

Connected & Automated Vehicles – Infrastructure Owners Perspective

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Connected Vehicles

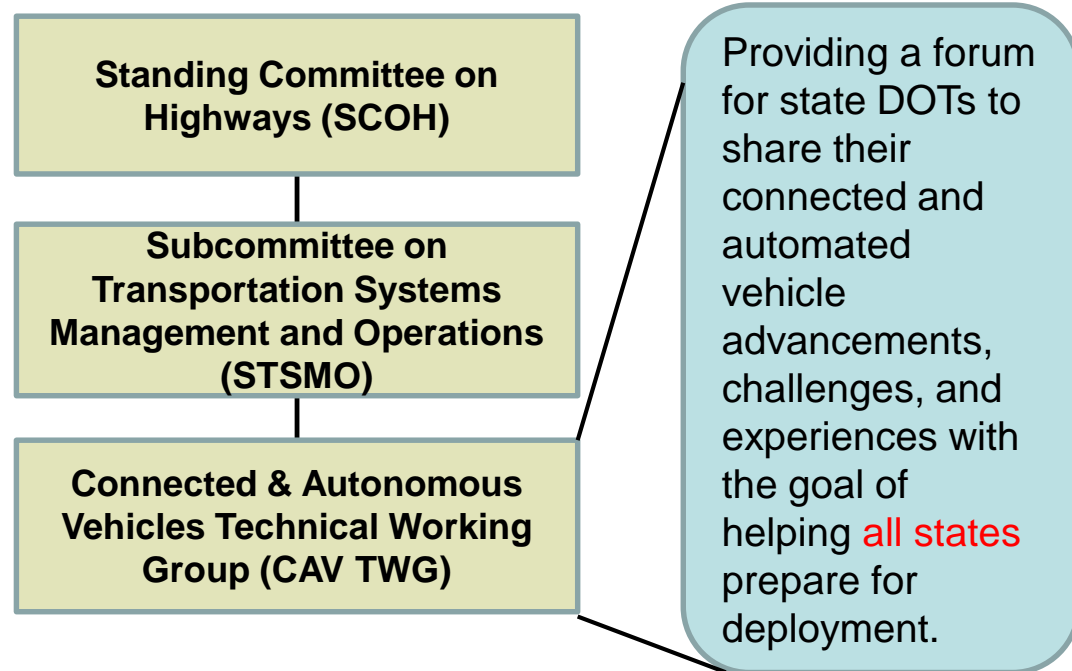
- Safety
 - Mitigate 83% of non-impaired crashes
- Mobility
 - Data / Traveler Information
- Collaboration is important to leverage the investment we are all about to make
- Significant paradigm shift

Connected Vehicle Communications



Source: Noblis, "TMC in a CV Environment", 2013

AASHTO SCOH CAV TWG



Current CAV TWG Member States

Washington	Minnesota
California	Utah
Arizona	Idaho
Texas	New York
Florida	New Jersey
Virginia	Iowa
Pennsylvania	Texas
Michigan	Wisconsin

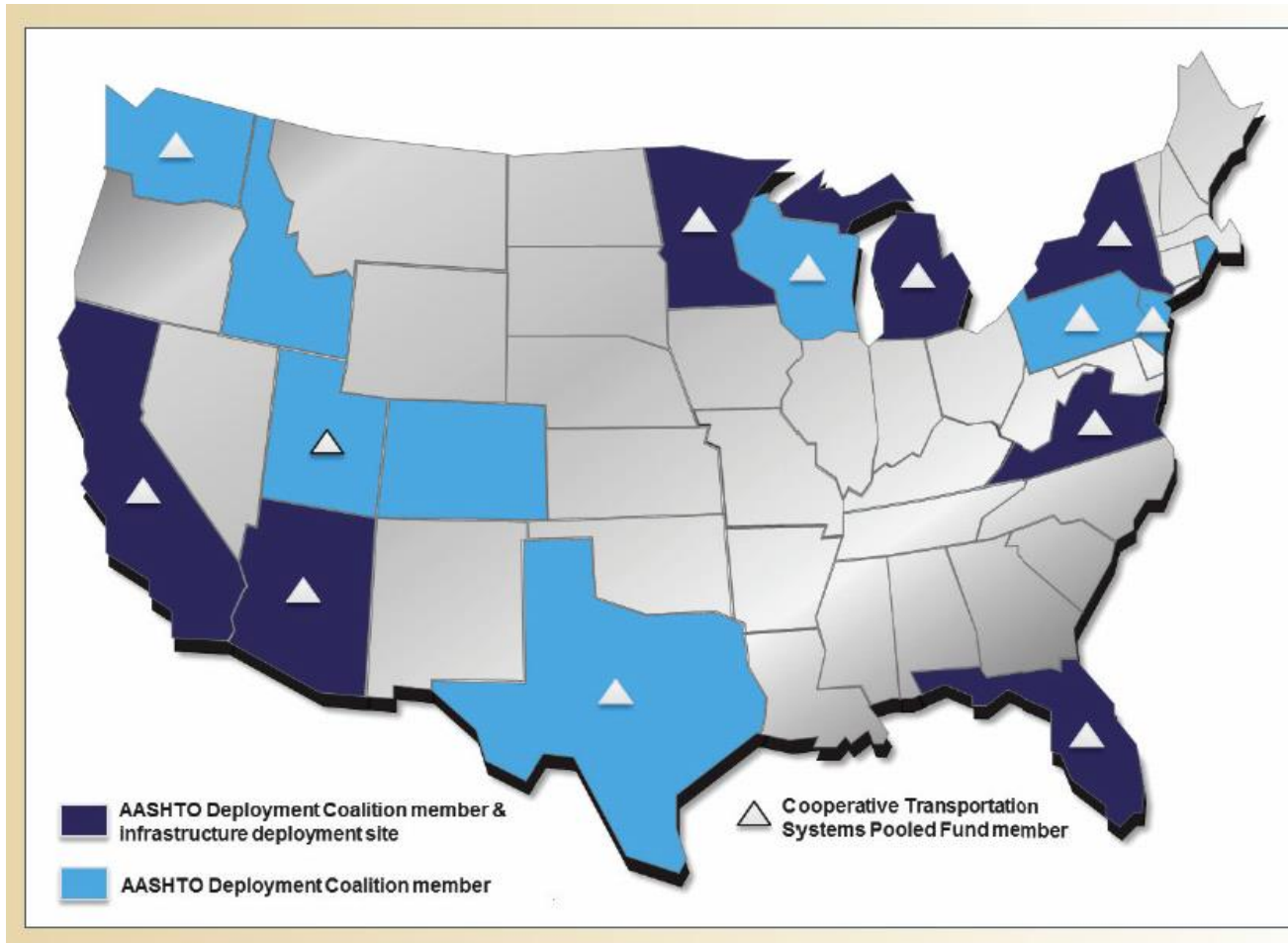
CAV TWG -- Recent Activities

- Presentations from the three Pilot Deployment Sites
- Monitored patent infringement issues
- Reviewed deployment decision tools
- Discussion about AV Policy / Legislation
- Survey of Infrastructure Owners (Joint effort with V2I DC TWG 1)

CV Pooled Fund Study

- Led by Virginia DOT (Melissa Lance)
- Fourteen members:
 - State, local, Transport Canada
- Projects:
 - Multi-modal Intelligent Traffic Signal Systems (MMITSS)
 - Mobile Road Weather Application
 - Automated Intersection Pavement Marking Detection
 - Standardizing a Basic Infrastructure Message (BIM)

CV Pooled Fund Study



V2I Deployment Coalition (DC)

The Concept:

- A single point of reference for stakeholders to meet and discuss V2I deployment related issues

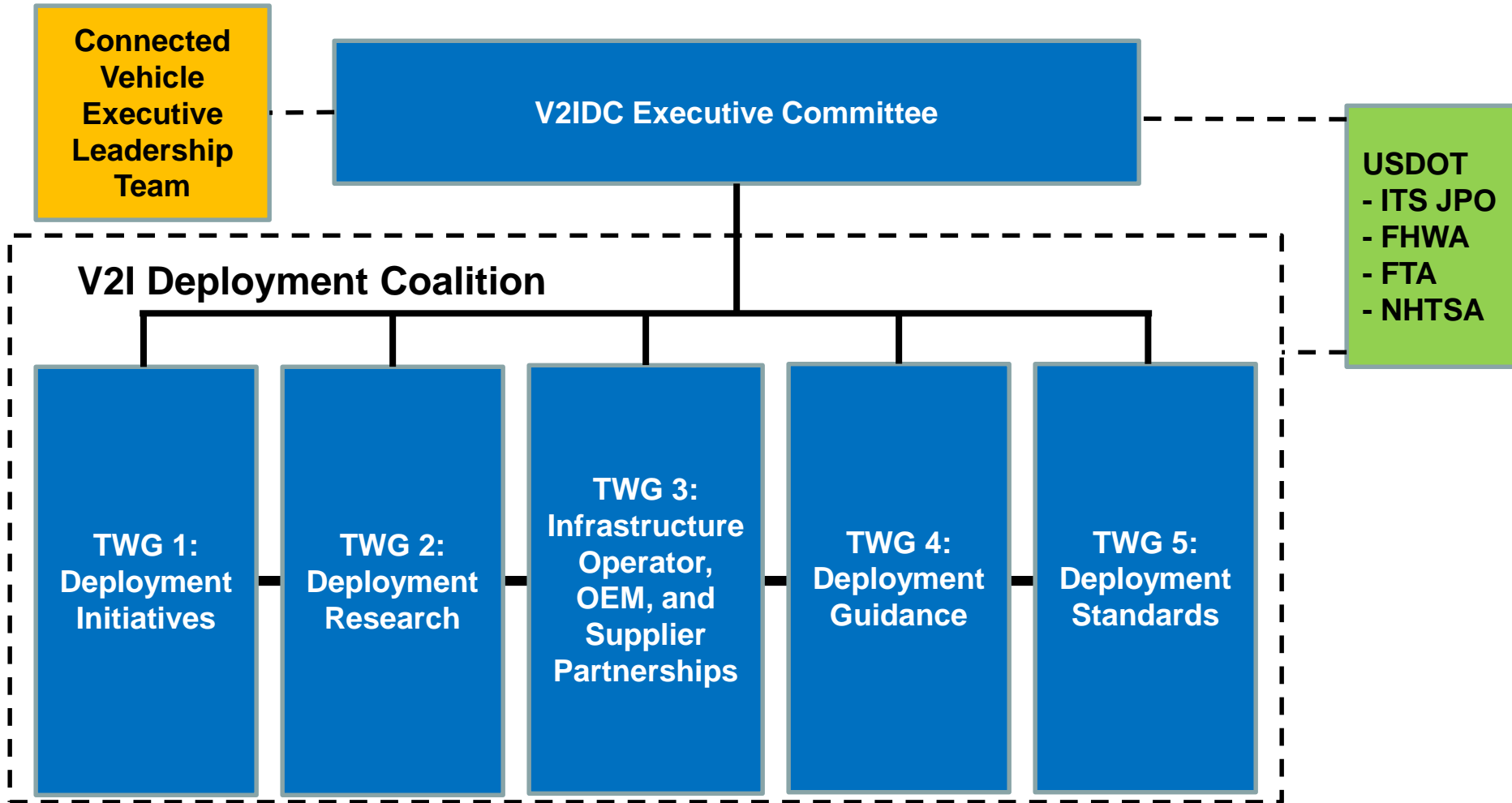
The Approach:

- USDOT asked AASHTO, ITE and ITS America to collaborate

The Goal:

- To help accelerate consistent and effective deployments of Connected Vehicle technologies

V2I Deployment Coalition Structure



Deployment Issues Addressed

Issue	TWG 1 Initiatives	TWG 2 Research	TWG 3 Partners	TWG 4 Guidance	TWG 5 Standards
Issue 1: V2X Applications	P	S	S	S	S
Issue 2: Complementary Communications to DSRC	N	P	N	N	N
Issue 3: V2I Data	N	S	P	N	S
Issue 4: Patents-Intellectual Property	N	P	N	N	N
Issue 5: Security	No action planned at this time				
Issue 6: V2I Outreach	N	S	N	P	S
Issue 7: Understanding the Benefits and Costs of V2I Deployment and Operation	S	S	P	S	N
Issue 8: V2I Standards	N	N	N	N	P
Issue 9: Understanding V2I Liability Assignment	N	P	N	S	N
Issue 10: V2I Synergies with Other Emerging Technologies	No action planned at this time				
Issue 11: V2I Consumer Messaging	N	N	N	P	N
Issue 12: V2I Multimodal Applications	No action planned at this time				
Issue 13: Infrastructure Processes as V2I Obstacles	P	N	N	S	N
Issue 14: Federal V2I Policy Statement	P	N	N	S	N
Issue 15: Maintaining V2I Infrastructure	P	N	N	N	N
Issue 16: Operator and OEM Goals for V2I	N	N	P	N	N

Activities of the V2I DC

Issue	TWG 1 Initiatives	TWG 2 Research	TWG 3 Partners	TWG 4 Guidance	TWG 5 Standards
Issue 1: V2X Applications	P	S	S	S	S
Issue 2: Complementary Communications to DSRC	5 TWG Work Plans				
Issue 3: V2I Data					
Issue 4: Patents-Intellectual Property					
Issue 5: Security					
Issue 6: V2I Outreach	No action planned at this time				
Issue 7: Understanding the Benefits and Costs of V2I Deployment and Operation	Surveys		Webinars		
Issue 8: V2I Standards					
Issue 9: Understanding V2I Liability Assignment	Technical Diagrams				
Issue 10: V2I Synergies with Other Emerging Technologies					
Issue 11: V2I Consumer Messaging	Documents / Papers				
Issue 12: V2I Multimodal Applications					
Issue 13: Infrastructure Processes as V2I Obstacles					
Issue 14: Federal V2I Policy Statement	Guidance Feedback				
Issue 15: Maintaining V2I Infrastructure					
Issue 16: Operator and OEM Goals for V2I					

V2I DC Goals

Initial Goals of the V2I DC:

To help accelerate V2I deployments related to:

1. Intersections (signalized & non-signalized)
2. End of queue warnings
3. Work zone management
4. Curve warning systems

CAV Institutional Framework

Entity

Role

**CAV Executive Leadership Team
(CAV ELT)**

Recommend Policies &
Deployment Approaches
(Chair: Kirk Steudle, MDOT)

Technical findings
& Questions

Policy level
Feedback

**Vehicle to Infrastructure
Deployment Coalition
Executive Committee
(V2I DC EC)**

Guidance to V2I DC on
Technical & Institutional
Issues

Input

Feedback &
Guidance

**V2I DC
Technical Working Groups
(TWGs)**

Collaborate on technical work
(Input level actions)

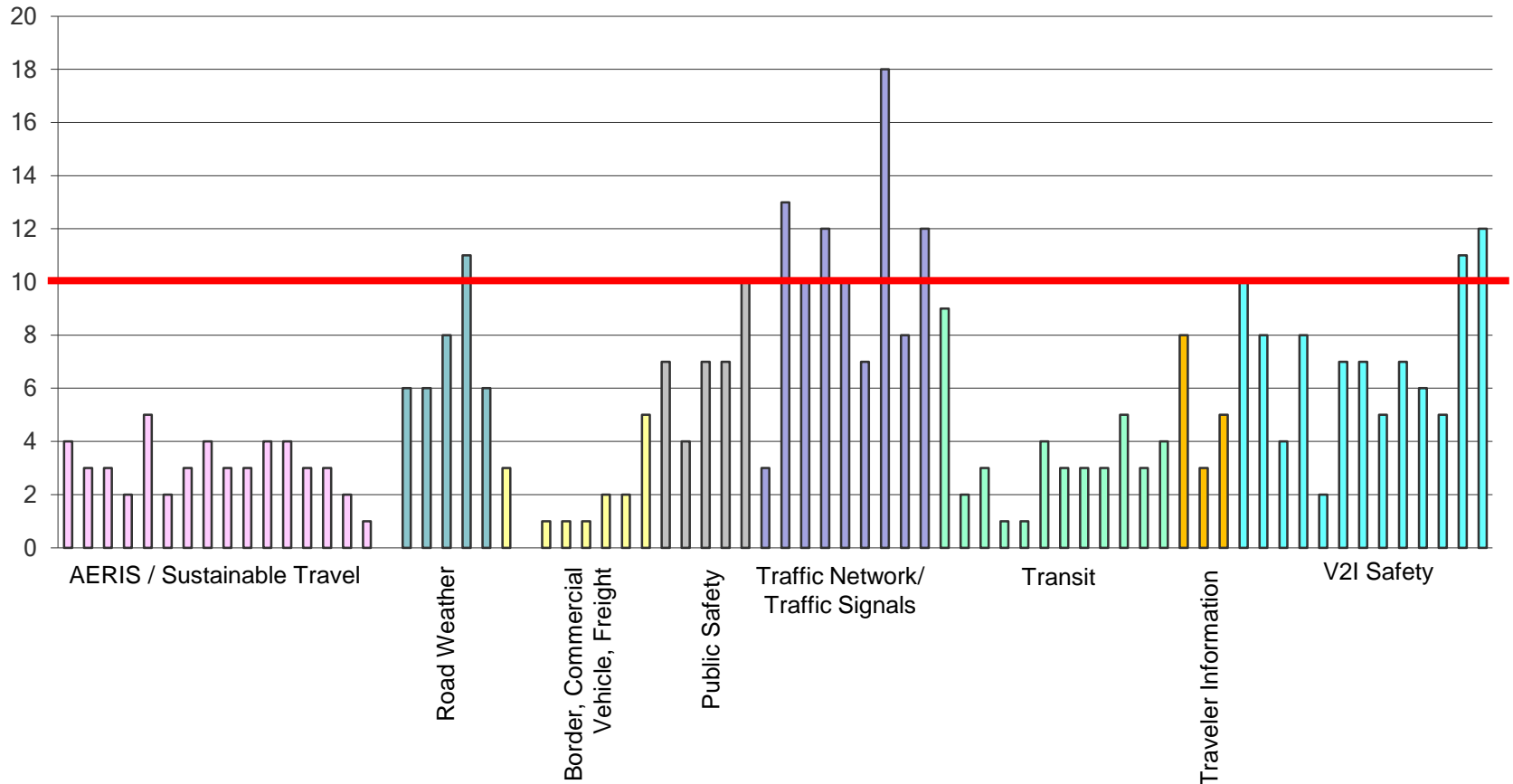
CAV Executive Leadership Team (ELT)

Meeting since 2005, Original Focus:

- Provide strategic guidance,
- Recommend policies and national deployment approaches,
- Provide critical program reviews,
- Assess the risks associated with deployment,
- Commit the resources of their organizations,
- Educate their organizations and supporting institutions

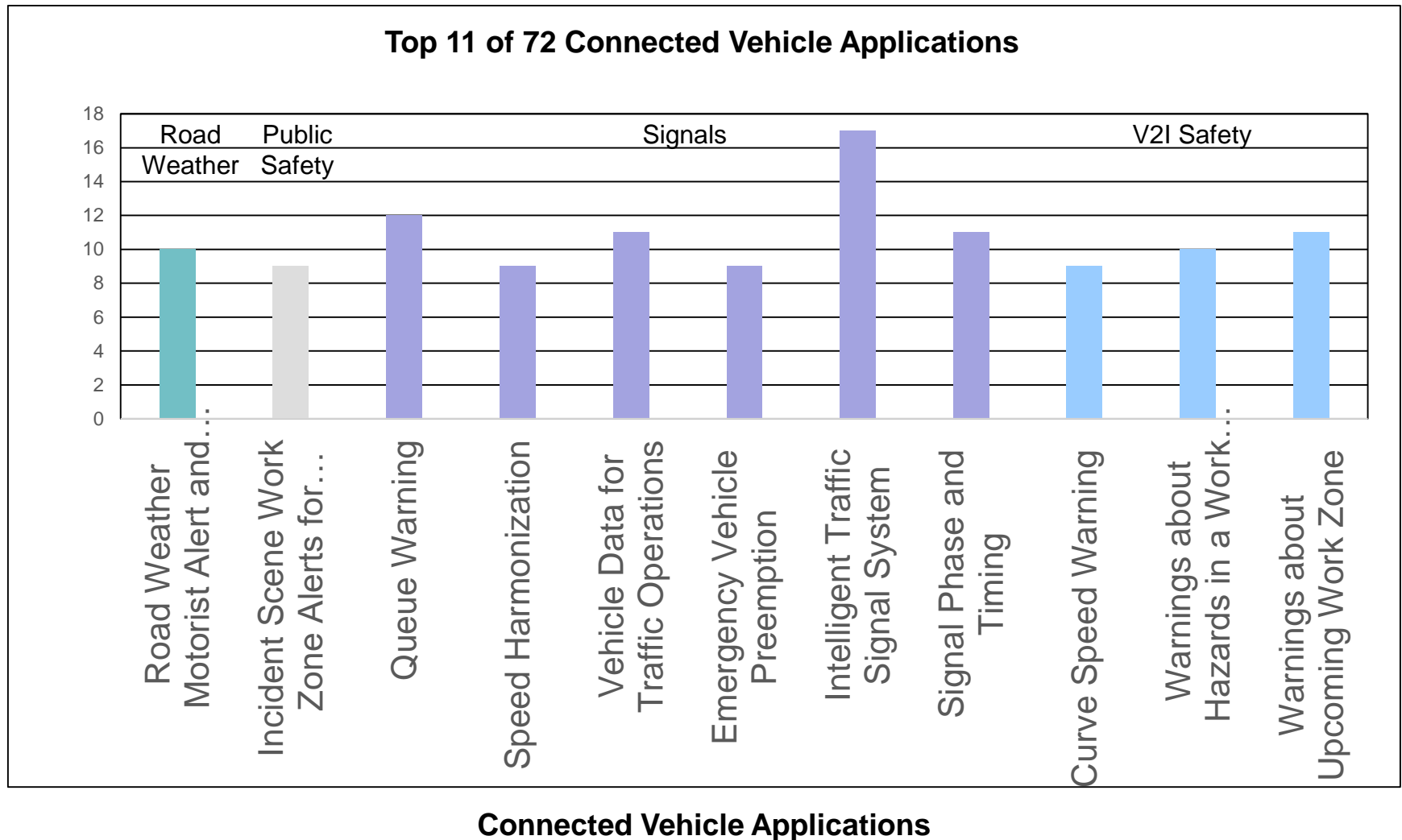
CV Applications Included in Plans or Proposals

Survey of State and Local Infrastructure Owners
(# of Responders = 22)

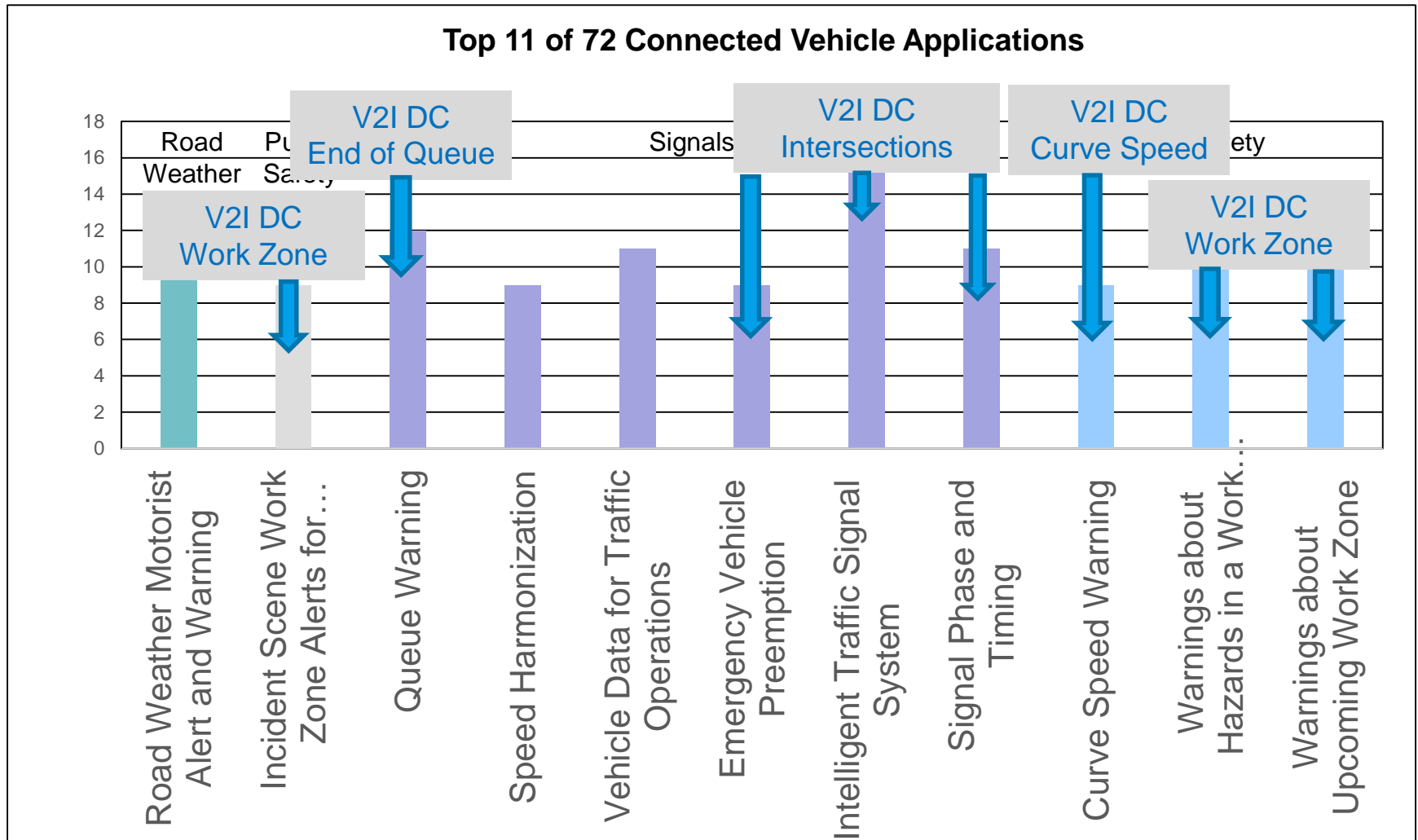


72 Connected Vehicle Applications by Group

Priority Applications – Results of TWG 1 Survey

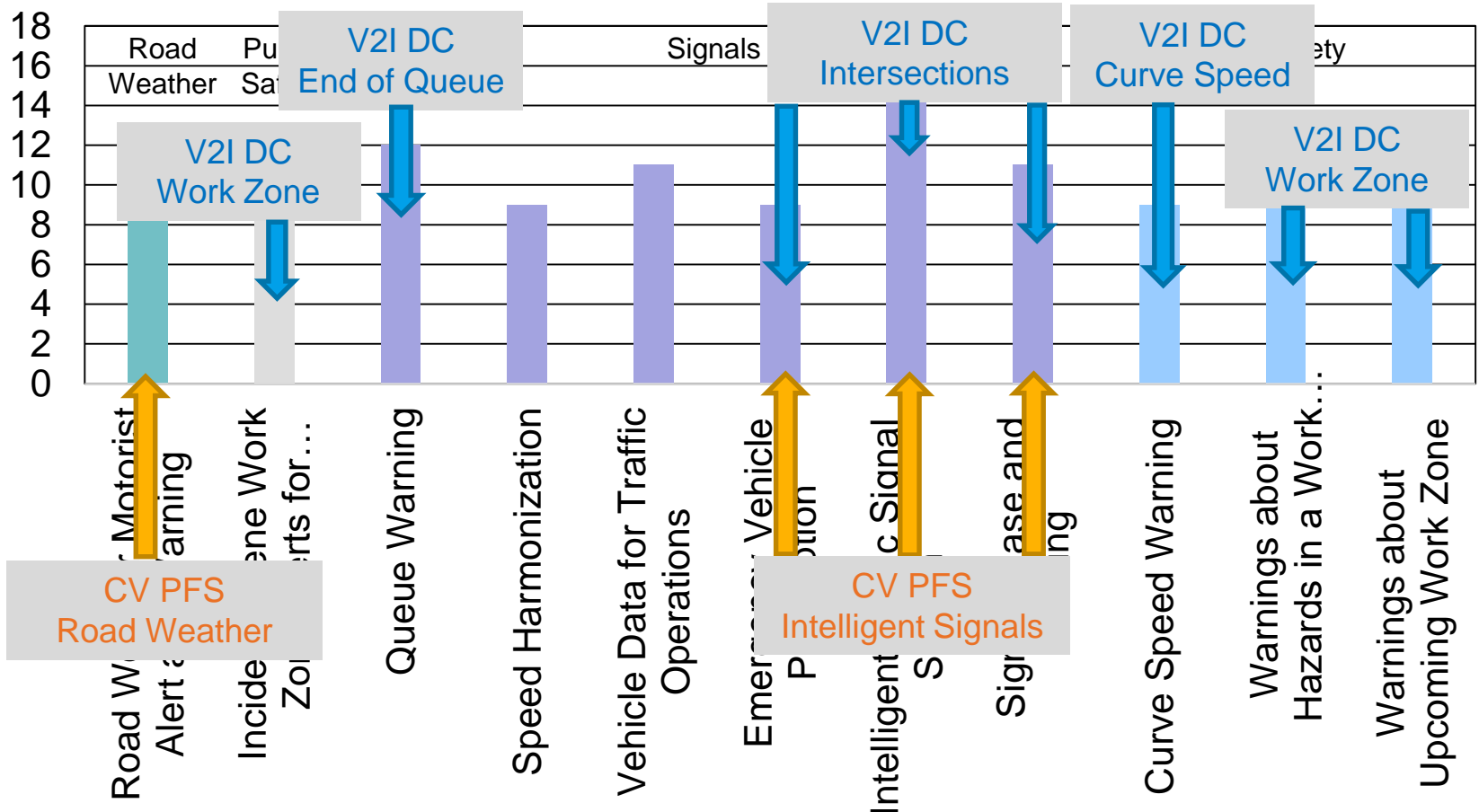


Priority Applications –V2I DC Priority Areas



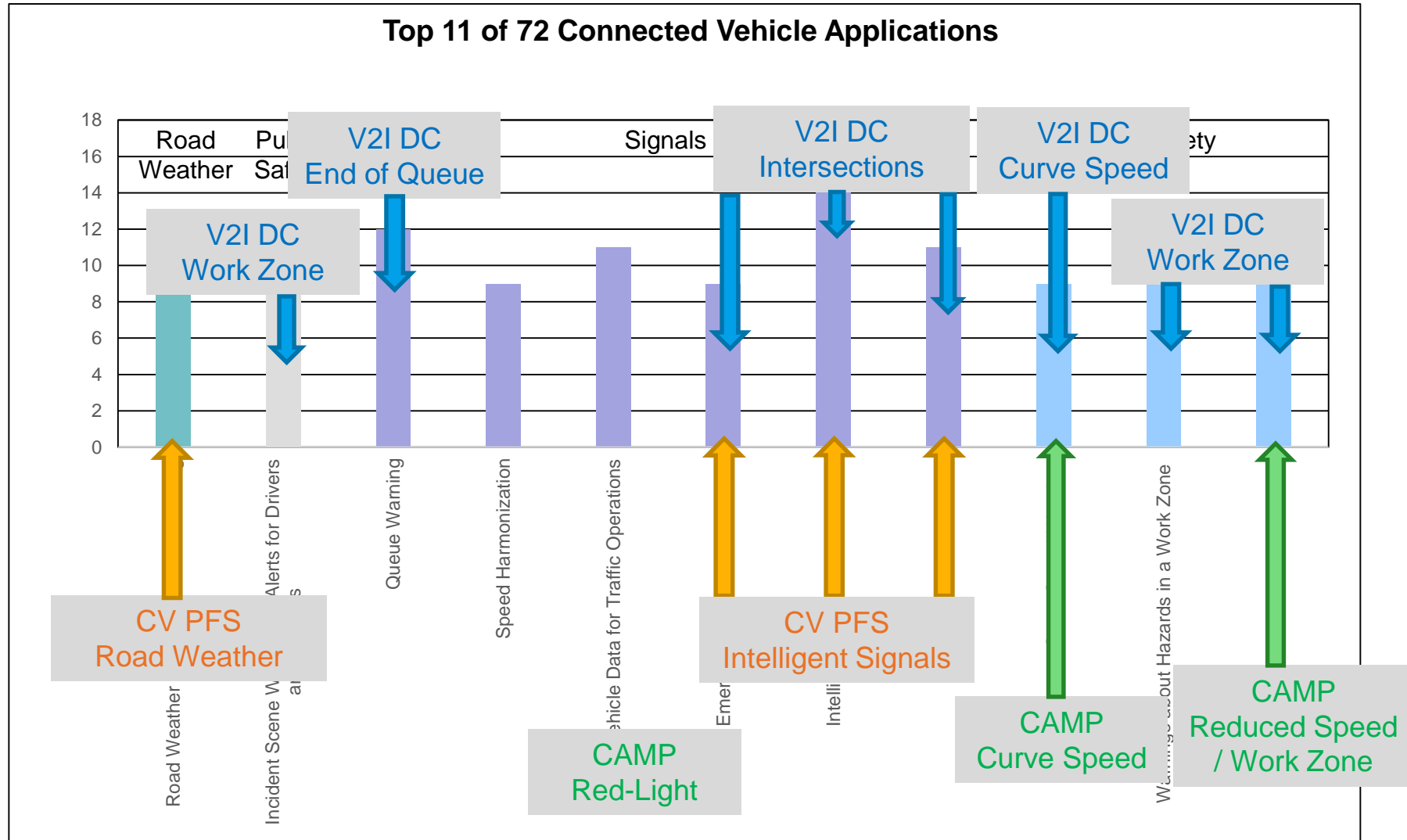
Priority Applications –CV Pooled Fund Projects

Top 11 of 72 Connected Vehicle Applications



Priority Applications –CAMP Demo Applications

Top 11 of 72 Connected Vehicle Applications



V2I Deployment Challenge

- Discussed within V2I DC TWG 1:
- How do we encourage / initiate broad V2I deployment?
- How do we demonstrate commitment to OEM and private industry?
- What is a reasonable, early expectation?
- Signalized Intersections

V2I Deployment Challenge

A challenge to achieve:

- Deployment of roadside DSRC hardware broadcasting Signal Phase and Timing (SPaT) on:
 - a coordinated corridor of at least **20 intersections**
 - in **each state**
 - by **2020**
- Commitment to operate for at least **10 years**

V2I Deployment Challenge

Goal of the Challenge:

- Give DOTs an entry into V2I deployment and operations (valuable experience with procurement, installation, operations)
- Help promote future (more advanced) V2I deployments
- Show a commitment to OEMs and developers

Connected Vehicle Deployment Challenge

20 SPaT Intersections in 50 States by 2020

The Challenge:

Equip at least one corridor (roughly 20 signalized intersections) in each of the 50 states with Dedicated Short Range Communications (DSRC) infrastructure to broadcast SPaT information by January 2020, and maintain operations for at least 10 years.

What is SPaT:

A Signal Phase and Timing (SPaT) message defines the current intersection signal light phases. The current state of all lanes at the intersection are provided, as well as any active pre-emption or priority.

Why This Challenge/Goal is Needed:

- To provide State and Local DOTs with an entry into DSRC based V2I Deployment (allow them to gain valuable procurement, licensing, installation, and operation experience)
- To promote future (more advanced) V2I deployments
- To show a commitment to automobile manufacturers and applications developers

"Fortunately, there is one fairly basic connected vehicle element which is relatively simple to deploy and fundamental to a number of applications, the 'signal phase and timing' (SPaT) message. SPaT defines the actions of a traffic signal. It is obtained from a traffic signal controller via a standard query protocol and is broadcast by most DSRC roadside devices as a standardized data message."

- Blaine Leonard, Utah DOT ITS Program Manager



Deployment Tools Will Be Available

The following tools will be developed:

- Guidelines for selecting corridors
- Procurement guidance
- DSRC licensing information
- Installation guidance
- Estimated costs
- Identification of existing funding sources that agencies may consider

Success in meeting the Challenge will be Measured

The V2I Deployment Coalition will work with the National Operations Center of Excellence (NOCoe) to maintain a website to track progress using a national map to depict locations where:

- There is a commitment to deploy; and
- DSRC SPaT broadcast is operational.



How to get involved?

The Connected Vehicle SPaT Deployment Challenge is being led by the V2I Deployment Coalition TWG 1 and the AASHTO CAV WG. Information is available at:

<http://www.transportationops.org>. Infrastructure Owners & Operators wishing to join the challenge, or others wishing to participate in the effort, may contact: Dean Deeter (AASHTO support liaison to both groups) at deeter@acconsultants.org

What?

Why?

Tools

Measure Success

Questions?

