



# Cleveland Regional ITS Architecture Update Review Workshop

March 29, 2017

# Workshop Outline

## Review of the Regional ITS Architecture Document

- Key Changes to the Document
- ITS Service Package Prioritization
- Review Stakeholder Comments

## Discussion of Existing and Planned ITS Projects

- Existing and Planned ITS Projects in the Region

## Discussion on Use and Maintenance of the Regional ITS Architecture

- Systems Engineering
- Architecture Conformance for Federal Funding
- Maintenance of the Regional ITS Architecture

# What is ITS?

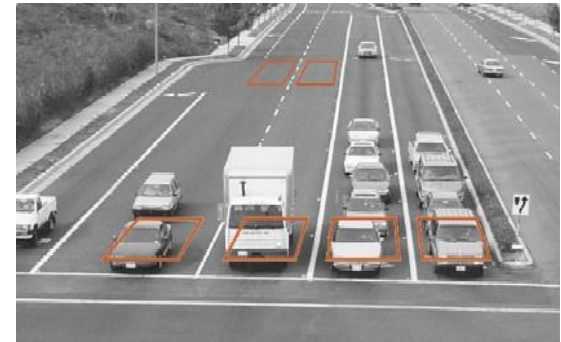
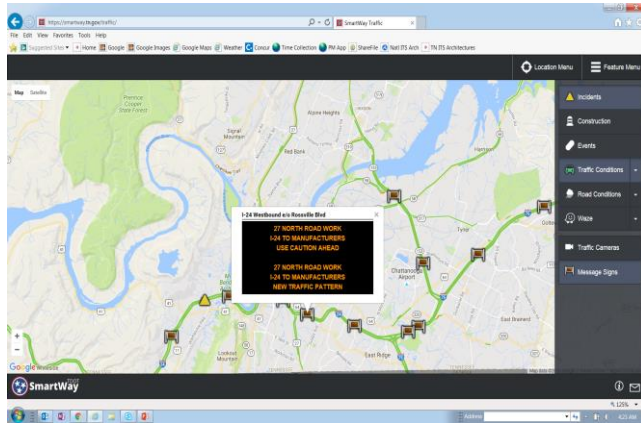
## *ITS:*

An acronym that stands for Intelligent Transportation Systems.

## *One definition of ITS:*

The application of data processing and data communications to surface transportation to increase safety and efficiency.

# What is ITS?



# ITS Applications

**Traffic Management**

**Traveler Information**

**Emergency Management**

**Maintenance & Construction Management**

**Public Transportation**

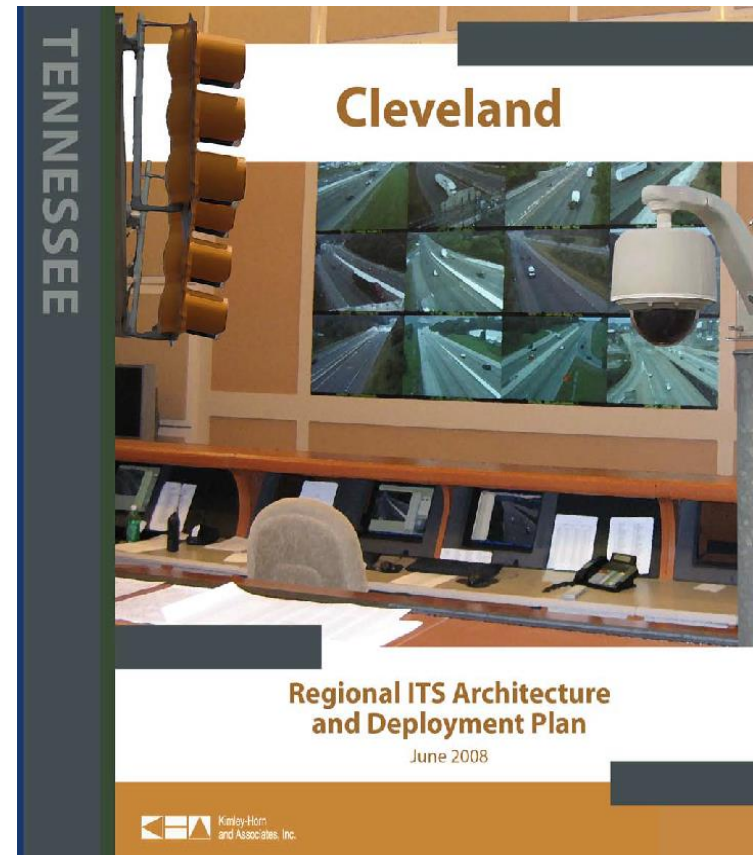
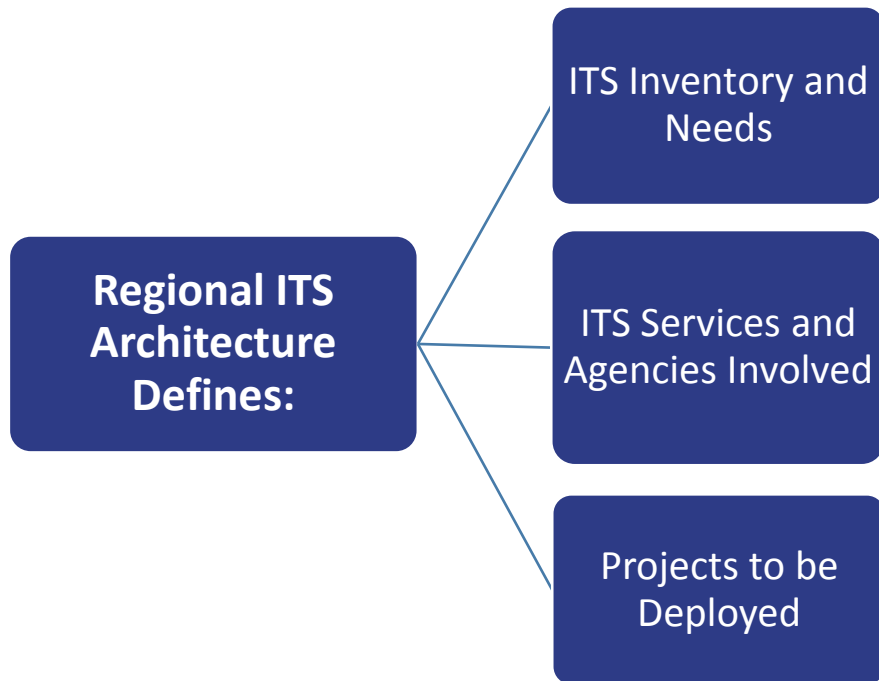
**Commercial Vehicle Operations**

**Archived Data Management**

**Vehicle Safety (Connected & Autonomous Vehicles)**

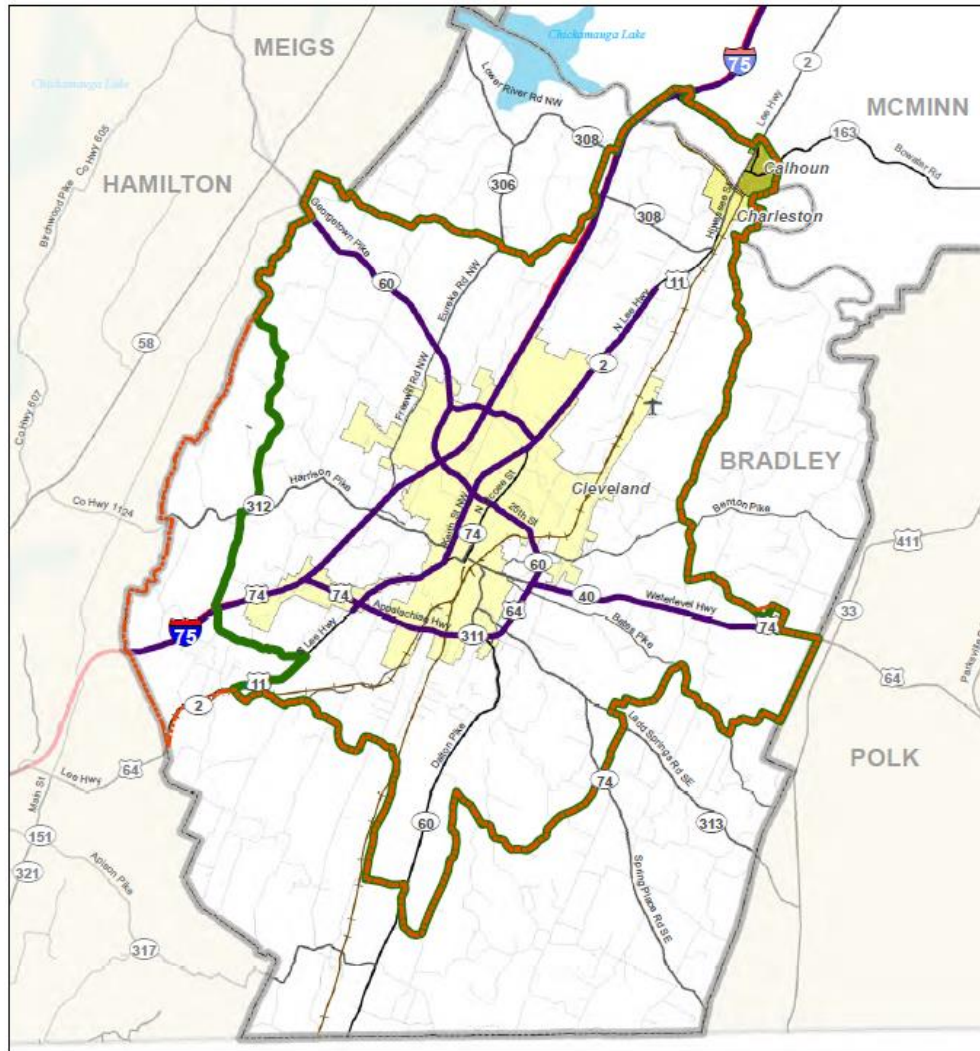


# Cleveland Regional ITS Architecture



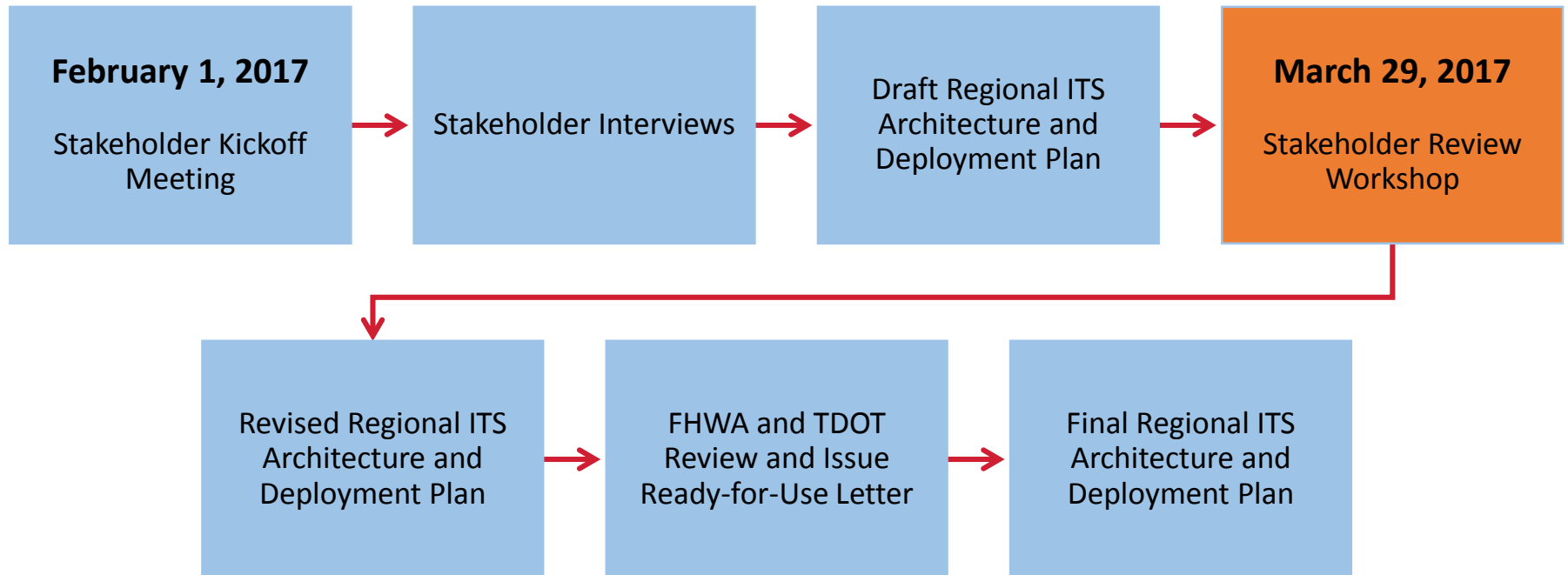
Last updated in 2008

# Cleveland MPO Planning Area



# Update Process

## Schedule





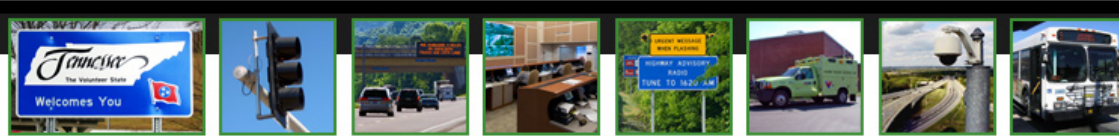
# Project Website

Project Website Located at the following link:

[www.kimley-horn.com/Projects/TennesseeITSArchitecture/cleveland.html](http://www.kimley-horn.com/Projects/TennesseeITSArchitecture/cleveland.html)

**Or Just Google  
Cleveland Regional ITS Architecture**

(Look for Link to Kimley-Horn Website)



Kimley-Horn and Associates, Inc.

**Kimley»Horn**

**TENNESSEE REGIONAL ITS ARCHITECTURES AND DEPLOYMENT PLANS**

**OVERVIEW**

**STATEWIDE**

**BRISTOL**

**CHATTANOOGA**

**CLARKSVILLE**

**CLEVELAND**

**JACKSON**

**JOHNSON CITY**

**KINGSPORT**

**KNOXVILLE**

**LAKEWAY**

**MEMPHIS**

**NASHVILLE**

## Cleveland Regional ITS Architecture

The Cleveland Regional ITS Architecture and Deployment Plan provides a long-range plan for the deployment, integration, and operation of ITS in the Cleveland Region. An update to the plan is being led by the Tennessee Department of Transportation (TDOT) in coordination with the Cleveland Urban Area Metropolitan Planning Organization (MPO). The update is expected to be completed in the Summer of 2017.

The Cleveland Regional ITS Architecture and Deployment Plan regional boundaries include a majority of Bradley County and the southern portion of McMinn County. Stakeholders included representatives from traffic, transit, emergency management, and public safety agencies at the local, state, and federal level. Two stakeholder workshops and several interviews with stakeholder agencies were conducted to gather input for the plan.

### Project Documents (2017 Version)

#### Regional ITS Architecture and Deployment Plan

- [Draft Cleveland Regional ITS Architecture and Deployment Plan](#)
- Draft Cleveland Turbo Architecture Database (In Development)
- Draft Cleveland Interactive ITS Architecture (In Development)

#### Workshop Materials

- [Kickoff Workshop Agenda – February 2017](#)
- [Kickoff Workshop Minutes – February 2017](#)
- [Kickoff Workshop Presentation – February 2017](#)
- [Review Workshop Agenda – March 2017](#)
- Review Workshop Minutes – March 2017 (To be Added Later)
- Review Workshop Presentation – March 2017 (To be Added Later)

#### Other Documents and Presentations

- [ITS Overview Sheet – February 2017](#)

### Project Documents (2008 Version)

#### Executive Summary

- [Cleveland Executive Summary](#)

#### Regional ITS Architecture

- [Cleveland Regional ITS Architecture](#)
- [Cleveland Regional ITS Architecture Appendices](#)
- [Cleveland Turbo Architecture Database \(download\)](#)

#### Regional ITS Deployment Plan

- [Cleveland Regional ITS Deployment Plan](#)

#### Workshop Minutes and Other Documents



### Project Contacts

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- Review Stakeholder Comments

## Discussion of Existing and Planned ITS Projects

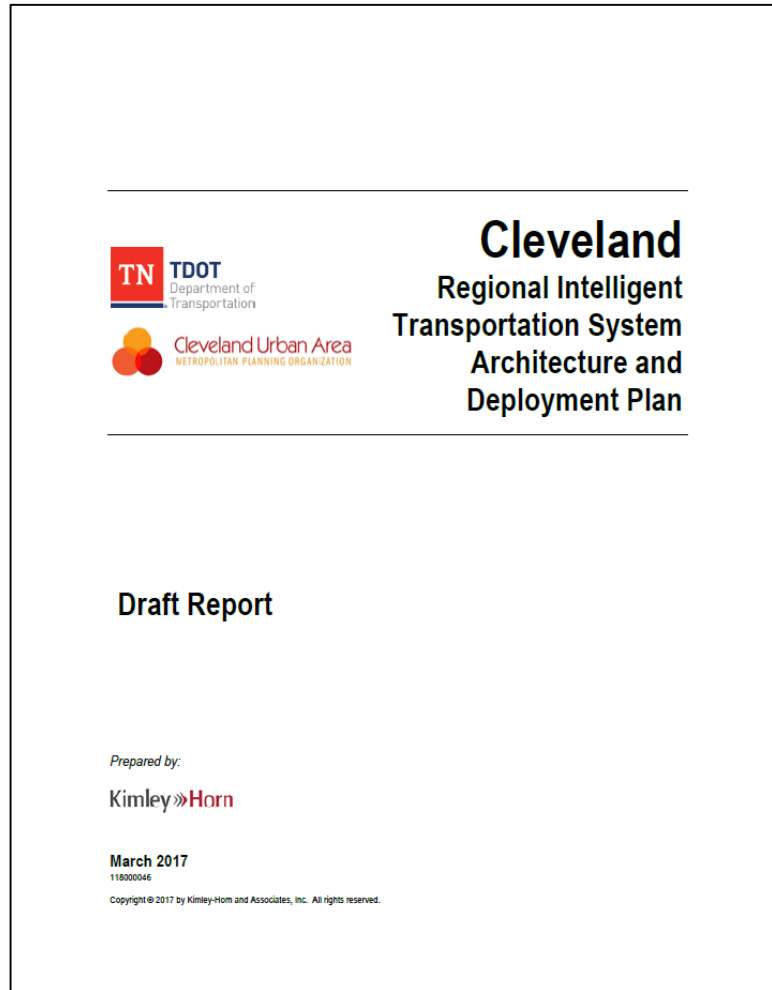
- Existing and Planned ITS Projects in the Region

## Discussion on Use and Maintenance of the Regional ITS Architecture

- Systems Engineering
- Architecture Conformance for Federal Funding
- Maintenance of the Regional ITS Architecture

# Regional ITS Architecture Update

**Comments Requested by  
April 5, 2017**

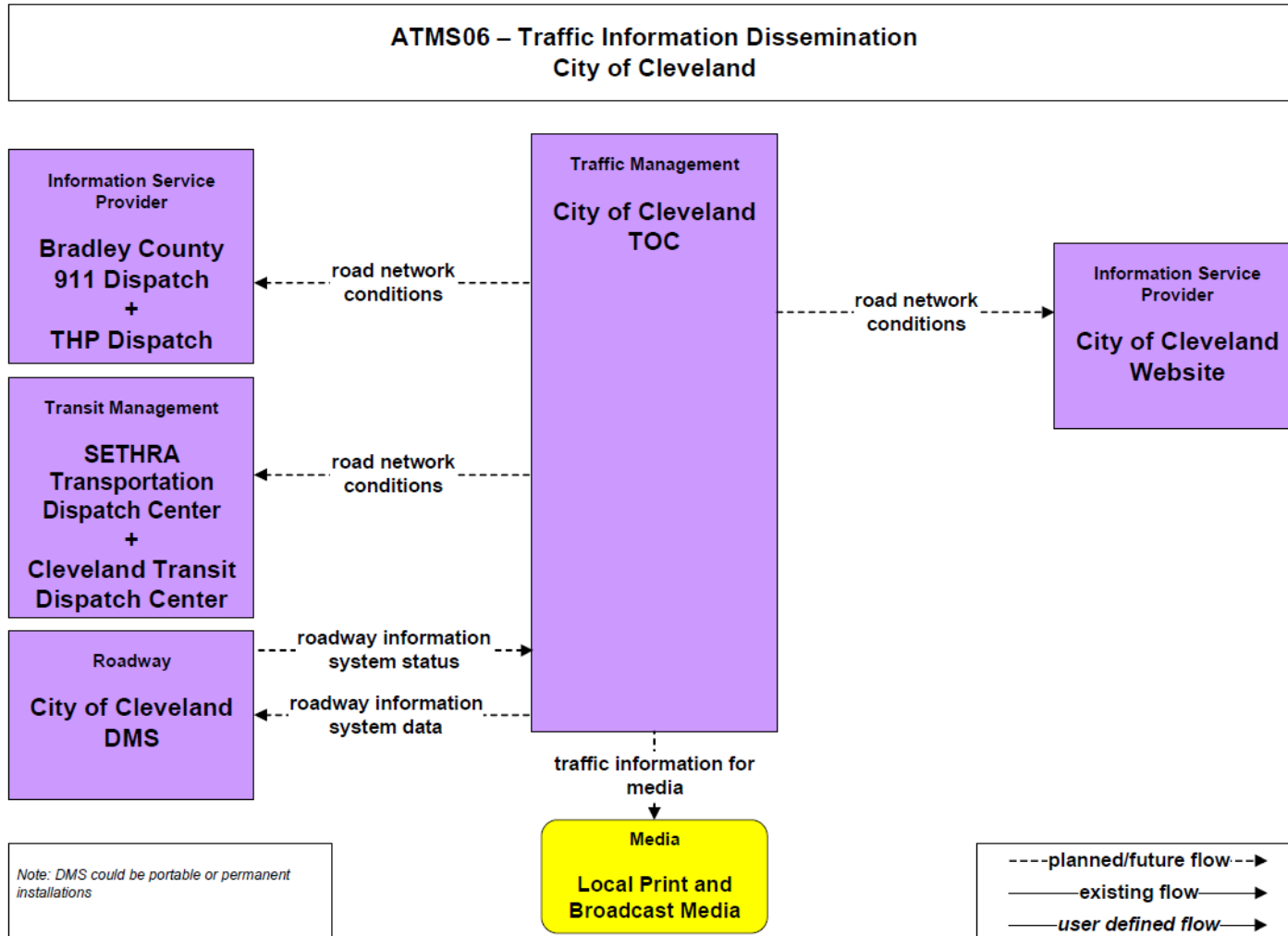


# Regional ITS Architecture Update

- Updated the following areas:
  - ITS Needs
  - Status of ITS Elements (Several Planned Elements are now Existing)
  - ITS Service Packages (Updated Data Flows, Added New ITS Service Packages)
  - ITS Deployment Plan Projects
  - Use and Maintenance Guidance Including Systems Engineering Guidance
- Comments requested by Wednesday, April 5, 2017



# Example ITS Service Package



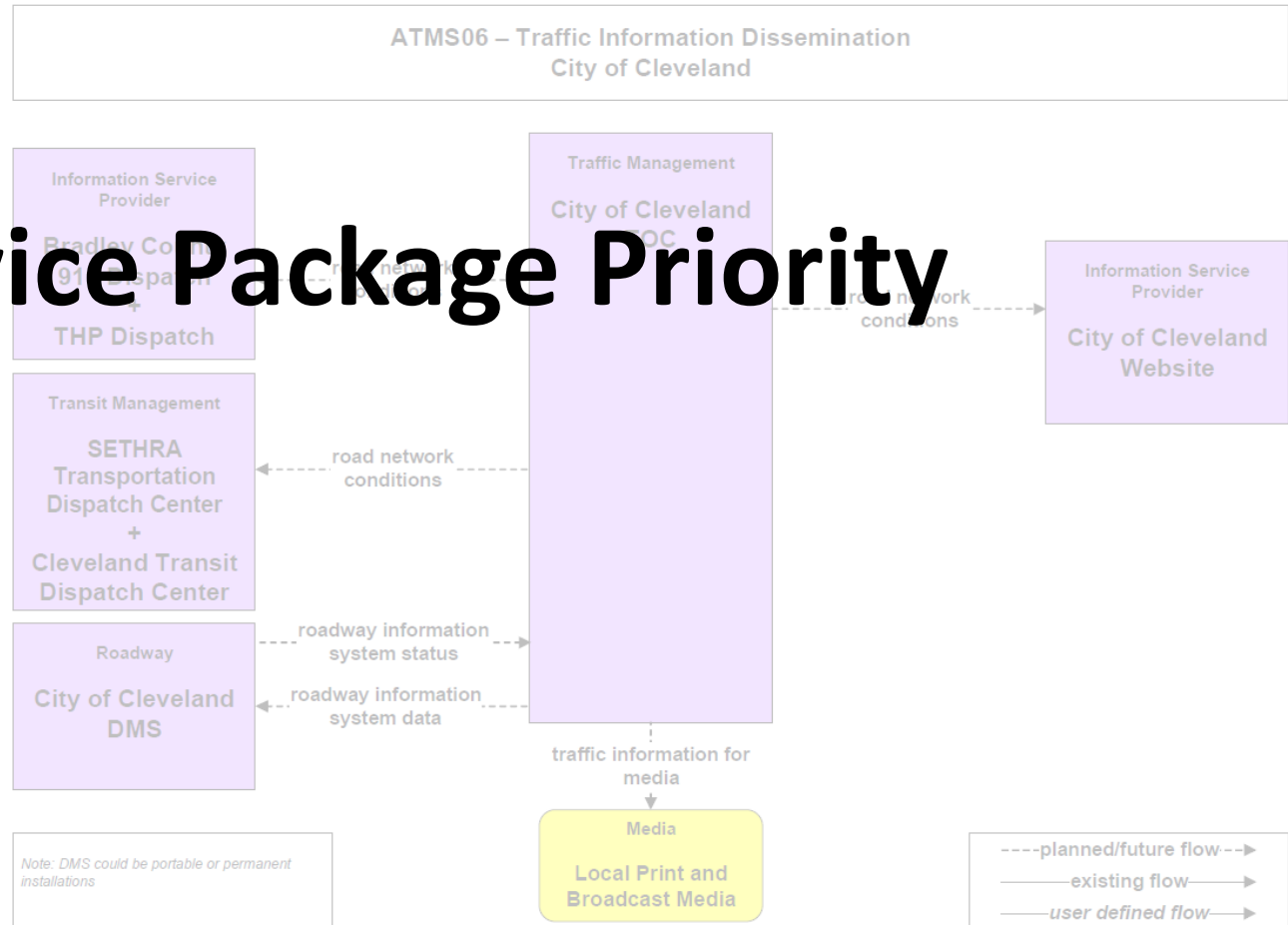
# Regional ITS Architecture Service Package Changes

Cleveland Regional ITS Architecture Service Package Updates – ATMS, EM, and MC Service Packages		
Service Packages Added or Removed	Service Packages with Added, Removed, or Edited Elements	
<p><b>ADDED:</b></p> <p>ATMS24 – Dynamic Roadway Warning (City of Cleveland)</p> <p>ATMS26 – Mixed Use Warning Systems (City of Cleveland)</p> <p><b>REMOVED:</b></p> <p>ATMS01 – Network Surveillance (TDOT Fog Management System)</p> <p>ATMS01 – Network Surveillance (City of Cleveland Overheight Vehicle Detection)</p> <p>ATMS11 – Emissions Monitoring and Management (City of Cleveland)</p> <p>ATMS19 – Speed Monitoring (TDOT Fog Management System)</p> <p>ATMS21 – Roadway Closure Management (TDOT Fog Management System)</p> <p>MC03 – Road Weather Data Collection (TDOT Fog Management System)</p> <p>MC04 – Weather Information Processing and Distribution (TDOT Fog Management System)</p> <p>MC08 – Work Zone Management (TDOT Region 2 Construction Office)</p>	<p>ATMS01 – Network Surveillance (TDOT Region 2 TMC – Knoxville)</p> <p>ATMS01 – Network Surveillance (City of Cleveland)</p> <p>ATMS03 – Traffic Signal Control (City of Cleveland Signal System)</p> <p>ATMS06 – Traffic Information Dissemination (All Applicable Stakeholders)</p> <p>ATMS07 – Regional Traffic Management (All Applicable Stakeholders)</p> <p>ATMS08 – Traffic Incident Management System (All Applicable Stakeholders)</p> <p>ATMS13 – Standard Railroad Grade Crossing (City of Cleveland)</p> <p>ATMS15 – Railroad Operations Coordination (City of Cleveland)</p> <p>ATMS19 – Speed Warning and Enforcement (City of Cleveland)</p> <p>EM02 – Emergency Routing (All Applicable Stakeholders)</p> <p>EM06 – Wide-Area Alert (Tennessee Valley Authority)</p> <p>EM08 – Disaster Response and Recovery (All Applicable Stakeholders)</p>	<p>EM09 – Evacuation and Reentry Management (Cleveland-Bradley County EMA)</p> <p>EM10 – Disaster Traveler Information (Tennessee 511 and SWIFT)</p> <p>MC01 – Maintenance and Construction Vehicle and Equipment Tracking (TDOT Region 2 District Operations)</p> <p>MC01 – Maintenance and Construction Vehicle and Equipment Tracking (City of Cleveland)</p> <p>MC01 – Maintenance and Construction Vehicle Maintenance (City of Cleveland)</p> <p>MC03 – Road Weather Data Collection (TDOT RWIS)</p> <p>MC04 – Weather Information Processing and Distribution (TDOT Region 2 District Operations)</p> <p>MC04 – Weather Information Processing and Distribution (Bradley County)</p> <p>MC08 – Work Zone Management (All Applicable Stakeholders)</p> <p>MC10 – Maintenance and Construction Activity Coordination (All Applicable Stakeholders)</p>
		<p>ATMS03 – Traffic Signal Control (Municipal Signal System)</p> <p>ATMS06 – Traffic Information Dissemination (City of Cleveland)</p>

# Regional ITS Architecture Service Package Changes (continued)

Cleveland Regional ITS Architecture Service Package Updates – APTS, ATIS, and AD Service Packages		
Service Packages Added or Removed	Service Packages with Added, Removed, or Edited Elements	Service Packages with Changes to Data Flows Only
<p><b>ADDED:</b></p> <p>APTS01 – Transit Vehicle Tracking (Cleveland Transit)</p> <p>APTS02 – Transit Fixed Route Operations (Cleveland Transit)</p> <p>APTS03 – Demand Response Transit Operations (Cleveland Transit)</p> <p>APTS04 – Transit Fare Collection Management (Cleveland Transit)</p> <p>APTS05 – Transit Security (Cleveland Transit)</p> <p>APTS06 – Transit Fleet Management (Cleveland Transit)</p> <p>APTS07 – Multimodal Coordination (SETHRA and Cleveland Transit)</p> <p>APTS08 – Transit Traveler Information (Cleveland Transit)</p> <p>APTS09 – Transit Signal Priority (Cleveland Transit)</p> <p>APTS10 – Transit Passenger Counting (Cleveland Transit)</p> <p>ATIS02 – Interactive Traveler Information (City of Cleveland Website)</p> <p>AD1 – ITS Data Mart (Cleveland Transit)</p> <p><b>REMOVED:</b></p> <p>APTS02 – Transit Fixed Route Operations (SETHRA)</p> <p>APTS10 – Transit Passenger Counting (SETHRA)</p>	<p>APTS01 – Transit Vehicle Tracking (SETHRA)</p> <p>APTS03 – Demand Response Transit Operations (SETHRA)</p> <p>APTS04 – Transit Fare Collection Management (SETHRA)</p> <p>APTS05 – Transit Security (SETHRA)</p> <p>APTS06 – Transit Fleet Management (SETHRA)</p> <p>APTS08 – Transit Traveler Information (SETHRA)</p> <p>ATIS01 – Broadcast Traveler Information (All Applicable Stakeholders)</p> <p>ATIS02 – Interactive Traveler Information (SmartWay Website)</p> <p>ATIS02 – Interactive Traveler Information (Tennessee 511)</p> <p>AD1 – ITS Data Mart (TDOT)</p> <p>AD1 – ITS Data Mart (City of Cleveland)</p> <p>AD2 – ITS Data Warehouse (Cleveland Area MPO)</p>	<p>None</p>

# ITS Service Package Priority Review



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## Discussion of Existing and Planned ITS Projects

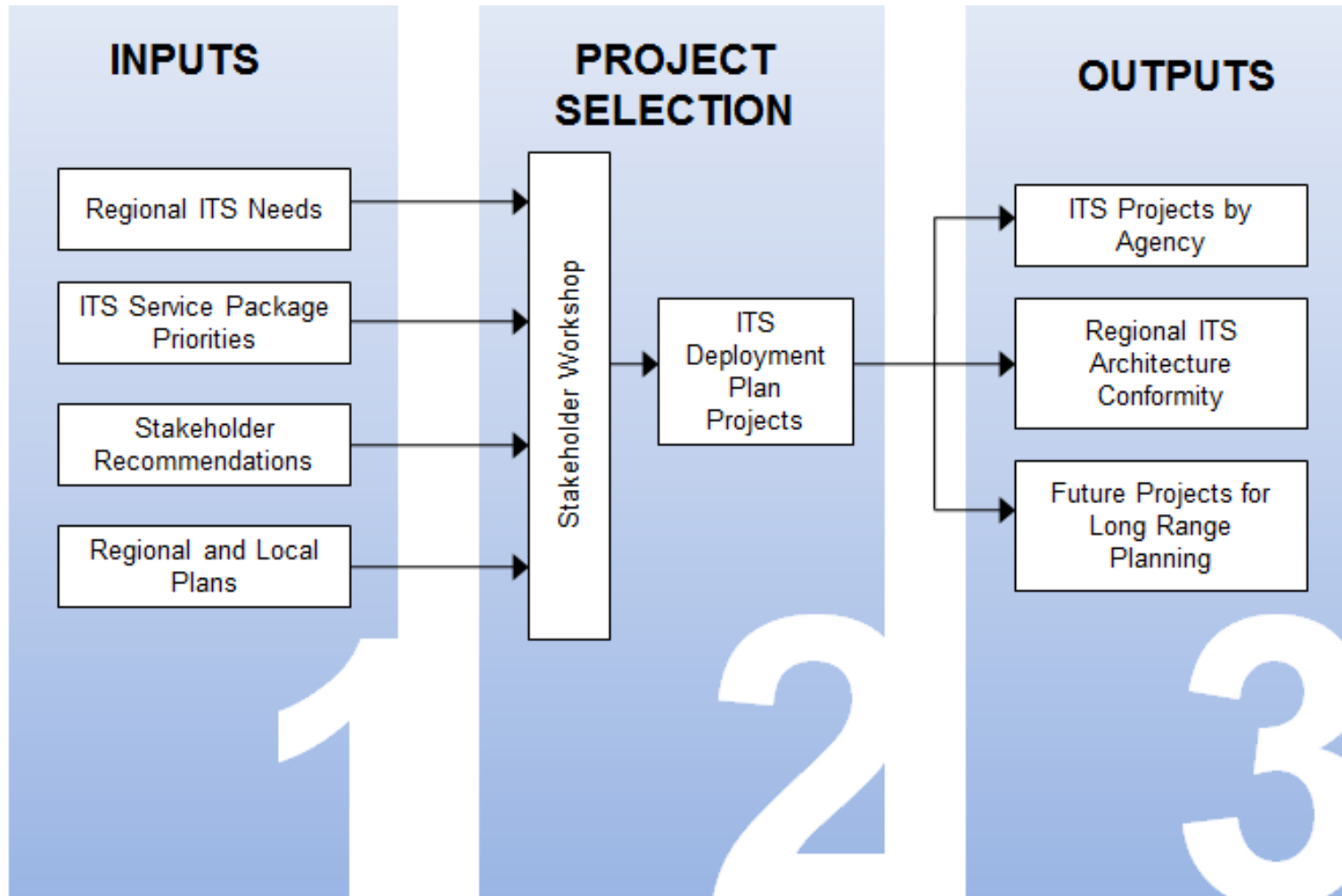
- Existing and Planned ITS Projects in the Region

## Discussion on Use and Maintenance of the Regional ITS Architecture

- Systems Engineering
- Architecture Conformance for Federal Funding
- Maintenance of the Regional ITS Architecture



# Regional ITS Deployment Plan



# Regional ITS Project Review



# Workshop Outline

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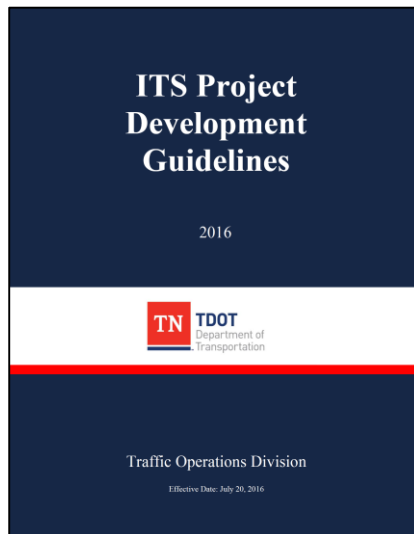
# Systems Engineering Overview

## Definition

Systems engineering is an approach that can help successfully implement systems. This approach **defines customer needs and required system functionality** early in the development cycle, determines system requirements, and then proceeds with design, implementation, verification and validation, operation, maintenance, and ultimately replacement of the system at the end of its life-cycle.

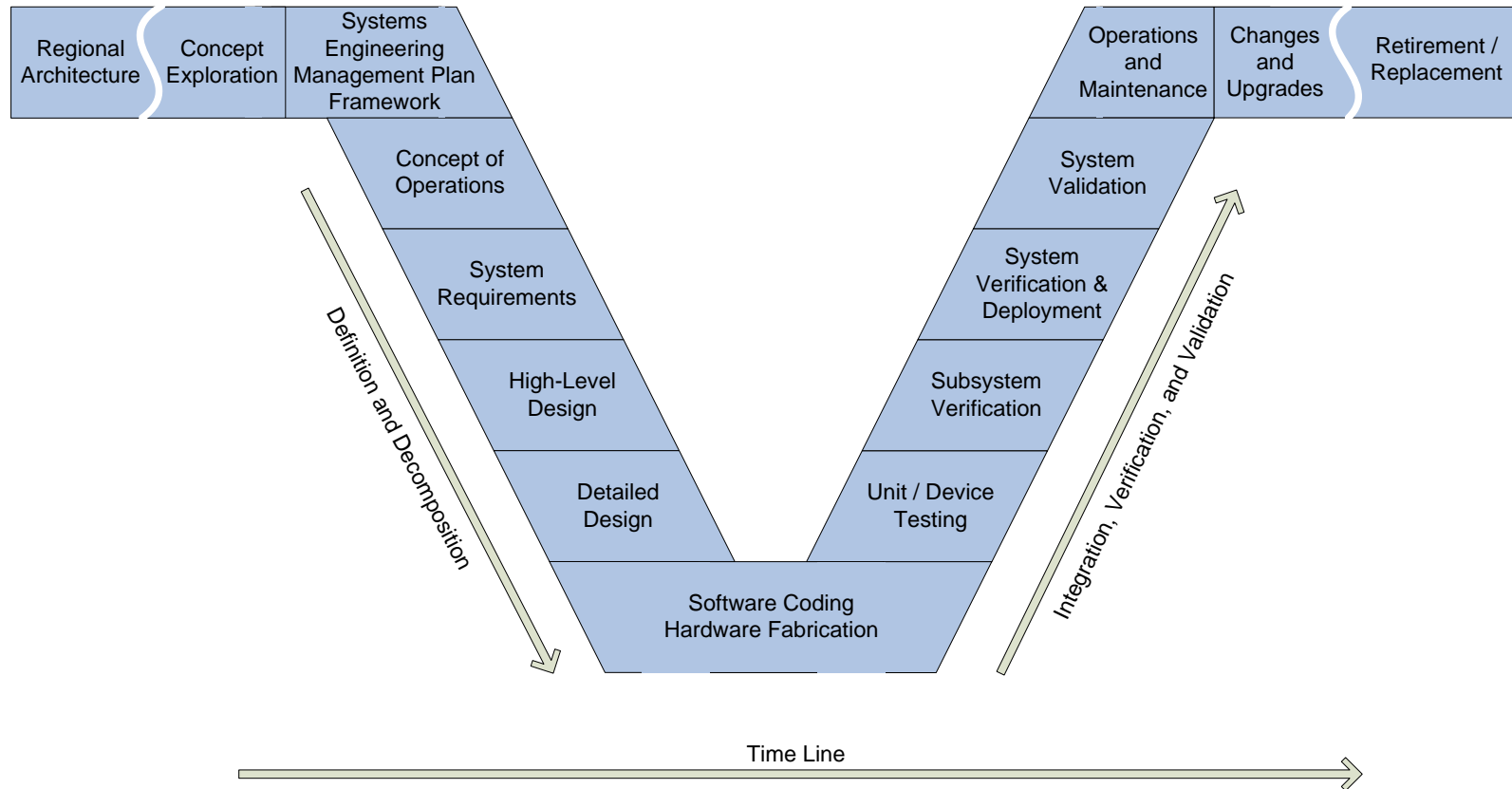
## Requirements

Using a systems engineering approach is required by the USDOT for ITS projects that use federal funds. The process includes demonstrating conformance to the Regional ITS Architecture.



Guidance can be found in the  
*TDOT ITS Project Development Guidelines*

# Systems Engineering Vee Diagram



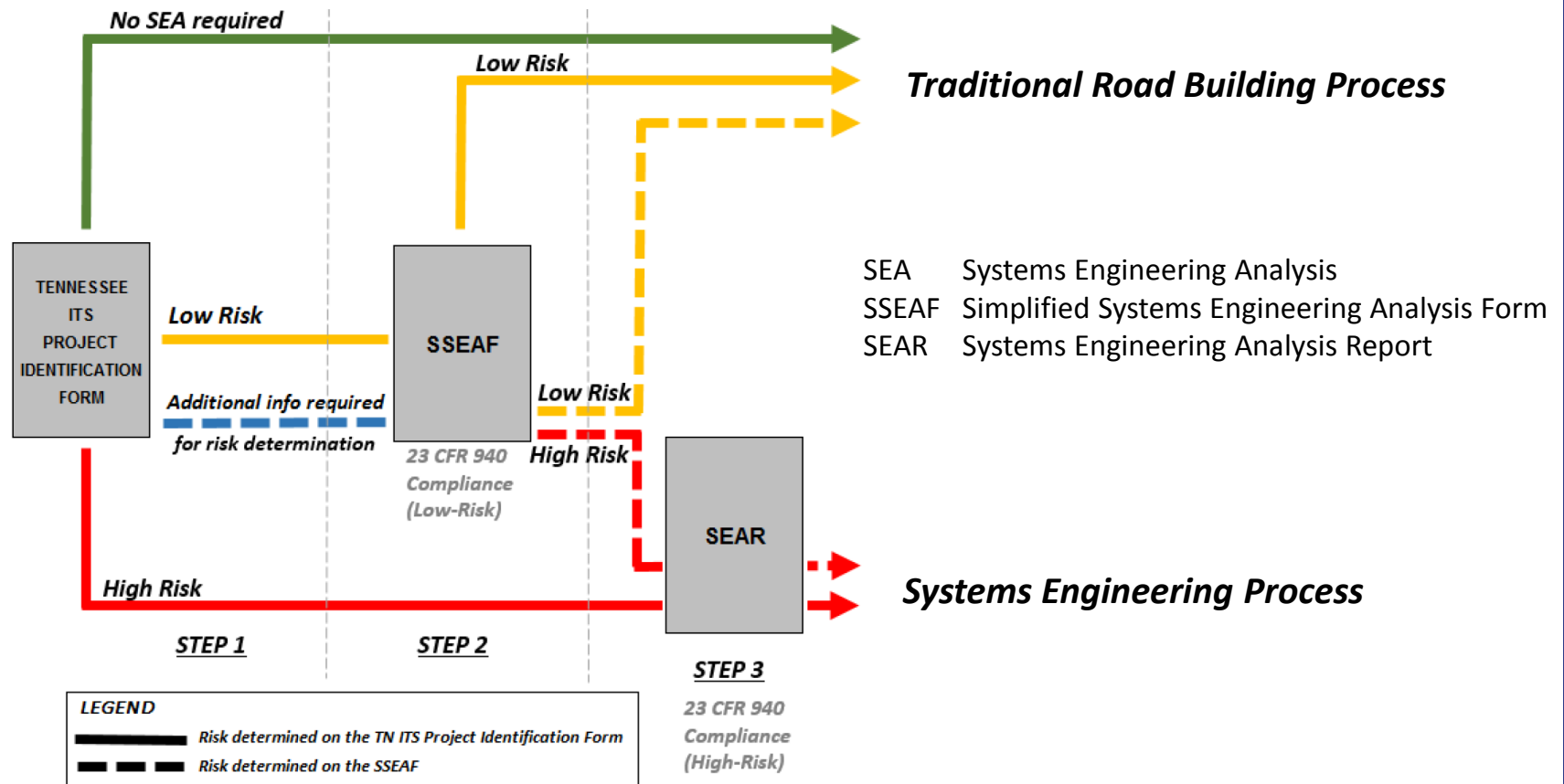


# Why Systems Engineering?

- Considers the full project life cycle, not just design
- Plans for system and addresses risks before designing
- Determines needed system functionality, which in turn helps with selecting the proper technology
- Fully documents system development, including trade-offs, alternatives, and design decisions
- Established expectations and understanding of risk helps to minimize costs and schedule overruns

**A Systems Engineering Analysis Report (SEAR) is most useful for projects whose success relies on many interacting elements or technologies**

# Is a Systems Engineering Analysis Required?



## TDOT's Process for ITS Systems Engineering Documentation

Source: TDOT ITS Project Development Guidelines (2016)

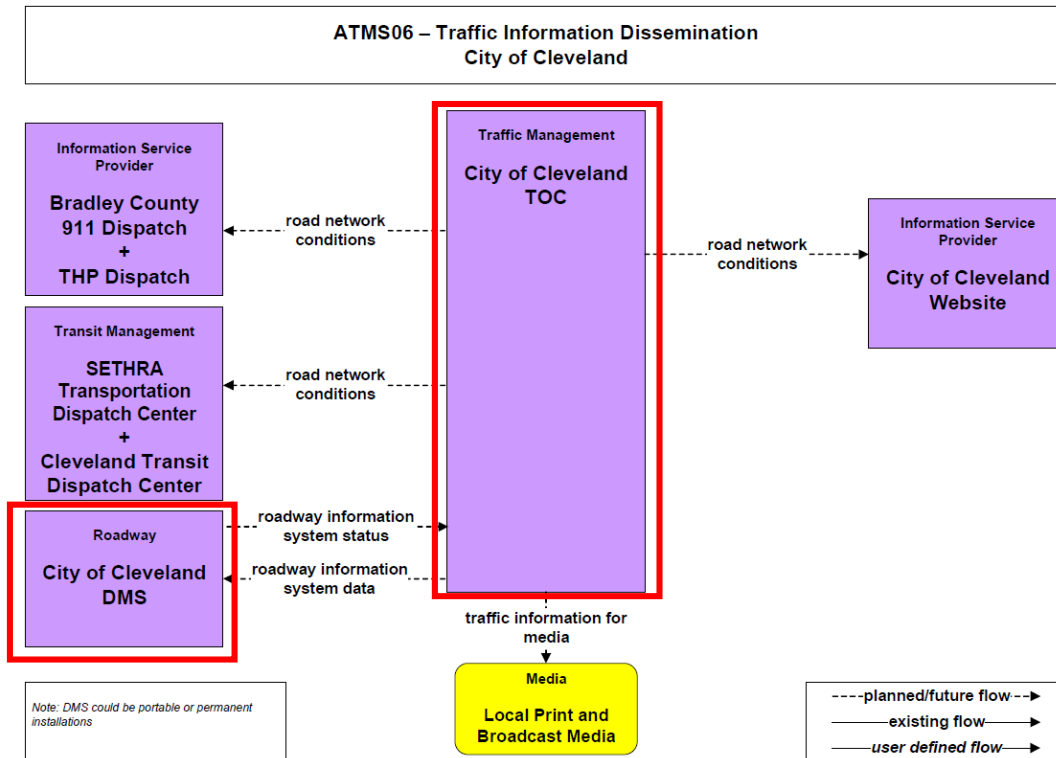
# Demonstrating Conformance

USDOT requires that ITS projects using federal funding conform to their Regional ITS Architecture. This process typically occurs in three steps:

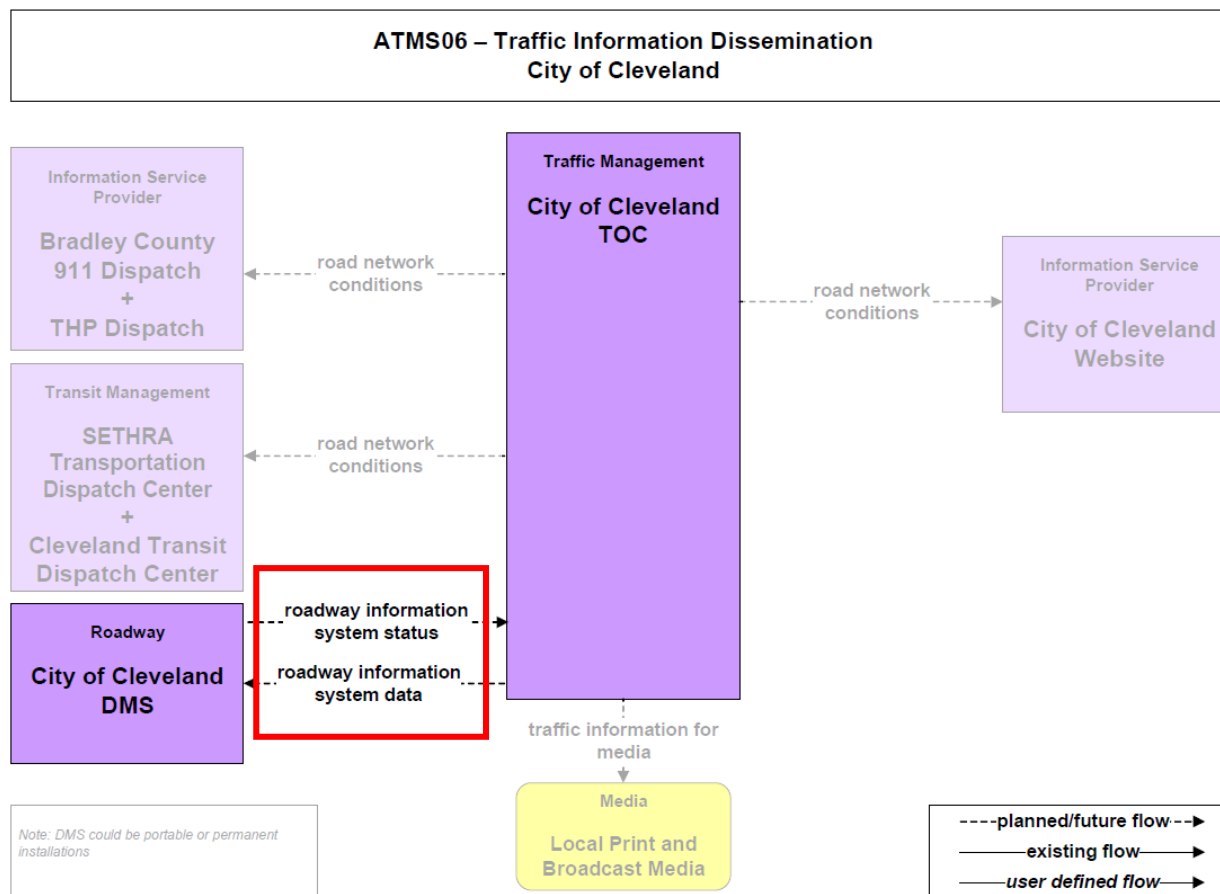
1. **Identify** the ITS components of the project
2. **Evaluate** the applicable service packages to determine if the project components and data flows are accurately documented
3. **Document** the conformance of the project to the Regional ITS Architecture or any changes that are necessary to achieve conformance

# 1. Identify ITS Components

Project	Description	Funding Status	Deployment Timeframe *	Applicable Market Packages
Cleveland DMS	Implement DMS on the US 64 Bypass to provide traveler information for detours from I-75 onto US 11. Signs would be located on North Lee Highway and on APD 40.	Funding Identified: No	Mid-term	ATMS06



# 2. Evaluate ITS Service Packages





# 3. Document Conformance

Project manager evaluates conformance to Regional ITS Architecture



*If Project does not conform*, project manager completes Regional ITS Architecture Maintenance Form and submits to maintainer



Maintainer confirms receipt of form and files form for use during next Regional ITS Architecture update

**Cleveland Regional ITS Architecture Maintenance Form**

**Question 1**  
Describe the requested change to the Regional ITS Architecture or Deployment Plan.

**Cleveland Urban Area METROPOLITAN PLANNING ORGANIZATION**

**Contact Information**

Agency	
Agency Contact Person	
Street Address	
City	
State, Zip Code	
Telephone	
Fax	
E-Mail	

**Change Information**  
Please indicate the type of change to the Regional ITS Architecture or Deployment Plan:

- ☐ Administrative Change – Basic changes that do not affect the structure of the ITS service packages in the Regional ITS Architecture.  
*Examples include: Changes to stakeholder or element name, element status, or data flow status.*
- ☐ Functional Change – Single Agency: Structural changes to the ITS service packages that impact only one agency in the Regional ITS Architecture.  
*Examples include: Addition of a new ITS service package or changes to data flow connections of an existing ITS service package. The addition or changes would only impact a single agency.*
- ☐ Functional Change – Multiple Agencies: Structural changes to the ITS service packages that have the potential to impact multiple agencies in the Regional ITS Architecture.  
*Examples include: Addition of a new ITS service package or changes to data flow connections of an existing ITS service package. The addition or changes would impact multiple agencies and require coordination between the agencies.*
- ☐ Project Change – Addition, modification, or removal of a project in the Regional ITS Deployment Plan.
- ☐ Other: \_\_\_\_\_

**Submittal**  
Please submit ITS Architecture Maintenance Documentation form to:  
Cleveland Metropolitan Planning Organization  
185 2nd Street NE  
Cleveland, TN 37311  
Phone: 423-479-1913  
E-mail: gthomas@clevelandtn.gov

Form Submittal Date: \_\_\_\_\_

Regional ITS Architecture Maintenance Form  
Version 2.0 – March 2017

# Regional ITS Architecture Maintenance

## Cleveland Regional ITS Architecture Maintenance Summary

Maintenance Details	Regional ITS Architecture and Deployment Plan	
	Minor Update	Full Update
<b>Timeframe for Updates</b>	As needed	Review in coordination with the update to the Regional Transportation Plan
<b>Scope of Update</b>	Review and update service packages to satisfy architecture compliance requirements of projects or to document other changes that impact the Regional ITS Architecture.	Entire Regional ITS Architecture and Deployment Plan
<b>Lead Agency</b>	Cleveland MPO in Coordination with TDOT	
<b>Participants</b>	Stakeholders impacted by service package modifications	Entire stakeholder group
<b>Results</b>	ITS service package or other change(s) documented for next complete update	Updated Regional ITS Architecture and Deployment Plan document, Appendices, and Turbo Architecture database

# Thank You!

**Tom Fowler**

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**Greg Thomas**

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**Joseph Roach**

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