ARC-IT v8 – The New National ITS Architecture & Tools

For the AASHTO Subcommittee on Transportation Systems Management and Operations (STSMO)
September 12-14, 2017
ITS Standards and Architecture Program Overview

- **“Interoperability”** within the ITS Joint Program Office (JPO) Strategic Plan

- **Architecture** provides a framework to guide planning and interoperable deployment of ITS and identifies interfaces for standardization. **Standards** define interfaces within architectures to enable required interoperability and support efficient deployment. **International Harmonization** seeks to leverage global resources and expertise to (1) maximize commonality of ITS deployments, (2) share labor resources and (3) access best-available expertise in order to facilitate ITS deployment and efficient markets.

- **Vision** – Safe, efficient, interoperable, secure and cost-effective ITS infrastructure, connected vehicle and automated vehicle deployments across North America.
National ITS Architecture is a “Living Document”

- Continuing evolution of the architecture over 20+ years

User Services Architecture Published
1993
1996
1997
1998
1999
2002
HRI Version 2.0
ADUS V3.0
MCO Ver. 4.0
Transportation Security Ver. 5.0
Version 6.0
Version 6.1
Version 7.0
Version V7.1
ARC-IT 8.0
CVRIA 2015
2017

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

- Defined around 4 views:
  - Enterprises to carry out services
  - Functions to implement services
  - Physical objects to implement that functionality
  - Communications protocols required for implementation
- Organized by Service Packages
Service Packages grouped by Area

- Traffic Management
- Public Transportation
- Maintenance and Construction
- Commercial Vehicle Operations
- Public Safety
- Parking Management
- Vehicle Safety
- Traveler Information
- Data Management
- Support
- Sustainable Travel
- Weather
ARC-IT Physical & Communications Views

- **Physical**
  - Physical objects
  - Information Flows
  - Identifies options for...
    - Interfaces to support ITS services
    - Allocation of functionality
    - Security safeguards

- **Communications**
  - Layered protocols between physical objects
  - Identifies options for each interface
    - Appropriate protocols & standards at all layers
Physical View – 5 Classes of Objects, connected together
Physical View Drawing for Transit Signal Priority Service Package

- Traffic Management Center
  - TMC Signal Control
  - TMC Multi-Modal Coordination
- ITS Roadway Equipment
  - Roadway Signal Control
- Connected Vehicle Roadside Equipment
  - RSE Intersection Management
- Transit Management Center
  - Transit Center Priority Management
- Transit Vehicle OBE
  - Transit Vehicle Signal Priority
- Transit Operations Personnel
  - Transit Operations Personnel Input

Flow of information:
- (2B) right-of-way request notification
- (2B) signal control commands
- (2B) signal control status
- (2A) signal priority service request
- (2A) intersection control status
- (2A) local signal priority request
- (1A) local signal priority request + vehicle location and motion
- (2A) intersection status
- Driver Information
- (2A) local signal priority request
- Transit vehicle operator input
- Transit vehicle operator display
- (2B) transit schedule information
- Transit operations status
- Transit operations personnel input
- (2B) transit vehicle schedule performance

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

U.S. Department of Transportation
ITS Joint Program Office
ARC-IT Website: www.arc-it.net
ARC-IT Tools Support Uses of the Architecture

- Two free downloadable software tools available to apply ARC-IT to regions and projects
What is **RAD-IT**?

- Create and maintain a regional ITS architecture
  - Framework that identifies stakeholders, systems, and interfaces for a metropolitan area or other region
- Identify and sequence ITS projects
- Support transportation planning and programming
- Formerly known as *Turbo Architecture*
- Table format
- Outputs – diagrams, tables, documents, website
What is SET-IT?

- Support Systems Engineering for ITS Projects
- Create diagram-based project architectures covering the Physical, Enterprise and Communications Viewpoints
- Originally to support tailored CV project architecture development (using CVRIA)
- Now expanded to support all of ARC-IT
- Providing visual feedback and tools to manipulate service package diagrams
- Outputs – diagrams, tables, documents (ConOps)
## ARC-IT Training Available Now

<table>
<thead>
<tr>
<th>Topic Area</th>
<th>Web-Based Training</th>
<th>On-Site Training</th>
<th>Workshops</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITS Architecture</td>
<td>ARC-IT Web-Based</td>
<td>ARC-IT 101 / Refresher</td>
<td>Quick-Starting Your RA Update</td>
</tr>
<tr>
<td></td>
<td>RA Use &amp; Maintenance Web-Based</td>
<td></td>
<td>Architecture Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use &amp; Maintenance Workshop</td>
</tr>
<tr>
<td>Software Tools</td>
<td>RAD-IT Web-Based</td>
<td>RAD-IT</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>SET-IT Web-Based</td>
<td>SET-IT</td>
<td>---</td>
</tr>
<tr>
<td>Systems Engineering</td>
<td>---</td>
<td>Systems Engineering</td>
<td>Systems Engineering for ITS</td>
</tr>
</tbody>
</table>

**From** [www.arc-it.net](http://www.arc-it.net) => Architecture Resources => Training
Technical Assistance Available from FHWA

- ITS Architecture Assessments
- Process Improvement Reviews
- Tools Assistance
- 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](https://ops.fhwa.dot.gov/its_arch_imp/index.htm)