CAT Coalition
Strategic Initiatives Working Group

October 22, 2020

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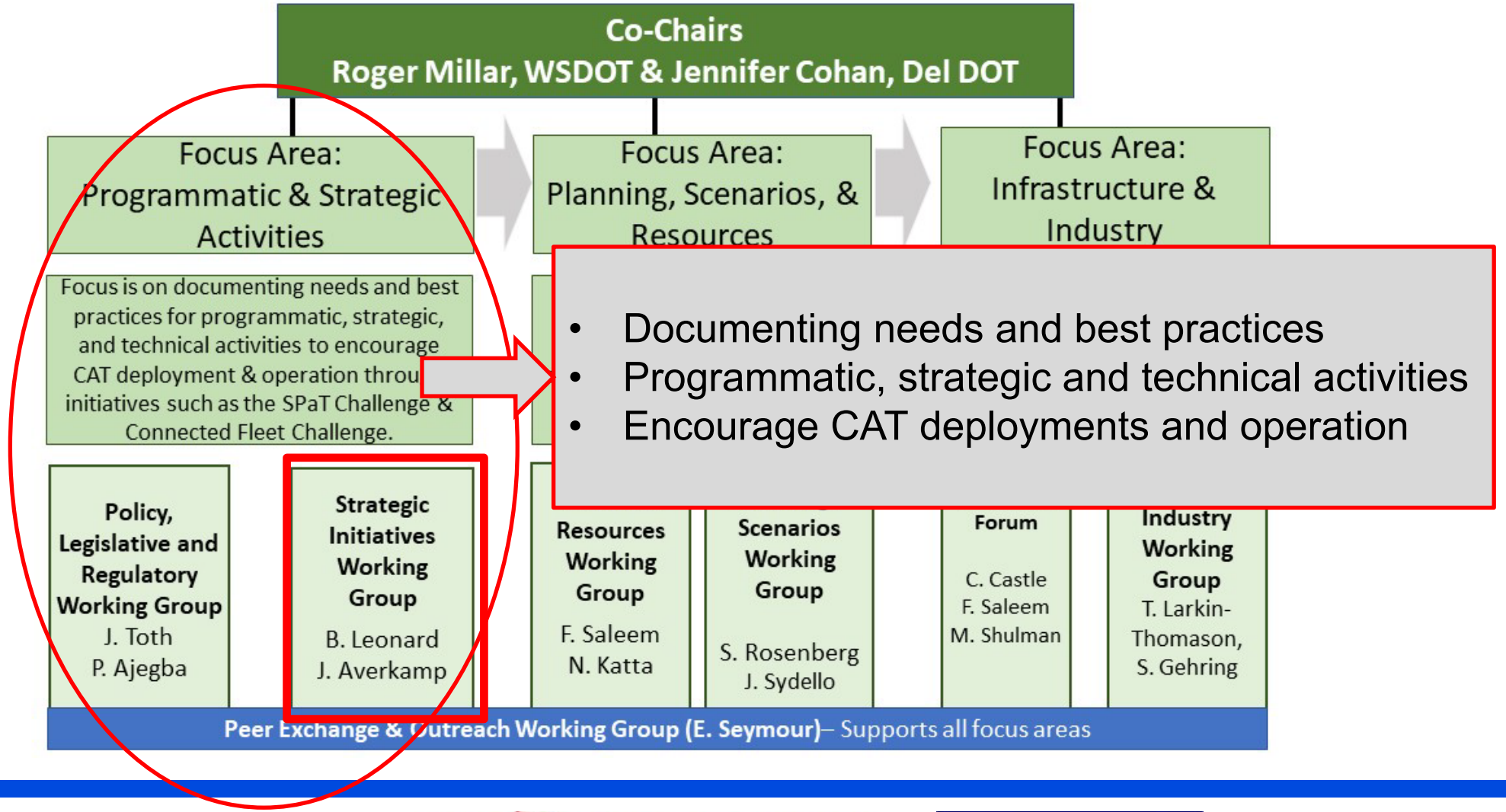
CAT Coalition



- Documenting needs and best practices
- Programmatic, strategic and technical activities
- Encourage CAT deployments and operation

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Strategic Initiatives Activities

- Activity #5: Share examples/benefits of CAT applications deployed
- Activity #7: Share and gather input on the CCI document
- Activity #8: IOO/OEM Forum activities review and input
  - Specifically on the Enabling Connected Intersections initiative
- Activity #9: Partner sharing – notices/ updates from stakeholders
- Activity #10: CAT deployment progress sharing
  - Specifically on SCMS, work zones, connected intersections, SPaT/ Fleet Challenge

CAT Coalition Strategic Initiatives Working Group
Webinar Agenda – October 22, 2020

1. Outreach and Knowledge Transfer
2. Topic #1: UK Connected Automated Vehicle Status (Activity #5)
3. New Topic #2: Recent V2I Hardware/Software Advances (Activity #10)
4. Topic #3: Enabling Connected Intersections Initiative – Connected Intersection Tracking Approach (Activity #8)
5. Update from Previous Webinars: Connected Work Zones (Activity #10)
6. Partner Reports / Discussion on Emerging Topics (Activity #9)

Outreach and Knowledge Transfer

- Suggestions for additional resources / topics to be shared
- Suggestions for additional members of this working group

UK Connected Vehicle Status

Andrew Graham, White Willow Consulting Ltd.
Darren Capes, DfT United Kingdom

Placeholder for Andrew’s slides

Andrew’s slides were circulated as a separate PDF file

Recent V2I Hardware/Software Advances

Recent V2I Hardware/Software Advances

The Concept:

- Open dialogue with one or more equipment manufacturers
- Invited 5 manufacturers this month
  - (1 confirmed participation today, 1 participating in January)
- Will invite additional manufacturers for January

The Goals:

- Educate working group members on the state of V2I equipment industry (e.g. trends, advances, approaches, challenges, etc.)
- Encourage productive dialogue across the industry
- Identify opportunities to expand our working group

Recent V2I Hardware/Software Advances

Today's participant: Iouri Nemirovski, Siemens

Questions:

1. What are the most significant changes or improvements to RSU technology in the past two years?
2. What is your approach to developing dual units RSUs?
3. Does the architecture of your product include embedded applications or are applications separate from the RSU?
4. Can you describe your approach to device certification?
5. What are the biggest hurdles you are facing in the industry?

Enabling Connected Intersections Initiative

Blaine Leonard – IOO/OEM Forum SPaT / RLVW Working Group

Enabling Connected Intersections

- Introduced to this working group in July
- Rationale for the project:
  - Majority of SPaT/MAP broadcasts today are received by fleet vehicles (e.g. transit, snowplows) or after-market on-board units
    - ❖ No verification of message receipt by independent party
  - Formal announcement from one OEM that production vehicles will have on-board safety applications starting in 2022
  - Outside of the communications uncertainties that exist, there are **data related actions** needed to "enable" and verify this connectivity to production vehicles

Enabling Connected Intersections
Seven (7) Primary Actions

Action #1: Create and reach consensus on minimum requirements for intersection broadcasts of SPaT & MAP.

Action #2: Summarize Industry Approach(es) to SCMS and develop IOO Guidelines

Action #3: Test Plan

Action #4: Reference Implementation and Functional Safety Assessment

Action #5: Develop and Execute the Enabling Connected Intersections Outreach and Expansion Strategy

Action #6: Deployment Tracking

Action #7: O&M Approach

Connected Intersections Testing Plan

Background –

- Five phases of testing / verification
  - Suited for the maturity of the IOO's deployments
  - Incremental steps toward full verification for/by production vehicles
- Leverage / coordinate with other parallel activities
  - M-City / UMTRI / CAMP / CV-PFS project in Michigan
  - USDOT / ITE Connected Intersections Guidance Document (Based on CCI)
- Followed by Outreach to get the testing plan into people's hands

Five Phases of CI Testing/Verification

Phase 1
- To verify the readiness of the agency and infrastructure to deploy connected intersections
- Does not require physical equipment broadcasting data

→ **Preliminary Verification**
- Resource understanding / training
- MAP message formatting & accuracy of nodes
- Signal System Compliance
- Location Correction Sources & Need

Phase 2
- To verify that installed connected signalized intersections meet minimum requirements for selected applications
- 3rd Party Tool or Test Vehicles

(Most SPaT Challenge Sites)

→ **Functional Verification**
- Accuracy of MAP messages
- Accuracy of SPaT Data Translation & Communication
- Location Correction Data

Phase 3
- Local Jurisdiction(s) Fleet Vehicles
- Actual vehicles (e.g. Utah Transit Fleet)

→ **Functional & Usability Verification**
- End to end verification
- Use of data to perform actions (vehicles under IOO control)

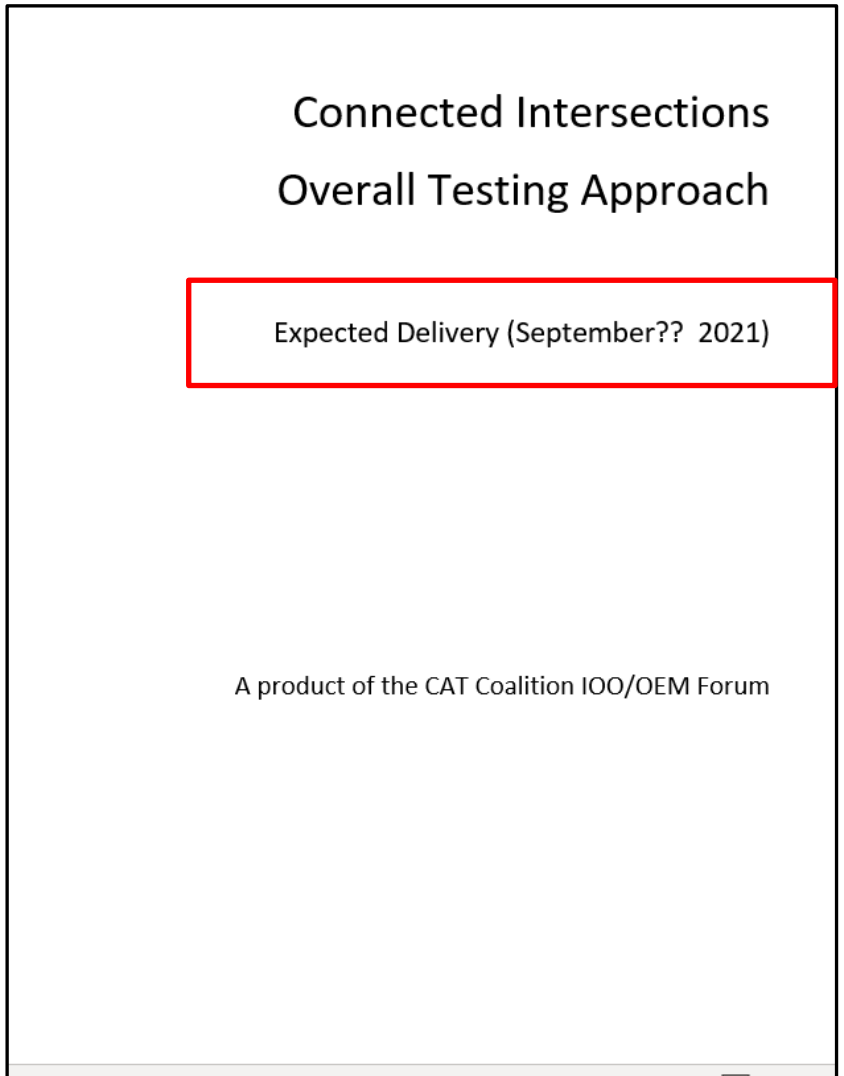
Phase 4
- Local & Visiting Vehicles
- 3rd party tools

→ **Functional, Usability, & Security**
- Different OBUs
- Different versions of standards
- Include SCMS

Phase 5
- Production Vehicles
- Cooperative/automated / self diagnosed

→ **Complete and On-going Verification**
- End to end verification
- Use of data to perform actions

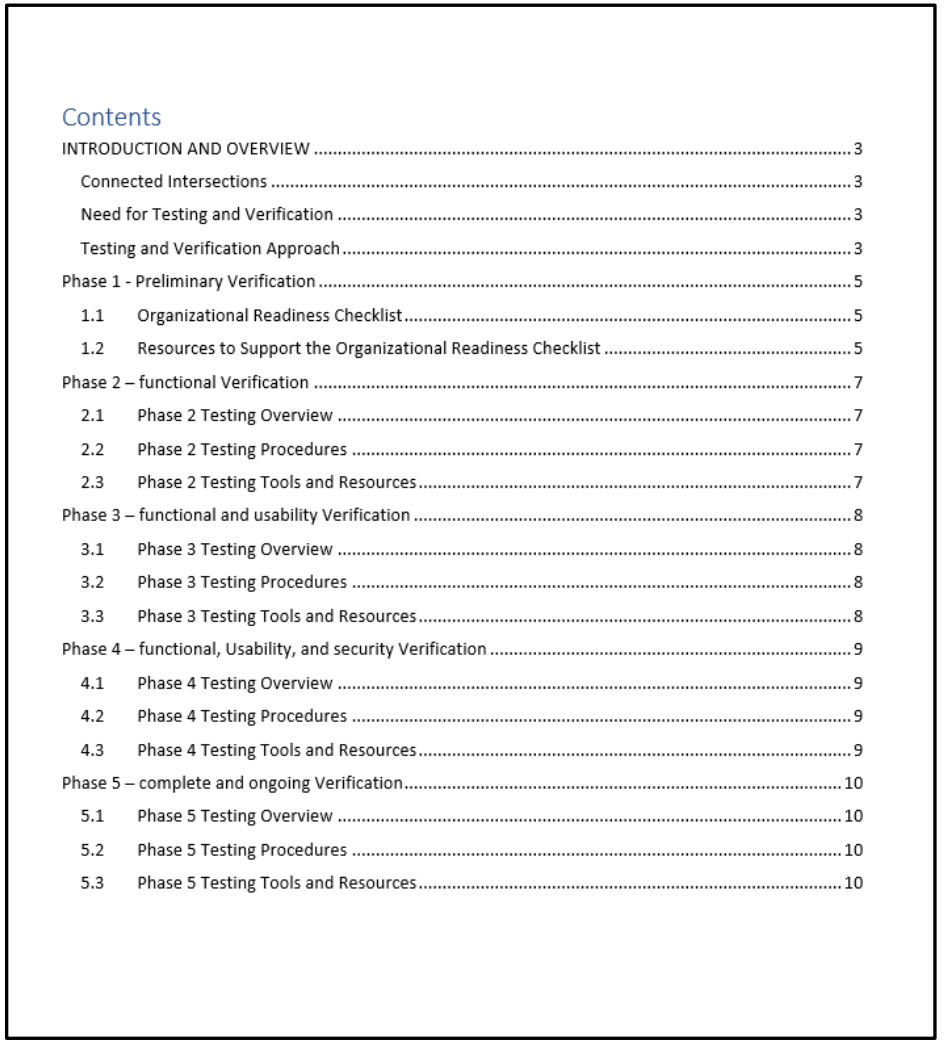
Connected Intersections
Overall Testing Approach Document


Connected Intersections

Overall Testing Approach

Expected Delivery (September?? 2021)

A product of the CAT Coalition IOO/OEM Forum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2.2 Phase 2 Testing Procedures 7
2.3 Phase 2 Testing Tools and Resources 7
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3.2 Phase 3 Testing Procedures 8
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Phase 4 – functional, Usability, and security Verification 9
4.1 Phase 4 Testing Overview 9
4.2 Phase 4 Testing Procedures 9
4.3 Phase 4 Testing Tools and Resources 9
Phase 5 – complete and ongoing Verification 10
5.1 Phase 5 Testing Overview 10
5.2 Phase 5 Testing Procedures 10
5.3 Phase 5 Testing Tools and Resources 10

Connected Intersections
Overall Testing Approach Document

Connected Intersections

Overall Testing Approach

Phase 1

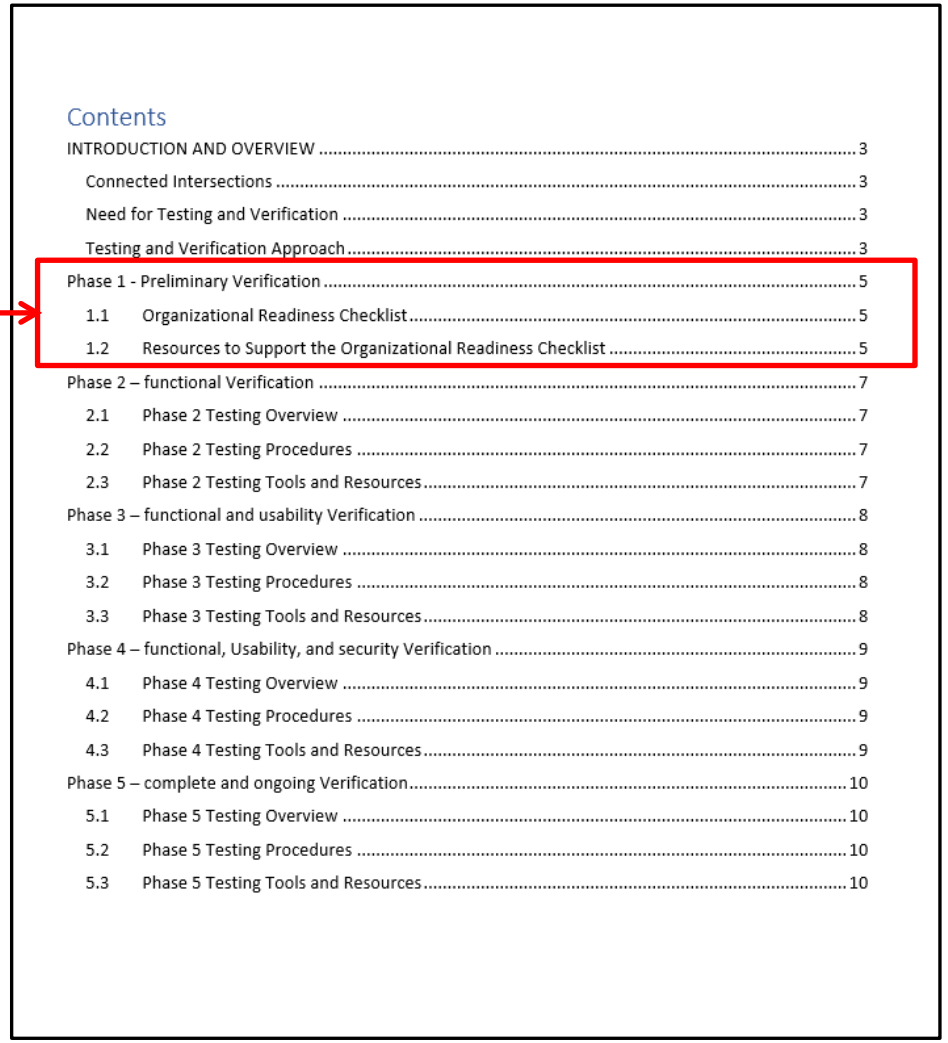
- To verify the readiness of the agency and infrastructure to deploy connected intersections
- Does not require physical equipment broadcasting data

<u>Preliminary Verification Resource</u>

A product of the IOO/OEM Forum SPaT / RLVW Group

Initial Version being review by five volunteers:

- Val Rader, AKDOT&PF;
- Lee Smith, TnDOT;
- Carole Delion, MDDOT;
- Susan Catlett, NJDOT;
- Jianming Ma, TxDOT



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Connected Intersections
Overall Testing Approach Document

Connected Intersections

Overall Testing Approach

Phase 2

- To verify that installed connected signalized intersections meet minimum requirements for selected applications
- 3rd Party Tool or Test Vehicles

(Most SPaT Challenge Sites)

Phase 3

- Local Jurisdiction(s) Fleet Vehicles
- Actual vehicles (e.g. Utah Transit Fleet)

Phase 2 & 3 being developed by two external projects:

M-City / UMTRI / CAMP / CV-PFS project
USDOT / ITE Connected Intersections Guidance Document

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Connected Intersections Tracking Approach

Background –

- Feedback from OEMs has suggested a need for IOOs to track which intersections are connected, tested, and verified to be operational
  - Helpful to understand the locations and densities of deployments
  - Could support on-board applications by comparing broadcasts received against a central database (verify that SPaT/MAP broadcasts were expected)
- This would not be a trivial task for IOOs to create and maintain

Connected Intersections Tracking Approach

Original thoughts in “Enabling Connected Intersections” concept:

- Coordinate with external efforts developing an intersection numbering scheme.
- Define a sustainable plan for an existing or new entity to coordinate and track IOO deployment status
  - Potential entities: SCMS Manager, national association, federal government, new entity
  - IOOs that have tested their deployments successfully could report them to this entity

Connected Intersections Tracking Approach

Recent thoughts and questions:

- Is a national, real-time database / list feasible, practical, sustainable?
  - Thousands of agencies own traffic signals
  - If feasible, which entity is best suited for this?
- Can a self-reported “message” suffice and be trusted?
- Are there local tools and processes than can self-report in real time?
  - Malfunction monitoring
  - Misbehavior reporting by a passing vehicle – comparing SPaT message to visual image
  - Other approaches?
- How frequently must the SPaT/MAP broadcast be tested to be trusted?

Update from Previous Webinars

Connected Work Zones – IOO/OEM Forum Reduced Speed Zone Warning (RSZW) WG

Connected Work Zones

(Presented by Collin Castle on the July webinar)

- Work Zone information (e.g. details describing lane closures, reduced speeds, workers presence) is one data element that vehicles cannot collect autonomously and therefore are looking to Infrastructure Owner Operators (IOOs) to provide

- There is a recognized intent among many IOOs to migrate beyond Traveler Information data towards more accurate and timelier “CAT Ready Work Zone Data”

- Before they can estimate when and what percentage of the work zones will be “connected work zones”, ***IOOs need a better understanding of “CAT Ready Work Zone Data”*** :
  - What is required?
  - How difficult is it to create and update the data?
  - What are the likely costs of creating the data?
  - What technical resources will be required to create the data?

- The Work Zone Data Collection (WZDC) Tool can enable IOOs to investigate the creation of the map data

Collin's Request From July

- **Use this tool to learn about Connected Work Zones**
  - Gain an understanding of the user interface, data needs
  - Gain an understanding of the WZDx & RSM generators
- **Test this tool on various work zone configurations**
  - Let us know which work zones are well supported
  - Let us know which work zones do not work well with the tool
- **Share your feedback with us**
  - See request on the next slide (MS Word document will be mailed to attendees)

Work Zone Data Collection Tool shared by Tony English on July webinar

Website:

https://neaeraconsulting.com/V2x_Home

GitHub site:

https://github.com/TonyEnglish/V2X-manual-data-collection

Full end to end test video located here

- Have any members downloaded and tested the tool to create work zone map messages?
- Any members interested in additional details on the work zone tool?

Partner Reports

USDOT

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ITS America

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Update on Emerging Topics

Group Discussion

Next Strategic Initiatives WG Webinar

- January 28th, 2021 2:00 – 3:30 PM Eastern

Other CAT Coalition Working Group Webinars

Planning Scenarios Working Group

- October 28th 12:00 ET

Infrastructure-Industry Working Group

- October 29th 2:00 ET

Technical Resources WG

- November 4th 11:00 AM Eastern

Policy Legislative, Regulatory (PLR) Working Group

- December 14th