

V2I Deployment Coalition Spring 2016 Meeting

Plenary Session

April 21, 2016

Detroit, MI

Welcome

Gummada Murthy, AASHTO

Matt Smith, MDOT

King Gee, AASHTO

Opening Remarks

Carlos Braceras, Utah DOT

Jeff Lindley, USDOT

TWGs Updates on Efforts and Progress

TWG 1 (Initiatives) Report

Bill Legg, WSDOT

V2I Deployment Coalition Spring 2016 Meeting

Report for
TWG 1
April 21, 2016
Detroit, MI

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

Issue 1: V2X Applications

- Survey of Infrastructure Owners & Operators
- We wanted to capture the knowledge gained by agencies who had planned or proposed V2I applications
- About 25 Responses

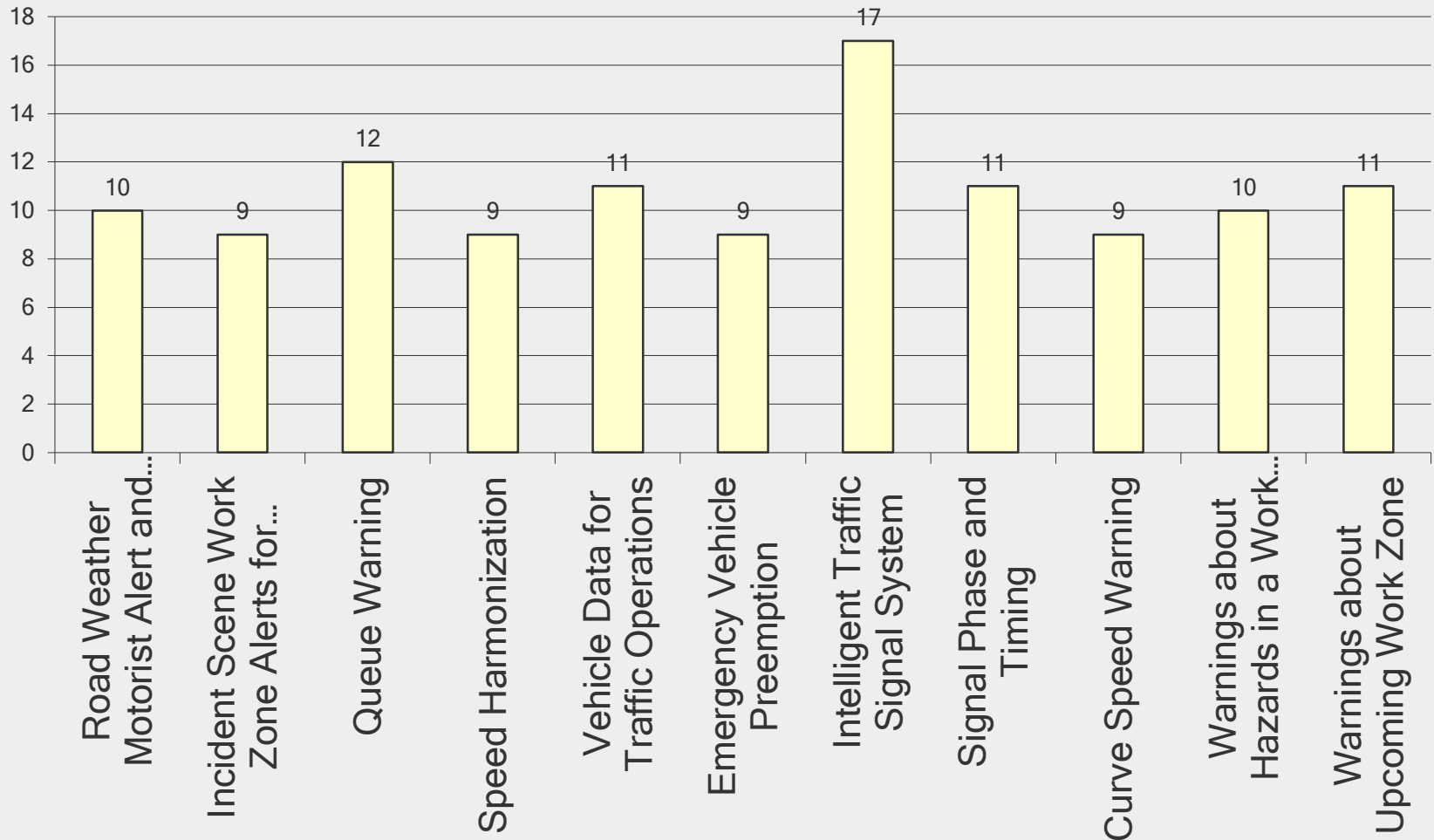
Primary Question in Survey

- Question 3 attempted to learn 3 things:
 - Which CV applications responding agencies had **included in their proposal or plan** for CV deployment
 - Which CV applications responding agencies felt **were most beneficial**; and
 - Which CV applications responding agencies **had already deployed**

CV Applications Included in Plans or Proposals

11 Most Selected Applications

Question 3: CV Applications Included in Agencies Plans or Proposals for Deployment
(Top 11 Applications Selected; # of Responders = 21)



Issue 1: V2X Applications

- Remaining Work:
 - Follow up with other TWGs to track progress on Issue #1
 - Structured process to follow up with each other TWG on related issue

Issue 7: Understanding the Benefits & Costs of V2I & Issue 15: Maintaining V2I Infrastructure

- Conducted 2 Webinars to share ongoing or completed USDOT funded B/C research
- Both webinars summarized & recorded
- Remaining Work:
 - Offer to Trial Cost/Benefit Tools with work Oregon DOT is doing
 - Webinars sharing UMTRI V2I Maintenance Issue Costs

Issue 13: Infrastructure Processes as V2I Barriers

- Identified a set of Barriers, some previously known (security, App maturity), some new (roadside sign to in-vehicle display consistency, pavement striping, etc.)
- Developed a Position Paper
- Outreached to other TWGs
- Remaining Work:
 - Follow-up Coordination with other TWGs

Issue #14 – Federal V2I Policy Statement

At the June meeting in Pittsburgh:

- TWG 1 members identified a need for a Federal V2I Policy Statement.
- A new Issue (#14) was added to the issues
 - **“...The V2I industry needs a strong message from a federal agency encouraging V2I deployment.”**

Issue #14 - Status

- In January, core members of TWG 1 and TWG 4 met by webinar to discuss topics for a Federal Statement
- USDOT representatives on TWG 4 shared that many (perhaps all) of the topics would be addressed by the V2I Deployment Guidance and Supporting Products
- Remaining Work:
 - Suggestion is that TWG 1 & 4 not prepare any requests until the Deployment Guidance documents are released

Potential Future Work – TWG 1

Identified a Future Work Plan to Support Deployment of V2I

- Put together a plan to facilitate the deployment of SPaT Nationally in the next 5 years:
 - Request at least a 10 year commitment to O&M
 - Will give the OEMs an option to develop applications

Contact for more information about TWG 1: Deployment Initiatives

Bill Legg, Chair

Joe Averkamp, Co-Chair

Dean Deeter deeter@acconsultans.org, Liaison

TWG 2 (Research) Report

Greg Larson, Caltrans

V2I Deployment Coalition Spring 2016 Meeting

Report for
TWG 2: Research
April 21, 2016
Detroit, MI

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

Issue 1: V2X Applications

Volunteers:

- Skip Yeakel, Volvo Group North America
- Bill Mahoney, National Center for Atmospheric Research
- Jianming Ma, Texas DOT, **Leader for this activity**
- Danjue Chen, Traffic Operations and Safety (TOPS) Lab at UW-Madison

Role in coordination: TWG 2 members will participate in reviewing the survey responses. TWG 2 members will also prepare a research definition for any additional research that might be needed towards identifying prioritized set of V2I applications, based on the survey results and comments received.

Targeted Outcome: Definition of any additional research proposed to further explore Issue #1.

Timeline. Give problem statements to TRB in June for consideration in NCHRP CAV Roadmap Project.

Issue 1: V2X Applications

Next Step: Develop a problem statement for harmonization of V2X apps for CAV research roadmap? Analyze the two lists, see what is the same, define what those mean, and **assess the readiness**.

Volunteers: Rob Bertini, Cal Poly and Tom Timcho, WSP

Assess the readiness of the V2X apps. Is this a CV PFS activity? Is this the readiness of off-the-shelf software? Should there be a common platform? We need to know the software, the platform, and the hardware.

Issue 3: V2I Data

Volunteers:


- Tom West, California PATH/UC Berkeley, **Leader for this activity**
- Jan-Mou Li, ORNL
- Danjue Chen, Traffic Operations and Safety (TOPS) Lab at UW-Madison
- Jianming Ma, Texas DOT
- Yang Cheng, Traffic Operations and Safety (TOPS) Lab at UW-Madison,

Role in Coordination: TWG 2 (Research TWG) will take the definitions of the highest priority data related issues that TWG 3 produces and develop research definitions that define the research activities (e.g. scope of research, anticipated results, cost estimate) that are recommended to address the prioritized issues over the coming 2-5 years.

Targeted Outcome: A research plan of action to research and resolve as many of the prioritized list of issues as possible over the coming 2-5 years.

Next Step: Develop a research problem statement for

1. Mechanisms for higher frequency dynamic map updates
2. Determine corrections for lane-level GPS positioning
3. Determine roadway friction indicators (e.g., skidding/braking)
4. Determine what owner/operators want from OEMs



Do we need a trusted forum for sharing agency/OEM data?

Issue 6: V2I Outreach (One-Stop Shop for Research)

Volunteers:

- Greg Larson, Caltrans
- Rob Bertini, Cal Poly State University
Ray Derr, Transportation Research Board
- Skip Yeakel, Volvo Group North America

Role in Coordination: TWG 2 will develop a description of the concept and intent for a “one-stop-shop” for Connected Vehicle research sharing. This concept will be available to allow entities that may be able to serve the purpose of the “one-stop-shop” (e.g. NoCOE or other entities) to be able to understand what resources would be required to develop and support the “one-stop-shop”. The intent would be that the “one-stop-shop” (as defined by TWG 2) could be developed in subsequent years by one or more entities to be determined based on the concept.

Status: TWG 2 has engaged the NOCoE to help develop the one-stop shop, and the Center will use its resources to help develop and maintain the one stop shop. We are now in Task 2 of the list of recommended next steps.

Issue 6: V2I Outreach (One-Stop Shop for Research)

Targeted Outcome: “One-stop-shop” for V2I related research concept described to the point where entities could estimate the costs and resources required to create and operate the ‘shop’.

Recommended Next Steps:

- **Task 1:** Email the CV/AV stakeholder group responsible for CV/AV research/operations in TRB, AASHTO, V2IDC, and et.al. to frame the early discussions on this initiative and the proposed approach below.
- **Task 2:** Reach out to the Transportation Research International Documentation (TRID) Database (<http://trid.trb.org/>) at the Transportation Research Board and the National Transportation Library (<http://ntl.bts.gov/>) in the Office of the Assistant Secretary for Research and Technology at the US Department of Transportation (Amanda Wilson is the head of the National Transportation Library at BTS (<http://ntl.bts.gov/>), and Alasdair Cain oversees the Transportation Research Hub at OST-R (<http://ntlsearch.bts.gov/researchhub/index.do>) and capture their CV/AV knowledge resources for compilation in the NOCoE Knowledge Center.

Issue 6: V2I Outreach (One-Stop Shop for Research)

Recommended Next Steps (continued):

- **Task 3:** Review and identify a desirable taxonomy to ensure effective key word tagging of CV/AV content.
- **Task 4:** Engage the CV/AV community proactively to obtain new content.
- **Task 5:** Identify strategy for promotion and outreach of these knowledge resources: NOCoE newsletter stories, webinars, listserv/discussion forums, etc.

Issue 7: Understanding the Benefits and Costs of V2I Deployment and Operation

Volunteers:

- Bill Gouse, SAE International
- Dick Mudge, Compass Transportation and Technology
- Alan Korn, Meritor WABCO
- Doug Gettman, Kimley-Horn, **Leader for this activity.**

Role in Coordination: TWG 2 members will participate in the demonstrations facilitated by TWG 1 and the case studies performed by TWG 3, and make a determination about where gaps are in what has been delivered (or is planned) from the current studies and what TWG 3 was able to derive from the case studies. TWG 2 will prepare a Research Definition for additional research activities needed to further define anticipated costs and benefits of V2I.

Targeted Outcome: A Research Plan of Action will be created defining additional research needed to supplement both the current and completed B/C studies and the case study analyses conducted by TWG 3. Look at the 20% of curves that are 80% of the problem. There needs to be a range of assumptions. Develop an assessment of effectiveness.

Recommended Next Steps: Develop a research problem statement.

Potential Future Work

- One-stop shop for research
- Other future research needs as they arise

Contact for more information about TWG 2: Research

Greg Larson, greg.larson@dot.ca.gov, Chair

Rob Bertini, rbertini@calpoly.edu, Co-Chair

Pat Zelinski, pzelinski@aaashto.org, Liaison

TWG 3 (Partners) Report

Matt Smith, MDOT

V2I Deployment Coalition Spring 2016 Meeting

Report for
TWG 3: Infrastructure Operator, OEM and
Supplier Partnerships

April 21, 2016

Detroit, MI

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 (future work)				
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

Issue 3: Data Strategies

- Identification of research priorities for TWG 2
 - Road friction
 - RTCM correction/lane level correction
- Infrastructure O/O's need data from vehicles – even for some safety applications
- Desire for further concept development for end-of-queue application(s)
- Three step strategy:
 - 1. What is needed for each application'
 - 2. What is common across applications
 - 3. What is “low-hanging” fruit.
 - 4. Address these data needs
- OEM's focus is on developing/perfecting current data elements (BSM, etc) before opening up new data sources

Issue 7: Understanding the B/C of V2I Deployments

- Can only make assumptions based on research
 - Information available from European model deployment
 - CV Pilot research and results important
- Value for benefits is dependent on the method of delivery
- Gaps
 - Specific benefits from work zone applications
 - Evolving infrastructure costs
 - Application development / “maintenance” costs
 - Security costs
- Needs to be consistently updated

Issue 16: Operator and OEM Goals for V2I

- Safety is a common goal for all
- Private sector providing solutions and services are in line with Public sector's overall mission and goals
- Private industry
 - Provide new technological solutions for Owner/Operators
 - New business opportunities
- Public Sector
 - Understand and look for technology that will allow them to achieve their mission and goals

Coordination with TWG 2

- Two research ideas:
 - Road Friction data needs and availability
 - GPS correction data

Remaining Work

- Issue 3 – Identify Infrastructure O/O Data needs
- Issue 7 – Incorporate additional information
 - European deployment
 - CV Pilots
 - Ongoing updates
- Issue 16 – Summarize work

Potential Future Work

- Continued identification of data needs
- Continued update of Benefits/Costs
- Security
 - Possible approach for V2I DC
- International Harmonization
 - Explore common concept development

Contact for more information about TWG 3: Infrastructure Operator, OEM and Supplier Partnerships

Matt Smith, Smithm81@michigan.gov, Chair

Roger Berg, roger_berg@denso-diam.com, Co-Chair

Adrian Guan, aguan@itsa.org, Liaison

TWG 4 (Guidance) Report

Faisal Saleem, Maricopa County

V2I Deployment Coalition Spring 2016 Meeting

Report for
TWG 4: Guidance
April 21, 2016
Detroit, MI

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

Issue 1: V2X Applications

- Reviewed results of TWG 1 survey – specifically question 3 – regarding priority apps
- Will identify if and to what extent new V2I Deployment Guidance addresses planned/most beneficial issues identified in survey
 - Road Weather Motorist Alert & Warning
 - Queue Warning*
 - Vehicle Data for Traffic Operations
 - Intelligent Traffic Signal System*
 - Signal Phase & Timing*
 - Warnings About Upcoming Work Zones*

*Apps with *
are also
considered
priority by
V2I DC*

Issue 6: V2I Outreach

- One of two primary issues and most significant for TWG 4
- Review of V2I Deployment Guidance was completed under this issue
 - Completed first review in June 2015
 - ❖ Provided nearly 200 comments

Issue 6: V2I Outreach

- Planning second review once new Guidance is released
 - ❖ Second review will include additional review of eight new support products

*Began reviewing products with * yesterday*

1. Systems Engineering Guide
2. Connected Vehicles and the Planning Process*
3. Guide to Licensing
4. V2I Message Lexicon
5. Pre-Deployment Guidance for V2I Safety Applications*
6. Estimating Benefits and Economic Impacts
7. Near Term Transition and Phasing*
8. Connected Vehicle Training Resources

Issue 6: V2I Outreach (cont.)

- Also under this issue, TWG 4 reviewed existing outreach and USDOT future plans for additional outreach, training and education
 - Provided summary feedback to USDOT
 - Participated in focus group (yesterday) regarding outreach plan content

Issue 7: Understanding B/C of V2I Deployment and Operation

- Reviewed summary work from TWG 1 and TWG 3 (yesterday)
- Will identify if and to what extent new V2I Deployment Guidance addresses how to:
 - Modify content in B/C tools
 - Share additional B/C info to add to overall tool
 - Use tool framework to calculate B/C in absence of relevant content
 - Factor B/C into business planning

Issue 9: Understanding V2I Liability Assignment

- Scheduled to discuss information from TWG 2 on this issue in June
- Will identify if and to what extent new V2I Deployment Guidance addresses liability

Issue 11: Consumer Messaging

- Reviewed samples of existing public and private sector messaging to consumers on Connected Vehicle and V2I in particular
- Identified messages that were:
 - Common: Used by all or most
 - Supportive: Clear, factual
 - Questionable: Confusing, potentially misleading
- Provided summary feedback to USDOT

Issue 13: Infrastructure Processes as V2I Obstacles

- Reviewed results of TWG 1 survey – specifically question 8 – regarding obstacles
- Will identify if and to what extent new V2I Deployment Guidance addresses obstacles identified in survey, *some* of which include:
 - DSRC security
 - Existing patents
 - Simple terminology (CV vs. AV; V2I/V2V/V2X)

Remaining Work

V2I Deployment Issues	Anticipated TWG 4 Actions	Anticipated Completion Date
Issue 1: V2X Applications	<ul style="list-style-type: none"> Identify relevant content from this issue that should be included in the overall outreach in Issue 6 based on TWG 3 findings. 	Q1-2016 (Underway)
Issue 6: V2I Outreach	<ul style="list-style-type: none"> Provide input to USDOT on V14 of Deployment Guidance. 	6-29-2015 (Completed)
	<ul style="list-style-type: none"> Identify outreach that may be needed to increase awareness and support of V2I among transportation agencies. 	Q3-2015 (Completed) and Q2-2016 (Underway)
	<ul style="list-style-type: none"> Provide input to USDOT on next version of Deployment Guidance and corresponding support products. 	Q4-2015 (Underway)
Issue 7: Understanding the Benefits and Costs of V2I Deployment	<ul style="list-style-type: none"> Identify relevant content related to calculating the benefits and costs of V2I applications based on work by TWG 1 that should be included in overall outreach in Issue 6. 	Q2-2016 (Underway)
Issue 11: V2I Consumer Messaging	<ul style="list-style-type: none"> Develop a description of the type of content and guidelines that are needed to be developed to enable consistent, accurate consumer messaging related to V2I applications. 	Q4-2015 (Complete)
Issue 13: Infrastructure Processes as V2I Obstacles	<ul style="list-style-type: none"> Identify relevant content related to infrastructure processes based on work completed by TWG 1 and TWG 3 that should be included in overall outreach in Issue 6. 	Q1-2016 (Underway)
Issue 14: Federal V2I Policy Statement	<ul style="list-style-type: none"> Identify relevant content related to a Federal V2I policy statement based on work done by TWG 1 that should be included in feedback on the V2I Guidance documents. 	Q4-2015 (Underway)

Contact for more information about TWG 4: Guidance

Faisal Saleem, faisalsaleem@mail.maricopa.gov, Chair

Navin Katta, navin@savarinetworks.com, Co-Chair

Ginny Crowson, crowson@acconsultants.org, Liaison

TWG 5 (Standards) Report

Ed Seymour, TTI

V2I Deployment Coalition Spring 2016 Meeting

Report for
TWG 5: Deployment Standards Working
Group

April 21, 2016

Detroit, MI

Deployment Issues Addressed

Issue	TWG 1 Initiatives	TWG 2 Research	TWG 3 Partners	TWG 4 Guidance	TWG 5 Standards
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Issue 3: V2I Data	N	S	P	N	S
Issue 6: V2I Outreach	N	S	N	P	S
Issue 8: V2I Standards	N	N	N	N	P

Issue 1: V2X Applications

- Gathering CV Pilots lessons (New York)
- Reviewing "ITS Standards for the Data Capture and Management Program"
- By June
 - Review CV Pilot lessons
 - Webinar on Data Capture document
 - Map Application Priorities by TWG 1 with priorities from other groups

Issue 3: V2I Data

- Liaison with WG 3 – context diagram
- By June or summer
 - Joint meeting with WG 3
 - Meeting with WG 5 and SAE V2I Task Force

Issue 6: V2I Outreach

- Share context drawing with other WGs and SAE DSRC Cmte
- By June
 - Recommendations including SAE Task Force, training, SDOs

Issue 8: V2I Standards

- Identify standards gaps
 - Context diagram, Docs, CV Pilots, Liason TWGs
 - Move the RSE Specification to an SDO
- Candidate actions to fill gaps
 - SAE Task Force

Potential Future Work

- Maintain the standards context drawing, complete white paper & use for training, resource for deployers
- Engage in Smart Cities and Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)
- Engage with telecommunications providers
- Conformance with appropriate standards
- Monitor certification – currently limited to and focused on CV Pilots

Potential Future Work

- Monitor Security needs and engage as it comes forward
- Consider standard specification for an ASD, subject to the contents of the NPRM
- Focus on and look for gaps in fleet-related standards if a NPRM for heavy vehicles is released. Perhaps broader engagement with commercial vehicle fleets
- Stay involved with the SAE I2V/V2I Task Force, and other SDOs

Contact for more information about TWG 5: Deployment Standards

Ed Seymour, e-seymour@tti.tamu.edu, Chair

Gary Duncan, gduncan@econolite.com, Co-Chair

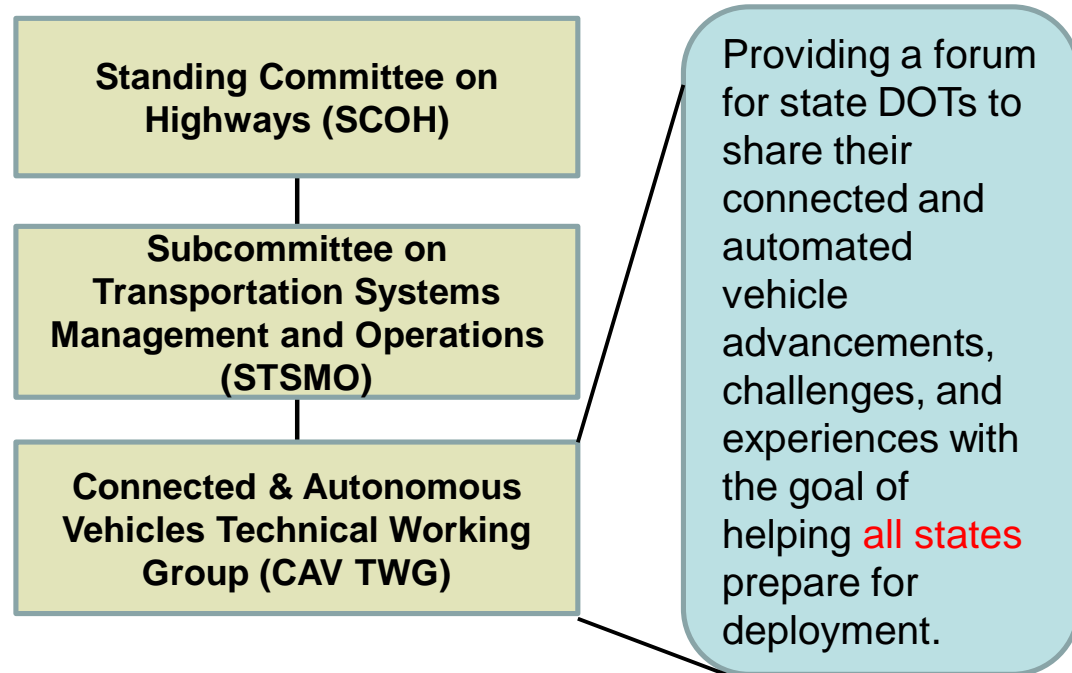
Siva Narla, snarla@ite.org, Liaison

V2I DC Coordination with Other Efforts

AASHTO CAV TWG & Other AASHTO Efforts

Blaine Leonard, Utah DOT

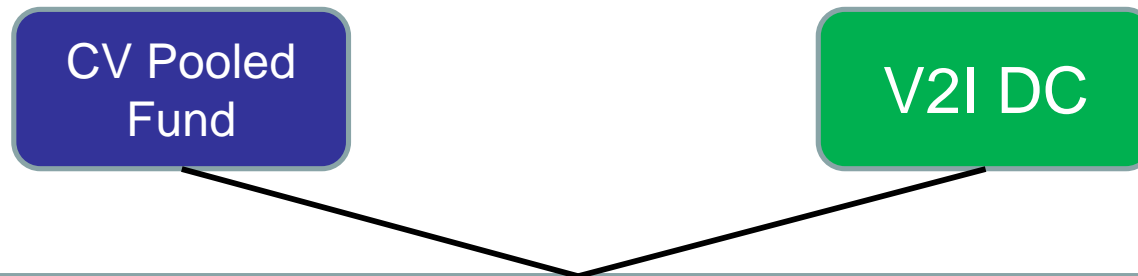
AASHTO SCOH CV Leadership



Current CAV TWG Member States

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

Relationship to V2I DC & CV Pooled Fund



AASHTO CAV TWG Involvement

Participate in the activities of the V2I DC and the Connected Vehicle Pooled Fund Study, as individual members, to:

- promote collaboration and
- identify projects and efforts appropriate for each group.
- Facilitate the selection of projects to be sponsored or undertaken by the CAV TWG.

CAV TWG -- Recent Activities

Joint V2I Application Survey with V2I DC TWG 1

- Both groups wanted to survey infrastructure owners & operators
- Avoided multiple surveys
- Involved more individuals in the creation of the survey and discussion of results

CAV TWG -- Recent Activities

Presentations by the three Pilot Deployment Sites

- Allowed more dialog between members & the pilot sites than other venues
- Allowed members to understand the applications planned and the planned use of DSRC at each site
- Enabled Pilot Sites to communicate to all CAV TWG members at one time

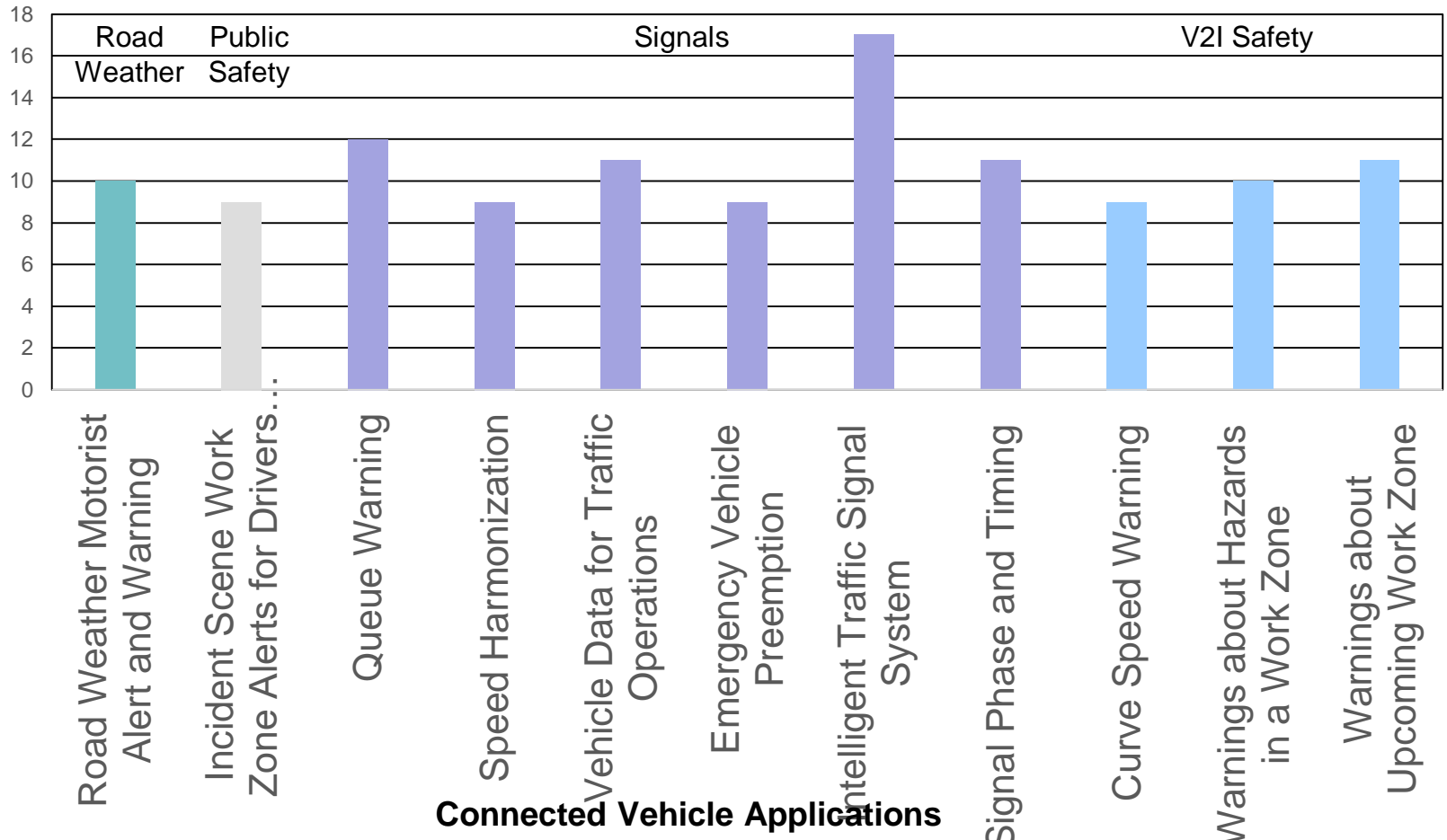
CAV TWG -- Recent Activities

Discussion about each members approach / progress towards AV Policy / Legislation

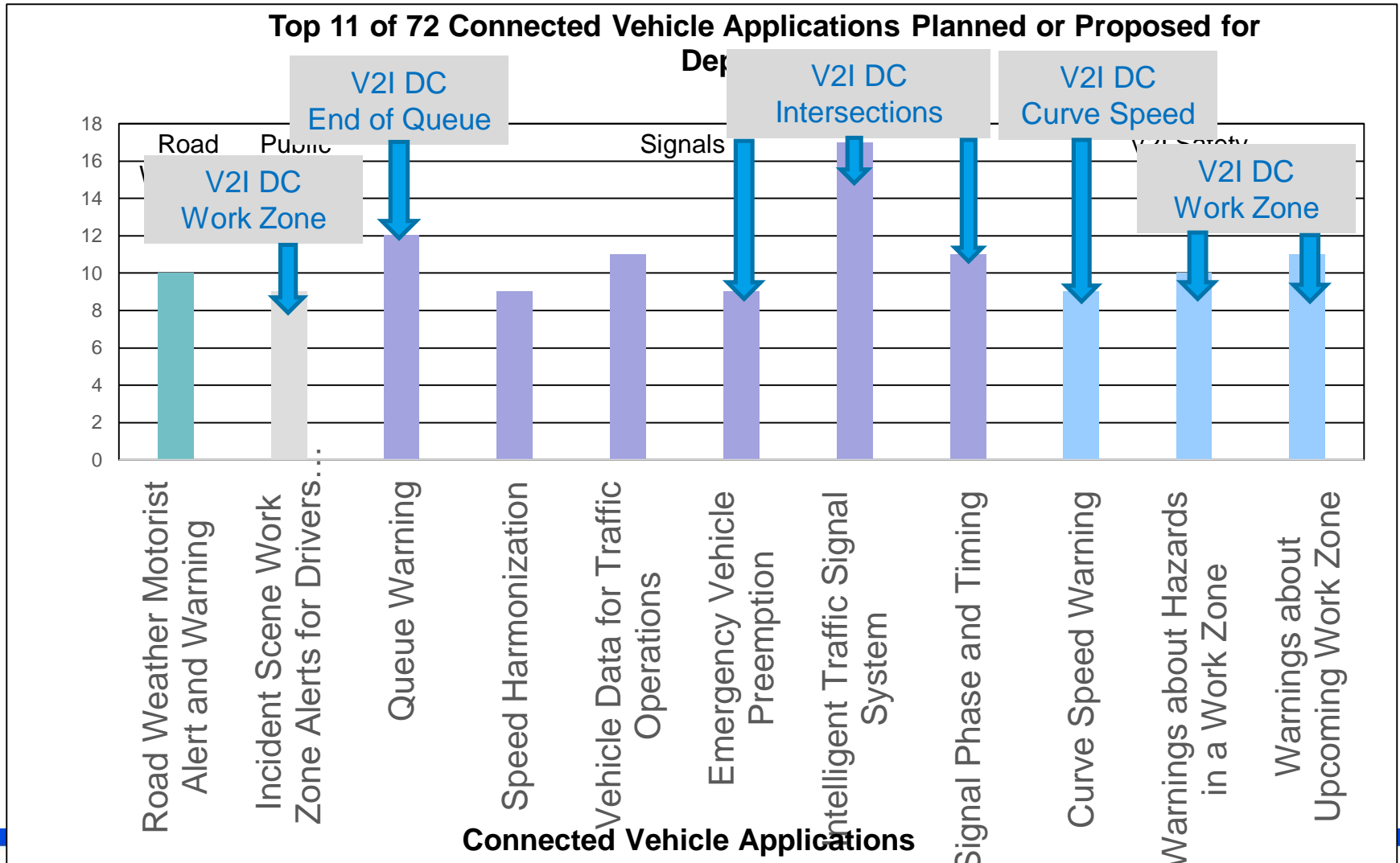
- Open dialog among members
- Sharing of draft policy statements
- Agreed for continued discussion

Priority Applications – Results of TWG 1 Survey

Top 11 of 72 Connected Vehicle Applications Planned or Proposed for Deployment

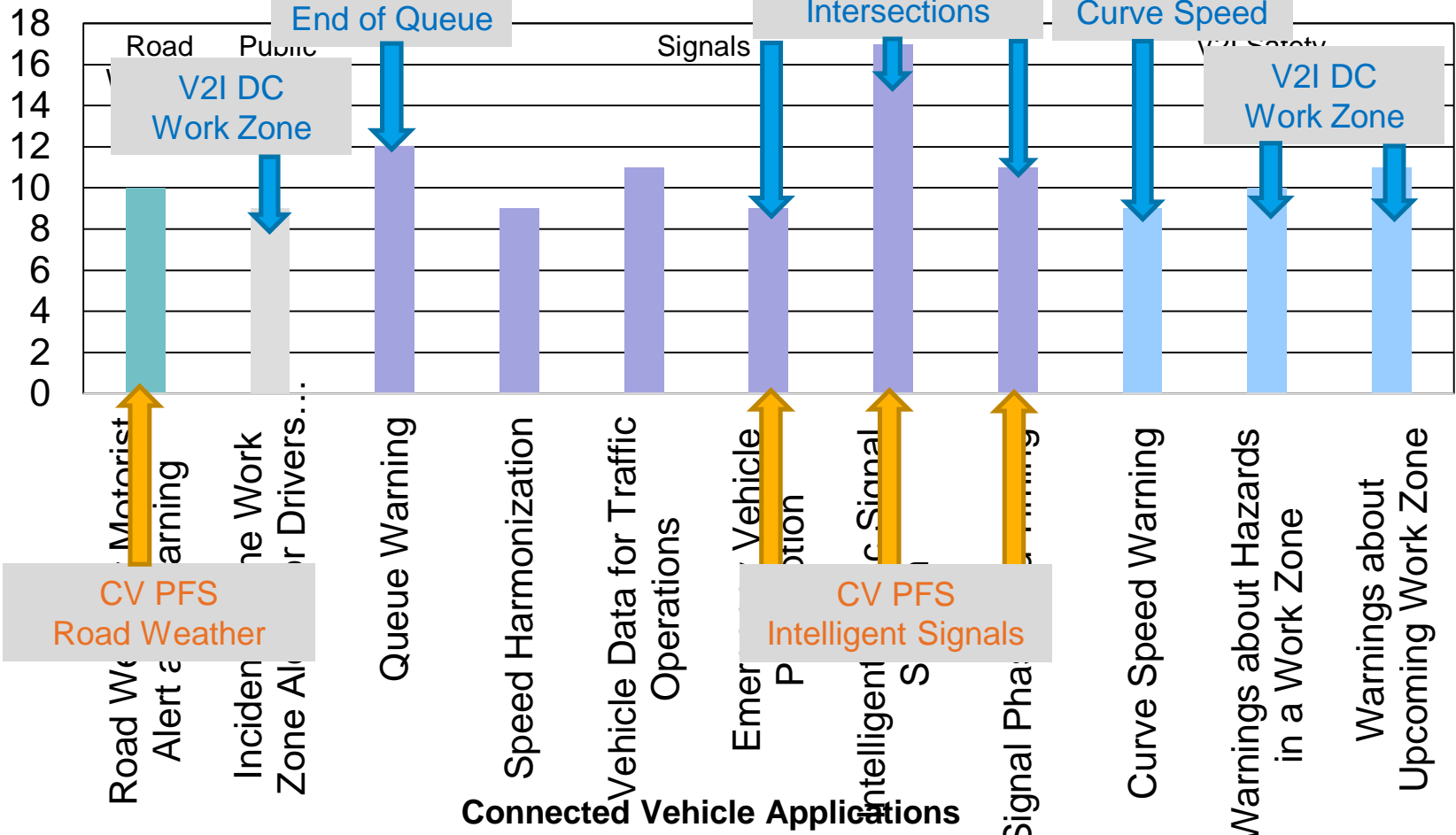


Priority Applications – Addition of V2I DC Priority Areas

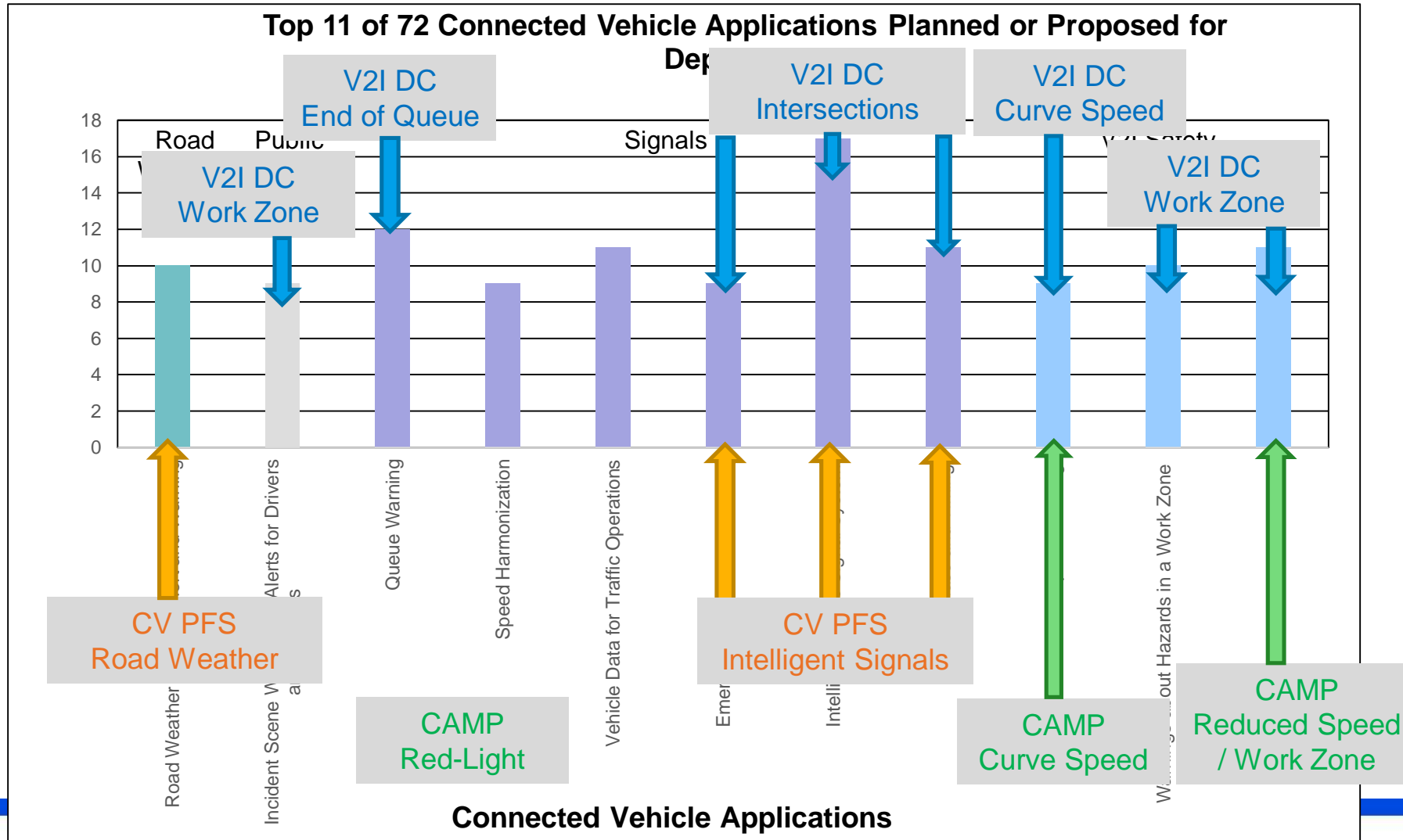


Priority Applications – Addition CV Pooled Fund Projects

Top 11 of 72 Connected Vehicle Applications Planned or Proposed



Priority Applications – Addition CAMP Demo Applications



CAV Executive Leadership Team (CAV-ELT)

Gummada Murthy, AASHTO

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

CAV ELT Roster

Entity	# of Members
USDOT	7 Liaisons
State DOTs	15 members
Local Governments	5 members
AASHTO	3 members
ITE / ITS America	1 member each
Automotive Industry	15 – 20 members
TRB	1 member
NACO / NACTO / IBTTA / VII / AAMVA/ Others	9 members

Automated Vehicle Public Policy Workshops

A series of workshops were conducted to discuss AV Public Policy. Locations included:

- Michigan
- Iowa
- Nevada

Automated Vehicle Public Policy Workshops

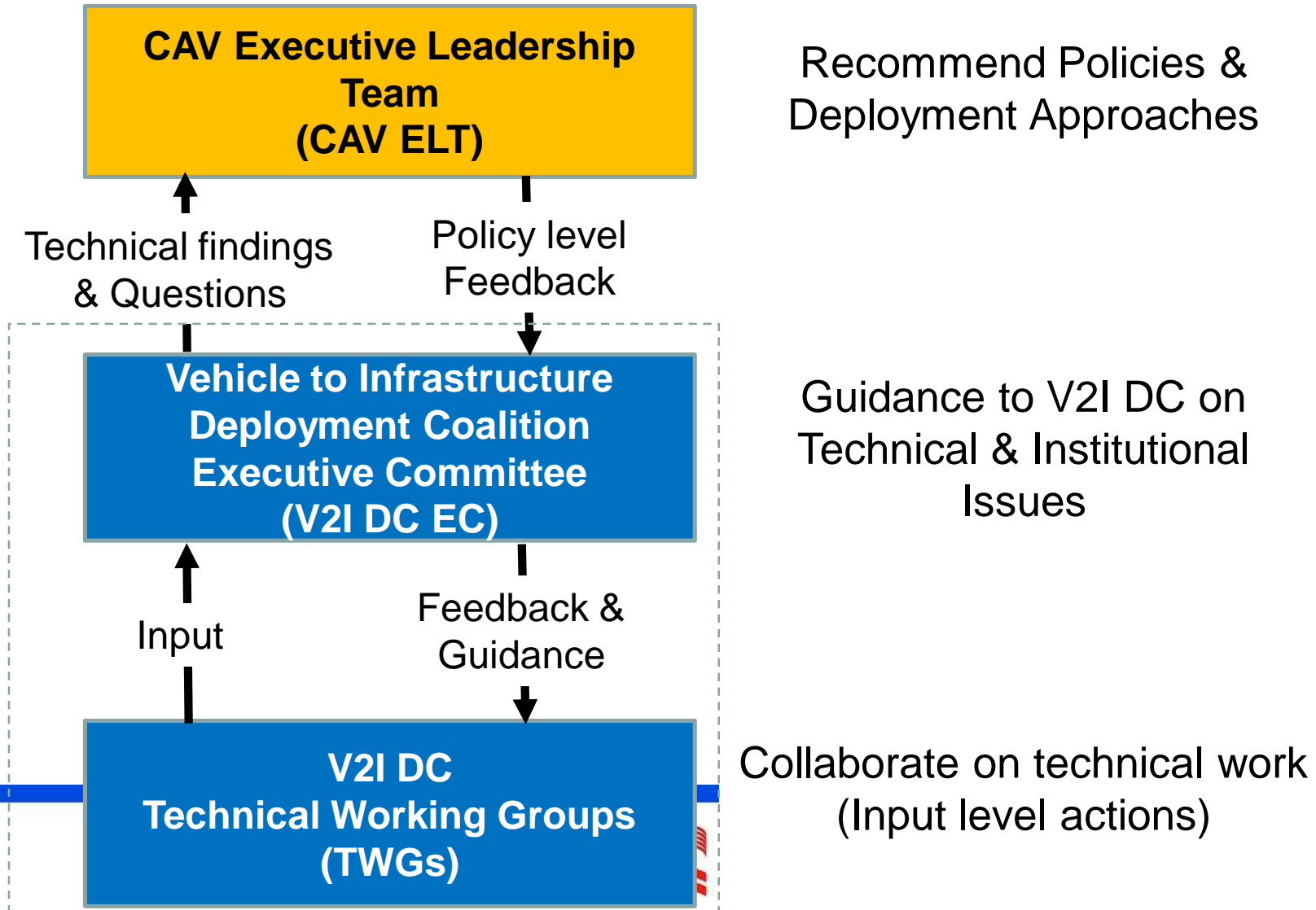
Objectives of the workshops:

1. Raise awareness of policy issues for various national, state and local organizations and agencies
2. Identify and refine near term urgent or important policy issues for further study, collaboration or advocacy
3. Determine future form of any follow-on automated vehicle public policy forum

CAV Institutional Framework

Entity

Role



TRB AV/CV Roadmap

Ray Derr, TRB

Cyber Security Task Force

Siva Narla, ITE

Plans for Consolidating Results of the V2I DC

Dean Deeter, Athey Creek Consultants

Last June in Pittsburgh

- 5 TWGs met for the first time
- TWGs were presented with 12 issues to discuss
- 4 new issues were identified

16 Issues

5 TWGs

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	Surveys		Webinars		
Issue 7: Understanding the Benefits and Costs of V2I Deployment and Operation					
Issue 8: V2I Standards	Technical Diagrams				
Issue 9: Understanding V2I Liability Assignment					
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	Guidance Feedback				
Issue 14: Federal V2I Policy Statement					
Issue 15: Maintaining V2I Infrastructure					
Issue 16: Operator and OEM Goals for V2I					

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					
Issue 3: V2I Data					
Issue 4: Patents-Intellectual Property					
Issue 5: Security					
Issue 6: V2I Outreach					
Issue 7: Understanding the Benefits and Costs of V2I Deployment and Operation					
Issue 8: V2I Standards					
Issue 9: Understanding V2I Liability Assignment					
Issue 10: V2I Synergies with Other Emerging Technologies					
Issue 11: V2I Consumer Messaging					
Issue 12: V2I Multimodal Applications					
Issue 13: Infrastructure Processes as V2I Obstacles					
Issue 14: Federal V2I Policy Statement					
Issue 15: Maintaining V2I Infrastructure					
Issue 16: Operator and OEM Goals for V2I					

5 TWG Work Plans

How will the findings all get consolidated?

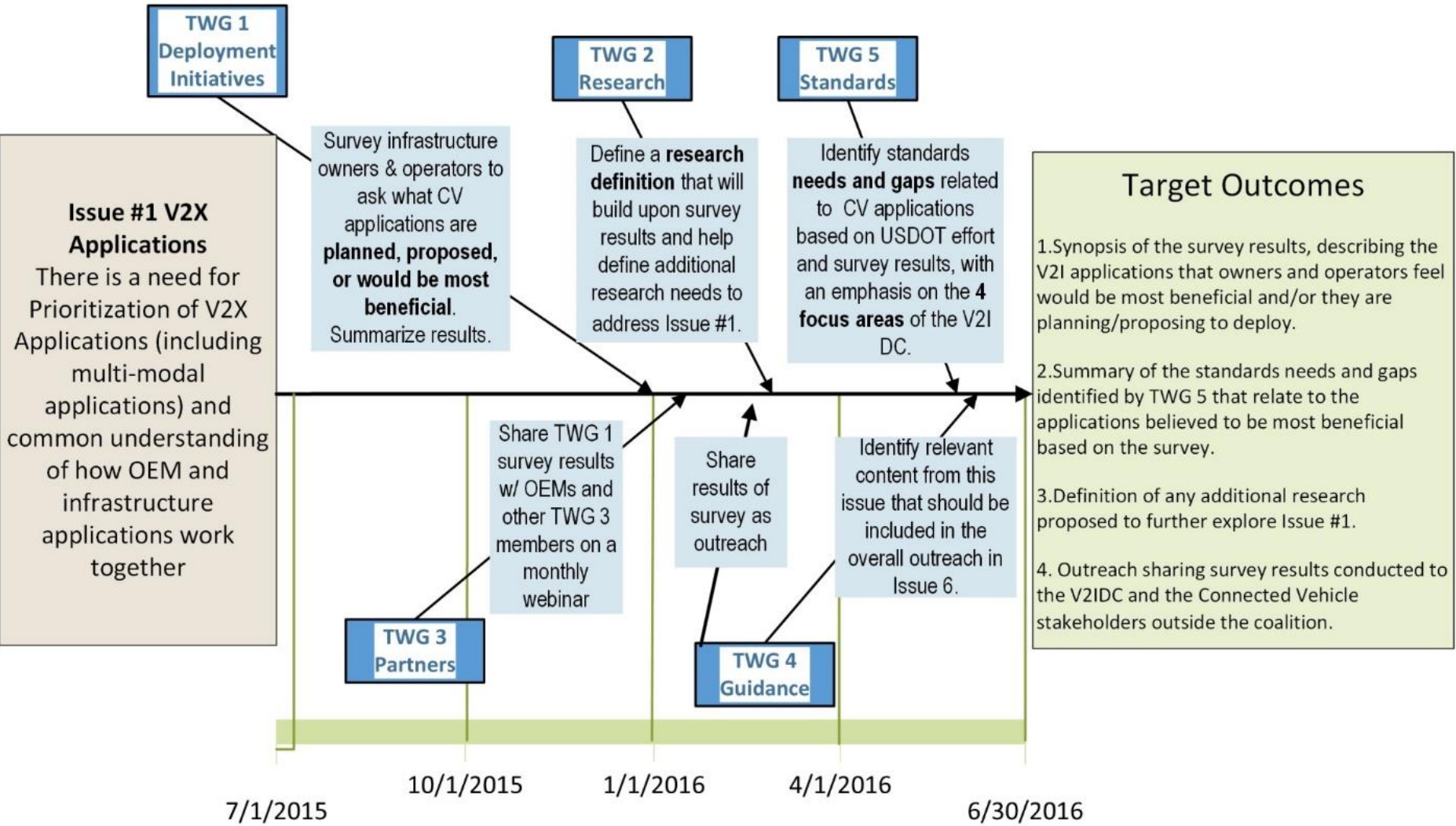
Documents / Papers

Guidance Feedback

Issue Specific Summaries

- Consolidate the findings of the TWGs by Issue.
- 3 Categories of actions taken on the Issues:
 - 1. No Action Taken** in the Initial 18 months
 - 2. Primarily One TWG** performing the actions on a particular issue
 - 3. Multiple TWGs** collaborating together

Multiple TWGs Collaborating (Issue #1: V2X Applications)



Issue #1: V2X Applications

One Summary that includes:

- Results of the V2I Applications Survey
- Discussion on the extent to which the highest ranked applications are addressed in the V2I Guidance documents
- Description of the Additional Research needs identified by TWG 2
- Any V2I standards gaps related to the highest ranked applications

Consolidation to Include

- 16 summaries describing the activities related to issues
 - Range from a paragraph describing why no activities occurred to multi-page documents
- All 16 summaries pulled together into an overall Technical Memorandum
- July to August Timeframe

V2I DC Future Plans

Gummada Murthy, AASHTO

Bob Arnold / Jonathan Walker, USDOT