Regional Transportation System Management and Operations (TSMO) Vision and Regional ITS Architecture Update

Visioning Workshop

December 17, 2018

ICF

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Consulting Group

ARC

Agenda

1. Welcome and Introductions
2. TSMO Overview
   - *What is TSMO?*
   - *Regional Examples of TSMO*
3. Developing a Regional Vision
   - *Breakout Groups*
   - *Report Backs and Discussion*
4. Introduction to ITS Architecture Update
5. Wrap Up and Next Steps

Where we are headed…
Creating a Regional TSMO Vision and Deployment Plan

Stakeholder Engagement

Developing a Common Vision

Establish a **TSMO vision** for the region

Develop operations goals and objectives

Our focus today

Defining the Building Blocks

Develop a baseline inventory of ITS and ATMS infrastructure

Explore best practices in transportation data governance and data exchange

Update the regional ITS Architecture

Conduct technological assessment

Leading to Effective Deployment

Identify pilot concepts

Develop ITS/TSMO Local Agency Deployment Guide

Develop 5-year and 10-year Action Plans

Transportation System Management and Operations (TSMO) Overview

What is Transportation Systems Management and Operations (TSMO)?

Integrated strategies to optimize the performance of existing infrastructure…

Multimodal coordinated systems, services, and projects…

To preserve capacity and improve security, safety, and reliability for users of the transportation network

OFFICIAL DEFINITION OF TSMO
Integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve security, safety, and reliability of the transportation system.
23 U.S. Code § 101(a)(30) MAP-21, SECTION 1103 (a) (30) (A)

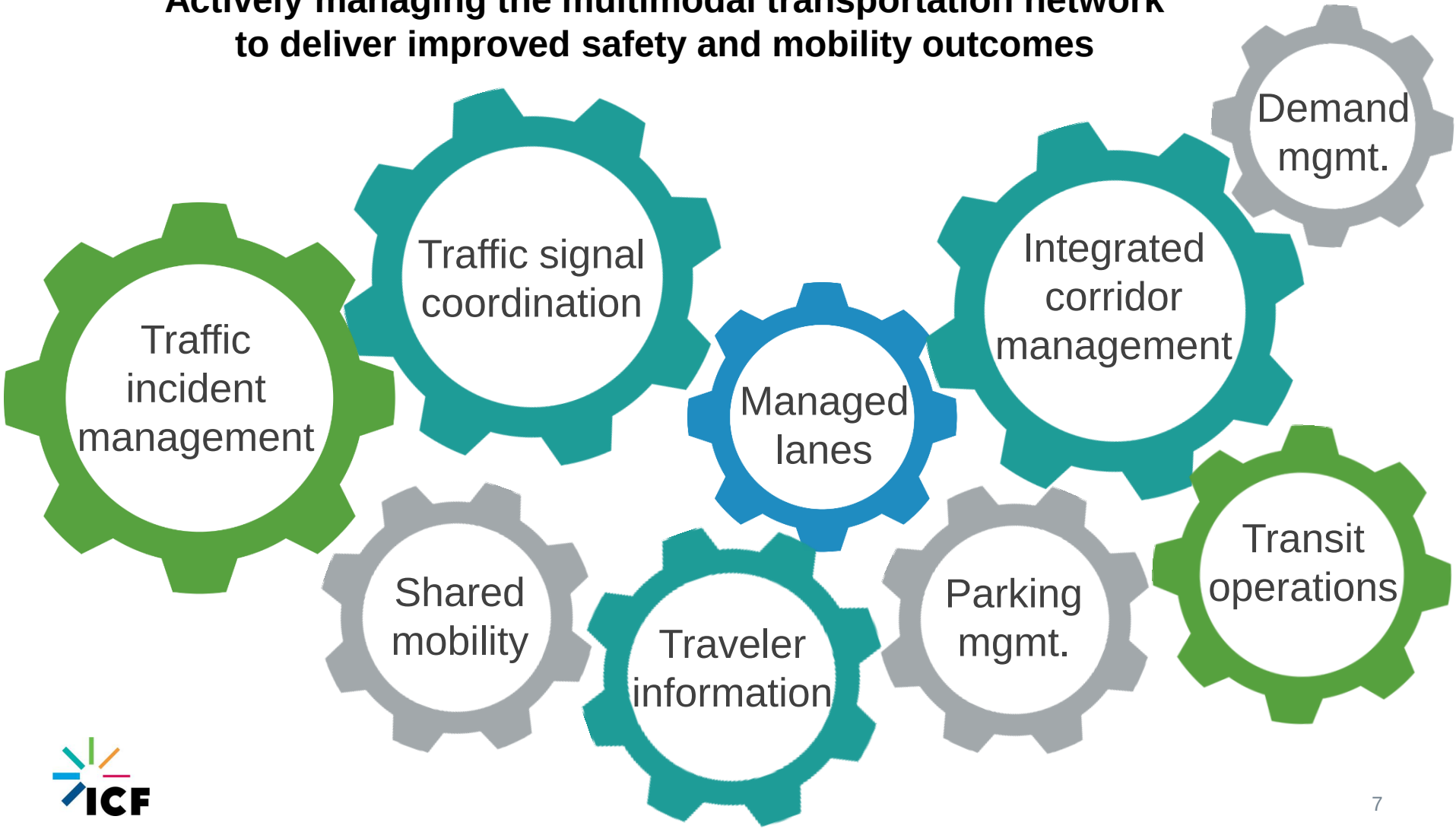
So really, what is TSMO?

TSMO is actively managing the multimodal transportation network to improve safety and mobility outcomes.

- **Optimizing the performance of existing facilities**
- **Maximizing performance of the system**
- **Targeted solutions to congestion causes**
- **Complement to capacity projects (integrated into new infrastructure)**

TSMO Strategies - Samples

Actively managing the multimodal transportation network to deliver improved safety and mobility outcomes



"TSMO Sounds Like What Agencies Already Do…"

- **Yes! Agencies throughout Georgia already support key TSMO programs, such as traffic incident management, traffic signal systems, TMCs, travel demand management, and traffic management for planned special events.**

RTOP
Regional Traffic Operations Program

Georgia Navigator Traffic Message Signs

HERO Incident Management Program


GDOT Transportation Management Centers

GEORGIACOMMUTEOPTIONS

But, TSMO also goes beyond what we currently do…
and we need to prepare for the future.

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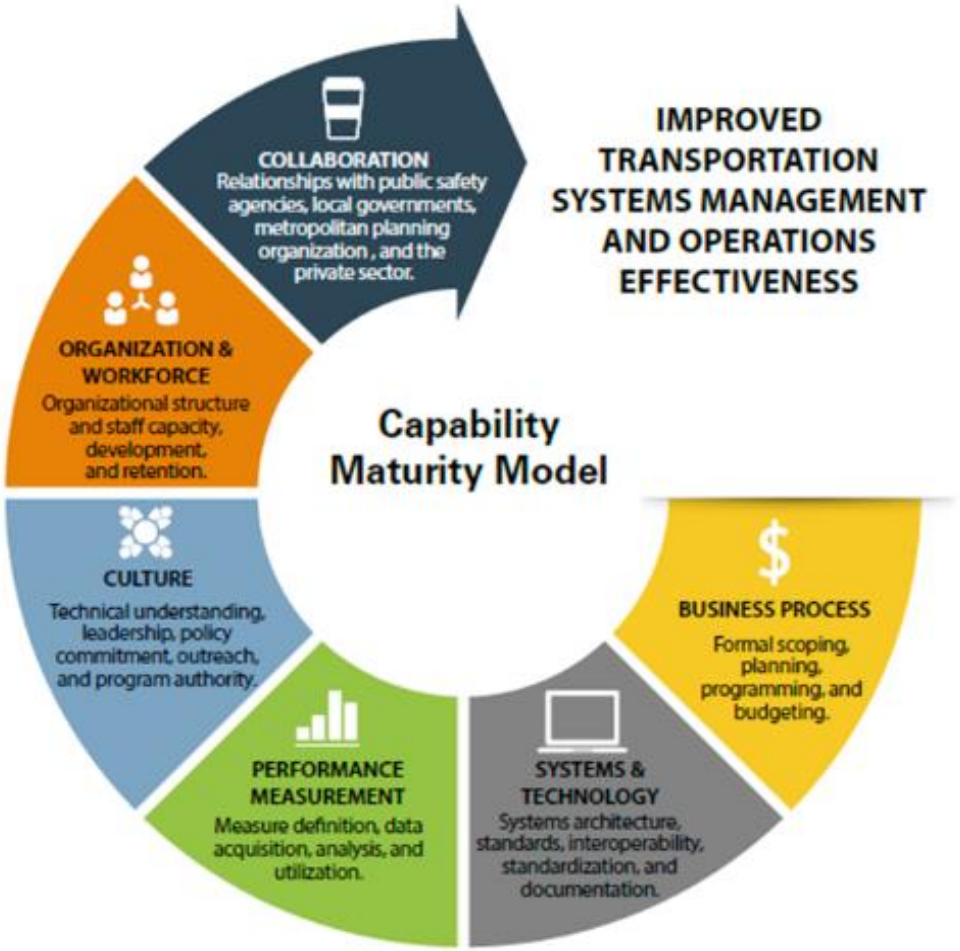
Photo sources: ARC website

TSMO Builds on Systems and Technology…..

…. more than ITS (Intelligent Transportation Systems)

Emphasizes coordination and collaboration across a wide array of partners and jurisdictional boundaries



Developing a Regional TSMO Vision

The Need for a TSMO Vision and Deployment Plan

Connected and automated vehicles

New data sources

New modal options and business models

TSMO Today

TSMO in 2040

Creating a Common Vision for TSMO in the Metro Atlanta Region

Building on a Strong Regional Foundation for TSMO

- Long history of collaboration on TSMO
- Robust policy framework, with emphasis on system reliability
- Strategic programs and projects, including RTOP, NaviGAtor, Strategic Regional Thoroughfares Program, express lanes program
- Significant data collection (from Waze, Traffic Incident Management program, etc.)

What is a TSMO Vision?

A vision provides a shared intention and direction for a program or focal point for the region.

Should speak to **high-level outcomes** and be consistent with and support the region's overall vision.

May identify **core principles or goals** for how the transportation system should be operated.

Atlanta's "Win The Future" Vision

Key Objectives in the RTP that Relate to TSMO

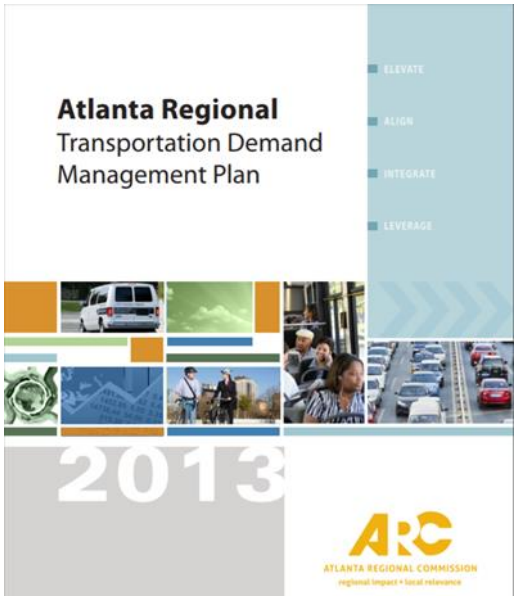
- **The "Atlanta Region's Plan Vision: *World Class Infrastructure, Competitive Economy, and Healthy Livable Communities."***

- **Transportation Objectives**
  1. Maintain and operate the existing transportation system to provide for ***reliable travel***
  2. ***Improve transit and non-SOV options*** to boost economic competitiveness and reduce environmental impacts
  3. Strategically expand the transportation system while supporting local land use plans
  4. Provide for a ***safe and secure*** transportation system
  5. Promote an ***accessible and equitable*** transportation system
  6. Support the ***reliable movement of freight*** and goods
  7. ***Foster the application of advanced technologies*** to the transportation system

Key Elements of Other Plans that Relate to TSMO (1)

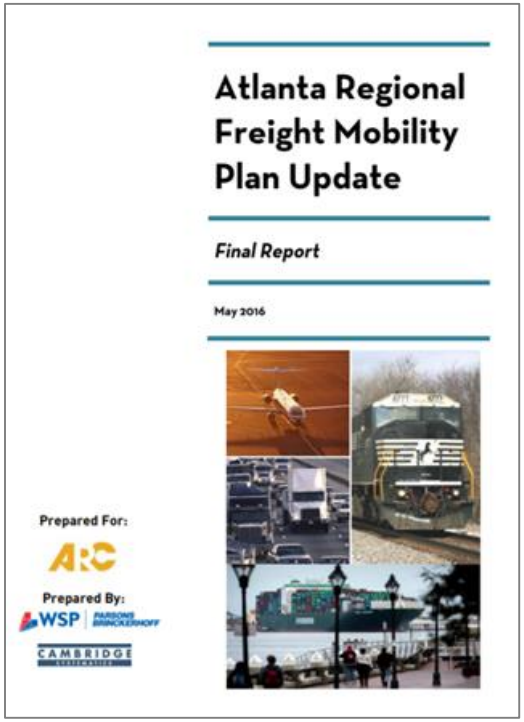
Regional Transportation Demand Management Plan (2013) – Goals and Strategies

1. Improve ***customer convenience and user experience***
   - Improve connection of TDM to regional information systems
2. Increase ***transportation connectivity, mode choice, and access***
   - Strategically link express bus service, local transit, vanpools, managed lanes and park and ride lots
3. Streamline ***regional coordination*** of policies, programs, services, and investments
4. Leverage and diversify funding sources for program sustainability
5. Pursue ***continuous performance and operations improvement***
   - Establish a single portal for collection and reporting of TDM and other transportation data



Key Elements of Other Plans that Relate to TSMO (2)

- **Atlanta Regional Freight Mobility Plan Update (2016)**
  - Outcome 1: Competitive Economy
    - Ensure a ***productive operating environment for freight*** transportation in the region.
  - Outcome 2: World Class Infrastructure
    - Ensure ***competitive freight performance*** in six key dimensions: travel time, reliability, cost, safety, sustainability, and risk management.
    - ***Manage the critical role of first, last, and transfer miles*** in the end-to-end performance of the region's supply chains.
    - Plan for the impact and promote the ***appropriate use of information, connected vehicle technologies, and driverless vehicles technologies*** to improve the productivity, safety, and visibility of freight movement.
  - Outcome 3: Healthy, Livable Communities
    - Plan and design our community centers for the ***timely and fuel efficient supply of goods*** necessary for living and working.
    - Promote the ***adoption of efficient freight vehicles and technologies*** offering safer, environmentally cleaner performance.
    - Define and adopt commercially viable methods to ***deliver goods on a 24-hour clock***.

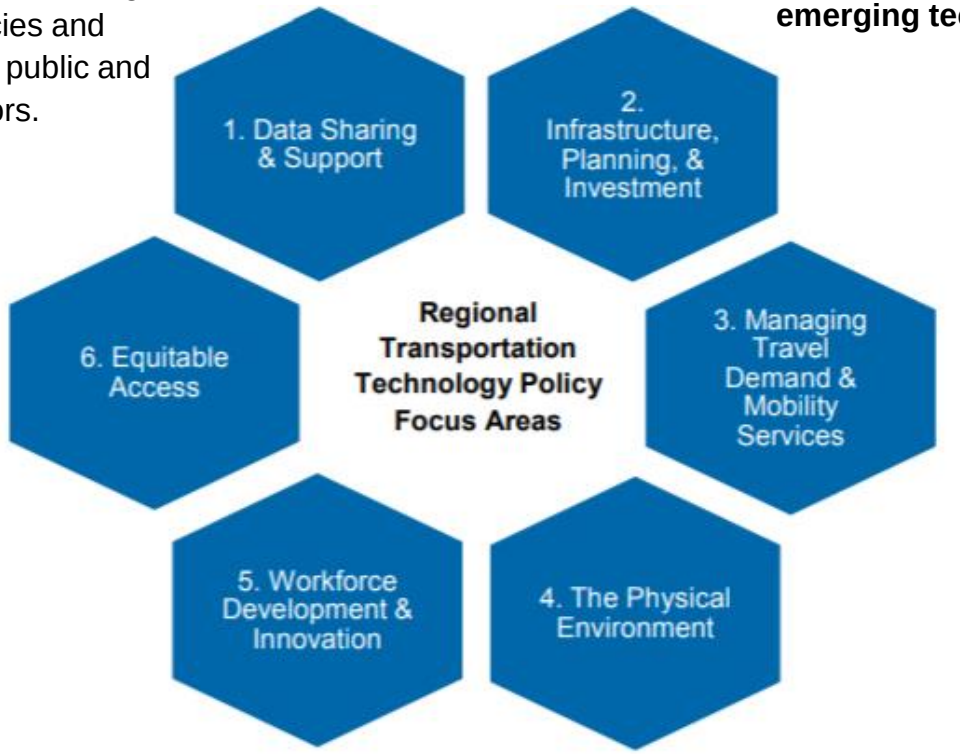


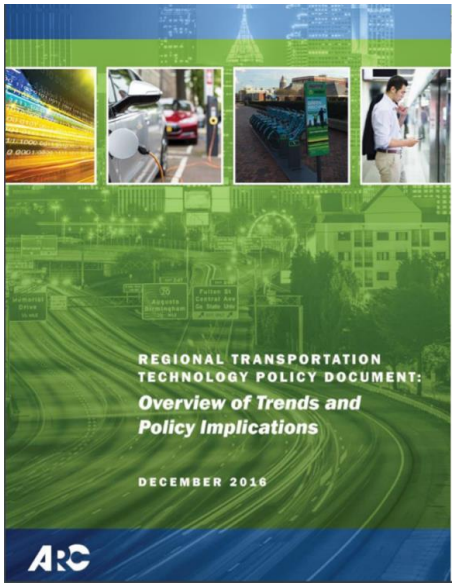
Key Elements of Other Plans that Relate to TSMO (3)

- **Regional Transportation Technology Policy Document (2016) – Policy Areas of Focus**

Facilitate data sharing and integration amongst public agencies and between the public and private sectors.

Investments in transportation infrastructure and technologies to **take advantage of new and emerging technology**.

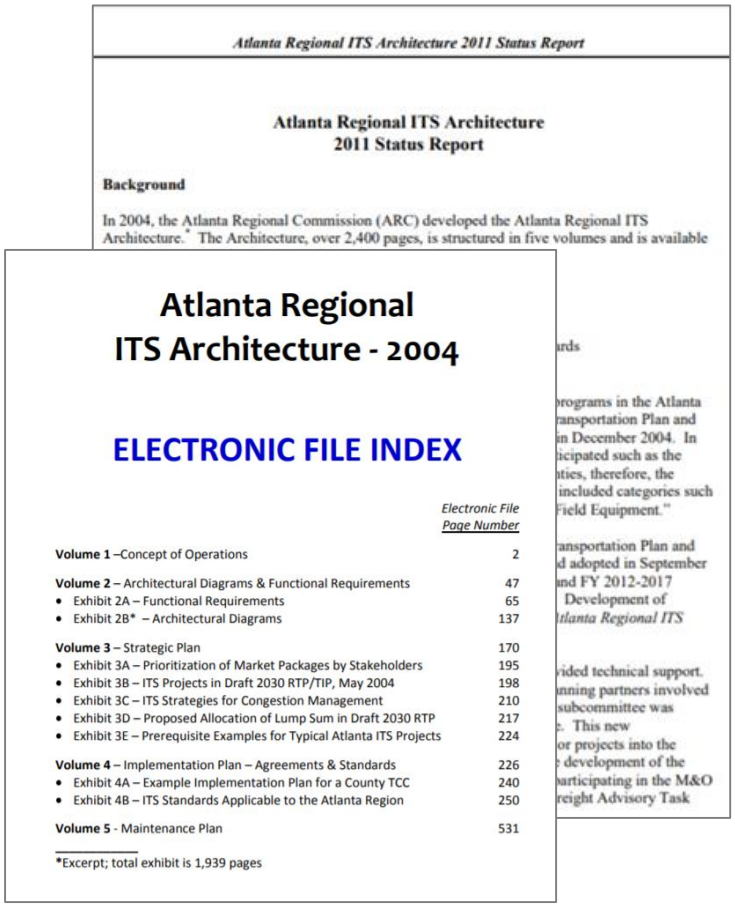




Actively manage travel demand and optimize system performance.

Key Elements of Other Plans that Relate to TSMO (4)

- **Atlanta Regional ITS Architecture (2004, 2011 update) - Vision**
  - Develop an ***extensive communications network*** that will provide direct, real time information to any local and state transportation and incident response agency that participates in transportation operations….
  - Provide ***real time traveler information*** through various media to the public.
  - Provide an ***institutional environment that emphasizes efficient operations*** of the transportation system and provides ***technological tools*** that enhance the operations of all transportation and incident response agencies.
  - Develop a process that ***monitors system performance*** and allows for system growth and enhancement.



Atlanta Regional ITS Architecture 2011 Status Report

Atlanta Regional ITS Architecture
2011 Status Report

Background

In 2004, the Atlanta Regional Commission (ARC) developed the Atlanta Regional ITS Architecture.* The Architecture, over 2,400 pages, is structured in five volumes and is available

Atlanta Regional ITS Architecture - 2004

ELECTRONIC FILE INDEX

	Electronic File Page Number
Volume 1 –Concept of Operations	2
Volume 2 – Architectural Diagrams & Functional Requirements	47
• Exhibit 2A – Functional Requirements	65
• Exhibit 2B* – Architectural Diagrams	137
Volume 3 – Strategic Plan	170
• Exhibit 3A – Prioritization of Market Packages by Stakeholders	195
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• Exhibit 4A – Example Implementation Plan for a County TCC	240
• Exhibit 4B – ITS Standards Applicable to the Atlanta Region	250
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*Excerpt; total exhibit is 1,939 pages

Stakeholder Survey

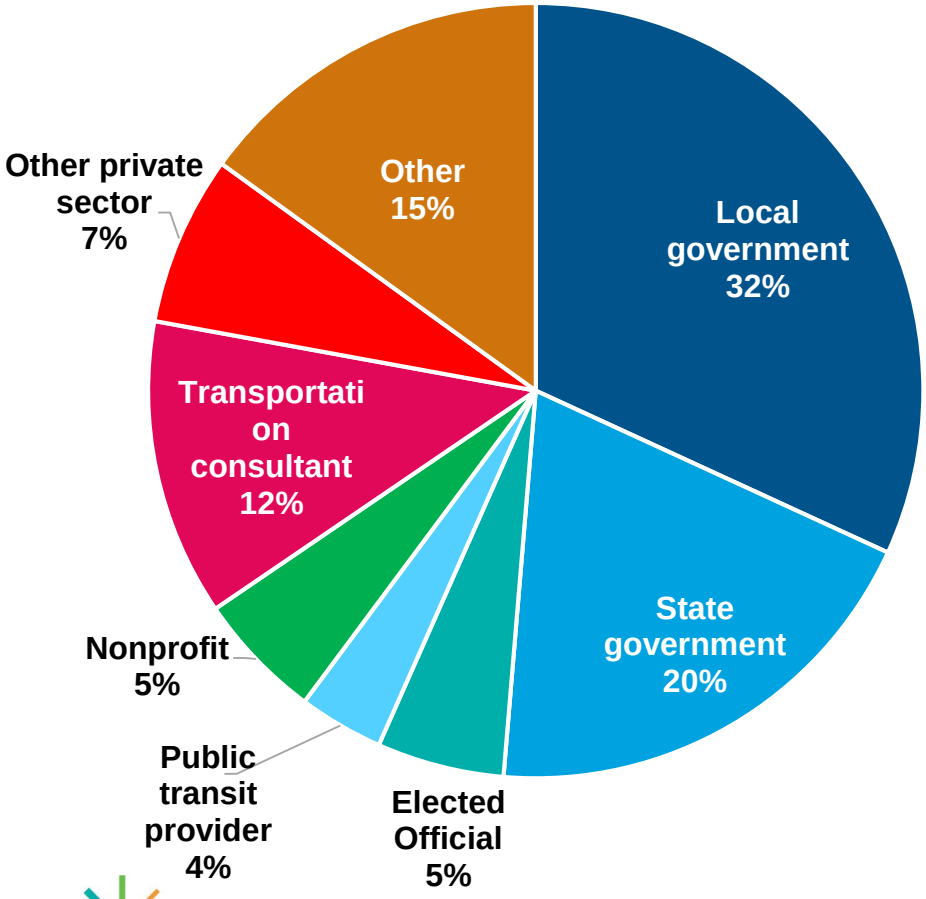
- What are we currently doing well?
- What are we not doing well?
- What should we be doing?

https://www.surveymonkey.com/r/ARCTSMOsurvey

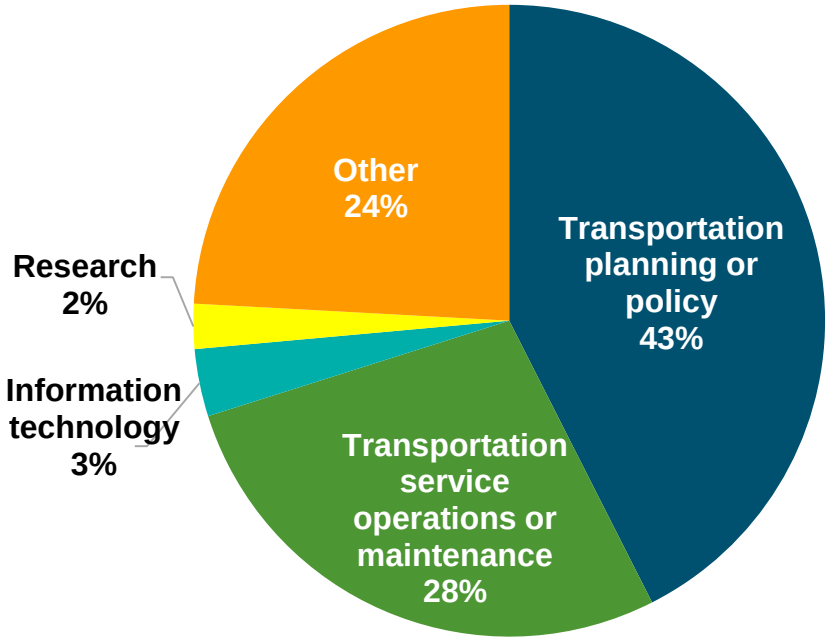
Preliminary Survey Response

109 Responses to Date

Agency Type

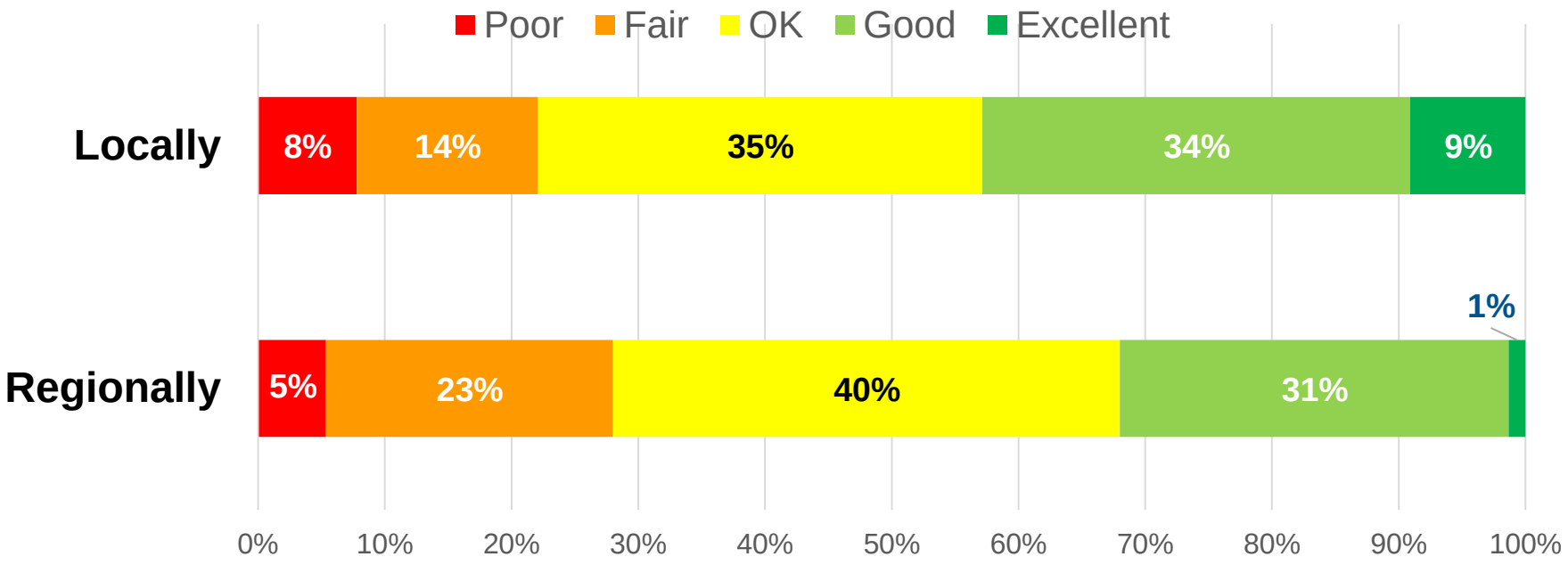


Role (of those in the transportation industry)



Preliminary Survey Results

How well do you think transportation system operations is being optimized…?



Preliminary Survey Results

Existing conditions in the Atlanta region that create challenges or impediments to advancing transportation system performance and operations?

- "Too many jurisdictions for transportation"
- "Funding and political will"
- "…I hope that there will now be a system that fully integrates the different jurisdictions with their technological capabilities and a willingness to be part of a whole in regard to managing transportation..."
- "Poor connectivity places a significant amount of traffic on a few streets which makes good optimization difficult."
- "Too big of focus on more roads"
- "The blind focus on MARTA"

Preliminary Survey Results

Existing conditions in the Atlanta region that create <u>strengths</u> or <u>opportunities</u> for advancing transportation system performance and operations?

- “Increased communications between incident response agencies”
- “Creation of the ATL”
- “New found support”
- “We have a lot of support it seems from industry, and other private sources and a good system in place for obtaining funds to help pay for advancing the transportation system and improving performance”
- “The region is starting to view itself as one area with a common goal rather than individuals”
- “The GDOT and local programs are working systemically to manage the signal system”

Preliminary Survey Results

Important factors for transportation system operations planning and decisions from a regional perspective over the coming years

- Reducing traffic congestion/decreasing travel time (4.60)
- Improving traveler safety (4.43)
- Supporting increased use of public transportation (4.31)
- Enhancing travel time reliability or predictability (4.26)
- Reducing transit travel times (4.18)
- Supporting freight movement / connections (4.05)
- Advancing adoption of other emerging technologies (4.03)
- Supporting increased use of other non-drive alone travel options (3.89)
- Connecting communities (3.89)
- Advancing adoption of connected or automated vehicle technologies (3.86)
- Improving air quality/protecting the environment (3.82)
- Enhancing real-time traveler information (3.80)
- Enhancing equity/access for disadvantaged populations (3.71)
- Improving security (3.60)

Very High: >4.4

High: 4.0-4.4

Moderate: 3.6-4.0

Rank 1-5 for each:

1 = Not important; 2 = Limited importance; 3 = Moderate importance; 4 = Very important; 5 = Extremely important

Preliminary Survey Results

What would you like to see included in a <u>regional vision</u> for transportation systems management and operations?

- "For the region's citizens, visitors, and freight haulers to have safe, reliable, efficient, and equitable travel through a variety of travel options"
- “Increasing the use of public transit and increasing the walking and biking access to all communities throughout the Atlanta region…"
- "Higher transit/bike/ped integration…While sidewalks are great, crosswalks are still extremely dangerous at many intersections built only for car movement"
- "Autonomous vehicle operations, where appropriate. Use of electric vehicles (including panel vans, e-bikes and scooters, and to drones to rural areas) for freight pickup/delivery activity.”
- "Methods and ways to get information to any person with a smartphone or electronic device, in a minimum amount of time and effort"

What is Your Vision?

Outcomes

Safety and Reliability

Reducing fatalities/injuries and unexpected delays due to weather, incidents, work zones, & special events

Mobility

Reducing delay, providing efficient options

Accessibility

Access to information and travel options for all

Win the Future

People, Processes, and Technology

Foster coordination of TSMO across all levels of government

Improve sharing of real-time data among partner agencies and with the private sector

Applying technology investments strategically to optimize system performance.

Focus on outcomes, goals, or principles

Break Out into Groups

Report Backs: What is Your Vision?

Safety and Reliability

Accessibility

Mobility

Win the Future

Vision - Draft

Starting Point

"*For the region's residents, visitors, and freight haulers to have safe, reliable, efficient, and equitable travel through a variety of travel options*."

Modifications / Additions / Goals

ITS Architecture Update

Regional ITS Architecture Comprehensive Update – Why we need an update?

- **Originally created in 2005**
- **Last updated in 2011**
- **What has changed since then?**
  - New systems and projects
  - Many projects have been deployed
  - National ITS Architecture has been extensively updated
    - New Connected Vehicle Services

Architecture Update: Planned Subtasks

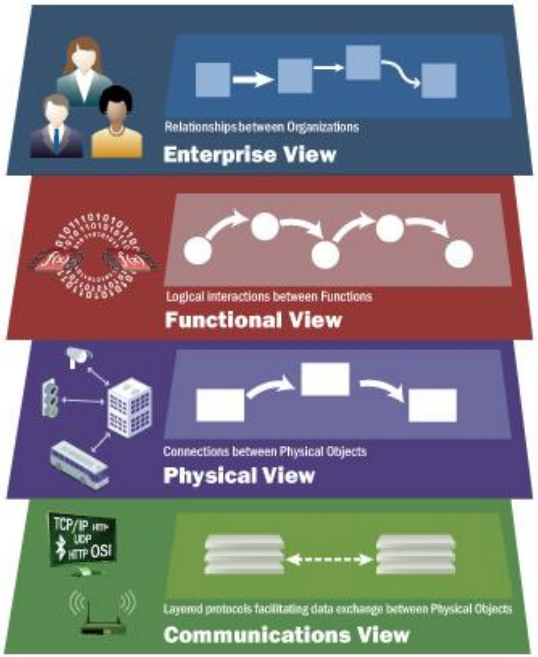
1. **Kickoff (today)**
2. **Gather Stakeholder input**
   - Inputs from Stakeholder Survey
   - Inputs from Inventory Update
   - Additional Stakeholder Interviews as needed
3. **Develop Draft ITS Architecture**
4. **Stakeholder Workshop**
5. **Develop Updated Draft ITS Architecture**
6. **Develop Final ITS Architecture**

ITS Architecture Overview

The National ITS Reference Architecture Provides a Framework to ...

- Identify key systems and services
- Describe required functions
- Define interconnections between functions
- Develop a blueprint for integration of systems

National ITS Reference Architecture is a "Living Framework"



User Services 1993

Architecture Published 1996

HRI 1997

Version 2.0 1998

ADUS 1999

MCO 2002

Security Ver. 5.0 2003

Version 6.0 2007

Version 6.1 2009

Version 7.0 2012

CVRIA V7.1 2015

ARC-IT 8.0 2017

ARC-IT 8.2 2018

ARC-IT 8.2

- ARC-IT: Architecture Reference for Cooperative and Intelligent Transportation
- Culmination of 25 years of National ITS Architecture development
- Covers all of ITS, including all of Connected Vehicle
- Enhance systems engineering tool & updated regional architecture tool

ARC-IT Service Packages

- **ARC-IT organized around Service Packages**
  - Service Packages grouped by Area

Traffic Management

Public Transportation

Maintenance and Construction

Commercial Vehicle Operations

Public Safety

Parking Management

Vehicle Safety

Traveler Information

Data Management

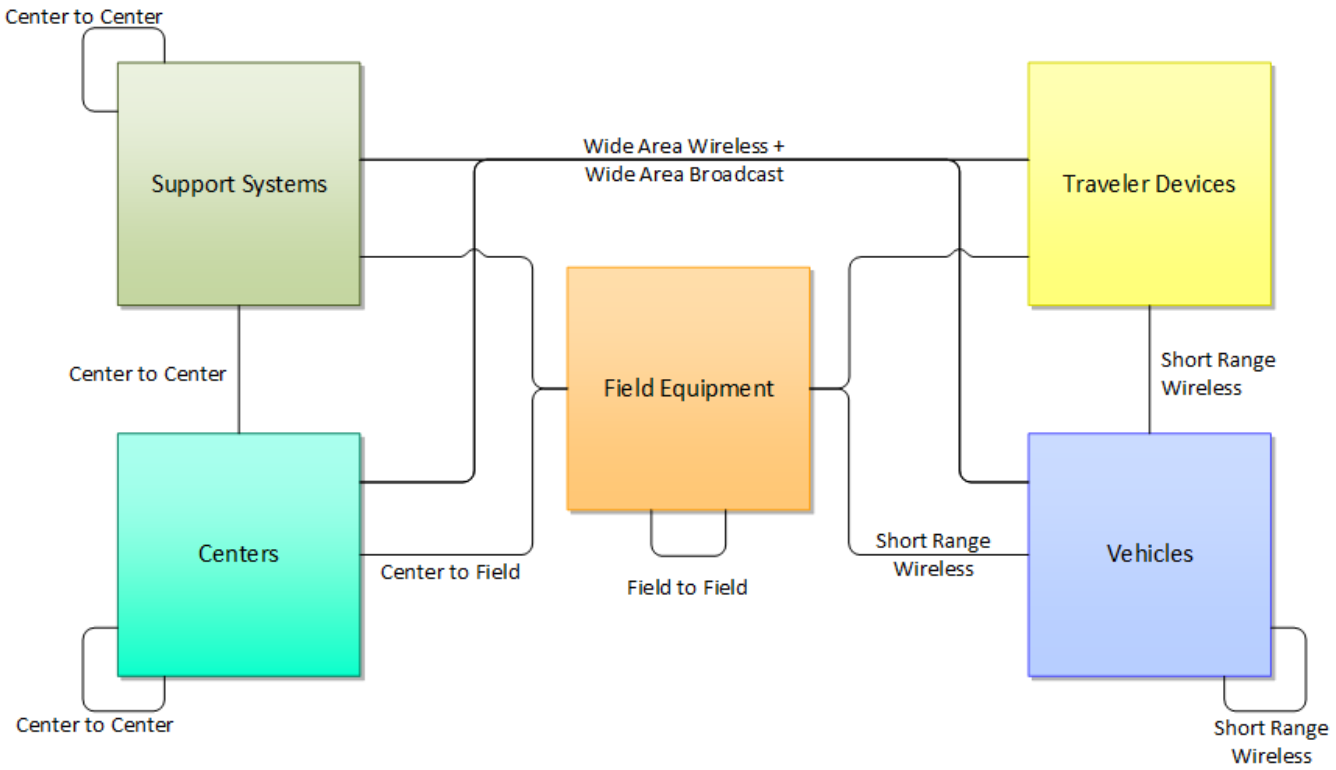
Support

Sustainable Travel

Weather

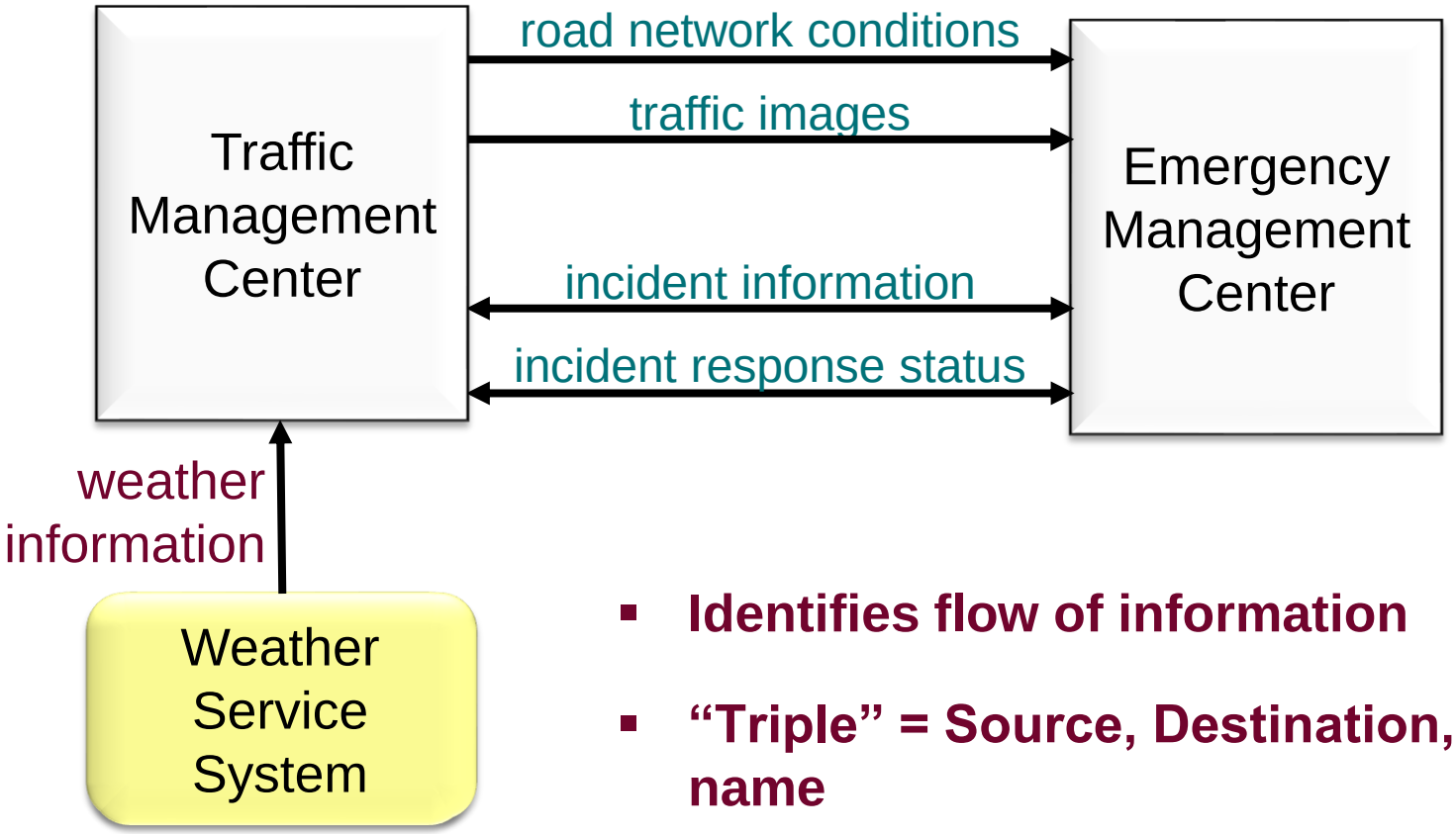
ARC-IT Physical View

- **Depicts:**
  - Physical objects that interact to deliver services
  - Interfaces and flows of information between those physical objects
- **Physical Objects organized into 5 Classes**



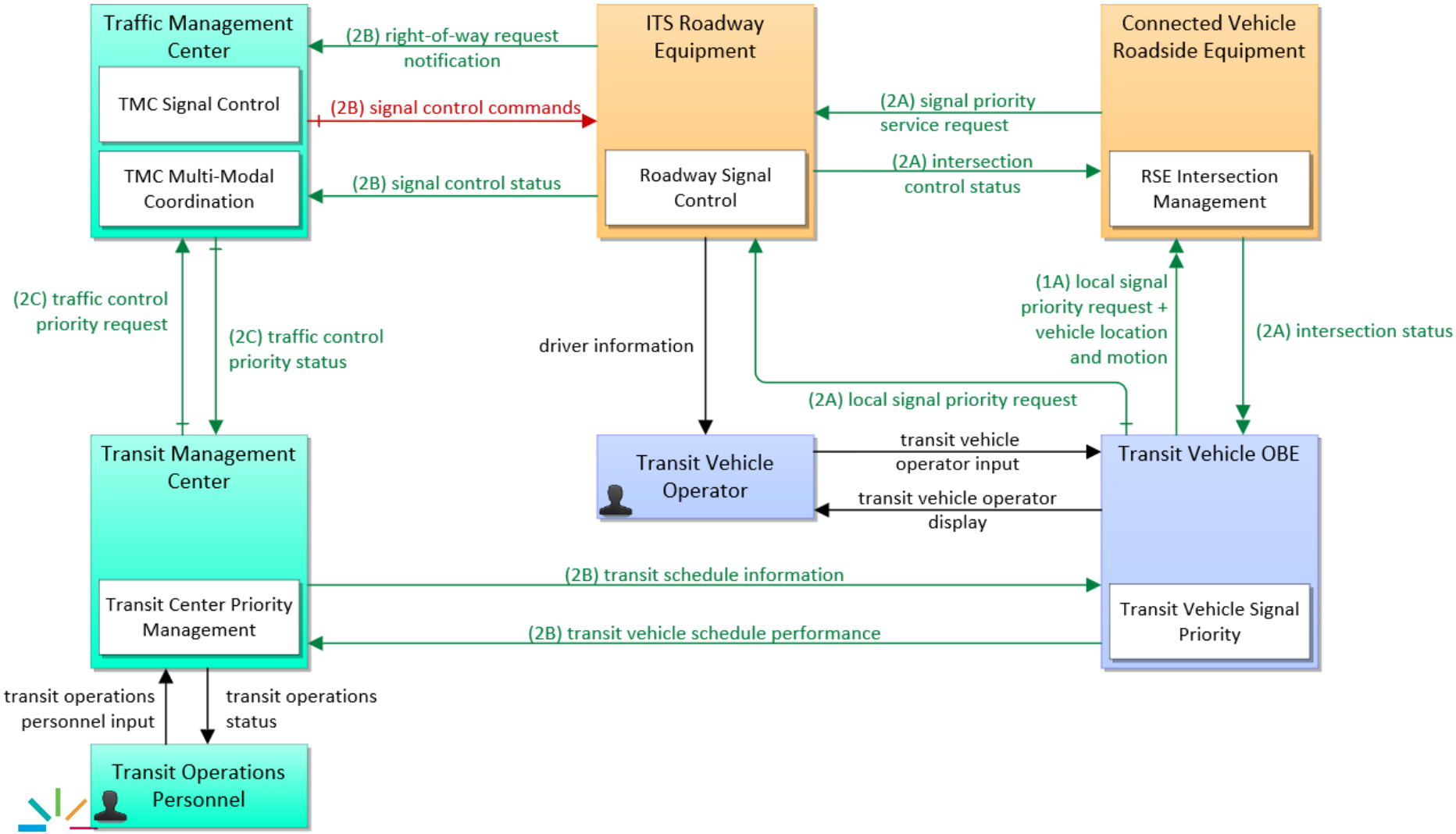
Physical View- Information Flows

- **Define Information Exchange**



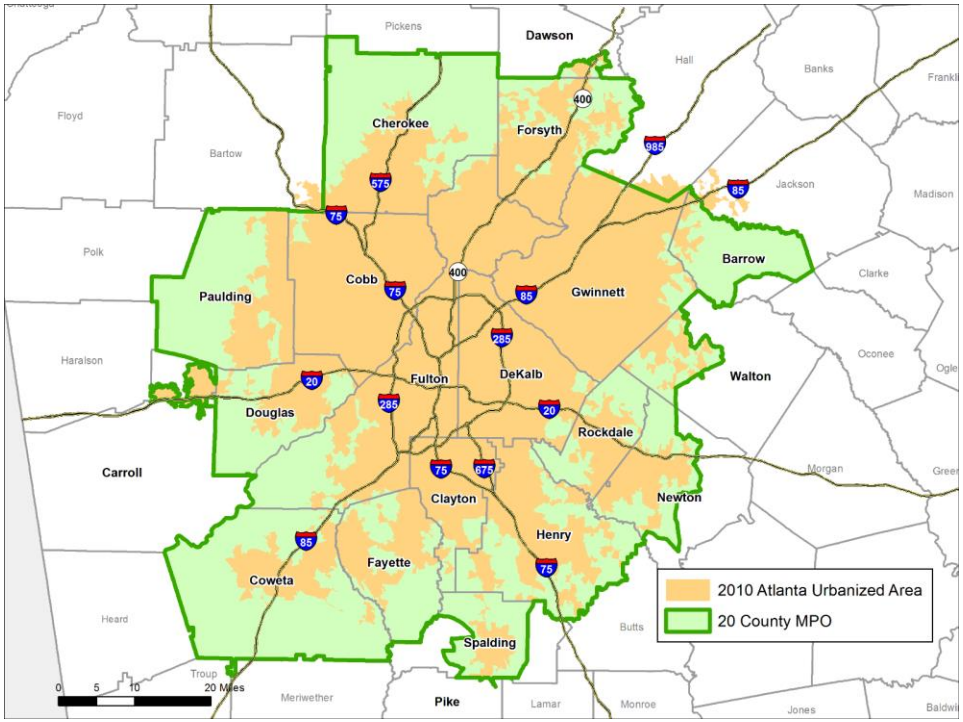
- **Identifies flow of information**
- **"Triple" = Source, Destination, Flow name**

Service Package Example – Transit Signal Priority



What is a Regional ITS Architecture?

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



Benefits of a Regional ITS Architecture

- **Transportation planning tool**
  - Get a handle on where we are going with our Intelligent Transportation System
- **Regional information sharing opportunities**
  - The problem: patchwork deployments that make sharing information difficult
  - Regional ITS Architecture: Get early insight into what ITS information others have that can help you do your job better (or you can provide to others)
- **Basis for Institutional Agreements when information crosses boundaries**

Benefits of Regional ITS Architecture (Cont.)

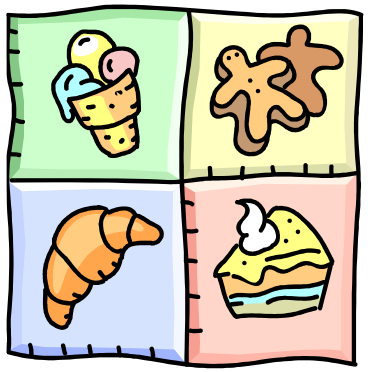
- **AND -- Addresses FHWA Rule/FTA Policy on ITS Architecture and Standards**
  - Requires Development of a Regional ITS Architecture if using Highway Trust Fund money to fund deployment of projects containing ITS elements.
  - Intended to foster integration of ITS Systems
  - Defines requirements for ITS projects
  - Defines requirements for ITS agreements
- **This update of the Regional ITS Architecture brings the architecture up to date so it can be useful to the stakeholders**

FHWA Rule/FTA Policy

1. Description of the region (Scope)
2. Identification of participating agencies and their systems (Inventory)
3. Operational concept
4. Agreements required for implementation
5. System functional requirements
6. Interface requirements
7. Identification of ITS standards
8. Sequence of projects required for implementation
9. Process for maintaining your ITS Architecture

How National ITS Architecture relates to Regional ITS Architecture

- **National ITS Architecture (the cookie cutter)**
  - a Framework or Template
  - a menu of possibilities
- **Regional ITS Architecture (the cookies)**
  - Specific instances, associated with local stakeholders and projects
  - Current inventory + future projects
  - Only the pieces you need
  - Put together based on local needs
  - Extensions, where necessary

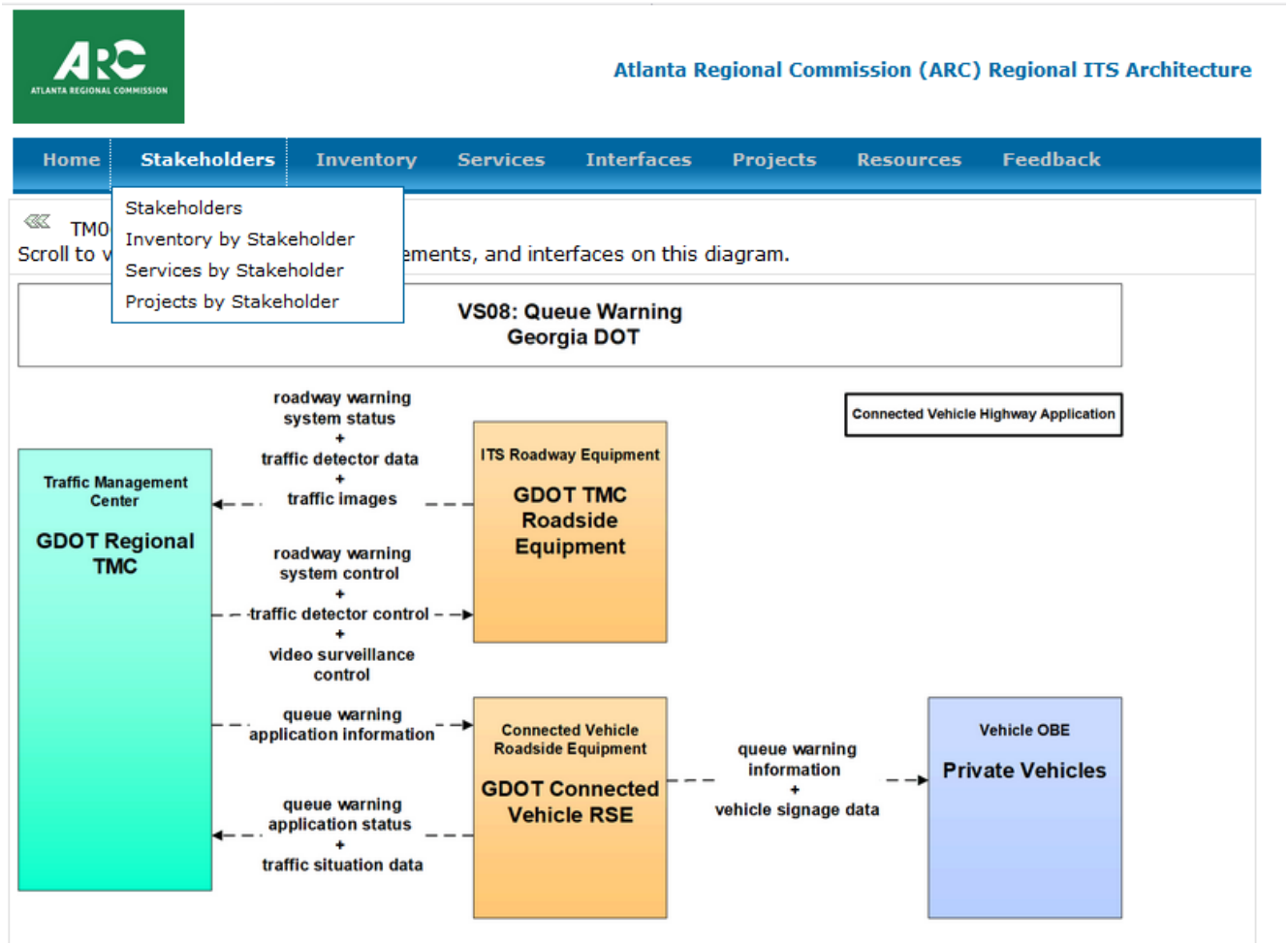


ARC ITS Architecture

ARC Regional ITS Architecture

- **Key Pieces**
  - Stakeholders
    - ARC, GDOT, GRTA, MARTA, Counties, Cities +
  - Elements
    - Centers, field equipment, vehicles +
  - Services with defined interfaces
    - Relevant Service Packages from 12 ARC-IT areas
  - Projects
    - Near term (TIP related) and longer term to time frame of arch
- **Plus**
  - Agreements
  - Functional Requirements
  - Standards

Customized Service Packages



Using the Architecture- TSMO Planning

- **Transportation Systems Management and Operations Plans**
  - **Business Processes.** Architecture describes interagency agreements, operational concepts (roles and responsibilities)
  - **Systems & Technology.** Architecture shows technology systems via service package diagrams, and describes functional requirements and applicable standards
  - **Performance Measurement.** Architecture can define for each operations objective:

Arterial Management	Transit Operations and Management
Emergency/Incident Management	Travel Demand Management
Freeway management	Travel Weather Management
Freight Management	Traveler Information
Special Event Management	Work Zone Management

Source: Applying a Regional ITS Architecture To Support Planning For Operations – A Primer

Using the Architecture for Project Development

- **FHWA Rule/FTA Policy 940.11 requires all ITS projects funded with highway trust funds be based on a systems engineering analysis**
- **The 7 minimum requirements for a systems engineering analysis:**
  1. *Identification of portions of the regional ITS architecture being implemented*
  2. *Identification of participating agencies' roles and responsibilities*
  3. *Requirements definitions*
  4. Analysis of alternative system configurations and technology options to meet requirements
  5. Procurement options
  6. *Identification of a) applicable ITS standards* and b) testing procedures
  7. Procedures and resources necessary for operations and maintenance

Requirements in italics can be found in the ITS architecture

Next Steps

- **Gather Inputs to create Draft Update**
  - Stakeholder Survey
  - Inventory
  - Additional Interviews as needed

- **Key Input Needs**
  - Projects- both near term and longer term
  - ITS Services begun or improved in the past decade

Wrap Up and Next Steps: Where do we go from here?

What's Next?

- **ARC and Consultant Team**
  - Use the input from today to inform the regional TSMO vision
  - Continue to gather ITS inventory
  - Begin work on ITS Architecture

- **Your Role**
  - Take and share the survey:

    https://www.surveymonkey.com/r/ARCTSMOsurvey

  - Look for opportunities to participate in future workshops.