NTOC Planning for Operations Webinar: Leveraging a Regional ITS Architecture in Planning for Operations

Ben Williams, FHWA Resource Center
Nathaniel Price, FHWA Oregon Division and Resource Center
Jim Hunt, FHWA Office of Operations

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U.S. Department of Transportation
Federal Highway Administration

Planning for Operations

Capacity Building Projects

Demand Management

Transit Improvements

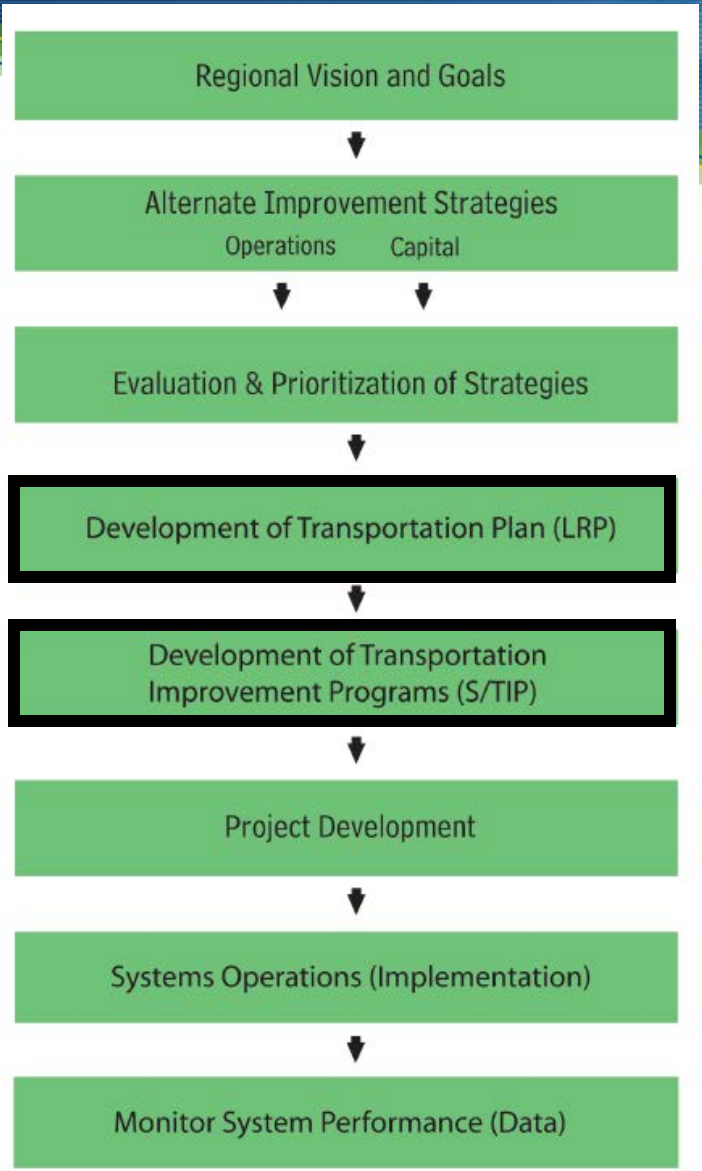
ITS Projects

Work Zone Coordination

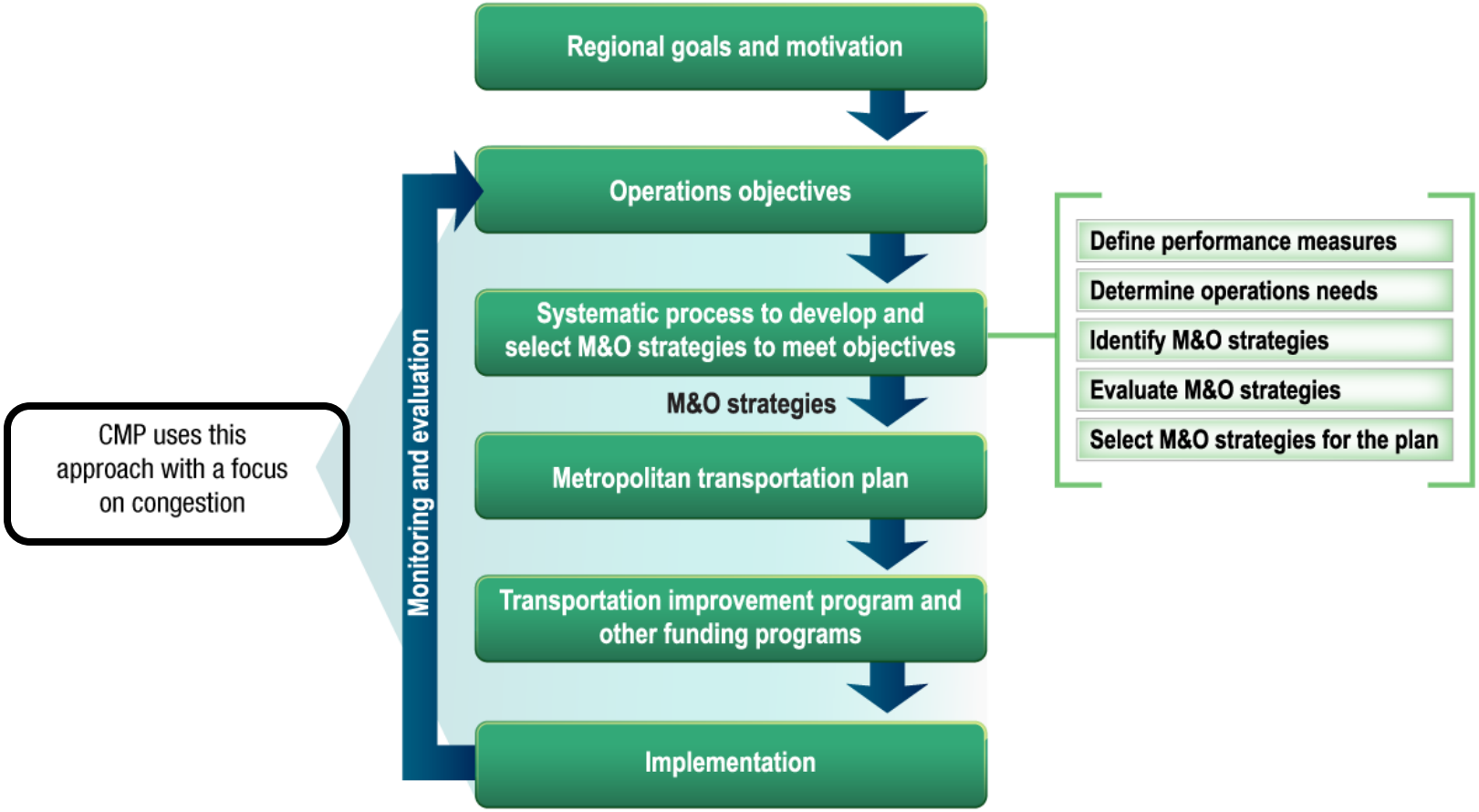
Other Operational Improvements

Traveler Information

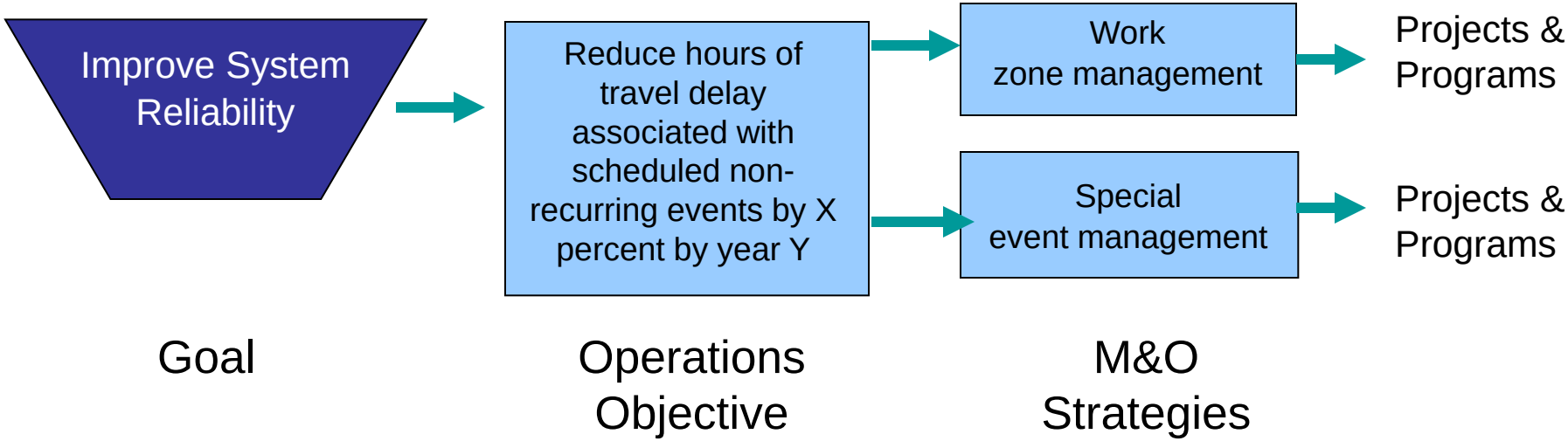
Transportation Planning Process



An Objectives-Driven, Performance-Based Approach to Planning for Operations



M&O Strategies Directly Support Planning Goals



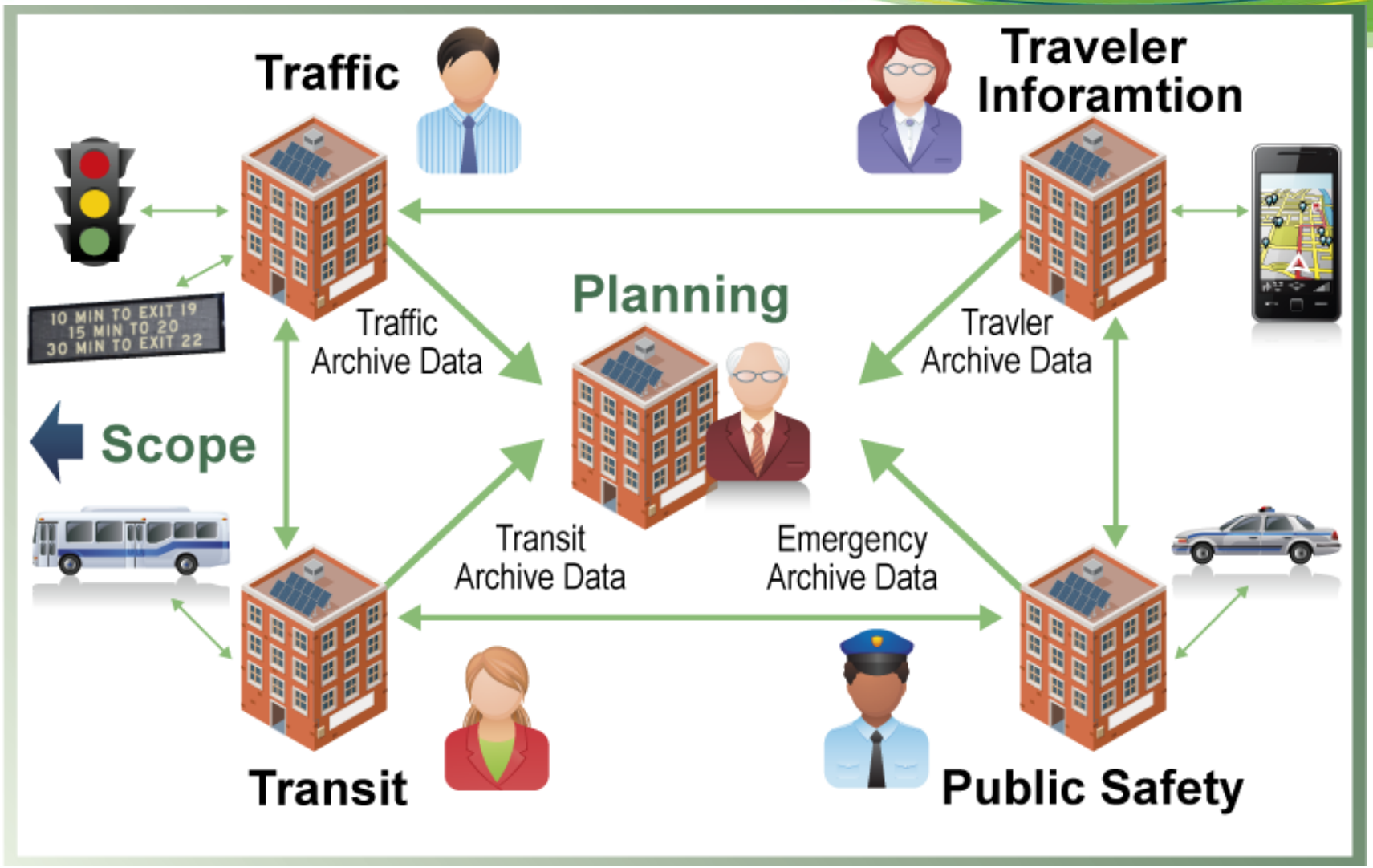
Value of Connecting the Regional ITS Architecture to Planning for Operations

- Regional ITS architecture offers a coordinated view of the institutional and technical aspects of ITS across agencies in region that is essential for planning for operations
- Integrating management and operations (M&O) into regional/Statewide planning requires significant inter-agency collaboration and regional view of system
- M&O is often underpinned by ITS
- Regional ITS architecture even more relevant with increased focus on data and performance measures in planning

Regional ITS Architecture

A framework for ensuring institutional agreement and technical integration for the implementation of ITS projects in a particular region

ITS Architectures are a Framework for Integration



Regional ITS Architecture Components

ITS Architecture

1. Region Description
2. Stakeholder Identification
3. ITS Elements
4. ITS Services
5. Operational Concept
6. Functional Requirements
7. Interfaces / Information Flows
8. Standards Identification
9. Project Sequencing
10. Agreements
11. Maintenance Plan

Architecture Scope and Stakeholders

ITS Architecture

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Scope of Architecture

- Geographic area
- Time horizon
- Breadth of ITS services

Stakeholders

- Anyone who owns, operates, maintains or uses ITS infrastructure

Inventory of ITS Elements

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A list of ITS elements and the elements that interface with them

And an element is:

"An ITS system or piece of a system"

An architecture is built around an inventory of existing and future ITS systems

- *Know what you have today*
- *Plan for future systems*

ITS Services

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The ITS capabilities you use to meet operational goals and objectives

Example Services:

- Broadcast Traveler Information
- Surface Street Control
- Transit Vehicle Tracking

Service Packages and the Regional Architecture

- Service Packages provide a menu of ITS services
  - Select Service Packages of interest
  - Map to your inventory and tailor

Transit Vehicle Tracking	✓
Transit Fixed-Route Operations	✓
Demand Response Transit Operations	✓
Transit Fare Collection Management	
Transit Security	✓

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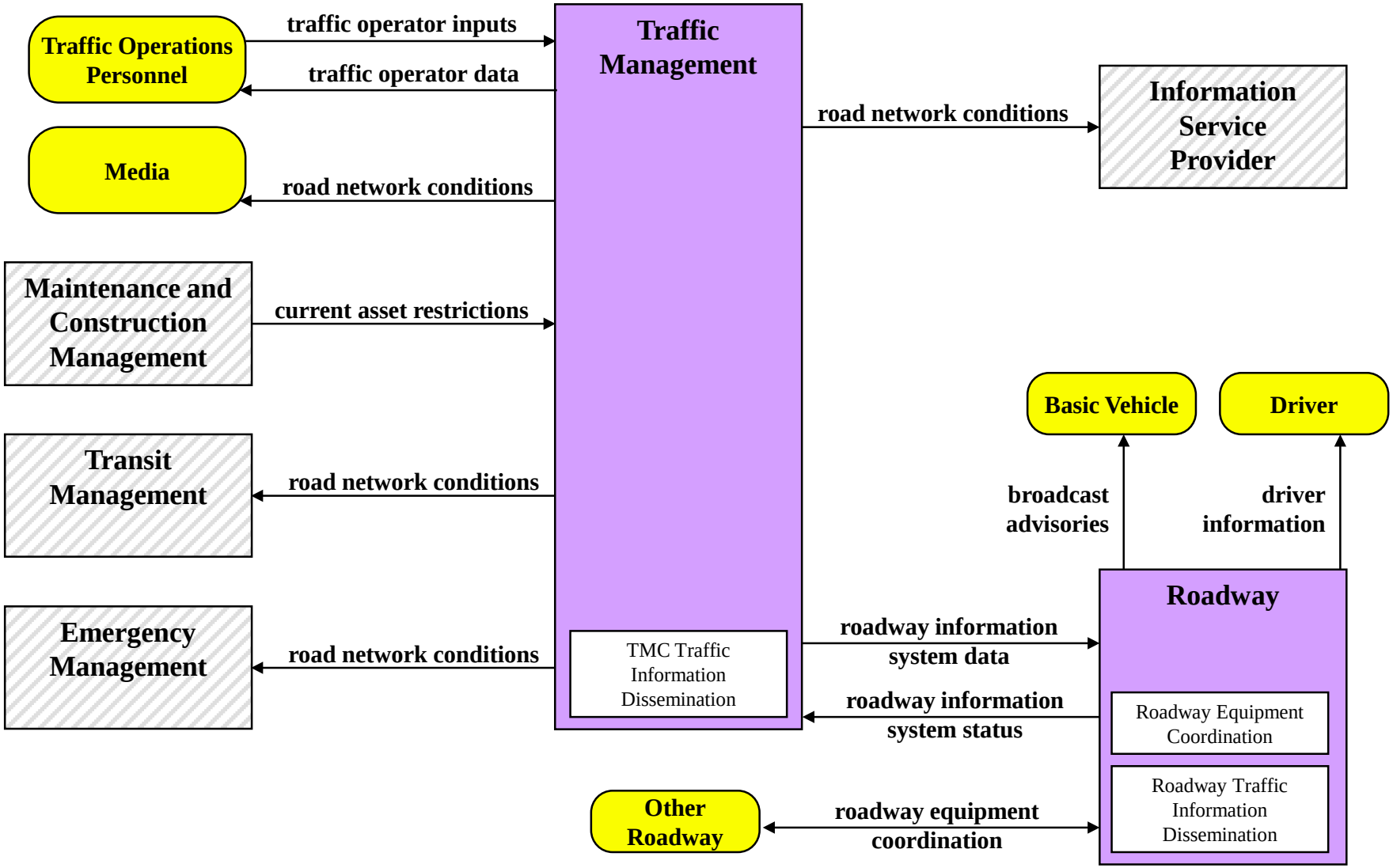
Traffic Information Dissemination (ATMS06)



Operational Concept

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Identifies the roles and responsibilities of stakeholders in the operation, implementation and maintenance of the ITS systems

Traffic Operations Center	• Detects & verifies incidents via CCTV video images • Receives automated incident alerts from Fire CAD

Functional Requirements

ITS Architecture

1. Region Description
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3. ITS Elements
4. ITS Services
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6. **Functional Requirements**
7. Interfaces / Information Flows
8. Standards Identification
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- High-level descriptions of what ITS elements will do in the region
  - NOT detailed design requirements
- Typically written as "shall" statements

The center shall remotely control environmental sensors that measure road surface temperature, moisture, icing and salinity.

Interfaces

ITS Architecture

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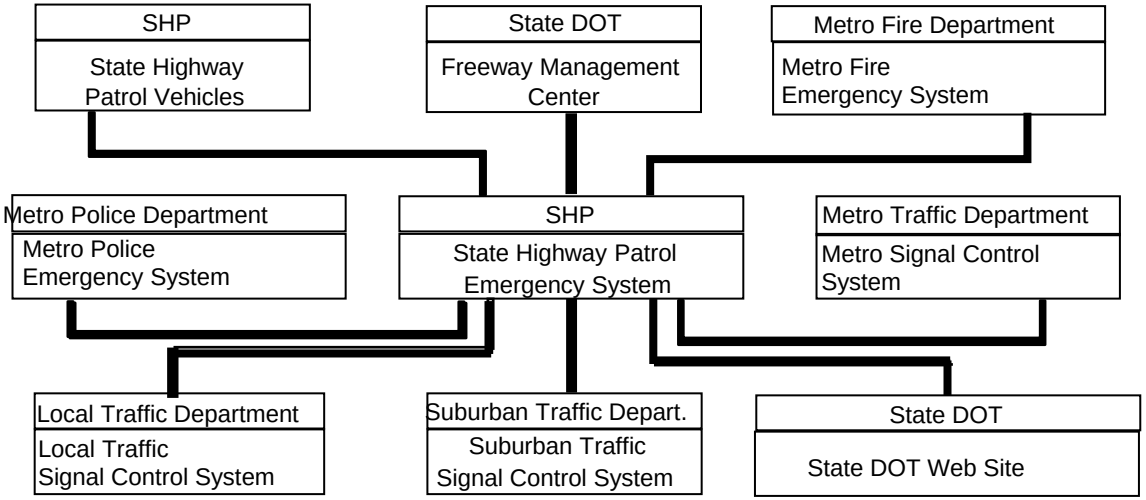
- Identify Interconnects

  Which systems will share info?

- Define Information Flows

  What information will they share?



Project Sequencing

ITS Architecture

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- Order in which ITS projects should be implemented
- Impacted by:
  - Technical issues
  - Institutional issues

Camera with Visual Tracking System (VTS) Installation	EM05-2: Transportation Infrastructure Security	Short-term	$1.2M
Automated Parking System	ATMS16-1: Parking Facility Management	Mid-term	$15.0M

Agreements

ITS Architecture

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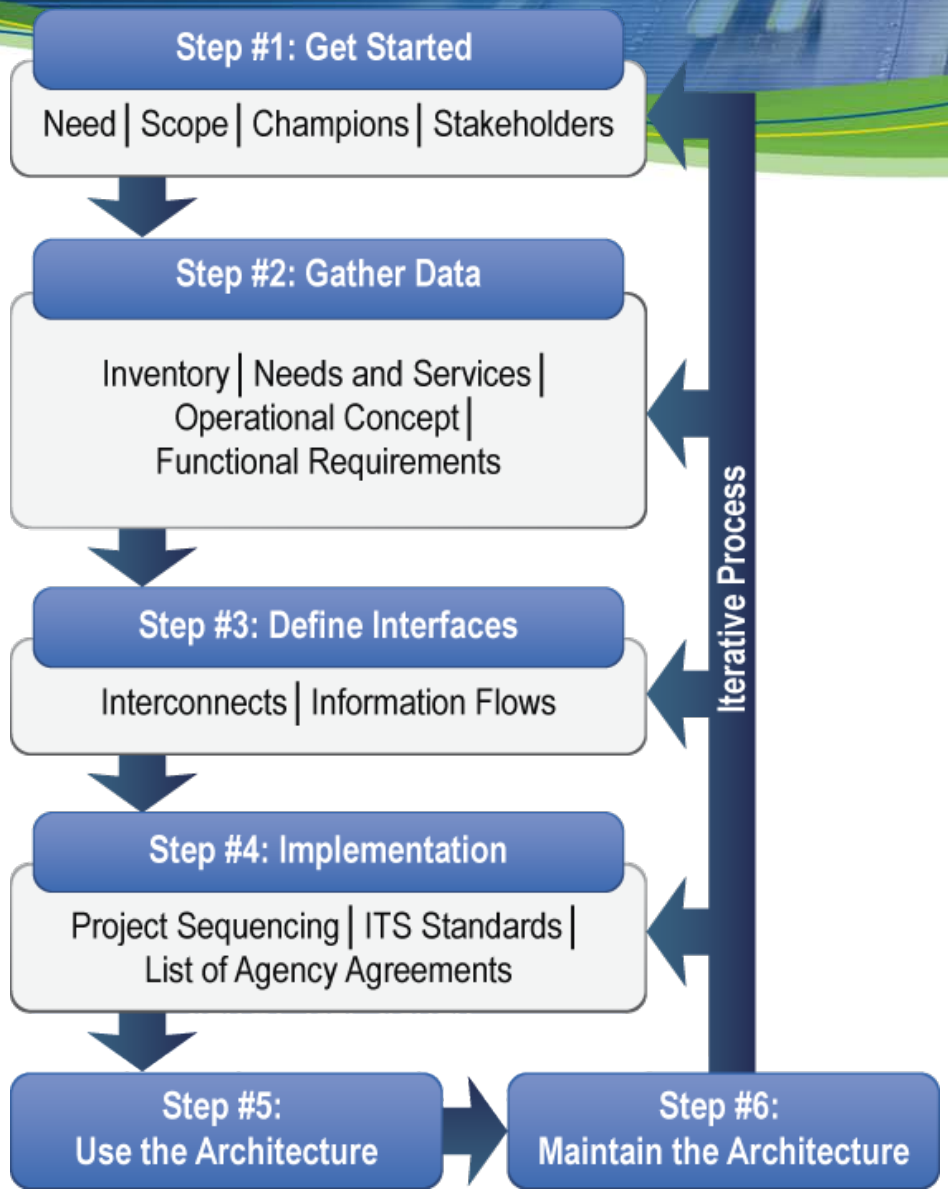
10. **Agreements**
11. Maintenance Plan

- Document institutional integration in region
- May be required for interjurisdictional interfaces
- Define:
  - Integration plans
  - Maintenance & operations plans
  - Funding responsibilities

Architecture Development is a Planning Process

NEED

PROJECTS



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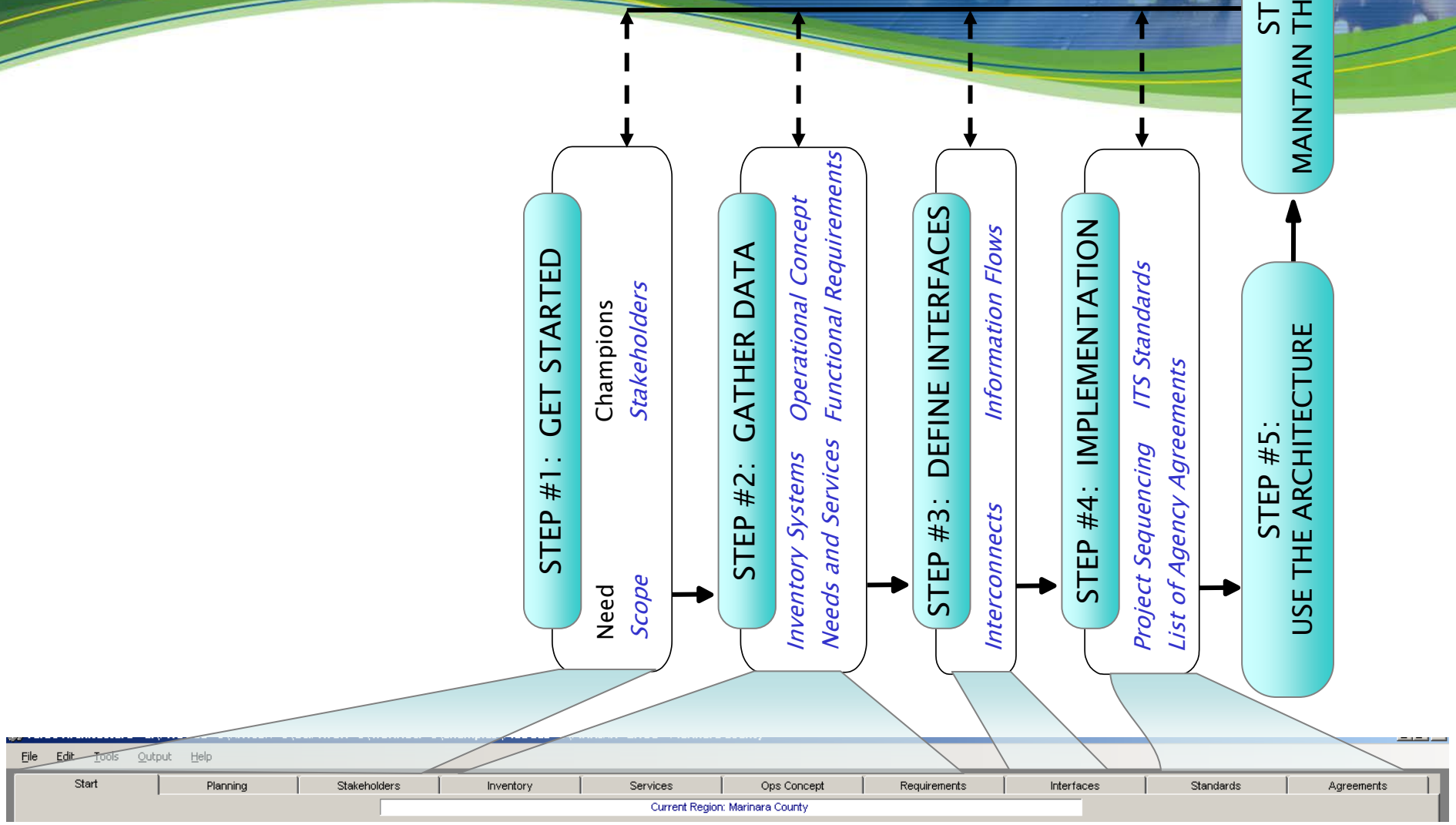
Turbo Interface Reflects Maintenance Process



Architecture Link to Planning Process Example

Transportation Planning

Goal: Provide an Efficient, Reliable Transportation System.

Objective:

- Reduce the mean duration of incidents (response & clearance time) by 20 percent in 5 years.

Strategy:

- Provide traveler information on incidents

Performance Measure:

- Mean duration of incidents

ITS Architecture

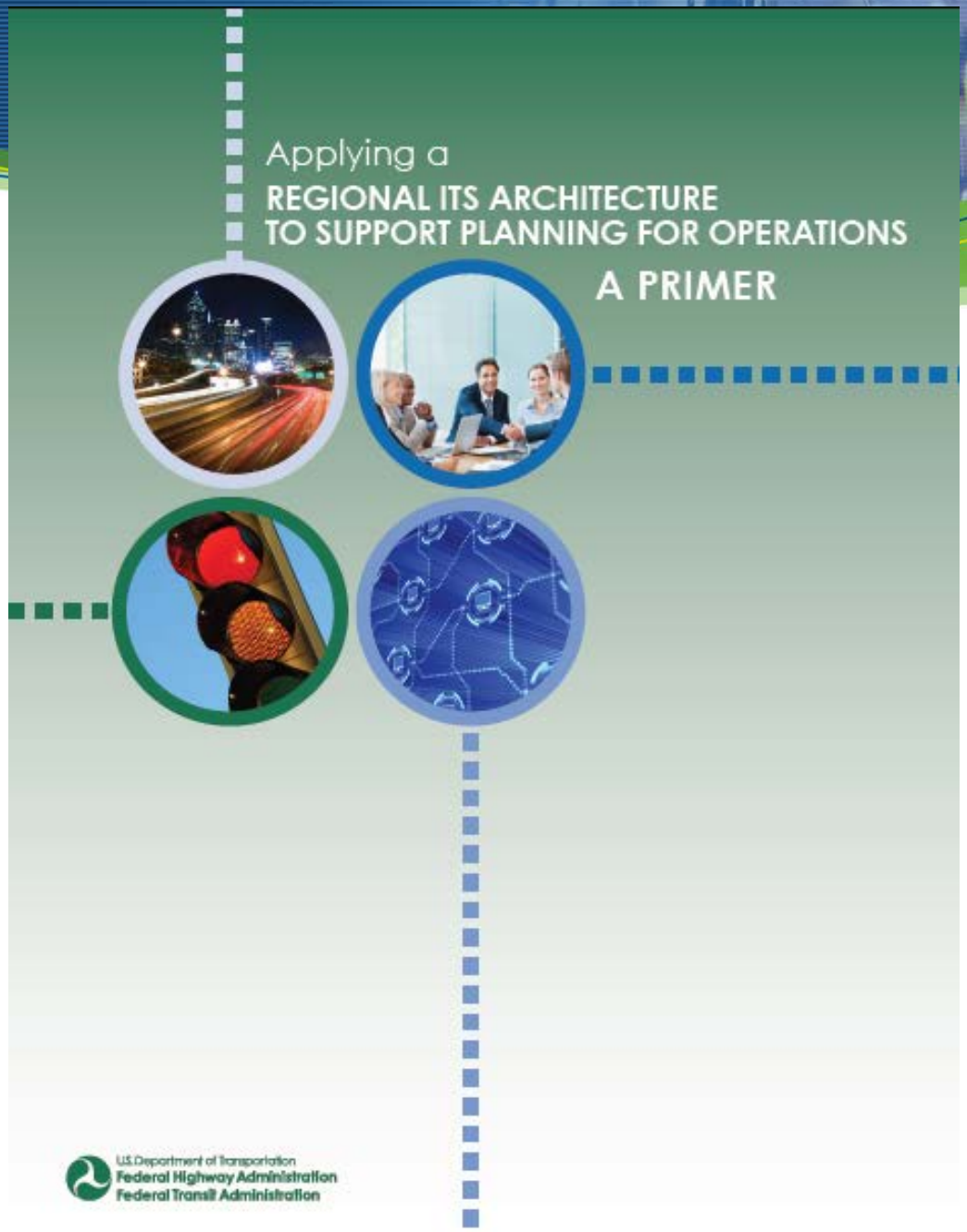
ITS Services:

- Broadcast Traveler Information (ATIS01)
- Interactive Traveler Information (ATIS02)
- Traffic Information Dissemination (ATMS06)

Projects:

- State 511 System Expansion
- Agency Traveler Information Website Upgrade
- Portable DMS Acquisition

Opportunities to Leverage the Architecture in Planning for Operations



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Overview

- Advancing Planning for Operations
- Opportunities for Architecture Use
- Creating a Planning Supportive Architecture

Overview

- Advancing Planning for Operations (P4O)
- Opportunities for Architecture Use
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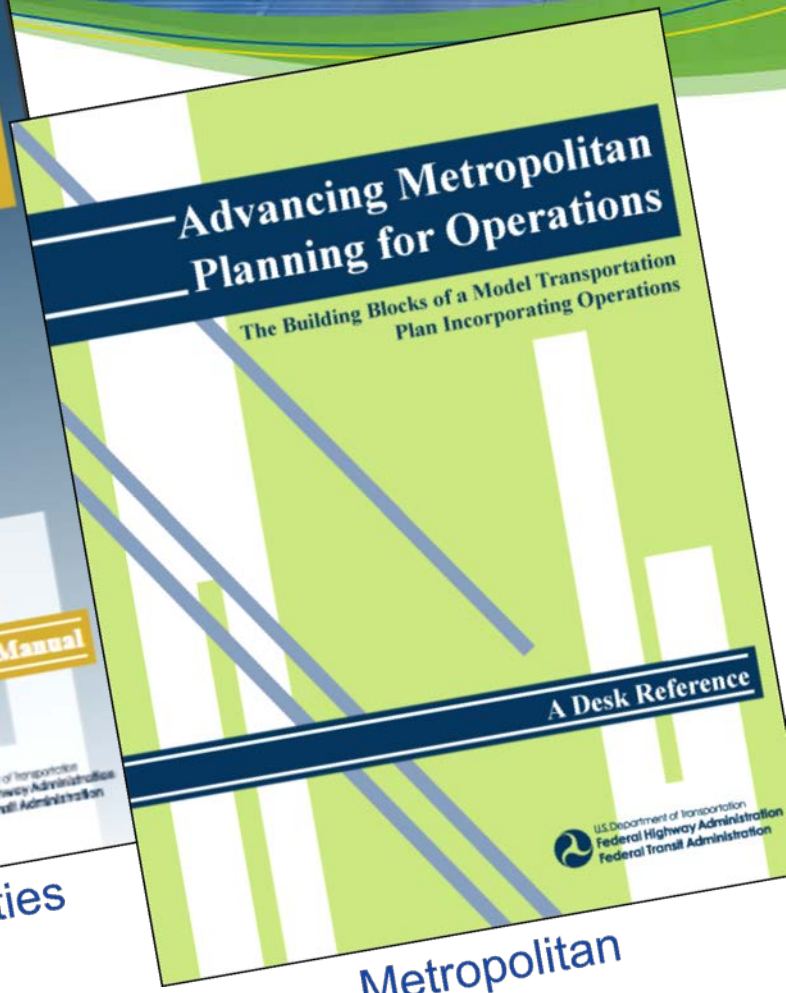
Planning for Operations Guidebooks

Presents The Approach

Statewide Opportunities



Metropolitan

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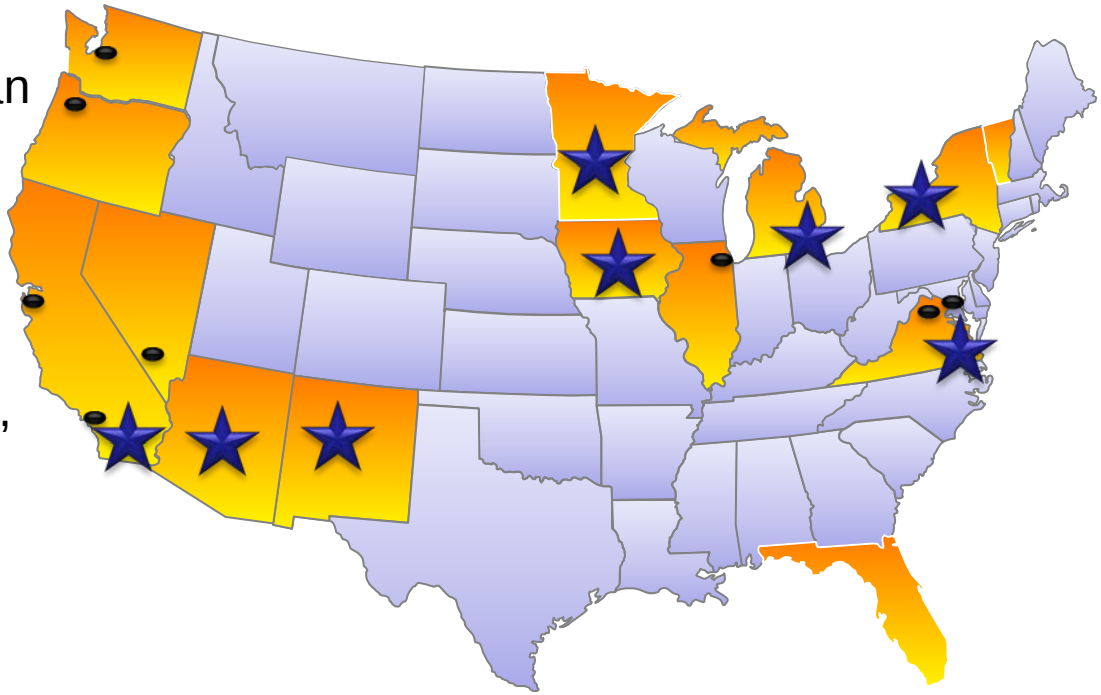
Overview

- Advancing P4O
- Opportunities for Architecture Use
- Creating a Planning Supportive Architecture

Regions Interviewed

1. Phoenix Metropolitan Region, Arizona
2. Ames Area Metropolitan Region, Iowa
3. Hampton Roads Metropolitan Region, Virginia
4. Southeast Michigan Metropolitan Region
5. Albuquerque Metropolitan Region, New Mexico
6. State of Minnesota
7. San Diego Metropolitan Region, California
8. Genesee-Finger Lakes Region, New York



Key Questions in Planning for Operations Addressed by Architecture

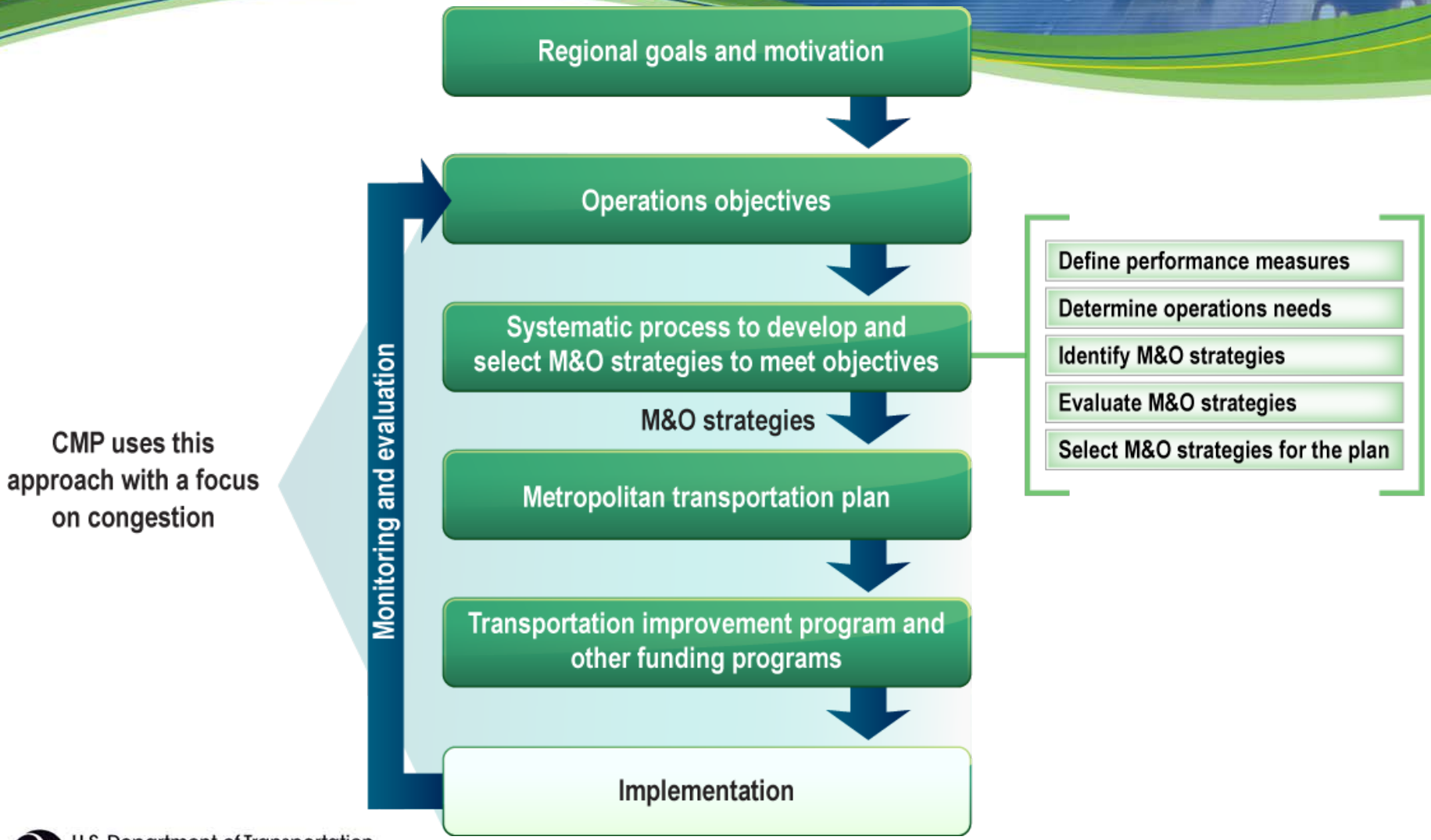
- ☑ What M&O strategies supported by ITS will help achieve our operations objectives?
- ☑ What data is available in the region to monitor transportation system performance and track progress toward operations objectives?
- ☑ Where are there gaps in providing transportation system management across our region?

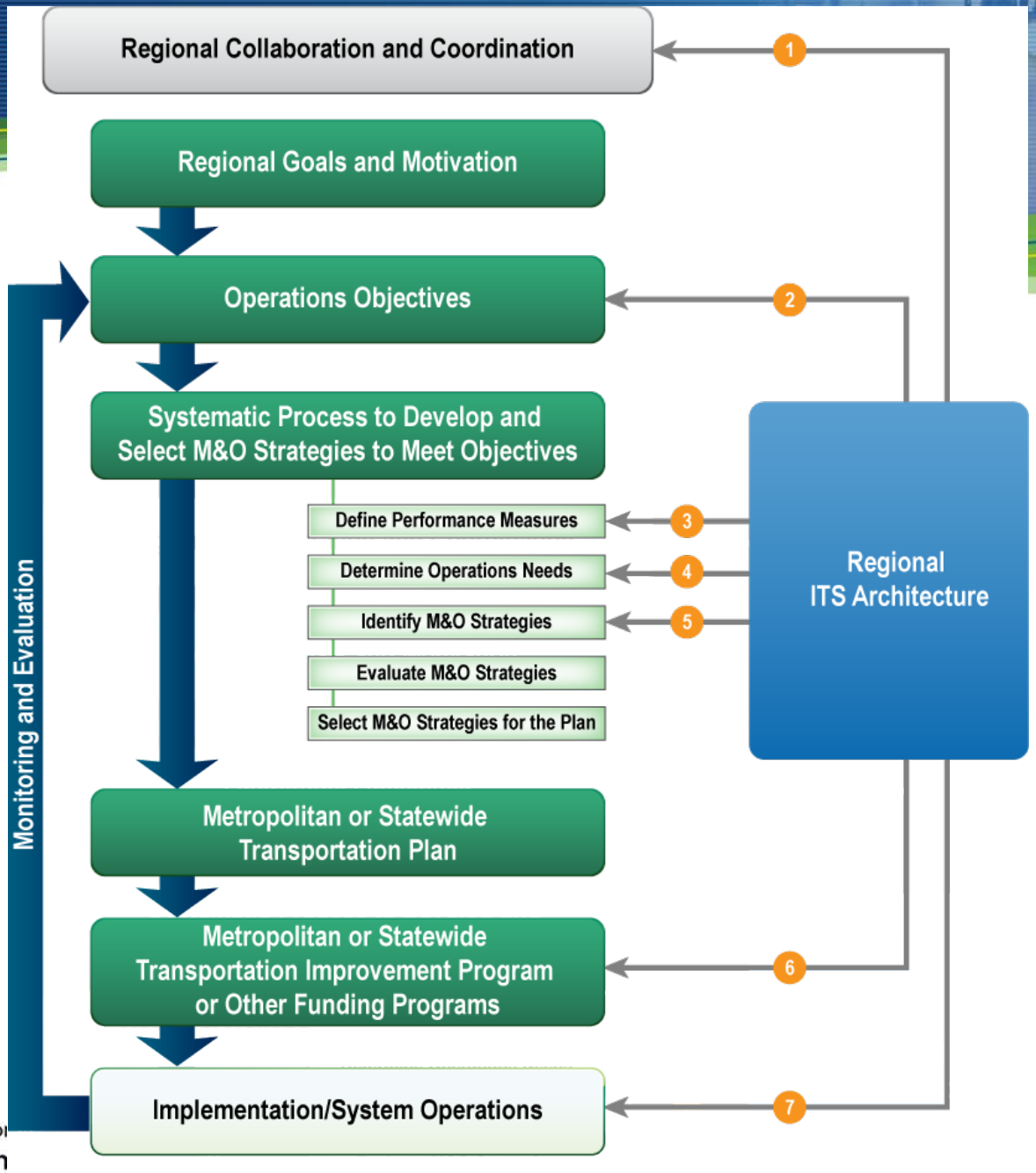
Key Questions in Planning for Operations Addressed by Architecture (Cont'd)

- ☑ How can we most effectively integrate a new M&O strategy with other existing or planned technology deployments?

- ☑ How can we define M&O projects or program in terms of functional requirements, operations concepts, supporting ITS standards, etc.?

Opportunities for Architecture Use in Planning for Operations





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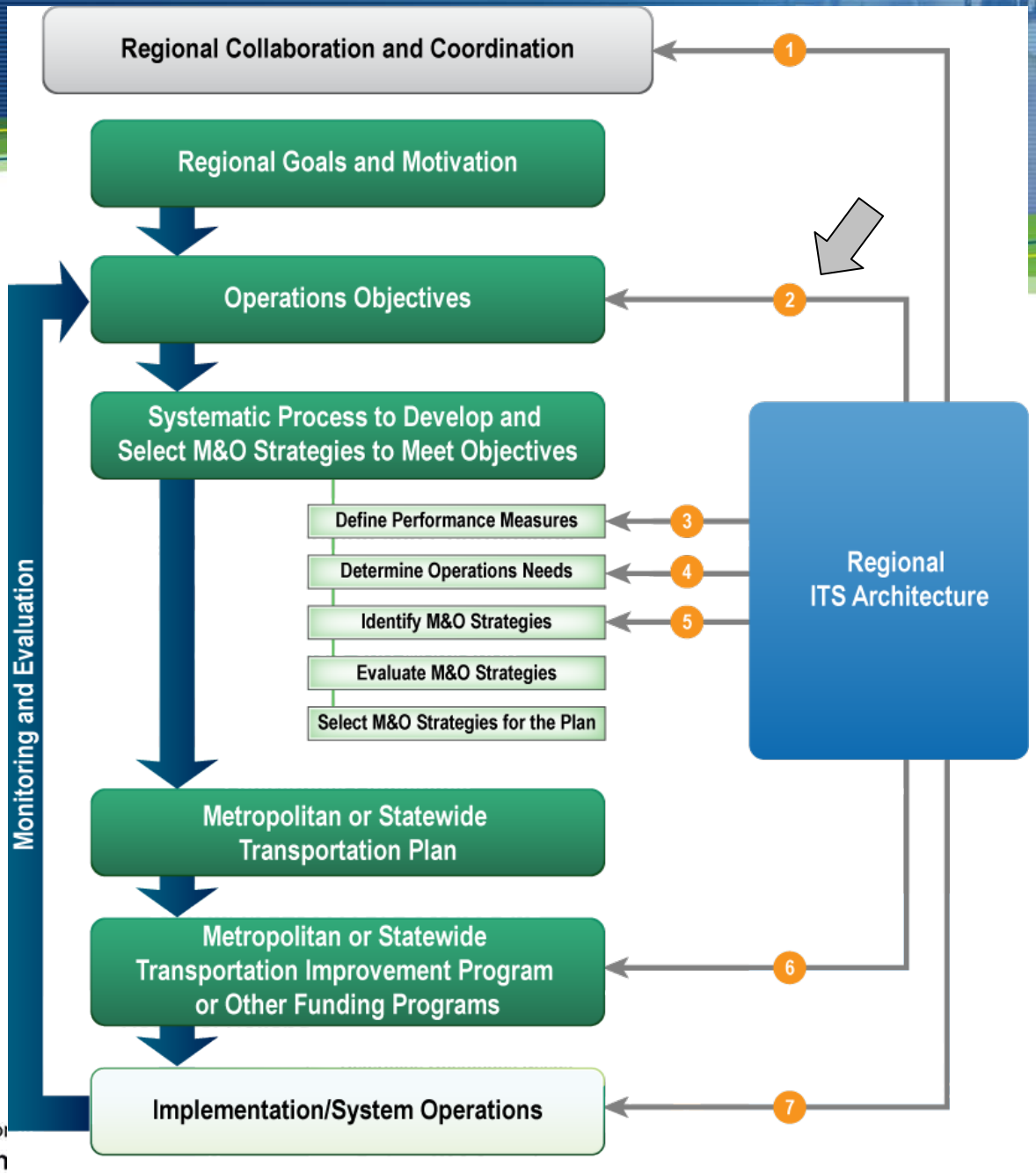
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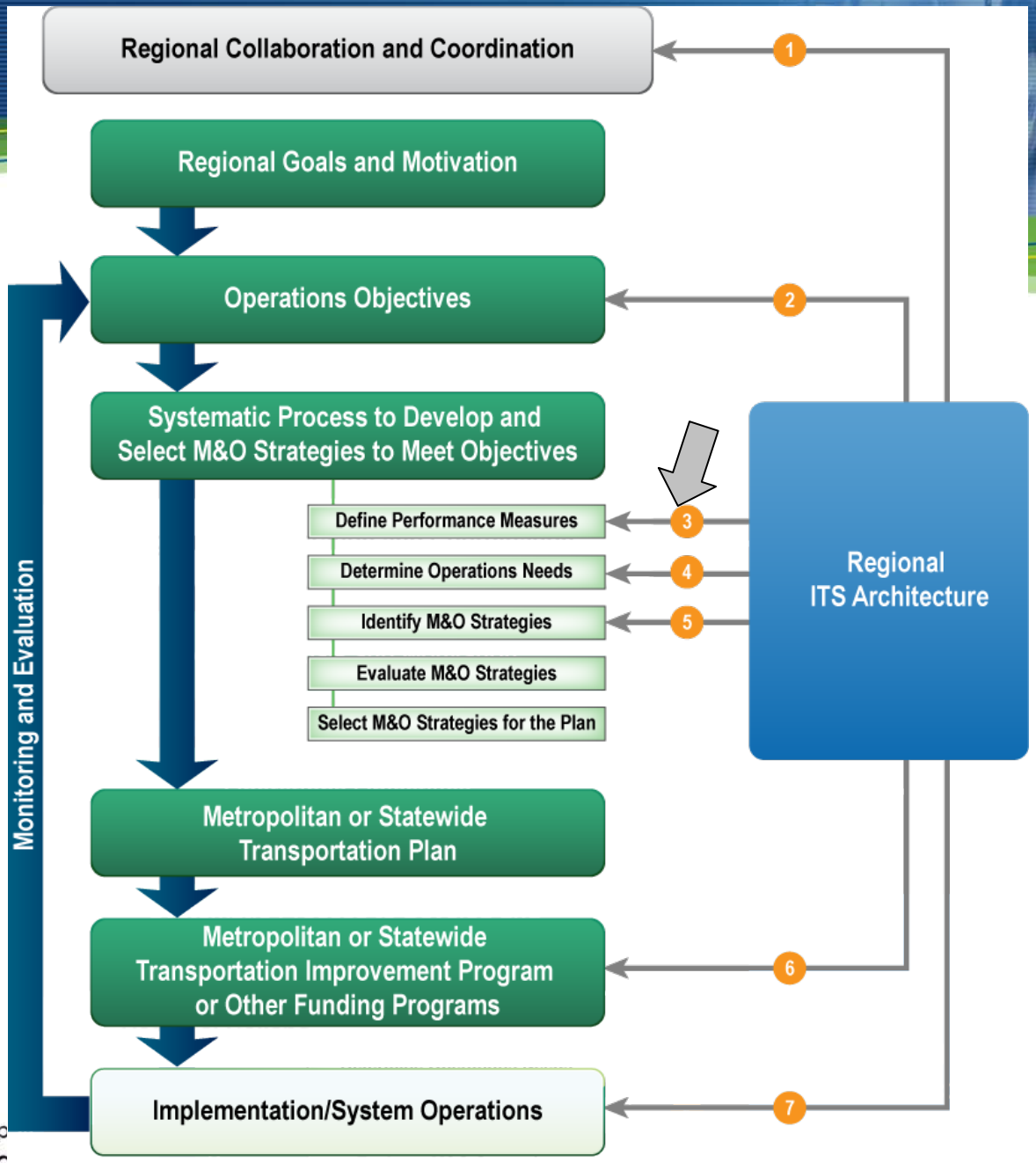
Regional Goals and Motivation
Operations Objectives
2
Systematic Process to Develop and Select M&O Strategies to Meet Objectives
Define Performance Measures
3
Determine Operations Needs
4
Identify M&O Strategies
5
Evaluate M&O Strategies
Select M&O Strategies for the Plan
Regional ITS Architecture
Monitoring and Evaluation
Metropolitan or Statewide Transportation Plan
Metropolitan or Statewide Transportation Improvement Program or Other Funding Programs
6
Implementation/System Operations
7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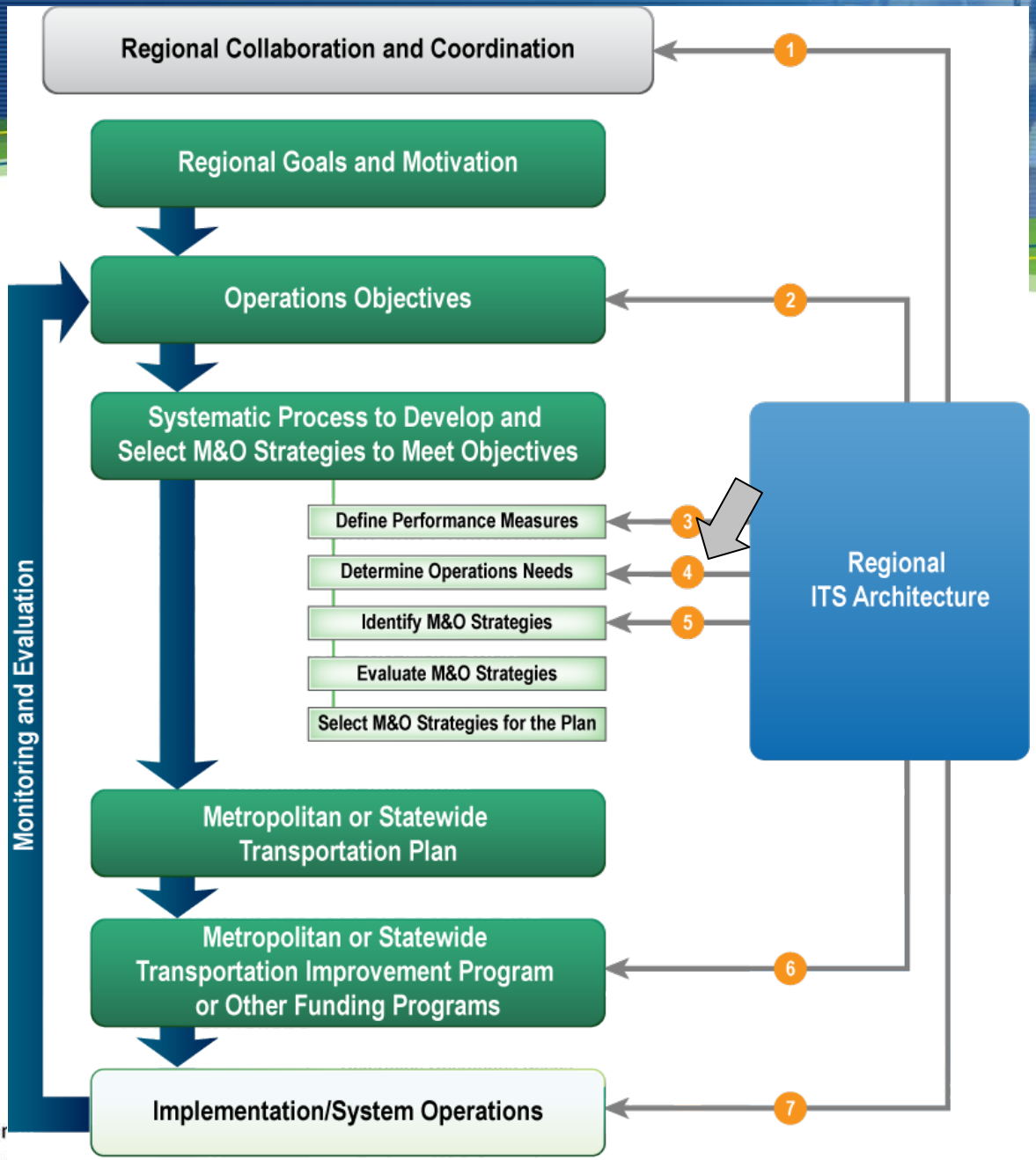
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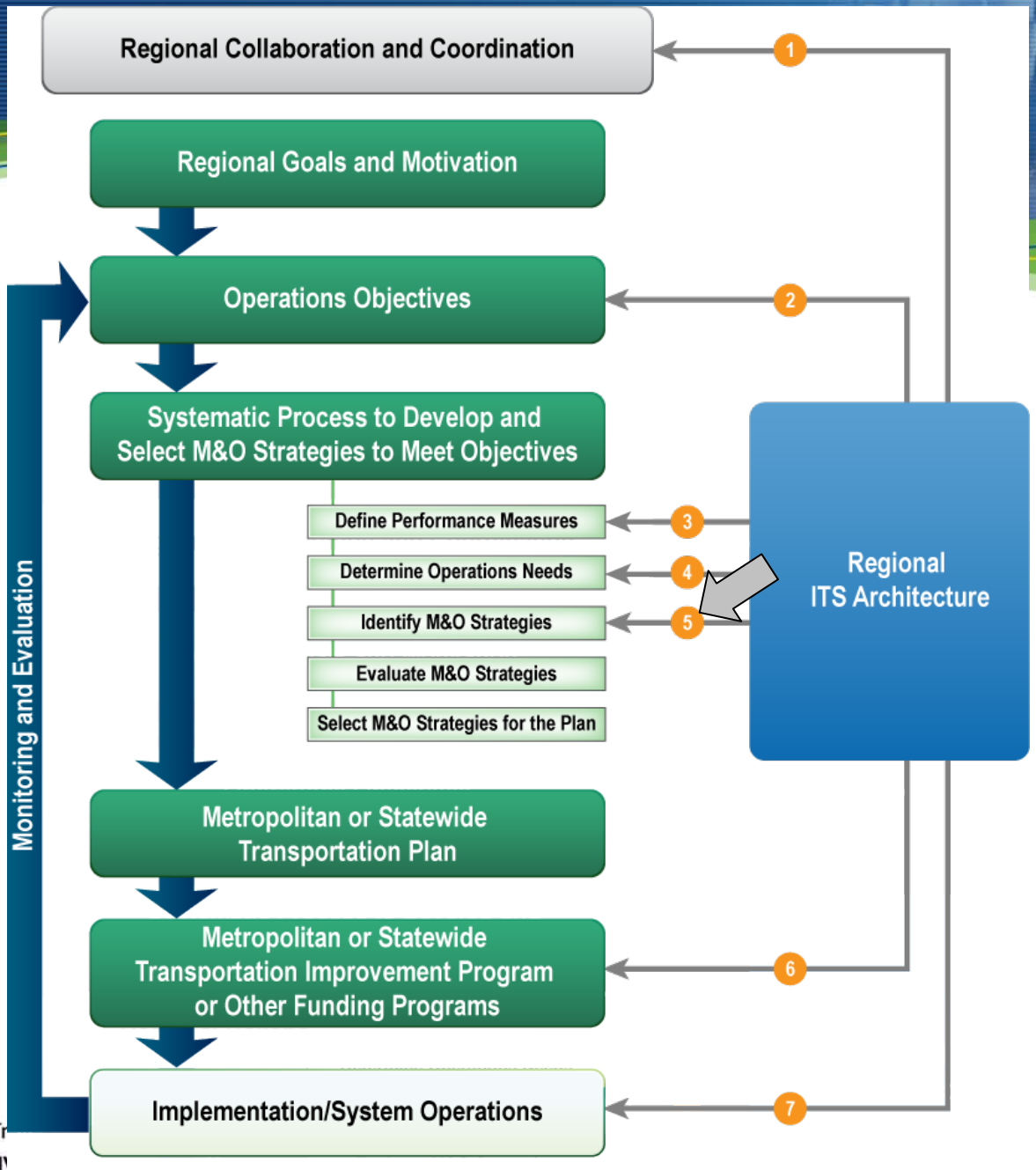
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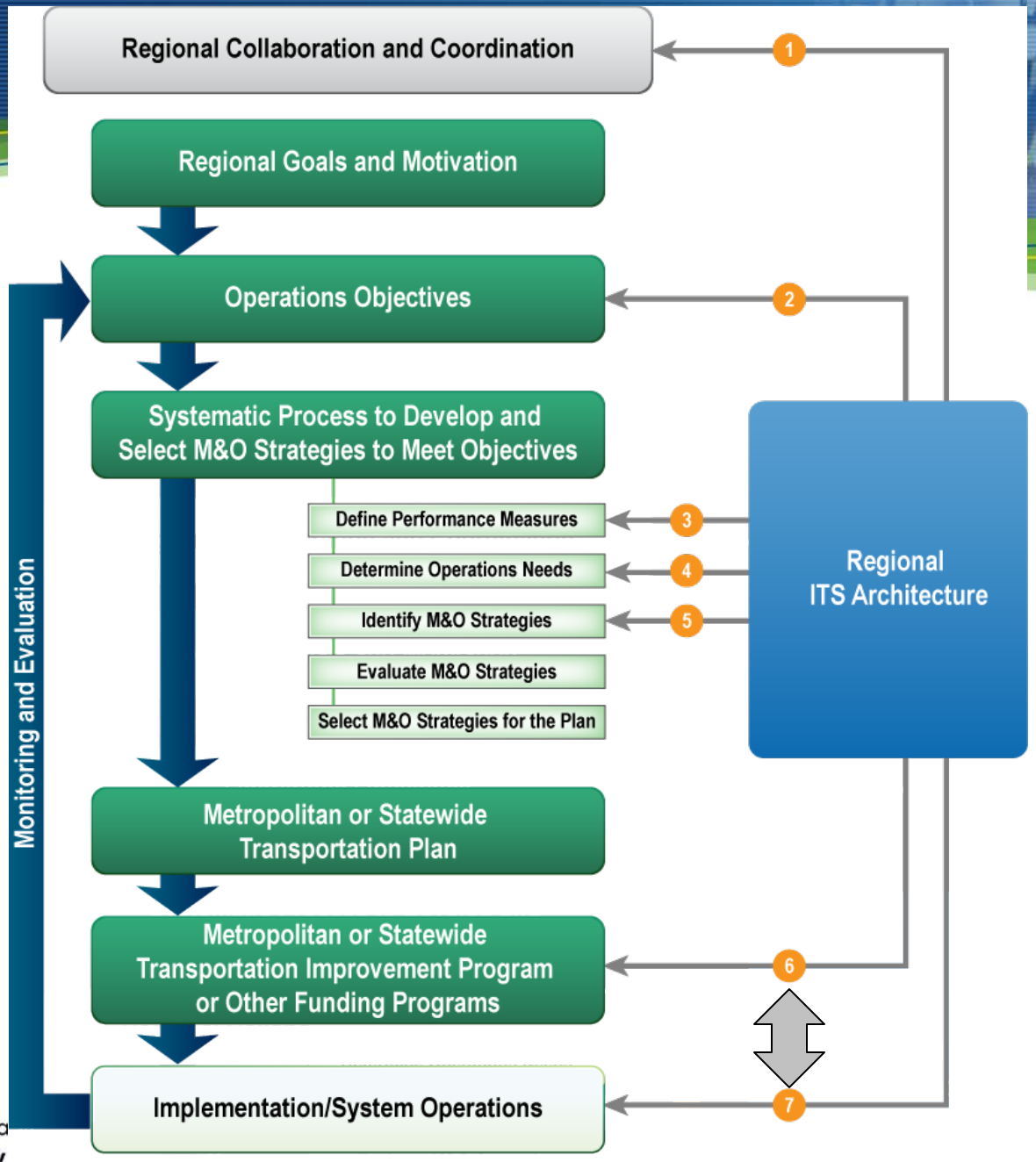
Link Objectives, Strategies, Service Packages

Objective	Strategies	Service Packages
Improve average vehicular travel time by at least 1.5 minutes during peak hour periods on major traffic corridors by 2035	Continue signal upgrades, periodic re-timing, and coordination of all new and existing signalized intersections	ATMS03: Traffic Signal Control
	Utilize car sharing programs and park and ride facilities to remove vehicle trips from the roadway network	ATIS08: Dynamic Ridesharing ATMS16: Parking Facility Management
	Continue adding connected pedestrian, bicycle and transit facilities to the existing transportation network making these travel modes more efficient	APTS02: Transit Fixed Route Operations APTS03: Demand Response Transit Operations APTS07: Multi-modal coordination

Objectives and strategies from Choices 2035 Champaign Urbana Urbanized Area Transportation Study Long Range Transportation Plan



6

7

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NOVA Project Proposal Template

1 PROJECT OVERVIEW

PROVIDE PROJECT OVERVIEW TEXT HERE INCLUDING PROJECT PURPOSE, LIMITS AND EXPECTED OUTCOMES

2 GOALS AND OBJECTIVES

PROVIDE SUMMARY TEXT OF STRATEGIC PLAN GOALS AND OBJECTIVES MET BY THIS PROJECT

VDOT's vision for the region and also for the Project Corridor is to:

Make Roadway Travel Safe, Efficient, and Reliable.

To meet this vision, VDOT NRO plans to achieve through this project by: (example below)

- Serving the public by providing them with the information they need to make good travel decisions;
- Monitoring real-time traffic conditions and the condition of its infrastructure;
- Proactively and rapidly identifying problems, including traffic congestion, crashes, and other mobility and safety needs;
- Taking rapid and effective action to address current and developing problems, appropriately applying a range of methods including physical improvements and advanced technologies;
- Sharing information, coordinating responses, and planning jointly with its partner agencies.

Goals and objectives met by this project include:

FOR EASE OF USE, PLACE AN "X" IN THE CELLS TO THE LEFT OF THE GOALS AND OBJECTIVES THAT WILL BE ADDRESSES BY THIS PROJECT

	GOALS AND OBJECTIVES [Mark the goals and objectives that apply to this project with an "X"]	EXPECTED BENEFITS
	Goal #1: Reduce Congestion	• Reduction in travel times • Reduction in delay (vehicle hours) • Reduction in incident duration • Improved travel time reliability
	1.1 Reduce travel times and delays for all modes along identified major corridors	
	1.2 Improve travel time reliability on major corridors	
	1.3 Actively manage travel demand on NRO facilities	
	1.4 Reduce delays due to work zones and planned special events	
	1.5 Reduce incident clearance times	
	Goal #2: Improve Safety	• Reduction in incidents
	2.1 Reduce vehicular crashes	
	2.2 Reduce pedestrian and bicyclist crashes	

6 PROJECT ARCHITECTURE

PROVIDE INFORMATION RELATED TO THE COMPONENTS OF THE NORTHERN VIRGNIA ITS ARCHITECTURE THAT ARE ASSOCIATED WITH THIS PROJECT. The Project Architecture provides a framework that identifies the institutional agreement and technical integration necessary to interface the ITS project with other ITS projects and systems. It addresses the application of the proposed system with a focus on integration and operation of the system(s). The NRO Regional ITS Architecture (www.vdot-itsarch.com/Default.htm) should be used as the basis for generating the project architecture. The section should summarize key stakeholders (e.g. VDT NRO, Private Sector ISPs, MATOC

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Overview

- Advancing P4O
- Opportunities for Architecture Use
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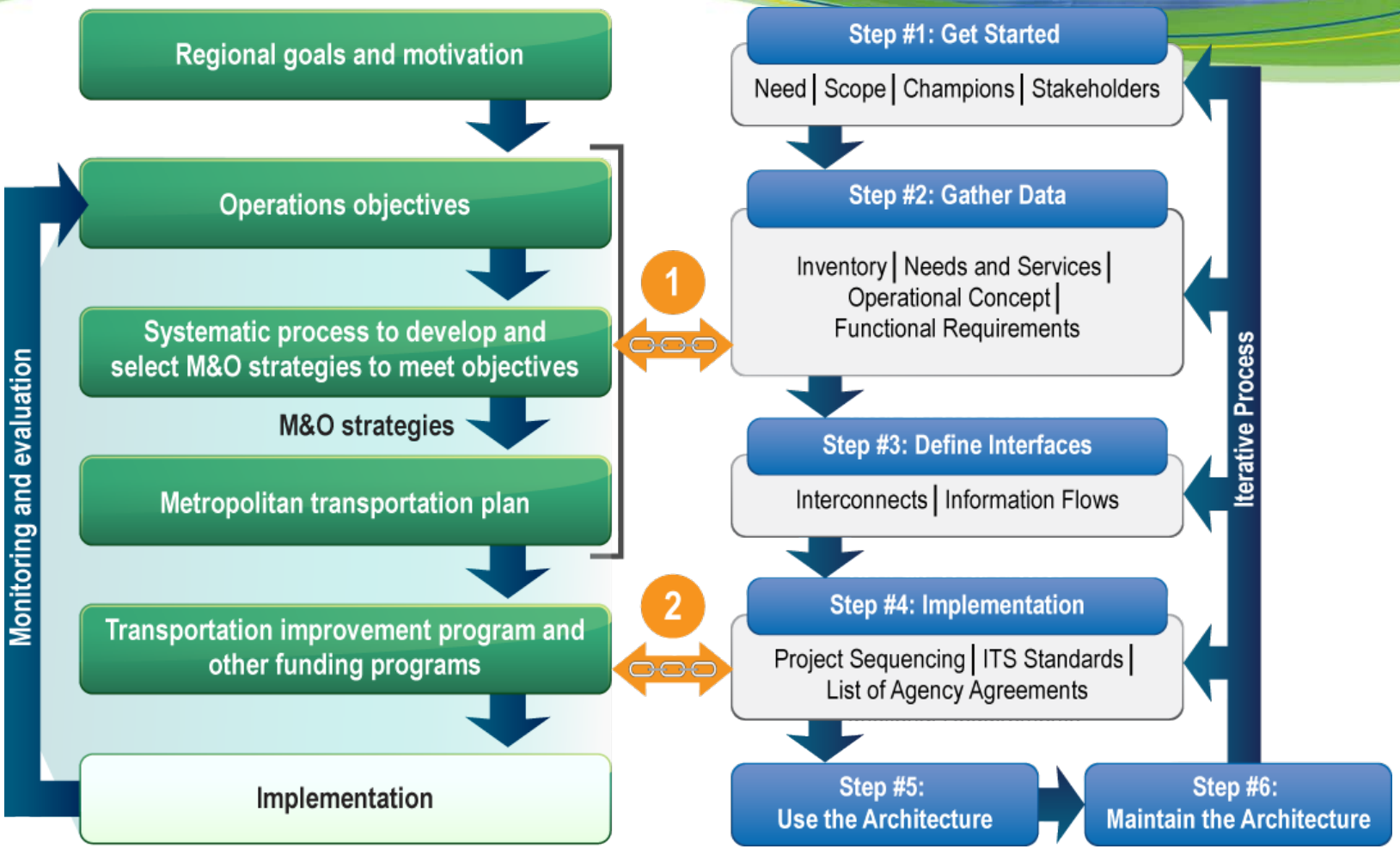
Keeping it Planner-Friendly

Challenge	Technique
The regional ITS architecture is a specialized topic area with its own terminology and concepts.	User Aids • Provide links to resources like the Regional ITS Architecture Guidance Document and other resources. • Include a glossary of terms. • Provide contact information for those with questions. • Include training with your next regional ITS architecture update.

Keeping it Planner-Friendly

Challenge	Technique
The sheer amount of information in the architecture can be daunting – hundreds or even thousands of functional requirements and interfaces. Users can get lost and never find the information they were seeking.	User-Friendly Organization • Provide a roadmap • Segment the regional ITS architecture documentation into "views" for different types of users. • Include navigation queues. • Provide summary level information with the opportunity to "drill down" into the detail.

Synergies are Two Way



- Update Architecture in conjunction with Plan Updates
- Leverage same regional committee for operations and ITS
- Use the operations objectives from transportation plan to guide identification of needs and services in architecture
- Link operations and ITS needs for plan and architecture
- Link M&O strategies for plan and ITS architecture services
- Create project sequence in ITS arch consistent with TIP/STIP

The ITS architecture, along with the ITS Strategic Plan, has assisted in defining projects and the connections between various projects and stakeholders.

Keith Nichols, Hampton Roads Transportation Planning Organization (Virginia)

The architecture gets you one step ahead...The architecture has helped us build out projects here and I believe we have gotten far more than our money's worth out of it.

Peter Thompson San Diego Association of Governments (California)

- U.S. DOT Planning for Operations Website
  - http://www.plan4operations.dot.gov
- National ITS Architecture
  - http://www.iteris.com/itsarch/
- Planning for Operations Workshop
  - Jim.hunt@dot.gov
  - ben.williams@dot.gov
- Regional Architecture Support
  - Nathaniel.Price@dot.gov
  - emiliano.lopez@dot.gov