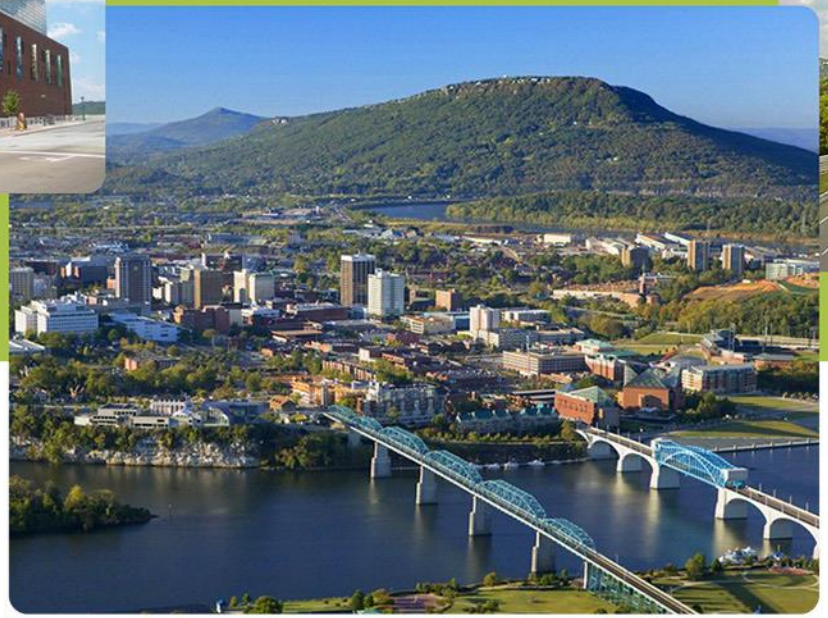


RPA

Chattanooga Regional ITS Architecture Update

Stakeholder Kickoff Meeting

Kimley»Horn

October 18, 2016

Outline

Overview of ITS

- What is ITS?
- ITS Benefits
- ITS Applications

Overview of Regional ITS Architectures

- What is a Regional ITS Architecture?
- Benefits of the Regional ITS Architecture
- Other Federal FHWA Programs and Initiatives

Discussion

- Regional ITS Architecture Update Process
- Existing and Planned Projects in the Region
- ITS Needs in the Region
- Interagency Connections in the Region

What is ITS?

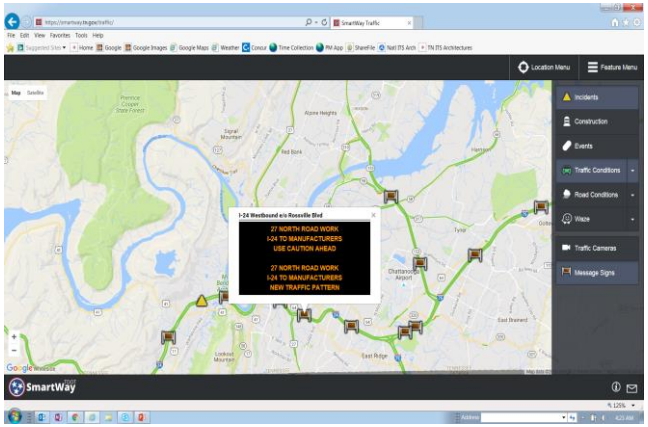
ITS:

An acronym that stands for Intelligent Transportation Systems.

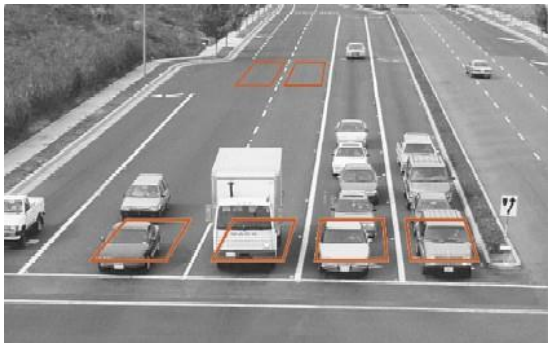
One definition of ITS:

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

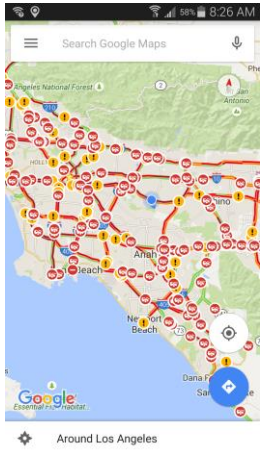
What is ITS?


Location Menu
Feature Menu
Incidents
Construction
Events
Traffic Conditions
Road Conditions
Waze
Traffic Cameras
Message Signs
I-24 Westbound e/o Rossville Blvd
27 NORTH ROAD WORK
I-24 TO MANUFACTURERS
USE CAUTION AHEAD
27 NORTH ROAD WORK
I-24 TO MANUFACTURERS
NEW TRAFFIC PATTERN
SmartWay

TRUCKS USE CNTR LANE



Why Deploy ITS?



Why Deploy ITS?

- Congestion caused urban Americans to travel **6.9 billion hours** longer and use an extra **3.1 billion gallons** of fuel for an estimated congestion cost of **$160 billion**
- Annual delay for the average traveler was **42 hours,** wasting **19 gallons** of fuel at a value of about **$960** per traveler
- Some of the most common causes of congestion included incidents, special events, and weather

**from the 2015 Urban Mobility Scorecard*

ITS Benefits

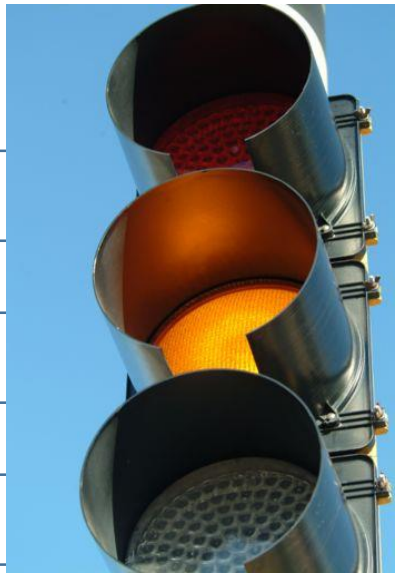
- Increased roadway and transit efficiency
- Enhanced incident and special event management
- Improved safety for travelers, public safety, and maintenance personnel
- Accurate and timely traveler information

ITS Applications

- Traffic Management
- Traveler Information
- Emergency Management
- Maintenance & Construction Management
- Public Transportation
- Commercial Vehicle Operations
- Archived Data Management
- Vehicle Safety (Connected & Autonomous Vehicles)

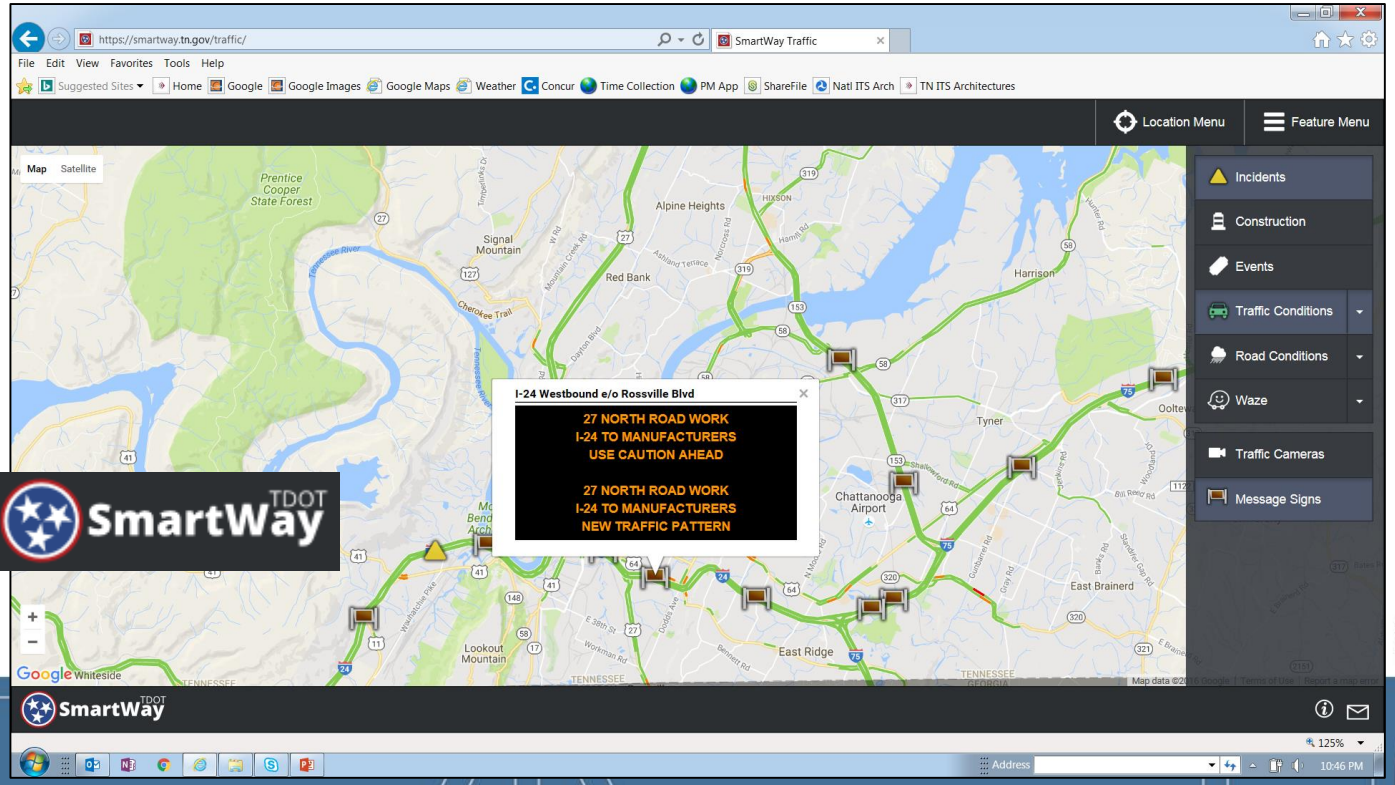
Traffic Management

- Data Collection
- Control
- Roadside Traveler Information



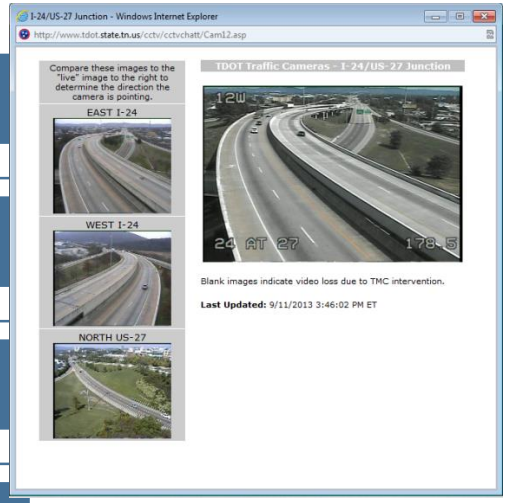
Traveler Information

- Traveler Information Website
- 511 Traveler Information Phone Number



Emergency Management

- Computer-aided Dispatch Systems
- AMBER Alerts
- Traffic Signal Preemption
- Video/Information Sharing
- Coordinated Incident Management



Public Transportation

- Smart Fare Payment Systems
- Automated Vehicle Location
- Video Security Systems
- Real-time Bus Arrival Information
- Transit Signal Priority
- Automated Passenger Counters

Commercial Vehicle Operations

- Freight Administration
- Weigh-In-Motion
- HAZMAT Management
- Freight Assignment Management

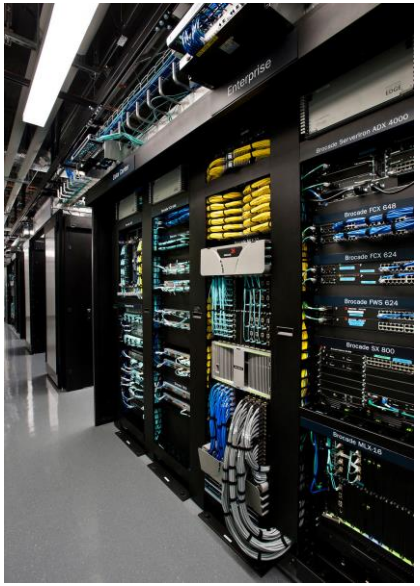
Not a large component of regional ITS planning because CVO are mostly determined at a state level.

Maintenance & Construction Management

- Flood Detection and Closure Systems
- Smart Work Zones
- Anti-icing Systems
- Vehicle Tracking Systems

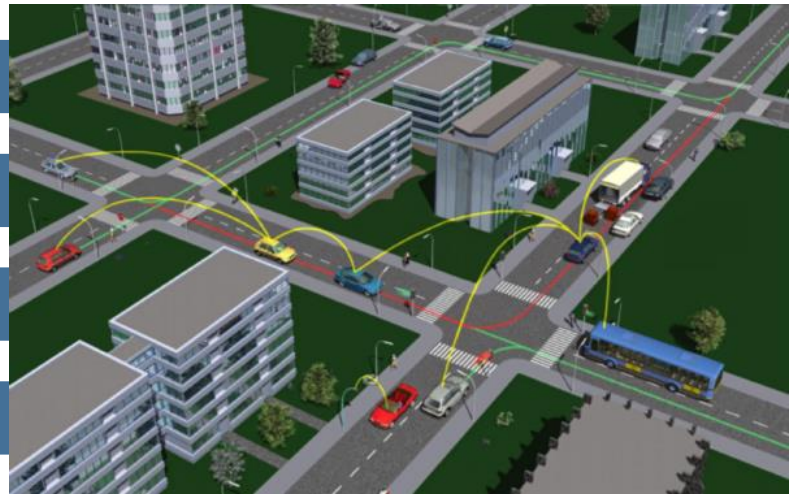
Archived Data Management

- Archived Data User Service at Traffic Management Centers
- ITS Virtual Data Warehouse



Emerging ITS Technologies

- Automated Vehicles
- Connected Vehicles
- Active Traffic Management
- Integrated Corridor Management
- Decision Support Systems
- Vehicle Detection System (Bluetooth)
- Privatized Traffic Data



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Regional ITS Architectures – an overview

Nick Renna
Operations Program Manager
Federal Highway Administration
Tennessee Division Office

U.S. Department of Transportation
Federal Highway Administration

Discussion Topics

1. Regional ITS Architectures
2. Planning for “TSM&O”
3. Connected Vehicles – V2I
4. Real-time traveler information
5. Opportunities for Chattanooga RITSA update

Regional ITS what?

Skyscape over Autumn Colors on the Cherohala Skyway

Regional Intelligent Transportation System Architecture

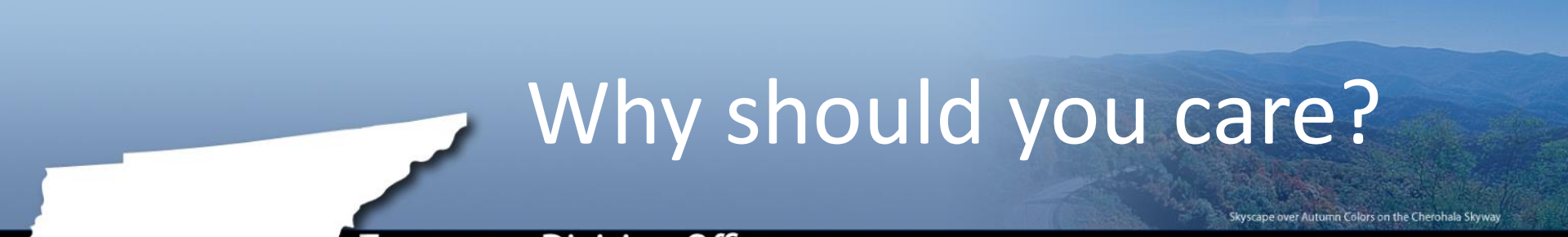
…or **"RITSA"**

Put simply, it is a vision for how transportation should work in a metropolitan area given all the technologies that are reasonably expected to be available.

Key pieces of a RITSA:

- Regional description
- Stakeholders
- Operational concept, including roles and responsibilities
- Operational agreements (such as MOUs)
- Functional requirements
- Information exchanges: existing and planned
- Applicable ITS standards
- Project sequence (a.k.a. deployment plan)

Why should you care?



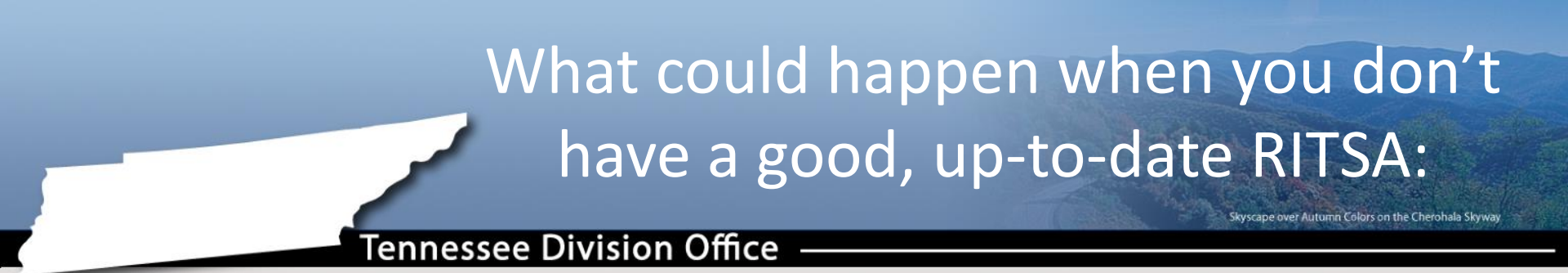
Tennessee Division Office

- All Highway Trust Fund ITS projects must conform with a RITSA

…yes, but RITSAs also:

- Help scope projects appropriately
- Ensure regional interoperability
- Offer a focused perspective for long-range planning
- Ensure preparedness for un-deployed technologies

What could happen when you don't have a good, up-to-date RITSA:



Tennessee Division Office

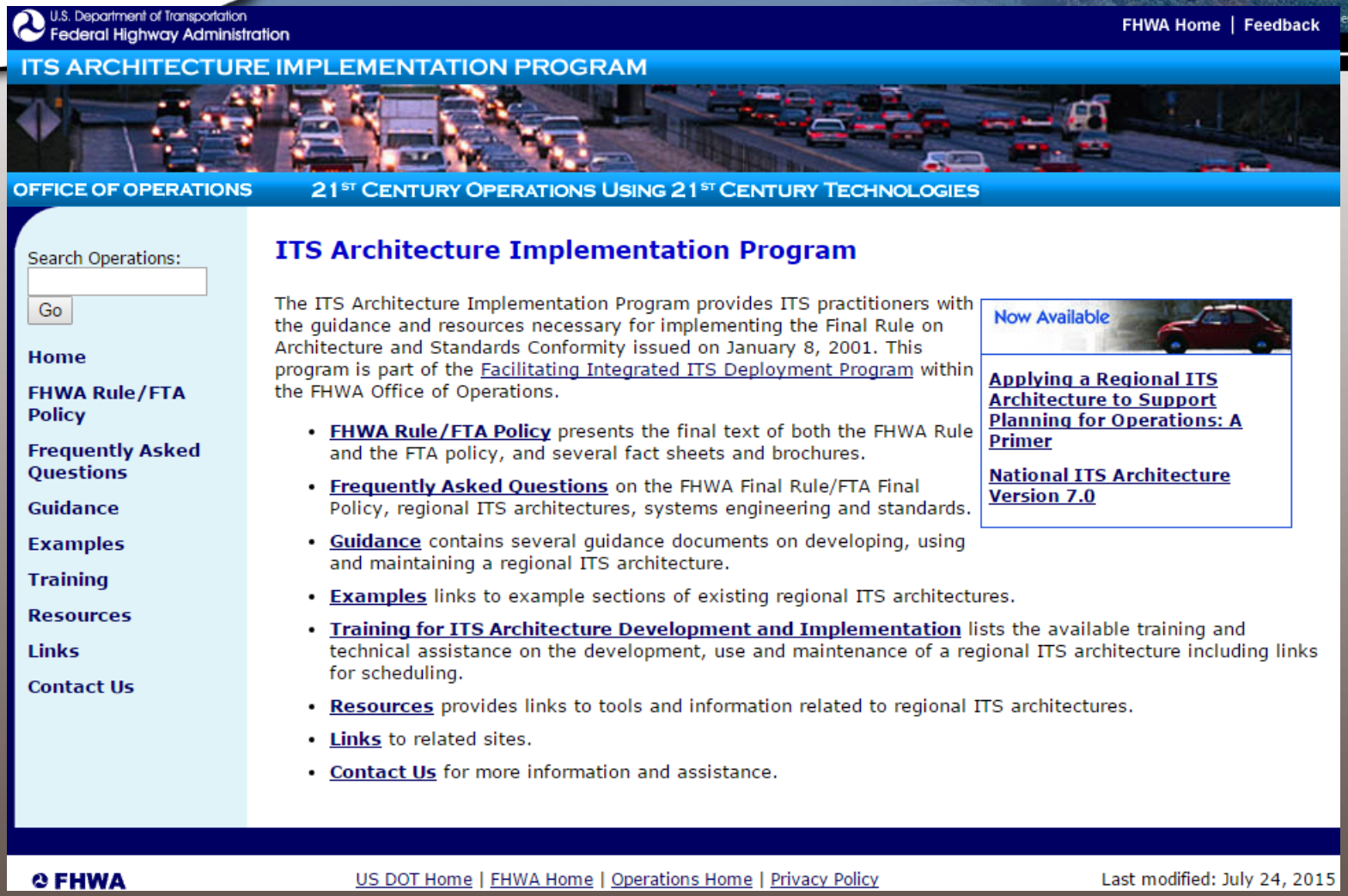
- The traveler experience is inconsistent, traveler information doesn't achieve its potential, and public satisfaction worsens
- Across jurisdictions systems are incompatible, and opportunities to enhance safety and mobility are missed
- Project life-cycle is reduced as obsolescence becomes commonplace
- Agency costs rise as ITS deployments become segregated from other project deliveries

A RITSA should be based on:

Skyscape over Autumn Colors on the Cherohala Skyway

- The requirements of 23 CFR 940 (www.ecfr.gov)
- The National ITS Architecture (http://www.iteris.com/itsarch/index.htm)
- The respective state or states ITS architecture (https://www.tn.gov/tdot/topic/its-statewide)
- Ideally, the format of Turbo Architecture software
- Former RITSAs and adjacent area RITSAs
- **Regional needs and priorities using stakeholder input!**

RITSA Resources



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Federal Highway Administration

http://www.ops.fhwa.dot.gov/its_arch_imp/

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Planning for TSM&O

U.S. Department of Transportation
Federal Highway Administration

Planning for TSM&O

Tennessee Division Office

- TSM&O = transportation system management and operations
- Purpose of TSM&O = managing the existing capacity of transportation infrastructure with strategies that optimize reliability and safety

Planning for TSM&O

Tennessee Division Office

Difference between TSM&O and ITS?

-TSM&O doesn't need to be ITS – for example, freeway service patrols, non-connected traffic signals, special event management, etc.

-Most, if not all, ITS is TSM&O, but not all TSM&O is ITS

Planning for TSM&O at TDOT

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Skyscape over Autumn Colors on the Cherohala Skyway

- **Capability Maturity Model (CMM) Assessment** to organize for transportation reliability
- **TSM&O Coordinating Committee** and working groups
- **CMM Implementation Plan** (ITS Asset Management System, TSM&O Annual Report, etc.)
- Sent staff to **Operations Academy** http://operationsacademy.org/
- Draft **Traffic Operations Program Plan** and starting new Statewide ITS Architecture
- **Reliability measure** integration in long-range plan policies
- SHRP2 award to apply **regional operations forums (ROFs)**

http://www.fhwa.dot.gov/goshrp2/Solutions/Reliability/L36/Regional_Operations_Forum

Planning for TSM&O at MPOs?

Skyscape over Autumn Colors on the Cherohala Skyway

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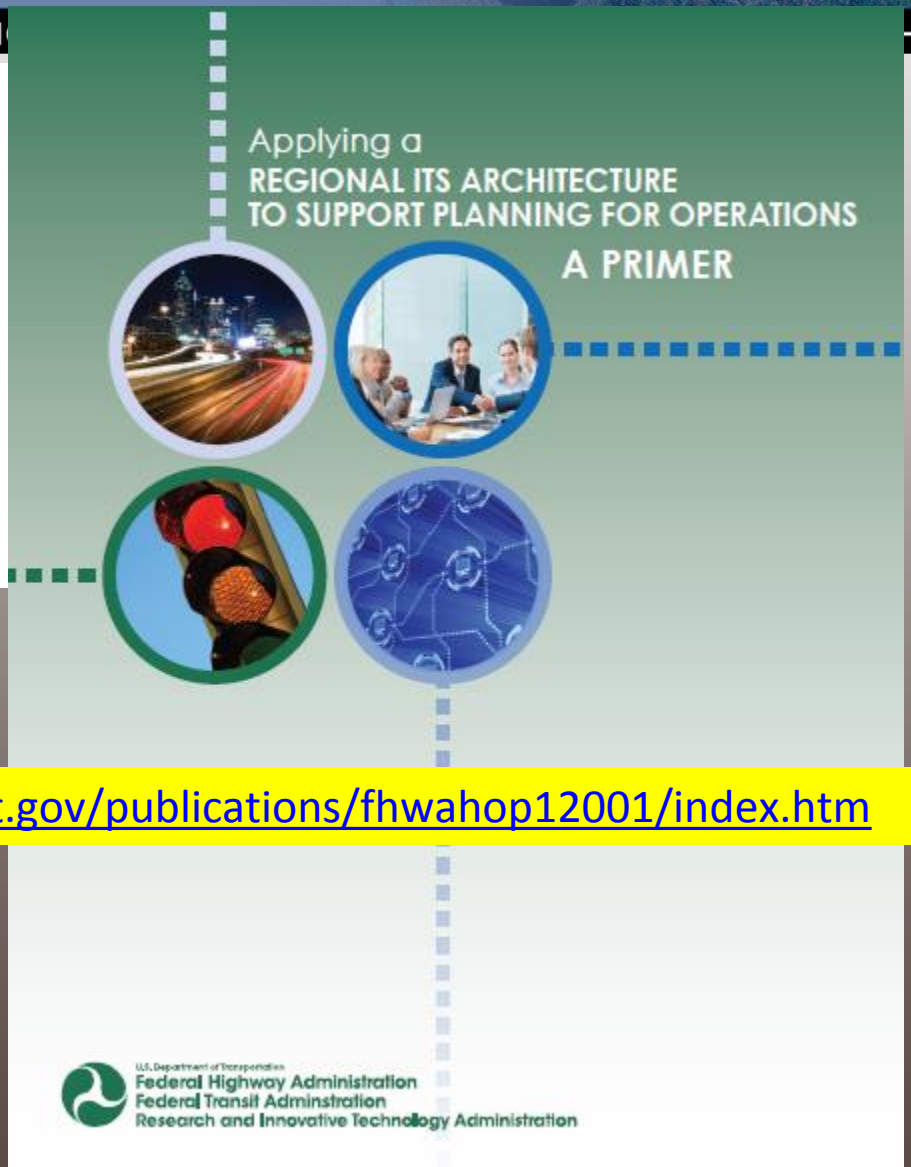
- Same tools are available

The role of the RITSA:

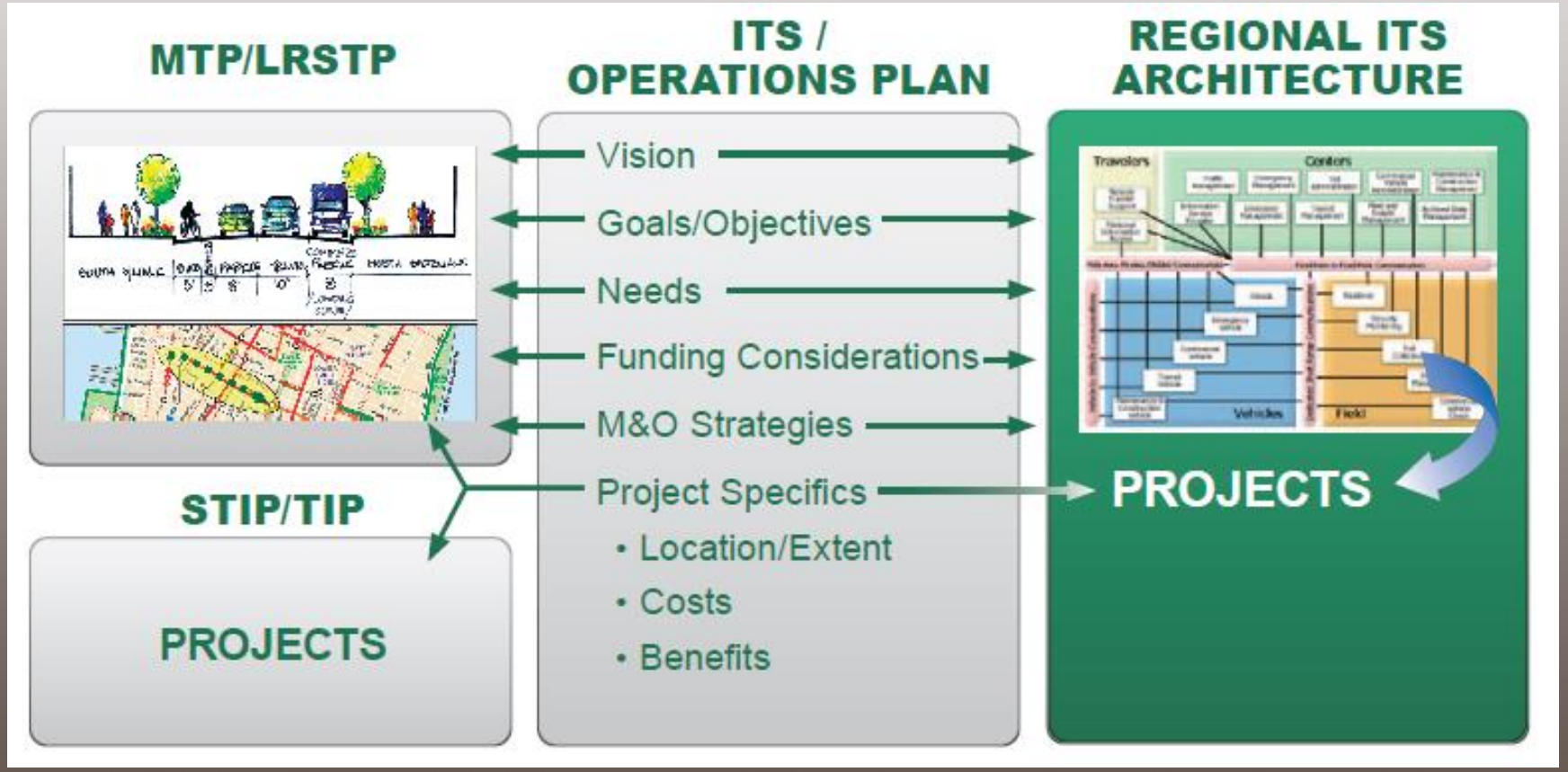


http://www.ops.fhwa.dot.gov/publications/fhwahop12001/index.htm

U.S. Department of Transportation
Federal Highway Administration

Before TSM&O plans:

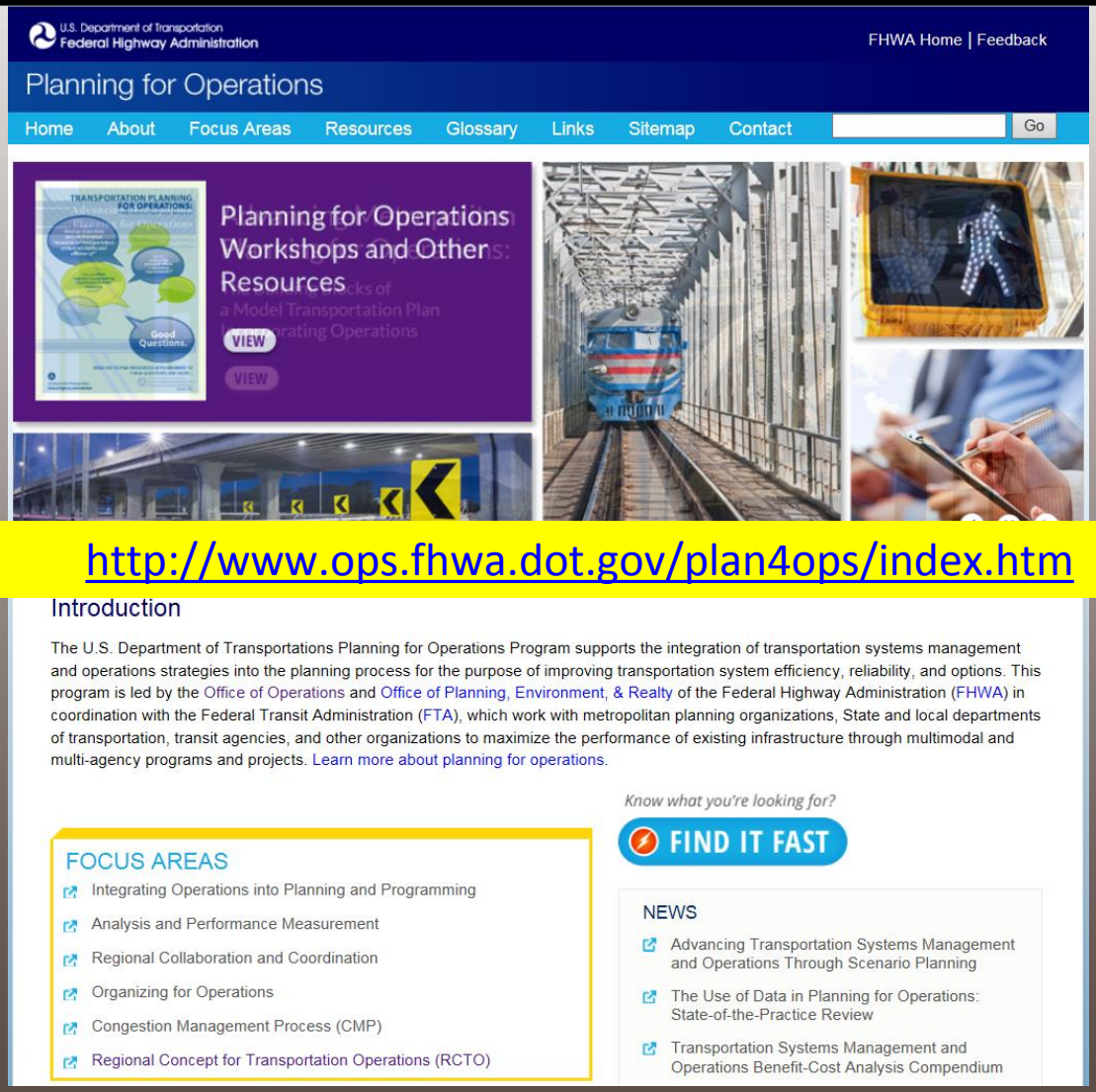
Skyscape over Autumn Colors on the Cherohala Skyway



FHWA Planning for Operations

Skyscape over Autumn Colors on the Cherohala Skyway

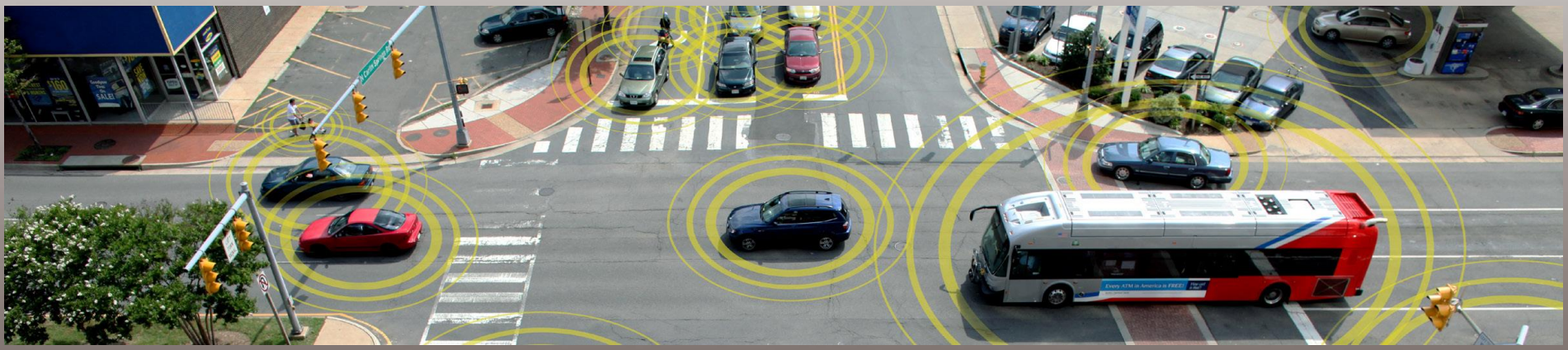
Tennessee Division Office



U.S. Department of Transportation
Federal Highway Administration

Skyscape over Autumn Colors on the Cherohala Skyway

So what about connected vehicles?



Let's catch up:

Skyscape over Autumn Colors on the Cherohala Skyway

- Connected vehicles talk to each other (V2V) or talk with the road (V2I)
- Autonomous vehicles drive themselves
- CVs can use any sort of technology, but DSRC is the radio bandwidth currently reserved for CV communications

http://its.dot.gov/cv_basics/index.htm

What USDOT has been up to

Skyscape over Autumn Colors on the Cherohala Skyway

- Systems engineering documents and standards

http://its.dot.gov/pilots/cv_pilot_apps.htm

Connected Vehicle Applications

V2I Safety

Red Light Violation Warning
Curve Speed Warning
Stop Sign Gap Assist
Spot Weather Impact Warning
Reduced Speed/Work Zone Warning
Pedestrian in Signalized Crosswalk Warning (Transit)

V2V Safety

Emergency Electronic Brake Lights (EEBL)
Forward Collision Warning (FCW)
Intersection Movement Assist (IMA)
Left Turn Assist (LTA)
Blind Spot/Lane Change Warning (BSW/LCW)
Do Not Pass Warning (DNPW)
Vehicle Turning Right in Front of Bus Warning (Transit)

Agency Data

Probe-based Pavement Maintenance
Probe-enabled Traffic Monitoring
Vehicle Classification-based Traffic Studies
CV-enabled Turning Movement & Intersection Analysis

Environment

Eco-Approach and Departure at Signalized Intersections
Eco-Traffic Signal Timing
Eco-Traffic Signal Priority
Connected Eco-Driving
Wireless Inductive/Resonance Charging
Eco-Lanes Management
Eco-Speed Harmonization
Eco-Cooperative Adaptive Cruise Control
Eco-Traveler Information
Eco-Ramp Metering
Low Emissions Zone Management
AFV Charging / Fueling Information
Eco-Smart Parking
Dynamic Eco-Routing (light vehicle, transit, freight)
Eco-ICM Decision Support System

Road Weather

Motorist Advisories and Warnings (MAW)
Enhanced MDSS
Vehicle Data Translator (VDT)
Weather Response Traffic Information (WxTINFO)

Mobility

Advanced Traveler Information System
Intelligent Traffic Signal System (I-SIG)
Signal Priority (transit, freight)
Mobile Accessible Pedestrian Signal System (PED-SIG)
Emergency Vehicle Preemption (PREEMPT)
Dynamic Speed Harmonization (SPD-HARM)
Queue Warning (Q-WARN)
Cooperative Adaptive Cruise Control (CACC)
Incident Scene Pre-Arrival Staging Guidance for Emergency Responders (RESP-STG)
Incident Scene Work Zone Alerts for Drivers and Workers (INC-ZONE)
Emergency Communications and Evacuation (EVAC)
Connection Protection (T-CONNECT)
Dynamic Transit Operations (T-DISP)
Dynamic Ridesharing (D-RIDE)
Freight-Specific Dynamic Travel Planning and Performance
Drayage Optimization

Smart Roadside

Wireless Inspection
Smart Truck Parking

What USDOT has been up to

- Pilot deployments:
  - http://www.its.dot.gov/pilots/
  - Wyoming, NYC, Tampa
  - Lessons and resources
- Connected Vehicle Affiliated Test Beds
  - http://www.its.dot.gov/testbed.htm
- Engineering and planning tools
  - RDE, OSADP, CVRIA, SET-IT, CO-PILOT, and upcoming guidance documents

Skyscape over Autumn Colors on the Cherohala Skyway

A quick word about Every Day Counts

EDC
every day counts

A quick word about Every Day Counts

Skyscape over Autumn Colors on the Cherohala Skyway

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ITS-related initiatives part of Round 4:

- Using Data to Improve Traffic Incident Management
- Automated Traffic Signal Performance Measures (ATSPMs)
- Road Weather Management – Weather-Savvy Roads

See fact sheets handed out.

EDC every day counts

http://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/

Skyscape over Autumn Colors on the Cherohala Skyway

Real-time traveler information

http://www.ops.fhwa.dot.gov/1201/index.htm

Real-time traveler information

23 CFR 511:

By November 8, 2014, state agencies needed to make available real-time information on the Interstate system:

- -Lane blockages
- -Road weather
- -Construction
- -Travel times or speeds

Real-time traveler information

23 CFR 511.311(d):

In short:

RITSAs need to ensure all this happens, too.

Real-time traveler information

TDOT:

-Recently joined Waze's "Connected Citizens" program

-Recently overhauled its SmartWay website

-In process of upgrading its TMC software

Tennessee Division Office

Thank you!

Questions?

Nick Renna

615-781-5769

nicholas.renna@dot.gov

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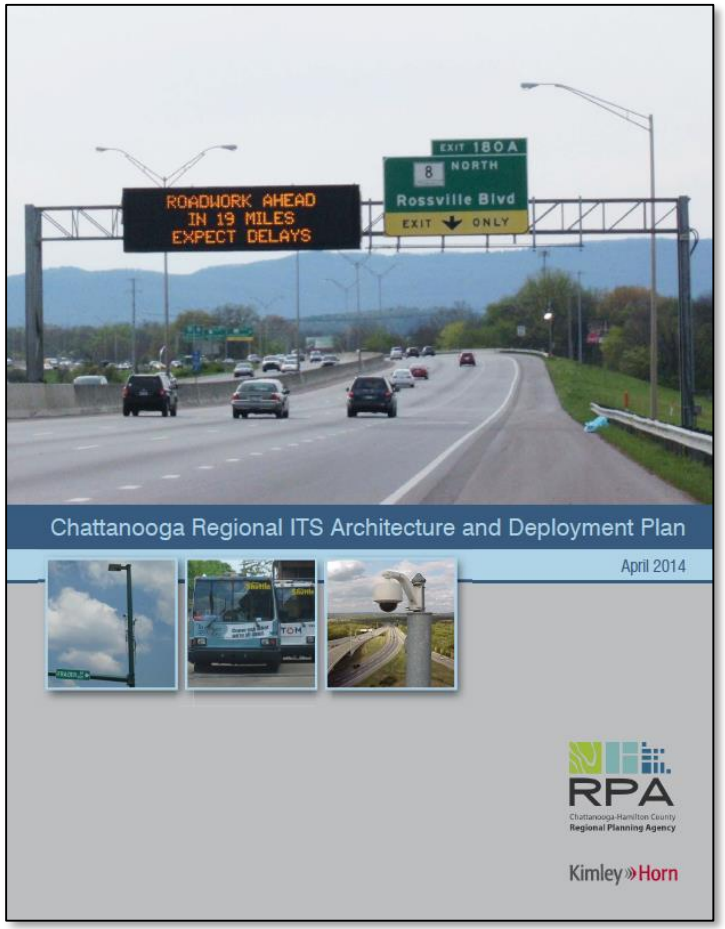
Chattanooga Regional ITS Architecture

Defines:

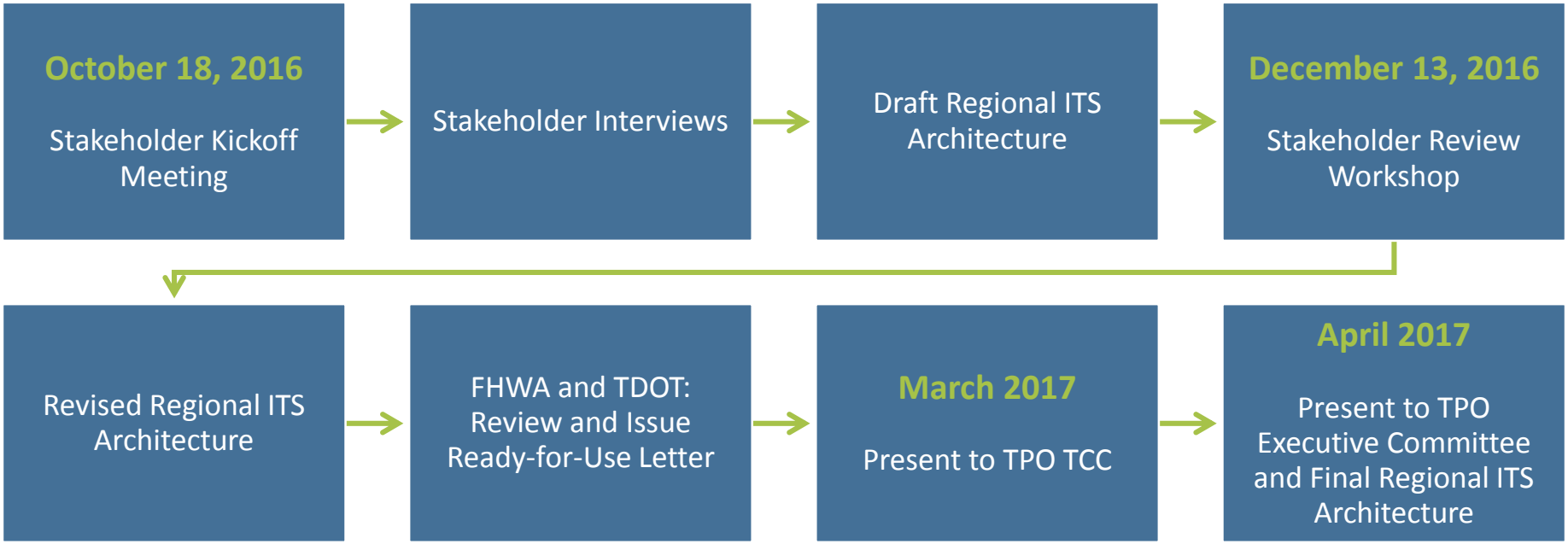
- ITS Inventory and Needs
- ITS Services and Agencies Involved
- Projects to be Deployed



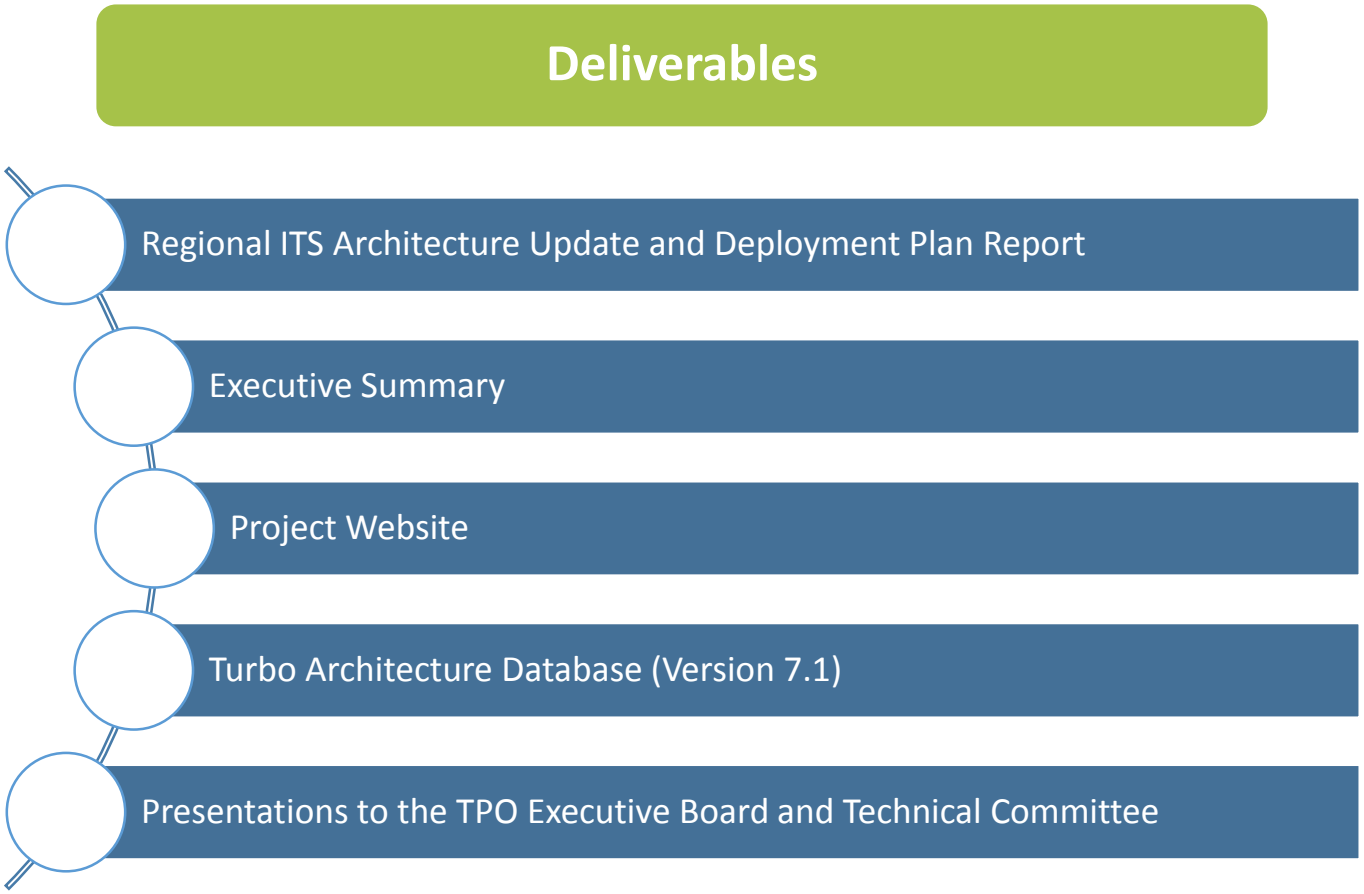
Last updated in 2014

Update Process

Schedule

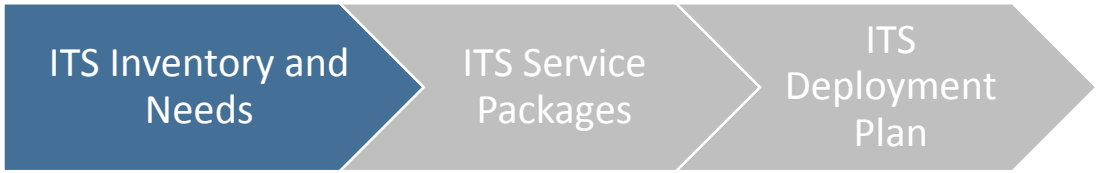


Update Process



Update Process

Update Process



Inventory

- Identify all existing and planned ITS components
- Identify all existing and planned connections between components

Needs

- Identify transportation needs in the Region
- Needs can be general or specific to ITS
- Continually update needs list throughout the project

Update Process

ITS service packages are the services that ITS can provide in the Region

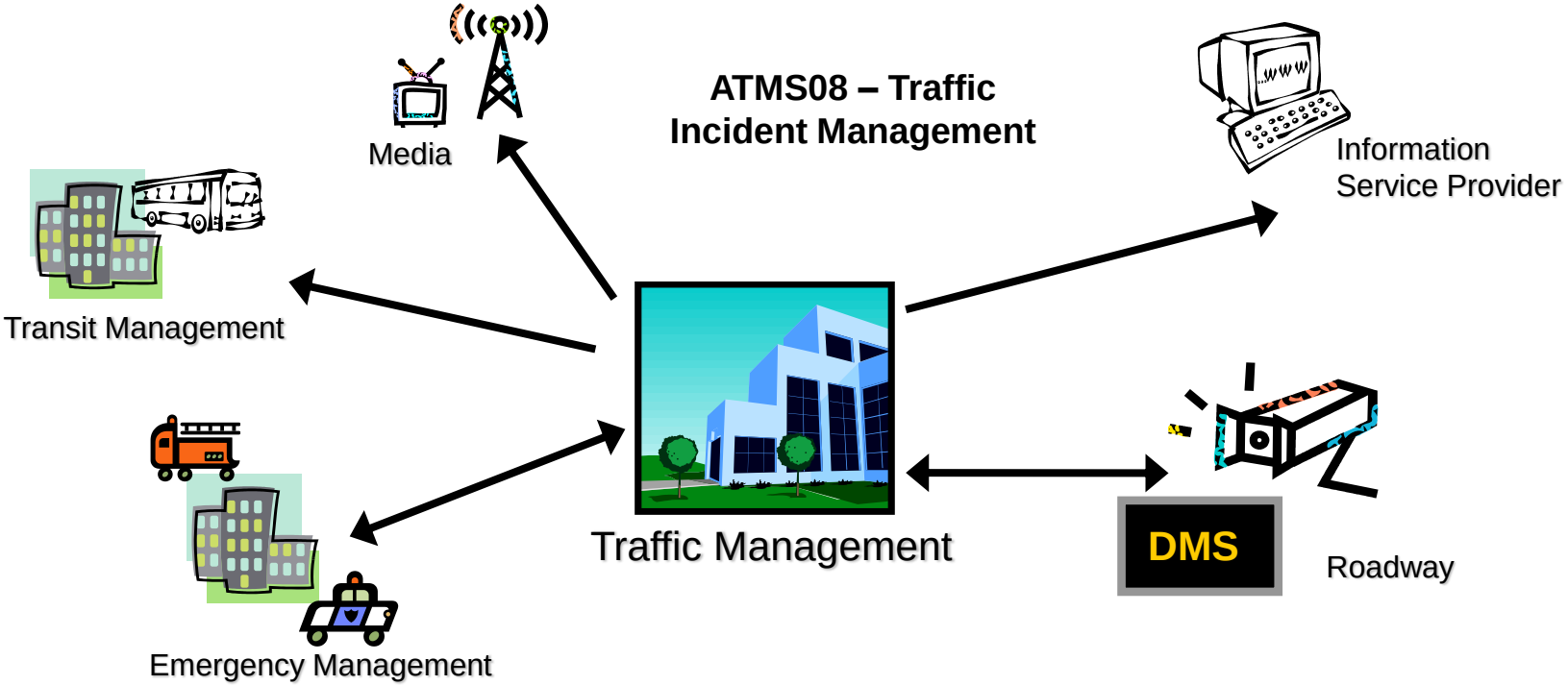
Common service packages:

- Network Surveillance
- Traffic Signal Control
- Traffic Information Dissemination
- Incident Management
- Road Weather Data Collection
- Transit Vehicle Tracking
- Transit Security
- Transit Signal Priority

A total of 97 service packages exist in the current version of the National ITS Architecture. 47 were selected for the current version of the Chattanooga Regional ITS Architecture.

Update Process

ITS Inventory and Needs → ITS Service Packages → ITS Deployment Plan



Update Process

Prioritizes projects into three time-frames (timeframes may be adjusted)

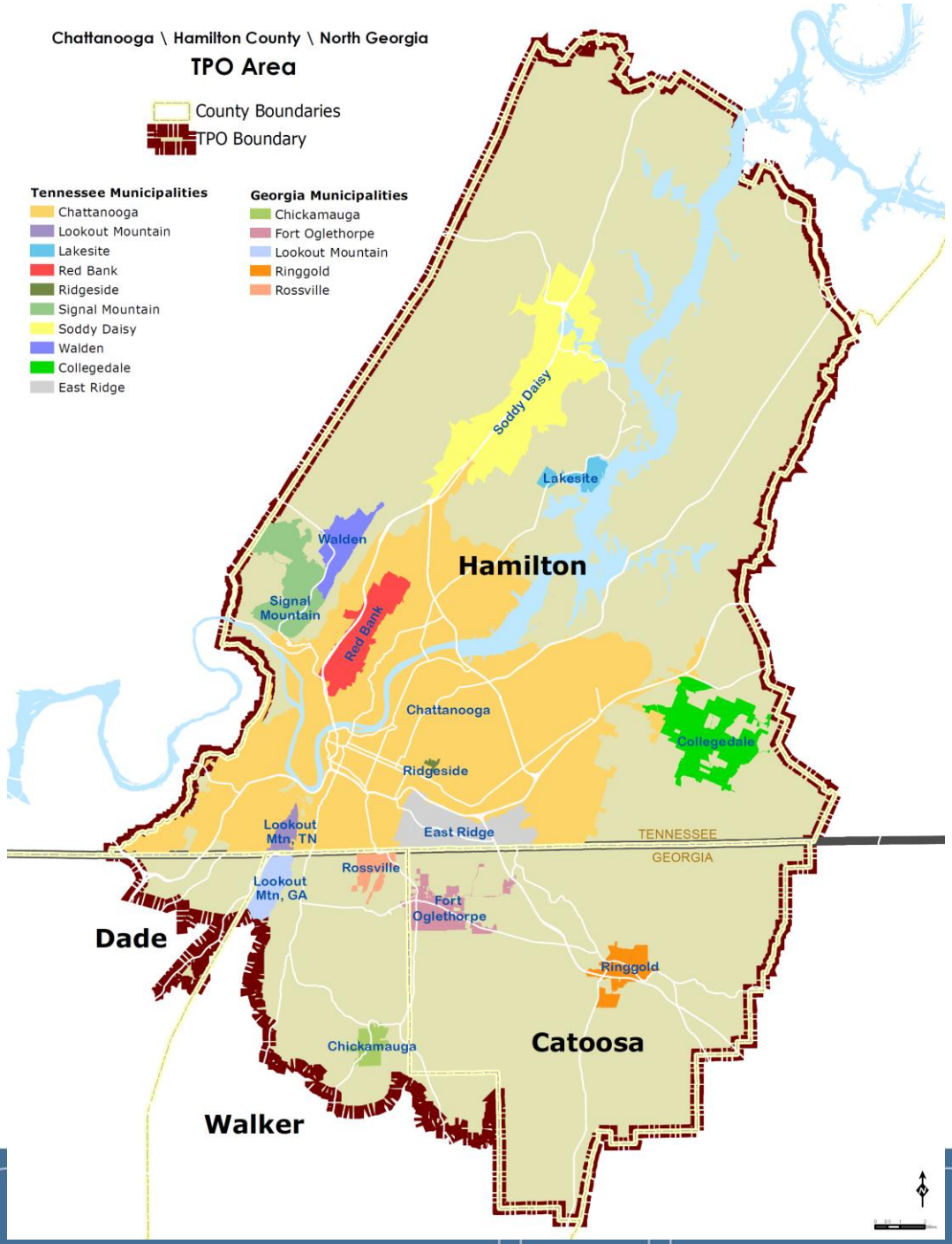
- Short-term (next 5 years)
- Mid-term (5 to 10 years)
- Long-term (beyond 10 years)

For each project the following information is included:

- Project description
- Responsible agency
- Estimate of probable cost
- Applicable service packages

Does not guarantee funding of the projects

Regional Boundary



Discussion Items

- Additional Stakeholders to Include?
- Existing and Planned ITS Projects in the Region?
- Suggested ITS Projects?
- Regional ITS Needs?
- Regional Interagency Connections?

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Regional ITS Needs?

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- Maintenance & Construction Management
- Public Transportation
- Commercial Vehicle Operations
- Archived Data Management
- Vehicle Safety (Connected & Autonomous Vehicles)

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Discussion Items

Regional Interagency Connections?

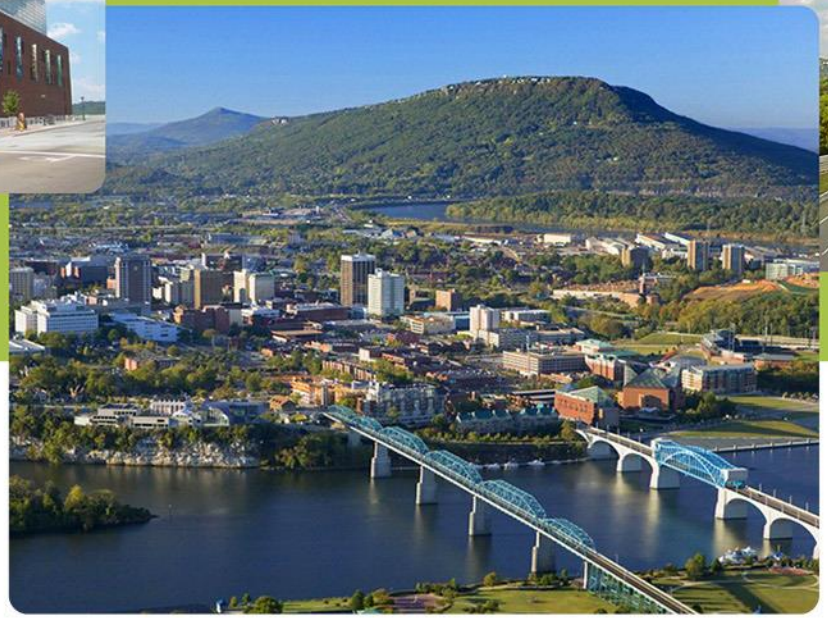
Traffic Agency ⟷ Traffic Agency

Traffic Agency ⟷ Transit Agency

Traffic Agency ⟷ Emergency Management

Transit Agency ⟷ Emergency Management

Emergency Management ⟷ Emergency Management



RPA

Chattanooga Regional ITS Architecture Update

Stakeholder Kickoff Meeting

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October 18, 2016