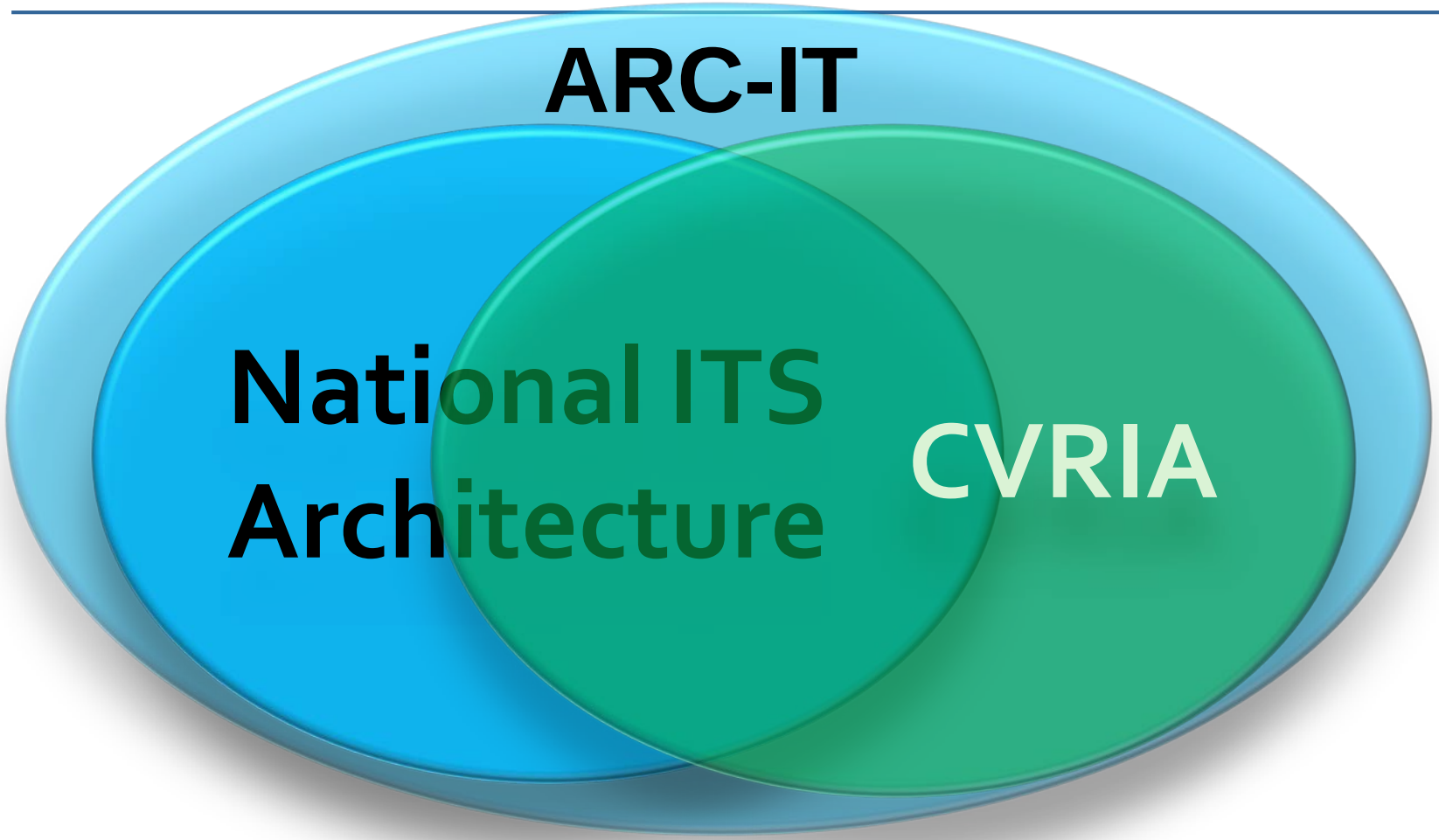
ARC-IT V8 Workshop

ARCHITECTURE OVERVIEW

ARC-IT Scope



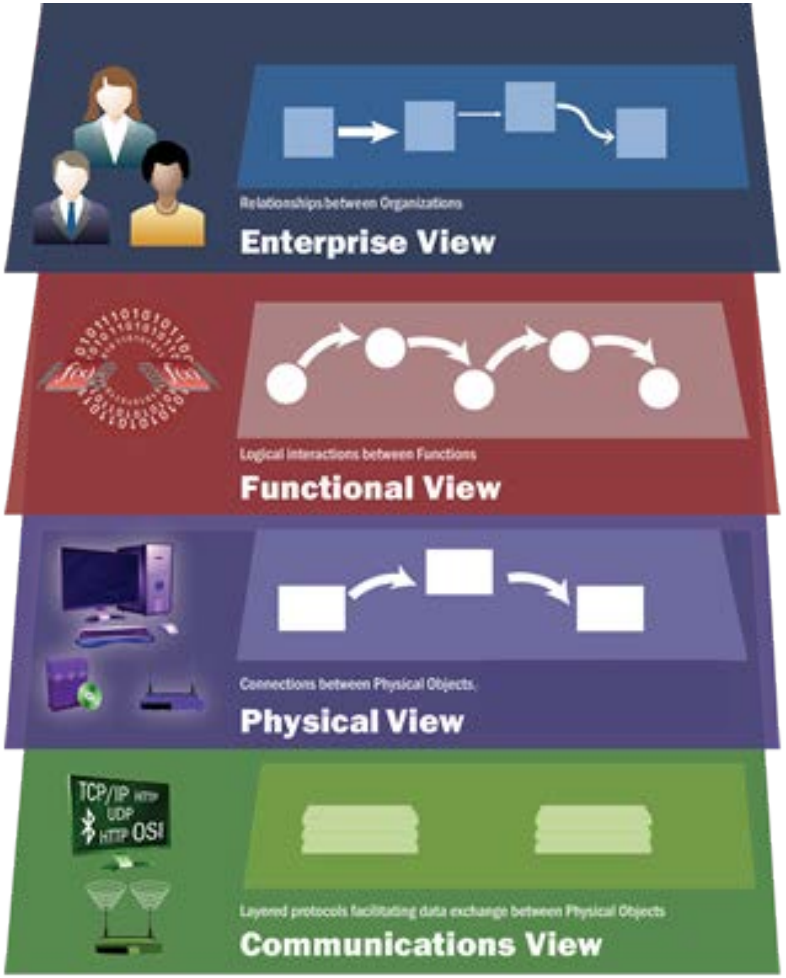
- ARC-IT combines services of National ITS Arch with connected vehicle content of CVRIA

ARC-IT Scope

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

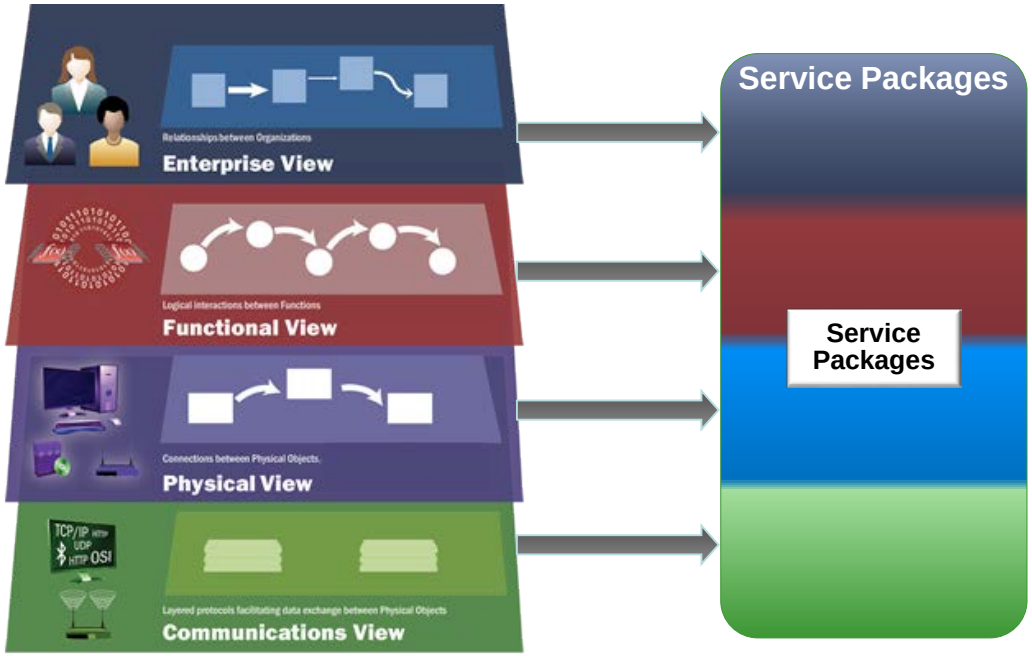
ARC-IT Structure

- Defined around 4 views:
  - Enterprises to carry out services
  - Functions to implement services
  - Physical objects to implement that functionality
  - Communications protocols necessary



ARC-IT Organization

- ARC-IT organized around **Service Packages**
  - Represent the portion of each view that provides a single ITS service
- User Services (from 1992) have been “retired”



ARC-IT Service Packages

- Service Packages grouped by Area

Traffic Management

Traveler Information

Public Transportation

Support

Maintenance and Construction Management

Public Safety

Commercial Vehicle Operations

Sustainable Travel

Parking Management

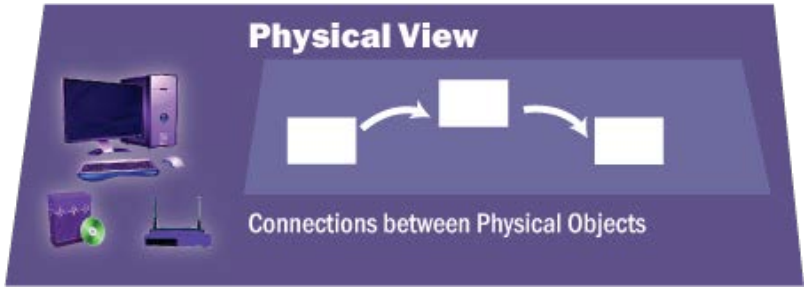
Data Management

Weather

Vehicle Safety

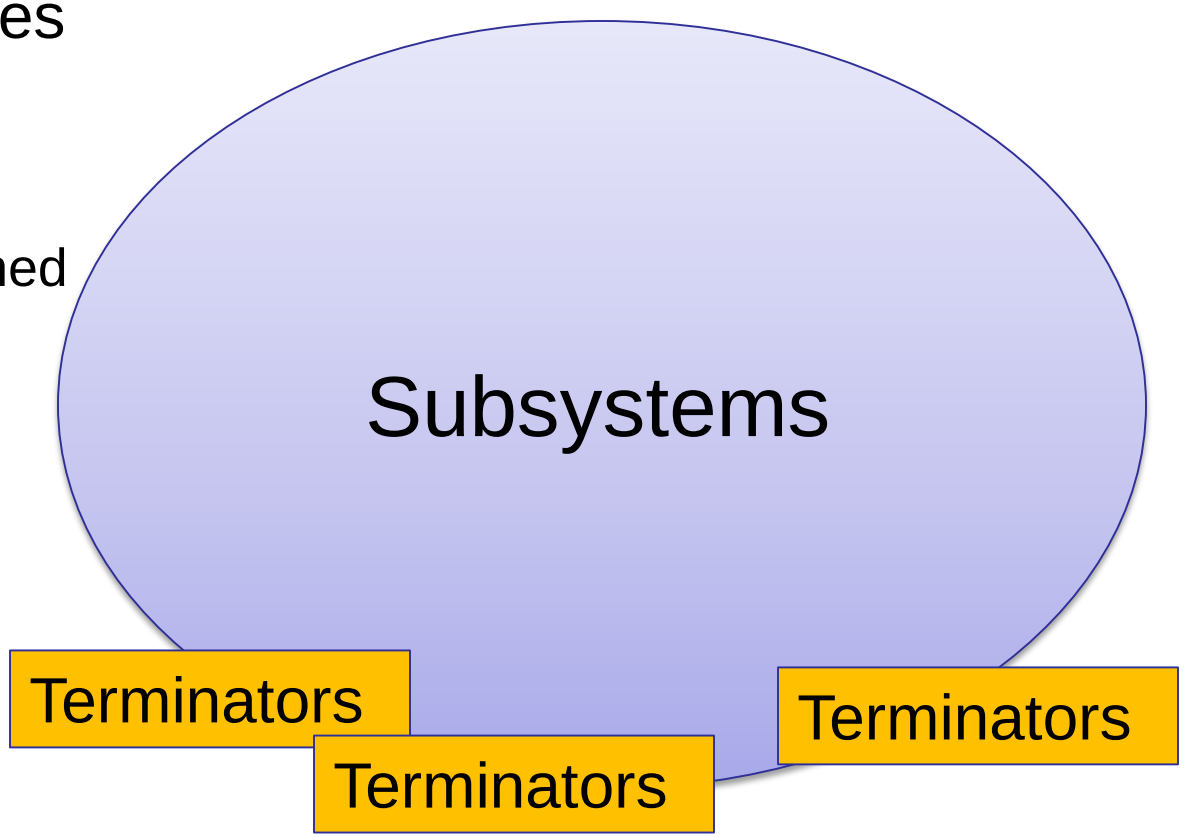
ARC-IT Physical View

- Depicts:
  - Physical objects that interact to deliver services
  - Interfaces and flows of information between those physical objects
- Identifies options for…
  - What are the interfaces to support ITS services?
  - What functionality is allocated to physical objects?
  - What objects require information security safeguards and what are they?



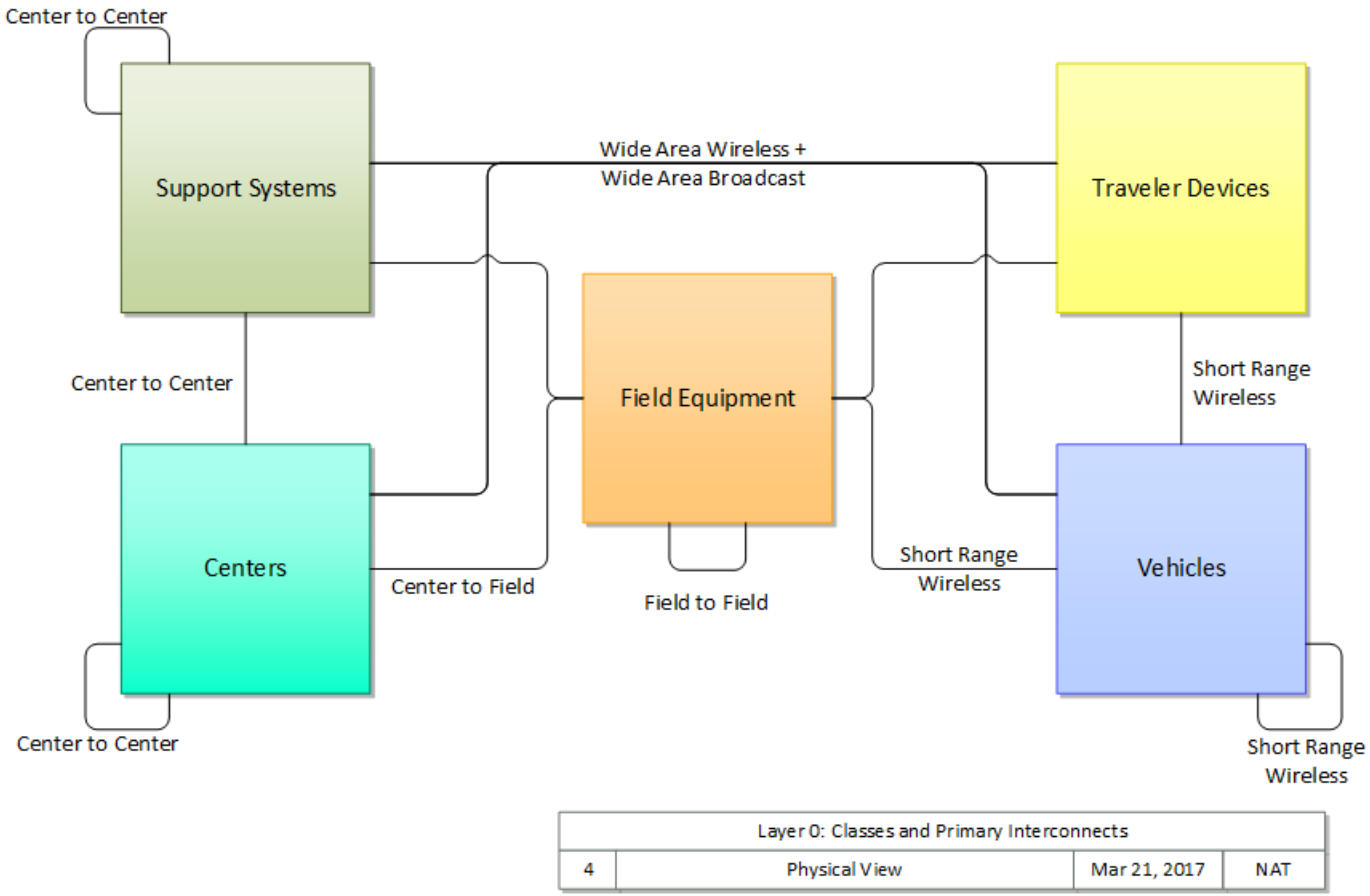
Physical View- Physical Objects

- Key “building blocks” of Physical View
- The physical systems, devices, vehicles, or people that provide ITS services
- Two Types
  - Subsystems
    - Functionality defined
  - Terminators
    - No Functionality
    - Three types



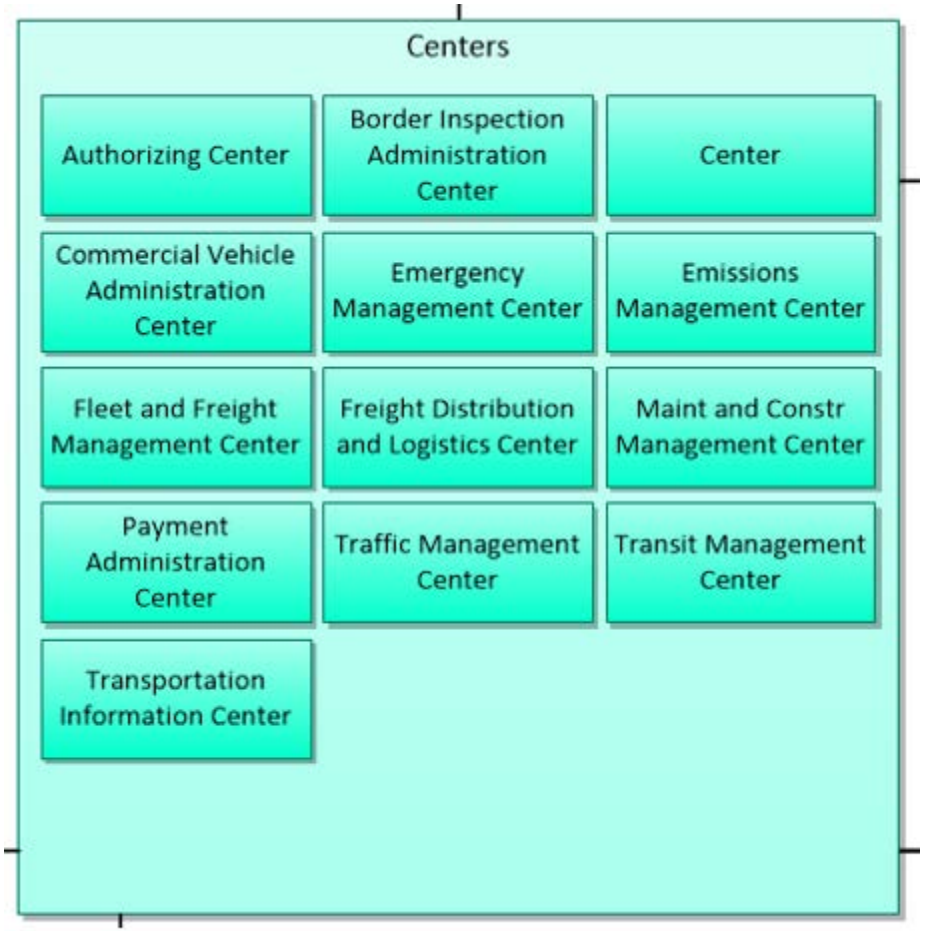
Physical View- Physical Objects

- Organized into 5 Classes



Physical View- Physical Objects

- Centers
  - Provide Key Operational functionality for ITS Services
  - Subsystem names use “center” (vs subsystems in earlier versions)
  - Includes generic Center to address how support functions interface with all centers.

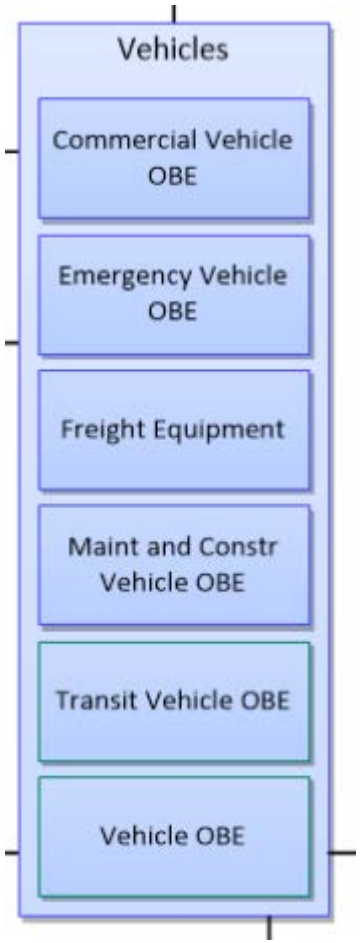


Physical View- Physical Objects

- Field Equipment
  - ITS Field Devices both
    - Long in use (e.g. CCTV, Traffic Signals, DMS) and
    - New (e.g. Connected Vehicle Roadside Equipment and Electric Charging Stations)

Physical View- Physical Objects

- Vehicles
  - ITS equipment in vehicles (on-board equipment)
  - Includes Freight Equipment

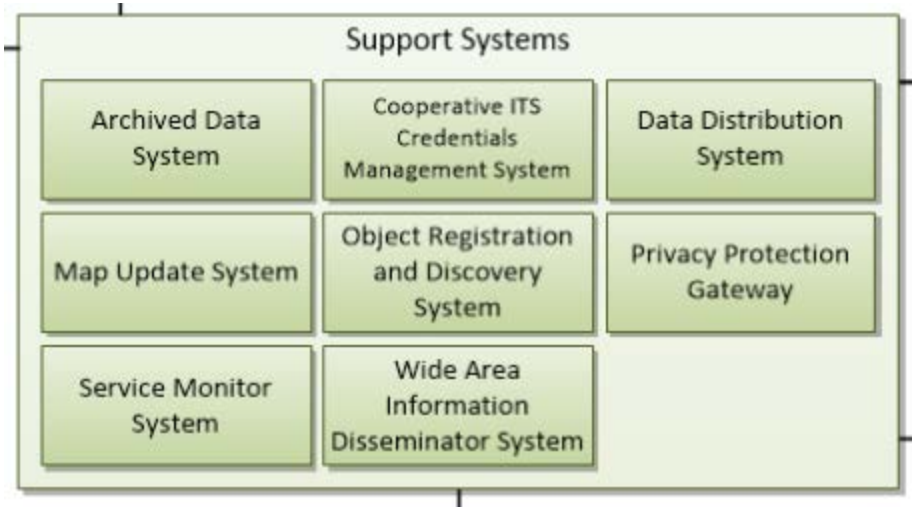


Physical View- Physical Objects

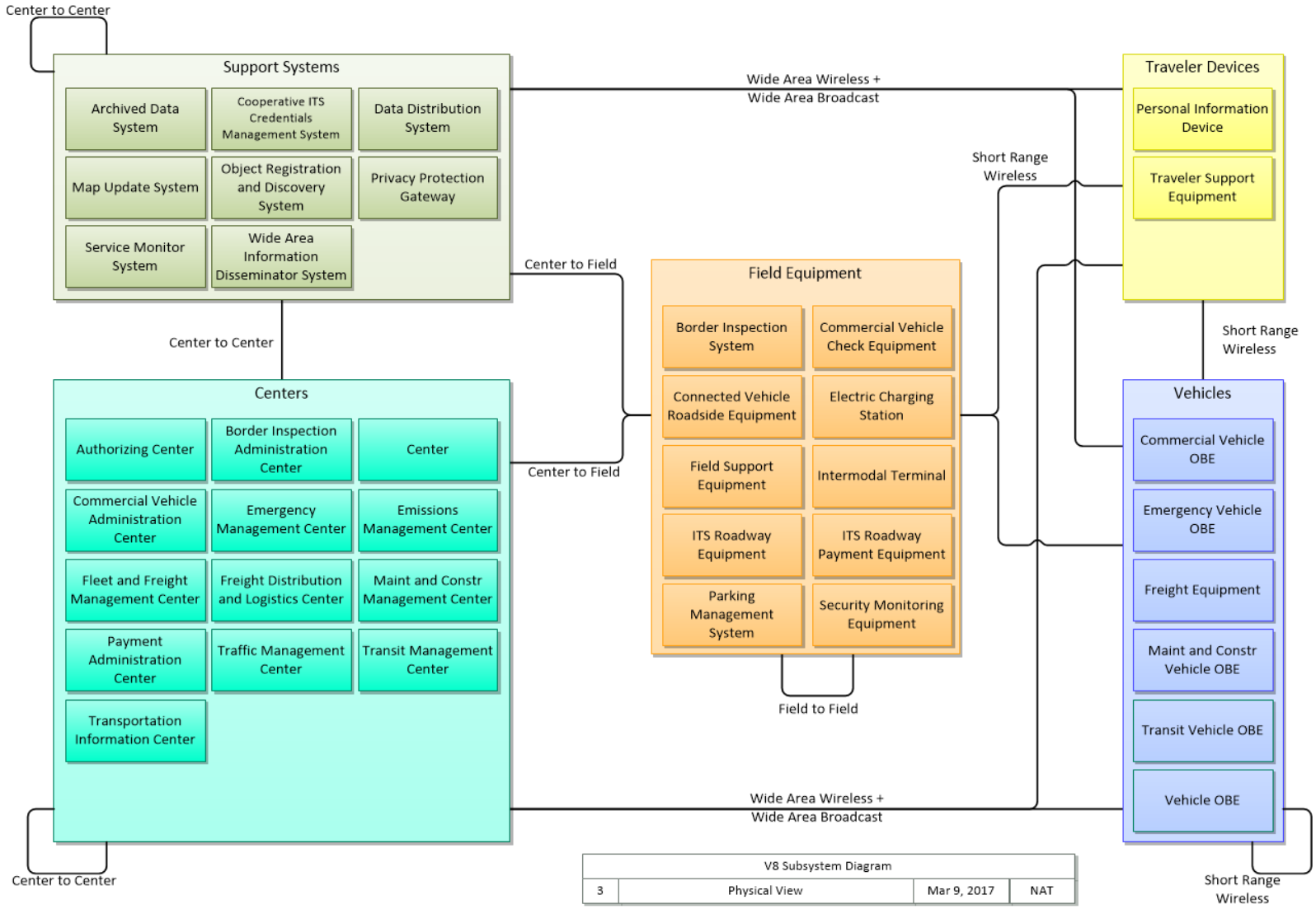
- Traveler Devices
  - Personal Devices (e.g. smart phones, tablets, and computers)
  - Public Devices (e.g. kiosks and transit stop signage)

Physical View- Physical Objects

- Support Systems
  - Includes non operational use of data (e.g. Archived Data System)
  - Systems that support operations
    - for all ITS (e.g. Map Update System)
    - For connected vehicle specific services (e.g. cooperative ITS credentials management system)



Physical View- Interconnect Diagram



Physical View- Terminators

- Represent People or Systems “on the edge” of the scope of ARC-IT
- Three primary types
  - System
  - Other Systems
  - Humans
- Within each type organized by class
  - Center/ Field/ Vehicle/ etc.

Physical View- Functional Objects

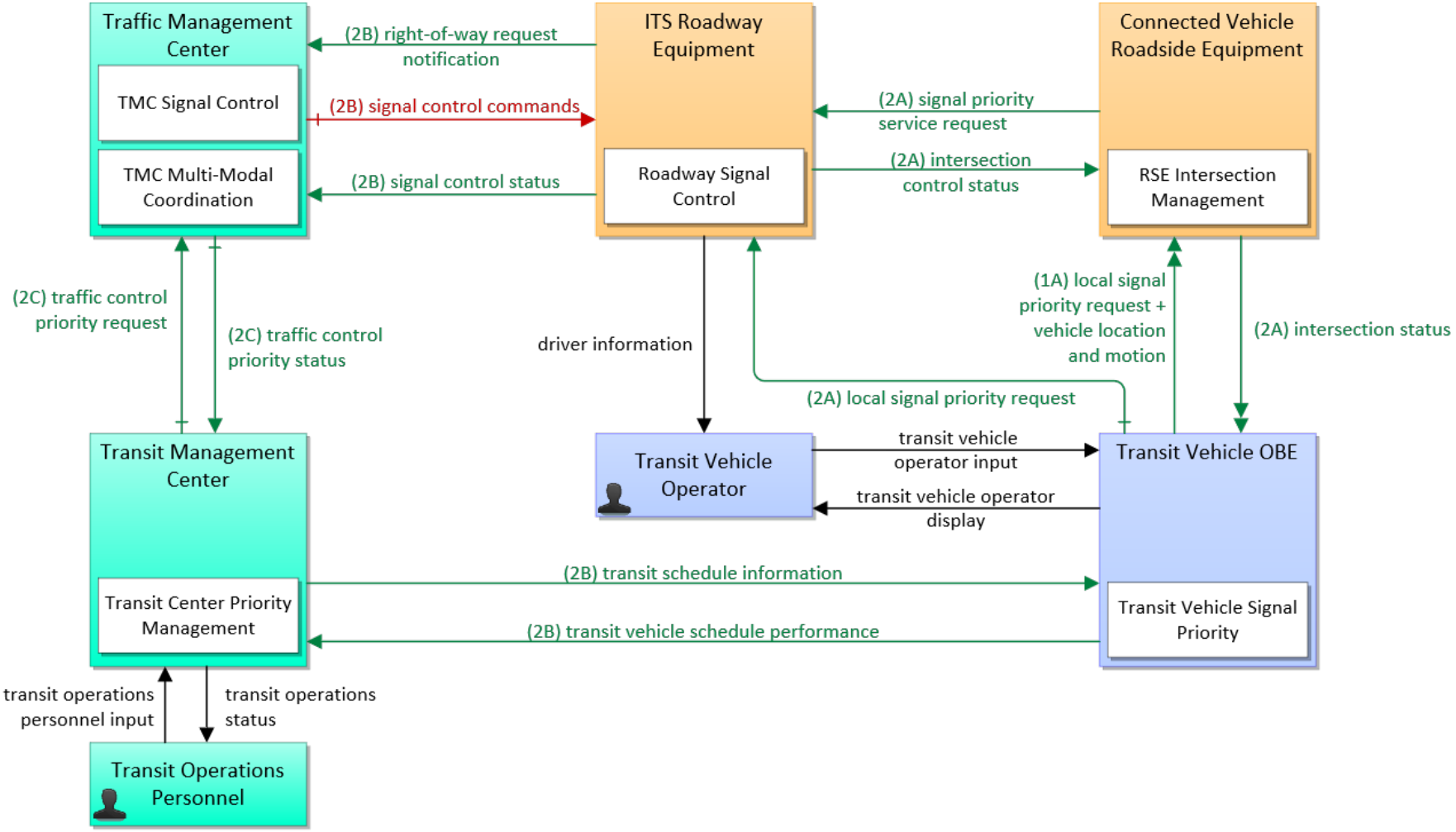
- Functional Objects are functional building blocks of Subsystems
  - Define the functions and interfaces required to support a “deployable” piece of the subsystem
  - Functional requirements are defined for each functional object
  - Replaces “Equipment Packages”

Physical View- Service Packages

- 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.

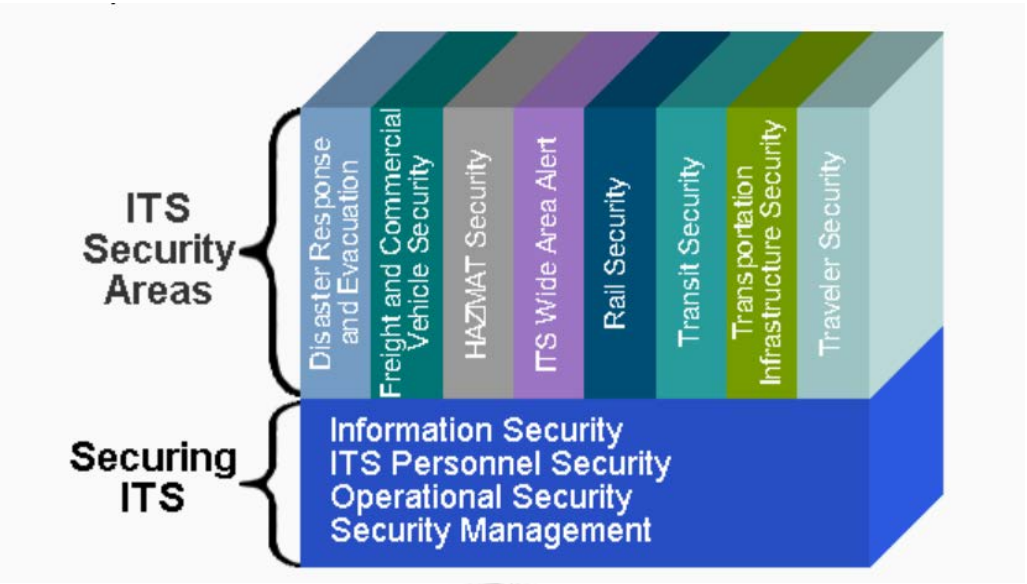
Service Package Example – Transit Signal Priority



PT09: Transit Signal Priority			
7	Physical	Oct 14, 2016	NAT

Physical View: Security

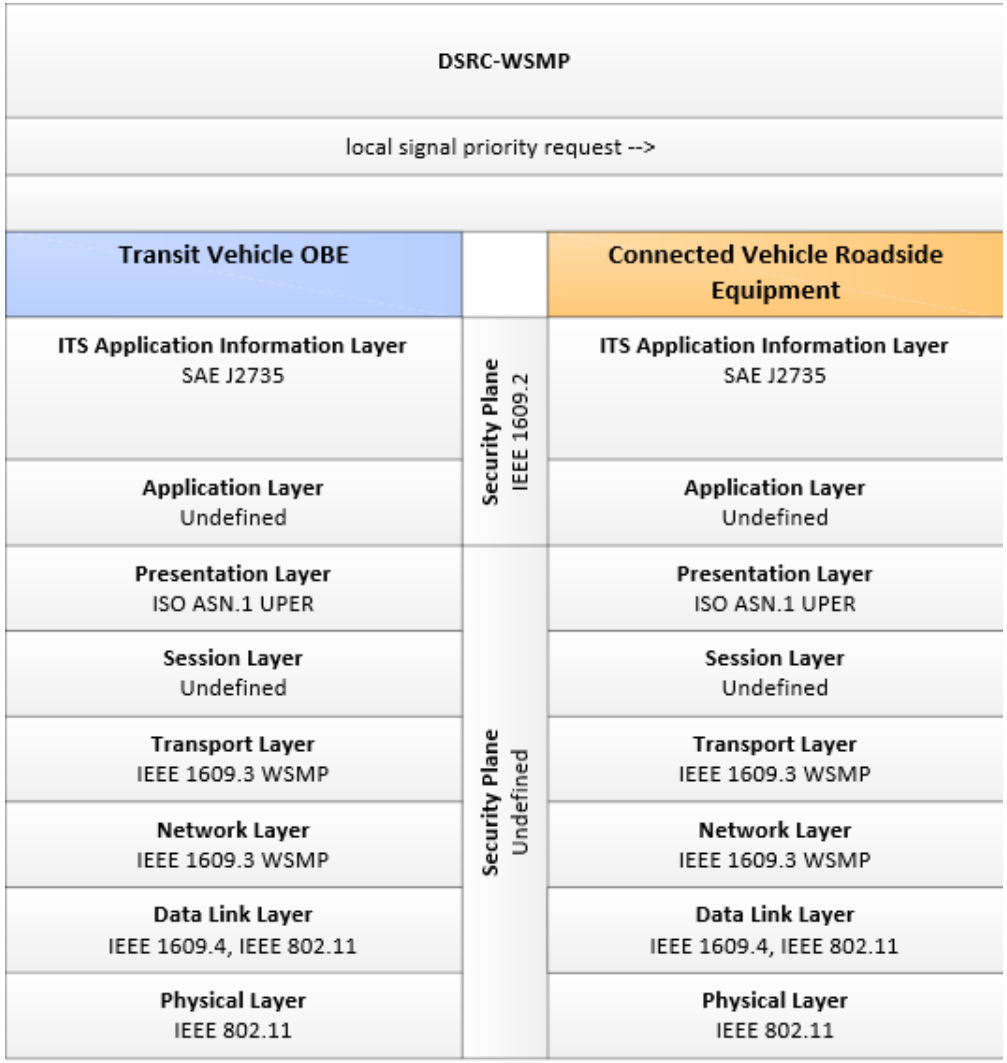
- Security Analysis of Physical Objects and Information flows included
  - Based on the FIPS-199 analysis
    - Confidentiality, Integrity, Availability
    - Security Device Classes
  - Lays the groundwork for following the NIST cybersecurity framework



ARC-IT Communications View

- Depicts:
  - Layered communications protocols that support communications between physical objects
- Identifies options for each “triple”…
  - Identity and appropriateness of protocols at all layers
  - How these protocols ensure or support:
    - Security
    - Privacy
  - Status of protocols as standards or privately provided protocols and the implications of their use from an evolve-ability perspective

ARC-IT Communications View Example



ARC-IT Enterprise View

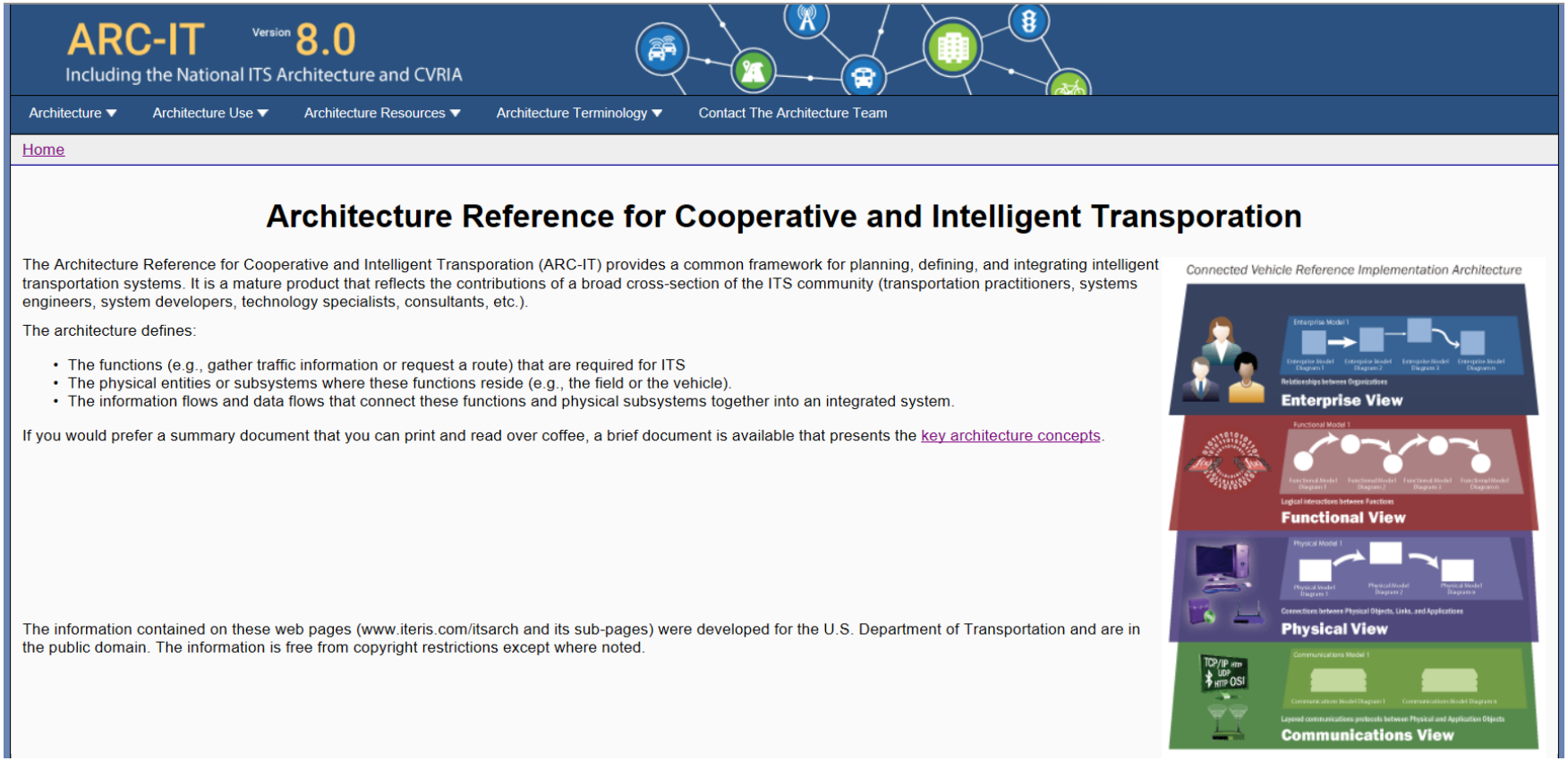
- Depicts:
  - Relationships between organizations
  - Roles organizations play in delivery of ITS services
- Organized around **Enterprise Objects**
  - Interact to exchange information
  - Manage or Operate Systems
- Details of View will be added in Version 8.1

ARC-IT Functional View

- Depicts:
  - Abstract functional objects (processes)
  - Flows of data between those processes
- Identifies options for…
  - What functionality is in physical objects?
  - What are the interfaces between logical objects?
  - What data flows between those functional objects?
- Details of View will be added in Version 8.1

ARC-IT Website

www.arc-it.net



ARC-IT Resources