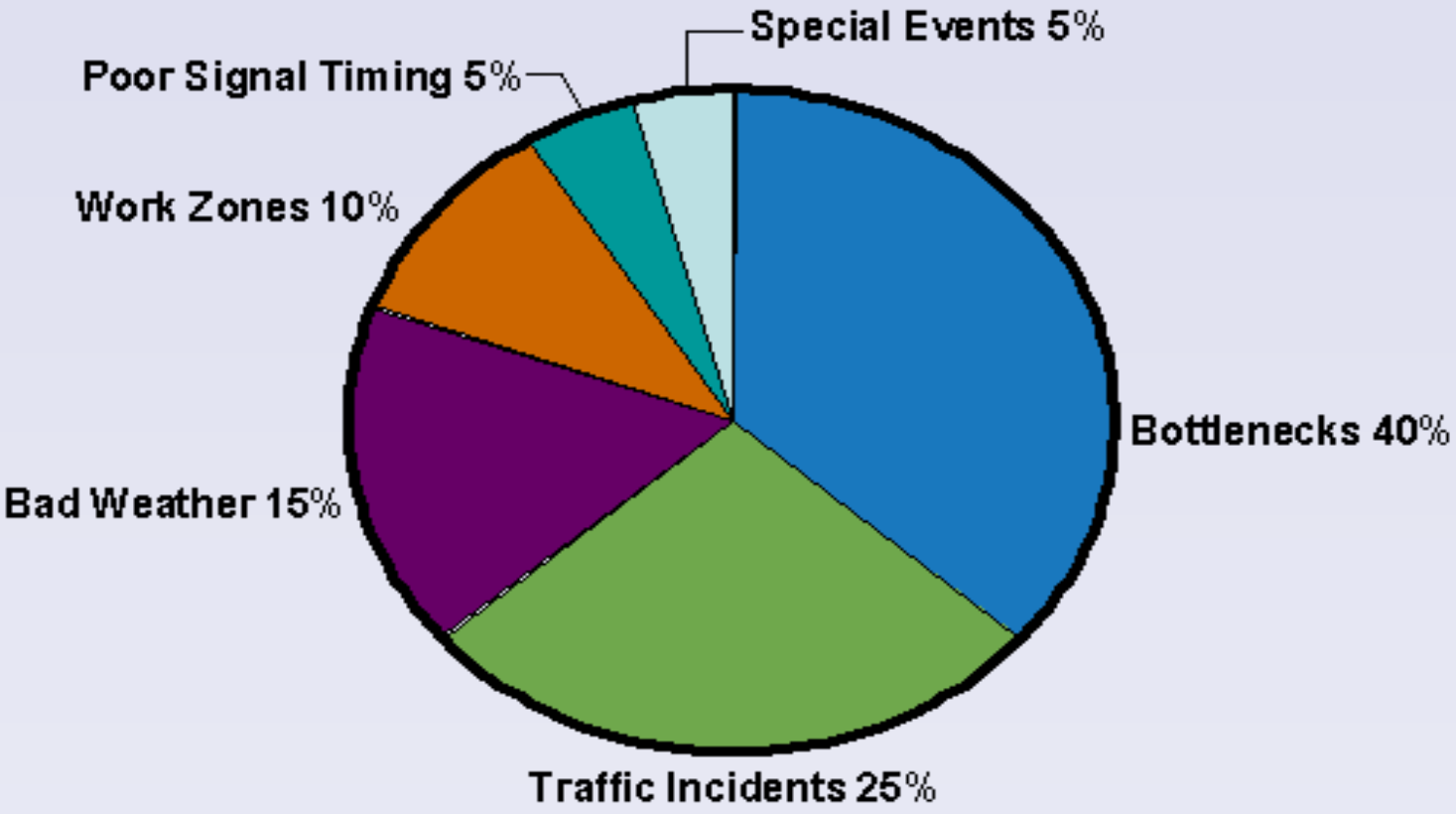
Background: Challenge/Opportunity

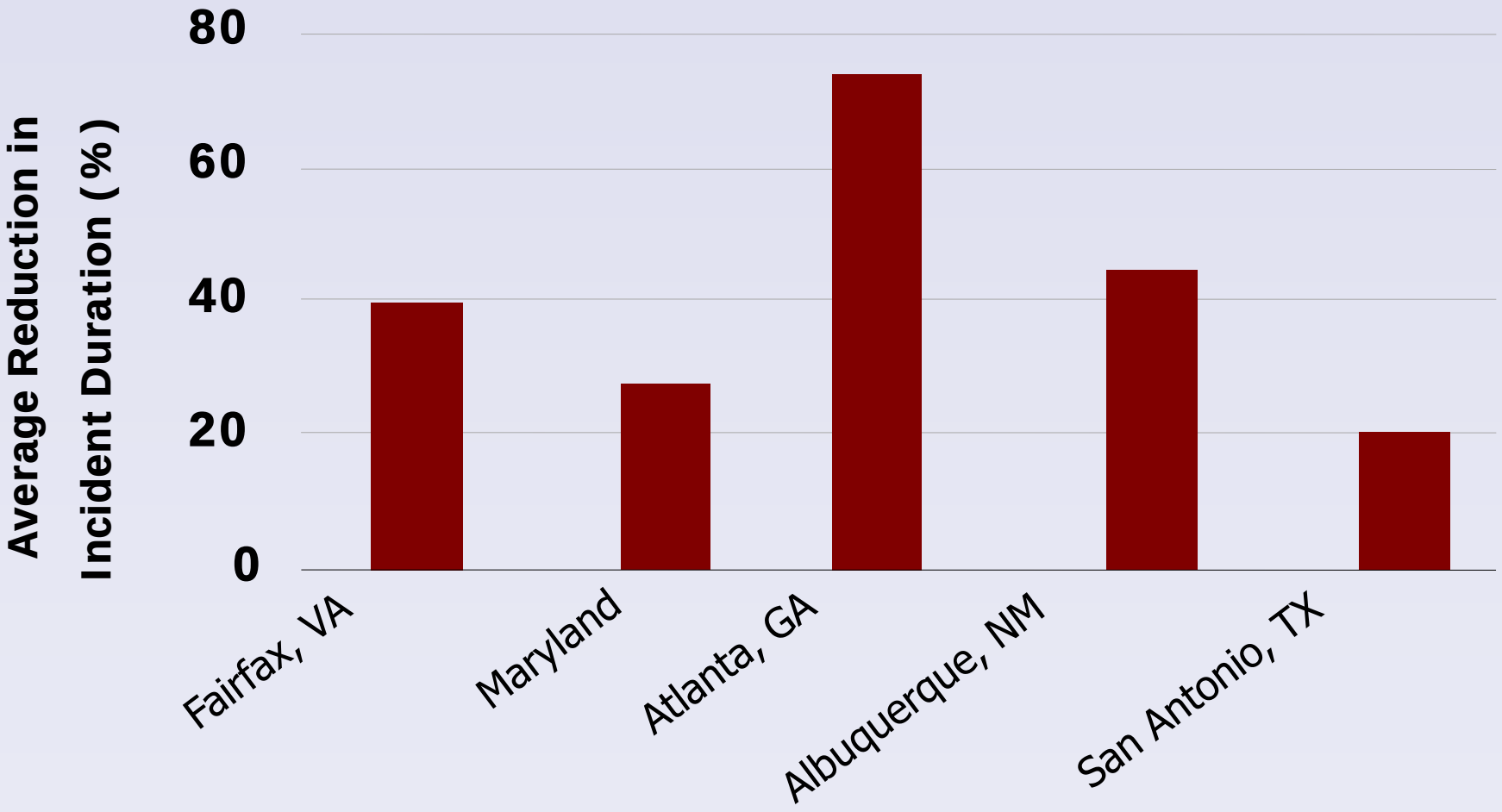
- *Problem:* Highway service deteriorating. Not much new capacity & increase in non-recurring congestion.
- *Opportunity:* Mobility increasingly dependent on managing performance of existing network – not widely understood
- *Challenge to agency:* Need for appropriate processes and relationships to mainstream program improvement.
- *Solution:* Provide guidance -- based on agency current state of play with manageable improvement steps
- *Target:* 21st Century State DOT as Network Operational managers

Increasing Knowledge about Causes of Congestion



Majority of delay/most unreliability caused by "non-recurring" events

But there is a Substantial Difference Between Average and Best Practice



And Much Unexploited Potential

SO&M Strategies	Potential Delay Reduction (plus improved reliability)
Flow control/ramp metering	**7-8%**
Traffic responsive signals	**10-12%**
Incident management	**10-15%**
Work zone traffic management	**3-4%**
Weather information	**2-3%**
Traveler information	**1-2%**
Active Traffic Management	**15%**
Pricing	**20%**

How can transportation agencies reach the potential of SO&M best practice and Beyond?

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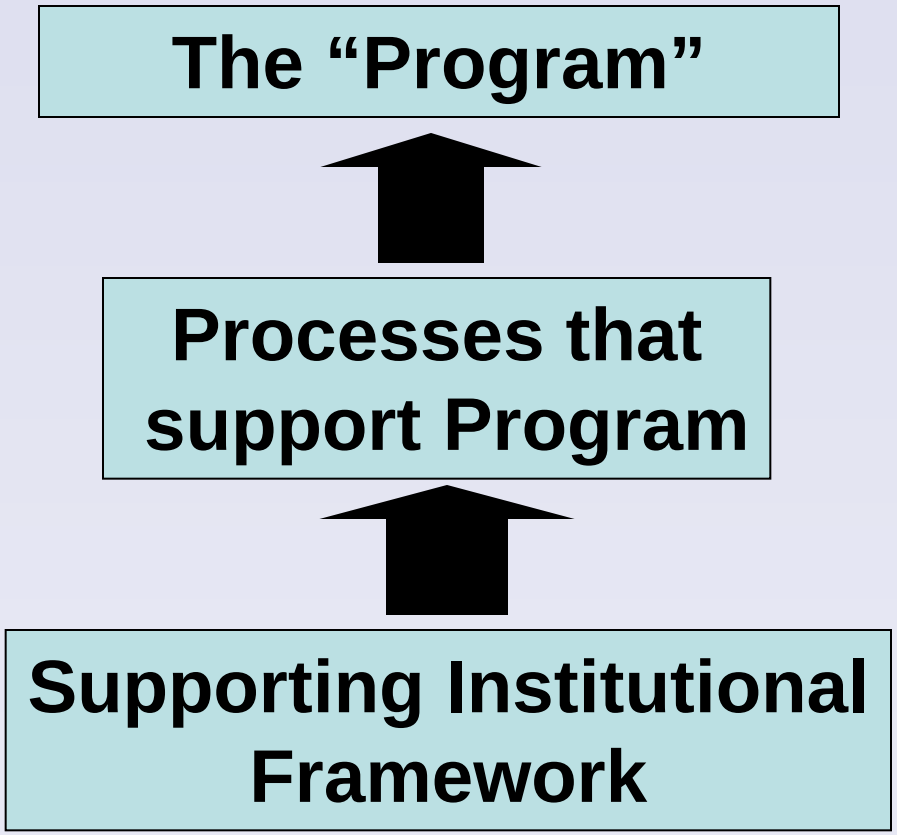
SHRP 2 Survey of Challenges

- Civil engineering Culture: TSM&O not understood
- Programs often (temporary) champion-dependent
- Standard Technical/Business processes unsuitable
- Limited network performance measurement
- Fragmented organization/Workforce KSAs unknown
- Competition for Resources
- Collaboration burden

Bottom line: SO&M is not a "program"

More Effective States Characteristics



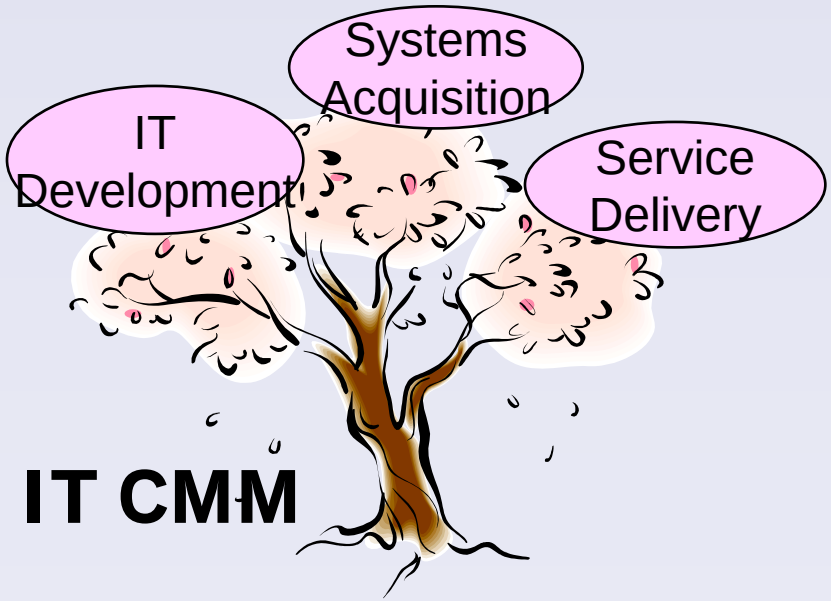
- What are the Characteristics of a effective program**?**

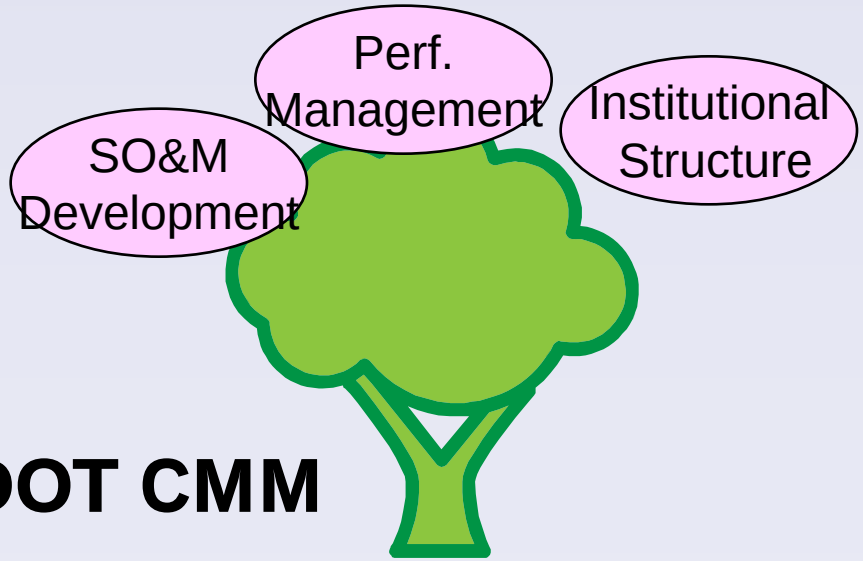
- What business & technical process are needed?

- What kind of organization and relationships support the processes**?**

Capability Maturity Framework

•Adaptation from IT -- The demand for continuous improvement mandated by market – and managed





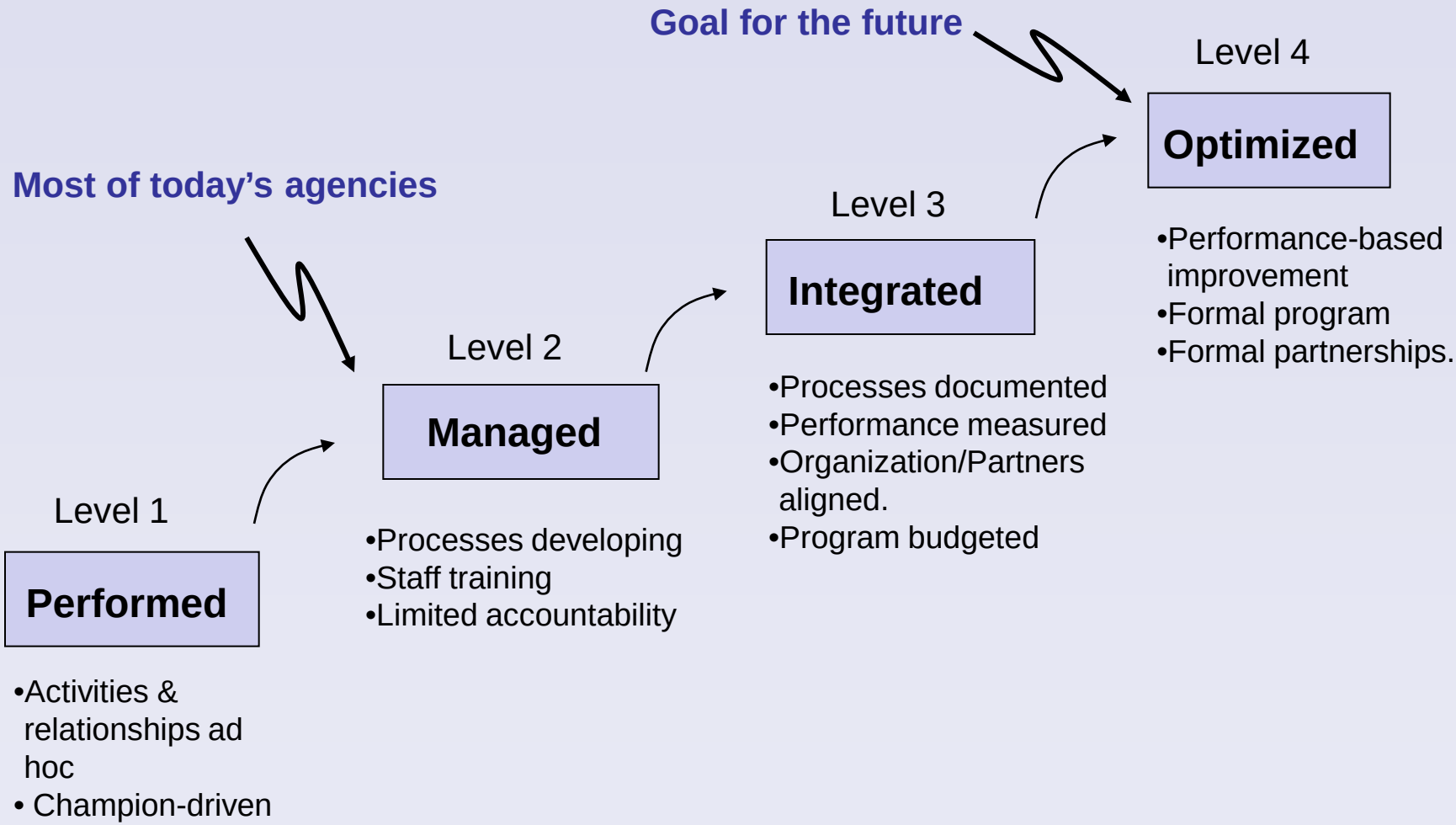
Key Features of the Operations Capability Maturity Model

- *Dimensions" of Capability*: 6 Critical Process and Institutional characteristics determined in research
- *"Levels" of Capability Maturity*: establish measurable & meaningful improvement in capability for each dimension
- *Guidance based on self-evaluated levels (Custom-tailored)* to agency level of congestion, user's position and current agency program characteristics

The Dimensions of Capability

1. *Business processes* -- planning, budgeting, development
2. *Systems & Technology* -- Systems engineering & technology selection
3. *Performance* -- measurement/utilization
4. *Culture* -- understanding/championship of TSM&O
5. *Organization and workforce*-- structure & development
6. *Collaboration* -- public and private

CMM Maturity Levels (for each dimension)



CAPABILITY MATURITY SELF EVALUATION

(example state)

ELEMENTS	LEVEL 1 PERFORMED	LEVEL 2 MANAGED	LEVEL 3 INTEGRATED	LEVEL 4 OPTIMIZING
Planning & Programming	X			
Systems & Technology			X	
Performance	X			
Culture		X		
Organization/ staffing		X		
Collaboration		X		

Lowest level is constraint

Ex: High Level Dimension Criteria

DIMENSION: PERFORMANCE MEASUREMENT			
LEVEL 1 PERFORMED	**LEVEL 2 MANAGED**	**LEVEL 3 INTEGRATED**	**LEVEL 4 OPTIMIZING**
Some outputs measured and reported by some jurisdictions	Output data used directly for after-action debriefings and improvements; data easily available and dashboarded	Outcome measures identified (networks, modes, impacts); and routinely utilized in common for objective-based program improvements	Performance measures reported internally for utilization and externally for accountability and program justification

Ex: High Level Dimension Criteria

DIMENSION: ORGANIZATION & WORKFORCE			
LEVEL 1 PERFORMED	**LEVEL 2 MANAGED**	**LEVEL 3 INTEGRATED**	**LEVEL 4 OPTIMIZING**
TSM&O added on to units within existing structure and staffing; dependence on technical champions	Organizational concept developed within/among jurisdictions with core capacity needs identified; cooperation in field takes place	TSM&O Managers with direct report to top management; Job specs, certification and training for core positions	SO&M senior managers at equivalent level with other jurisdiction services and staff professionalized

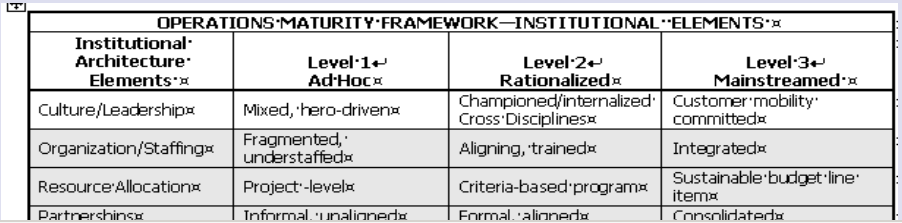
The Rules of Improving TSM&O Capability

- The objective is continuous improvement
- All (6) dimensions are essential/synergistic
- Dimension at the lowest level is the constraint
- Levels of capability can not be skipped

Guidance is Detailed for Actions

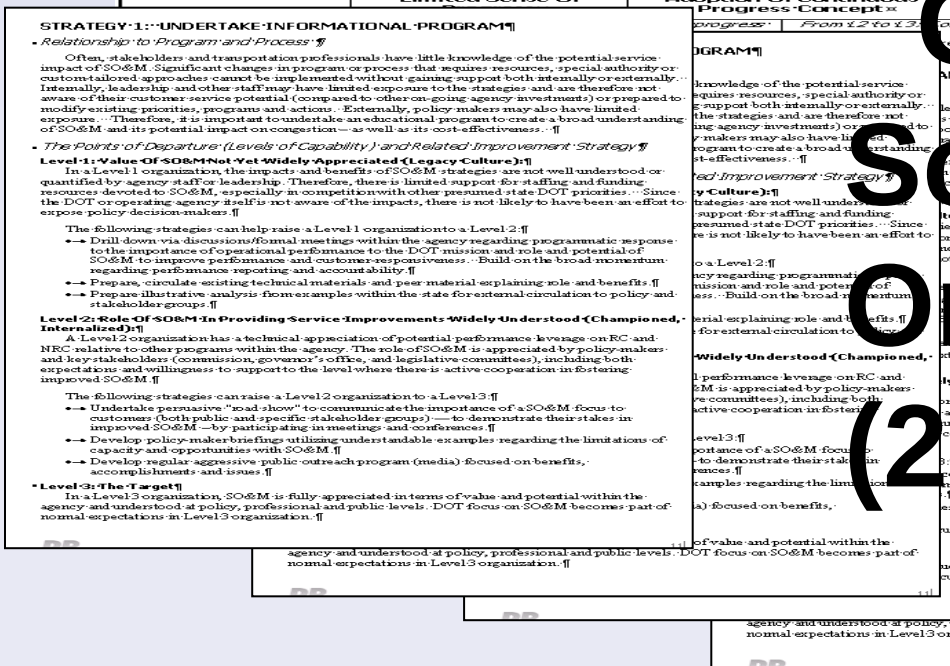
(21 X 3 sets)

Business Processes	Systems & Technology	Performance Measurement
•Planning •Scoping •Programming/Budgeting •Project Development/Procurement	•Regional architectures •Project systems engineering/Testing and validation •Standards/Interoperability	•Measures definition •Data acquisition •Measures utilization
Culture	**Organization/ Workforce**	**Collaboration**
• Technical understanding • Leadership/Championship • Outreach • Program Status/Authorities	•Program status •Organizational structure •Recruitment and retention •Staff development	•Public safety agency collaboration •Local government/MPO/RTPA cooperation •Outsourcing/PPP



OPERATIONS MATURITY FRAMEWORK—INSTITUTIONAL ELEMENTS			
Institutional Architecture Elements	Level 1 Ad Hoc	Level 2 Rationalized	Level 3 Mainstreamed
Culture/Leadership	Mixed, hero-driven	Championed/internalized Cross Disciplines	Customer mobility committed
Organization/Staffing	Fragmented, understaffed	Aligning, trained	Integrated
Resource Allocation	Project-level	Criteria-based program	Sustainable budget line item
Partnerships	Informal, unaligned	Formal, aligned	Consolidated

CULTURE: LEVELS AND OBJECTIVES FOR NEXT STEPS TO IMPROVE			
LEVEL OF OPERATIONS PROGRAM MATURITY	LEVEL 1 Ad Hoc	LEVEL 2 Rationalized	LEVEL 3 (Target) Mainstreamed
1. UNDERTAKE INFORMATIONAL PROGRAM	Value Of SO&M Not Yet Widely Appreciated	Role Of SO&M In Providing Service Improvements Widely Understood	SO&M Fully Appreciated
	From L1 to L2: Role of SO&M in providing service improvements widely understood • Drill down re the relevance of operational performance to the DOT mission	From L2 to L3: SO&M fully legitimized • Undertake persuasive "road show" to communicate new DOT focus to customers — policy-makers and public	
2. EXERT SENIOR LEADERSHIP	Lack Of Senior Champions	Visible Senior Support Agency Wide	Stable SO&M Leadership
	From L1 to L2: Visible senior support agency-wide • Exert senior management leadership visibly throughout organization and across disciplines regarding SO&M leverage and cost-effectiveness	From L2 to L3: Stable SO&M leadership • Identify and accept of risks associated with expanding and intensifying new mission	
3. ESTABLISH FORMAL CORE PROGRAM	Mission Vague & SO&M Subsidiary To Other Programs	SO&M A Formal M… Program With Su… Policy	New State DOT Business Model
	From L1 to L2: SO&M a formal mission and program with supporting policy • Update Mission in light of SO&M business case for mobility in light of minimum new capacity	From L2 to L3: (DOT Business Model) • Introduce SO&M as core DOT program, at sa… level as … development and maint…	
4. RATIONALIZE State DOT AUTHORITY	SO&M Underappreciated	Championed/Internalized Across Disciplines	Mobility Mainstreamed
	From L1 to L2: Effective span of control needs identified • Identify/describe opportunities to rationalize current presumed constraints regarding DOTs activities	From L2 to L3: Effective span of control • Legitimize SO&M and partner role rationalization via policy development initiatives	
	Limited Sense Of …	Adoption Of Continuous … Progress Concept	Continuous … Improvement …



STRATEGY 1: UNDERTAKE INFORMATIONAL PROGRAM

- *Relationship to Program and Process*

Often, stakeholders and transportation professionals have little knowledge of the potential service impact of SO&M. Significant changes in program or process that requires resources, special authority or custom-tailored approaches cannot be implemented without gaining support both internally or externally. Internally, leadership and other staff may have limited exposure to the strategies and are therefore not aware of their customer service potential (compared to other on-going agency investments) or prepared to modify existing priorities, programs and actions. Externally, policy makers may also have limited exposure. Therefore, it is important to undertake an educational program to create a broad understanding of SO&M and its potential impact on congestion — as well as its cost-effectiveness.

- *The Points of Departure (Levels of Capability) and Related Improvement Strategy*

Level 1: Value Of SO&M Not Yet Widely Appreciated (Legacy Culture):

In a Level 1 organization, the impacts and benefits of SO&M strategies are not well understood or quantified by agency staff or leadership. Therefore, there is limited support for staffing and funding resources devoted to SO&M, especially in competition with other presumed state DOT priorities. Since the DOT operating agency itself is not aware of the impacts, there is not likely to have been an effort to expose policy decision-makers.

The following strategies can help raise a Level 1 organization to a Level 2:

- Drill down via discussions/formal meetings within the agency regarding programmatic response to the importance of operational performance to the DOT mission and role and potential of SO&M to improve performance and customer responsiveness. Build on the broad momentum regarding performance reporting and accountability.
- Prepare, circulate existing technical materials and peer material explaining role and benefits.
- Prepare illustrative analysis from examples within the state for external circulation to policy and stakeholder groups.

Level 2: Role Of SO&M In Providing Service Improvements Widely Understood (Championed, Internalized):

A Level 2 organization has a technical appreciation of potential performance leverage on RC and NRC relative to other programs within the agency. The role of SO&M is appreciated by policy-makers and key stakeholders (commission, governor's office, and legislative committees), including both expectations and willingness to support to the level where there is active cooperation in fostering improved SO&M.

The following strategies can raise a Level 2 organization to a Level 3:

- Undertake persuasive "road show" to communicate the importance of a SO&M focus to customers (both public and specific stakeholder groups) — to demonstrate their stakes in improved SO&M — by participating in meetings and conferences.
- Develop policy-maker briefings utilizing understandable examples regarding the limitations of capacity and opportunities with SO&M.
- Develop regular aggressive public outreach program (media) focused on benefits, accomplishments and issues.

Level 3: The Target

In a Level 3 organization, SO&M is fully appreciated in terms of value and potential within the agency and understood at policy, professional and public levels. DOT focus on SO&M becomes part of normal expectations in Level 3 organization.

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The Guidance Scheme On paper (200 pp!)

On-going Steps

- Validation of basic concepts via State/regional self-evaluation workshops with simplified version
- Conversion to web-based guidance tool: (via NCHRP for AASHTO) – now in beta

L06 provides example of use of SHRP 2 research as basis for practice improvements

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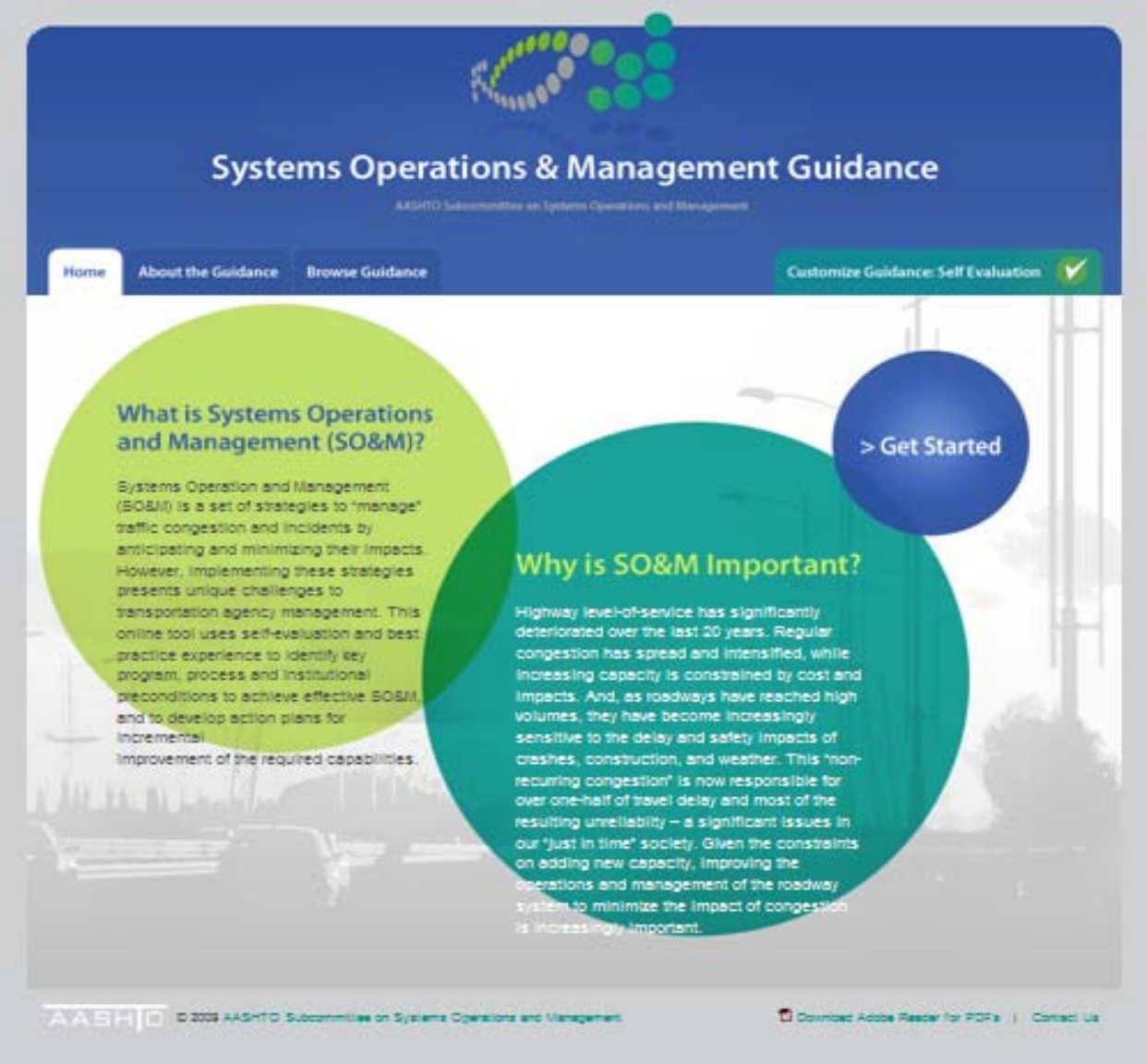
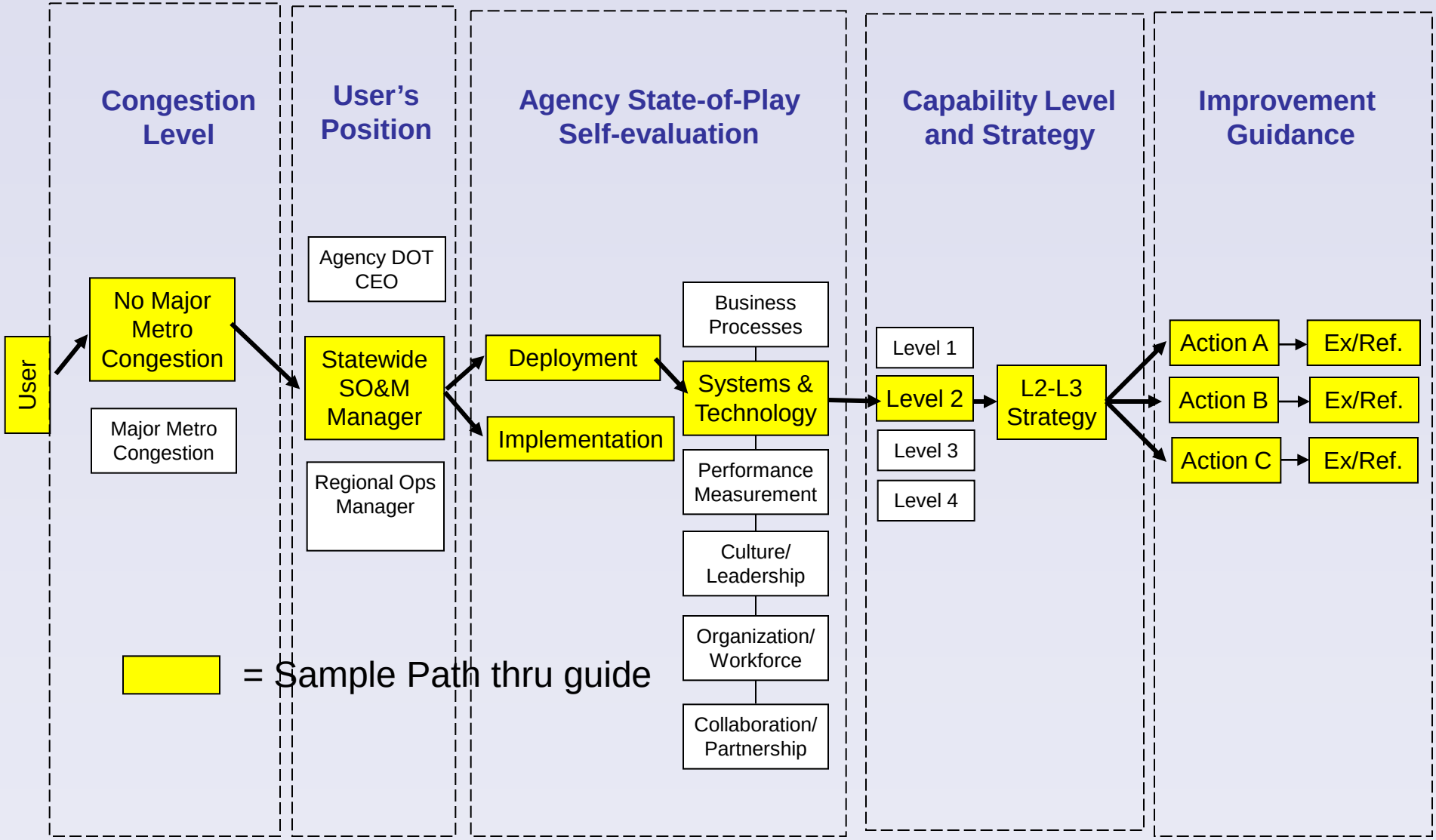
AASHTO web-based Guide to Systems Management & Operations



Guide Structure



Sample path through the self-evaluation and guidance

Walk-Through

www.aashtosomguidance.org

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