I-95 Corridor Coalition Connected and Automated Vehicle Conference

Connected Vehicles Pilots, Smart Cities and the FAST Act

Tuesday, June 21, 2016

Egan Smith

Managing Director, Intelligent Transportation System Joint Program Office

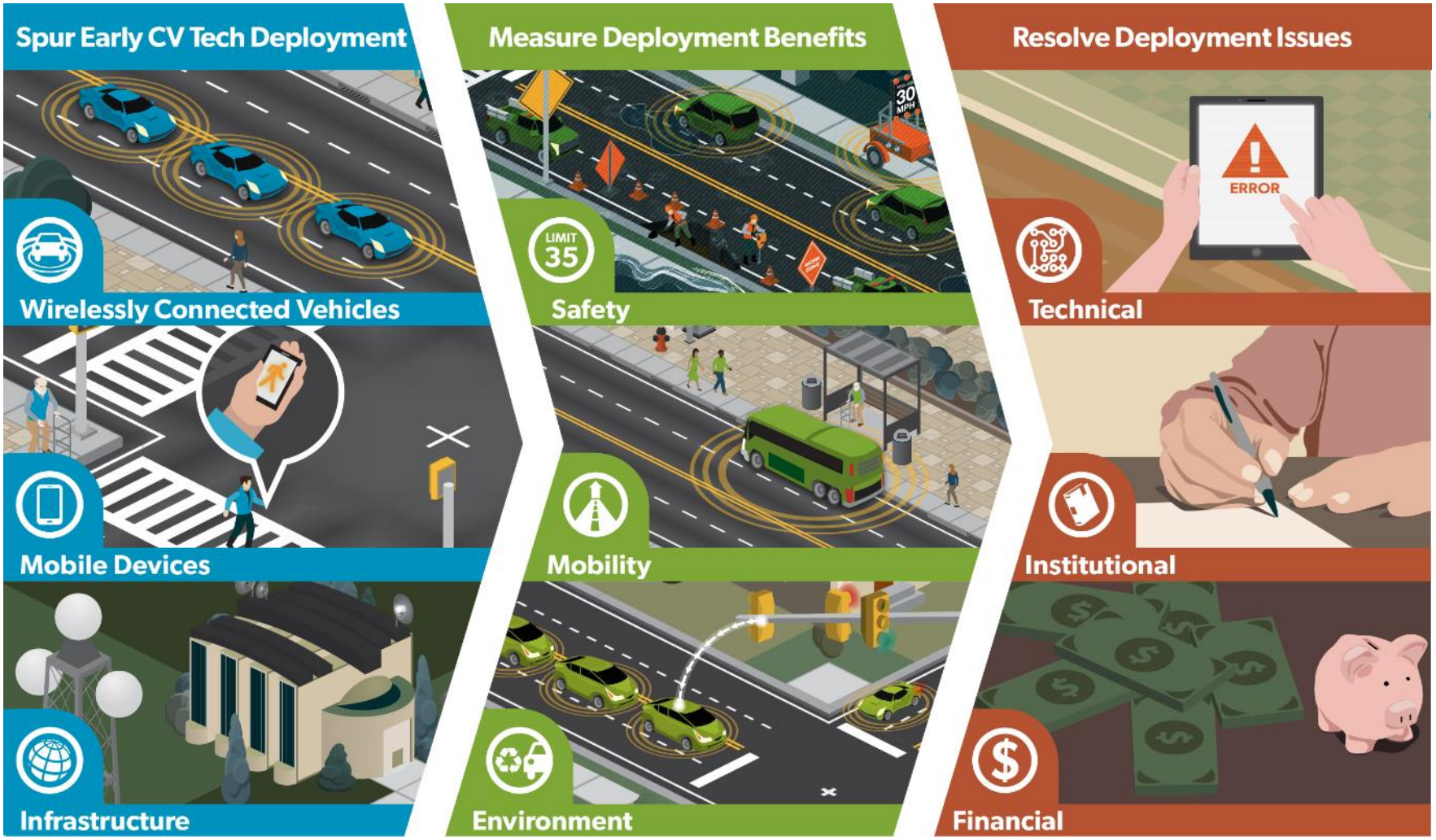
(ITS JPO)

U.S. Department of Transportation (USDOT)

CONNECTED VEHICLE PILOT
Deployment Program

ITS Joint Program Office

CV Pilot Deployment Program Goals



Pilot Sites and Deployment Schedule

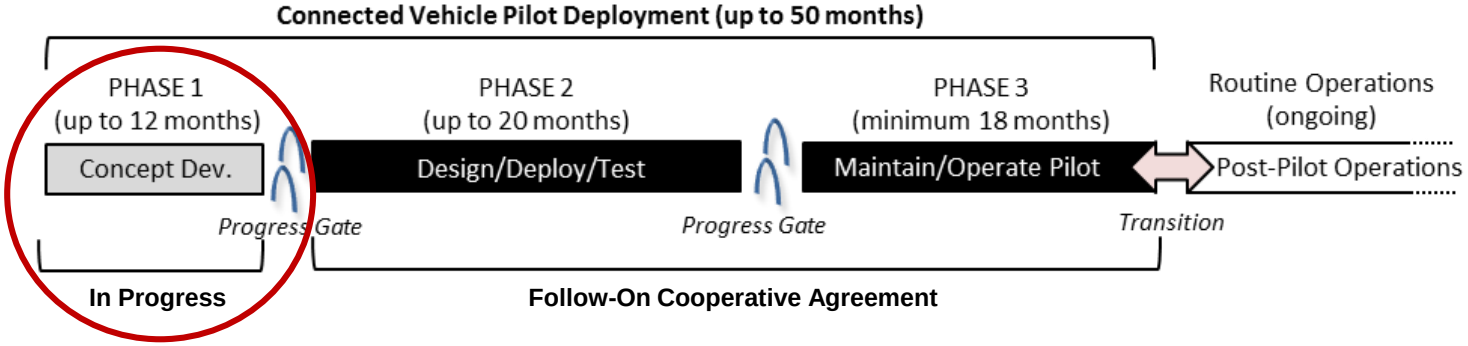
- Pilot Sites

ICF/WYDOT

NYCDOT

Tampa (THEA)

- Overall Deployment Schedule



  - Phase 1 – Creates the foundational plan to enable further design and deployment
  - Phase 2 – Detailed design and deployment followed by testing to ensure deployment functions as intended (both technically and institutionally)
  - Phase 3 – Focus is on assessing the performance of the deployed system
  - Post Pilot Operations (CV tech integrated into operational practice)

ICF/Wyoming DOT

Kate Hartman (ITS JPO), ICF/WYDOT CV Pilot Site COR

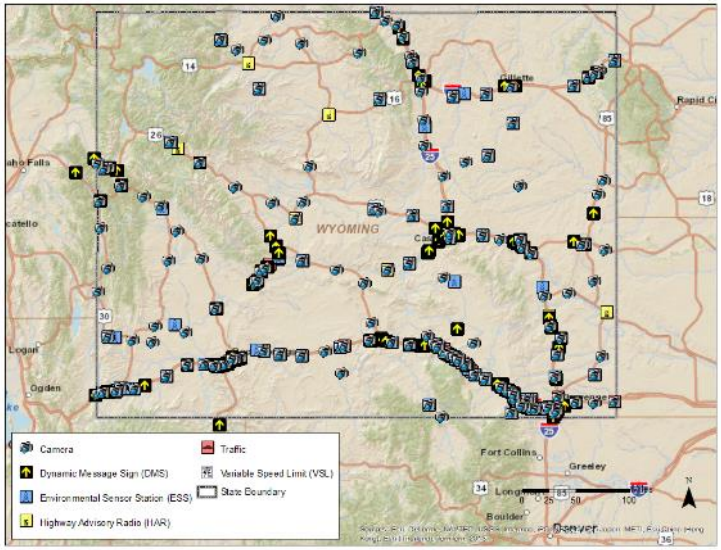
ICF/WYDOT Pilot Deployment Overview

Objective:

- Reduce the number and severity of adverse weather-related incidents (including secondary incidents) in the I-80 Corridor in order to improve safety and reduce incident-related delays.
  - Focused on the needs of the commercial vehicle operator in the State of Wyoming

Approach:

- Equip fleet vehicles (combination of snow plows, maintenance fleet vehicles, emergency vehicles, and private trucks) that frequently travel the I-80 corridor to transmit basic safety messages (BSMs), collect vehicle and road condition data and provide it remotely to the WYDOT TMCs
- Deploy DSRC roadside equipment (RSE) to supplement existing assets and initiatives
- Road weather data shared with freight carriers who will transmit to their trucks using exiting in-vehicle systems



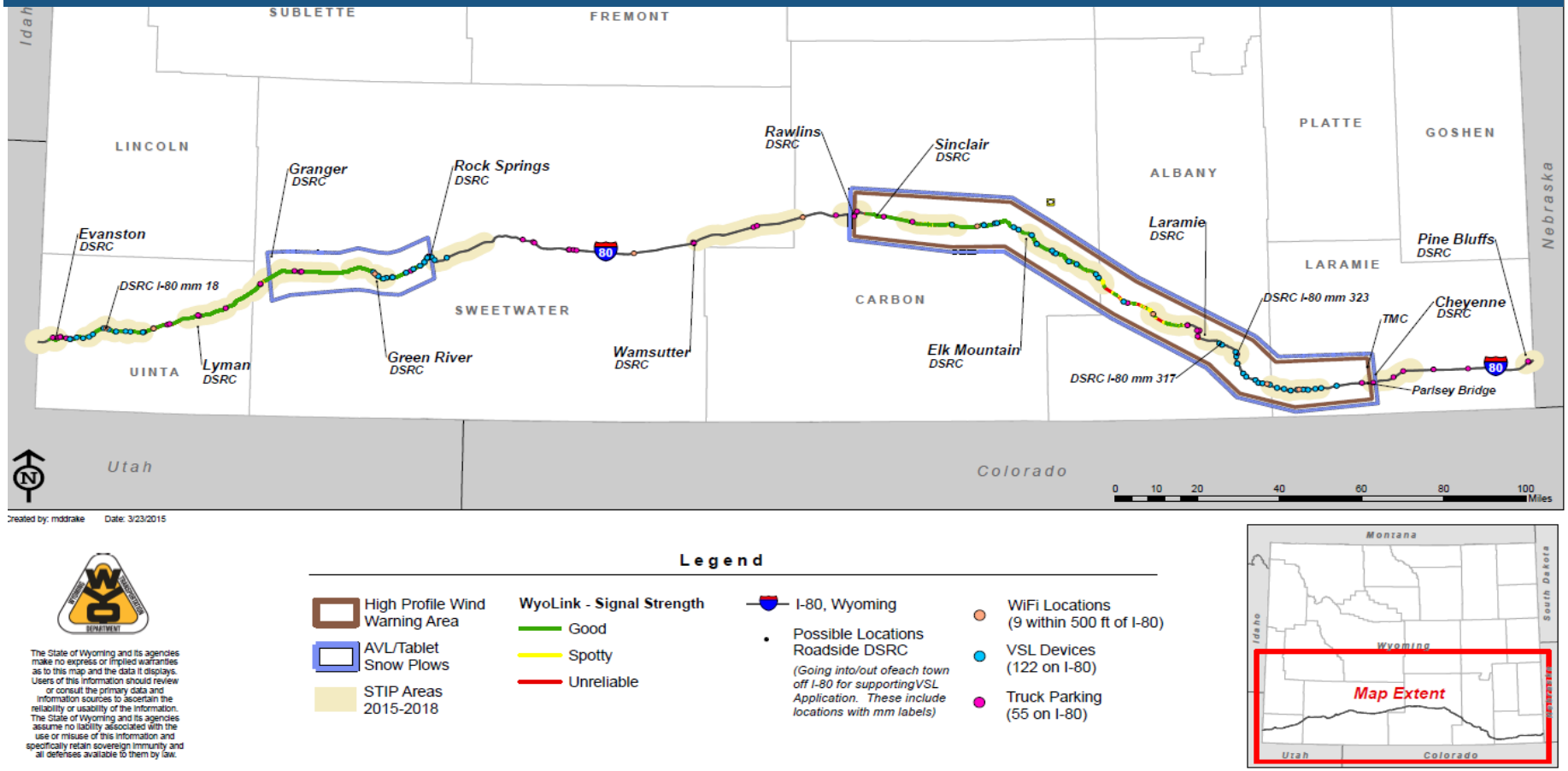
Source: Wyoming DOT

Deployment Team:

- Prime Consultant: ICF International; Partner State: Wyoming DOT
- Sub Consultants: Trihydro Corporation, National Center for Atmospheric Research, University of Wyoming, Catt Laboratory and McFarland Management

ICF/WYDOT Pilot Deployment Site: High Priority Corridor

Wyoming I-80 Corridor – Connected Vehicle Map



Created by: mddrake Date: 3/23/2015

The State of Wyoming and its agencies make no express or implied warranties as to this map and the data it displays. Users of this information should review or consult the primary data and information sources to ascertain the reliability or usability of the information. The State of Wyoming and its agencies assume no liability associated with the use or misuse of this information and specifically retain sovereign immunity and all defenses available to them by law.

Legend

- High Profile Wind Warning Area
- AVL/Tablet Snow Plows
- STIP Areas 2015-2018

WyoLink - Signal Strength

- Good
- Spotty
- Unreliable

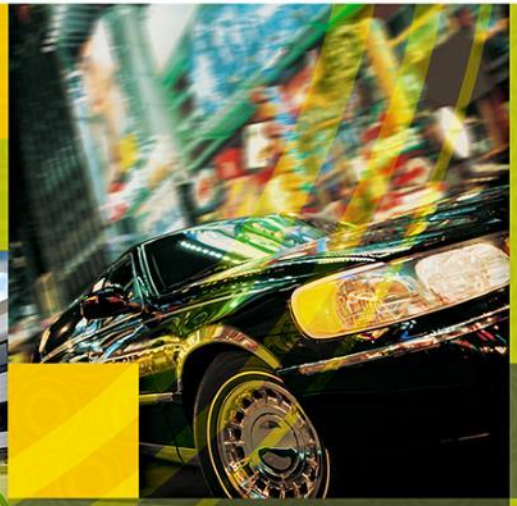
- I-80, Wyoming
- Possible Locations Roadside DSRC *(Going into/out ofeach town off I-80 for supportingVSL Application. These include locations with mm labels)*
- WiFi Locations (9 within 500 ft of I-80)
- VSL Devices (122 on I-80)
- Truck Parking (55 on I-80)

Source: Wyoming CV Pilot Deployment Team

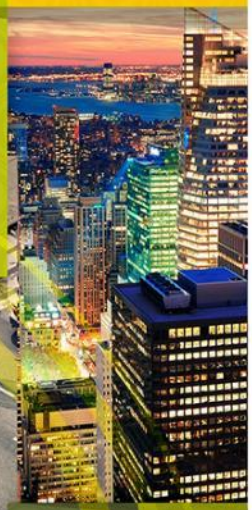
ICF/WYDOT Pilot Deployment Proposed CV Applications: Summary

CV Application	WYDOT Snow Plows	WYDOT Maintenance Fleet Vehicles	Emergency Vehicles	Private Trucks/ Commercial Vehicles
1. Road Weather Advisories for Trucks and Vehicles	✓	✓	✓	✓
2. Automatic Alerts for Emergency Responders			✓	
3. CV-enabled Weather-Responsive Variable Speed Limits	✓	✓	✓	✓
4. Spot Weather Impact Warning	✓	✓	✓	✓
5. Work Zone Warnings	✓	✓	✓	✓
6. Situational Awareness	✓	✓	✓	✓
7. Truck Parking Availability for Freight Carriers				✓
8. Freight-Specific Dynamic Travel Planning				✓

Photo Courtesy: MTA New York City Transit



New York City DOT



Jonathan Walker (FHWA), NYCDOT CV Pilot Site COR

NYCDOT Pilot Deployment Overview

Objective:

- Improve safety and mobility of travelers in New York City through connected vehicle technologies
  - Aligned with the NYC's Vision Zero initiative, which seeks to reduce crashes and pedestrian fatalities, and increase safety of travelers in all modes of transportation

Approach:

- Equip up to 10,000 vehicles (taxis, buses, commercial fleet delivery trucks, and City-owned vehicles) that frequently travel in Midtown Manhattan and Central Brooklyn to transmit and receive connected vehicle data
- Install V2I technology at high-accident rate arterials:
  - Upgrade 239 traffic signals along 1st, 2nd, 5th, and 6th Avenues in Manhattan and Flatbush Avenue in Central Brooklyn (emergency evacuation route)
  - Deploy Roadside equipment (RSE) along FDR Drive

Source: NYC DOT

Deployment Team:

- Prime Consultant: NYC DOT
- Sub Consultants: JHK Engineering, Battelle, Cambridge Systematics, KLD Engineering, Security Innovation and Region 2 University Transportation Research Center

NYCDOT Pilot Deployment Site

Manhattan Grid

- Closely spaced intersections (600' x 250')
- Day vs. Night conditions
- Residential/commercial mix
- High accident rate (red dot) (2012-2014)
  - 20 fatalities
  - 5,007 injuries
- 204 intersections

Central Brooklyn – Flatbush Ave

- Over-Height restrictions
  - Tillary St.; Brooklyn Bridge
- High accident rate (red dots) (2012-14)
  - 1,128 injuries
  - 8 fatalities
- Average AM speed 15 mph
- 35 intersections

Manhattan – FDR Drive

- Limited access highway
- Excludes trucks/buses
- Short radius of curvature
- Over-Height restrictions
- $1,958,497 in Over-Height incident delay costs (2014)
  - 24% of City-wide total

Source: NYC DOT

NYCDOT Pilot Deployment Proposed CV Application-Fleet Distribution

CV Application	Taxi & Limousine	NYC DOT/ Sanitation	MTA/ NYCTA Buses	Commercial Vehicles	Pedestrian
	7500	500	1500	500	TBD
1. Speed Compliance	✓	✓	✓	✓	
2. Red Light Violation Warning	✓	✓	✓	✓	
3. Ped. in Signalized Crosswalk Warn.	✓	✓	✓	✓	✓
4. RT Vehicle in Front of Bus Warning			✓		
5. Mobile Accessible Ped Signal Sys.					✓
6. Curve Speed Compliance	✓	✓	✓	✓	
7. Oversize Vehicle Compliance		✓	✓	✓	
8. Work Zone Speed Compliance	✓	✓	✓	✓	
9. I-SIG	✓	✓	✓	✓	
10-14. V2V Applications (5)	✓	✓	✓	✓	
15. Evacuation Information	✓	✓	✓	✓	


Tampa (THEA)
Tampa Hillsborough
Expressway Authority
Govind Vadakpat (HRDO), Tampa (THEA) CV Pilot Site COR
TAMPA HILLSBOROUGH
EXPRESSWAY
AUTHORITY

TAMPA (THEA) PILOT DEPLOYMENT OVERVIEW

Objective:

- The primary objective of this deployment is to alleviate congestion and improve safety during morning commuting hours.
  - Deploy a variety of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) safety, mobility, and agency data applications to create reinforcing benefits for motorists, pedestrians, and transit operation.

Source: THEA

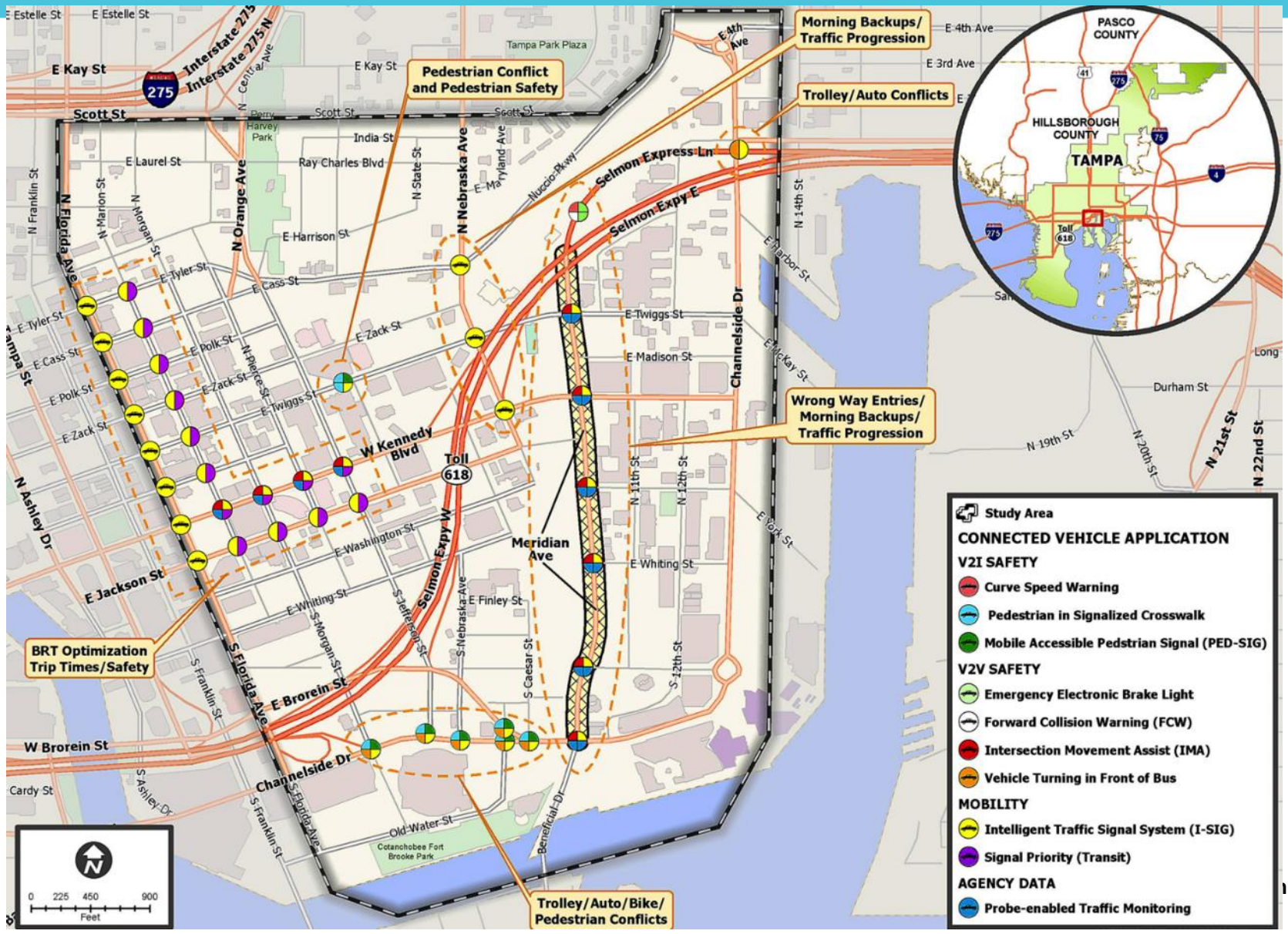
Approach:

- Deploy a variety of connected vehicle technologies on and in the vicinity of reversible express lanes and three major arterials in downtown Tampa to solve the following transportation challenges:
- Morning peak hour queues, wrong-way entries, pedestrian safety, bus rapid transit (BRT) signal priority optimization, trip time and safety, streetcar trolley conflicts, and enhanced signal coordination and traffic progression.

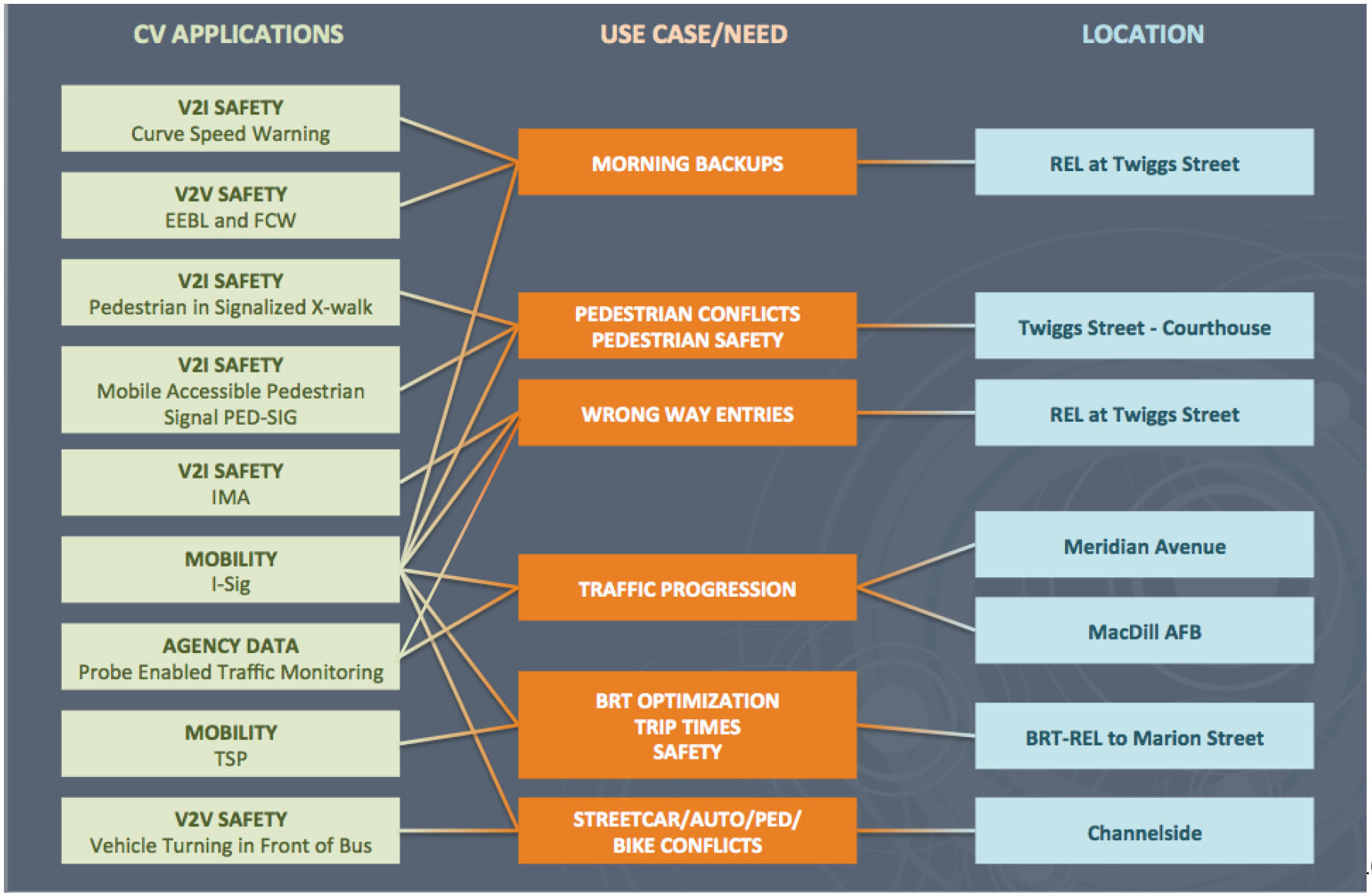
Deployment Team:

- Prime Consultant: Tampa Hillsborough Expressway Authority (THEA)
- Sub Consultants: HNTB Corporation, Siemens Industry, Inc., Booz Allen Hamilton, Center for Urban Transportation Research at University of South Florida and Global-5 Communications

Tampa (THEA) Pilot Deployment Site
An Overview of Downtown Tampa



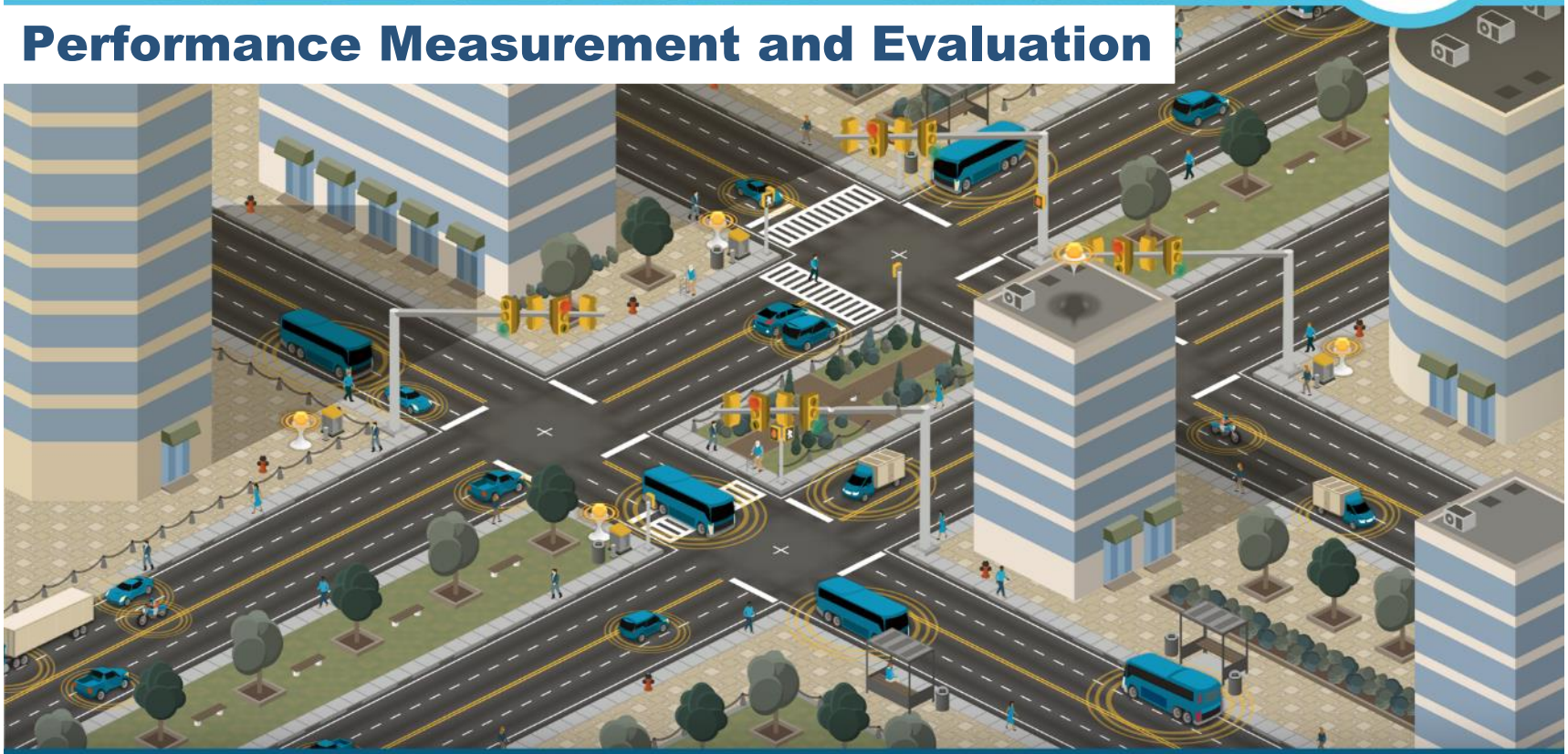
Tampa (THEA) Pilot Deployment Site Needs: Issues and Applications Relationship



U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

CONNECTED VEHICLE PILOT
Deployment Program

Performance Measurement and Evaluation



ITS Joint Program Office

Performance Measurement & Evaluation

- **Performance Measurement**
  - Means of assessing the progress made towards attaining established goals
  - Not just about data collection, verification, and cleaning but also about using the data to understand the system

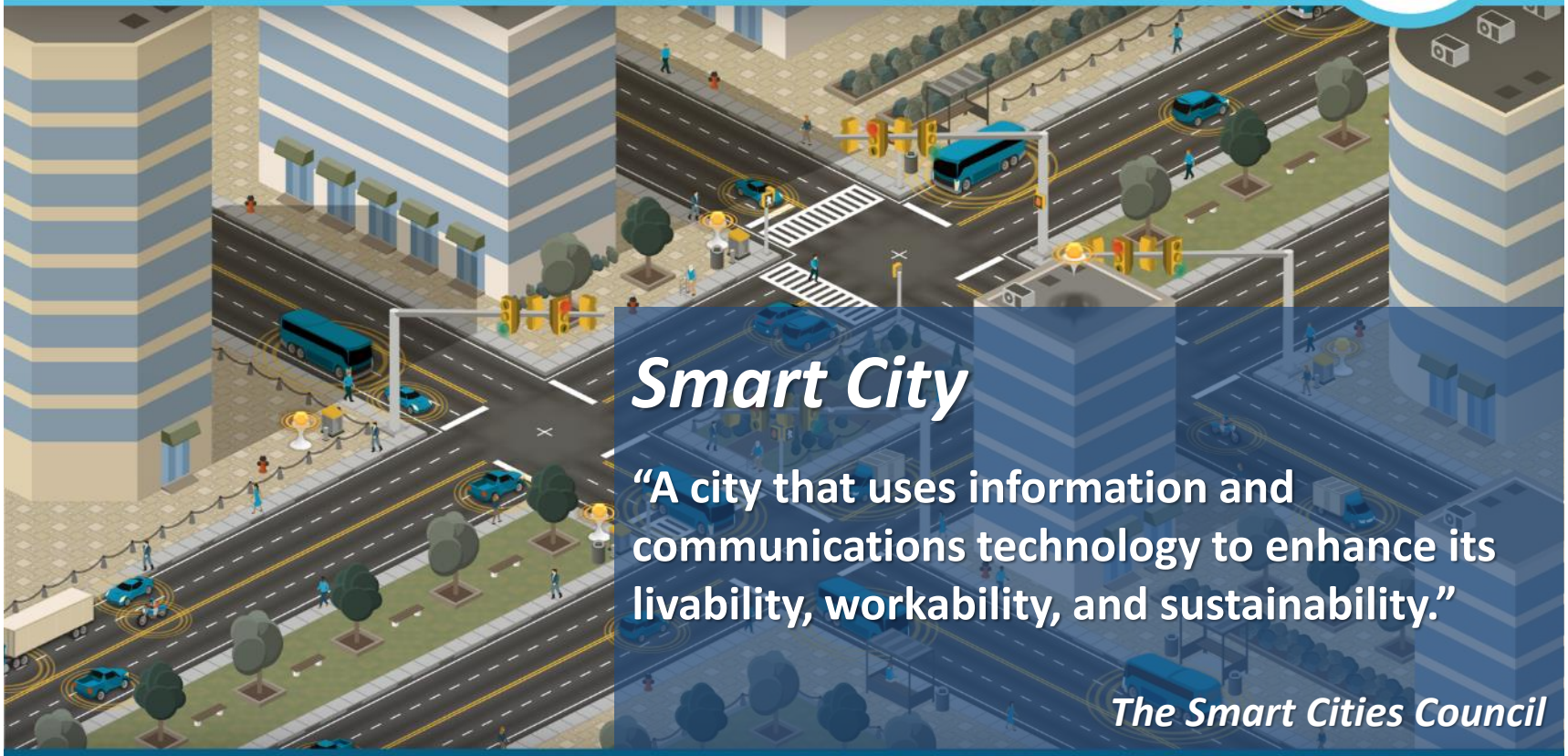
- **Performance Monitoring**
  - Ongoing tracking of performance to assess if targets have been or likely to be met
  - Enables system managers to take corrective and proactive actions to control and manage the system
  - Allows system managers to understand the impacts of investments and policies

- **Performance Evaluation**
  - Systematic and ***objective*** examination of measures and outcomes to understand the impacts of investments and policies have on performance, thus improving current and future planning and investment decisions
  - Conducted by an ***independent party*** who has no vested interest or stake in the project

Lessons Learned in CV Pilots Concept Development Phase

- Stakeholder interaction early and often leads to better concepts and more buy-in
- Sites are eager to consume USDOT technical assistance
  - Deployments are complex, requiring a lot of diverse elements to come together in an integrated system (technical, security, privacy, performance measurement, institutional, financial, etc.)
- Site-to-site coordination can be useful (since not set up as competitive)
  - Cooperation on security, vendor interaction, stakeholder coordination (UPS in WY and NYC)
  - Participation in virtual roundtables
- Building in performance measurement to a deployed system requires some serious thinking in the concept development phase
- We didn't forget a key area in Phase 1 (so far), e.g., training or safety management
- The deliverables from the sites are creating examples for others to follow
  - E.g., good lessons learned from Safety Pilot Model Demonstration (SPMD) on installation planning/training
- Concept development takes some time to conduct – prior to procuring/ designing/installing equipment
- Using standards (intelligently) can help to advance sites systems engineering

THE BIG PICTURE



Smart City

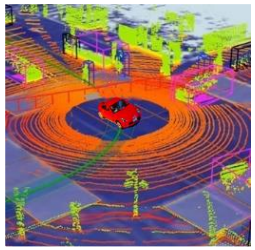
"A city that uses information and communications technology to enhance its livability, workability, and sustainability."

The Smart Cities Council

Advanced Technologies and Smart Cities

Technology convergence will revolutionize transportation, dramatically improving safety and mobility, enhancing ladders of opportunity, and reducing environmental impacts

- Connected Vehicles
- Vehicle Automation



Connected-Automated Vehicles

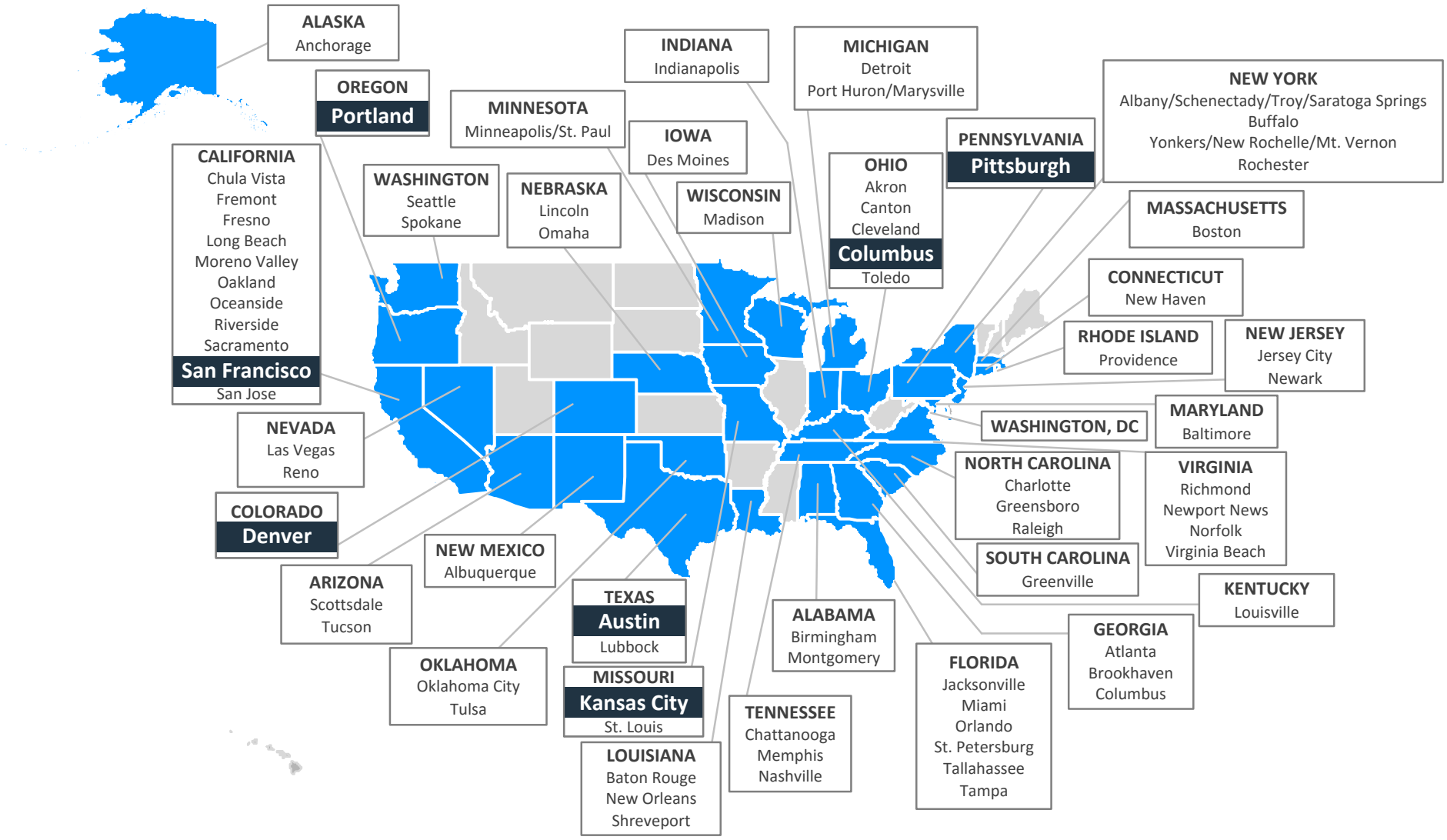
- Internet of Things
- Machine Learning
- Big Data
- Sharing Economy

Smart Cities

Benefits

- Order of magnitude safety improvements
- Reduced congestion
- Reduced emissions and use of fossil fuels
- Improved access to jobs and services
- Reduced transportation costs for gov't and users
- Improved accessibility and mobility

Smart City Challenge Finalists



Advanced Transportation & Congestion Management Technologies Deployment (ATCMTD) Program

- **Funding: $60 Million for each of fiscal years 2016-2020**
- **Federal share not to exceed 50% of project cost**
- **No more than 20% of the total amount in a fiscal year to a single recipient**

Q&A / Stay Connected

Join us for the *Getting Ready for Deployment* Series

- Discover more about the 2015 CV Pilot Sites
- Learn the Essential Steps to CV Deployment
- Engage in Technical Discussion

Website: http://www.its.dot.gov/pilots

Twitter: @ITSJPODirector

Facebook: https://www.facebook.com/USDOTResearch

Contact for CV Pilots Program:

Kate Hartman, Program Manager

Kate.Hartman@dot.gov

Contact for Pilot Sites:

- Kate Hartman, ICF/Wyoming Site COR Kate.Hartman@dot.gov
- Jonathan Walker, NYC Site COR Jonathan.b.Walker@dot.gov
- Govind Vadakpat, THEA Site COR G.Vadakpat@dot.gov