



Advancing Planning for Operations

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FHWA, Office of Operations
Phoenix, Arizona – May 12, 2010**

Advancing Planning for Operations

What is Planning for Operations?

- Enhance and strengthen both planning & operations functions to support regional operations in the 21st Century.
- Enhance regional decision-making process so that operations investments are on par with investments in construction & system preservation.

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Planning for Operations: *Program Goal*

- Improve performance of regional transportation systems through
 - An objectives-driven, performance-based approach to planning for operations
 - Enhanced collaboration & coordination between planners & operators
 - Effective integration of Congestion Management Process (CMP) and Management & Operation (M&O) strategies in the Metropolitan Transportation Plan

The Result: *Increased Performance of Our Existing Transportation System*

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*Responding to a
Changing World
with a New Approach*

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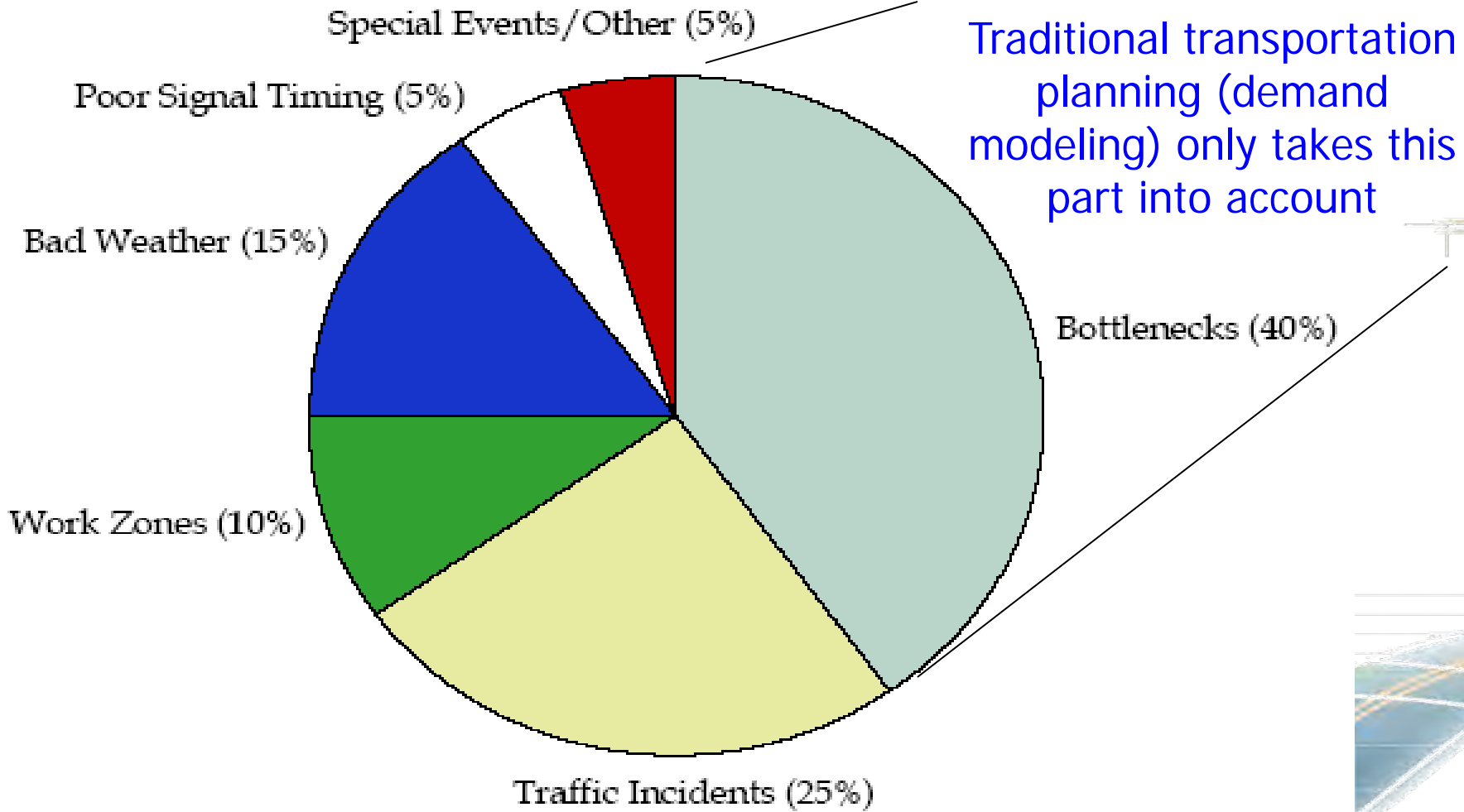
A Changing World

- Travelers expect more choices & better information
- Increasing requirement to get the most out of existing resources
- Expanding opportunities through technology
- Increasing pressure to address climate change
- Efficient evacuations
- Need to share data & information
- Global economy that demands effective multi-modal solutions

Requires a shift towards performance-based solutions & away from project-focused responses

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Sources of Congestion: National Summary

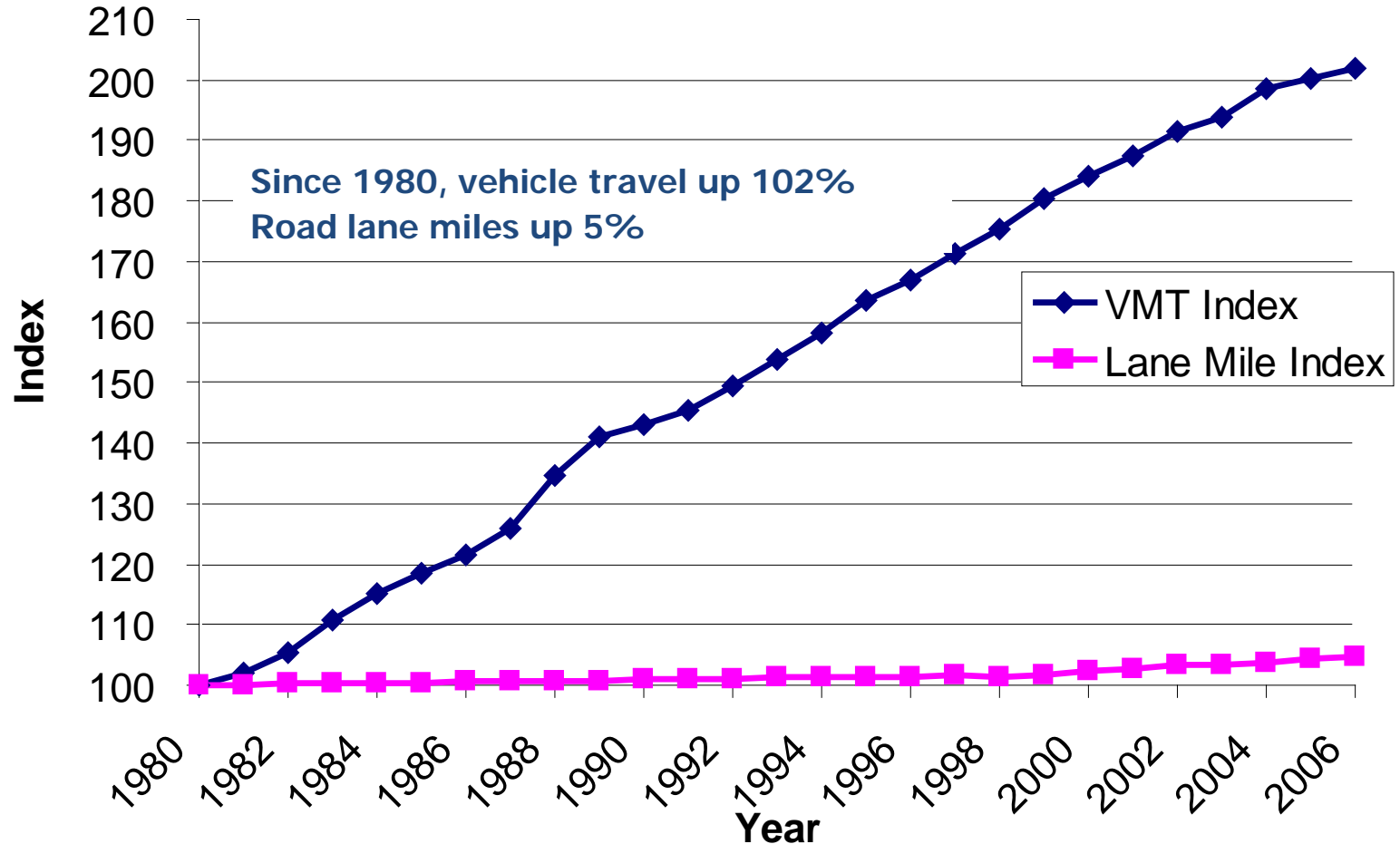


Traffic Congestion and Reliability. FHWA (September 2005)

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Capacity Constrained

Trends





Need to Think Beyond Traditional Capacity Projects

- Limited funding for large-scale capacity projects
- Long-time to plan, assess, and build new infrastructure
- Potential adverse impacts on communities, land use, air quality, etc.

*There exists the need to address traveler concerns
through better Management & Operations*



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What Do Our Customers 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

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What is Management & Operations?

M&O is: **“A regionally integrated program to optimize the performance of existing infrastructure**

- Through multimodal and intermodal, cross-jurisdictional systems, services, and projects ...
- Includes regional operations collaboration and coordination activities between transportation and public safety agencies.”

SAFETEA-LU Technical Corrections Act of 2008

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How Can Management & Operations Help?

- **Quick Implementation**
 - Minimize ROW Takings
 - Less Environmental Review Time Typically
 - Projects Can Be Started Quickly
- **Provide Short & Long Term System Benefits**
 - Reduce Congestion & Enhance Safety
- **Environmental Benefits**
 - Reduce Air Pollutant Emissions
 - Promote Transit & Ride Sharing Usage
- **Commerce**
 - Enhance Freight & Goods-Movement Reliability

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Category/Project	B/C Ratio Other Metrics	Safety	Mobility	Energy/ Environment
Traffic Signal Optimization/Retiming	17:1 to 62:1	High	High	High
Traffic Incident Management	Incident ratio reduced 30-40%	High	High	High
Safety Service Patrols	2:1 to 42:1	High	High	High
Surveillance	6:1	High	Med	Med
Road Weather Information Systems	2:1 to 10:1	High	High	Med
Electronic Toll Systems	2:1 to 3:1	Med	High	High
Open Road Tolling	Cost rates reduced up to 49% Speeds increased up to 51%	High	High	High
Ramp Metering Systems	15:1	Low	High	Med
Electronic Border Crossing Systems	85:1 to 118:1	Med	Med	Med
Commercial Vehicle Information Systems and Networks	3:1 to 5:1	Med	Med	Med
Electronic Credentialing	1:1 to 50:1	Med	Med	Med
Electronic Screening	2:1 to 12:1	Med	Med	Med
Bus Rapid Transit	2:1 to 10:1	Med	High	Med
Traffic Adaptive Signal Control	Improved travel time 6-11%	Med	High	High
Transit Signal Priority	Reduced transit delay 30-40% Improved travel time 2-16%	Med	High	Med
Traveler Information/Dynamic Message Signs	3% decrease in crashes	Low	High	Low
Parking Management Systems	Increase in transit mode share up to 6	Med	Med	Low
Transit Automated Vehicle Location/ Computer Aided Dispatch	AVL improves on-time bus performance 9-68% CAD improves on-time bus performance up to 9%	Med	Med	Med
High Occupancy Toll Facilities	23% would pay \$2 to save 10 minutes 59% would pay \$2 to save 20 minutes	Med	High	Med

Benefits of Collaboration between Planners & Operators

- Planners better understand operations and how operational strategies can meet regional transportation goals
- Planners utilize the best data available to forecast future conditions

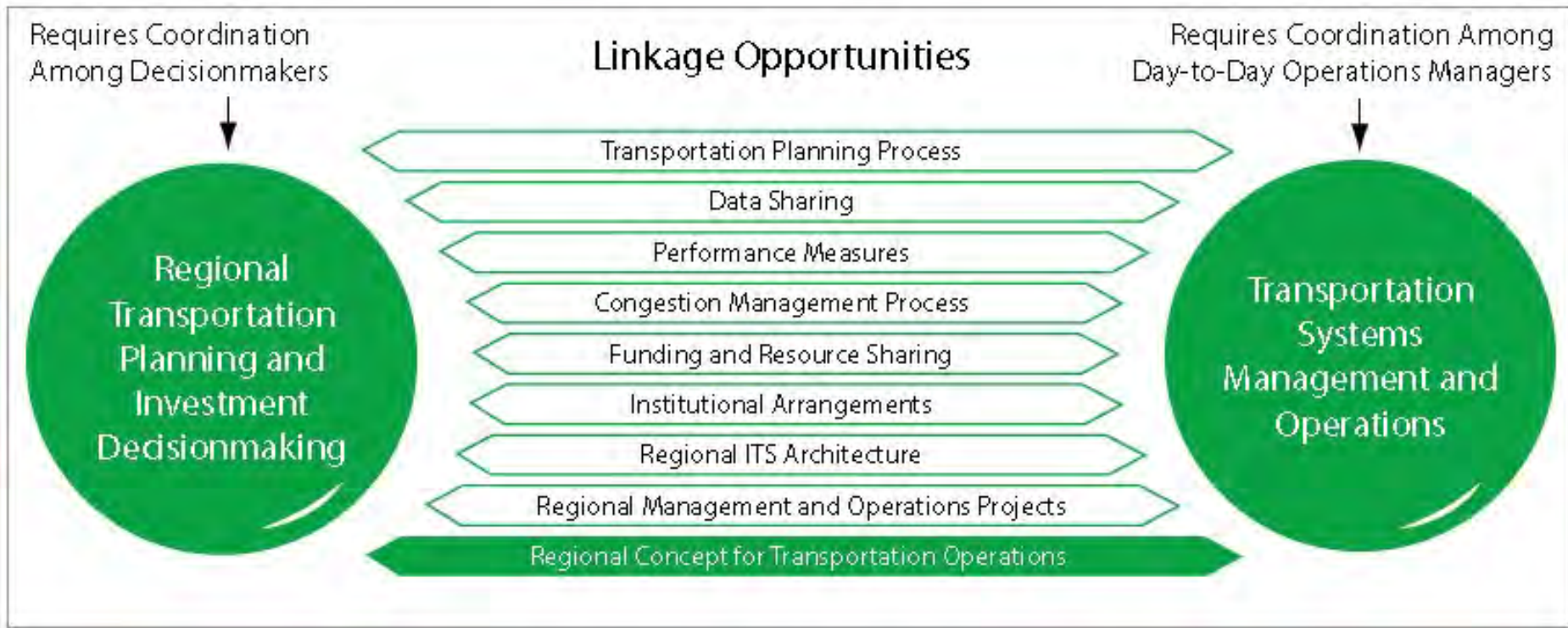
- Operators better understand the planning process, opportunities, and expectations
- Operations projects and programs receive increased resources and credibility



***Transportation investment decisions
reflect the best allocation of
resources***

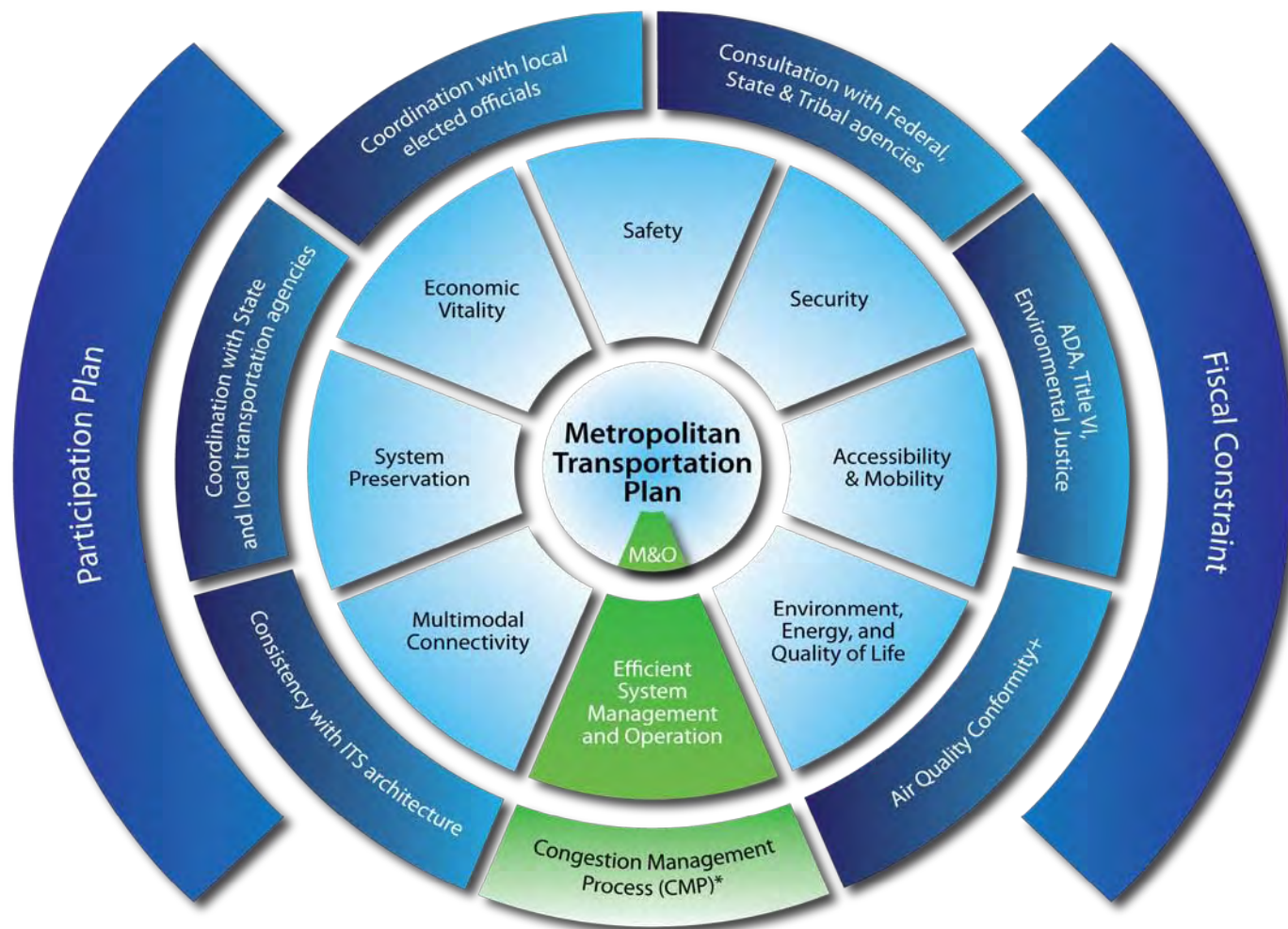
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Where We Are Headed? A “Cultural Shift”



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M&O and CMP in Context of Metropolitan Transportation Planning Requirements



* Required for TMAs

+ Required for nonattainment and maintenance areas

What is the Congestion Management Process (CMP)?

- A systematic approach applied in a metropolitan region to identify congestion and its causes, propose mitigation strategies, and evaluate the effectiveness of implemented strategies
- As an integral part of the planning process that influences decision making, the CMP feeds projects and strategies directly into the Plan, TIP, and STIP

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What are the Essential Elements of a CMP?

- Monitoring & evaluating transportation system performance
- Identifying causes of congestion
- Identifying & evaluating alternative strategies
- Evaluating effectiveness of implemented strategies

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M&O in SAFETEA-LU

1. **Planning factor:** Promote efficient system management and operations (Section 6001(h))
2. **Requirement to Include M&O Strategies**
 - MTP shall include “operational and management strategies to improve the performance of existing facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods” (Section 6001(i))
 - Long Range Statewide Transportation Plan (LRSTP) should include: “operations and management strategies to ensure the preservation and most efficient use of the existing transportation system”
3. Additionally, **for TMAs, a Congestion Management Process (CMP)** is required
 - the transportation planning process under this section **shall address congestion management through a process that provides for effective management and operation**, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under this chapter and title 23 through the use of travel demand reduction and **operational management strategies** (Section 5303(k))

How does M&O and CMP connect?

Regional operations objectives in the MTP

The CMP actualizes the operations objectives through a systematic approach for:

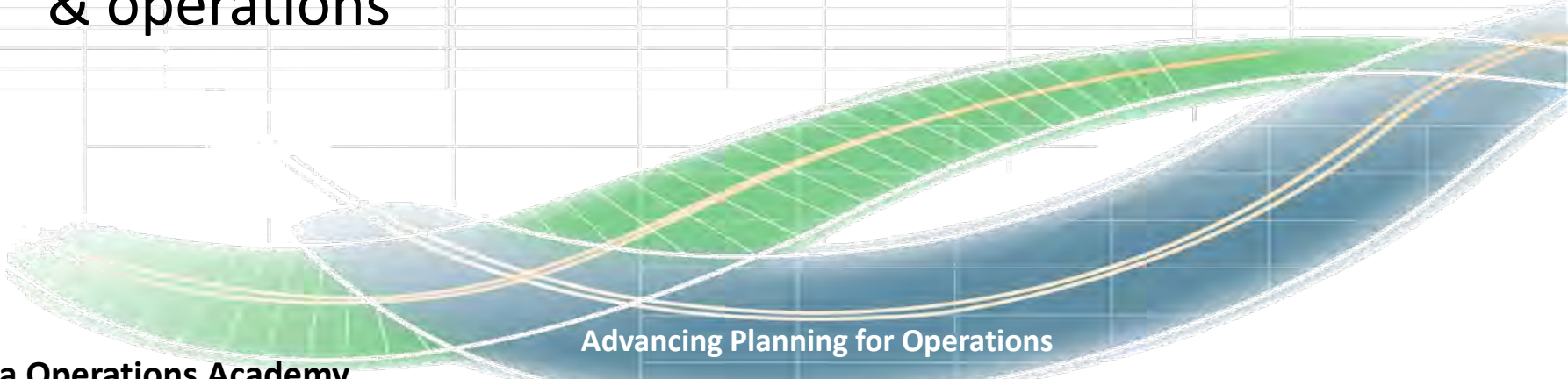
- Developing performance measures
- Identifying and analyzing problems
- Collecting data
- Developing strategies
- Monitoring performance

Congestion mitigation strategies including M&O strategies



How do we effectively integrate CMP and M&O into our planning process?

- A viable approach
- Measurable objectives
- A systematic process that includes performance measures for developing and selecting M&O strategies
- Collaboration to create more effective management & operations



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New Thinking

Advancing an Objectives Driven, Performance-Based Approach to Planning for Operations

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Objectives-Driven, Performance-Based Approach

Transportation Plan includes:

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

M&O strategies are programmed & implemented in collaboration with local agencies

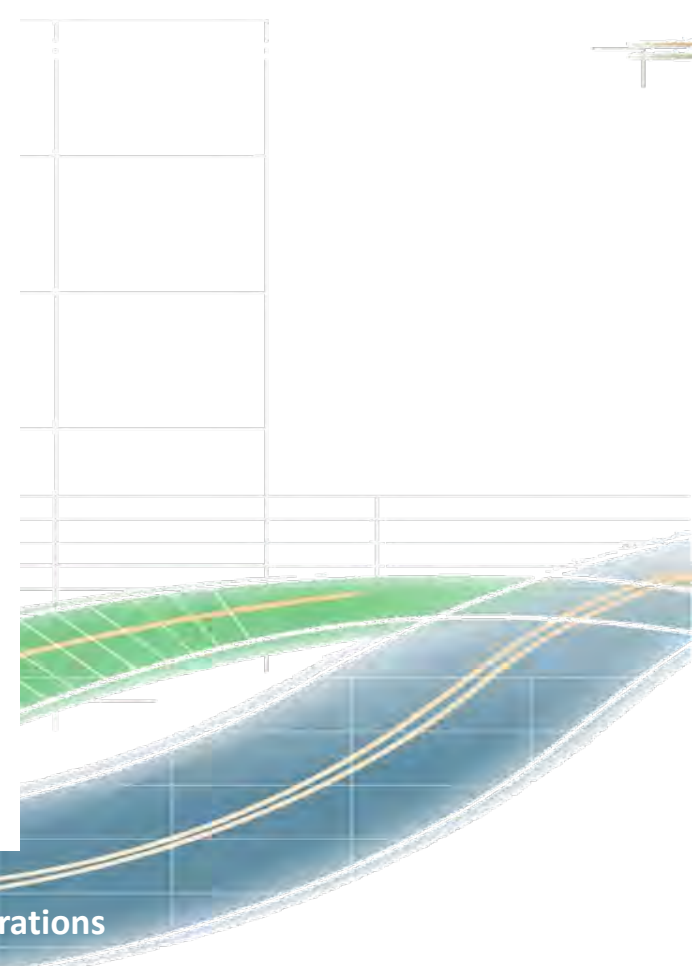
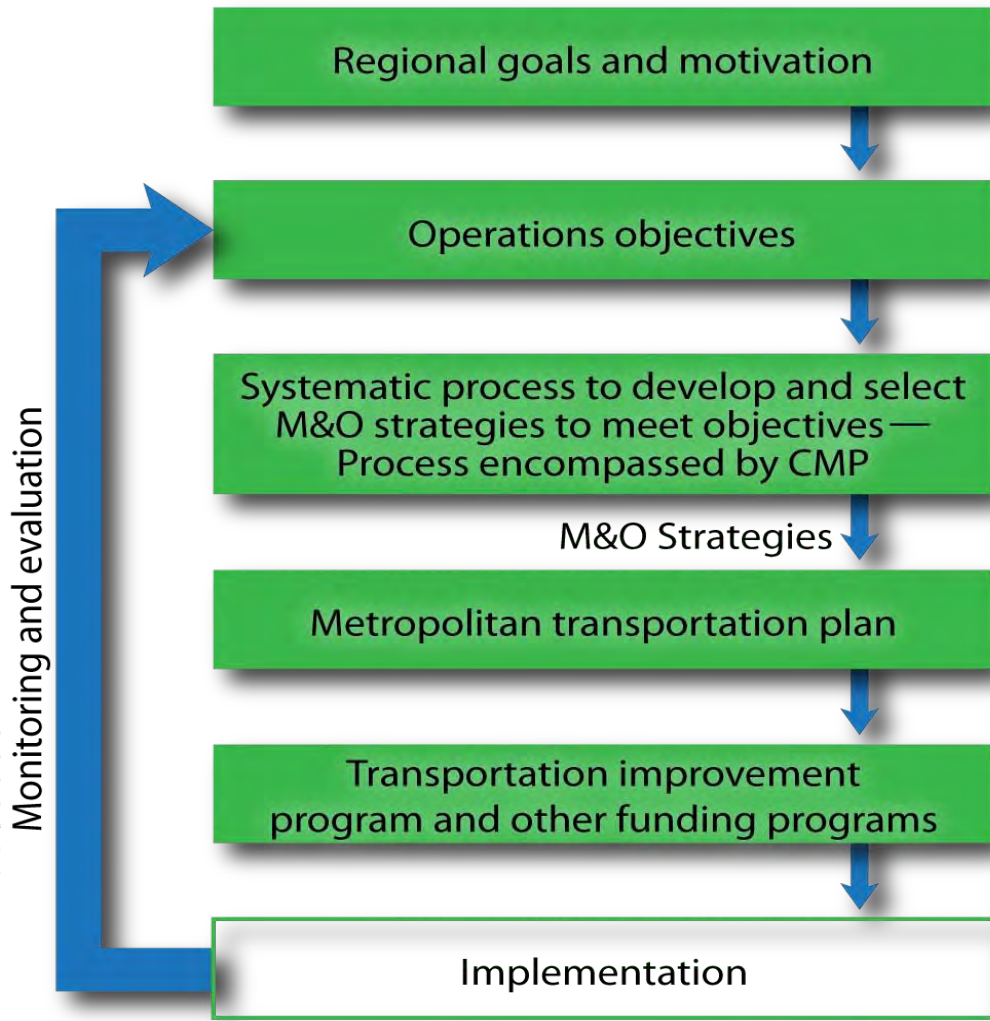
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Benefits of the Objectives-Driven, Performance-Based Approach

- Operators & planners work together developing & addressing short-term & long-term system performance objectives
- Agencies effectively prioritize investments to achieve agreed upon objectives
- System performance outcomes are improved
- Implemented performance measures *demonstrate accomplishments*

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The Approach



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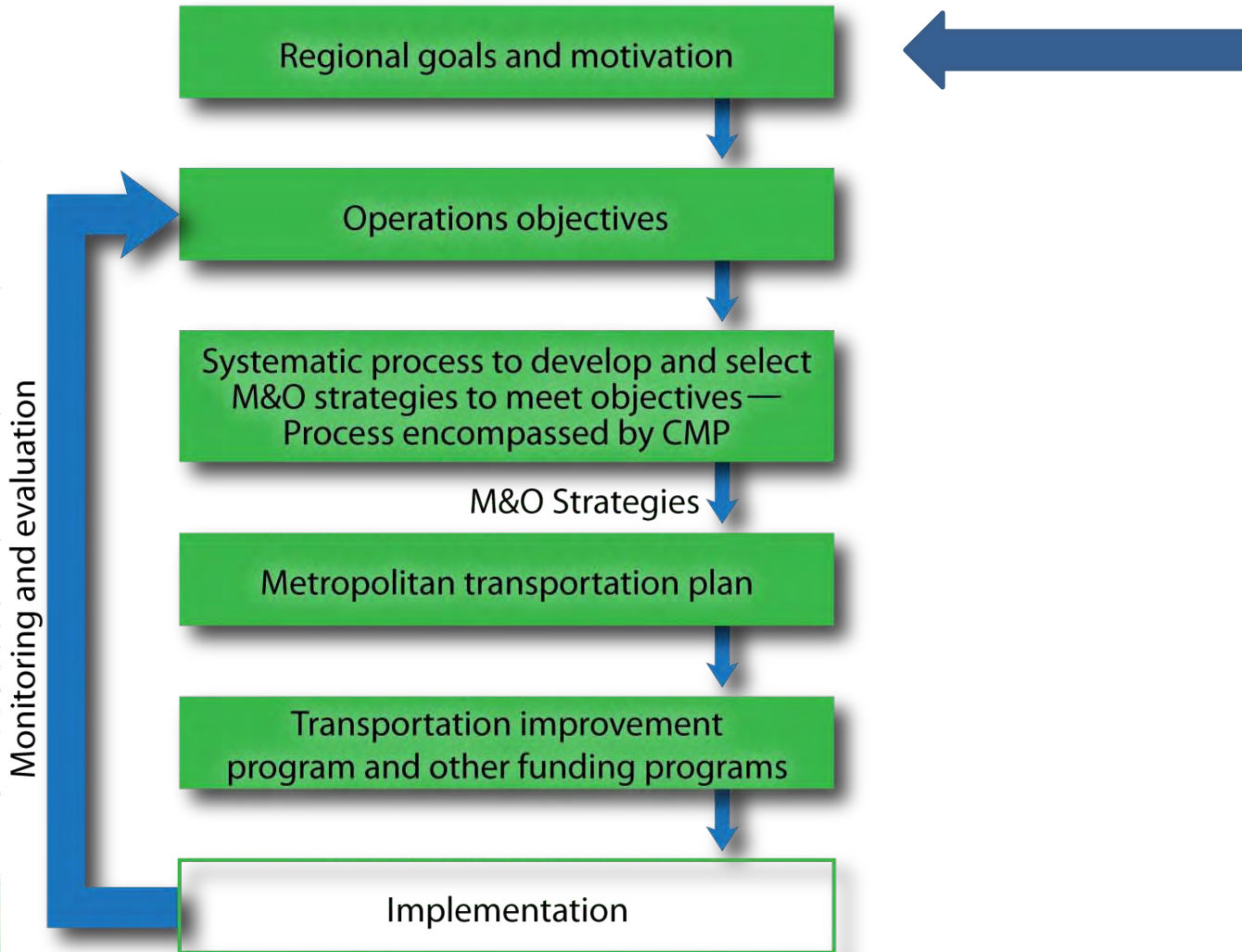
Use of Approach at Metro: The Portland, Oregon MPO

- Set performance targets (objectives) for plan in areas of economy, environment, equity
 - Ex. By 2035, reduce vehicle hours of delay/person by 10% compared to 2010.
 - Established performance measures to monitor plan performance
 - Ex. Delay & cost of delay to freight
 - Ex. Non-drive alone mode share
 - Performance monitoring every 2 years with observed data to guide implementation decisions
 - Supported by M&O plan and regional operations committee
- Contact: Deena Platman at deena.platman@oregonmetro.gov*

Use of Approach in Private & Public Organizations

- Commonly used to improve quality & manage performance in service-oriented environment
- FedEx
 - 12-component service quality indicator tracks daily
 - Quality action teams analyze data for root causes of problems
 - Management meets daily to discuss performance
- Austin Energy (community-owned electric utility)
 - Sets measurable objectives aligned with overarching organizational strategy
 - Performance trends reported to public monthly on cost, reliability, and safety

Regional Goals & Motivation

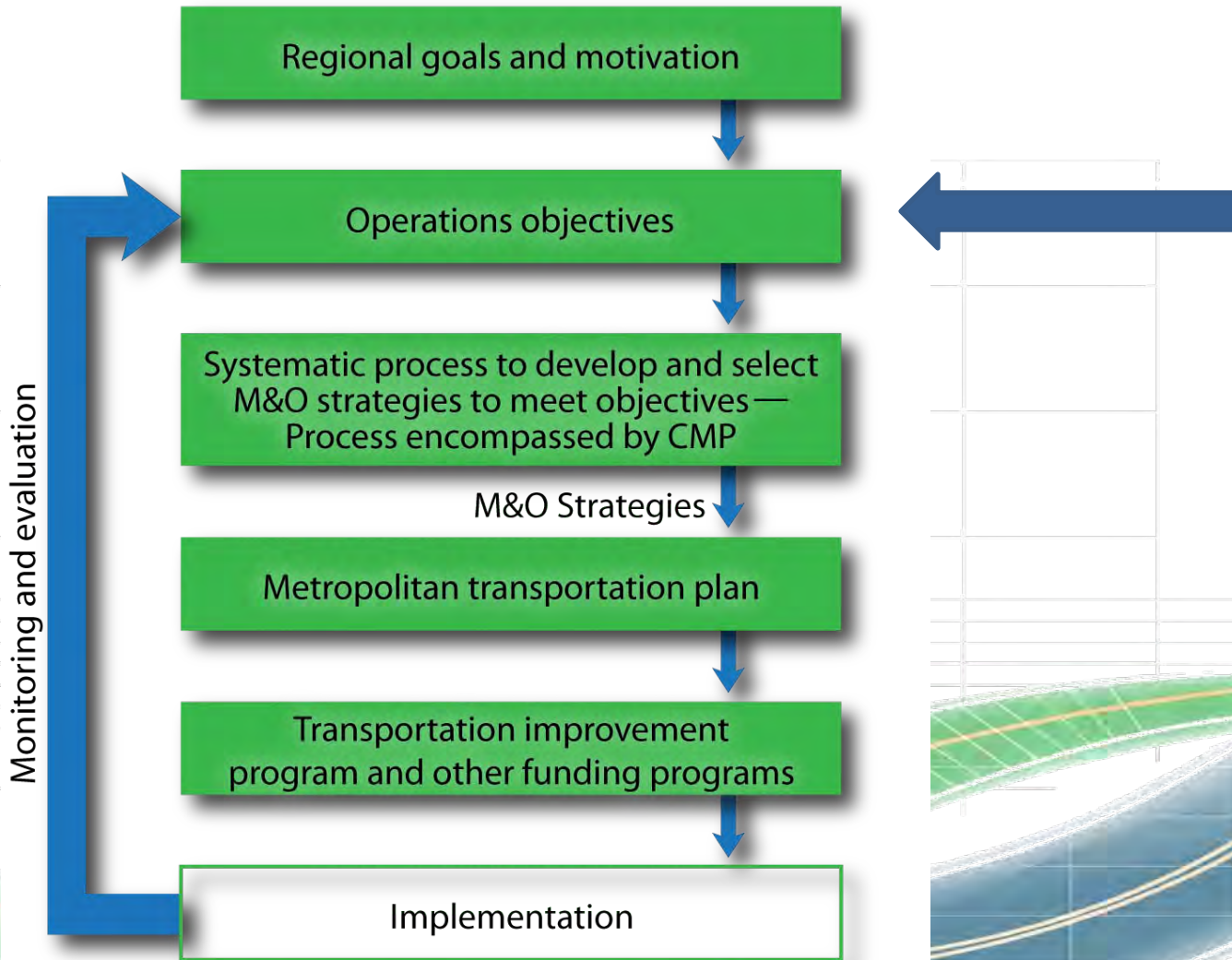


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Operations Goals in the MTP

- Goals describe desired end state
- Examples of operations goals:
 - “Maximize Transportation System Management and Operations” *Baltimore Regional Transportation Board (BRTB) – 2035 Regional Transportation Plan*
 - “Improve transportation system performance” *Chicago Metropolitan Agency for Planning (CMAP) – 2030 Regional Transportation Plan*
 - “A reliable commute” - *Metropolitan Transportation Commission - 2030 Plan*
- Other goals include safety, economy, land use, etc.

Operations Objectives



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Operations Objectives that are SMART

Operations objectives to be included in the plan are developed through collaboration with a broad range of regional participants and reflect regional values.

Specific. Sufficient to guide approaches

Measurable. Quantitative measurement

Agreed. Consensus among partners

Realistic. Can be accomplished

Time-Bound. Identified time-frame for accomplishment



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Sample 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.

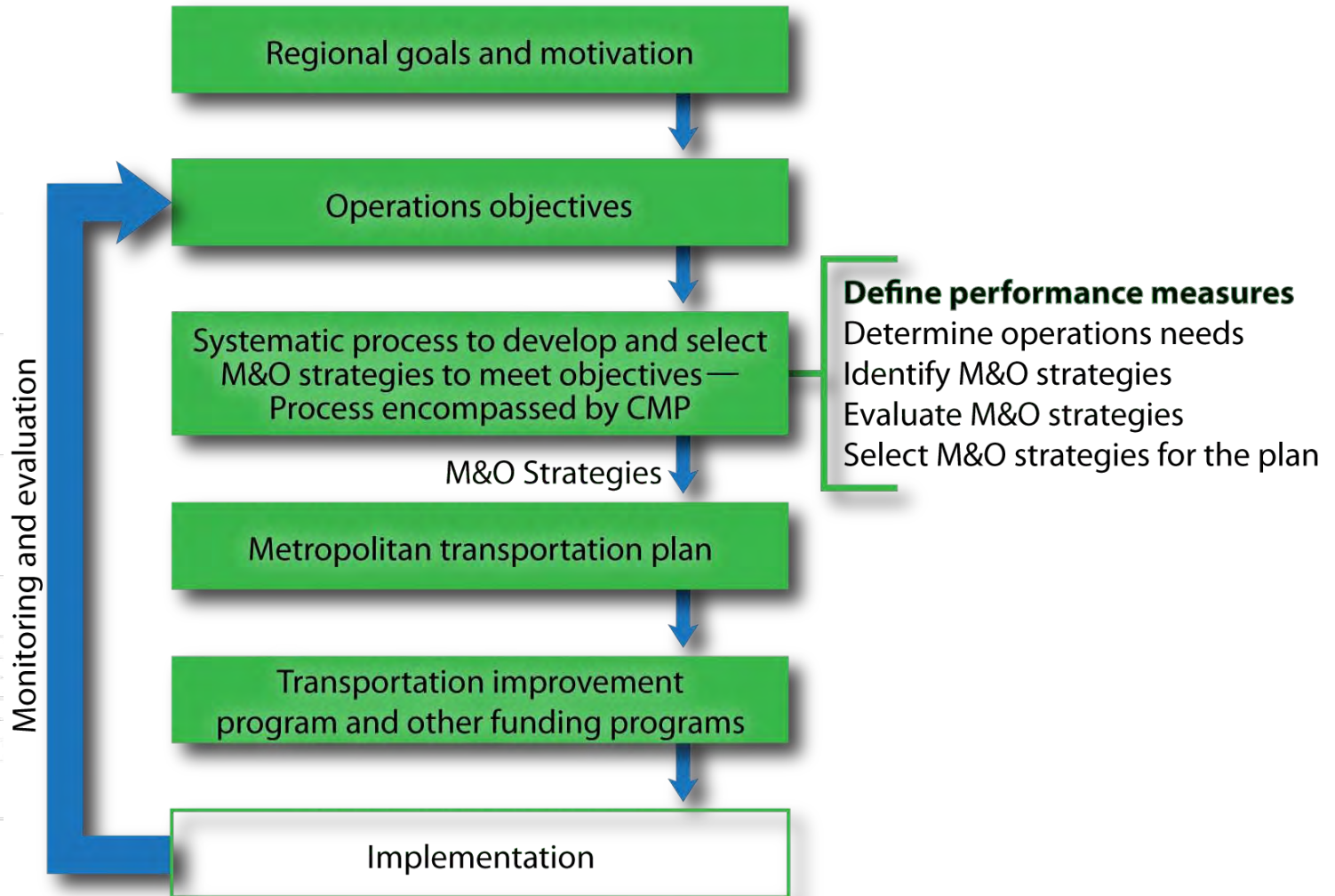
Outcome & Activity-Based Objectives

- Outcome-based objectives
 - Describe system performance outcomes typically experienced by the user
 - Example: By 2030, reduce per-capita delay on freeways by 20% below today's levels
 - What regions ultimately want to achieve
- Activity-based objectives
 - Describes desired performance by system operators
 - Example: By 2010, provide access to real-time bus arrival information at all transit stations
- Activity-based objectives should directly support the achievement of an outcome-based objective

Operations Objectives in the Planning Process

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

Performance Measures





The Key Role of Performance Measures

- Within the CMP, used to identify specific deficiencies within the system and monitor congestion
- Focus attention on operational issues (e.g., congestion, incident clearance time, etc.)
- Prioritization of investments
- Track progress toward measurable objectives
- Report progress to the public and decisionmakers
- Demonstrate value of operational projects/programs
- Provide real-time guidance for system management

Defining Performance Measures

- Wide range of potential performance measures
 - Outcome measures: e.g., hours of delay
 - Activity measures: e.g., incident clearance time, percentage of roadways with automated signal coordination
- Coordination and collaboration among range of agencies
 - MPO
 - Transit Agencies
 - State DOT
 - Local DOT, Departments of Public Works
- Can draw on existing agency performance measures

Sample Transportation System Performance Measures

Travel time	Average travel times; Average travel speeds
Congestion extent	Lane miles of congested conditions Average hours of congestion per day
Delay	Vehicle-hours of recurring delay Non-recurring delay
Incident occurrence/delay	Median minutes from time of incident to clearance
Travel time reliability	Buffer time; Buffer time index
Transit performance	On-time performance Transit travel times in comparison to personal vehicle travel times
Customer satisfaction	Percent reporting being satisfied
Person throughput	Peak hour persons moved per lane

Small Group Exercise: Forming SMART Operations Objectives

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Exercise: Forming SMART Operations Objectives

- Purpose:
 - Review and critique regional objectives for an MPO developing its MTP
- Review objectives and re-write objectives to be SMART Specific, Measurable, Agreed, Realistic, and Time-Bound
 - Reduce traffic congestion on major interstate highways
 - Reduce incident based delay by 40 percent
 - Encourage participation in the regional commuter travel demand management program
 - Ensure that transit service is reliable

Discussion

- What challenges or issues are faced in developing regional operations objectives that are SMART?
- What is needed to overcome those challenges?



Break – 15 Minutes

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Systematic Process: Determine Operations Needs



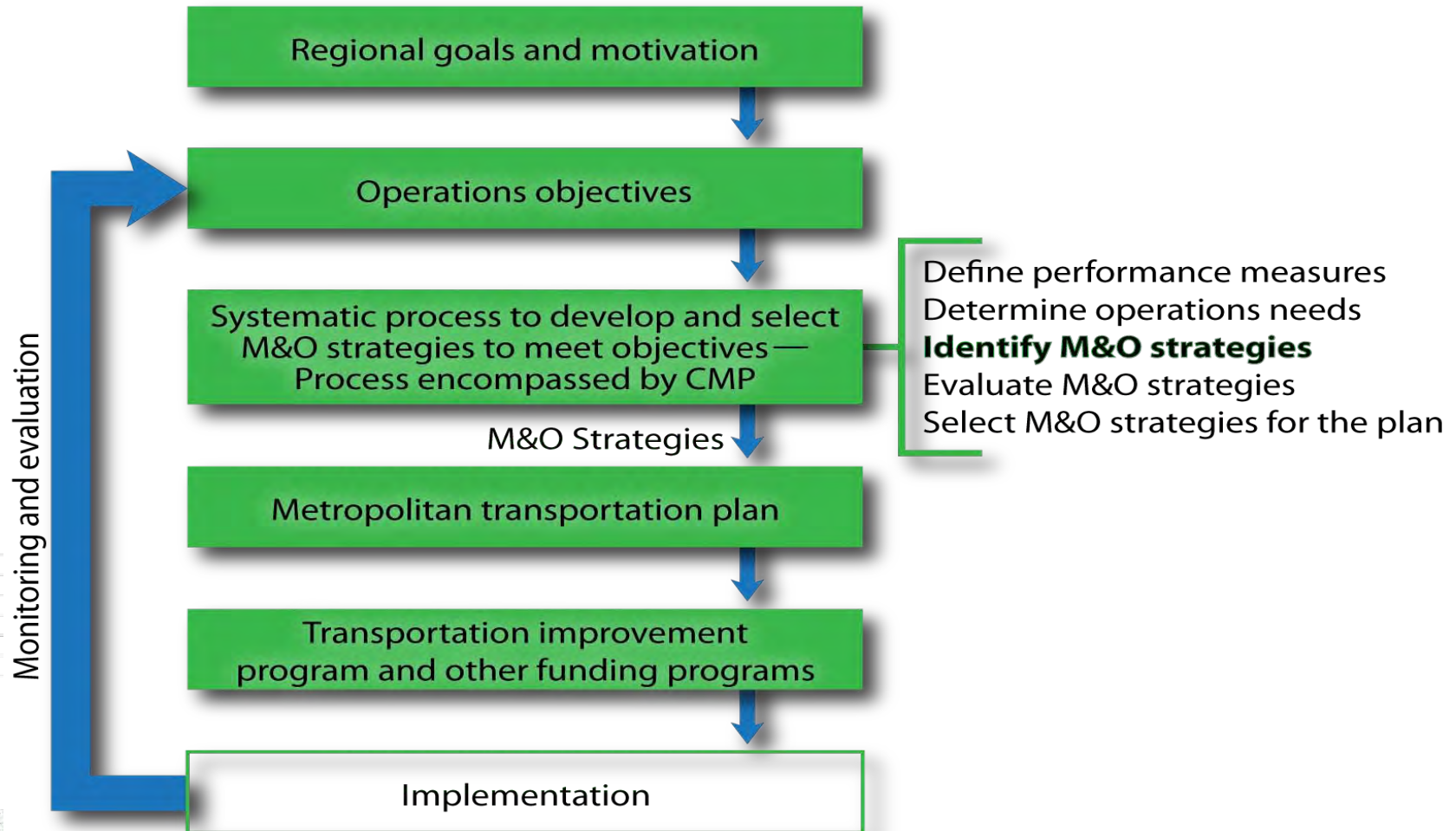
Determining Operations Needs

- One of first steps in reaching objectives – determine what changes are needed from multi-agency, regional perspective
- Several ways to do this depending on focus of operations objective:
 - Collecting data on current & planned transportation system . Determine where congestion occurs & its causes as part of Congestion Management Process
 - Revisit needs brought out during Regional ITS Architecture development

Determining Operations Needs

- Several ways to do this depending on focus of operations objective (cont'd):
 - Convene operators in region & examine where activities can be coordinated & improved such as utilizing groups focused upon:
 - Incident Management
 - Emergency Evacuation Planning
 - Signal Timing coordination & improvements
 - Enhancing Real-Time Traveler Information

Systematic Process: Identify M&O Strategies



Identify M&O strategies to address Operations Needs

- M&O strategies best established through collaboration between operators in the region and planners
- Strategies may include:
 - Expansion of current operations capabilities/services
 - Adoption of best practices from another region
 - Institutional arrangements enabling mutual support & cooperation between operators
 - Implementation of new systems

Examples of Management & Operations Strategies

Applied individually or in combination

- Traffic incident management
- Traveler information services
- Road weather management
- Freeway management
- Traffic signal coordination
- Work zone management
- Electronic payment/toll collection
- Transit signal priority
- Emergency response and homeland security
- Freight management
- Travel demand management
- Transit fleet management and dispatching

Regional ITS Architecture provides a blueprint for how ITS (used for many M&O strategies) can be coordinated on a regional level.

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A Powerful Tool to Use: *Integrated Corridor Management*

- Coordinated, multimodal cross-network operations within a corridor
- Efficient use of existing network assets
- Better information & more choices for travelers



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Why Integrated Corridor Management (ICM)?

- Integrates strategies & technology to more efficiently move people & goods
- Provides a Toolbox of policies, strategies, requirements & methodologies to advance Operations
- Demonstrates how proven & emerging technologies can strongly link separate transportation networks

*Significant
Congestion*

*ICM Control and
Information*

*Managing All
Corridor Capacity*



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Summary of Approach



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A Key Way to Engage Operators: MPO Operations Committees

- Many MPOs convene committees of operators in their regions to coordinate ITS/operations activities & recommend M&O strategies for consideration in Plan & TIP



- Examples:

Capital District Transportation Committee (Albany, NY) hosts Regional Operations Committee to assist in proposing M&O strategies/initiatives in TIP

Hampton Roads Intelligent Transportation System (ITS) and Operations Planning Committee reviews ITS applications for CMAQ funding and provides recommendations to MPO

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Benefits of Collaboration

The background features a light gray grid. Overlaid on the grid are several wavy, ribbon-like shapes in shades of green and blue, with orange lines running through them, suggesting a dynamic or data-driven environment.

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Maricopa Association of Governments Traffic Signal Optimization Program

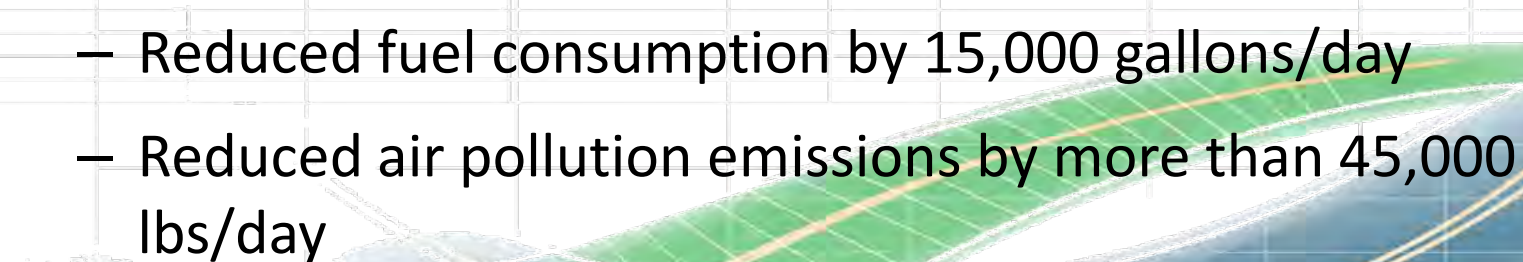
- Convened Regional Operators to develop RCTO & develop Operations Objectives & Performance Measures
- Identified tremendous needs for Signal Retiming assistance across region
- Developed Signal Timing program giving assistance to overextended Engineers in region through central on-call consultant



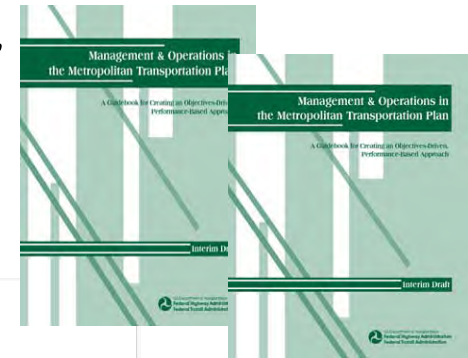
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Denver Traffic Signal System Improvement Program

- Assists signal operators to regularly time their signals & improve system infrastructure with funding & technical assistance
 - Works towards regional goals of improving mobility & reducing air pollution
 - From 2003 to 2006, TSSIP:
 - Reduced delays by nearly 36,000 vehicle hours/day
 - Reduced fuel consumption by 15,000 gallons/day
 - Reduced air pollution emissions by more than 45,000 lbs/day
- 

Planning for Operations: *Website Resources*



- **FHWA Planning for Operations Website**

<http://www.plan4operations.dot.gov>

- ***Interim Guidebooks on Congestion Management Process and Management & Operations in Planning Process***

http://www.plan4operations.dot.gov/cmp_mo_guidebooks.htm

- ***A Primer - Statewide Opportunities For Linking Planning & Operations***

<http://www.ops.fhwa.dot.gov/publications/fhwahop08028/index.htm>

- ***Applying Analysis Tools in Planning for Operations***

<http://www.plan4operations.dot.gov/casestudies/analysis.htm>

- ***National Transportation Operations Coalition Webcast Archive (Feb. 23, 2010 and Jan. 25, 2010)***

http://ntoctralks.com/web_casts_archive.php

Just Released FHWA & FTA Resource

Advancing Metropolitan Planning for Operations: An Objectives-Driven, Performance-Based Approach - A Guidebook

- *Provides practitioners a thorough understanding of the approach and its elements*
- *Available on the Planning for Operations website*

The Foundation Document for This Program

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Resources Supporting “The Approach”

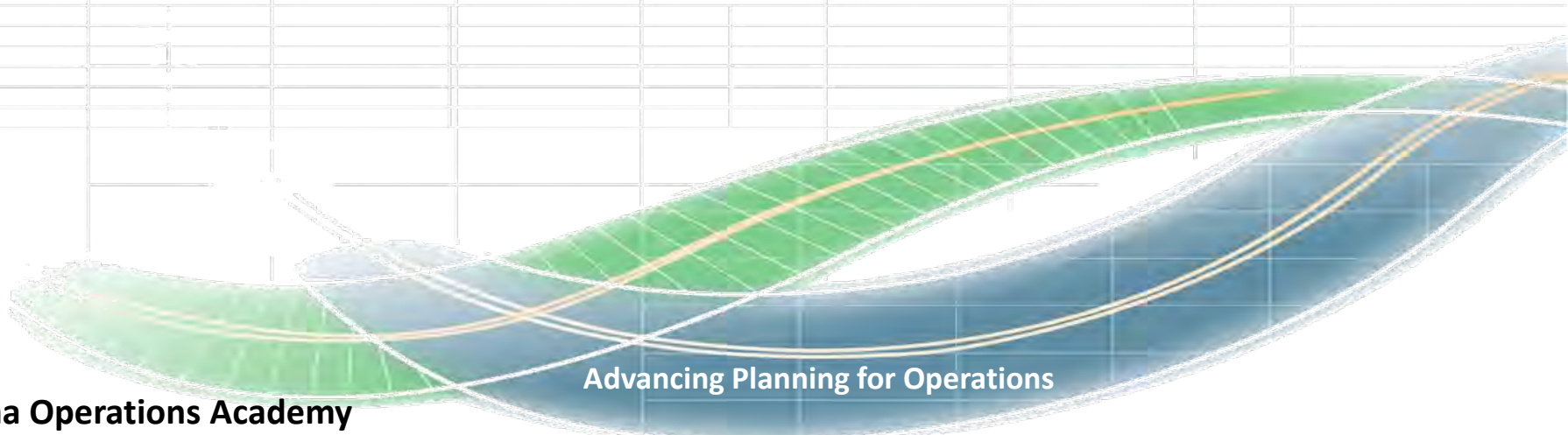
- Advancing Metropolitan Planning for Operations: The Building Blocks of a Model Transportation Plan Incorporating Operations - A Desk Reference
- Statewide Opportunities for Integrating Operations, Safety, and Multimodal Planning: A Reference Manual
- Innovative Analysis Methods Report & Upcoming Workshops



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Why? An Approach Document Only Gets You So Far...

- Resources Needed to Provide Help Getting Started
- Provide Opportunities to Advance Good Practice for Operations Objectives & Performance Measures
- Provide Technical Tools to Better Grasp How We Model Operations in Planning



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Model Transportation Plans

Product Envisioned: A Desk Reference –

Not A Guidebook

- The Goal: Provide Tools of Operations Objectives to Get Planners & Operators Started Advancing Operations Strategically

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Model Transportation Plans

- *Illustrate A Plan* Showing Strategic Operations in Planning
- Menus of Regional Operations Objectives & Associated Performance Measures
- Identify Supporting Operations Programs & Projects MPOs Can Advance
- Potential Safety Benefits from Meeting Operations Objectives

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How Does This Look?

System Efficiency: Duration of Congestion	
General Description	These objectives focus on managing the duration of recurring congestion (roadway or intersection) on the transportation system. Common expressions of recurring congestion are volume-to-capacity (V/C) ratio and level of service (LOS), which is measured in terms of travel speed or delay. In areas where there is extensive congestion, the degree or intensity of congestion can be revealed, particularly for areas that experience significant congestion (spatially and/or temporally).
Operations Objectives	<ul style="list-style-type: none"> • Reduce the daily hours of recurring congestion on major freeways from X to Y by year Z. • Reduce the number of hours per day that the top 20 most congested roadways experience recurring congestion by X percent by year Y.
Performance Measures	<ul style="list-style-type: none"> • Hours per day at LOS F or V/C > 1.0 (or other threshold).
Anticipated Data Needs	<ul style="list-style-type: none"> • Hourly traffic volume data (e.g., traffic counts); inventory of facilities (number of lanes, presence/frequency of signals/intersections, etc.); calculations or estimates of capacity by hour of the day.
Data Resources and Partners	<ul style="list-style-type: none"> • ITS data (continuous traffic counters), traffic count programs, studies. • GIS or other database of system inventory. • State DOTs, regional planning councils, MPOs, highway districts, cities, counties, and traffic management centers.
M&O Strategies to Consider	Strategies designed to reduce recurring congestion, such as traffic signal coordination; travel demand strategies that encourage shifts in travel mode, time, or route; and, congestion pricing strategies that encourage shifts to off-peak periods.
Safety-related Benefits	<p>An indirect benefit from reductions in the duration of congestion is the lower rate of exposure to incident-causing conditions. A management program aimed at reducing congestion can also help address aggressive driving. Drivers put in situations where their travel is significantly delayed tend to drive more aggressively, increasing the opportunity for traffic crashes.</p> <p>SOURCE: Neuman, Timothy r., Ronald Pfefer, Kevin I. Slack, Kelly Kennedy Hardy, Richard Raub, Roy Lucke, Richard Wark. <i>NCHRP REPORT 500 Guidance for Implementation of the AASHTO Strategic Highway Safety Plan Volume 1: A Guide for Addressing Aggressive-Driving Collisions</i>. 2003</p>



The Key Components

- Operations Objective:
 - Reduce the regional average travel time index by X percent per year.
- Associated Performance Measure:
 - Travel time index (the average travel time during the peak period, using congested speeds, divided by the off-peak period travel time, using posted or free-flow speeds).
- Data Needs:
 - Travel speed data during peak and off peak periods across a network of facilities (freeways, highways, arterials, LRT, BRT, bus routes, etc.).

Innovative Analysis Methods Report & Outreach

- Fall 2009: Report Completed Showcasing Technical Tools available to Planners & Operators to model Operations program in Planning process
- First Workshops Held
 - January 25 at Dallas-Fort Worth MPO
 - April 1 Atlanta, GA
- Next Workshop – May 25 Milwaukee, WI
- *More Workshops to Come in the Southwest..*

Technical Tools to Model Operations in Planning

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Statewide Planning for Operations & Safety

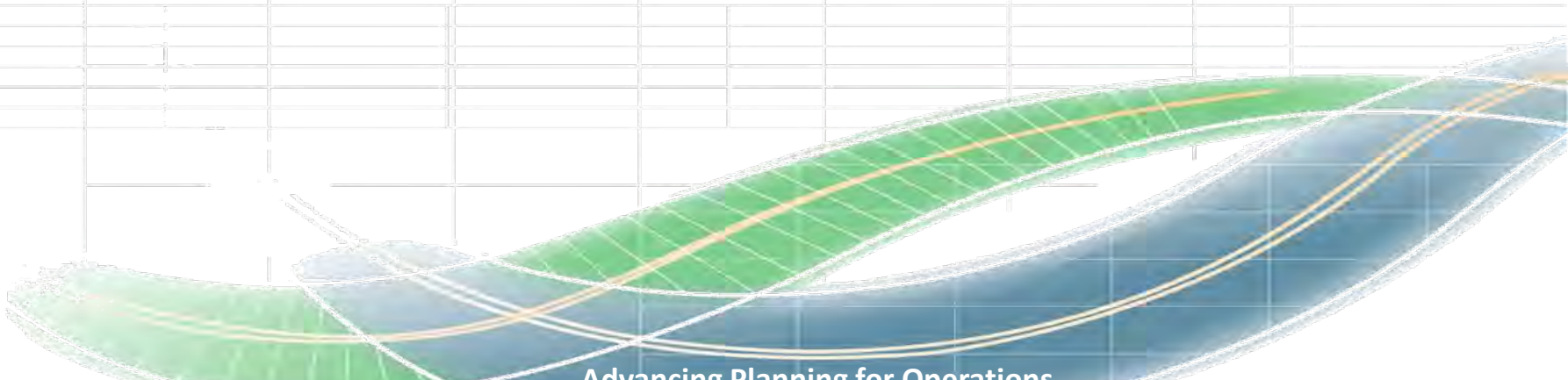
- Project Commenced November, 2008 with Initial Peer Exchange May 2009
- Follow-up Peer Exchange Conducted Mid-November 2009
- Final Reference Guide Published July 2010
- Strong Example of Operations working with Planning & Safety to Advance Joint Product Initiative

Use Momentum From Overall Guidebooks Outreach to Advance Performance-Based Approach with the States

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What is Coming Next?

- “Hands On” Technical Assistance Workshops Across the Country Fall 2010
- Two Day Duration Events – Exercise Driven
- Focus of Fall Workshops: Go Beyond the Approach & Help MPO’s and States Strategically Advance Operations



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For More Information

- Contact:

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- *John Sprowls, FTA-Office of Planning*

- John.Sprohls@dot.gov, 202-366-5362





Questions & Discussion

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