



# National ITS Architecture Update

**ITS Joint Program Office  
Professional Capacity Building Program  
Talking Technology and Transportation  
(T3) Presentation  
August 23, 2007**



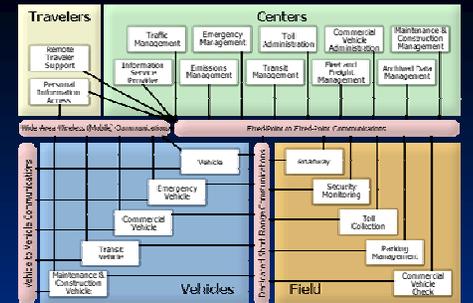
Research and Innovative  
Technology Administration



U.S. Department of Transportation  
**Federal Highway  
Administration**

# Agenda

- National ITS Architecture
  - Overview
  - Version 6.0 update
- Turbo Architecture version 4.0 preview
- Discussion of deployment support and resources available
- Presenters
  - David Binkley, Lockheed Martin
  - Mac Lister, FHWA

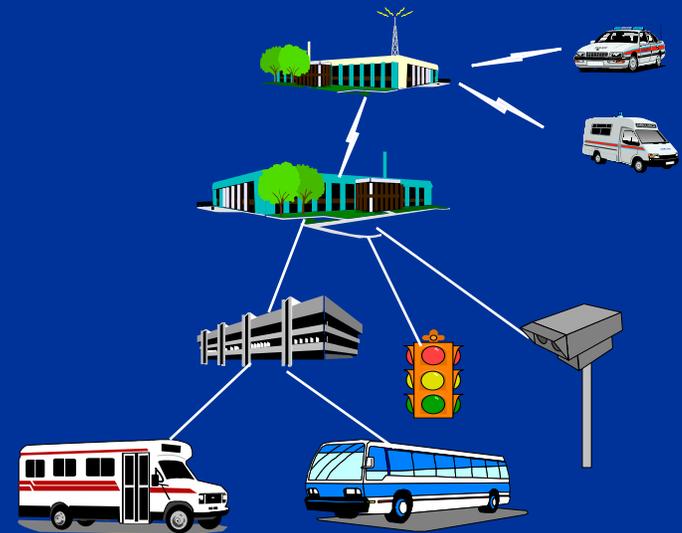


# National ITS Architecture Overview



# What is ITS?

- Intelligent Transportation Systems (ITS) include the electronics, communications or information processing used singly or integrated to improve the efficiency or safety of surface transportation
- Examples:
  - Traffic signal controllers
  - Traffic Management Centers
  - “511” (traveler information)
  - Electronic toll-tagging

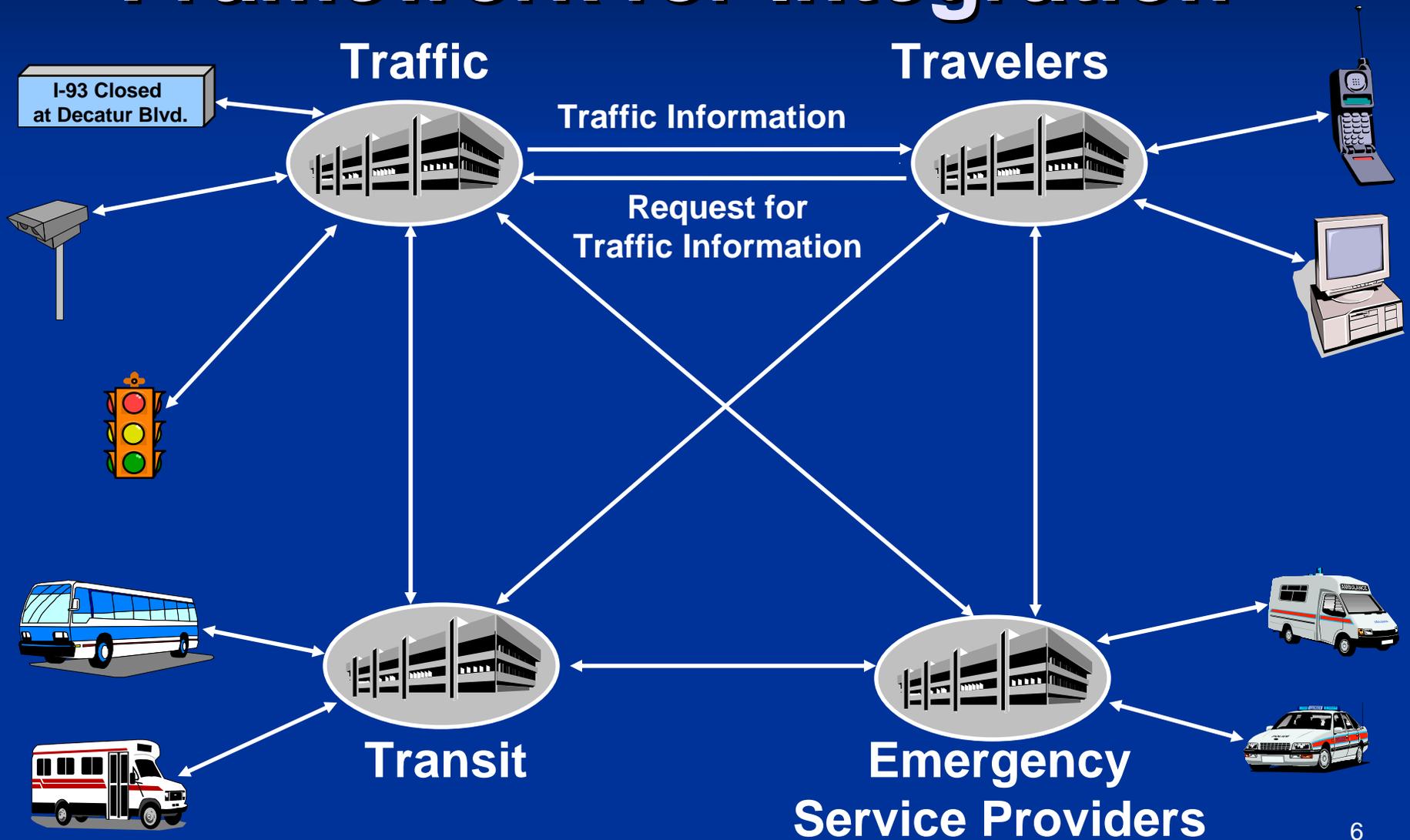


# What is an ITS Architecture?

- Framework for Developing Integrated Transportation Systems
- Identifies:
  - Organizations
  - Systems operated
  - Functions performed
  - Communications
  - Information exchanged



# ITS Architectures Provide a Framework for Integration

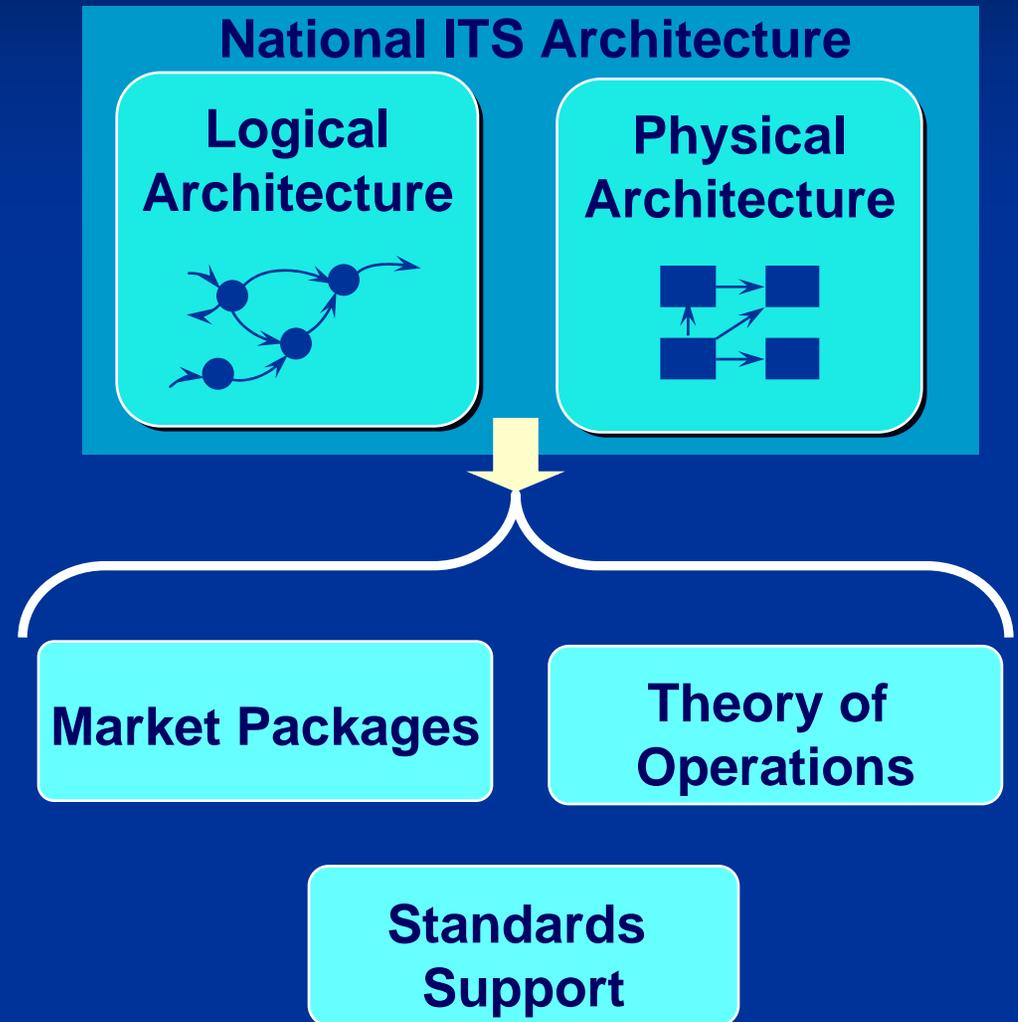


# What is the National ITS Architecture?

- HIGH-LEVEL national framework, “blueprint”, used to help guide ITS deployment and transportation planning
- Based on 33 transportation related ITS User Services:
  - Physical Entities – Subsystems/Terminators
  - Logical Architecture – Processes, Data Flow
  - Interfaces – Information Flows
  - Deployment oriented Market Packages

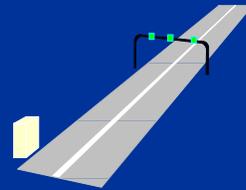
# Architecture Products

- Available on
  - CD-ROM
  - Website
- Contains
  - Hypertext
  - PDF docs
  - Databases

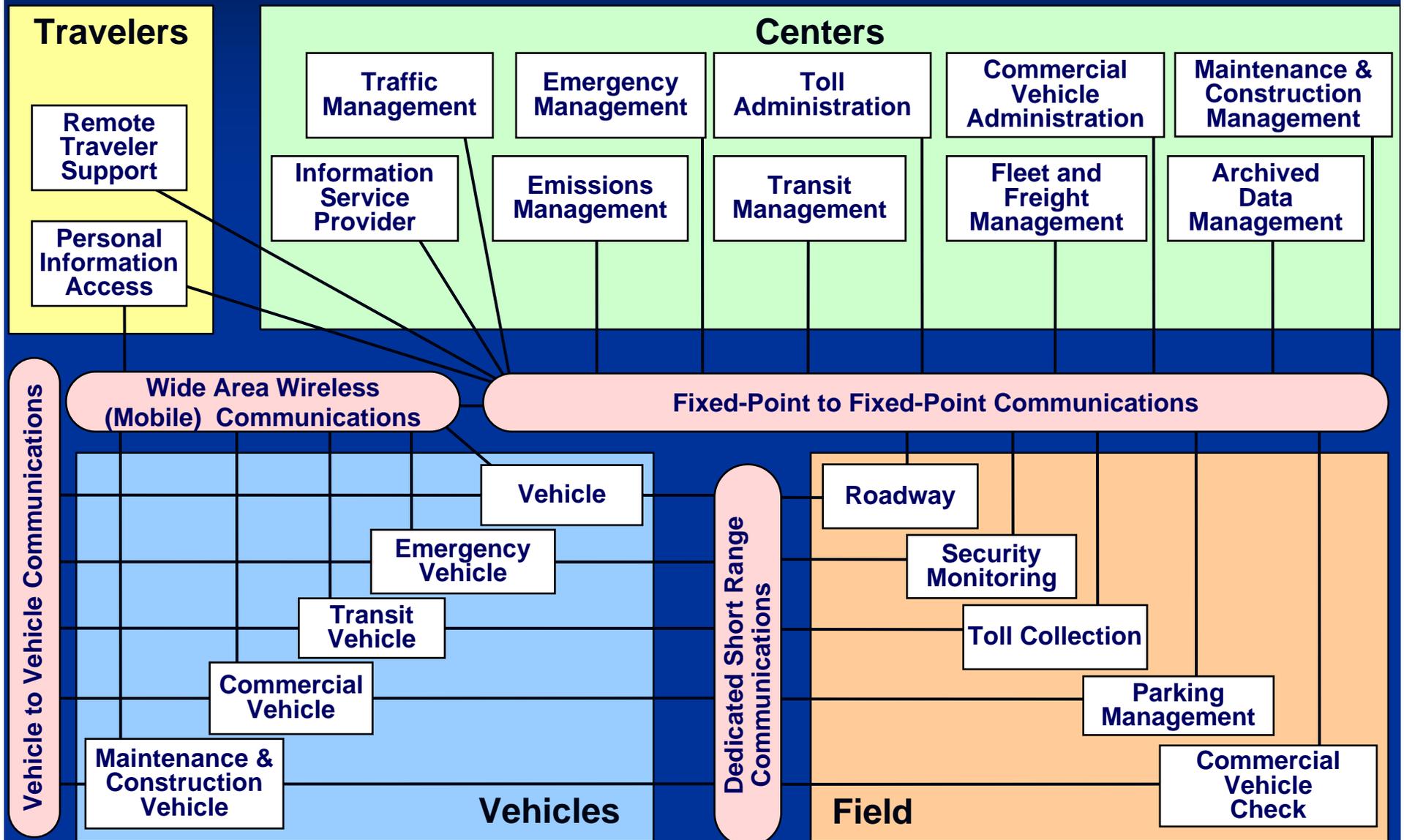


# Subsystems

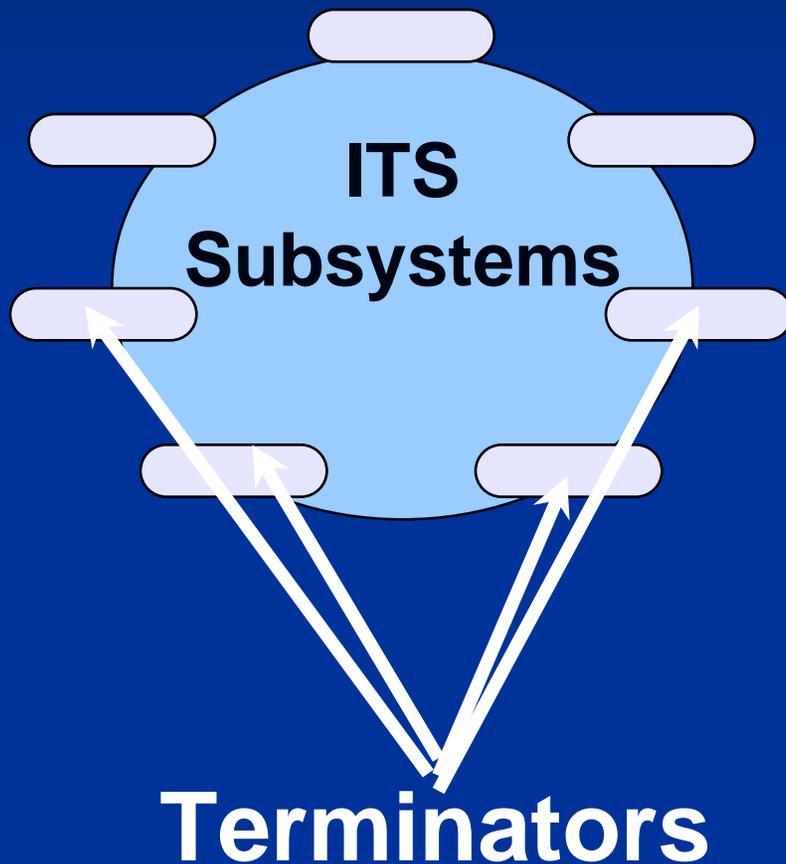
- Part of the overall Intelligent Transportation System
- Identify major systems, functionality
- Identify major interfaces
- Define key standardization points
- 4 Categories
  - Centers
  - Field
  - Vehicles
  - Travelers



# Subsystem Diagram



# Terminators Define the ITS Boundary



- Entities outside of ITS
- Define interfaces but not functionality
- Four types of Terminators
  - Environment
  - Human
  - System
  - Other System

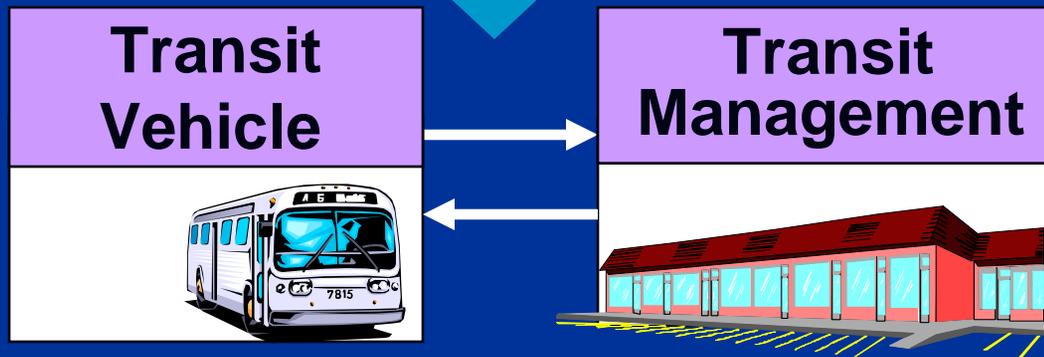
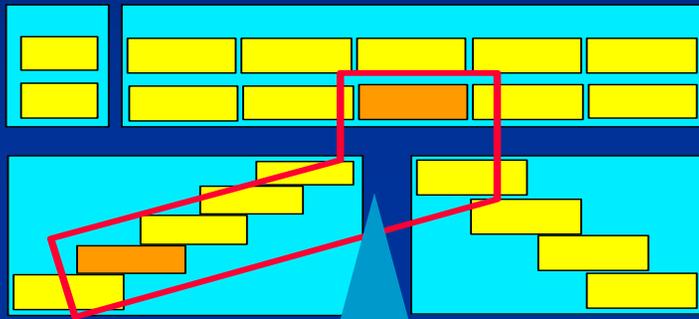
# Market Packages

## Architecture

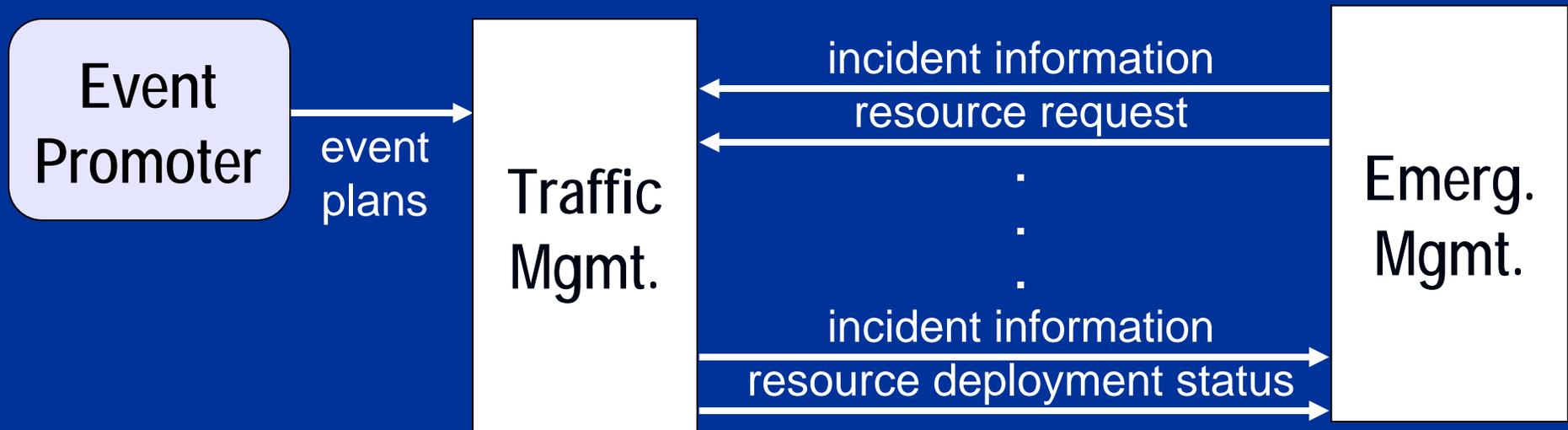
Framework  
spanning all of ITS

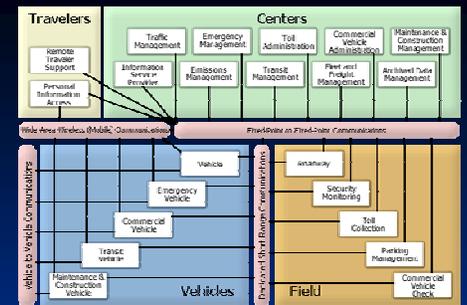
## Market Packages

Contain pieces of the  
architecture  
that provide a  
particular  
transportation service

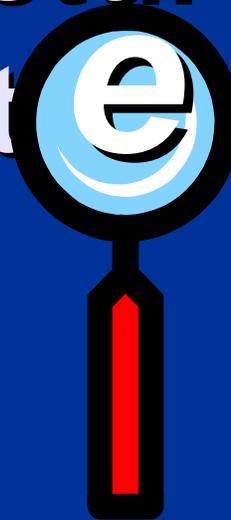


# “Architecture Flows” Define Information Exchanged



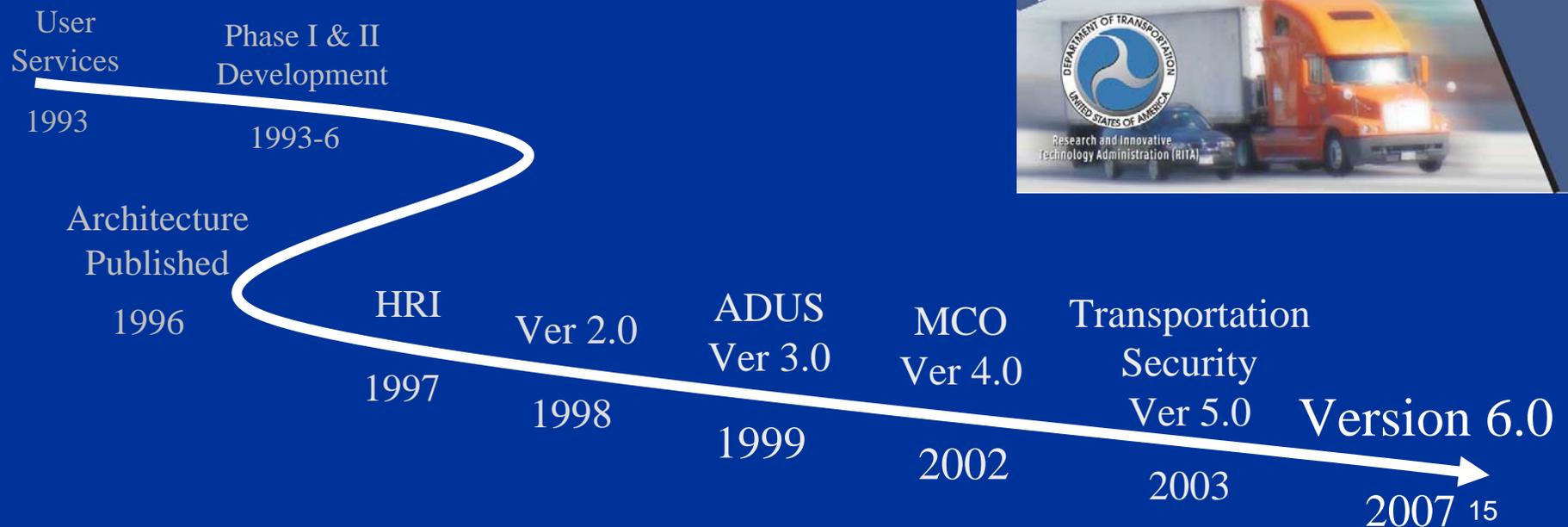
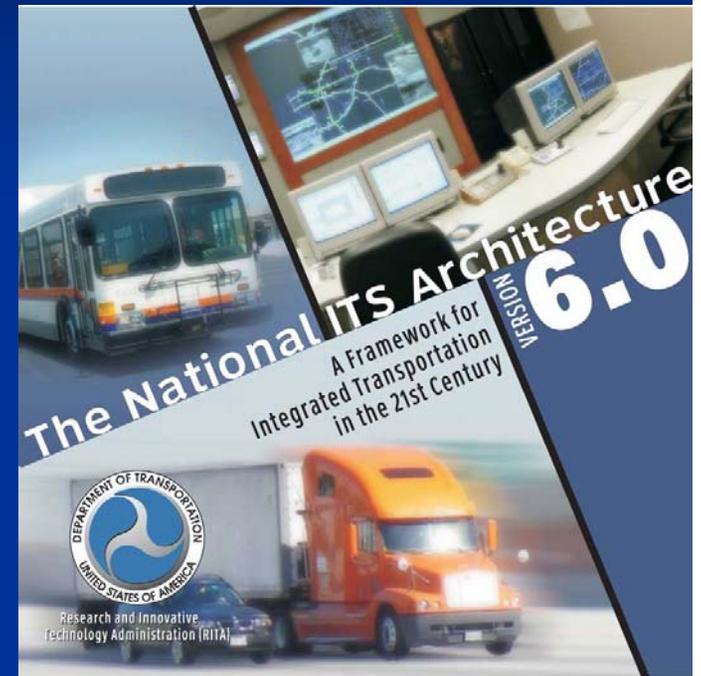


# National ITS Architecture Version 6.0 Update



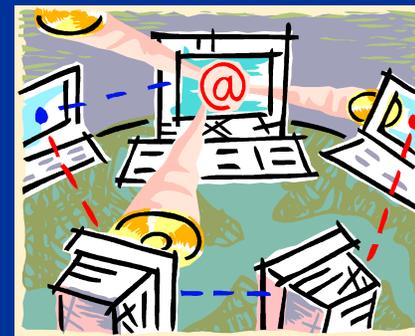
# National ITS Architecture is a “Living Document”

- Continuing evolution of the architecture over 10 years
- Version 6.0 continues support for ITS technical evolution and deployment



# Architecture Evolution in Step with Industry

- Research and Federal Programs
  - DOT Initiatives
  - Border Information Flow Architecture (BIFA)
  - Commercial Vehicle Information and System Networks (CVISN)
- ITS Standards
- Deployment Lessons Learned



# Version 6.0 Changes

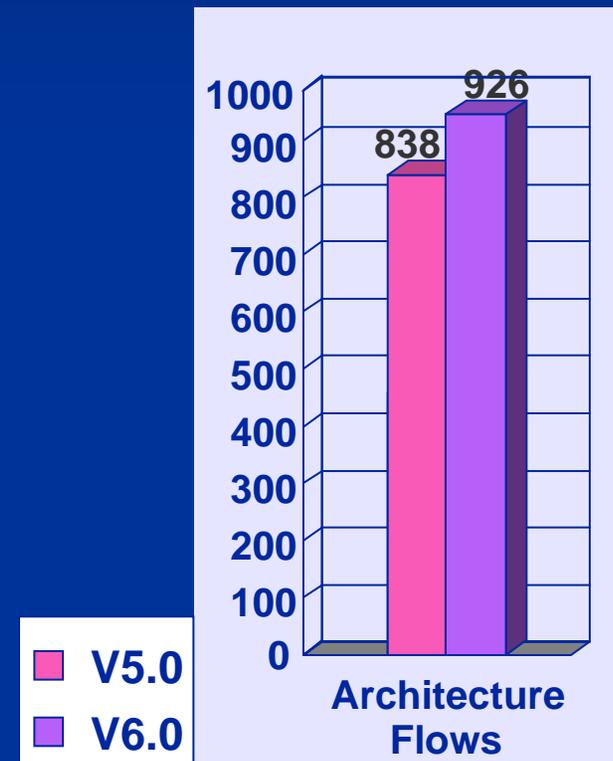
## Subsystems, Terminators, Flows

- Subsystems
  - No Changes

- Terminators



- Architecture Flows



# Market Package Changes

- 91 Total in V6.0 vs. 85 in V5.0
- New MPs
  - APTS09 Transit Signal Priority
  - APTS10 Transit Passenger Counting
  - ATIS06 Transportation Operations Data Sharing
    - replaced Integrated Transportation Management/Route Guidance
  - ATIS10 VII Traveler Information
  - ATMS12 Roadside Lighting System Control
    - replaced Virtual TMC and Smart Probe Data
  - AVSS12 Cooperative Vehicle Safety Systems
  - MC11 Environmental Probe Surveillance
  - MC12 Infrastructure Monitoring

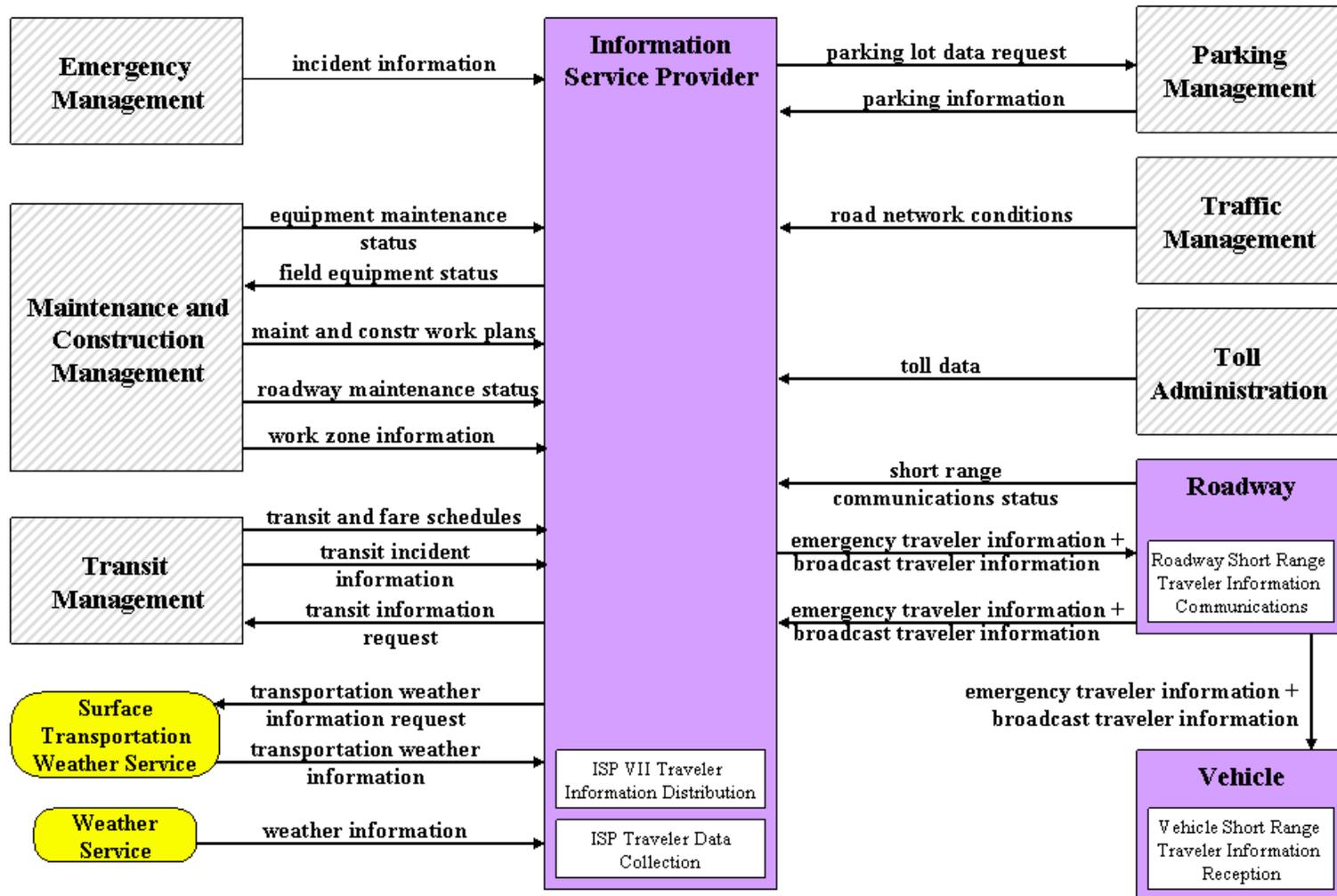
# Architecture & the Initiatives

- National ITS Architecture evolving as DOT initiatives are developed and tested
- Vehicle Infrastructure Integration (VII)
  - Modify existing services (probe surveillance), interfaces between Vehicles and Roadway / Infrastructure
  - New probe-based services: traveler information, environmental probe surveillance, infrastructure monitoring



# New VII Market Package

ATIS10 – VII Traveler Information

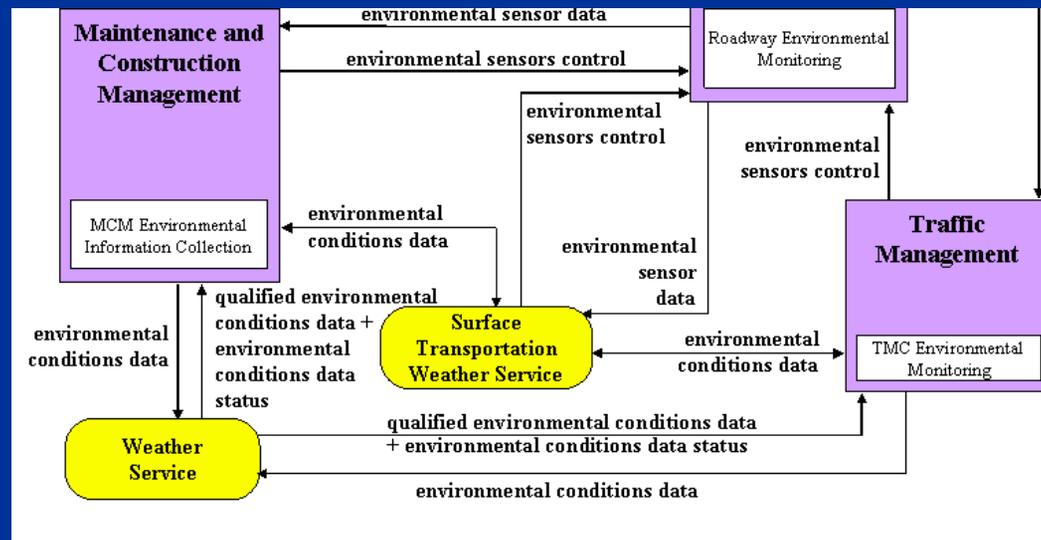


# Architecture & the Initiatives

## ■ Clarus



- Revised interfaces with the Weather Service
- Modified MC03 Road Weather Data Collection MP to emphasize collection of sensor data, provision of qualified information back to ITS from Clarus



# Architecture & Other Federal Activities

- Expanded CVISN Capabilities
  - Sync National ITS Architecture with CVISN V3
    - Support Smart Roadside
    - New Driver Identification Card terminator
- Border Information Flow Architecture (BIFA)
  - Modified International Border Electronic Clearance MP
    - New terminators: Border Inspection Administration, Border Inspection Systems



# Other Changes

- Support use of ATIS in No-Notice Disasters, ITS role in BioHazard situations
  - Interfaces for Reverse 911
  - New Public Health System terminator
- Presentation, user access changes:
  - Functional requirements added to Equipment Package pages
  - Short user service descriptions added to top of each User Service Requirements page
  - Documents Page, added:
    - User Service Document
    - Regional ITS Architecture Guidance Document, V2
    - Systems Engineering for ITS

Document View



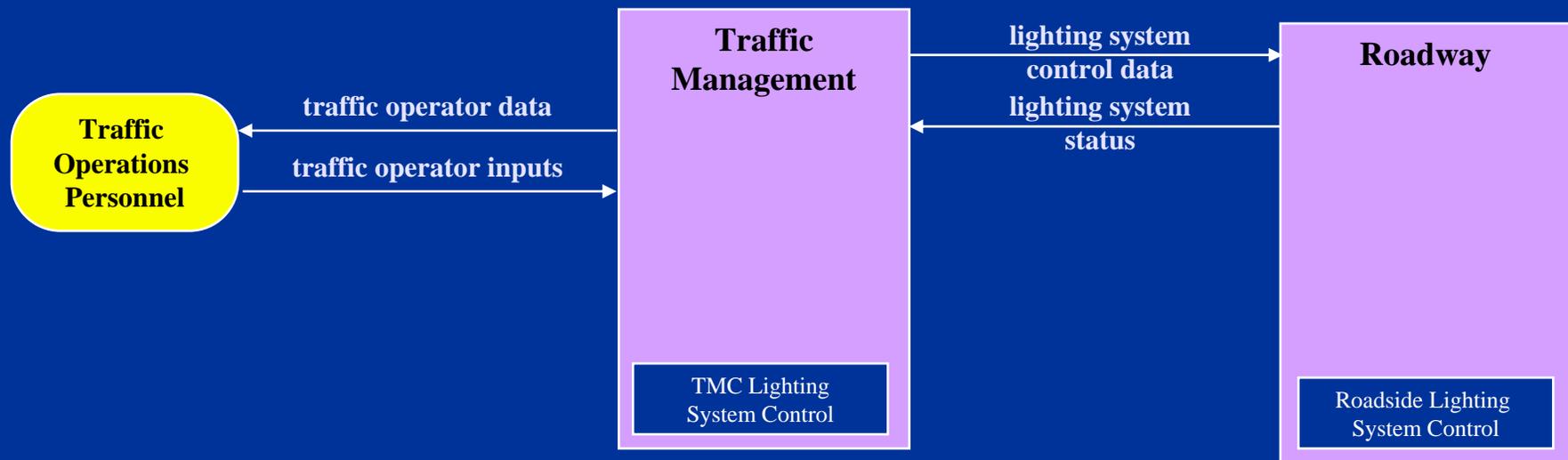
# Other Changes

- Rehosted Logical Architecture to Telelogic System Architect™
  - New look-and-feel in Data Flow Diagrams (DFDs)
- Databases, documents, hypertext updated
- Standards mapping updated
  - Sync with ITS Standards program web site
  - Map latest Standards activities to Architecture: TCIP V3, TMDD, DSRC/WAVE
  - Application Areas
    - Flows, standards support key areas of deployment



# Other Changes – Standards Support

- Support new NTCIP 1213 Electrical Lighting and Management Systems
- New functions, interfaces, and new Market Package:  
ATMS12 Roadside Lighting System Control

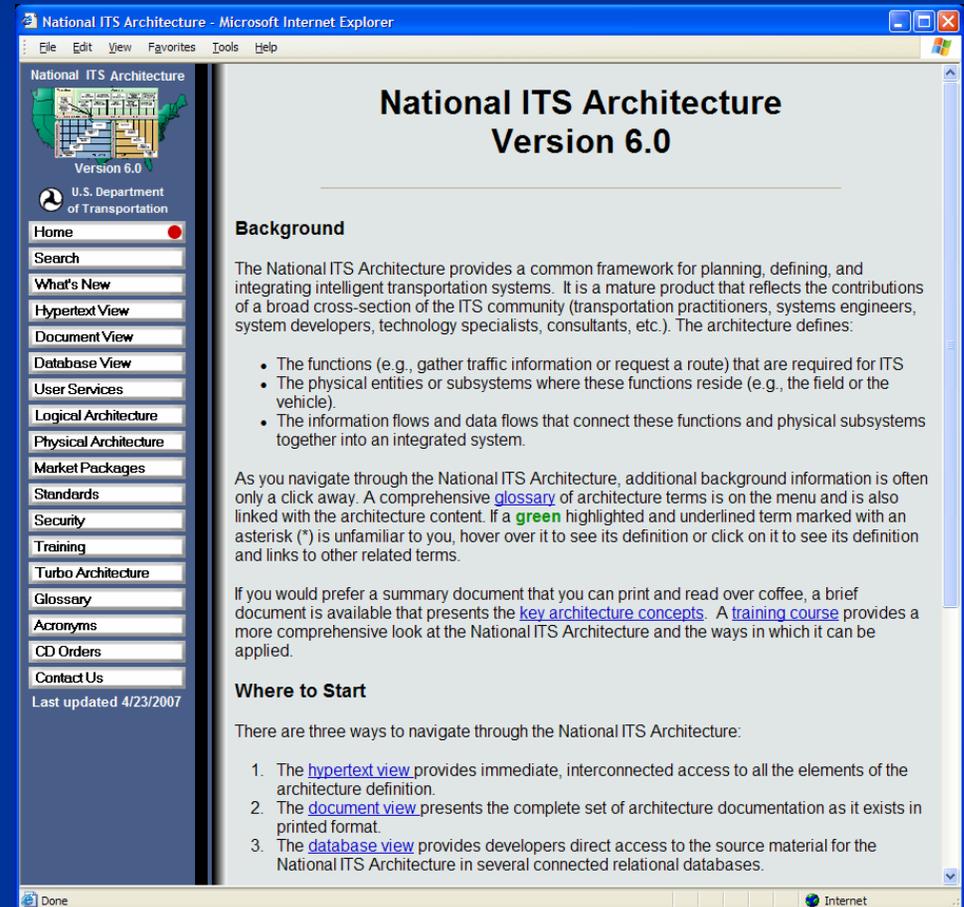


# Version 6.0 Available Now

- On the Web: <http://www.its.dot.gov/arch/index.htm>
  - Click on “National ITS Architecture Version 6.0”



- CD-ROM's also available



The screenshot shows a web browser window titled "National ITS Architecture - Microsoft Internet Explorer". The page content includes:

- Navigation Menu:** Home, Search, What's New, Hypertext View, Document View, Database View, User Services, Logical Architecture, Physical Architecture, Market Packages, Standards, Security, Training, Turbo Architecture, Glossary, Acronyms, CD Orders, Contact Us. Last updated 4/23/2007.
- Page Title:** National ITS Architecture Version 6.0
- Section: Background**

The National ITS Architecture provides a common framework for planning, defining, and integrating intelligent transportation systems. It is a mature product that reflects the contributions of a broad cross-section of the ITS community (transportation practitioners, systems engineers, system developers, technology specialists, consultants, etc.). The architecture defines:

  - The functions (e.g., gather traffic information or request a route) that are required for ITS
  - The physical entities or subsystems where these functions reside (e.g., the field or the vehicle).
  - The information flows and data flows that connect these functions and physical subsystems together into an integrated system.

As you navigate through the National ITS Architecture, additional background information is often only a click away. A comprehensive [glossary](#) of architecture terms is on the menu and is also linked with the architecture content. If a **green** highlighted and underlined term marked with an asterisk (\*) is unfamiliar to you, hover over it to see its definition or click on it to see its definition and links to other related terms.

If you would prefer a summary document that you can print and read over coffee, a brief document is available that presents the [key architecture concepts](#). A [training course](#) provides a more comprehensive look at the National ITS Architecture and the ways in which it can be applied.
- Section: Where to Start**

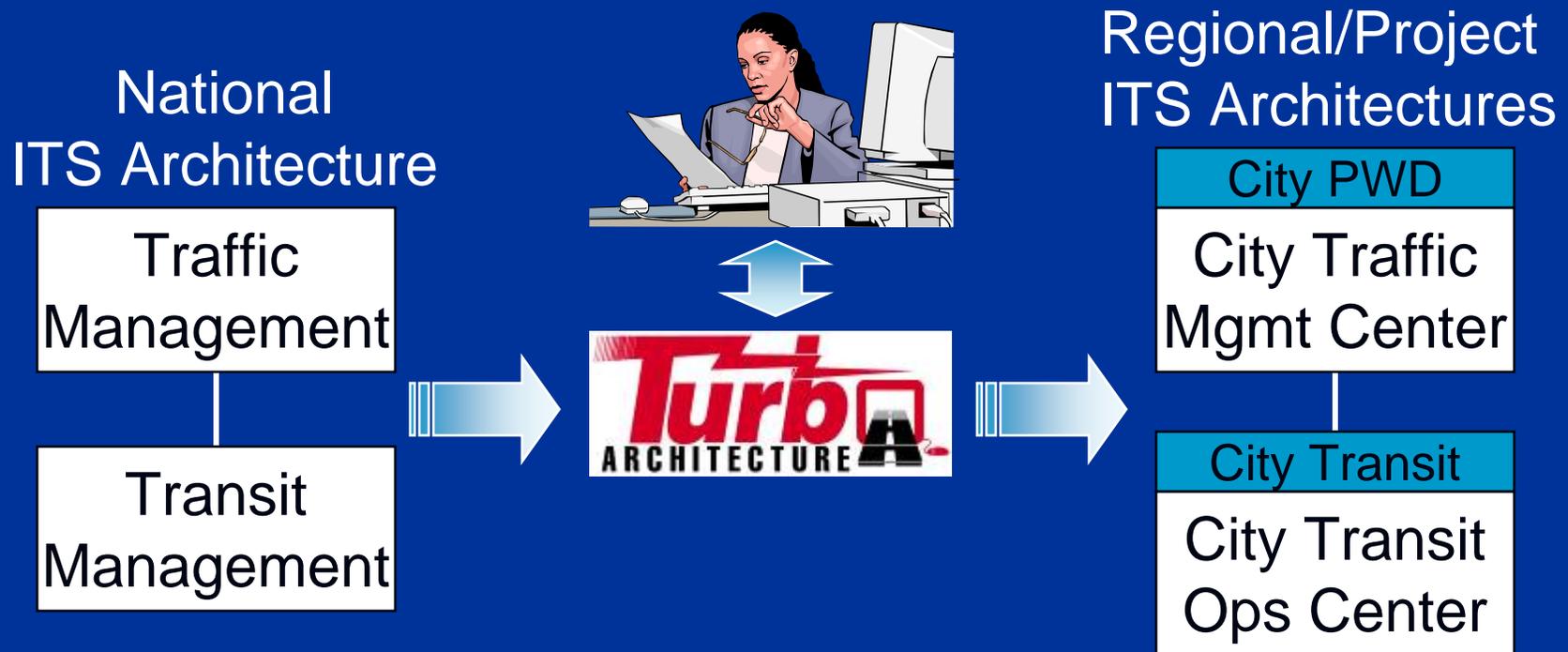
There are three ways to navigate through the National ITS Architecture:

  1. The [hypertext view](#) provides immediate, interconnected access to all the elements of the architecture definition.
  2. The [document view](#) presents the complete set of architecture documentation as it exists in printed format.
  3. The [database view](#) provides developers direct access to the source material for the National ITS Architecture in several connected relational databases.

# Turbo Architecture Version 4.0 Update

# What Turbo Does

*Turbo* is a software tool that automates use of the National ITS Architecture.



# Turbo Version 4.0

- Comprehensive Upgrade will include



- Support for Version 6.0 of the National ITS Architecture



- Enhancements that focus on improving project definition based on a regional ITS architecture



- Bug fixes to ensure trouble-free operation

# Version 4.0 Project Enhancements



- Version 4.0 is the first Turbo upgrade to focus on project definition capabilities
  - Focus on Regional ITS Architectures until now
- Project definition interface will be revamped to make it more intuitive
- New features will be added to make project definition more useful and powerful

# Improved Project Interface



- Modify Turbo interface to make project definition more intuitive

The screenshot displays the Turbo Architecture software interface. The window title is "Turbo Architecture - C:\marinaraV4.tbo - MCDOT-Saucelito". The interface is divided into several sections:

- Project Elements:** A list of project elements is shown on the left. The "City Operations Center" is selected and highlighted with a red box. A red arrow labeled "New" points to this selection.
- Details Pane:** The right pane shows details for the selected "City Operations Center". It includes fields for Name, Stakeholder, Status (Current Project), and Description. The Name is "City Operations Center", the Stakeholder is "Saucelito City Department of Transportation", and the Status is "Existing". The Description reads: "The SCDOT maintains a City Operations Center near the government center. This serves as a central point for monitoring the signal system (327 intersections) and dispatching field staff. The COC is staffed during rush".
- Selected Subsystems/Terminators:** A section at the bottom right shows "Selected Subsystems/Terminators" with "Traffic Management (Subsystem)" checked.

# Improved Project Interface



- Improve capability to select and reuse regional ITS architecture Roles and Responsibilities

**New**

Turbo Architecture - C:\Documents and Settings\Ron

File Edit Tools Output Help

Start Stakeholders Inventory Services **Ops Concept** Requirements Interfaces Standards Agreements

Role and Responsibility Areas

Regional Areas All Areas Add Areas

- Amber Alert for Marinara County
  - RR Marinara County Department of Transportation
  - RR Marinara County Sheriffs Department
  - RR State Highway Patrol
  - Freeway Management for Marinara County
  - Incident Management for Marinara County
  - Parking Management for Marinara County
  - Surface Street Management for Marinara County
  - Transit Services for Marinara County
  - Traveler Information for Marinara County

Stakeholder Roles and Responsibilities

Area: Amber Alert for Marinara County

Stakeholder: State Highway Patrol

Role and Responsibility	Include
SHP is responsible for statewide coordination of Amber Alerts.	<input checked="" type="checkbox"/>
SHP determines that criteria for an Amber Alert has been met and activates an alert.	<input checked="" type="checkbox"/>
SHP notifies MCDOT and provides Amber Alert information	<input checked="" type="checkbox"/>

# Improved Project Interface



- Improve capability to select and reuse regional ITS architecture functional requirements

Functional Requirements

Bus Operations Center Transit Center Vehicle Tracking

**Bus Operations Center - Transit Center Vehicle Tracking Requirements (6 Entries)**

Number	Requirement	Status	In Region	Include	Tailored
1	The center shall monitor the locations of all transit vehicles within its network.	Planned	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	The center shall determine adherence of transit vehicles to their assigned schedule.	Planned	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of	Not Planned	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	The center shall provide transit operational data to traveler information service providers.	Planned	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	The center shall provide collected transit probe data to traffic management centers and traveler information service providers	Not Planned	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	The center shall provide collected transit probe data to SDDOT.	Planned	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

New

Tailor

Delete

Apply

Close

New

In Region	Include	Tailored
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

# Project Definition Challenge



- Bridging the gap between high-level regional ITS architecture and specific projects

## Architecture

WSDOT  
Inventory

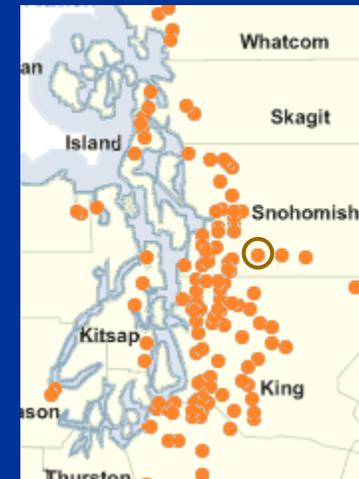
WSDOT  
NW Region  
Field Equipment

WSDOT  
Olympic Region  
Field Equipment

*The Gap*

## Specific Project

WSDOT Projects



- Technology Neutral
- Location Neutral

- Technology Specific
- Location Specific

# Project Definition Challenge (2)



- Bridging the gap between high-level regional ITS architecture and specific projects

## Architecture

WSDOT  
Inventory

WSDOT  
NW Region  
Field Equipment

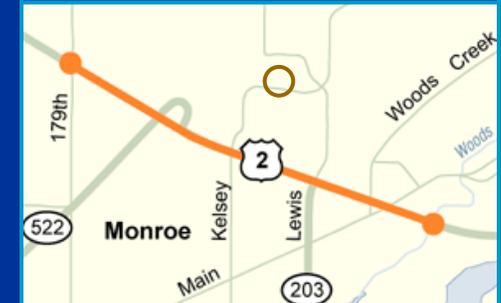
WSDOT  
Olympic Region  
Field Equipment

*The Gap*

## Specific Project

US 2–179<sup>th</sup> to Woods Cr.

- Signal upgrade
- Grade crossing coord.
- Traffic Cameras



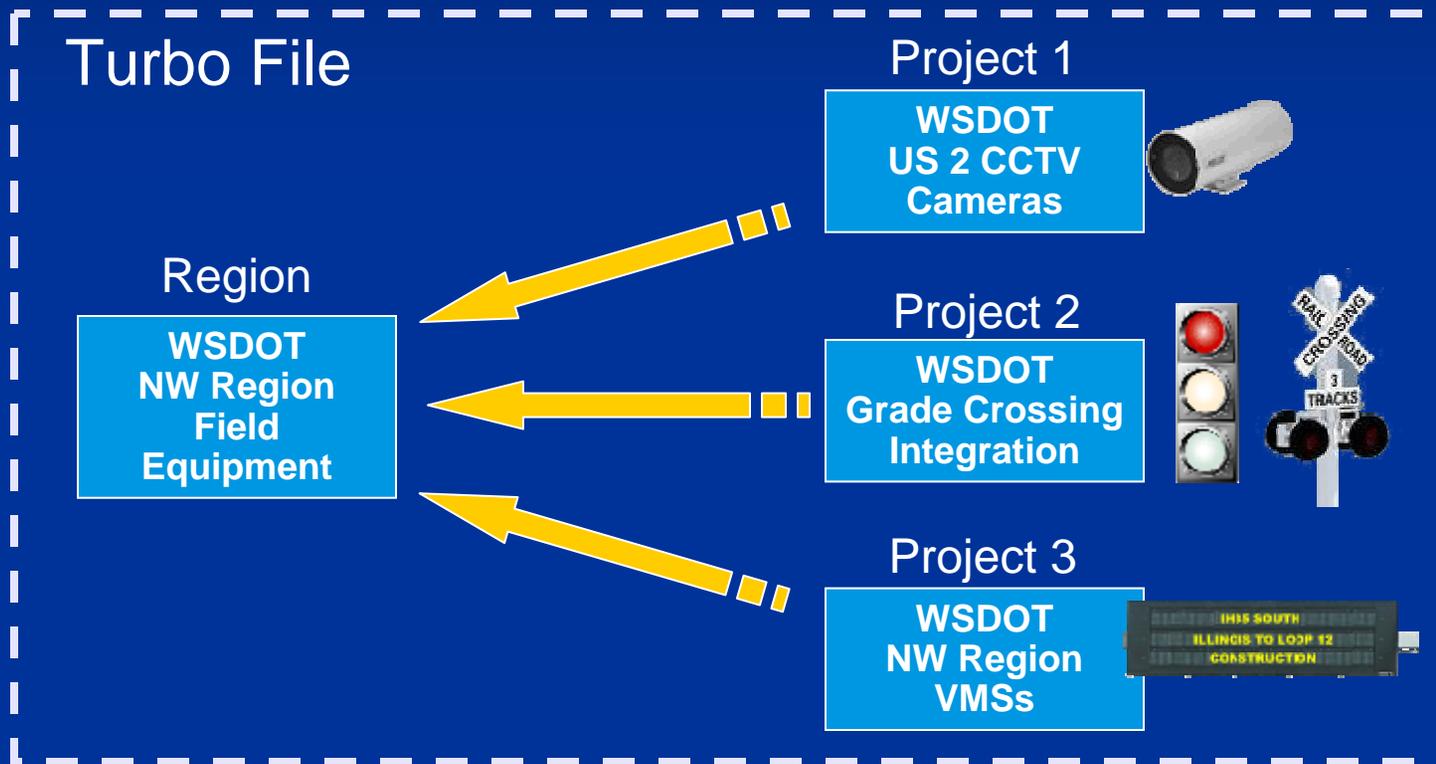
- Technology Neutral
- Location Neutral

- Technology Specific
- Location Specific

# Turbo V4.0 Solution (1)



- Relate elements in different architectures

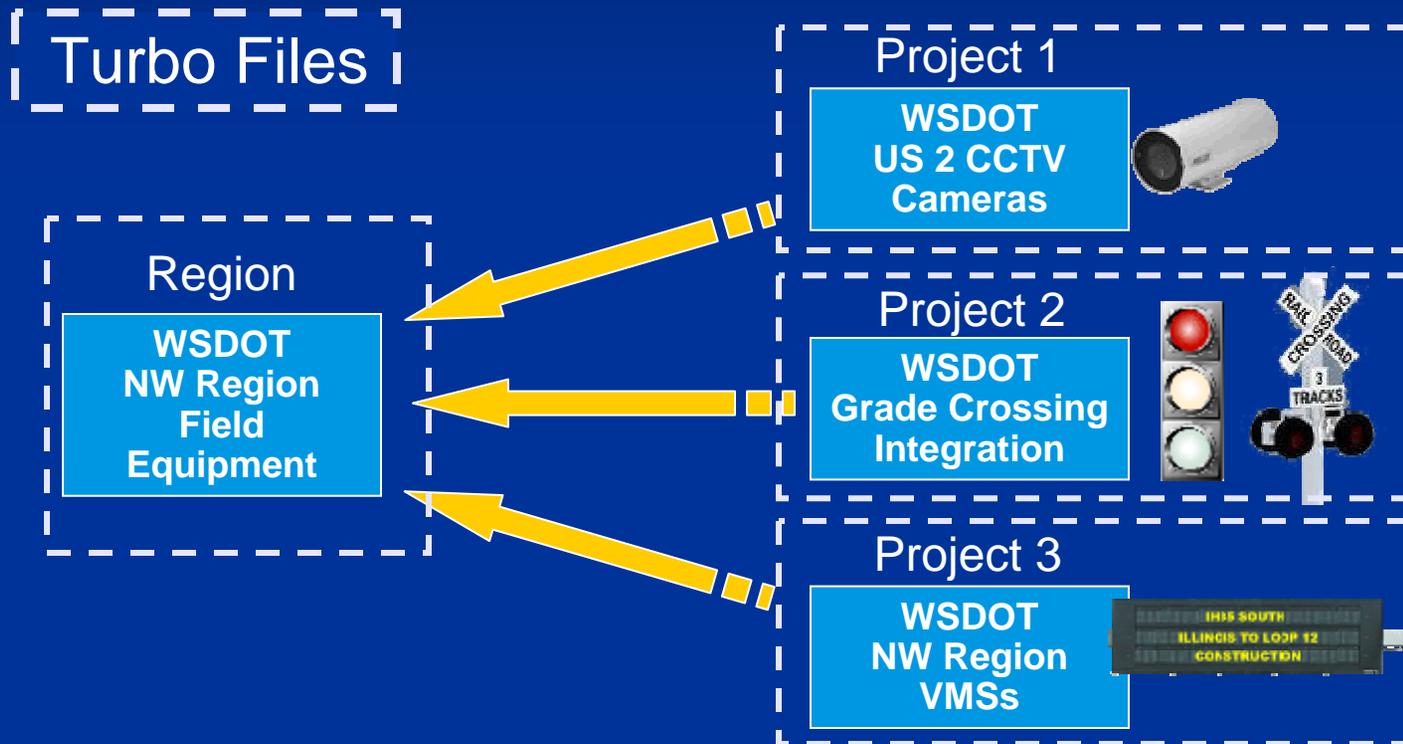


- Element *Instances* with different levels of detail

# Turbo V4.0 Solution (2)



- Relate elements in different architectures

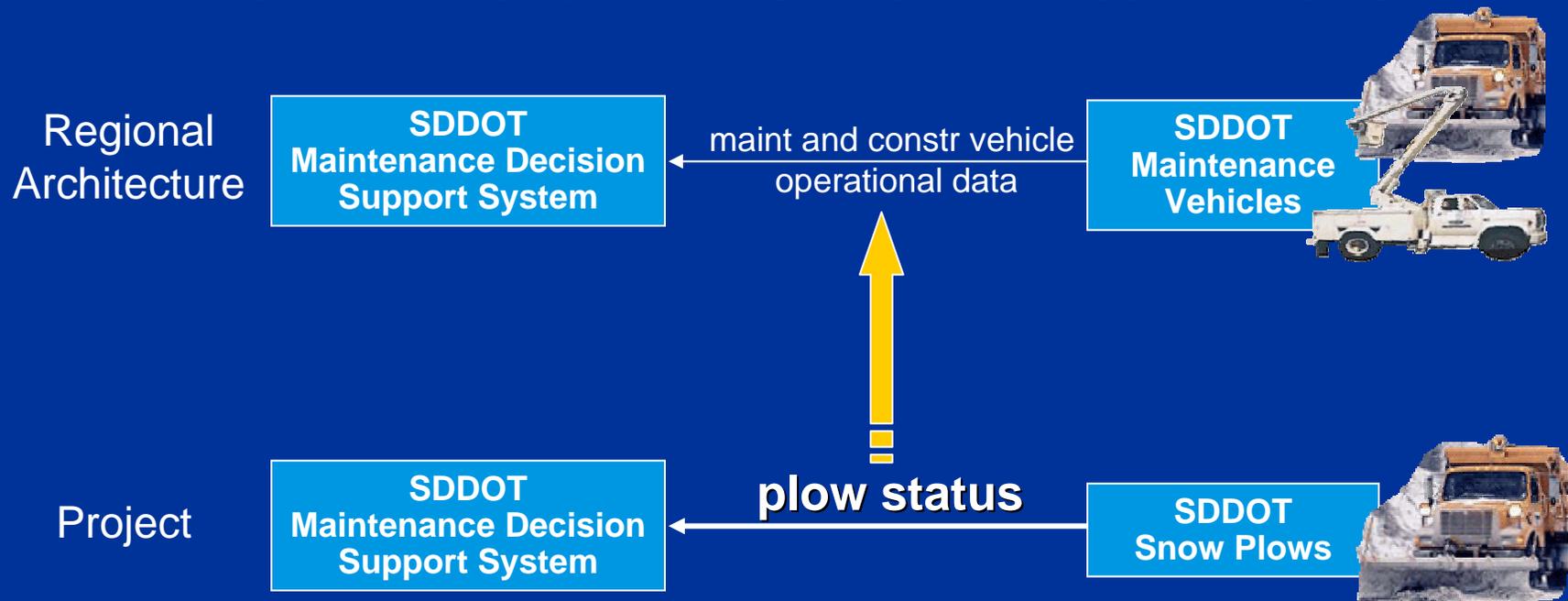


- Elements *Shared/Related* in different architecture *files*

# Turbo V4.0 Solution (3)



- Support User Defined Flow Names
  - Pick flow names that make sense for your project
  - Relate flows to National ITS Architecture flows



# Turbo Release Schedule

2000				2001				2002				2003				2004				2005				2006				2007			
1Q	2Q	3Q	4Q																												

↑ V1.0

↑ V2.0

↑ V3.0

↑ V4.0

*Turbo  
Releases*

- **Version 4.0 Available  
October 2007**



# Turbo User Support

■ 800 Number (800-260-1001)



■ E-Mail (turbo@iteris.com)



■ Web ([www.iteris.com/itsarch](http://www.iteris.com/itsarch))

