ARC-IT Version 9.2 Webinar

December 12, 2023

1:00 – 2:30 pm Est

U.S. Department of Transportation

Intelligent Transportation Systems
Joint Program Office

INTELLIGENT TRANSPORTATION SYSTEMS

PROFESSIONAL CAPACITY BUILDING

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- Click on the Public Chat square on your screen
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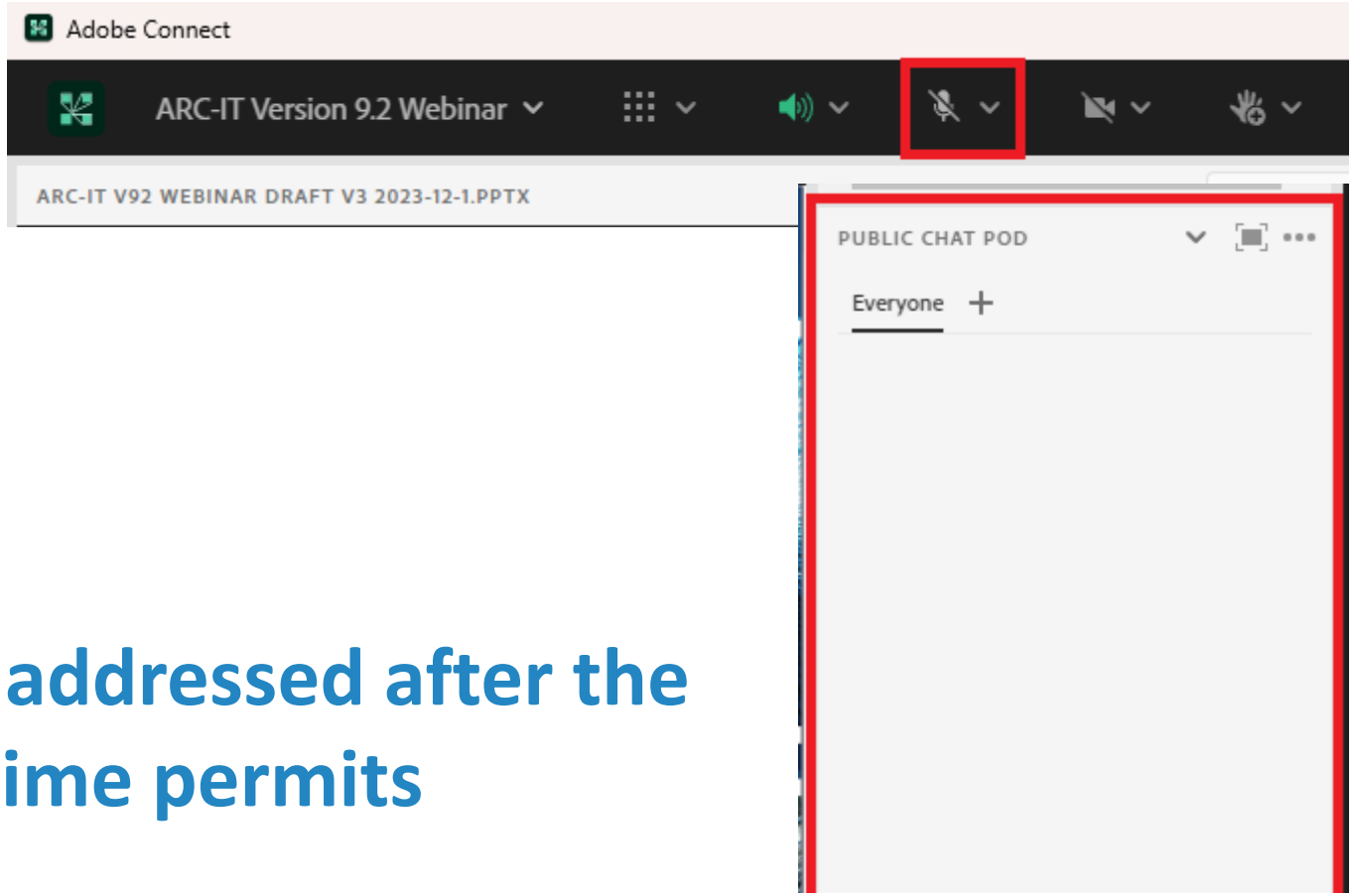


Questions/comments will be addressed after the last presentation, as time permits

Poll Questions

Today's Speakers

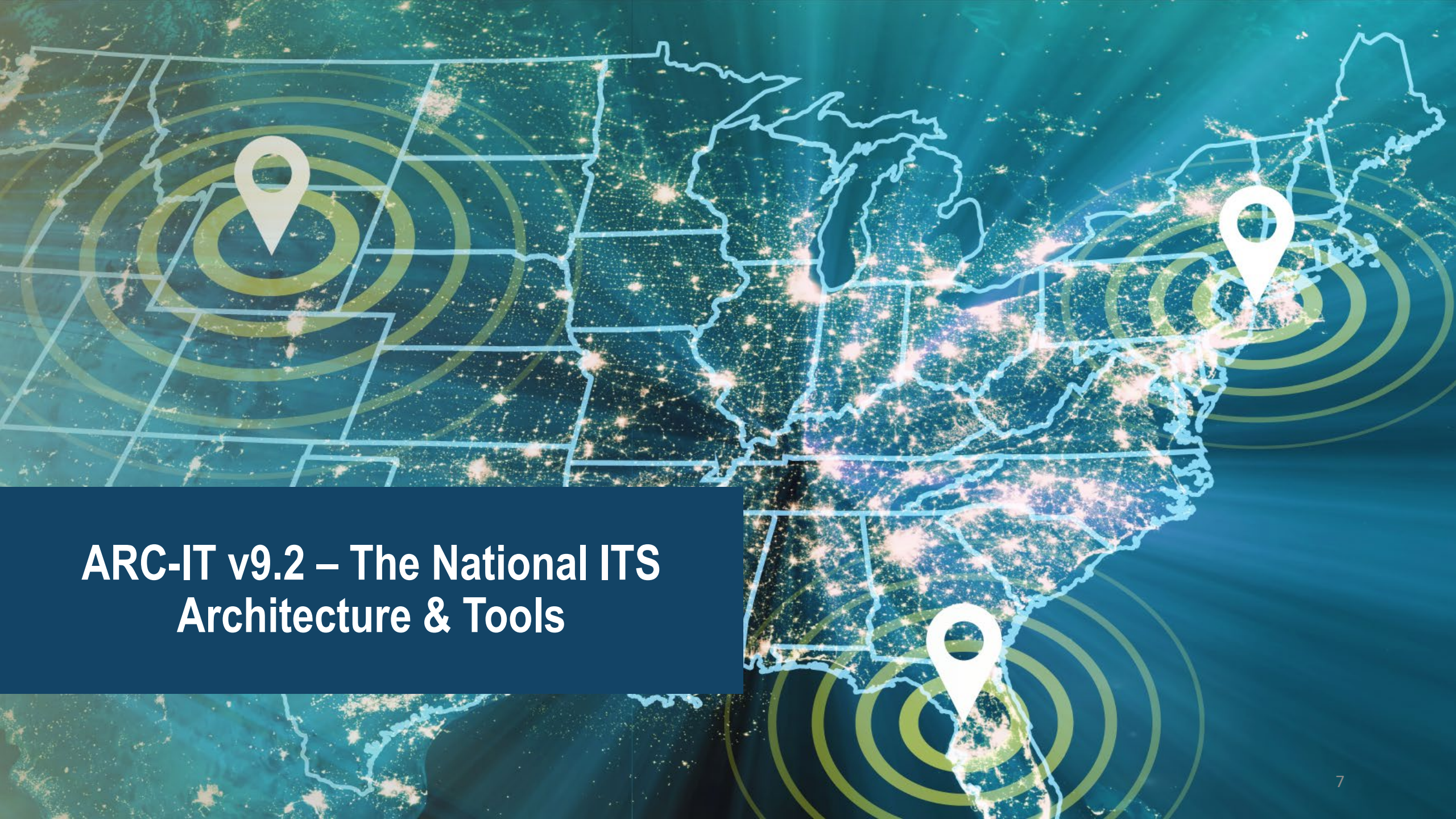
Robert Sheehan, PE, PTOE
Program Manager
ITS Joint Program Office

Kingsley Azubike, P.E., PTOE
Transportation Specialist
FHWA Office of Operations

David Binkley
Principal Systems Engineer
Iteris

Cliff Heise
Vice President, Iteris

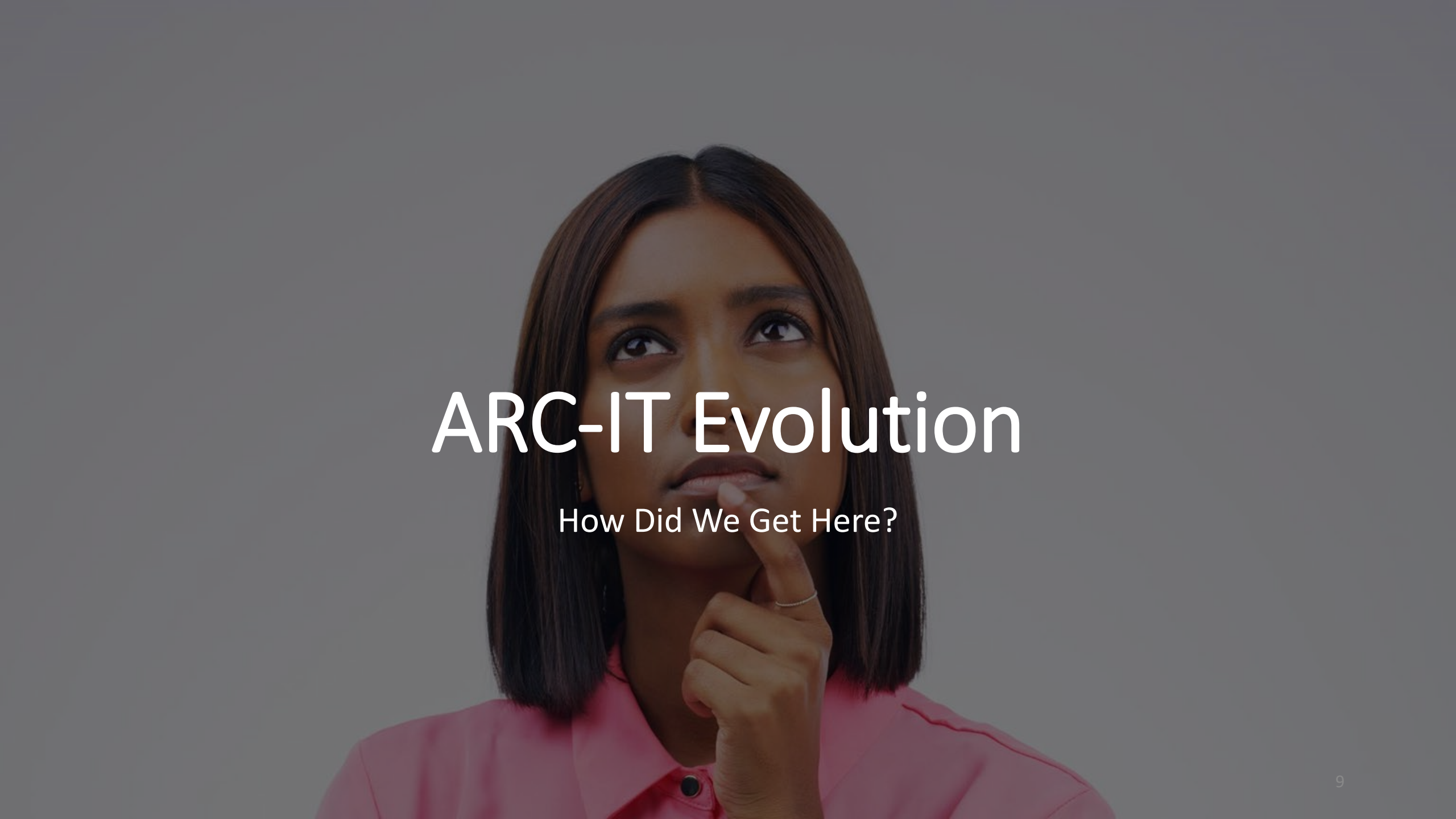
Andrew Magee
Senior Planner
Indianapolis MPO



ARC-IT v9.2 – The National ITS Architecture & Tools

ARC-IT Discussion Today

- Describe the latest updates to the National ITS Reference Architecture, version 9.2 known as ARC-IT
- Tour the Website
- Describe the tools—what they are, what they are used for, and who should use them in planning for deployment and project implementation
- Discus how ARC-IT fits into the deployment process and where to find out more

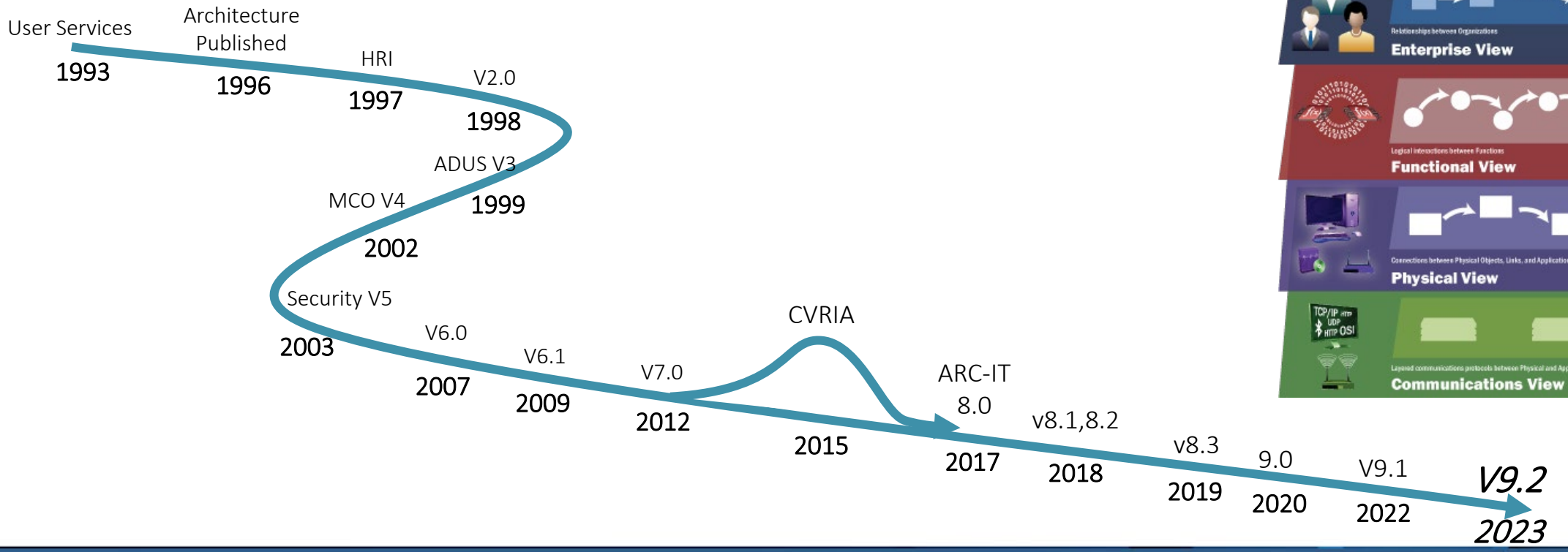


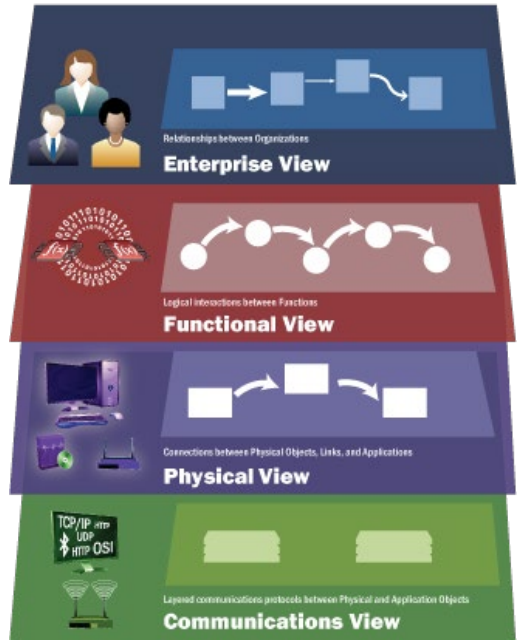
ARC-IT Evolution

How Did We Get Here?

ARC-IT – The National ITS Reference Architecture is a "Living Document"

- Provides a common framework for planning, defining, and integrating ITS
- Continually evolving & growing





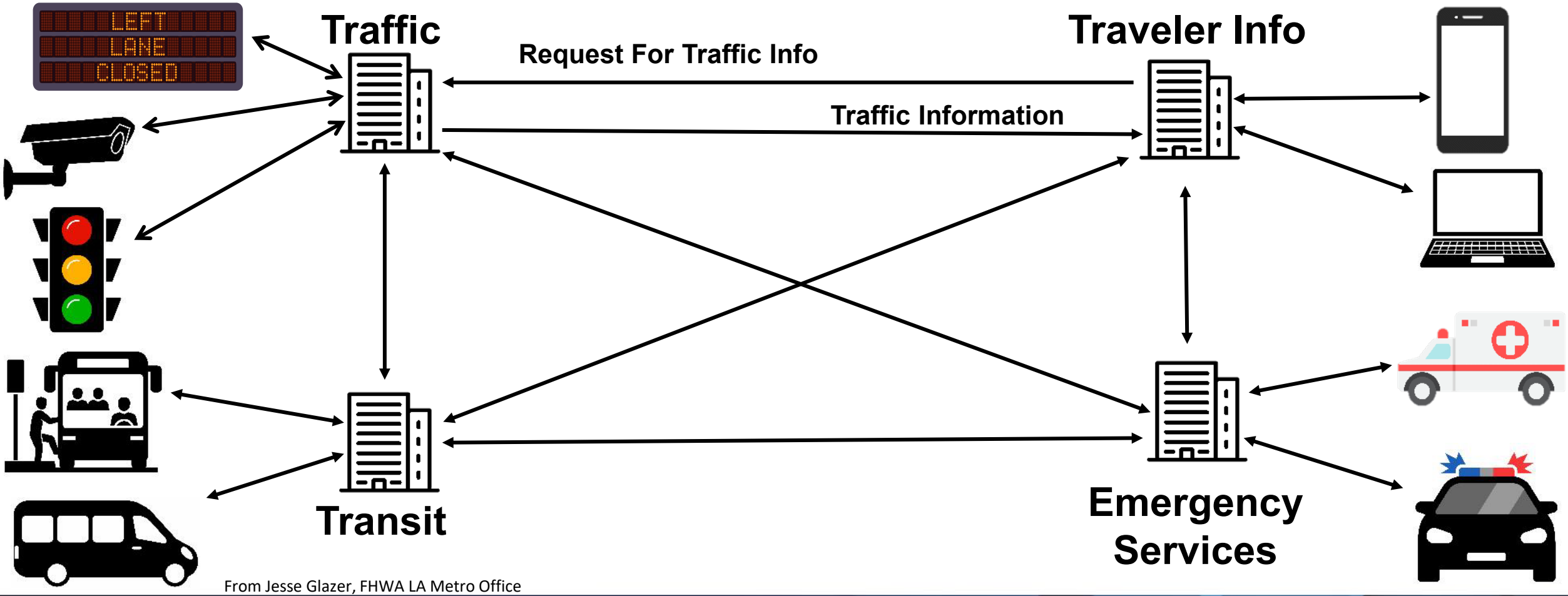
Why Do We Need a National ITS Reference Architecture?

- Provide a national “vision” for ITS
- Guide sound ITS planning and investments at the state and local level
- Support systems engineering analysis for projects deploying ITS
- Identify and scope the needs for standardized interfaces

System Architecture for ITS

- Provides a framework for developing integrated transportation systems
- Identifies:
  - Organizations
  - Systems operated
  - Functions performed, services provided
  - Communications required
  - Information exchanged
- WITHOUT getting into specific technologies, picking winners/losers
  - Technology Neutral is key

ITS Architecture Includes: Agencies, Systems, Communications, Information Flows



From Jesse Glazer, FHWA LA Metro Office

Users and Use Cases Supported

- Regional Planning
- Project Scoping, Project Development
- Standards Investment, Standard scope, standard development

ARC-IT Gives Us a Framework and a Platform

Ask Big Questions

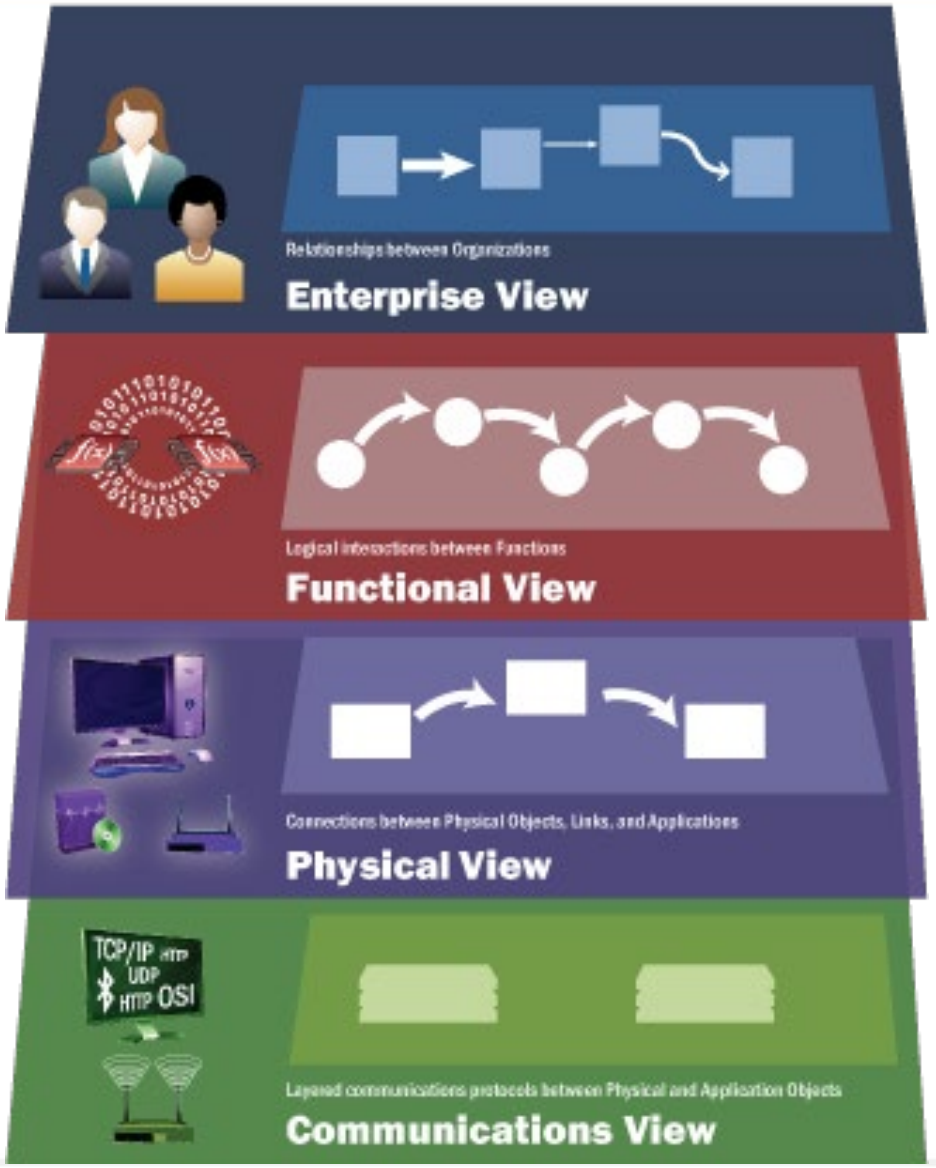
- What is ITS?
- How do we build and deploy ITS?
- How do we make ITS deployment more efficient?
- How do we leverage new communications technologies?
- How do we balance privacy and public safety?
- What can we deploy on shared spectrum?

In an Evolving Domain

- Traffic, transit, commercial vehicle, traveler information
- Archived data
- Highway railroad intersections
- Maintenance and construction
- Security
- Connected & automated vehicles
- Multimodal accessible travel
- Intermodal freight
- Robots, aerial mobility and other science fiction

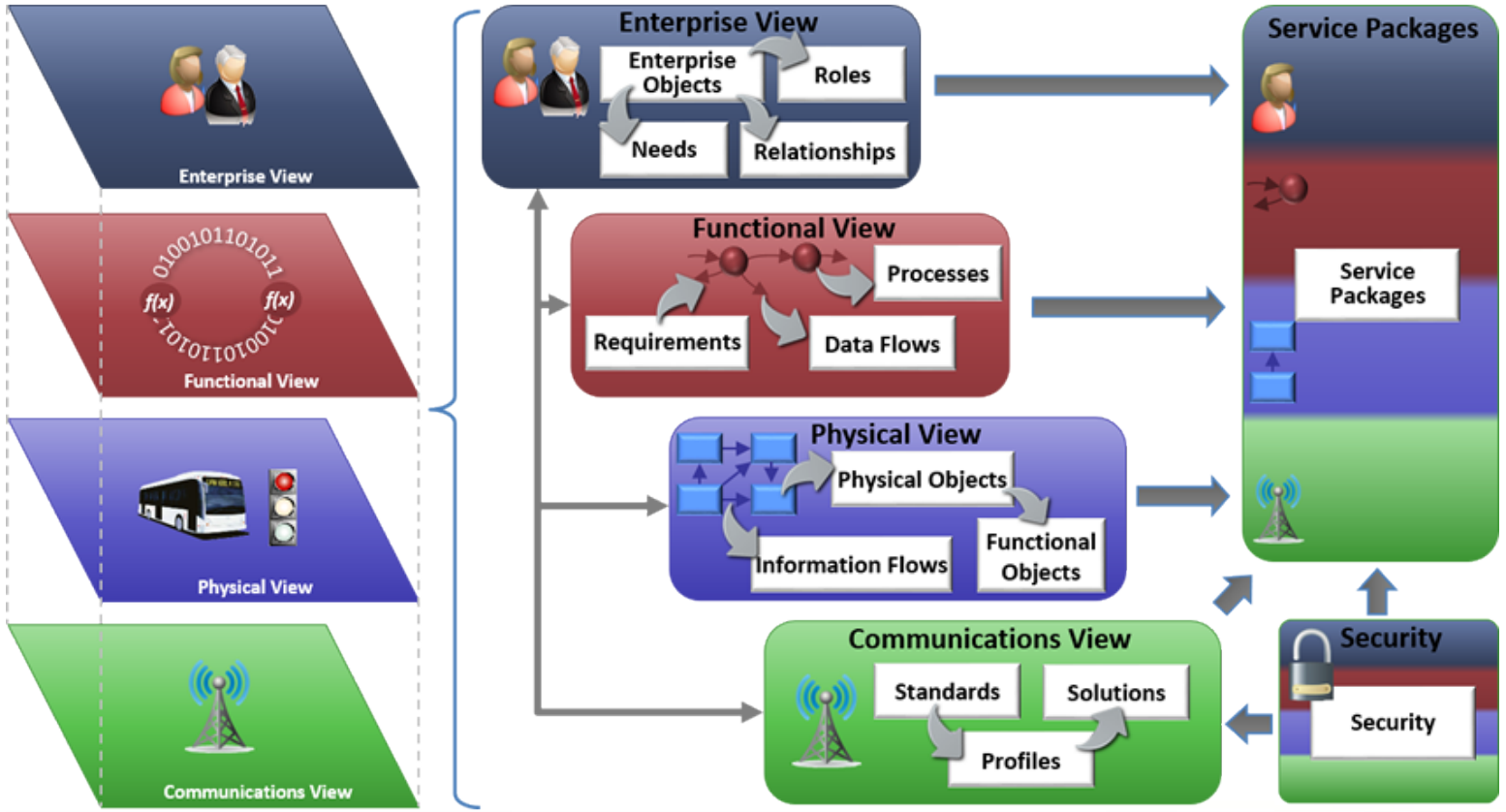
ARC-IT's Structure

How is it Organized and Put Together?



ARC-IT Structure and Organization

- Defined around 4 views, Organized by Service Packages

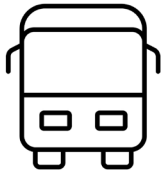


www.arc-it.net

ARC-IT Service Package Areas

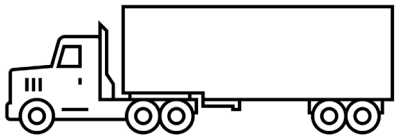
Traffic Management

Public Transportation



Maintenance and Construction

Commercial Vehicle Operations



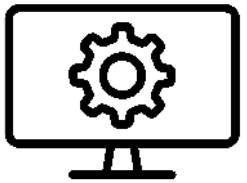
Public Safety

Parking Management

Vehicle Safety

Traveler Information

Data Management



Support

Sustainable Travel

Weather

What's New for 2023

New Features and Services for version 9.2

Intelligent Transportation Systems Joint Program Office

U.S. Department of Transportation

ARC-IT V9.2 Changes

- Multimodal Accessible Travel (MAT)
  - Vulnerable Road Users (VRU)
    - Pedestrians
    - Micro Mobility Vehicles (MMV)
  - Wayfinding and Navigation
    - Pathways
    - Indoor and Outdoor
  - Shared Use Fleets
    - Personal mobility fleets such as shared-use cars, ebikes, and scooters plus ride hail/ taxis
  - Payment Integration
    - Across a range of mobility services (e.g. bus, rail, shared use, and micro mobility services)

New 9.2 – more personal devices, especially for Vulnerable Road Users

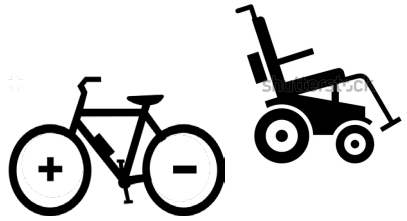
ARC-IT 9.1

Vehicle On-Board Equipment (OBE)

Personal Info Device (PID)

ARC-IT 9.2

+



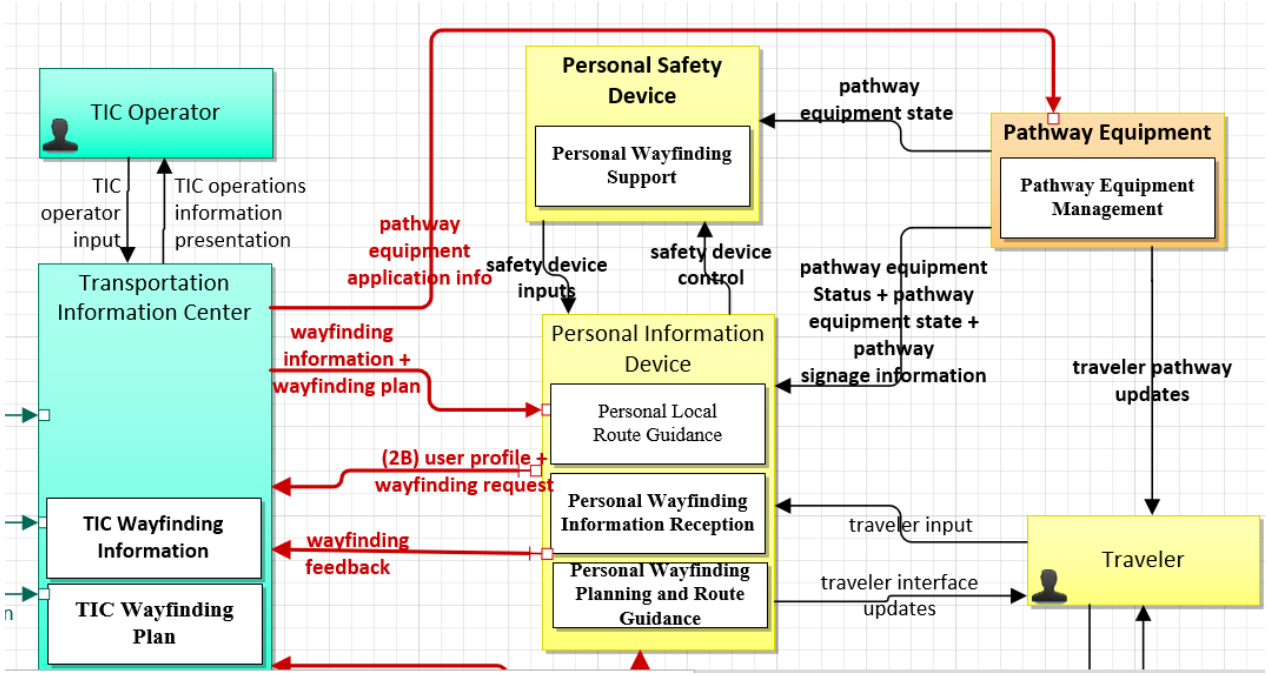
Micro Mobility Vehicle (MMV)

+

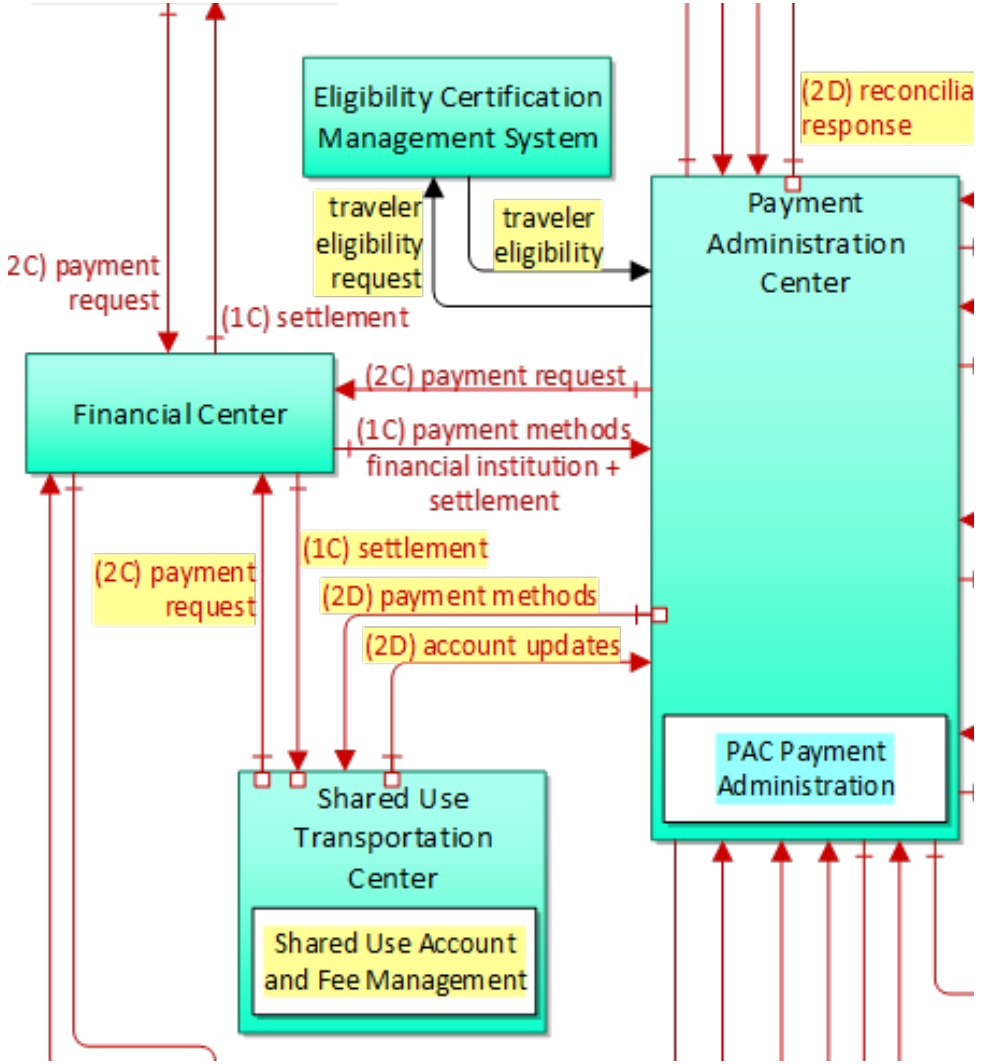
Personal Safety Device (PSD)

ARC-IT Updates for Wayfinding

- New Service Package - **TI08 Personal Wayfinding**
  - Tailored wayfinding information, both pre-trip and real-time guidance
  - Addresses
    - Pathways (sidewalks & bike lanes)
    - Open areas (pedestrian plazas),
    - Indoor facilities, and
    - Crosswalks

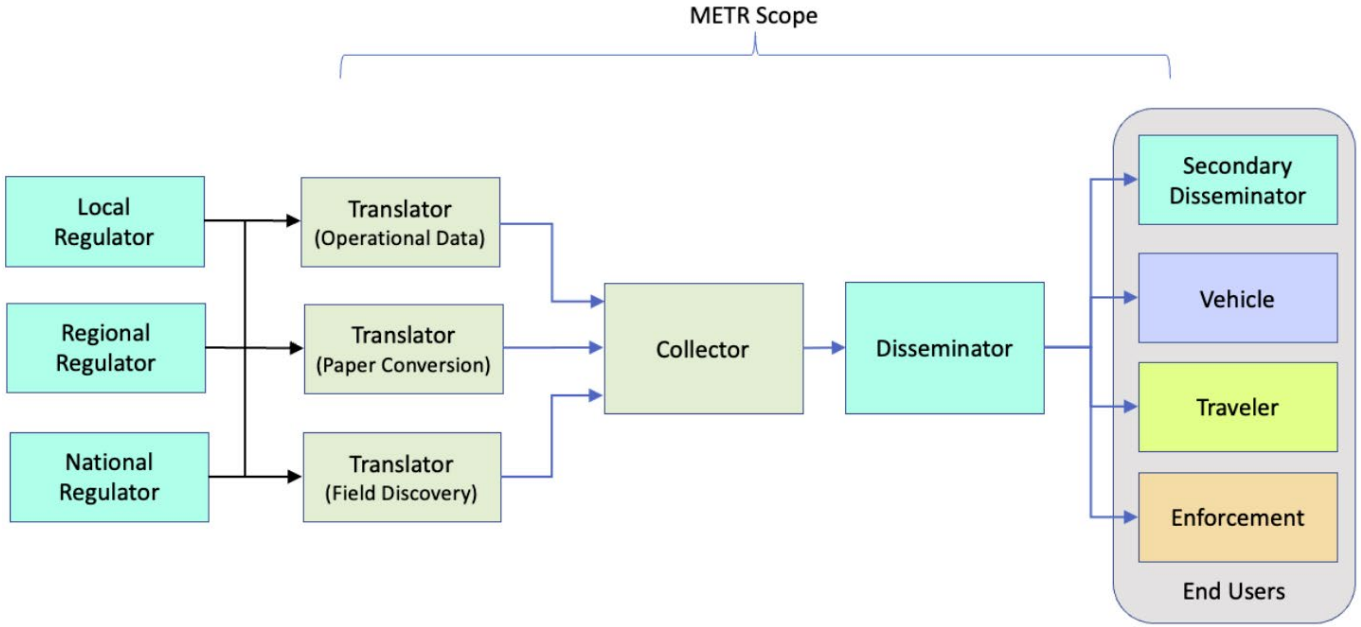


Updates to TI05 Integrated Multimodal Electronic Payment

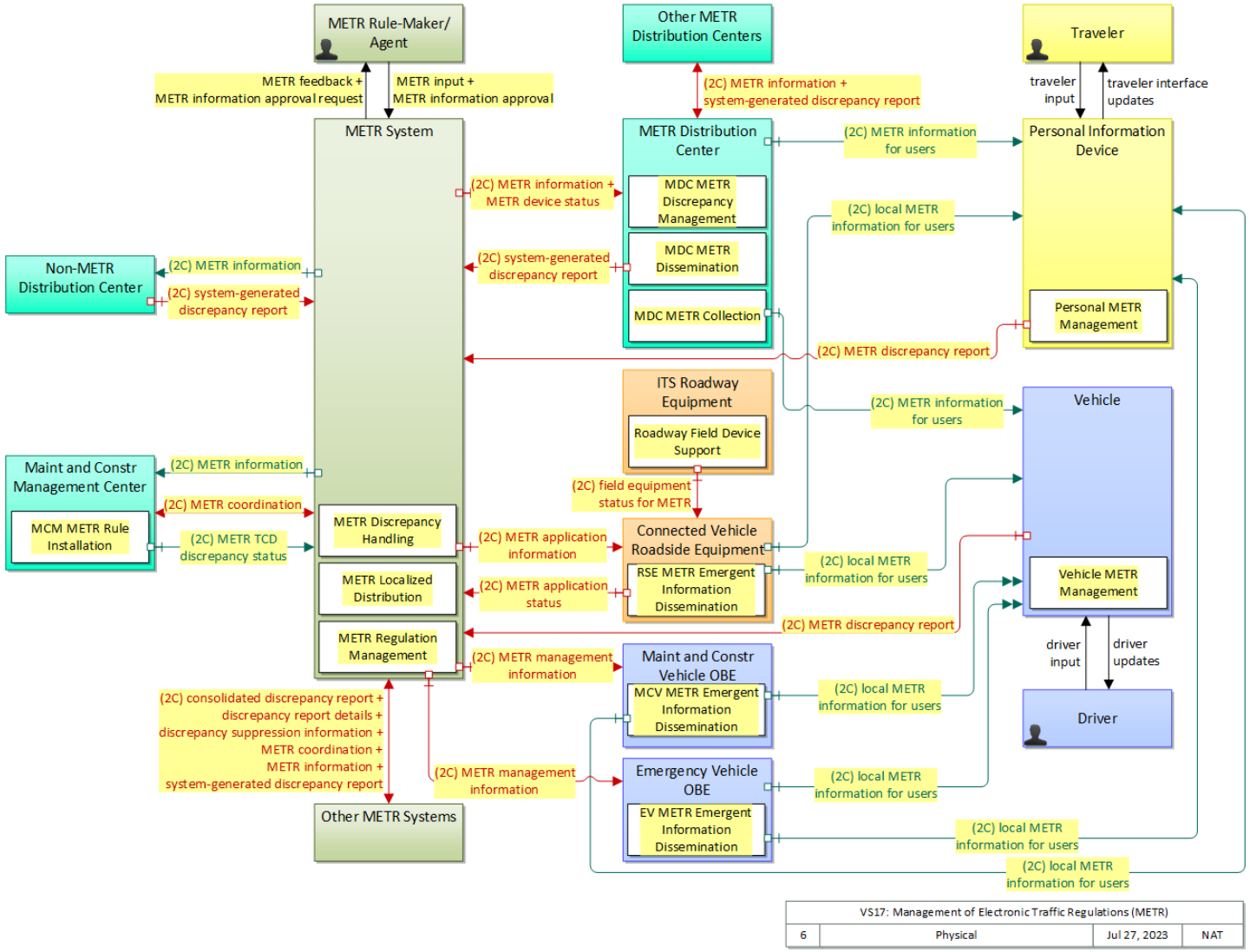


ARC-IT V9.2 Changes, continued

- Management of Electronic Traffic Regulations (METR)
  - Provide a trustworthy way for electronic systems to learn about transport rules
  - ISO Standard in Development



METR in ARC-IT



ARC-IT V9.2 New Service Packages

- MC12: One-Way Convoy Driving
- SU15: Vulnerable Road User Device Transition Support
- TI08: Personal Wayfinding
- VS18: Vulnerable Road User Clustering

- Significant Modifications made to 17 other Service Packages
  - VS12 renamed VRU Safety
  - TI05 Integrated Multimodal Electronic Payment
  - ST05 Electric Charging Stations Management
  - MC07 Work Zone Safety Monitoring

Other New Content

- Physical Objects
  - Vehicle vs Light Vehicle (now a generic Vehicle can be used to model safety and other common functions for any vehicle class)
  - Micromobility Vehicle Onboard Equipment
  - Pathway Equipment
  - Pathway Communications Unit
  - Electric Charging Management Center
  - Shared Use Transportation Center

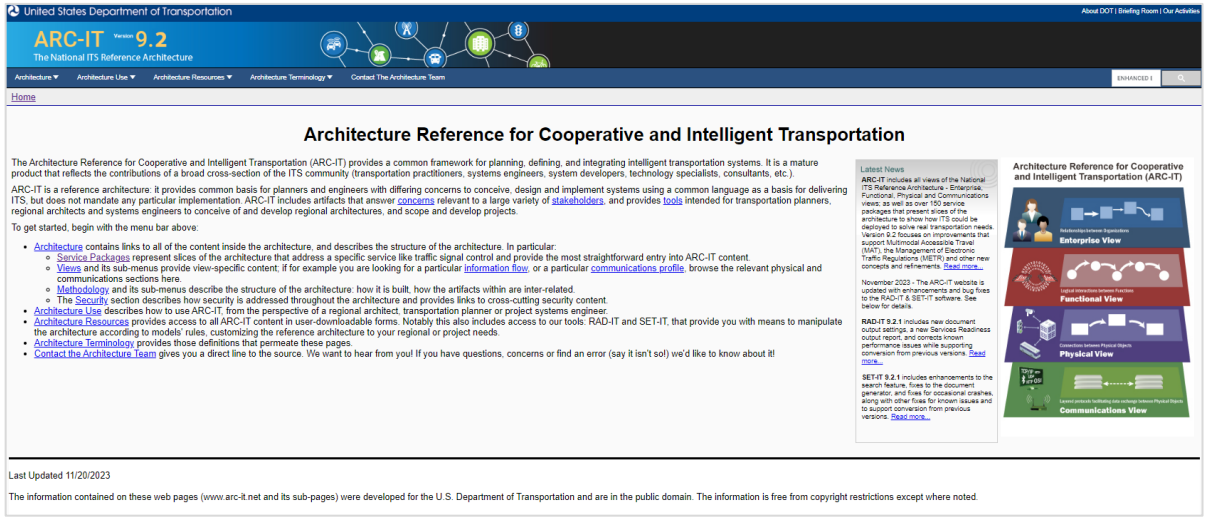
Version 9.2 Tools Updates

- Both RAD-IT & SET-IT are updated
  - Incorporate all of ARC-IT's new services, objects, communications solutions
  - Conversion automates parts of your upgrade process
- Other New Features:
  - Document Settings: RAD-IT remembers settings for document generation; support multiple documents per file
  - Improved Performance
  - Alias: to use your own terminology for information flows and interconnects without losing traceability to ARC-IT
  - Diagram Enhancements: SET-IT diagram generator improved for physical and enterprise context diagrams

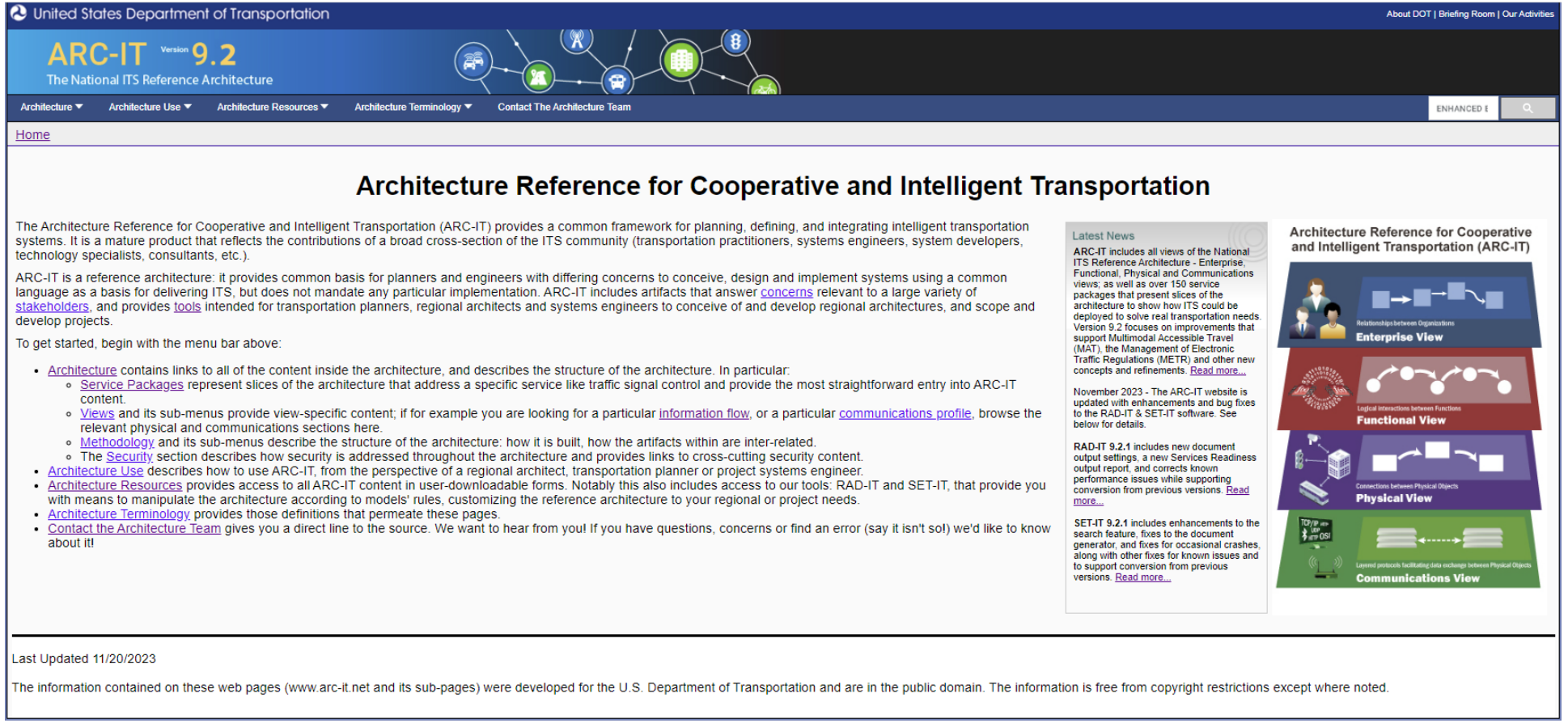
Website Tour

Let’s take a tour of:

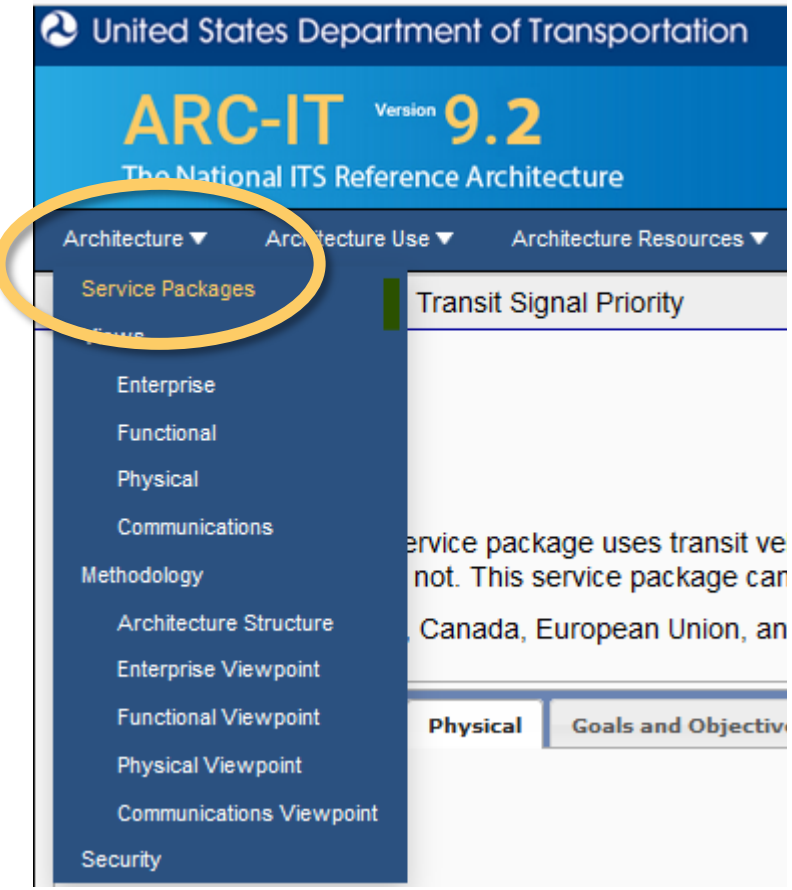
www.arc-it.net



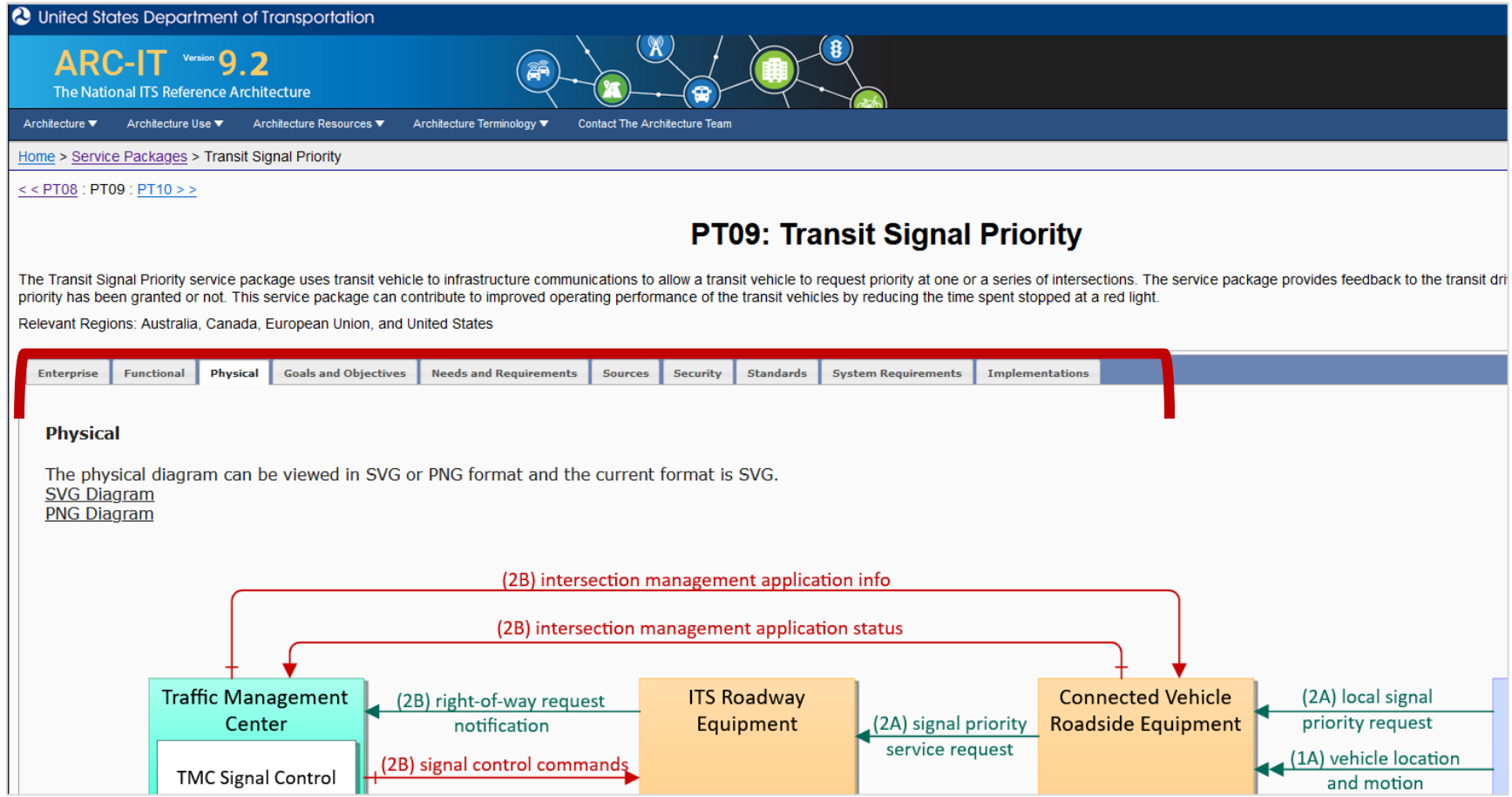
ARC-IT Website (www.arc-it.net)



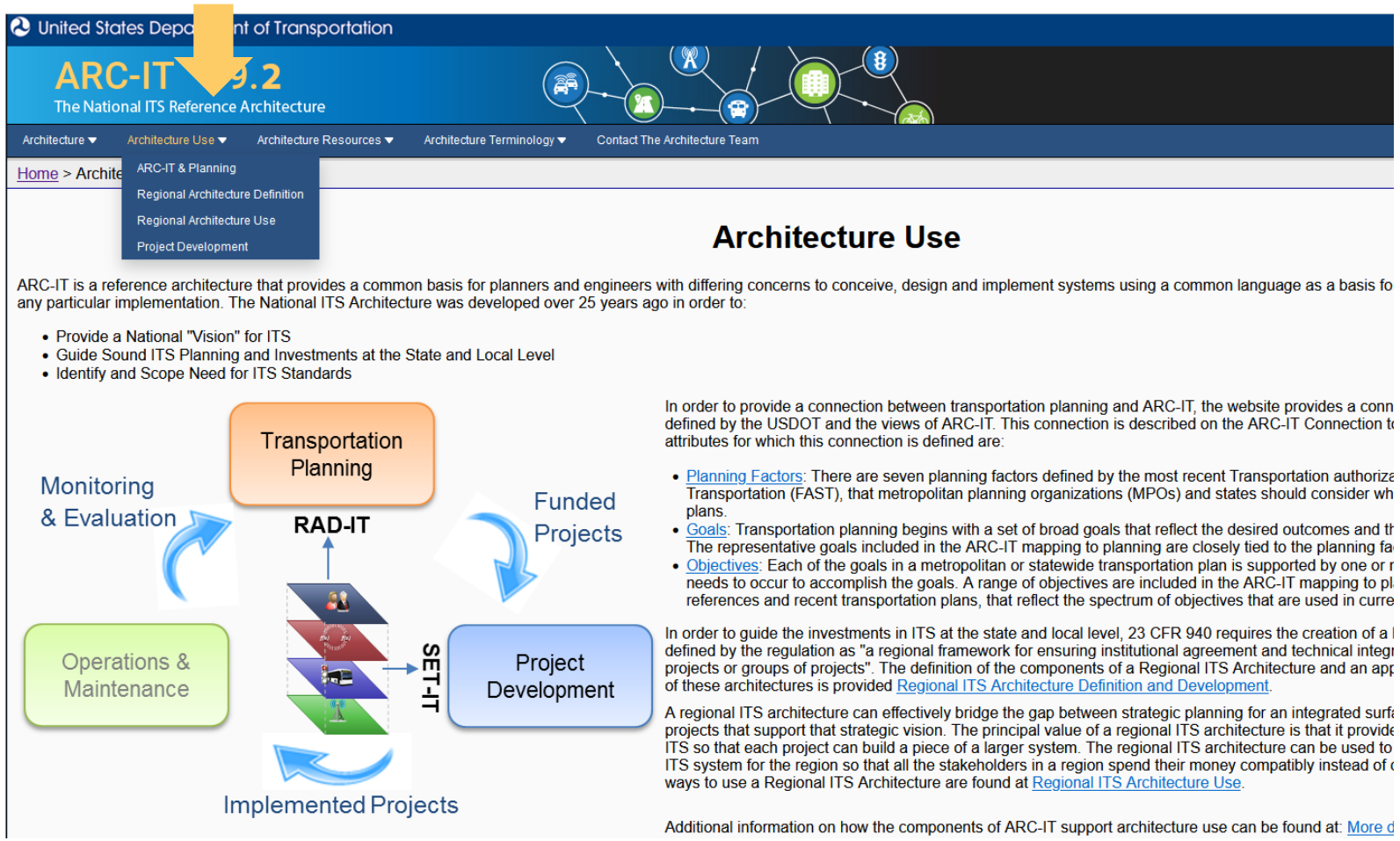
ARC-IT Website: Architecture Pull-Down



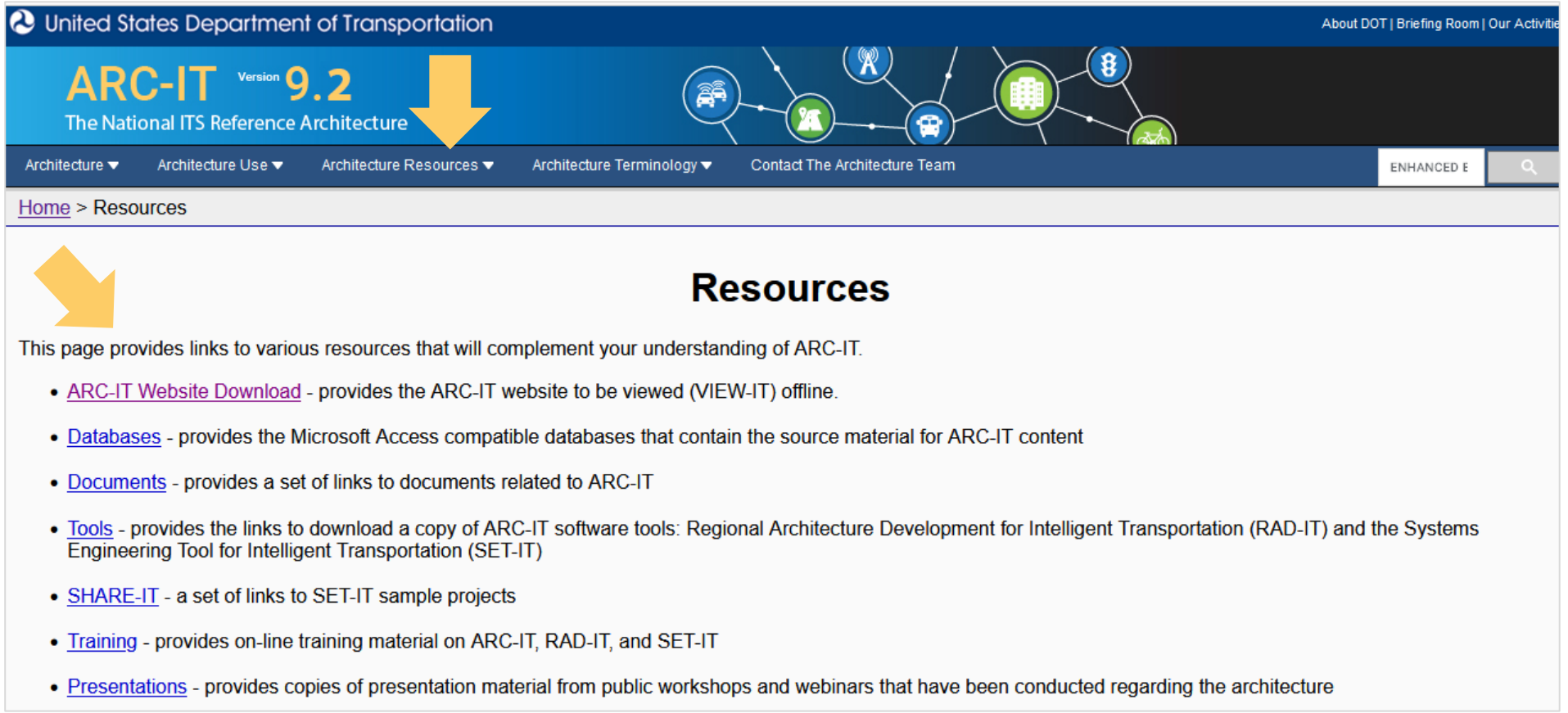
ARC-IT Service Packages Menu



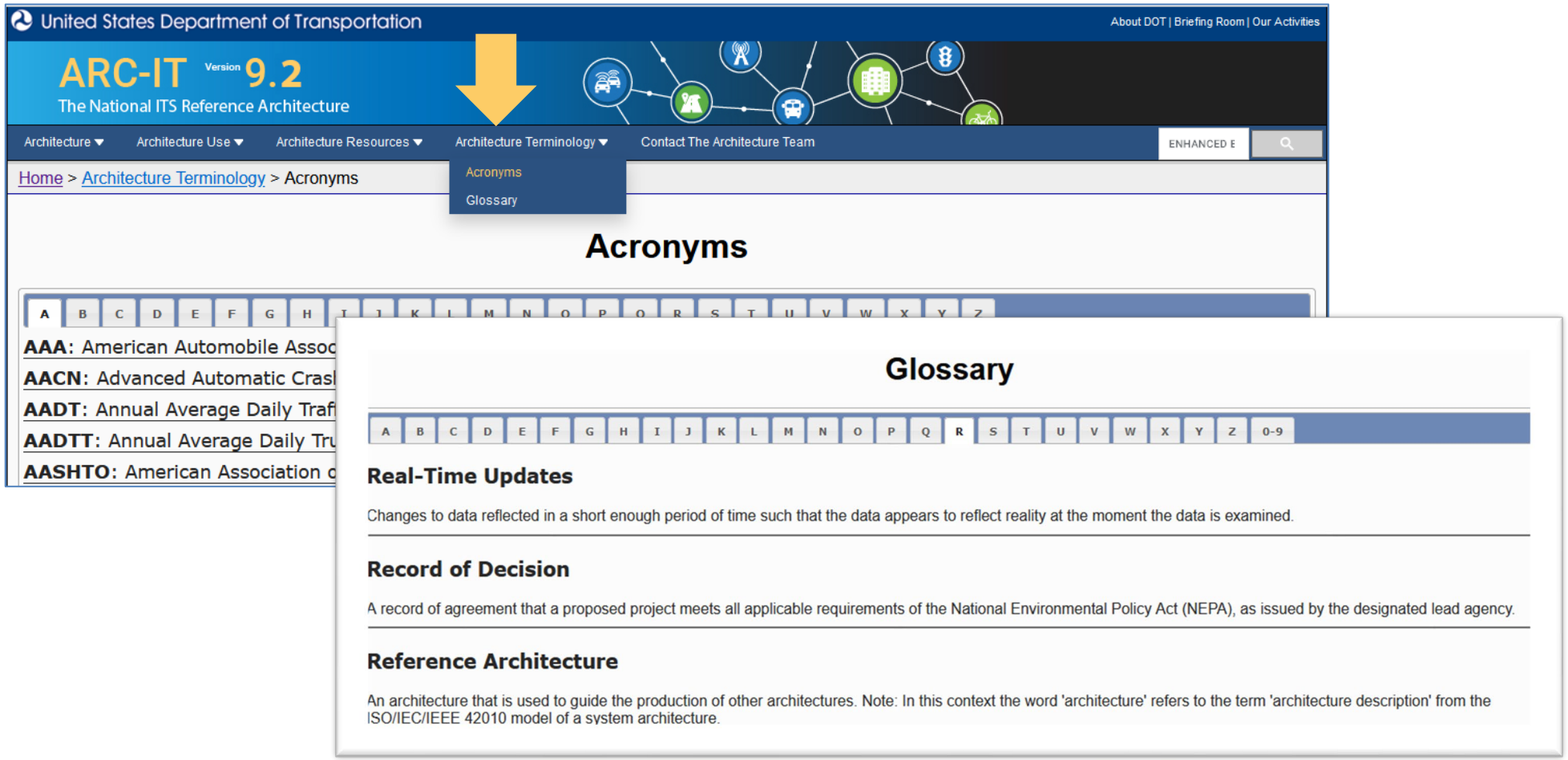
ARC-IT Website: Architecture Use



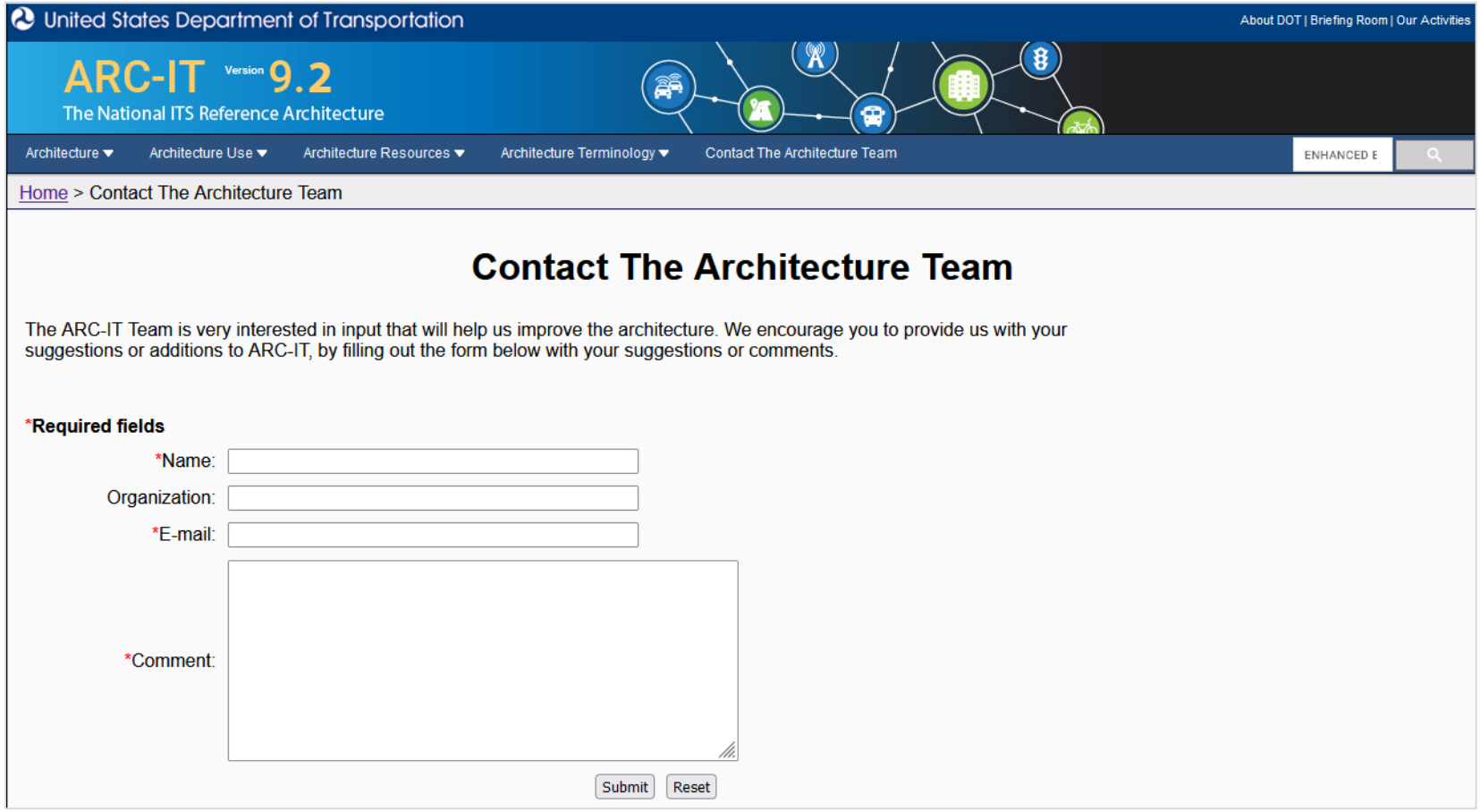
ARC-IT Website: Architecture Resources



ARC-IT Website: Architecture Terminology



ARC-IT Website: Contact Us Page

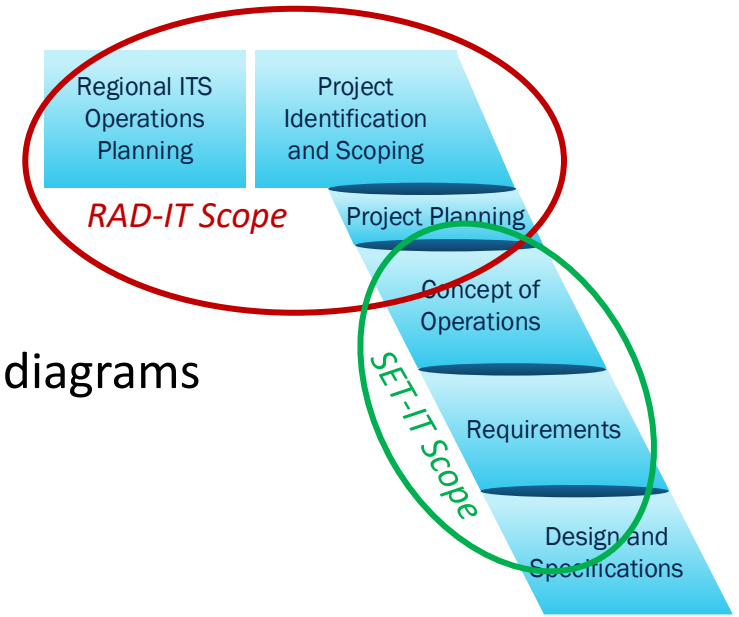


Architecture Toolset

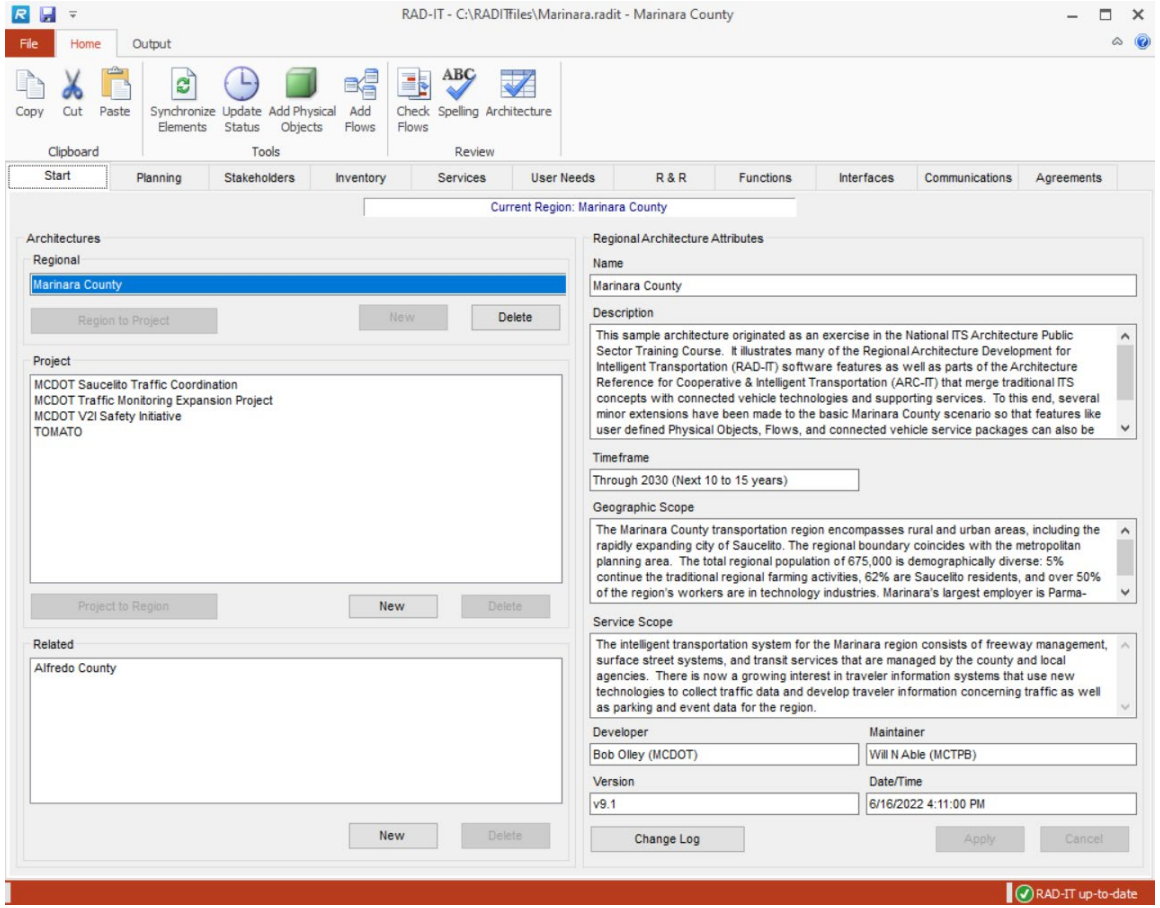
- RAD-IT & SET-IT

Scope of Tools

- RAD-IT focuses on regional planning and the development of operational concepts,
  - Stakeholders, Physical Objects, Service Packages, Interfaces for the region
- SET-IT is project-focused
  - scope specified in the regional architecture
  - graphical tool,
    - providing visual feedback and tools to manipulate service package diagrams
  - Identify/Customize Comm solutions
  - Develop Enterprise agreements
  - Outputs – ConOps, diagrams, tables
- Training for both tools available on the ARC-IT website



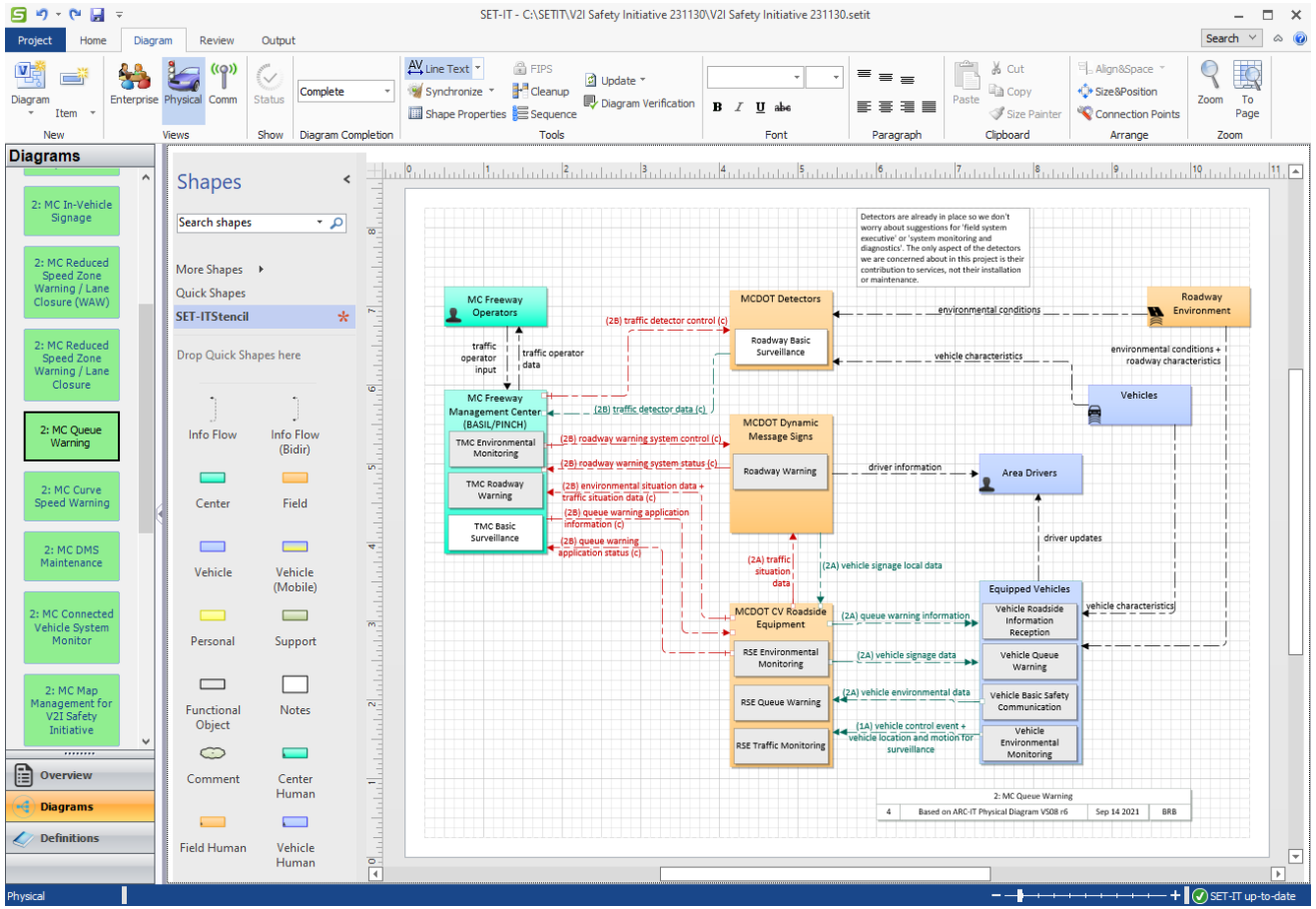
Regional Architecture Development for Intelligent Transportation (RAD-IT)



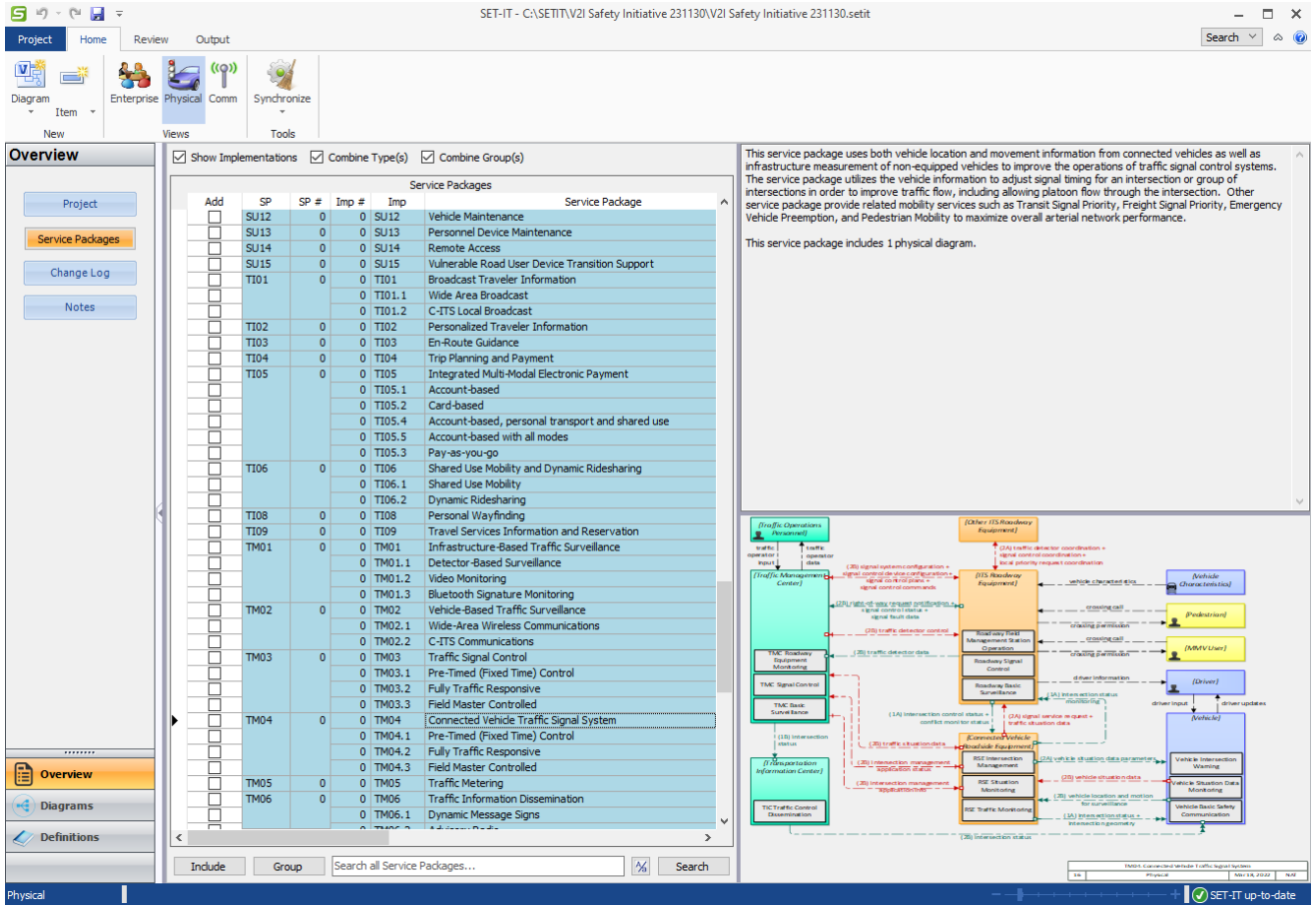
Systems Engineering Tool for Intelligent Transportation (SET-IT)

- Originally to support Connected Vehicle project architecture development
- Expanded to include all ITS
- Creation of diagram-based project architectures
- Covering the Physical, Enterprise and Comm Views
- Outputs include Concept of Operations document, project document, Visio drawings.
- Microsoft Visio 2013 or newer

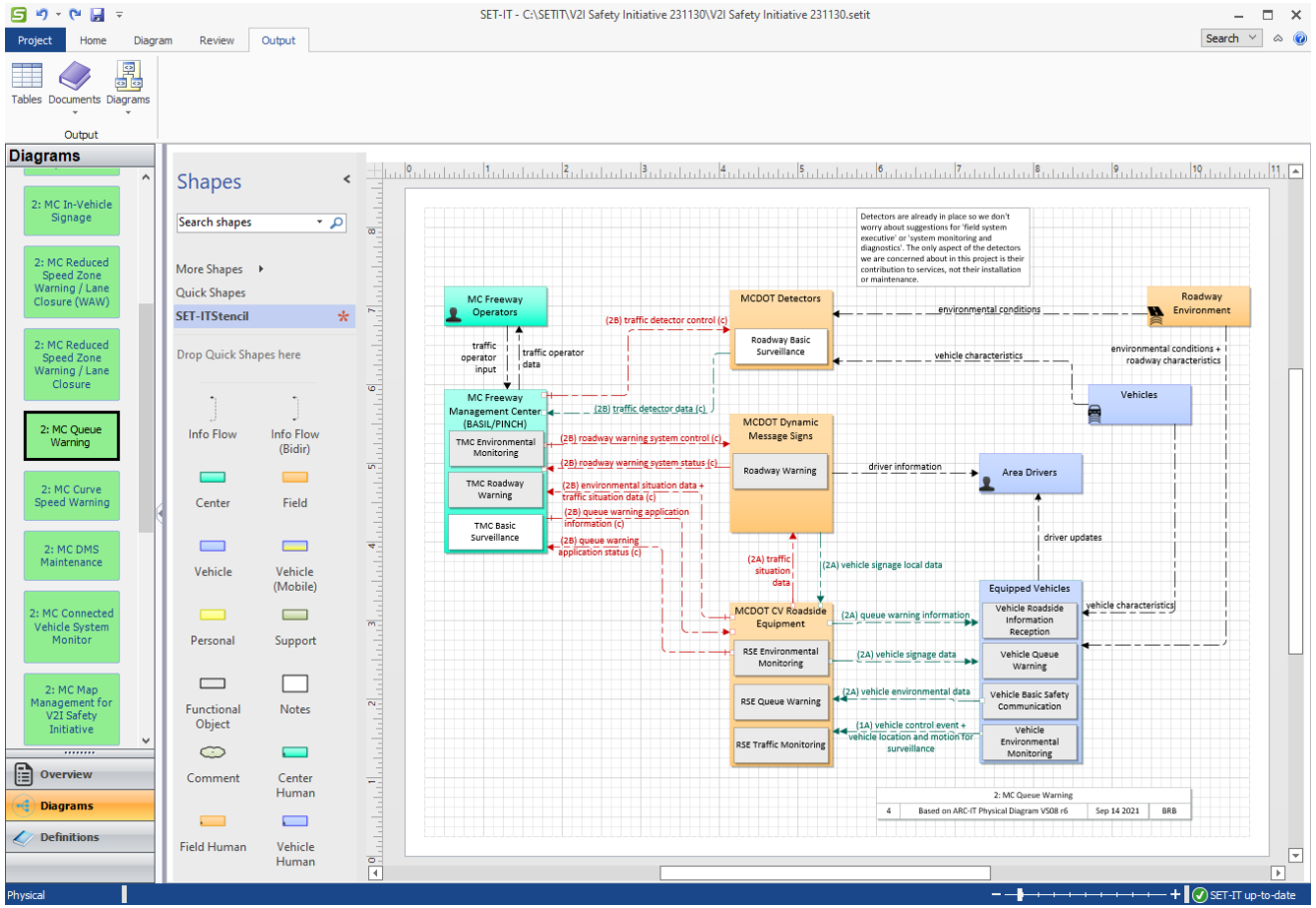
SET-IT – Visually Customize a Project's Architecture

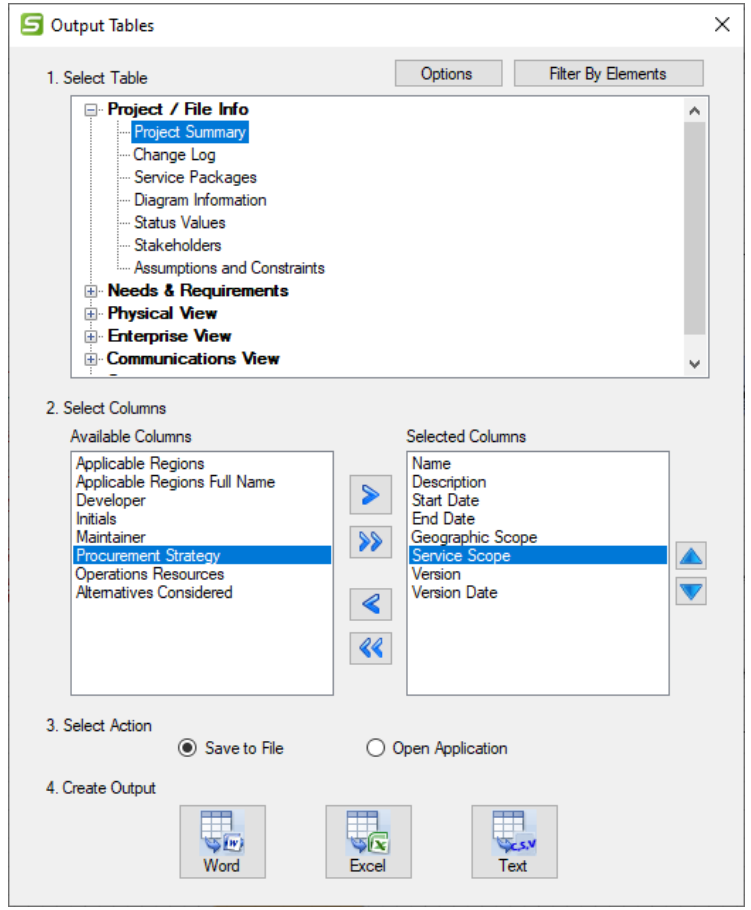


SET-IT Provides Access to All ARC-IT Service Packages



SET-IT User Interface & Output Menus





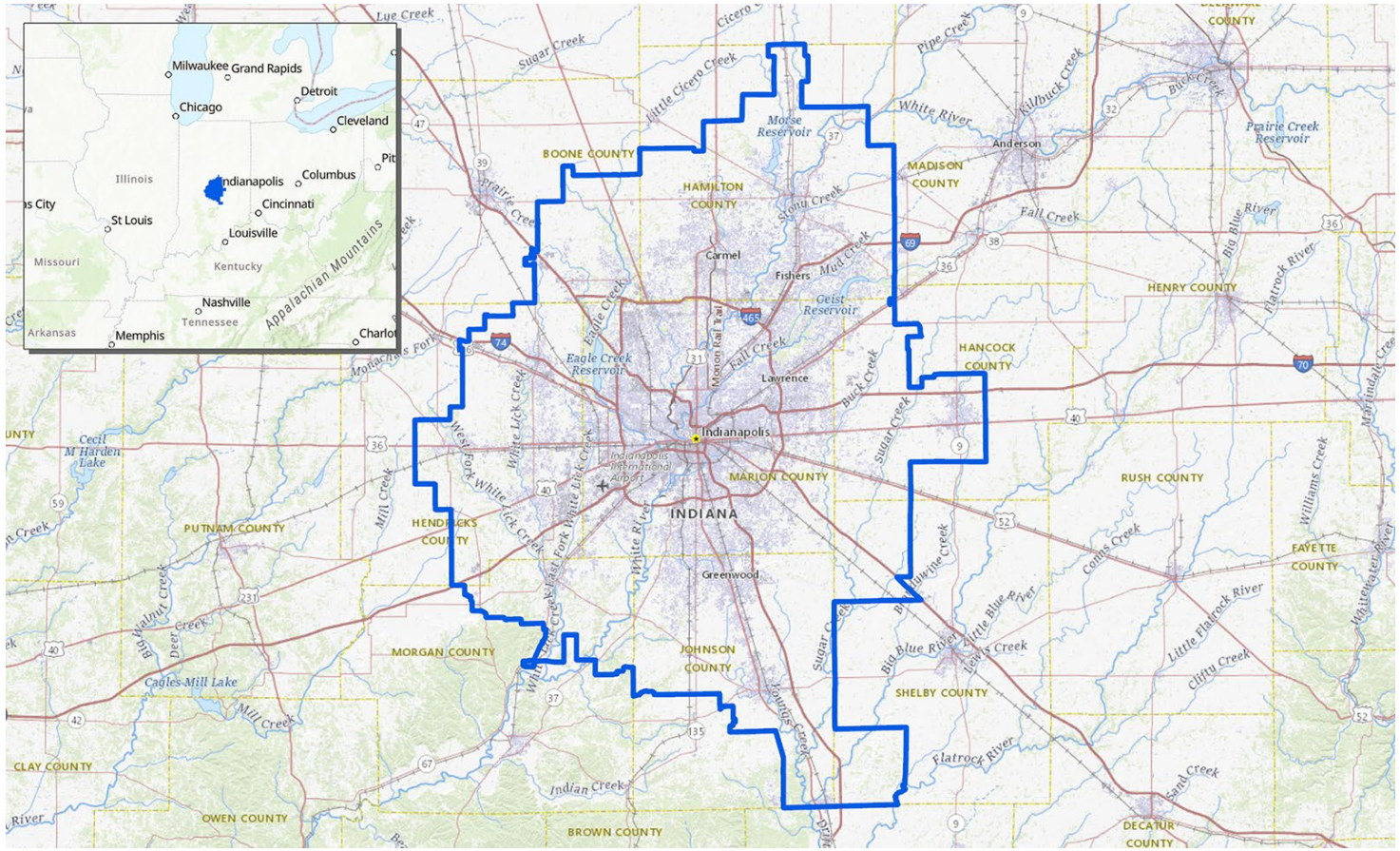
ARC-IT Tools Integration

- SET-IT's Import: connecting regional planning to project definition
  - Take the Regional Architecture content as an input for a project in SET-IT
  - Drive more SE analysis using tools → requirements, ICDs, security, comm standards
- RAD-IT's Import supports feedback from a project back into the regional architecture

Andrew Magee

Senior Planner
Indianapolis MPO

Indianapolis MPO



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Indianapolis Regional ITS Architecture

- Managed and maintained by Indianapolis MPO
- Representative of ITS across Central Indiana Region
  - Available to all agencies and communities to support ITS planning
  - Reference architecture for entire Region
- Supports Active Transportation Plan
  - Bike, pedestrian, micro-mobility devices such as shared scooters
  - Multimodal Accessible Travel (MAT) through interaction with existing transit systems such as Bus Rapid Transit and local bus service
  - Safety for Vulnerable Road Users
- Architecture Update Project will be completed in January 2024
  - Incorporated VRU Safety and MAT services supporting Active Transportation Plan
  - Developed example projects to facilitate stakeholder engagement
  - Phased approach for MAT: Planning, En-Route Guidance, and Payment Integration

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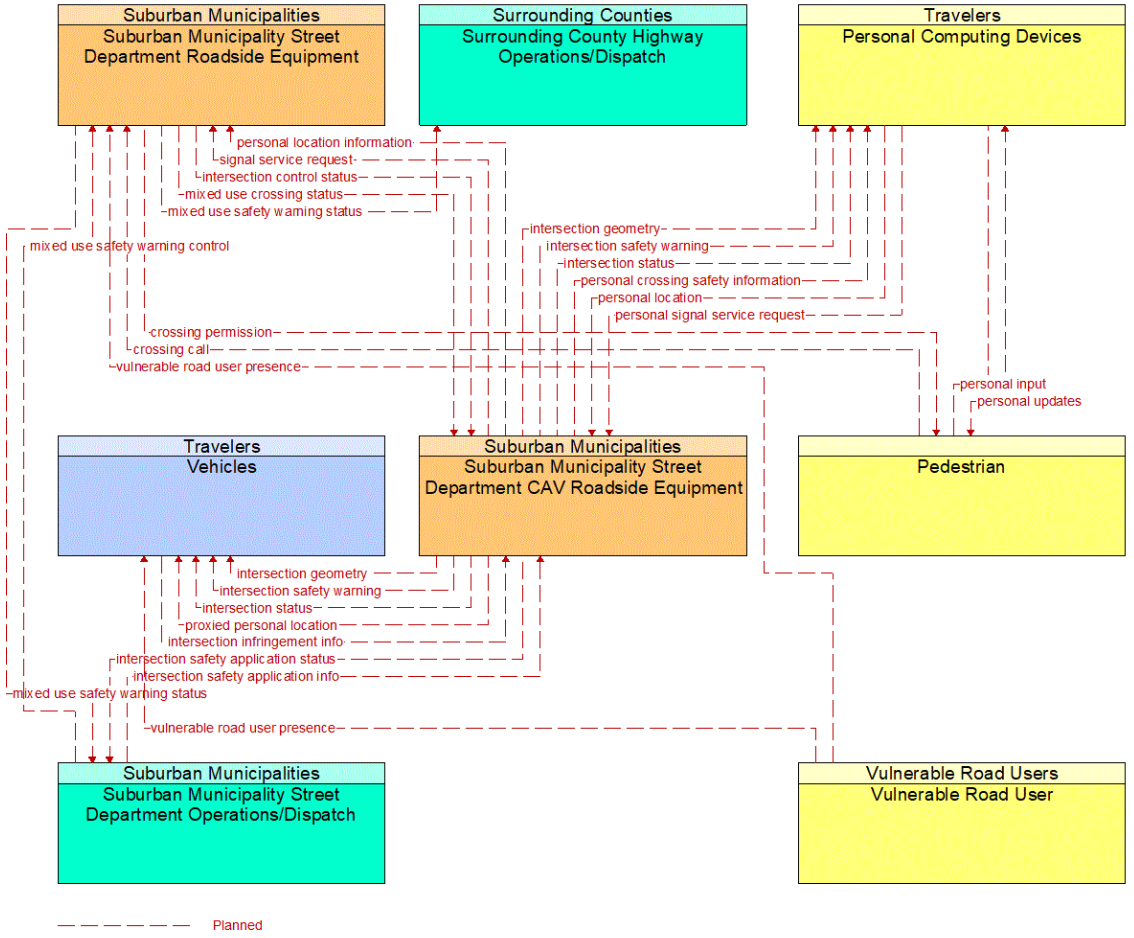
Vulnerable Road User Safety

- Detection of VRU via
  - Roadside devices (cameras)
  - Mobile device (smart phone)
- VRU presence communicated to CAV Roadside Equipment
  - Communication to CAV-equipped vehicles
- Use of “generic” stakeholder Roadside Equipment supports planning as stakeholders are ready



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Poll Question

Architecture Deployment Support

Intelligent Transportation Systems Joint Program Office

U.S. Department of Transportation

ARC-IT Training Available

Topic Area	Web-Based Training	On-Site Training	Workshops
ITS Architecture	ARC-IT Web-Based RA Use & Maintenance Web-Based	ARC-IT 101 / Refresher	Quick-Starting Your RA Update Architecture Development Use & Maintenance Workshop
Software Tools	RAD-IT Web-Based SET-IT Web-Based	RAD-IT SET-IT	---
Systems Engineering	---	Systems Engineering	Systems Engineering for ITS

{Directly from the website} {Coordinated w FHWA Operations}

Technical Assistance Available from FHWA

- ITS Architecture Assessments
- Process Improvement Reviews
- Tools Assistance

1. Architecture Scope and Region Description		Purple
General Scope Comments Here		
Question	**Answer**	**Comments**
a. Is the region defined geographically? Have boundaries been established such as counties, municipal boundaries, metropolitan areas, statewide, etc.?	Unknown	
b. Has a timeframe for the architecture been defined? (For example, 5 or 10 years into the future, or the TIP/STIP or other Capital Plan planning period)?	Unknown	
c. Has the scope of the regional architecture been defined (i.e. the range of services, institutions, or jurisdictions)? Does the scope seem appropriate given the circumstances?	Unknown	
d. Are adjacent/overlapping ITS architectures identified?	Unknown	

Contact

- FHWA Resource Center/Division Offices
- Kingsley Azubike, FHWA Office of Operations (kingsley.azubike@dot.gov)

- https://ops.fhwa.dot.gov/its_arch_imp/index.htm

ITS PCB Trainings

www.pcb.its.dot.gov/itscourses/default.aspx#training

New Web-Based Trainings & In-Person Trainings

Web-based Trainings (WBT)

- ITS: What, Why, and How
- Improving Highway Safety with ITS
- *ITS Cybersecurity**
- *ITS Systems Engineering**

nhi national highway institute

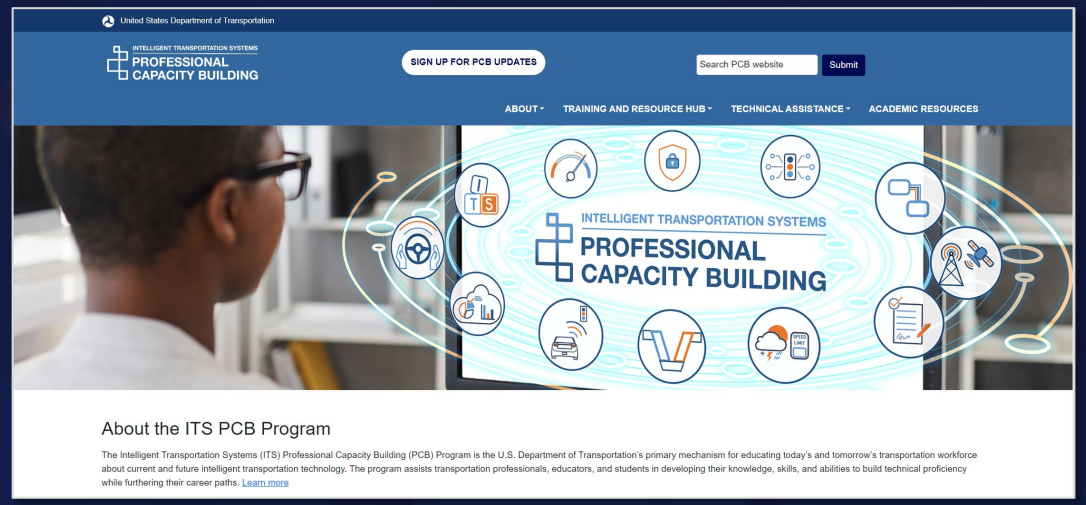
www.nhi.fhwa.dot.gov

In-Person Trainings
(Offered to ITS State Chapters)

- Crowdsourcing for Advancing Operations
- Building an ITS Project SOW to Carry Out the Systems Engineering Process
- Applying the NIST Framework to Transportation Systems
- *V2X Foundational Training**

** In Development; available in early 2024*

Thank You for Coming



For more information, visit:

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