Wyoming Pilot Update at the Application Design Stage

Kate Hartman, USDOT
Vince Garcia, Tony English, Shane Zumpf
TODAY’S AGENDA

- **Purpose of this Webinar**
  - Share experiences of designing CV applications
  - Talk about how these applications are being designed/developed
  - Identify technical and other barriers and how they are being overcome
  - Discuss how these apps will eventually be tested and their performance measured

- **Webinar Content**
  - Connected Vehicle Pilot Deployment Program Overview
  - Wyoming DOT CV Application Design Experiences
  - Stakeholder Q&A

- **Webinar Protocol**
  - Please mute your phone during the entire webinar
  - You are welcome to ask questions via chatbox at the Q&A Section
  - The webinar recording and the presentation material will be posted on the CV Pilots website
**CONNECTED VEHICLE PILOT DEPLOYMENT PROGRAM**

**PROGRAM GOALS**
- Participate in **Design/Build/Test Phase** Webinars/Conference Presentations from the three Pilot Sites (see website for exact dates and times)

**STAY CONNECTED**
- Visit Program Website for Updates: [http://www.its.dot.gov/pilots](http://www.its.dot.gov/pilots)
- Contact: Kate Hartman, Program Manager, Kate.Hartman@dot.gov

**PILOT SITES**
- WYDOT
- NYCDOT
- Tampa (THEA)
Wyoming DOT CV Pilot Deployment Overview

Vince Garcia
I-80 Users Need Actionable Road Weather Information

The need for actionable information is growing.

- Estimated Firms Subscribed to WYDOT’s CVOP: 150 (Sept 2015)
- Downloads of WYDOT 511 App*: 0 (Sept 2015)
- Downloads since Feb 2016 when app was released:
  - November 2017: 800
  - 2018: 110,000+*

WYDOT’s Commercial Vehicle Operator Portal (CVOP)

*Downloads since Feb 2016 when app was released.
Pilot Objectives

Road Weather Condition Input
1. Improve road weather condition reports received into the TMC

TMC Information Dissemination
1. Improve ability of the TMC to generate wide area alerts and advisories
2. Efficiently manage closures, restrictions and speed limits
3. Effectively disseminate and receive messages from TMC to en-route vehicles
4. Improve information to commercial vehicle fleet managers

Vehicle/Roadside Alerts & Advisories
1. Effectively transmit and receive V2V messages to reduce incidents and their severity
2. Enhance emergency notifications of a crash

Outcomes
1. Improve speed adherence and reduce speed variation
2. Reduce vehicle crashes
Pilot Elements

CV Environment
75 Roadside Units on I-80
400 Vehicles with DSRC Connectivity

V2V Applications
Forward Collision Warning
Distress Notification

V2I Applications
Situational Awareness
Spot Weather
Work Zone Warning

WYDOT’s CV Pilot System

Wyoming CV System
Wyoming DOT CV Applications and Design Experiences

Tony English
Topics for discussion

- Which CV applications are being used with the WYDOT CVP
- How these applications are being designed/developed
- Technical and other barriers we have found and how they are being overcome
- How these apps will eventually be tested and their performance measured
CV Applications

On-Board Applications
- Applications available to equipped vehicles

TMC Operations Applications
- Support for WYDOT Traveler Information and Traffic Management
Vehicle System

All vehicles that are part of the vehicle system will have:

- Ability to share information via DSRC with connected devices (vehicles and RSUs)
- Ability to broadcast Basic Safety Message
- Ability to receive Traveler Information Messages (TIM)
- Human-Machine Interface (HMI) to communicate alerts and advisories to driver

Vehicle Sub-Systems
1. WYDOT Fleets
2. Integrated Trucks
3. Retrofit Vehicles
4. Highway Patrol

On-board Vehicle Technologies
- OBU with DSRC and Satellite Receiver
- Human Machine Interface
- CAN Bus Integration (selected vehicles)
- Environmental Sensors (selected vehicles)
System Overview

- Ingests and processes CV data
- Generates alerts and advisories
- Brokers data between internal and external systems
- Generates and distributes TIMs
- Stores data for performance management

Wyoming CV Pilot System

External Interfaces
- US DOT Interfaces (e.g. SCMS)
- WYDOT Interfaces (e.g. ATMS and ATIS Systems at the TMC)
- Weather

CV Subsystems
- Roadside Units
- Operational Data Environment
- Pikalert® System
- WYDOT Data Broker
- WYDOT Data Warehouse
Onboard Applications

- Forward Collision Warning (FCW)
- Distress Notification (DN)
- Work Zone Warning (WZW)
- Spot Weather Impact Warning (SWIW)
CV Applications
Worked with two vendors in the development of applications
Selected of applications based on User Needs assessment
Testing has been on-going, but quite time consuming
Iterative process done in Agile framework

Barriers
Rollout of IPv6, CV technology is evolving, security

Performance Measures (Vehicle only, will cover TMC later)
Logging of BSM (during events, 30 second, privacy)
Logging of TIM (creation, reception, alert)
Logging of DB (creation, alert)
Application, Security, HMI, and Environmental Logging
Wyoming DOT TMC Applications
Supporting CVs

Shane Zumpf
CV Data will support several TMC functions for traffic management and traveler information on I-80. All these applications will be enabled by external interfaces to the existing TMC Systems from the Wyoming CV System.

- Support Variable Speed Limit, Closures, Restriction Management
- Support Wyoming Traveler Information (WTI) Updates
- Support Commercial Vehicle Operators Portal Updates
- Support Third-Party Interface
Application Areas

TMC Applications

CV Applications
Determine Level of Effort

- REBUILD
- MODIFY
- LEAVE ALONE
Operational Data Environment (ODE)
Proof of Concept Tools
Wyoming Traveler Information

WTI Application
- TMC Operator Updates VSL
- TMC Operator Updates Road Conditions

ODE Wrapper
- Formats input to valid TIM
- Calls ODE to generate TIM
- Determines area and RSUs

ODE
- Generates TIMs
- Pushes to RSU(s)
- Pushes to SDW (satellite)
Transportation Reports and Action Console (TRAC)

- Pikalert
- Snow Plow App
- Distress Notification

TRAC
### Transportation Reports and Action Console (development)
#### TRAC Task List

Last updated 2017-11-14 15:50:57

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Pikalert to CVOP

- Alerts
- Forecasts

**Data Broker**
- Ingest Data
- Extrapolate forecasts

**Pikalert**

**CVOP**
- Validate Pikalert Data
- Commercial Vehicle Operator Access
Wyoming 511 App

Truck Parking Area
- Closed
- Location: I-80 MM 345
- Spaces: 41
- Availability: Unknown
- Fuel: Not Available
- Restrooms: Not Available
- Food: Not Available
- Showers: Not Available
- Comment: Warren Road

Nov 13, 2017 at 2:24 PM

Submit Availability

Spaces available
Only a few spaces available
Full parking lot

Submit  Cancel
Data Collection

System Data - Vehicle -
- Basic Safety Messages
  - Part 1 & 2
- Mobile Weather Observations
- Vehicle Interactions
  - V2V, V2I

System Data - CV System -
- Pikalert
  - Road conditions
  - Advisories, warnings
- Traveler information messages
- WYDOT TMC logs

Non-System Data
- Road weather reports
- Individual vehicle speeds
- Road Weather Information
- Variable speed limits
- Dynamic message signs
- Road closures
- Crashes

Survey and Interview Data
- Commercial Vehicle Operator
- Drivers
- WYDOT staff
- Other stakeholders

Modeling and Simulation Data
- Modifications to VISSIM Model Of I-80 Section
Pre-Deployment Data Collection and Analysis

- Collected Pre-Deployment data to establish baseline conditions
  - October 2016 through January 2018
- Phase 2 System Performance Report (Baseline)
  - Initial - 12/11/2017 (completed)
  - Final - 4/30/2018 (under development)

Crashes Per Month (October 2016-May 2017)

- Total Crashes
- Truck Crashes
Testing/Lessons Learned

☑ Ensure CV tech is fully integrated with TMC operations, yet loosely coupled

☑ Plan for CPU and Disk needs

☑ Have integration with IPv6 at TMC

☑ Be prepared for addition security considerations

☑ Build human readable dashboards for TMC that present CV data
Please keep your phone muted

Please use chatbox to ask questions

Questions will be answered in the order in which they were received
Join us for the Getting Ready for Deployment Series

- Discover more about the CV Pilot Sites
- Learn the Essential Steps to CV Deployment
- Engage in Technical Discussion

Visit the Pilot Site Websites for more Information:

- NYCDOT Pilot: https://www.cvp.nyc/
- Tampa (THEA): https://www.tampacvpilot.com/
- Wyoming DOT: https://wydotcvp.wyдорож.info/

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