



August 29, 2018

SMART REGION SACRAMENTO

ITS Architecture and Future Technology Master
and Implementation Plan

ITS ARCHITECTURE WORKSHOP



Kimley»Horn
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Agenda

- Introductions
- Meeting Purpose & Project Overview
- ITS Architecture Overview
- Review and Update ITS Stakeholders and Elements
- Service Package Overview
- Discussion of Regional ITS Projects
- Lunch Break, Noon – 1:00
- Discussion of Regional ITS Projects (continued)
- Review and Update ITS Service Package Diagrams
- Next Steps

ITS Architecture Overview



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Intelligent Transportation Systems

■ Definition

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

■ Includes Systems within

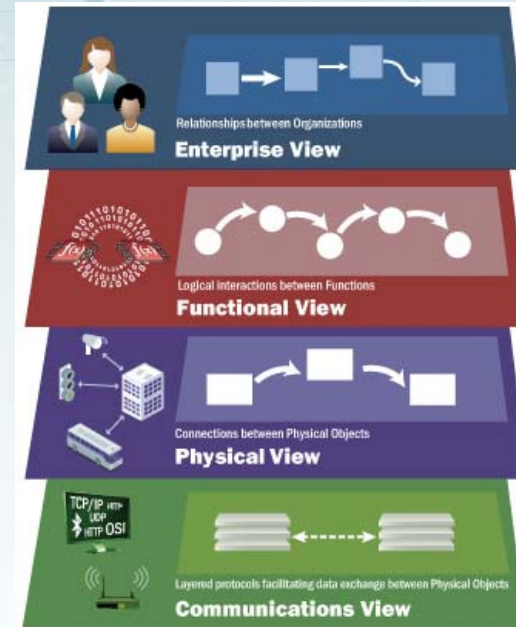
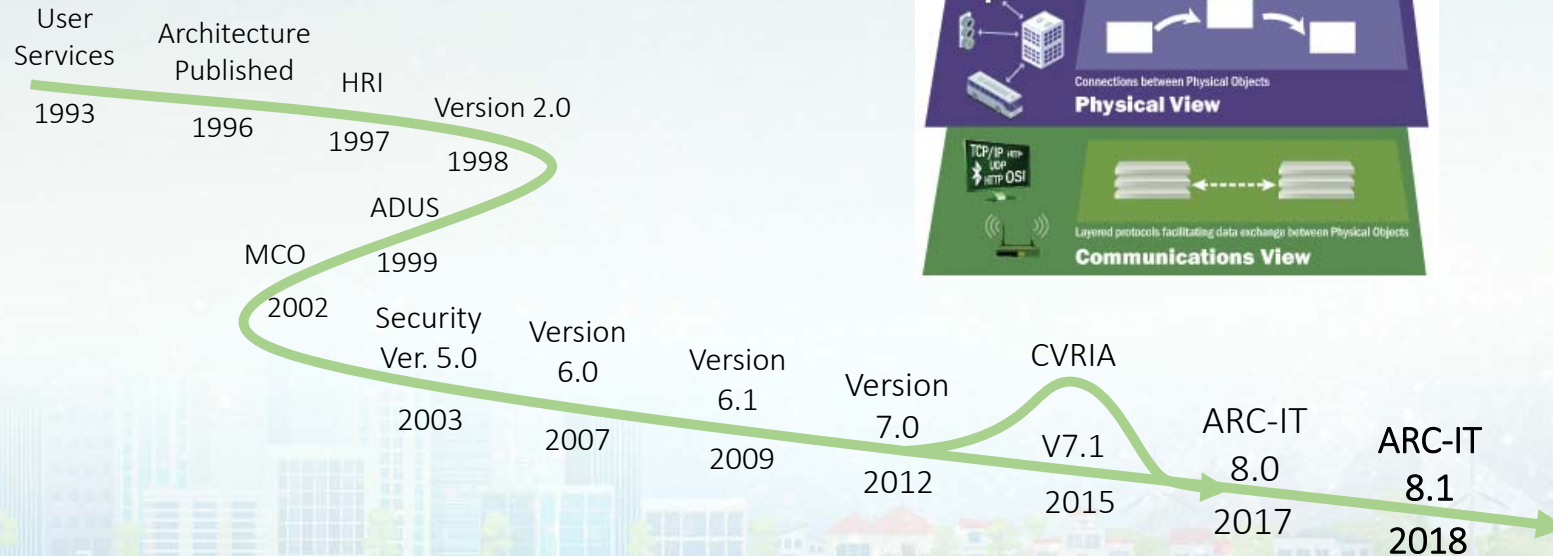
- Traffic Management
- Transit Management
- Emergency Management
- Traveler Information
- Maintenance Management

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

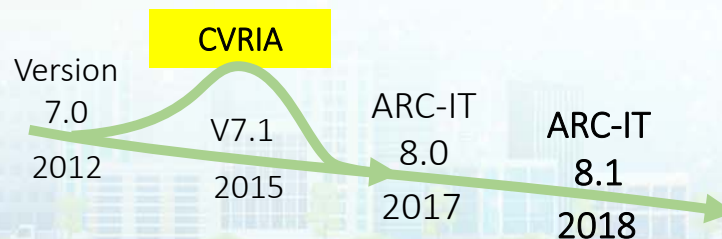
National ITS Reference Architecture is a “Living Document”

- Continuing evolution of the architecture over 25 years



Connected Vehicle Reference Implementation Architecture (CVRIA)

- Established a framework for integrating connected vehicle applications & technologies that includes:
 - Needs/requirements
 - Multi-faceted system architecture
 - Prioritized interfaces for standardization
 - SET-IT tool to support CV project design
- Merged into the National ITS Architecture in ARC-IT 8.0



ARC-IT 8.1

- 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

RAD-IT ✓ ARC-IT 8.1 **SET-IT** 

139 Service Packages

V7.1

97 Service Packages



CVRIA

96 Applications



Architecture Use

- National ITS Reference Architecture
 - Basis for Regional ITS Architectures
 - Framework for ITS Standards
- Architecture and Standards Support Implementation
 - Project by Project
 - Integrated
 - Interoperable
 - Cost-Effective

ARC-IT



Regional ITS Architectures



ITS Standards

NTCIP
ITE TMDD
DSRC/WAVE
⋮



ITS Projects

- Incremental
- Integrated
- Interoperable
- Cost-Effective



SET-IT

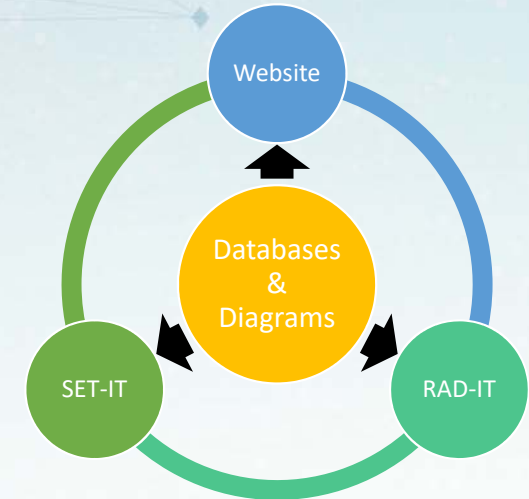


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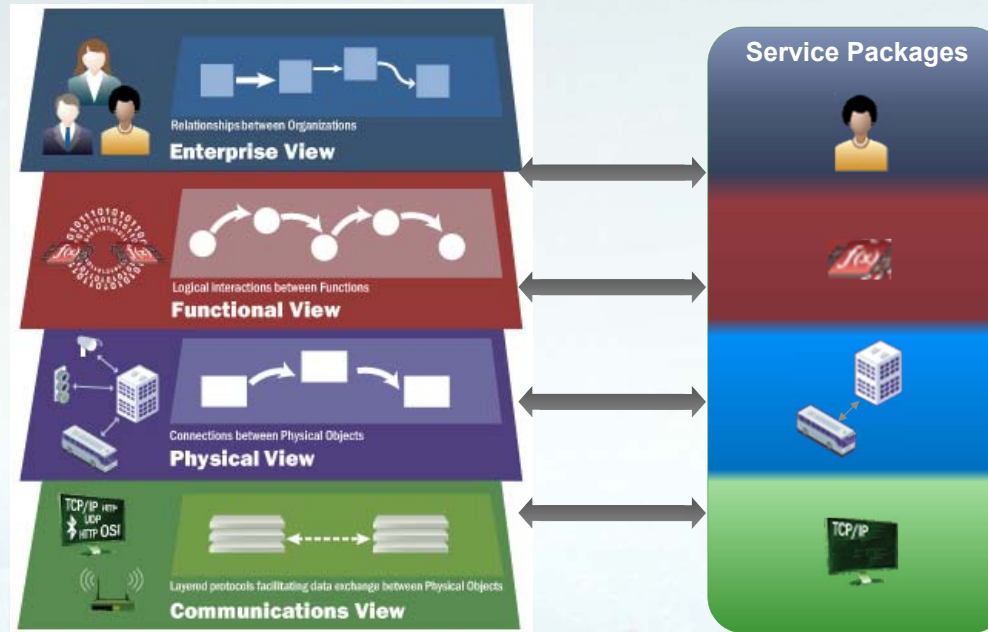
ARC-IT Content

- ARC-IT is comprised of the following
 - Architecture Details contained in
 - Databases
 - Diagrams
 - Architecture Website
 - Hyperlinked view of architecture information
 - Software Tools
 - Regional Architecture Development (RAD-IT)
 - Project Development (SET-IT)



ARC-IT Organization

- ARC-IT organized around **Service Packages**
 - Represent the portion of each view that provides a single ITS service



ARC-IT Organized around Service Packages

- Represent the portion of each view that provides a single ITS service
- Grouped by areas

Traffic Management



Public Transportation



Maintenance and Construction



Commercial Vehicle Operations



Public Safety



Parking Management



Vehicle Safety



Traveler Information



Data Management



Support



Sustainable Travel

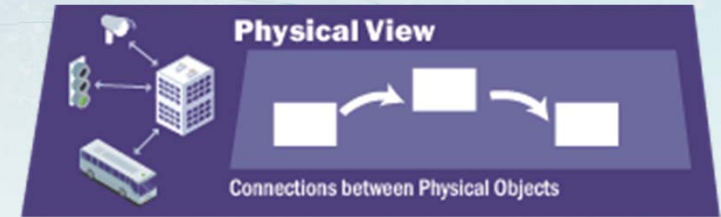


Weather



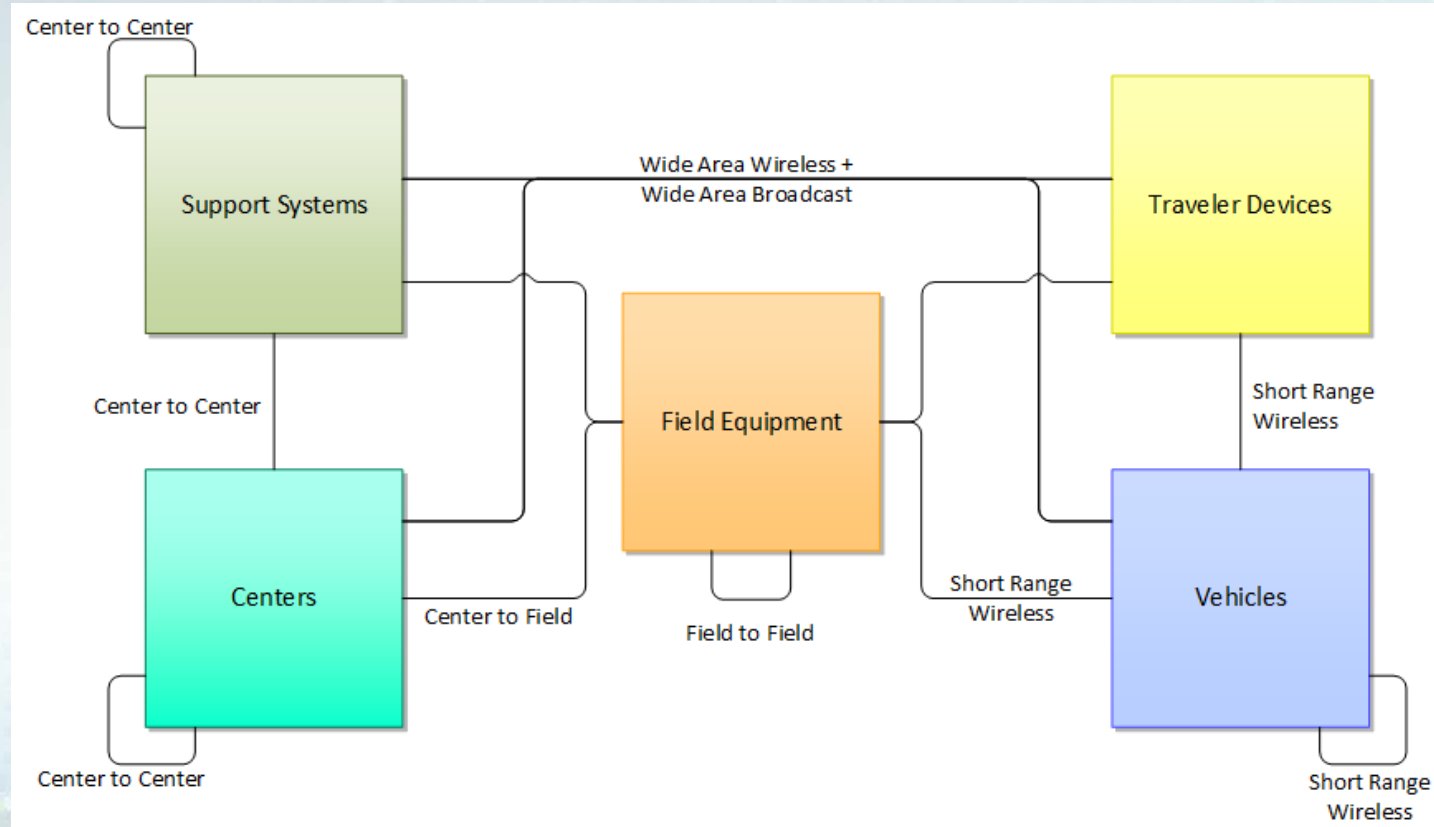
Other ARC-IT Key Concepts

- *Physical objects* that interact to deliver services
- Functionality within Physical Objects
 - *Functional Objects*
- Interfaces and *information flows* between the physical objects



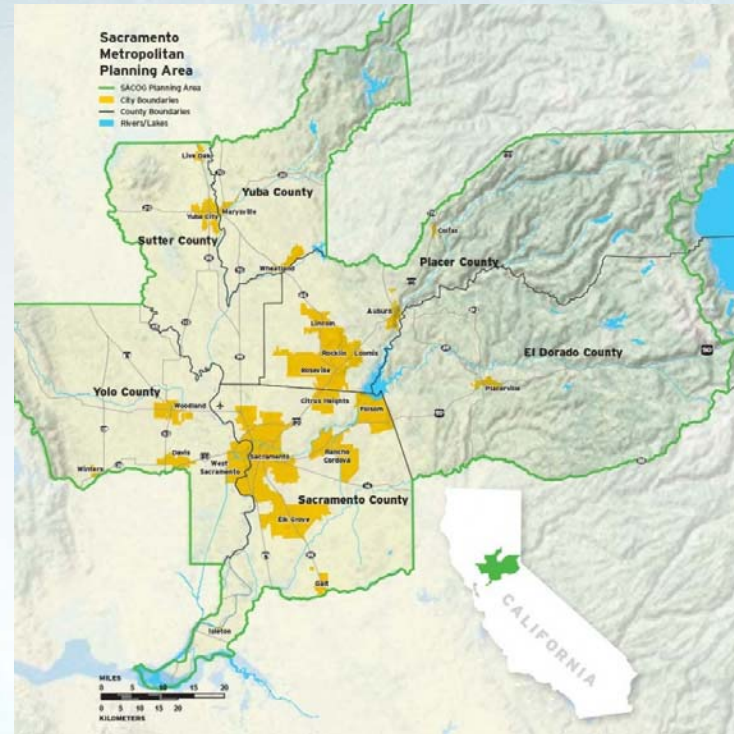
Physical Objects

- Organized into 5 Classes



What is a Regional ITS Architecture?

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



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What is Regional ITS Architecture?

■ Does Provide:

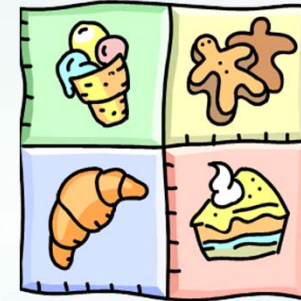
- A blueprint on how ITS systems will work together to satisfy surface transportation needs.
- Identifies the ITS stakeholders in a region and their elements
- Identifies the information to be exchanged between stakeholder elements
- Selects standards for information exchange

■ Doesn't Define:

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

How National ITS Architecture relates to Regional ITS Architecture

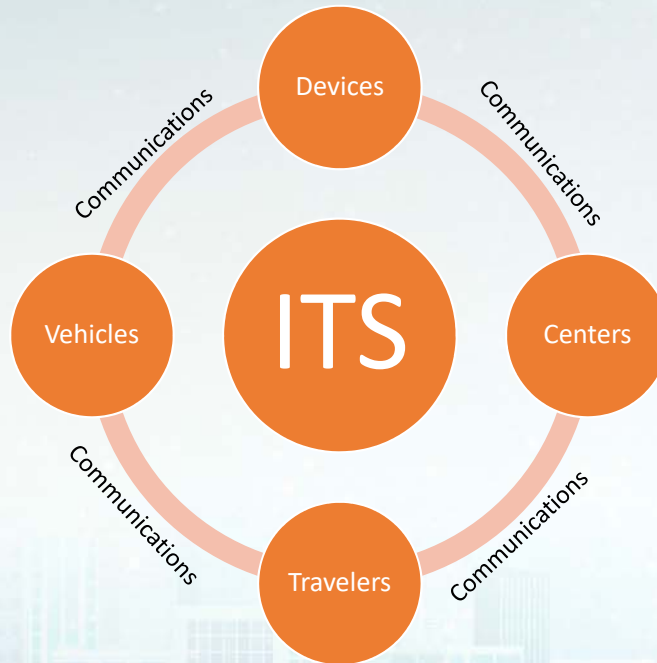
- National ITS Architecture (the cookie cutter)
 - a Framework or Template
 - a menu of possibilities
- Regional ITS Architecture (the cookies)
 - Specific instances, associated with local stakeholders and projects
 - Current inventory + future projects
 - Only the pieces you need
 - Put together based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



Regional ITS Architecture is composed of:

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

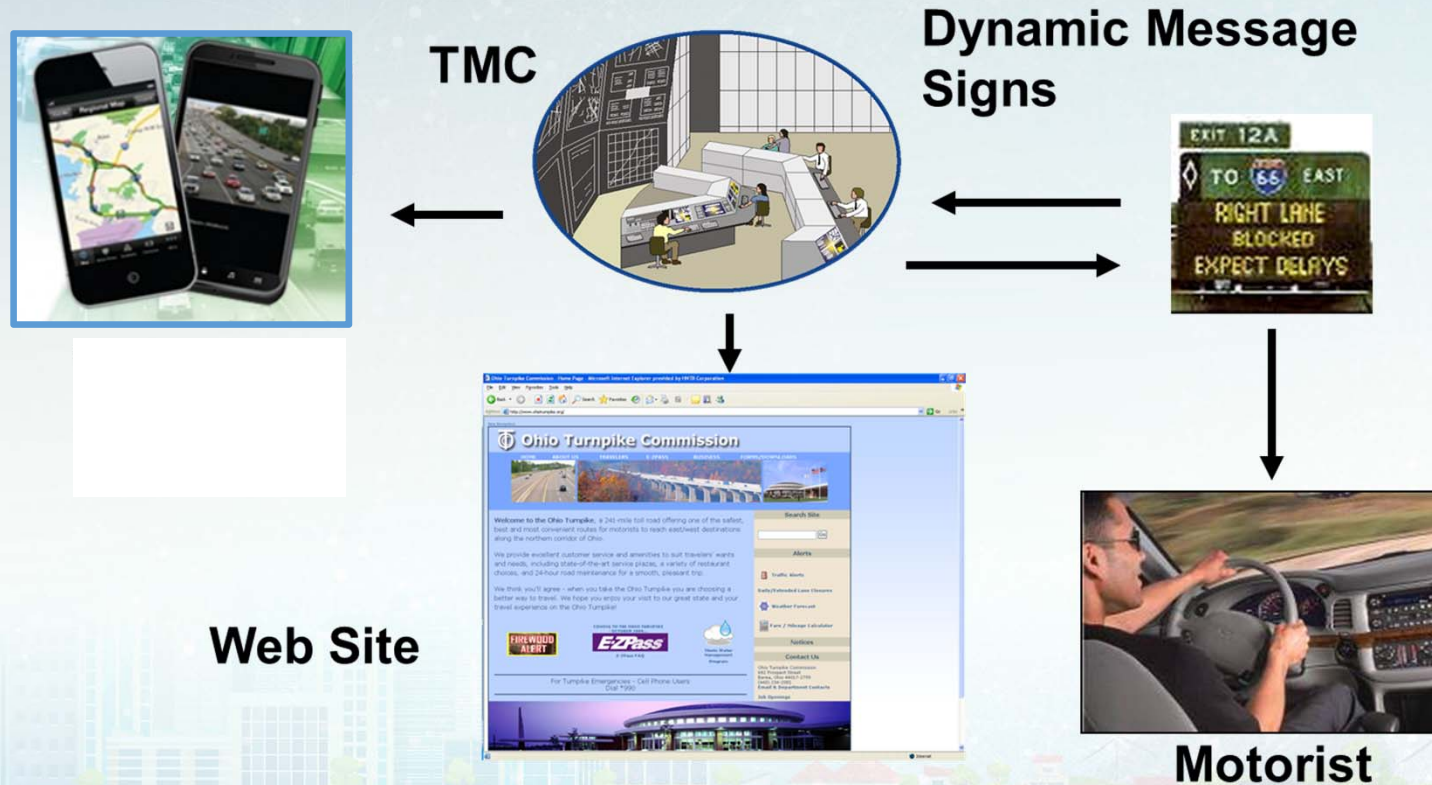
Inventory: Architecture Elements



- Field Devices
 - Cameras
 - Electronic Signs
 - Speed Sensors
- Centers
 - Traffic Mgmt Center
 - 911 Dispatch
- Vehicles
 - GPS and AVL tracking
- Travelers

Service Packages

- Example: Traffic Information Dissemination



Benefits of a Regional ITS Architecture

- Transportation planning tool
 - Understand where we are going with our Intelligent Transportation System
- Find opportunities to work together across multiple jurisdictions and agencies
- 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)
 - Identify open ITS standards: reduce long term risk/cost

Still more Benefits

■ Institutional Agreement:

- The problem: Time consuming to develop when information crosses institutional boundaries
- Regional ITS Architecture: Establish consensus based foundation for agreements – to get the process started

And finally....

- 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
 - Defines requirements for ITS projects

ITS Projects

- Regional ITS Architecture partially satisfies the systems engineering requirements for FHWA Rule/FTA Policy on ITS Architectures and Standards
- Part 940.11 Requirements:
 - Portion of the regional ITS architecture
 - Roles and responsibilities
 - High-level requirements
 - Alternative communications infrastructure
 - **Applicable ITS Standards**
 - Procurement options
 - Operations and Maintenance

Regional ITS Architecture Described by:

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

Sacramento Regional ITS Architecture

- First Version of Architecture developed in 2006
 - Complete description of elements, services, and projects at that time
 - Found limited use for project development
- Update needed to
 - Address new services (e.g. connected vehicle)
 - Address projects planned for the next decade +
 - Plus- update for major changes from ARC-IT V8.1

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



Discussion of Scope, Stakeholders and Elements



SACOG Regional ITS Architecture Scope

- Geographic
 - Covers the 6 county SACOG region
- 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

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



Television
Station

TMC



Dynamic Message
Signs

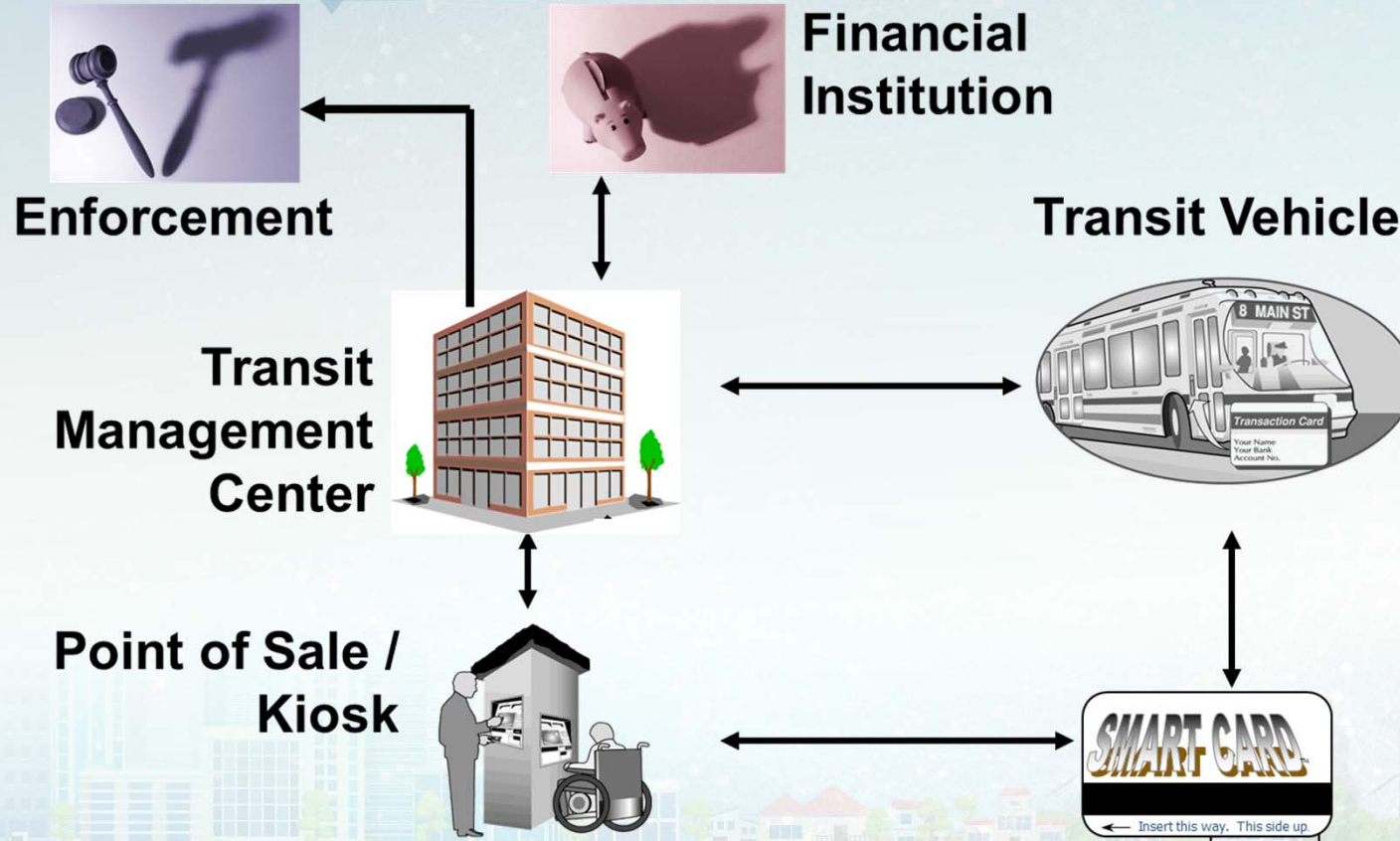


Web Site



Motorist

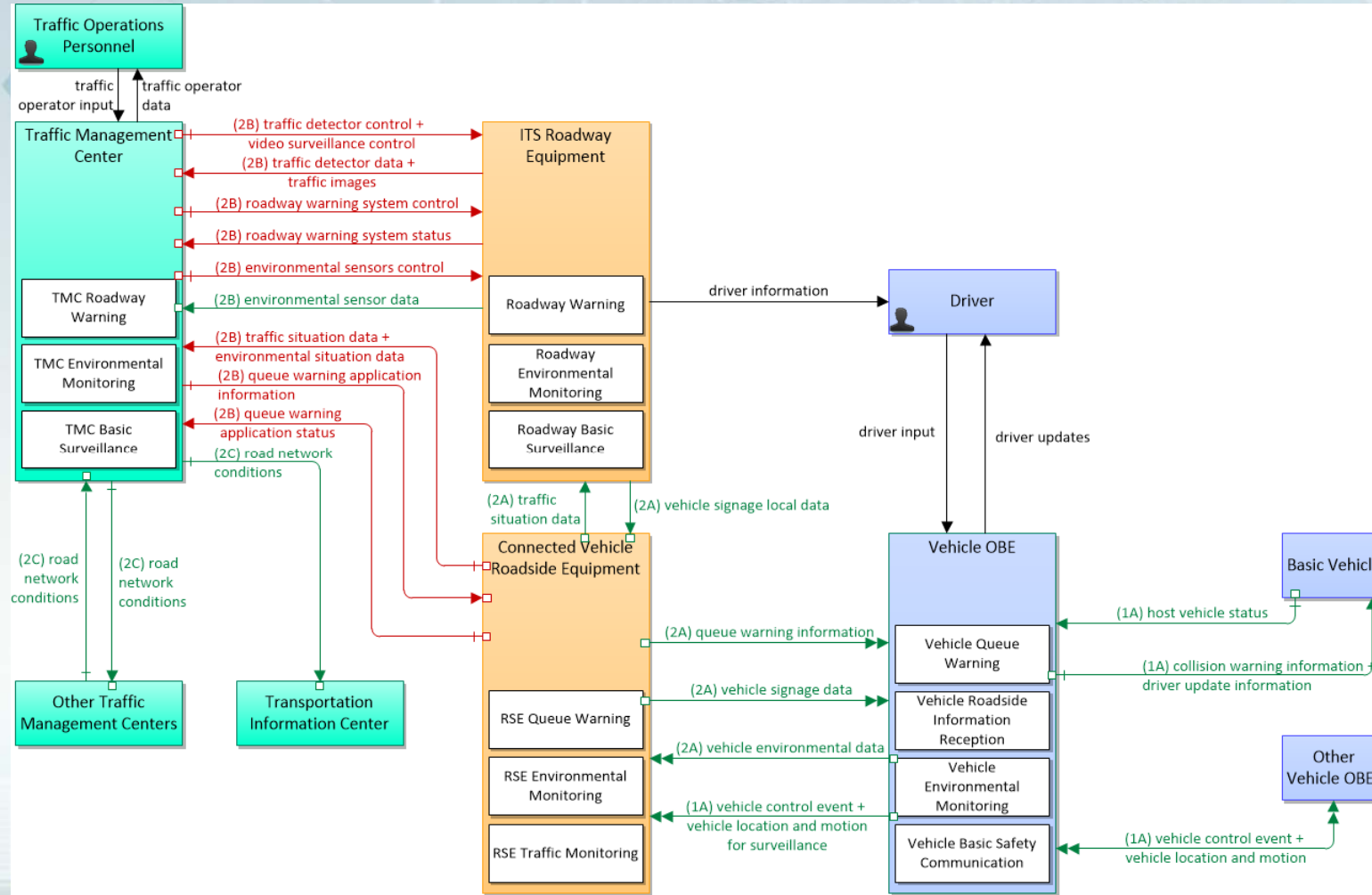
Automated Transit Fare Payment



Physical View- Service Packages

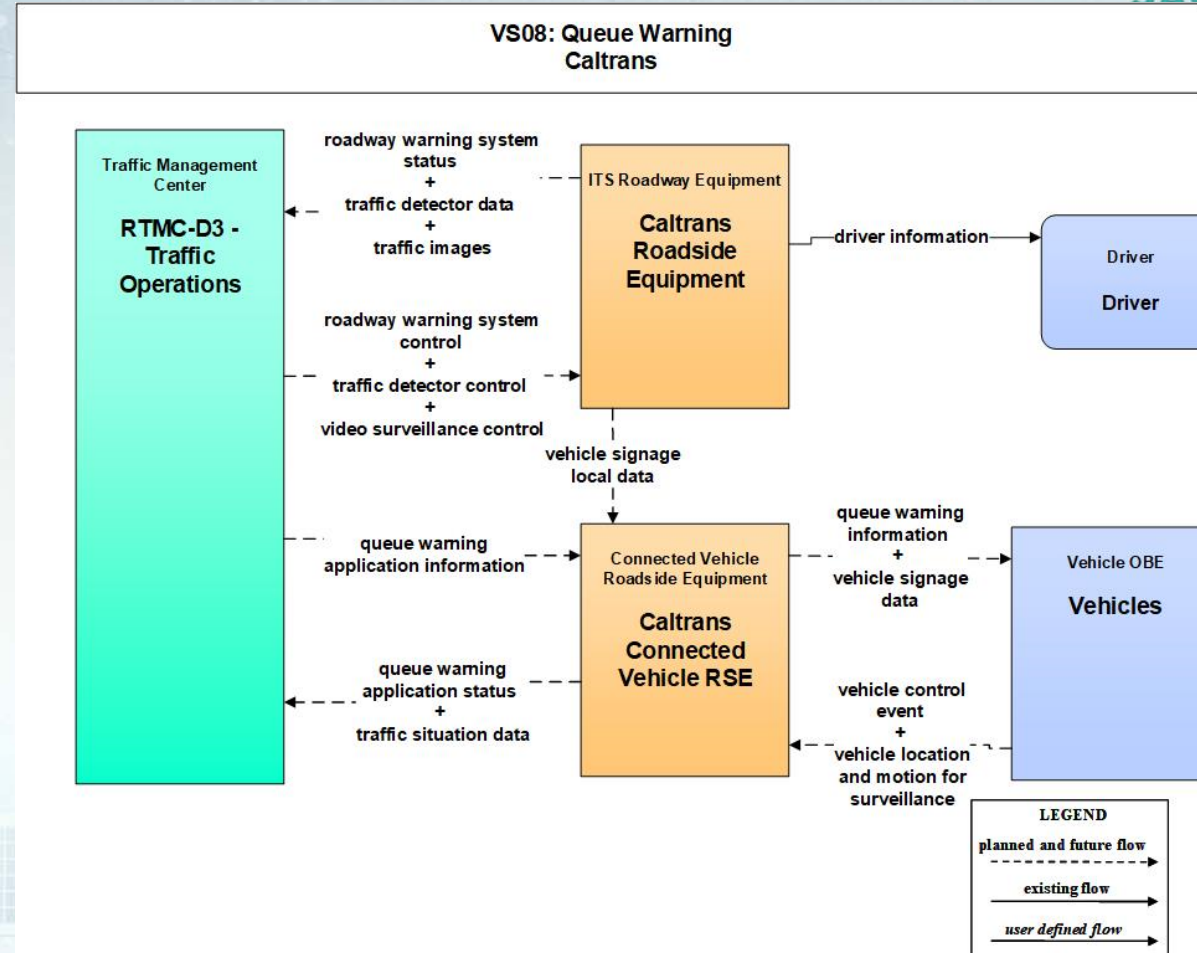
- Service Packages are Portion of Physical View that provide an ITS Service
- Service Packages in the Physical View are defined by a set of:
 - Physical Objects
 - Functional Objects
 - Information Flows
- Plus a diagram showing all how all these are connected.

ARC-IT Service Package- Queue Warning



Customized Service Package Diagrams

- Customize to reflect regional operational concepts



Regional ITS Projects



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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 SACOG 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
 - Implementation Plans
- 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.....

Next Steps

- Complete Draft Regional ITS Architecture and update project website
- Email to all stakeholders and attendees with information
- Comments solicited from stakeholders
- Architecture updated and finalized after receipt of comments
- Final presentation to stakeholders of Architecture- done by webinar.



THANK YOU



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LUNCH BREAK



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