



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

## *ITS Architecture Workshop*

March 19, 2019



# Agenda

1. Welcome and Introductions
2. ITS Architecture Overview/ Review & Update ITS Stakeholders and Elements
3. Discussion of Regional ITS Projects
4. Service Package Overview / Prioritization
5. Review and Update Customized Service Packages
6. Use of Regional ITS Architecture
7. Data Governance Overview
8. Data Governance Discussion
9. GDOT Connected Data Platform
10. Wrap Up and Next Steps



# 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 (12/17)**
- 2. Gather Stakeholder input**
- 3. Develop Draft ITS Architecture**
- 4. Stakeholder Workshop (today)**
- 5. Develop Updated Draft ITS Architecture**
- 6. Review and Comment by Stakeholders**
- 7. Develop Final ITS Architecture**



# ITS Architecture Overview

# Intelligent Transportation Systems

## ■ Definition

- “The Application of data processing and data communications to surface transportation, to increase safety and efficiency.”

## ■ Includes Systems within

- Traffic Management
- Transit Management
- Emergency Management
- Traveler Information
- Maintenance Management

# History of ITS Architecture

- Broad FHWA funding for regional ITS in early 1990s
- Many systems deployed but data collected was proprietary and systems could not talk to each other
- In 1996, National ITS Architecture established
- In 2001, FHWA issued Rule 940 requiring that ITS architectures be developed for 'regionally significant' ITS projects to be eligible for federal funding

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

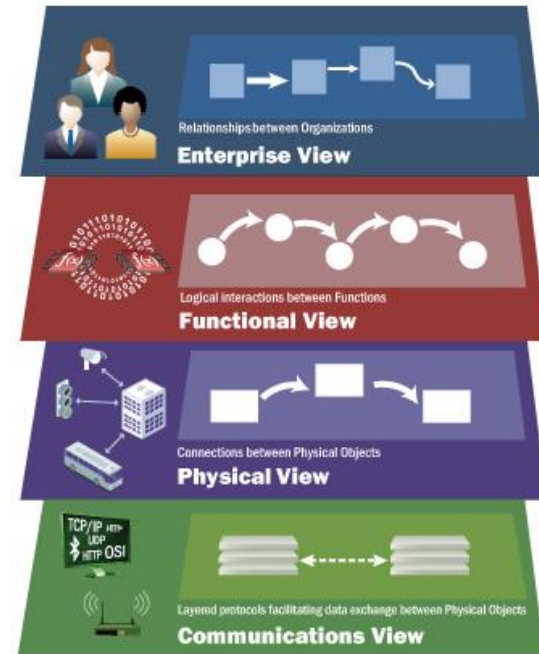
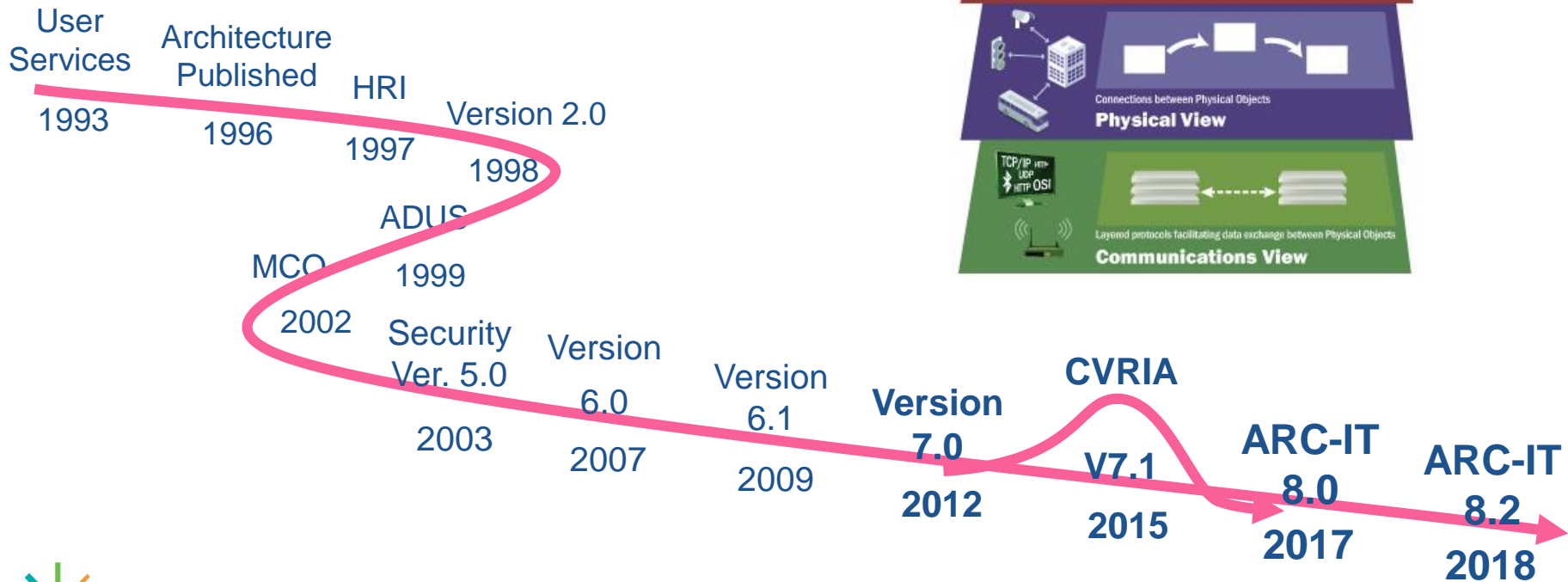
- Identify key systems and services
- Describe required functions
- Define interconnections between functions
- Develop a blueprint for integration of systems





# National ITS Reference Architecture is a “Living Framework”

- Continuing evolution of the architecture over 25 years



# ARC-IT 8.2

- ARC-IT: Architecture Reference for Cooperative and Intelligent Transportation
- 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

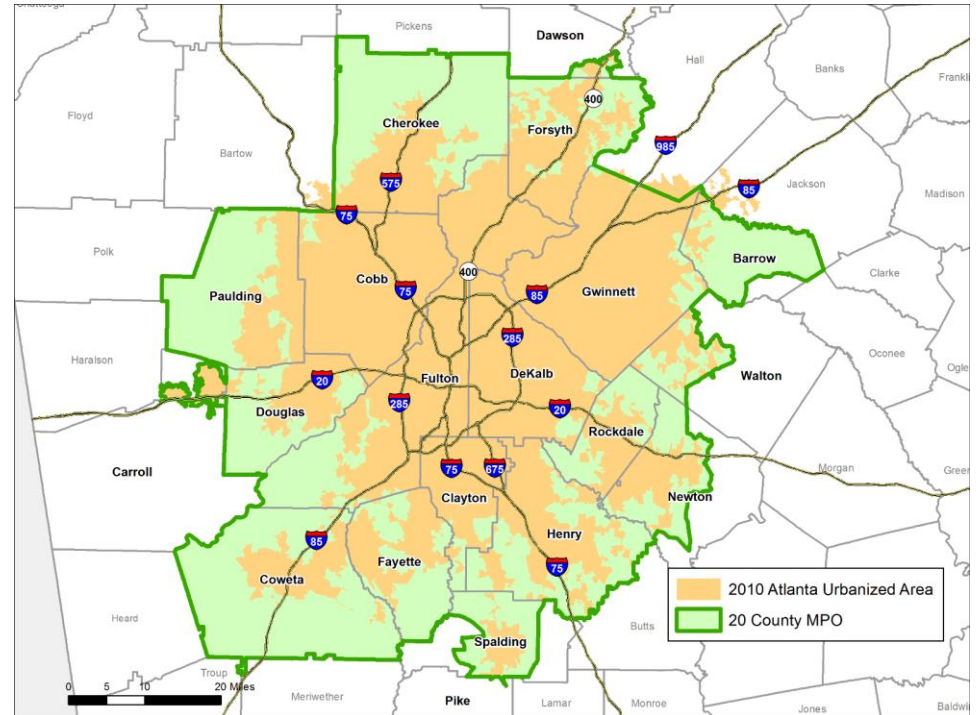


Weather



# 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**

# What is a Regional ITS Architecture?

## ■ **Does Provide:**

- A blueprint on how ITS systems will work together to satisfy surface transportation needs.
- Identifies the ITS stakeholders in a region and their elements
- Identifies projects planned for the region
- Identifies the information to be exchanged between stakeholder elements

## ■ **Doesn't Define:**

- Select specific technologies or design
- Determine how projects are selected or funded



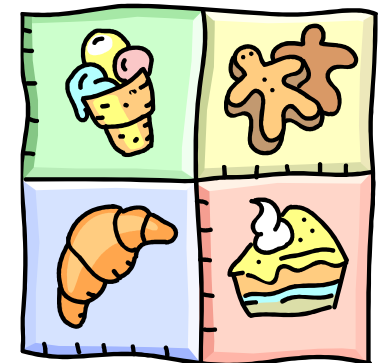
# How National ITS Architecture relates to Regional ITS Architecture

- **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



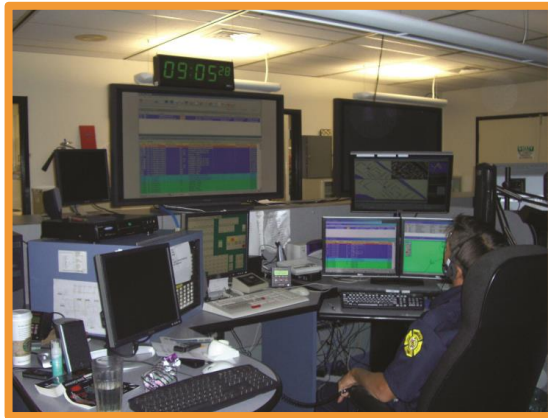


# Regional ITS Architecture Described by:

- **Database of architecture details (RAD-IT file)**
- **Customized Service Packages File**
- **Architecture Document**
- **Hyperlinked Website**

# In Summary...

- **To ensure investments in ITS can be leveraged**
  - Primary purpose of ITS is to support daily traffic operations, transit and safety
  - Provide additional services as defined
- **To be eligible for FHWA funding**





# ARC Regional ITS Architecture



# Discussion of Scope, Stakeholders and Elements



# ARC Regional ITS Architecture Scope

- **Geographic**

- Covers the 20 County MPO

- **Time Frame**

- Existing Today → 20 years in the future, with an emphasis on those ITS activities likely to be implemented in the next 5-10 years

- **Scope of Services**

- Traffic management, maintenance and construction operations, incident management, emergency services, transit management, traveler information, and archived data management

# Who is a Stakeholder?

- **Technical Definition:**

- Someone that sends or receives transportation information to/from other stakeholders either directly or with their systems.

- **Institutional Definition:**

- Someone who builds, operates or maintains ITS equipment.

# ITS Inventory

- **A list of ITS elements and the elements that interface with them**
- **And an ITS element is:**
  - “The name used by stakeholders to describe high level parts of an ITS system.”
- **Types of Elements:**
  - Centers – Traffic, Emergency, Transit
  - Field Devices – Traffic, Maintenance
  - Traveler Interfaces – Web sites
  - Data Systems – Planning, Archives
  - Vehicles – Transit, Emergency, Maintenance



# Regional ITS Stakeholders and Inventory

- Let's review the Stakeholders and Inventory



# Regional ITS Projects

# ITS Projects

- **How will your systems evolve?**
  - What new or enhanced services will you provide?
  - What systems will you connect to and what information will you share?
  - What agreements need to be in place to make it happen?
- **The ARC Regional ITS Architecture will provide the framework and plan for the evolution of your systems over the next 10 to 20 years.**

# Review ITS Projects

- **ITS Projects Identified from**
  - Survey
  - Inventory Inputs from
- **For each project consider**
  - Name, Description
  - Key Stakeholders
  - Timeframe (short or long-term)
  - Mapping to Architecture

# ITS Projects

- **Will input ITS projects into the RADIT database.**
- **Ability to generate outputs to create a systems engineering analysis and functional requirements for each project.**
  
- **Let's go to Project List.....**



# Discussion of ITS Services – Service Packages Overview

# ITS Services Cover

**Traffic Management**



**Public Transportation**



**Maintenance and Construction**



**Commercial Vehicle Operations**



**Public Safety**



**Parking Management**



**Vehicle Safety**



**Traveler Information**



**Data Management**



**Support**



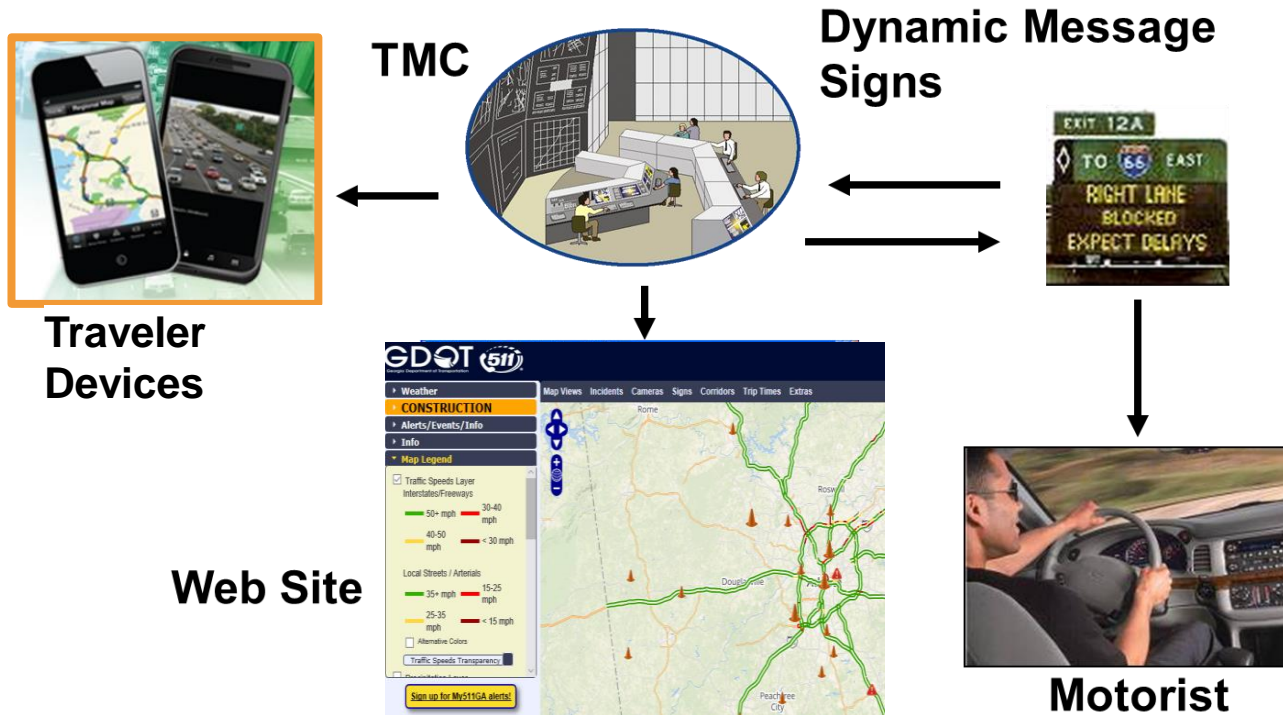
**Sustainable Travel**



**Weather**

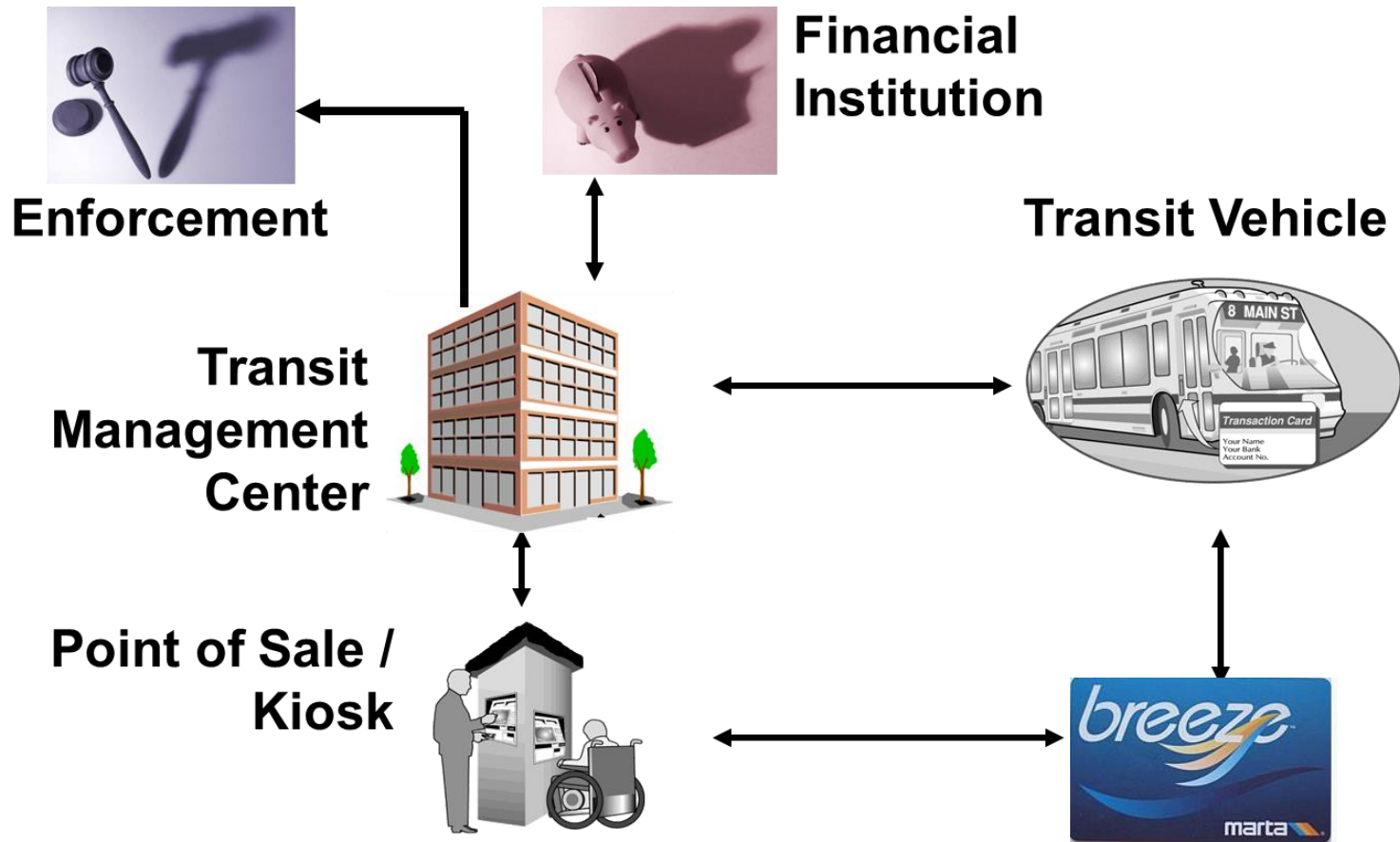


# Traffic Information Dissemination





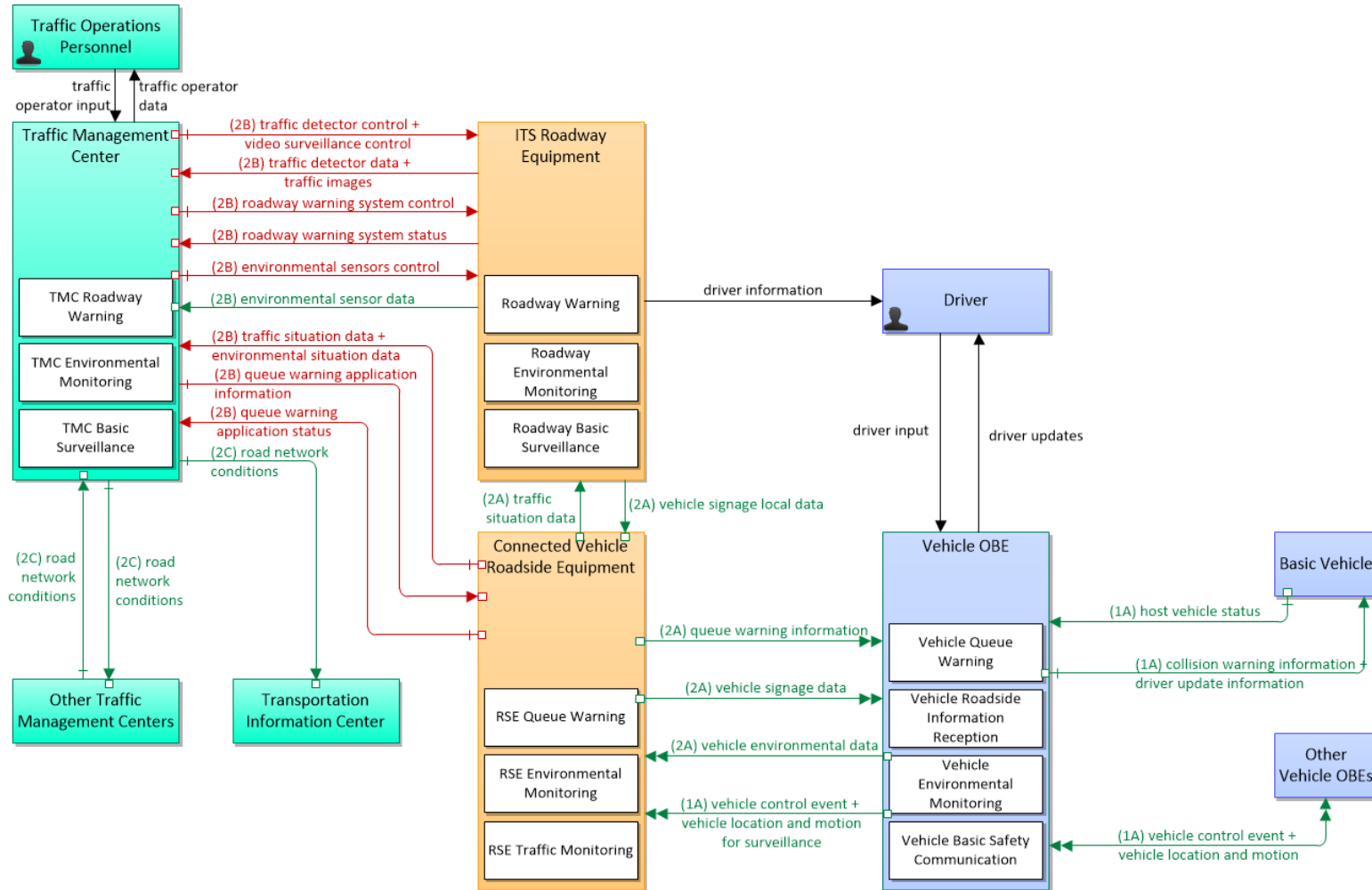
# Automated Transit Fare Payment



# Physical View- Service Packages

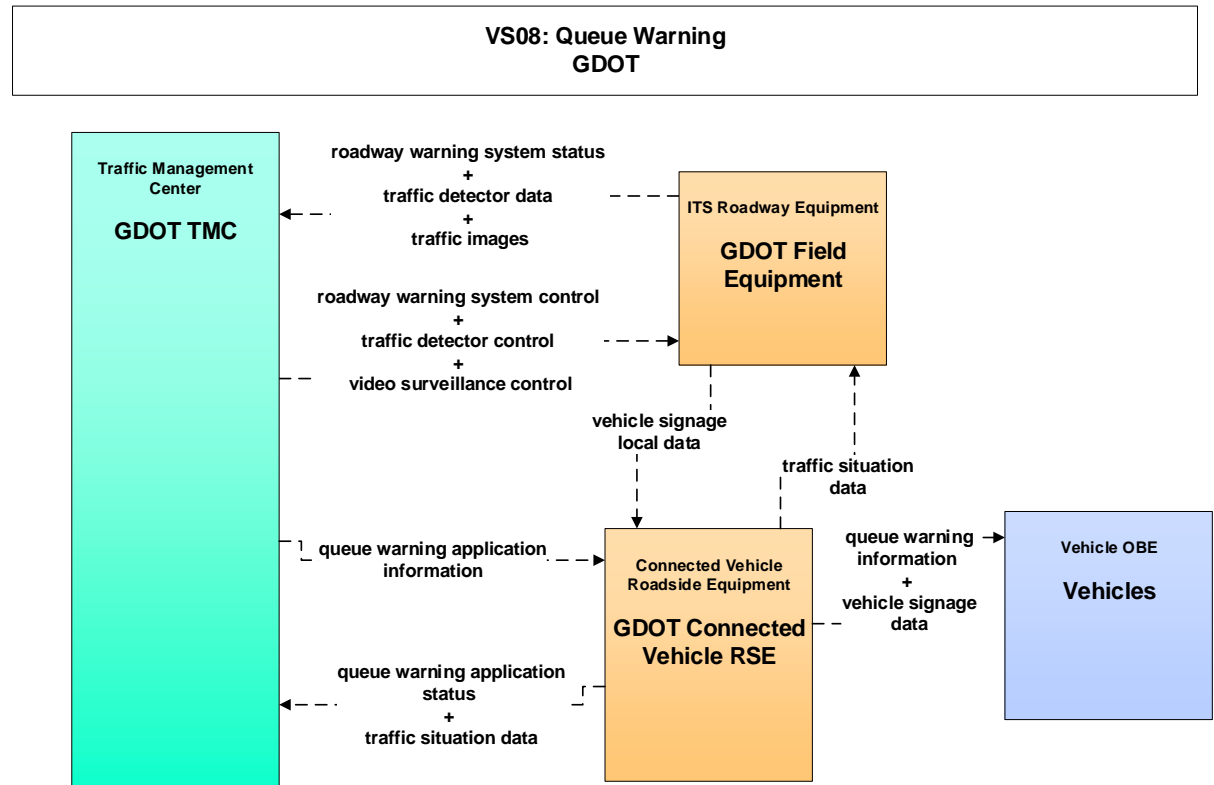
- **Service Packages are Portion of Physical View that provide an ITS Service**
- **Service Packages in the Physical View are defined by a set of:**
  - Physical Objects
  - Functional Objects
  - Information Flows
- **Plus a diagram showing all how all these are connected.**

# ARC-IT Service Package- Queue Warning

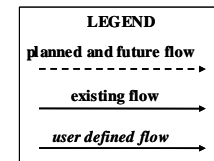


# Customized Service Package Diagrams

- Customize to reflect regional operational concepts



- Let's look at the Customized Service Packages ...





# Using the Architecture

# Using the Architecture- TSMO Planning

- **Transportation Systems Management and Operations Plan**
  - Identify relevant TSMO strategies, including emerging technologies and their potential benefits
  - Map these strategies to the ITS Architecture
    - Service Packages
    - Projects
  - Allows Connection from TMSO Plan to Architecture

# 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

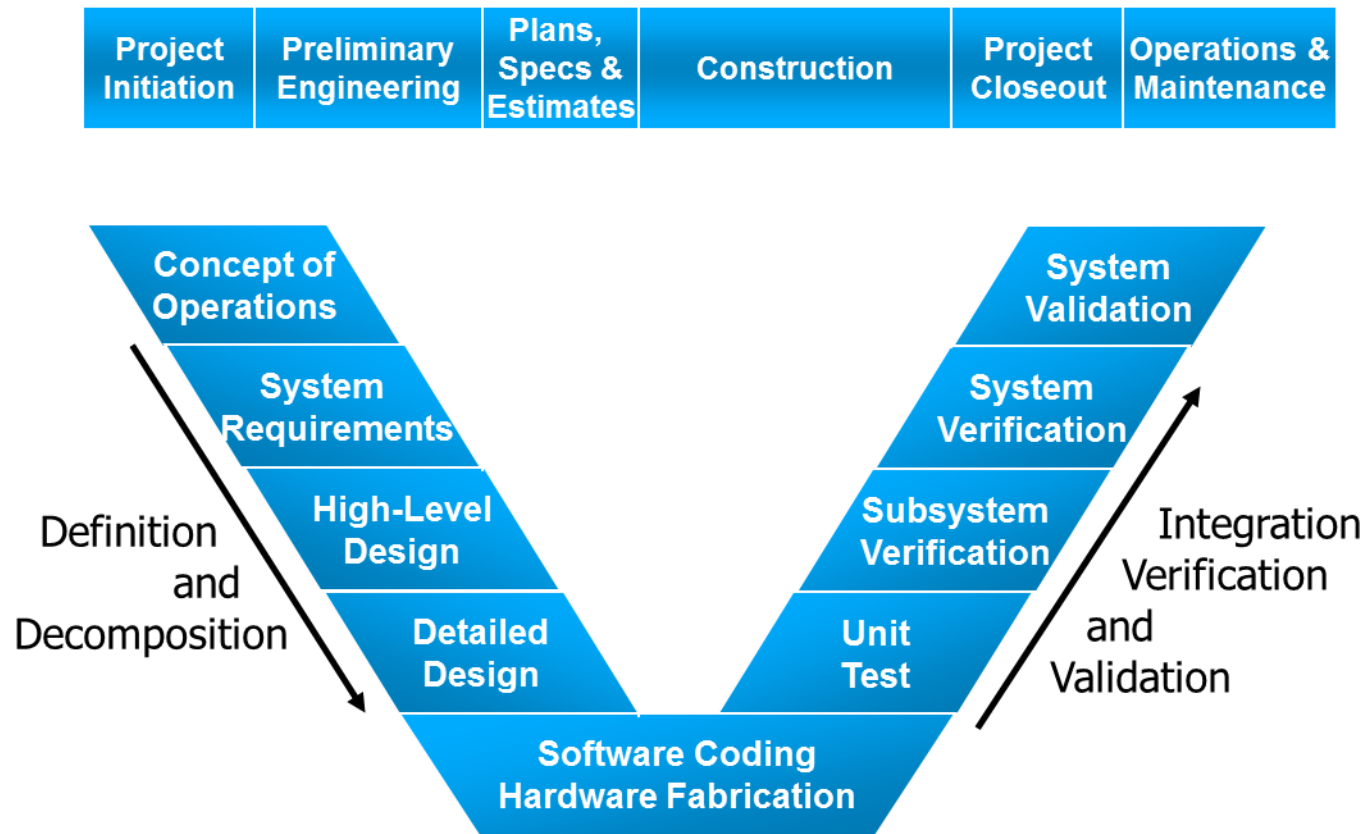
*Requirements in Bold can be found in the ITS architecture*

# Why Use the Systems Engineering Process?

- **Reduce Risk**
  - Control costs and schedule
  - Satisfy users' needs
- **Fulfill the requirements of the Federal Rule**

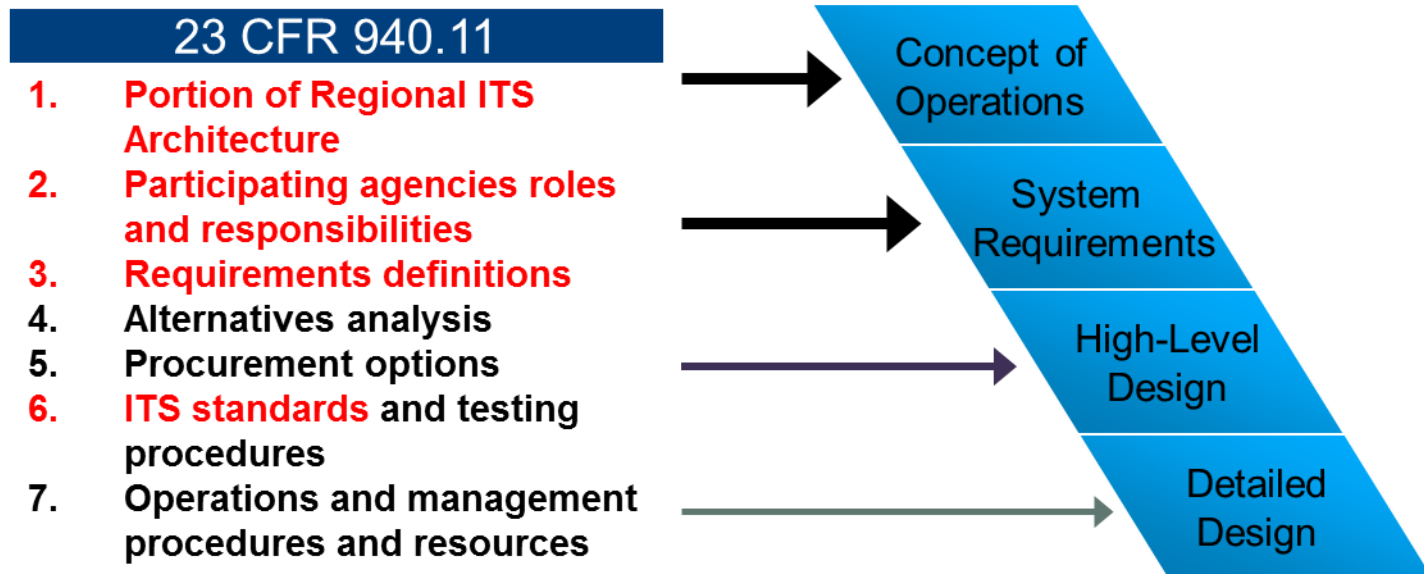


# Systems Engineering/Project Development



# Systems Engineering Analysis Requirements

- Rule/Policy requires all HTF-funded projects be based on a systems engineering analysis
  - Scale commensurate with project scope



- Regional Architecture can provide inputs to process

# Project Architecture Development

## ■ Systems Engineering Tool for Intelligent Transportation (SET-IT)



- Scope specified in the regional architecture
  - Graphical tool,
    - Visual feedback and tools to manipulate service package diagrams
    - Communications stack templates, standards at protocol layers,
    - Download from ARC-IT Website ([www.arc-it.net](http://www.arc-it.net))
  - Outputs – documents (e.g. ConOps), diagrams, tables
- 
- Create more detailed architectures to support Project Development

# Using the Architecture- Web based Version

- **Short tour of similar web-based Architecture**
- **How to find project information:**
  - If a project architecture has been created, look at the Projects web page.
  - If a project architecture has not be created, look at the regional ITS architecture services and find the appropriate web pages.



## Task 2: Inventory

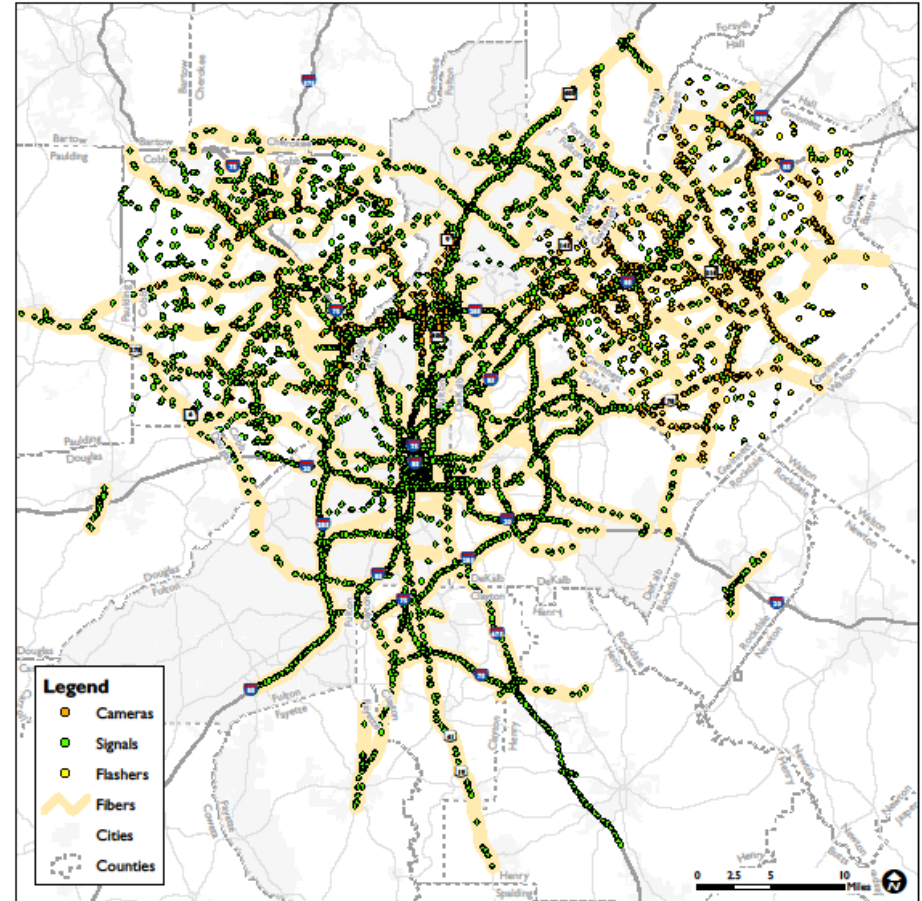
# Regional Inventory

## Regional ITS Assets

- Fiber (NexusWorx)
- Connected Traffic Signals
- Cameras
- Warning Systems
- Other

## Regional Transit Technology Assets

- Communication Assets
- Traveler Information
- Operations
- Data Collection
- Field Equipment
- Other





## Task 3: Data Governance

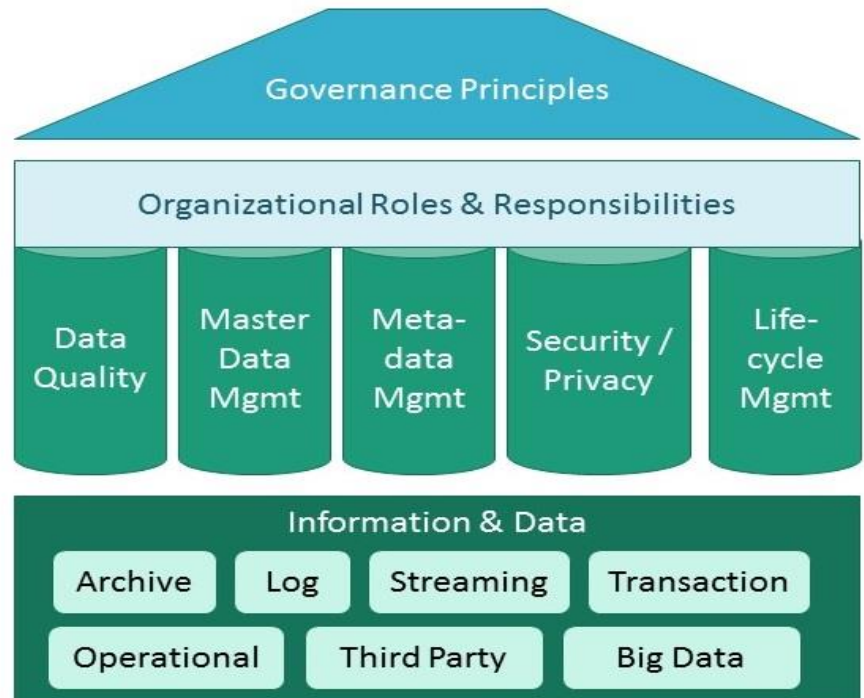
# What is Data Governance?

***Data governance is the exercise of decision-making and authority for data-related matters.***

Data Governance Institute

***Data governance is defined as the processes, policies, standards, organization, and technologies required to manage and ensure the availability, accessibility, quality, consistency, auditability, and security of data in a company or institution.***

Informatica





# “Best Practices for Data Governance” Report

## Changing Needs in Transformative Transportation Environments

- Impacts of emerging technologies – TSMO, CAV, IoT, mobility services
- Role of ARC in changing data universe

## Data Governance Frameworks

- Stakeholders, components, and data in your Enterprise
- Benefits for ARC and its constituents

## Data Strategies and Governance Models

- Policies, organizational models, roles and responsibilities
- Maturity models

## Data Lifecycle Management

- Management processes
- Current practices

## Data Architecture and Integration

- Content and quality
- Provisioning and sharing data



# Data Activity and Discussion



# Discussion Questions

- **What are 3 major challenges to your organization sharing data with other organizations today?**
  - Identify each challenge on a separate **blue** sticky note.
- **List the 3 most important data sets that you need from other organizations today.**
  - Identify each data set on a separate **yellow** sticky note.
- **Given projects under deployment, list the 3 most important data sets you expect to share in the future?**
  - Identify each data set on a separate **pink** sticky note.



# Next Steps and Wrapup: Where do we go from here?



# Next Steps

## ■ **Task 4: ITS Architecture**

- Create Full draft architecture including Web version
- Put out for stakeholder comments
- Connection to TSMO strategies will be added later once these have been developed.