

Intelligent Transportation Systems (ITS) Joint Program Office (JPO)

Connected Vehicle Reference Implementation Architecture Update

Stakeholder's Webinar
November & December 2013

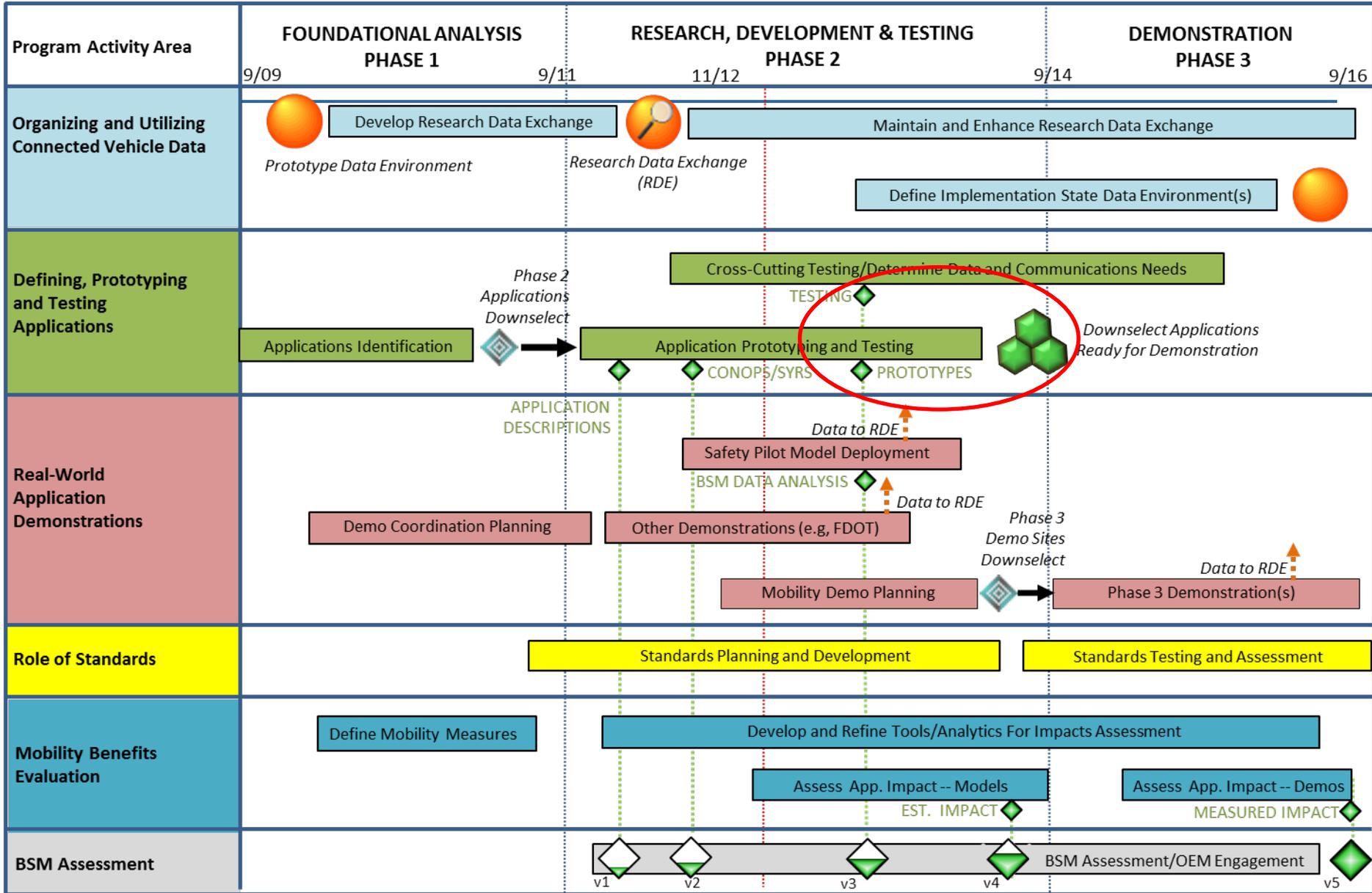


Response, Emergency Staging and Communications, Uniform Management, and Evacuation

- **Incident Scene Pre-Arrival Staging Guidance for Emergency Responders (RESP-STG)**
- **Incident Scene Work Zone Alerts for Drivers and Workers (INC-ZONE)**
- **Emergency Communications and Evacuation (EVAC)**



Data Capture and Management and Dynamic Mobility Applications Programs: Integrated Roadmap



LEGEND:

- RDE Data Feed
- Mobility Applications
- Research Data Exchange
- Data Environment
- U.S. Rep.
- Decision Point
- preliminary BSM Assessment Papers
- final BSM Assessment Papers
- Key Activity Informing BSM Assessment

R.E.S.C.U.M.E. Program Status

Phase I (FY12-FY13)

- Completed ConOps, Systems Requirements Document, and Test Readiness Assessment

Phase II (FY13-FY14)

- Prototype Development and Testing
 - Develop and test prototypes for INC-ZONE and RESP-STG
 - Define an architecture for EVAC and identify institutional issues
 - Awarded to Battelle/UMD-CATT team; kickoff 8/28/2013
- Impacts Assessment
 - Estimate impacts of integrated multi-application deployments using standardized messages and shared communication networks
 - Awarded to Booz Allen; kickoff in mid-September

R.E.S.C.U.M.E. Program Status (cont'd)

Phase II Prototype Development Status

- Detailed Requirements for Prototype
 - Completed
- **Prototype System Architecture**
 - **Under development now; final by January 2014**
 - **Your input today on the Phase I System Architecture will be welcome and valuable as we shape the Phase II Architecture**
- Prototype System Design Document
 - Final due in January 2014
- Prototype System Acceptance Test Plan & Summary
 - Final due in February 2014
 - Testing and results due in March 2014
- Prototype Demonstrations
 - Go/No-Go decision based on test results.
 - If approved, expect demos in late FY14 / early FY15

For More Information

RITA U.S. Department of Transportation
Research and Innovative Technology Administration

Intelligent Transportation Systems
Joint Program Office

About | Research | Tech Transfer | Library | Press Room | Training | RITA

Contact Us 10:47 AM Updated August 19, 2013

Print page

Imagine that . . .
...a car a mile ahead of you on the highway sends an alert to your vehicle, warning you of upcoming slippery conditions that are causing drivers to slam on their brakes.

1 2 3 4 5 6 7 8 >

U.S. Department of Transportation Announces Three New Webinars to Obtain Stakeholder Input on Next ITS Strategic Plan
Read more...

Spotlight

- U.S. DOT to Host Annual Public Meeting on Its Connected Vehicle Research and Policy Program 8/19/13
- Request for Information Connected Vehicle - Next Stage Certification Environment 8/9/13
- U.S. DOT Releases Summary Report from the First CVRIA Public Stakeholder Workshop 7/18/13

More News>>

Our Current Research

Applications | Mode-Specific | Cross-Cutting

- Vehicle-to-Vehicle Safety
- Vehicle-to-Infrastructure Safety
- Real-Time Data Capture
- Dynamic Mobility Applications
- Environment
- Road Weather
- Connected Vehicle Policy

More >>

Procurement Opportunities

As we implement the ITS Research Strategic Plan, open procurements may become available through a variety of solicitations. [More >>](#)

Public Meetings View >>

MARK YOUR CALENDAR
The Intelligent Transportation Systems Joint Program Office (ITS JPO) has the following meetings and webinars planned. All events are free and open to the public.

SAFETYPILOT
CONNECTED VEHICLE TECHNOLOGY

Stay Connected

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Share

Linda Dodge

*Chief of Staff & ITS Public
Safety Program Manager*

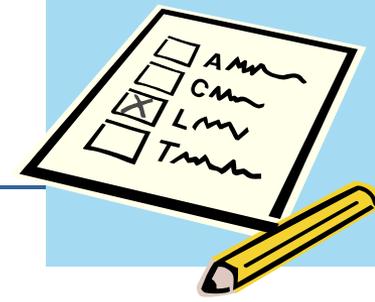
ITS JPO, USDOT

202.366.8034

linda.dodge@dot.gov

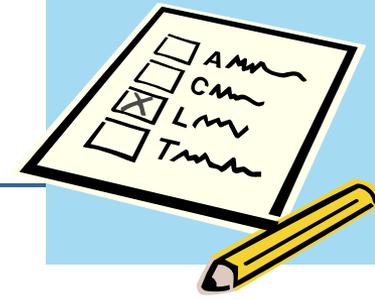
<http://www.its.dot.gov/>

Poll Question 1



- **Which of the following best describes your role in Connected Vehicles?**
 - Federal Government
 - State DOT or Metropolitan Planning Organization
 - Local government
 - Car maker / OEM
 - Roadside equipment maker
 - Consultant
 - Academic
 - Other

Poll Question 2



- **How familiar are you with CVRIA (check all that apply)?**
 - Attended one of the previous webinars
 - Visited the CVRIA website
 - This is my first experience

CVRIA Update Webinars



- These webinars are meant to:
 - Familiarize attendees with the Connected Vehicle Reference Implementation Architecture (CVRIA) so that they will be equipped to provide feedback on the architecture
 - Provide an update on the development of the CVRIA
 - Review portions of the CVRIA Website
 - Discuss standardization planning and policy analysis
- Today's Speakers
 - Linda Dodge
 - David Binkley, Ron Ice, Tom Lusco
 - Chris Karaffa, Jim Marousek
 - Dawn LaFrance-Linden, Scott Smith

CVRIA Update Webinar #7 – Agenda

Topic	Start	End
Welcome & Background/Overview	1:30	:40
Introduce Applications of the Day	1:40	1:50
CVRIA Applications	1:50	2:45
Interface Selection / Standardization Planning	2:45	3:00
Pertinent Policy Issues	3:00	3:15
Q&A	3:15	3:30

(All Times Eastern)

CVRIA Update Webinar – Applications to be Reviewed

Applications for Webinar	Date
V2I <ul style="list-style-type: none">• Red Light Violation Warning• Curve Speed Warning• Speed Harmonization (SPD-HARM)	Nov 6, 2013
Signal Applications <ul style="list-style-type: none">• Intelligent Traffic Signal System• Emergency Vehicle Priority• Eco-Approach and Departure	Nov 14
Road Weather <ul style="list-style-type: none">• Weather Responsive Traffic Management• Enhanced Maintenance Decision Support	Nov 19

CVRIA Update Webinar – Applications to be Reviewed, continued

Topics	Date
Freight & Fleet Operations <ul style="list-style-type: none">• Smart Roadside Initiative• Freight Advanced Traveler Information Systems (FRATIS)	Nov 26
Support Applications <ul style="list-style-type: none">• Data Distribution• Communications Support• Core Authorization	Dec 3
Transit Applications <ul style="list-style-type: none">• Pedestrian in Signalized Crosswalk Warning• Integrated Multi-modal Payment	Dec 10
R.E.S.C.U.M.E. <ul style="list-style-type: none">• Incident Scene Pre-Arrival Staging Guidance for Emergency Responders• Incident Scene Work Zone Alerts for Drivers & Workers	Dec 17



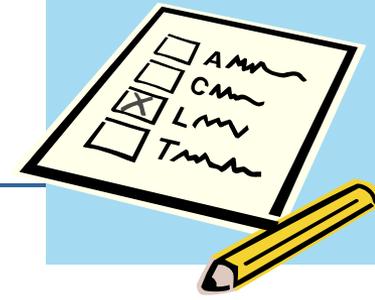
Connected Vehicle Reference Implementation Architecture (CVRIA)

Landscape: Safety, Mobility, Environmental Applications with common supporting infrastructure

- Purpose of CVRIA is to identify a **framework** for integrating connected vehicle technologies and identify interfaces for standardization
- By...
 - Collecting and aggregating connected vehicle needs/requirements
 - Developing a multi-faceted system architecture
 - Identifying and prioritizing **candidate interfaces** for standardization
 - Conducting policy analysis around the architecture
- Near term uses – Define interfaces/functions/standards to support early deployments, e.g. SE Michigan 2014
- Longer term – the National ITS Architecture will incorporate CVRIA to support use of connected vehicle in
 - regional ITS architectures/plans
 - future transportation projects
- So, we need your help:
 - Are we capturing the connected vehicle applications adequately?
 - Are we including all of the necessary interfaces?
 - We'll show you how to provide feedback via the website?



Poll Question 3



- With what area of the connected vehicle program are you or your stakeholders primarily interested?
 - Safety
 - Mobility
 - Environment
 - Support



CVRIA Website Users Guide

- This site uses Scalable Vector Graphics (SVGs) to produce diagrams that are crisp and support hyperlinks from the graphical elements to the detailed descriptions
 - Different web browsers support SVGs in different ways (some not at all). Try viewing the site with browsers like Firefox, Chrome, Safari for best results.
 - As an alternative to SVGs all graphics are also available Portable Network Graphics (PNG) format. You may have to click on the PNG option to see it.
- This site is still under construction, many pages are updated on a fairly regular basis. Make sure you are looking at the latest version of a web page by clicking “Refresh” or “Reload” within your browser.



Web Tour Road Map

Start here

[JPO / Std / Activities / CVRIA](#)



Start / Home
www.iteris.com/cvria/

What's the overall layout?



Architecture Viewpoints Tab

Let's focus on an application

Applications Tab

How do I learn about an app?

Physical Tab
(objects, flows, comm)

Enterprise Tab
(4 phases)

Functional & Requirements Tabs

What about standards?

Standards Tab

What else is here?

Resources / Glossary

How do I provide feedback?

[Comment on Page](#)



Let's Begin the Tour

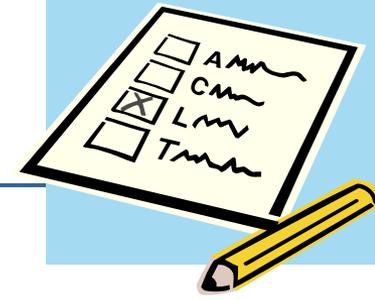
Go To Website

<http://www.standards.its.dot.gov/DevelopmentActivities/CVReference>

Or

<http://www.iteris.com/cvria/index.html>

Poll Question 4



- **Which of the Architecture Views presented interests you the most?**
 - Communications
 - Enterprise
 - Functional
 - Physical



Uses of CVRIA

Now that you've completed the 'tour' of the website, let's talk about some ways that CVRIA can be used...

SE Michigan 2014

- Provide platform for interoperability between vendors, operators and solution providers by developing V2I data exchanges
 - Field and Back-Office functions
- Developing Architecture Views using CVRIA:
 - Physical (What)
 - Multi-layer diagrams
 - Enterprise (Who)
 - Communications

Future Connected Vehicle Projects

- CVRIA 'Mini-Tool' allows developers to use the CVRIA Visio Drawings
- Customize physical view drawings to describe future projects using same 'language' and format
- Supports multi-layer approach
 - Layer 0 – high-level objects and interconnections
 - Layer 1 – project specific physical, application objects
 - Layer 2 – application level (just like the application drawings on CVRIA website)

Connected Vehicle projects can be defined as collections of applications from CVRIA and use the same 'language', interfaces, standards

CVRIA Next Steps

- November / December
 - Gathering feedback from webinars and website
 - Incorporate inputs
 - Update tools
- Ongoing
 - Maintain CVRIA
- 2014 / 2015
 - Monitor usage in Test Beds, Demos, Early Deployments
 - Updating architecture, tools as needed
 - Merge / Incorporate CVRIA into Nat'l ITS Arch

**Intelligent Transportation Systems (ITS)
Joint Program Office (JPO)**

***Connected Vehicle Reference Implementation
Architecture:***

Standards Development Strategy and Plan



CVRIA and Standards

The USDOT's Intelligent Transportation Systems (ITS) Joint Program Office (JPO) is developing a standards plan to guide ITS standards-related efforts and activities in support of the USDOT ITS connected vehicle research program, and to support broad deployment of connected vehicle (CV) technologies

This plan will be a living document that will evolve as ITS technologies, implementation strategies, and policies develop

The plan will help the USDOT bridge the “standards gap”

Adopt ✓

- Lower effort, cost
- Quicker implementation
- Modify interface to meet the standard

Adapt ?

- Increased effort, cost
- Extended implementation
- Adapt standard to the extent possible, adapt interface as necessary

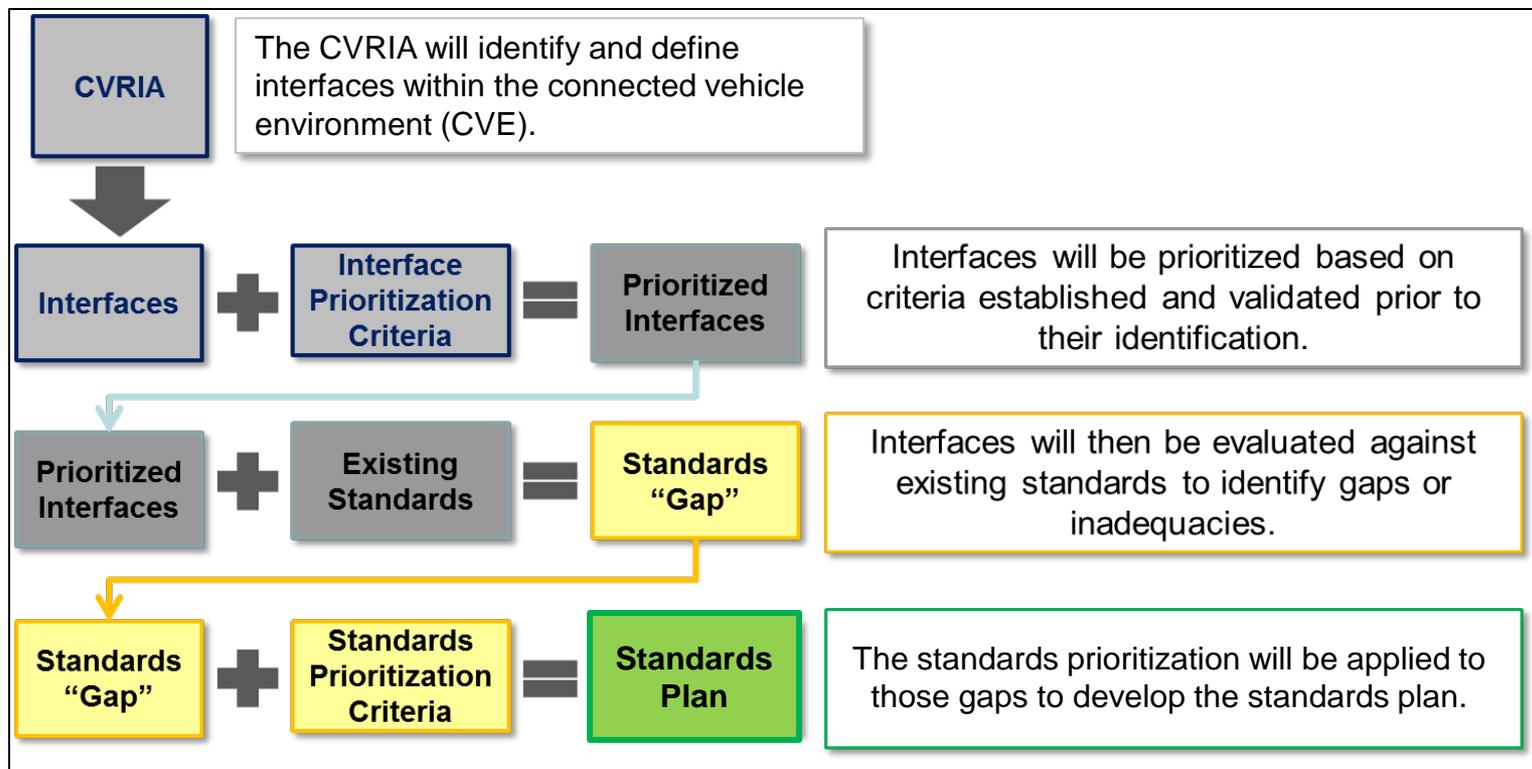
Create !

- Greatest effort, cost
- Longest implementation
- Get it “just the way you like it”



Standards Plan Approach

Once interfaces are identified and defined, they must be prioritized and associated with standards, which will then be prioritized



Using Prioritization

- Scoring process and criteria are not absolute
- They are one factor, among many, in determining how to allocate resources to support standardization activities



- They may be adapted to evolving goals and objectives

Next Steps

- **Currently**

- The CVRIA viewpoints/database are being analyzed now to identify and define interfaces within the architecture.

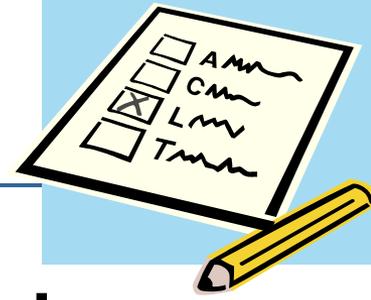
- **Feedback**

- Feedback on applications or other aspects of the architecture will help us to refine: *interface identification and definition; scoring; interpreting results.*

- **Second Public Workshop**

- Presentation of findings and results of interface and standards prioritization
- First opportunity to share results of the interface and standards analyses
- Tentatively planned for the San Francisco Bay Area, February 19-20, 2014

Poll Question 5



- **Are these views clear and stable enough to start interface analysis for standards?**
 - Yes
 - No
 - Unsure

**Intelligent Transportation Systems (ITS)
Joint Program Office (JPO)**

***Connected Vehicle Reference Implementation
Architecture
and
Connected Vehicle Policy***

Scott Smith

USDOT / Research and Innovative Technology Administration /
Volpe National Transportation Systems Center

December 2013



When we say “Policy” ... Issue Areas Include (1/2)

- **Certification.....what certification is required?**
- **Communications.....what technologies are preferred?**
 - *When is DSRC necessary or desirable?*
- **Credentialing.....who has access to CV systems?**
 - *Who may have access to on-board or roadside equipment for maintenance. What training / certification is needed?*
- **Data governance.....who may access the data?**
 - *Privacy (movement tracking) concerns*
 - *Use of data for enforcement*
 - *Use of data to establish liability*
- **Governance.....what are the roles of the participants?**
 - *Who runs the various systems*
 - *How to avoid road user distraction (driver or pedestrian)*

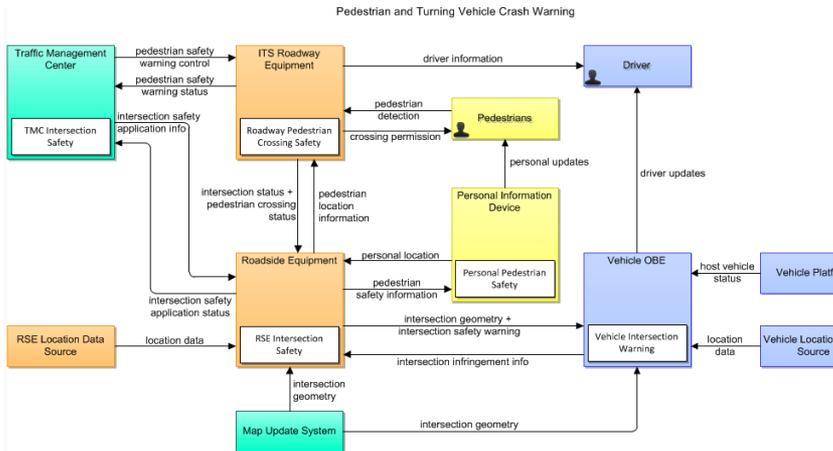
Policy Issue Areas (2/2)

- **Intellectual Property.....what are the risks for exposure?**
- **Interoperability.....how is data exchange handled?**
 - ***Between onboard, roadside, and personal DSRC equipment, which may come from a variety of manufacturers***
- **Liability.....who is responsible for bad outcomes?**
- **Privacy.....what information to protect?**
- **Resiliency.....what are the failure modes?**
 - ***Dependence on reliable map and roadway geometry information***
- **Security.....how to we prevent inappropriate usage?**
 - ***OBE and external data sources (RSE, maps)***
 - ***Security of links to RSE***
- **Social equity.....how are benefits distributed?**
 - ***Safety/mobility impacts on non-connected vehicles***
 - ***Safety/mobility impacts on other road users***

Policy Process (1/2)

For each application:

- Identify information flows
 - Primarily from physical view
 - Some enterprise
- Look for policy issues



(link to web definition) ↓Flow↓	↓From (Flow origin)	↓To (Flow destination)	Certification	Community	Credentialed	Data Governance	Governance	IF	Interoperability	Liability	Privacy	Resiliency	Security	Social Equity	Pedestrian and Turning Vehicle Crash Warning	PTVCW
crossing permission	ITS Roadway Equipment	Pedestrians					..		Amy0 05					\$0058 0068 00780	248	
driver information	ITS Roadway Equipment	Driver					Amy0 01		Amy0 02	Amy0 02						245
driver updates	Vehicle OBE	Driver	Tim0 01	Tim0 02			..		Amy0 03	Amy0 03						240
host vehicle status	Vehicle Platform	Vehicle OBE	Tim0 01	Tim0 02				Andy0 015	Tim0 04			239
intersection geometry	Map Update System	Roadside Equipment	Tim0 01	Tim0 02			..			Amy0 05						243
	Map Update System	Vehicle OBE	Tim0 01	Tim0 02			..			Amy0 03						242
	Roadside Equipment	Vehicle OBE	Tim0 01	Tim0 02			..			Amy0 03						249
intersection infringement info	Vehicle OBE	Roadside Equipment					Amy0 31		Amy0 03	Amy0 02						241
intersection safety application info	Traffic Management Center	Roadside Equipment	Tim0 01	Tim0 02			..									796
intersection safety application status	Roadside Equipment	Traffic Management Center	Tim0 01	Tim0 02			Amy0 07									798
intersection safety warning	Roadside Equipment	Vehicle OBE					..		Amy0 03	Amy0 03						250
location data	RSE Location Data Source	Roadside Equipment	Tim0 01	Tim0 02			Amy0 01			Amy0 05				Tim0 04		799
	Vehicle Location Data Source	Vehicle OBE	Tim0 01	Tim0 02			Amy0 04	Amy0 2		Amy0 05		Andy0 008	Tim0 04			238
pedestrian crossing status	ITS Roadway Equipment	Roadside Equipment	Tim00	Tim002			..			Amy0 03				\$0058 0068 00780	247	
pedestrian detection	Pedestrians	ITS Roadway Equipment					..							\$0058 0068 00780	255	
pedestrian location information	Roadside Equipment	ITS Roadway Equipment	Tim0 01	Tim0 02			..							\$0058 0068 00780	251	
pedestrian safety information	Roadside Equipment	Personal Information Device	Tim0 01	Tim0 02			..			Amy0 03				\$0058 0068 00780	252	
pedestrian safety warning control	Traffic Management Center	ITS Roadway Equipment								Amy0 03						244
pedestrian safety warning status	ITS Roadway Equipment	Traffic Management Center														246
personal location	Personal Information Device	Roadside Equipment	Tim0 01	Tim0 02			Amy0 31			Amy0 10				\$0058 0068 00780	253	
personal updates	Personal Information Device	Pedestrians					Amy0 33			Amy0 34				\$0058 0068 00780	254	
signal phase and timing	ITS Roadway Equipment	Roadside Equipment	Tim0 01	Tim0 02			..									797

Policy Process (2/2)

- Write brief summaries of each issue
- One information flow may apply to multiple applications

(link to web definition) ↓Flow↓	↓From (flow origin)	↓To (flow destination)	Certification	Communications	Credentialing	Data Governance	Governance	IP	Interoperability	Liability	Privacy	Resiliency	Security	Social Equity	INC-ZONE <small>Incident Scene Work Zone Alerts for Drivers and Workers</small>	RVI <small>Route ID for the Visually Impaired</small>	PEDM <small>Pedestrian Mobility</small>	SPAT <small>Signal Phase and Timing</small>	PTVCW <small>Pedestrian and Turning Vehicle Crash Warning</small>
personal.location	Personal Information Device	Roadside Equipment	T001 S002	T002			A031			A010				S005S0 06S007 S008	1477	1533	790	891	253
personal.updates	Personal Information Device	Pedestrians					A033			A034				S005S0 06S007 S008			792	893	254

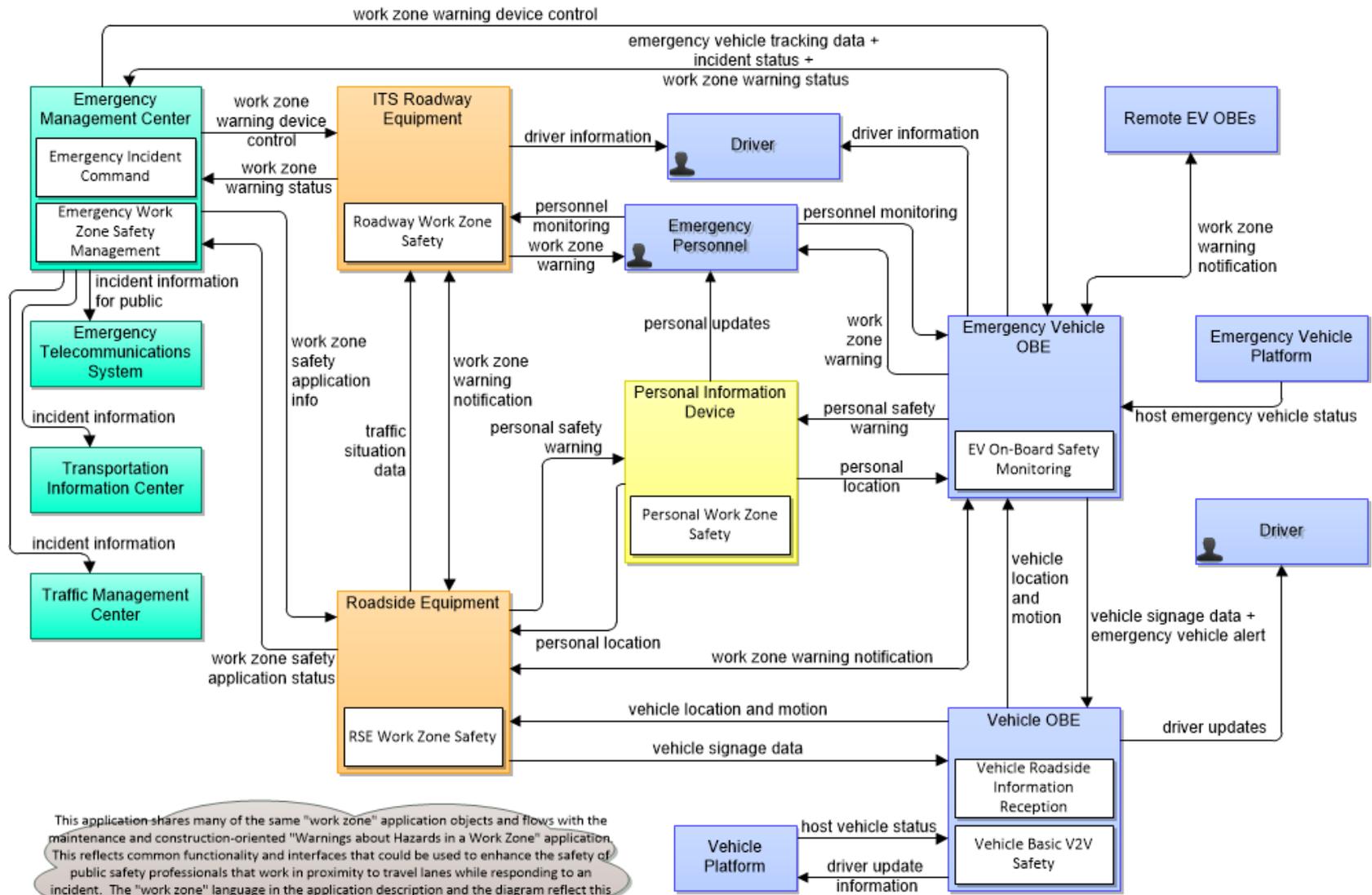
Spreadsheet	PO	PolicyArea	IssueTitle	IssueSummary
A031	143	Governance	Prevailing Data Source	In cases where two or more sources provide location or other critical data, which source is s
A033	144	Governance	Pedestrian Traffic Laws	Is pedestrian required to respond to alerts and warnings?
A010	156	Liability	Liability for faulty data	Who is liable if TMC, RSE, or PID provides incorrect data to vehicles? ...and if vehicle OBE se
A034	167	Liability	Pedestrian Traffic Laws	Is pedestrian liable for own injuries if s/he fails to respond appropriately to alerts & warnin
T001	181	Certification	Ensure OBE or RSE Credential is valid	Anytime data is exchanged with an OBE or and RSE, the device must be trusted by the syste
T002	182	Communications	Data Exchange between RSEs, OBEs and other system objects	The choice of communication in this application is critical to its safe operation and effective
S002	196	Communications	Need for reliable real-time communications with PID for safety	For a safety application using a personal information device (PID) held by a pedestrian or bi
S005	199	Social Equity	Will the application protect all non-motorized users who have	In the definitions of the Physical Objects, "Pedestrians" are defined as follows: "Pedestria
S006	200	Social Equity	Will the application protect all types of pedestrians, including	A person with a mobility impairment may walk exceptionally slowly, or may be using a whe
S007	201	Social Equity	Will the application protect all types of pedestrians, including those with visual impairments?	
S008	202	Social Equity	Affordability of Personal Information Devices.	Unlike the case with motor vehicles, where certain equipment can be mandated, one cann

Incident Scene Pre-Arrival Staging Guidance for Emergency Responders

Application Specific Issues	Most Relevant Universal Issues
<ul style="list-style-type: none">▪ Certification and Interoperability<ul style="list-style-type: none">◻ Interoperability with institutions (e.g., hospitals) whose primary mission is not transportation▪ Data Governance<ul style="list-style-type: none">◻ Are some of the data items (medical records, care facility status) available?▪ Governance<ul style="list-style-type: none">◻ Who designs and tests the routing and staging algorithms?▪ Privacy<ul style="list-style-type: none">◻ Handling of medical records◻ Carriers may consider their vehicle cargoes to be proprietary▪ Social equity<ul style="list-style-type: none">◻ Ensuring that smaller service providers (e.g., a volunteer fire department or private ambulance) has access to the benefits	<ul style="list-style-type: none">▪ Communications<ul style="list-style-type: none">◻ When is DSRC really needed?◻ Speed and reliability of safety-critical communications▪ Data Governance<ul style="list-style-type: none">◻ Enforcement◻ Liability▪ Governance<ul style="list-style-type: none">◻ Avoid driver distraction▪ Liability<ul style="list-style-type: none">◻ Failure to follow advice from the system◻ System gives bad advice▪ Interoperability between roadside equipment (RSE) and onboard equipment (OBE)▪ Security of links between external data sources (Maps and RSE) and vehicle OBE; security of links to RSE



Incident Scene Work Zone Alerts for Drivers and Workers



This application shares many of the same "work zone" application objects and flows with the maintenance and construction-oriented "Warnings about Hazards in a Work Zone" application. This reflects common functionality and interfaces that could be used to enhance the safety of public safety professionals that work in proximity to travel lanes while responding to an incident. The "work zone" language in the application description and the diagram reflect this commonality, though incident scenes are traditionally not called "work zones" by transportation or public safety professionals.

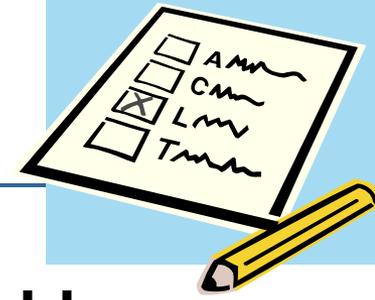
Incident Scene Work Zone Alerts for Drivers and Workers			
3	Physical	Nov 3, 2013	NAT

Incident Scene Work Zone Alerts for Drivers and Workers

Application Specific Issues	Most Relevant Universal Issues
<ul style="list-style-type: none"> ▪ Certification and Interoperability <ul style="list-style-type: none"> ▫ What requirements apply to personal information devices (PIDs) ▪ Communications <ul style="list-style-type: none"> ▫ Size, weight and power constraints on PIDs ▫ Speed and reliability of safety-critical communications ▪ Data Governance <ul style="list-style-type: none"> ▫ Vehicle movement data from this application could conceivably be used to improve future response to incidents, in terms of traffic management. What are the rules for using the data? ▪ Governance <ul style="list-style-type: none"> ▫ Education on worker's use of these systems and their limitations ▪ Social equity <ul style="list-style-type: none"> ▫ Ensuring that smaller service providers (e.g., a volunteer fire department or private ambulance) has access to the benefits 	<ul style="list-style-type: none"> ▪ Communications <ul style="list-style-type: none"> ▫ When is DSRC really needed? ▪ Data Governance <ul style="list-style-type: none"> ▫ Enforcement ▫ Liability ▪ Governance <ul style="list-style-type: none"> ▫ Avoid driver and worker distraction ▪ Liability <ul style="list-style-type: none"> ▫ Failure to follow advice from the system ▫ System gives bad advice ▪ Interoperability between personal information devices (PID) roadside equipment (RSE) and onboard equipment (OBE) ▪ Security of links between external data sources (Maps and RSE) and vehicle OBE; security of links to RSE



Poll Question 6



- **Do you plan to visit the CVRIA website and add comments by the end of December?**
 - Yes
 - No
 - Unsure

**Intelligent Transportation Systems (ITS)
Joint Program Office (JPO)**

***Connected Vehicle Reference Implementation
Architecture Update***

Q&A + Final Thoughts



THANK YOU

- This concludes today's webinar.
- Check out the T3 site and the CVRIA website (<http://www.iteris.com/cvria/>) for the next webinar or to view archives of previous webinars.
- Keep those comments coming!
 - CVRIAcomments@iteris.com
- For other questions on CVRIA or the connected vehicle program:
 - Steve.Sill@dot.gov – 202-366-1603
 - Walt.Fehr@dot.gov – 202-366-0278

