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

2016 NVLA Annual Conference

How Talking Cars Will Transform the Future of Driving

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(ITS JPO)
U.S. Department of Transportation (USDOT)

Presentation Overview

- Our Transportation Challenges
- Where We're Headed – the *Intelligent Transportation System Strategic Plan*
- Connected Vehicles
  - What Are They?
  - What Can They Do?
- In the News (Video)
- Is This Real
  - Pilots and Deployment of Connected Vehicles
- The Big Picture
  - Smart City Challenge
- The Time Is Now
  - Why Should You Be Interested

Today's Transportation Challenges

Safety

- 32,675 highway deaths in 2014
- 6 million crashes in 2014
- Leading cause of death for ages 11, 16-24

Mobility

- 6.9 billion hours of travel delay
- $160 billion cost of urban congestion

Environment

- 3.1 billion gallons of wasted fuel
- 56 billion lbs of additional CO_2

Data Sources:

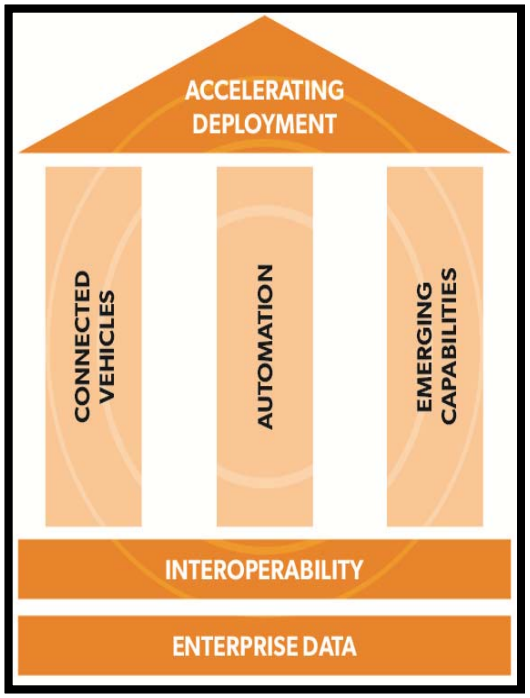
Quick Facts: 2014 Data, National Highway Traffic Safety Administration (January 2016); 2015 Annual Urban Mobility Report, Texas Transportation Institute (Aug 2015); Centers for Disease Control

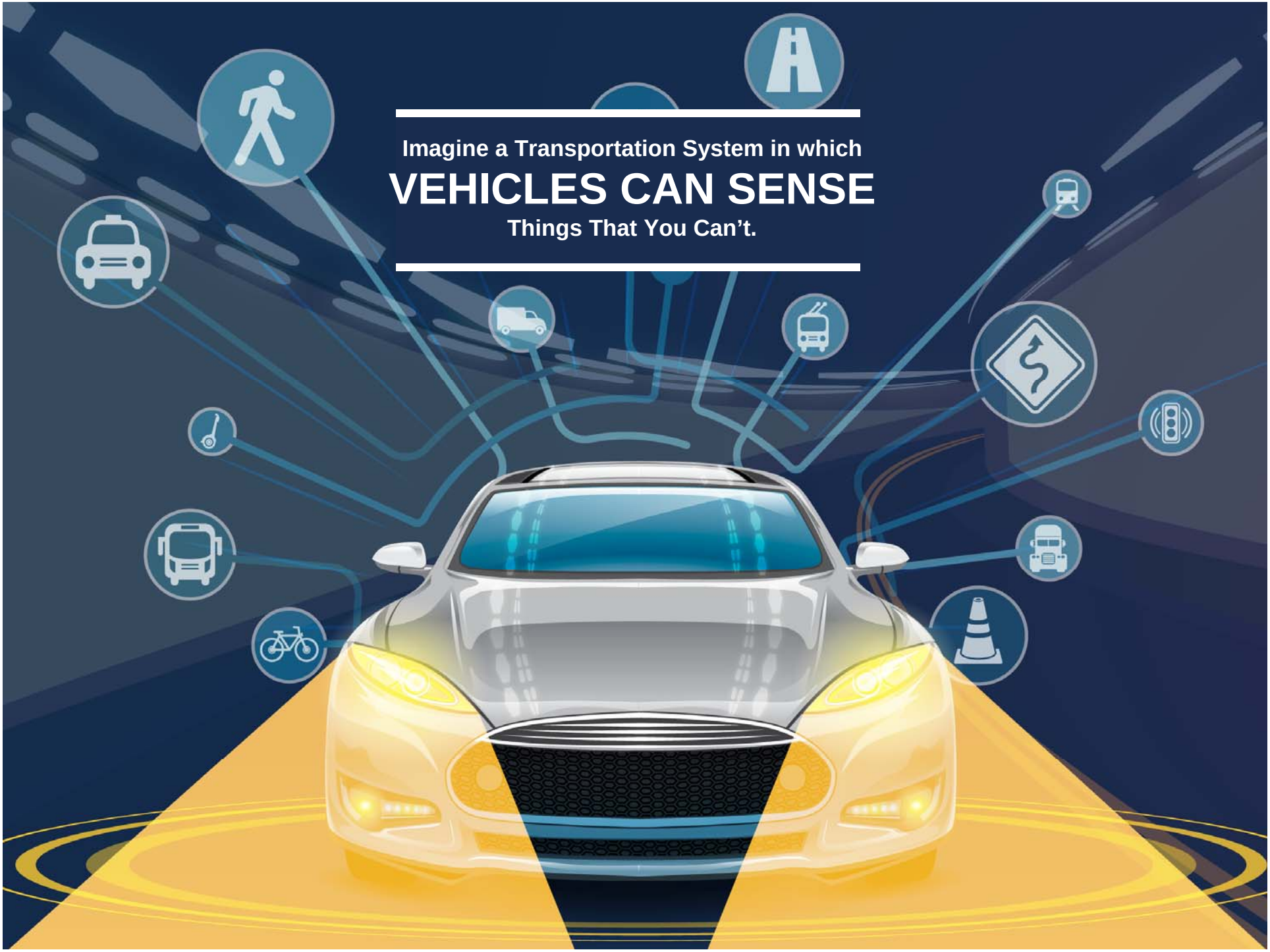
Intelligent Transportation System Strategic Plan 2015-2019

http://its.dot.gov/strategicplan/index.html

Strategic Plan Program Categories

- **Accelerating Deployment** advances ITS work from adoption to wider scale deployment in coordination with multiple disciplines and stakeholders.
- **Connected Vehicles** focuses on adoption and deployment.
- **Automation research** focuses on automated road-vehicle systems that transfer some vehicle control from the driver to the vehicle.
- **Emerging Capabilities** focuses on future generations of transportation systems.
- **Enterprise Data** focuses on operational data capture from sensors, mobile devices, and vehicles, and applying data across all modes of transport.
- **Interoperability** emphasizes effective connectivity among devices and systems.




Imagine a Transportation System in which
VEHICLES CAN SENSE
Things That You Can't.

HOW CONNECTED VEHICLES WORK

1. A wireless device in a car sends basic safety messages 10 times per second
2. Other nearby cars and roadside equipment receive the messages
3. Drivers get a warning of a potential crash

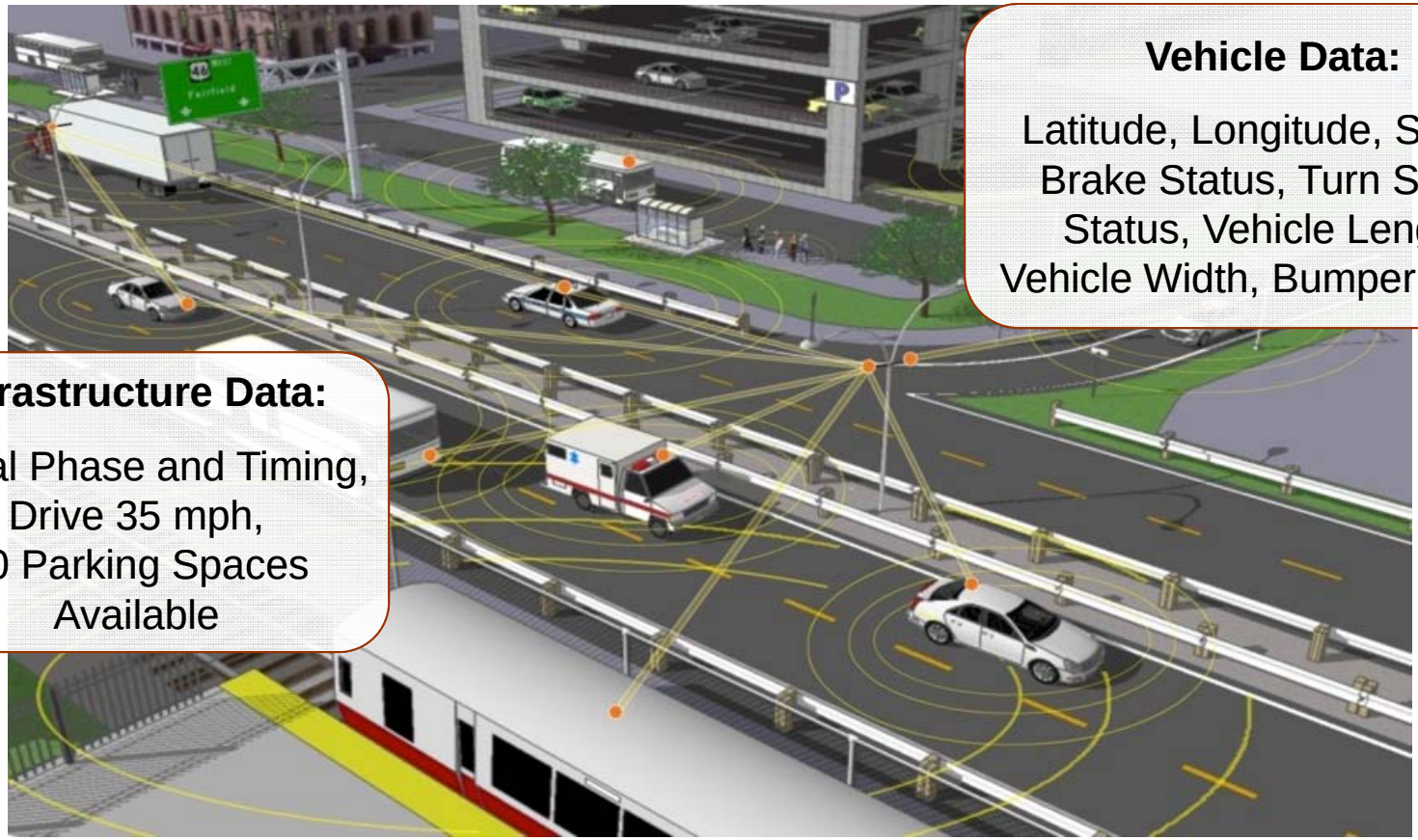
Connected Vehicles have the potential to reduce non-impaired crash scenarios by

80%*

*Source: NHTSA

Connected Vehicles: *What Are They?*

A connected vehicle talks to other connected vehicles and advanced roadside infrastructure like traffic signals and work zones, as well as our smart phones, over a secure wireless network.



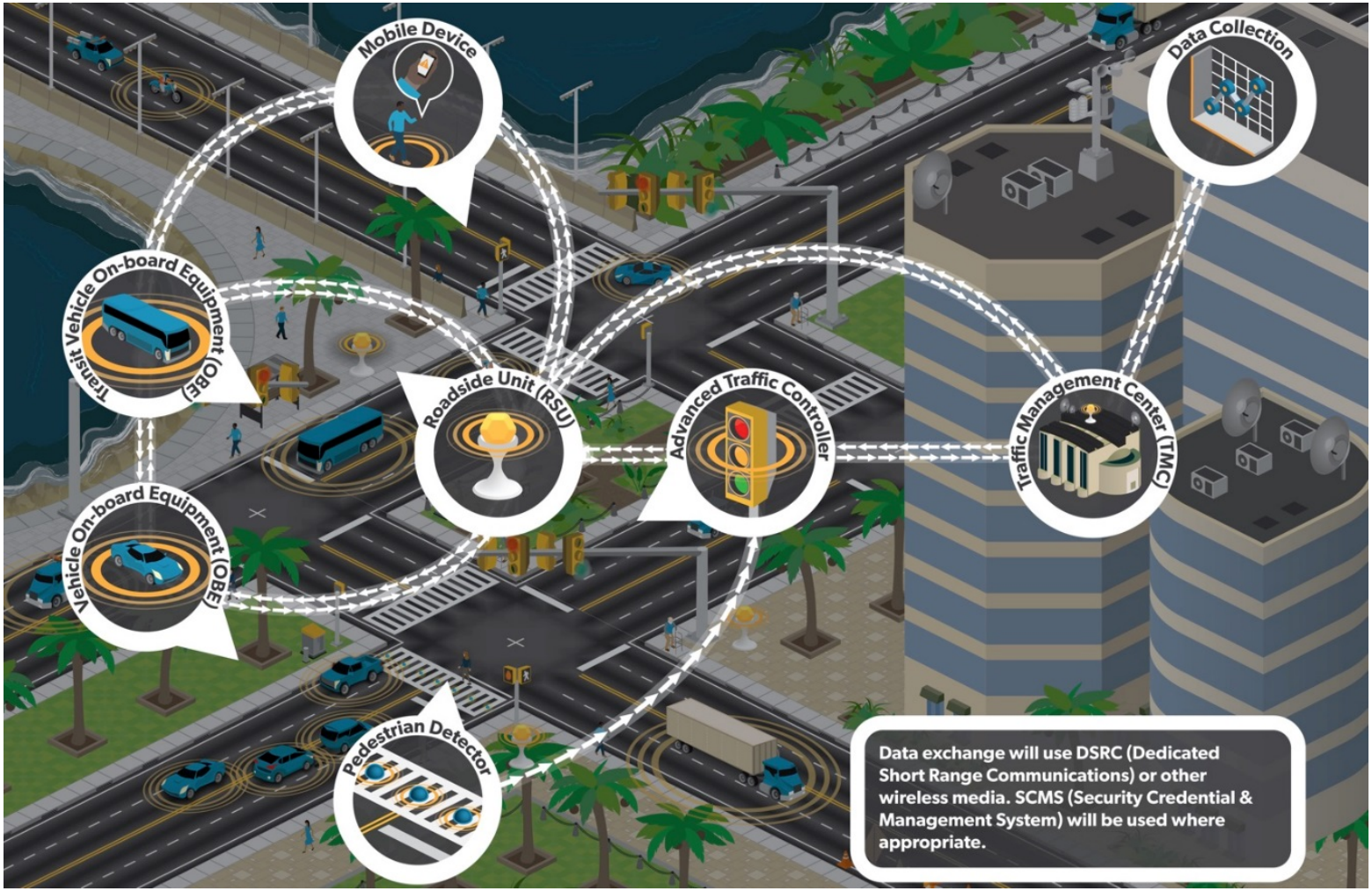
Vehicle Data:

Latitude, Longitude, Speed, Brake Status, Turn Signal Status, Vehicle Length, Vehicle Width, Bumper Height

Infrastructure Data:

Signal Phase and Timing, Drive 35 mph, 50 Parking Spaces Available

Connected Vehicles: *What Are They?*



Connected Vehicles: *What Can They Do?*

- Save lives by significantly reducing traffic accidents
- Make travel easier, more efficient, and more enjoyable
- Help curb pollution

Connected Vehicles: *Saving Lives*

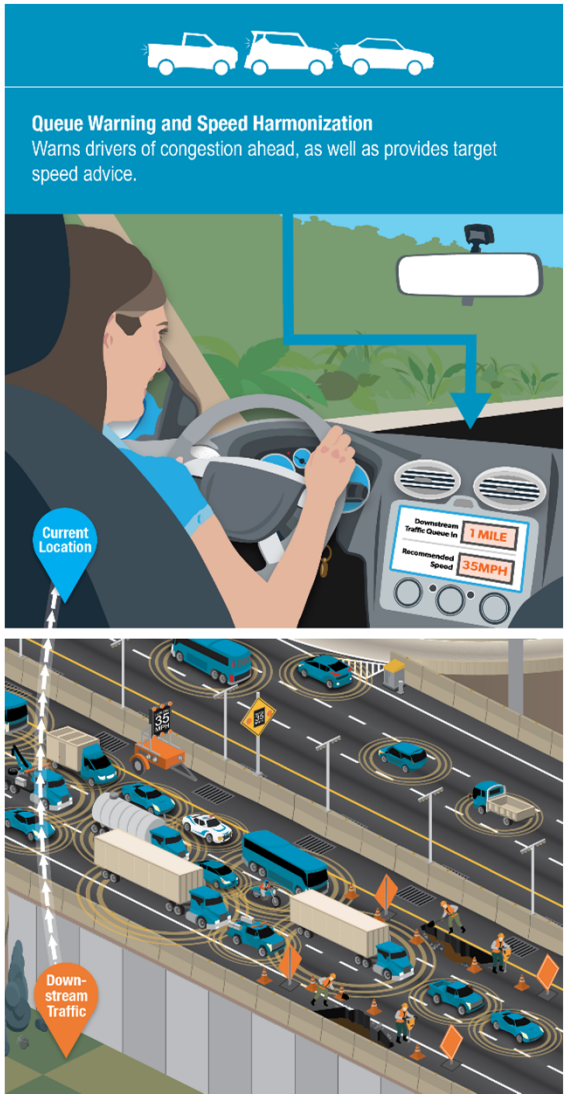
Intersection Movement Assist:

Warns the driver when it is not safe to enter an intersection—for example, when something is blocking the driver's view of opposing or crossing traffic

Connected Vehicles: *Improving Mobility*

Queue Warning and Speed Harmonization:

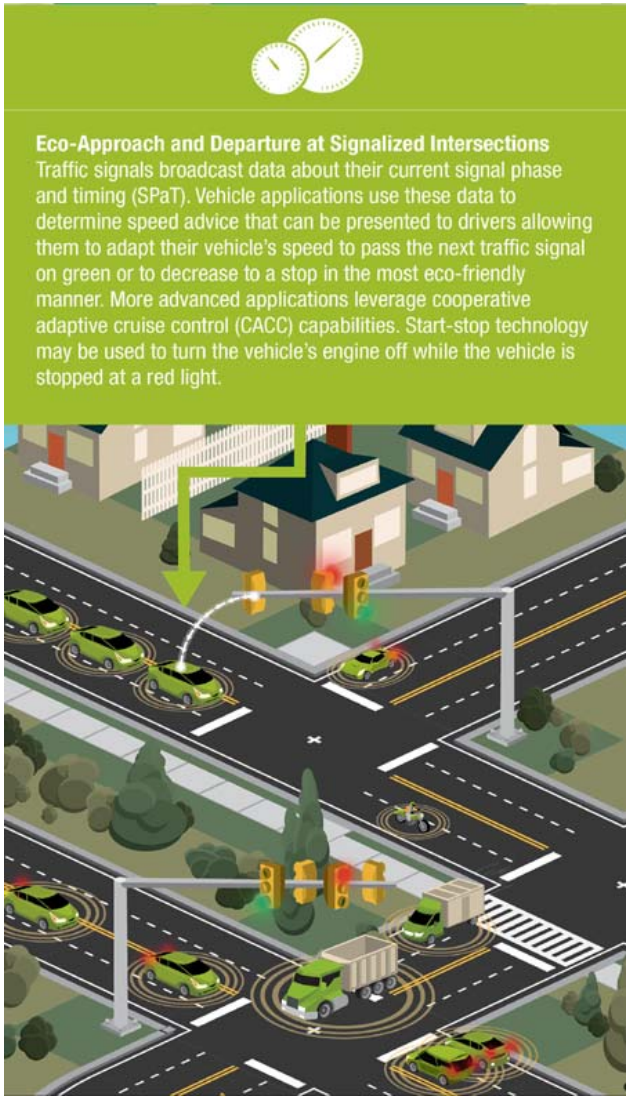
Warns drivers of upcoming congestion and provides speed recommendations



Connected Vehicles:
Protecting the Environment

Eco Approach and Departure at Signalized Intersections:

Presents information to drivers about traffic signal timing, allowing drivers to adapt their speed to pass the signal on green or decrease speed to a stop in the most eco-friendly way possible.



IN THE NEWS

IS THIS REAL

Successfully Piloting Connected Vehicles

SAFETYPILOT

Safety Pilot laid the groundwork for understanding how this technology interacts in a real-world setting and how drivers respond to it

- Data collection exceeded our expectations
- Regular drivers experienced proven technology
- Connectivity was achieved across various types and modes
- Risk reductions were achieved

Connected Vehicle Pilot Deployment Program

PROGRAM GOALS

PILOT SITES

STAY CONNECTED

- Participate in Concept Development Phase Webinars for the three Pilot Sites (see website for exact dates and times)

Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Jul 2016	Aug 2016
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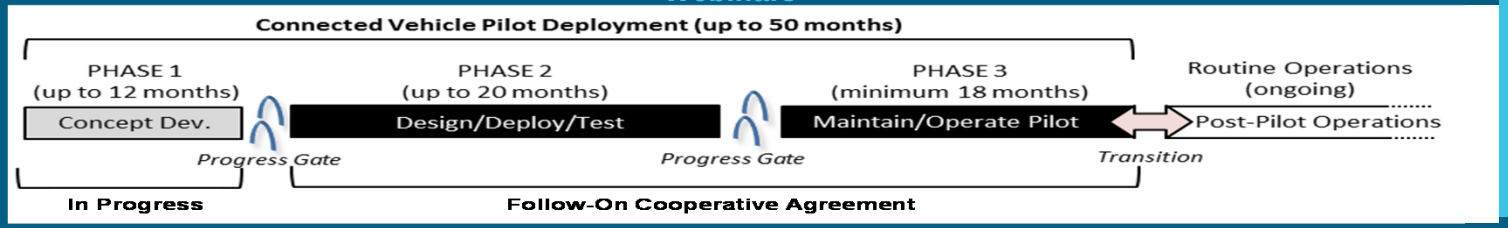
Concept of Operations Webinars — **Performance Measurement Webinars** — **Comprehensive Deployment Plan Webinars**



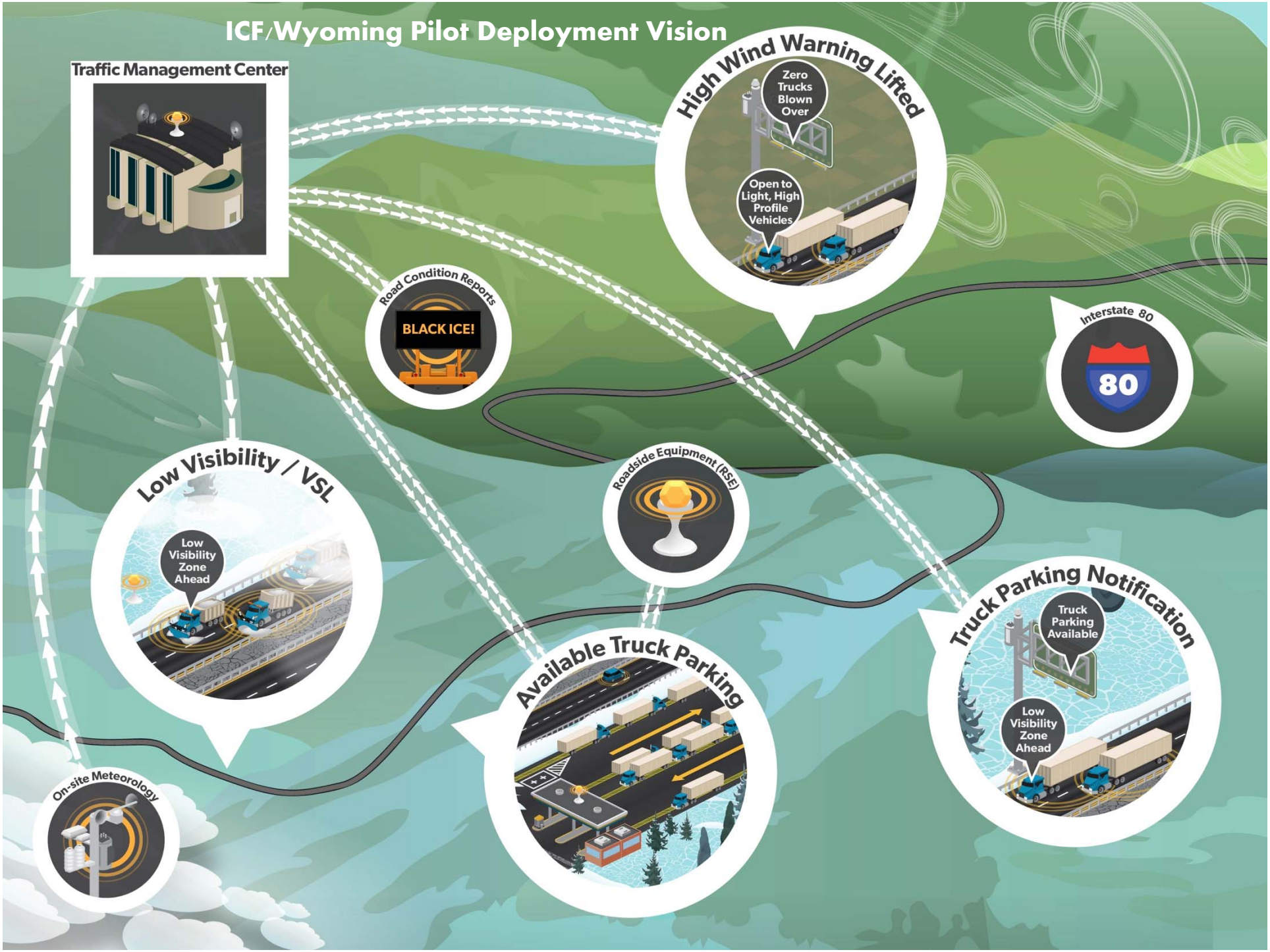
U.S. Department of Transportation
ITS Joint Program Office

Connected Vehicle Pilot Deployment Sites

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

- Improve safety and mobility of travelers in New York City through connected vehicle technologies.
- Vehicle to vehicle (V2V) technology installed in up to 10,000 vehicles in Midtown Manhattan, and vehicle to infrastructure (V2I) technology installed along high-accident rate arterials in Manhattan and Central Brooklyn.

- Alleviate congestion and improve safety during morning commuting hours.
- 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 transportation challenges.


ICF/Wyoming Pilot Deployment Vision
Traffic Management Center
High Wind Warning Lifted
Zero Trucks Blown Over
Open to Light, High Profile Vehicles
Road Condition Reports
BLACK ICE!
Interstate 80
80
Low Visibility / VSL
Low Visibility Zone Ahead
Roadside Equipment (RSE)
Truck Parking Notification
Truck Parking Available
Low Visibility Zone Ahead
Available Truck Parking
On-site Meteorology

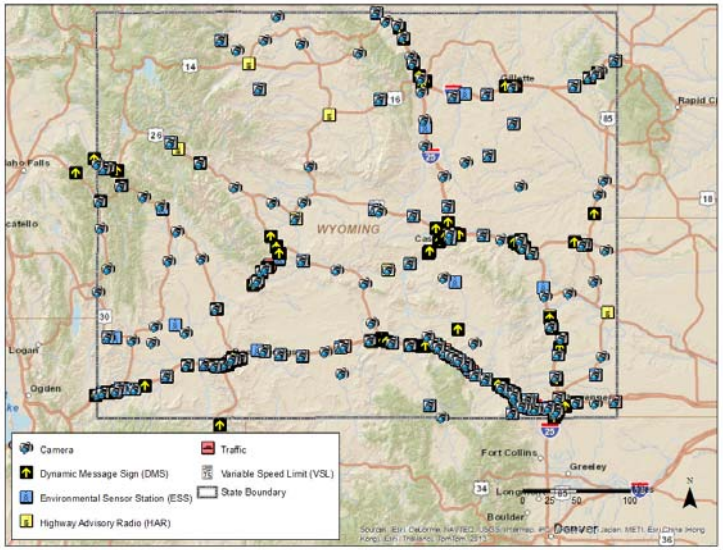
ICF/WYOMING PILOT DEPLOYMENT OVERVIEW

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:

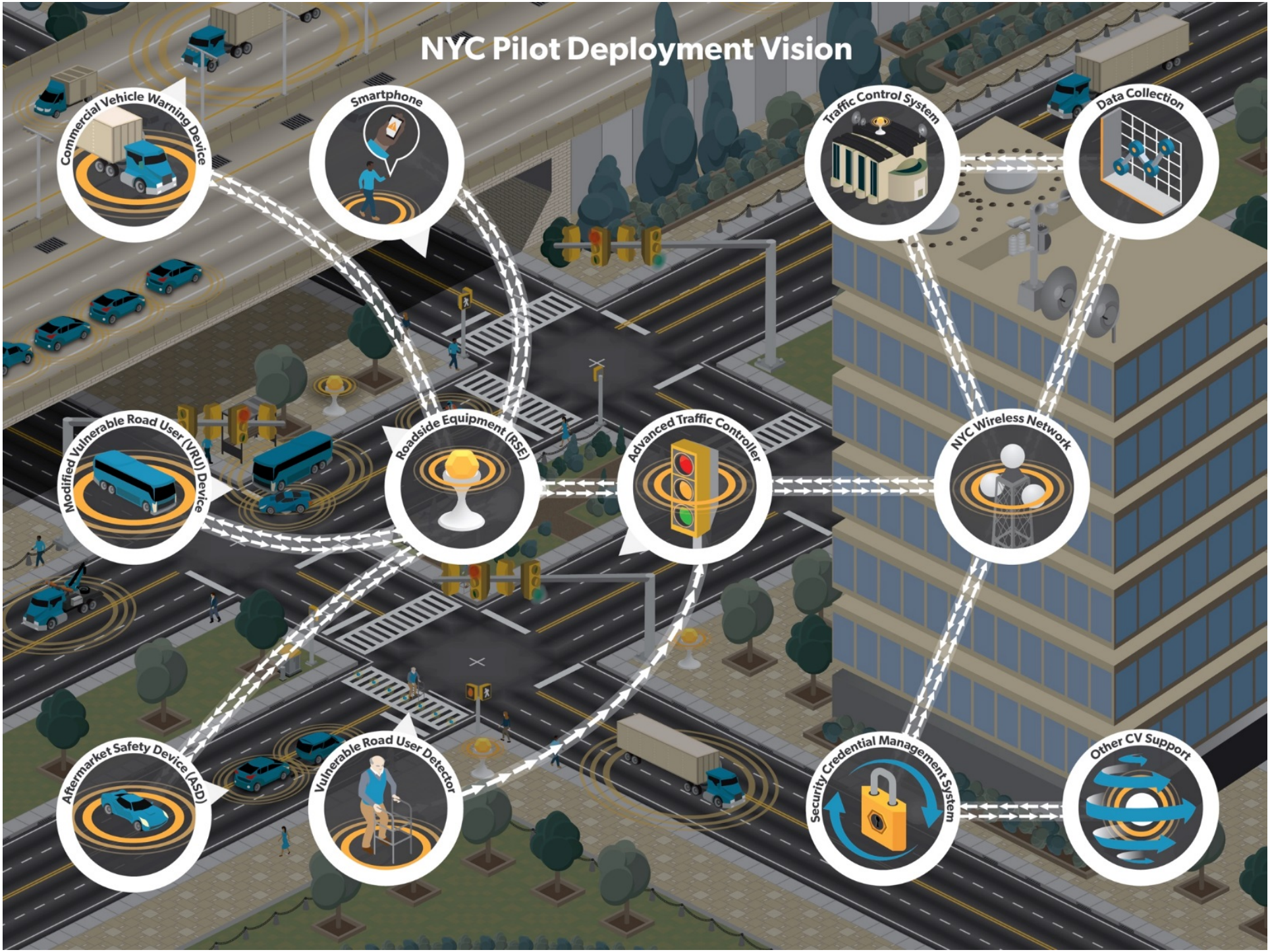
- Equip fleet vehicles (combination of snow plows, maintenance fleet vehicles, emergency vehicles, and private trucks) that frequently travel the I-80 corridor to transmit basic safety messages (BSMs), collect vehicle and road condition data and provide it remotely to the WYDOT TMCs
- Deploy DSRC roadside 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


NYC Pilot Deployment Vision
Commercial Vehicle Warning Device
Smartphone
Traffic Control System
Data Collection
Modified Vulnerable Road User (VRU) Device
Roadside Equipment (RSE)
Advanced Traffic Controller
NYC Wireless Network
Aftermarket Safety Device (ASD)
Vulnerable Road User Detector
Security Credential Management System
Other CV Support

NEW YORK CITY (NYC) 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

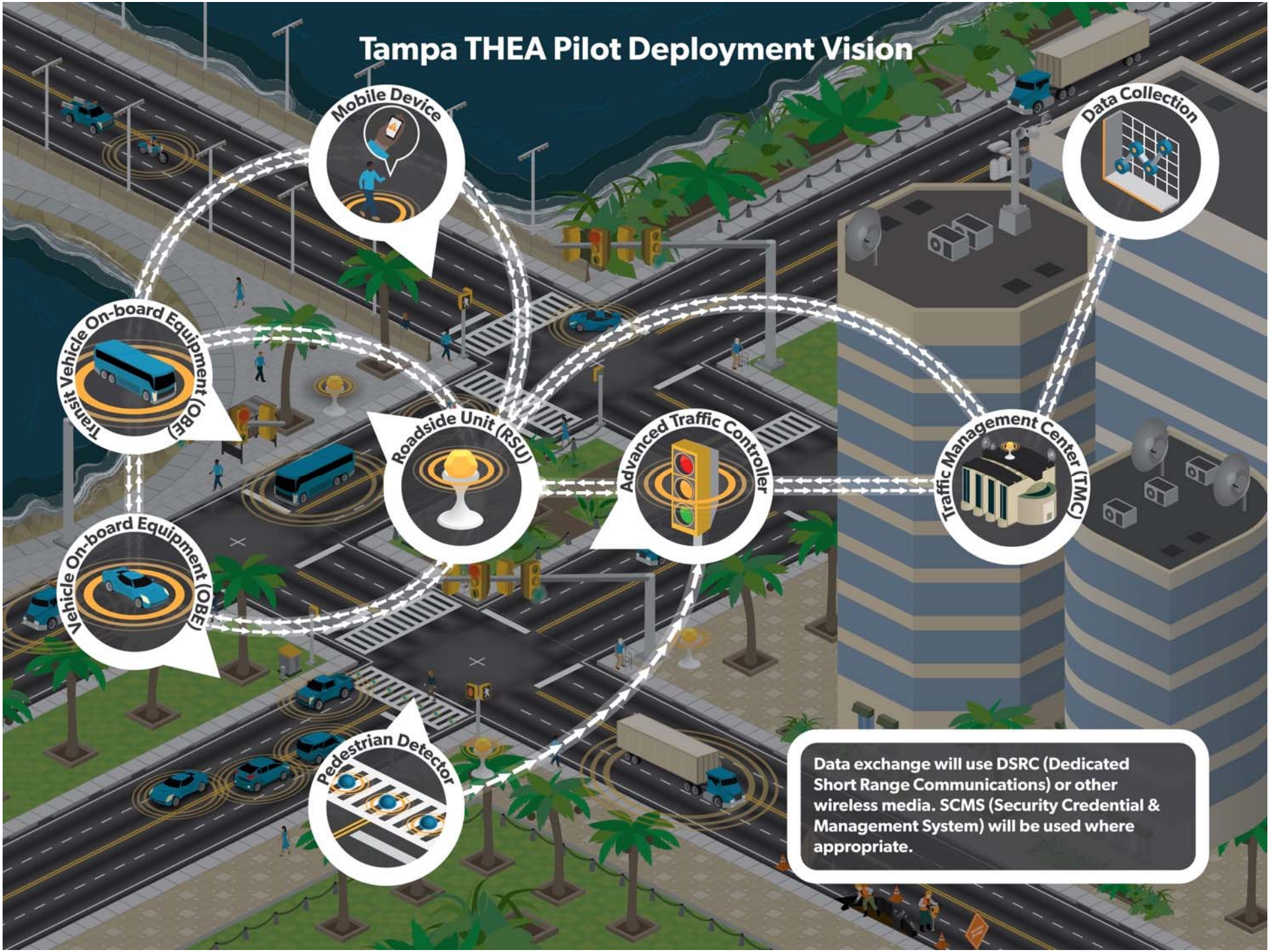
Approach:

- 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


Tampa THEA Pilot Deployment Vision
Mobile Device
Data Collection
Transit Vehicle On-board Equipment (OBE)
Roadside Unit (RSU)
Advanced Traffic Controller
Traffic Management Center (TMC)
Vehicle On-board Equipment (OBE)
Pedestrian Detector
Data exchange will use DSRC (Dedicated Short Range Communications) or other wireless media. SCMS (Security Credential & Management System) will be used where appropriate.

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

THE BIG PICTURE

Smart City

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

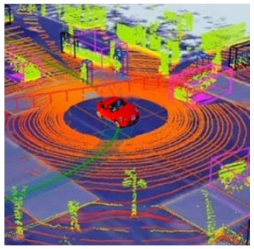
The Smart Cities Council

Source: Microsoft Clip Art (Bobby Mikul)

Advanced Technologies and Smart Cities

Technology convergence will revolutionize transportation, dramatically improving safety and mobility while reducing costs and environmental impacts

- Connected Vehicles
- Vehicle Automation
- Internet of Things
- Machine Learning
- Big Data
- Mobility on Demand



Connected-Automated Vehicles

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

DOT Smart City Challenge

1,400 local officials, companies, academics and non-profits joined our webinars

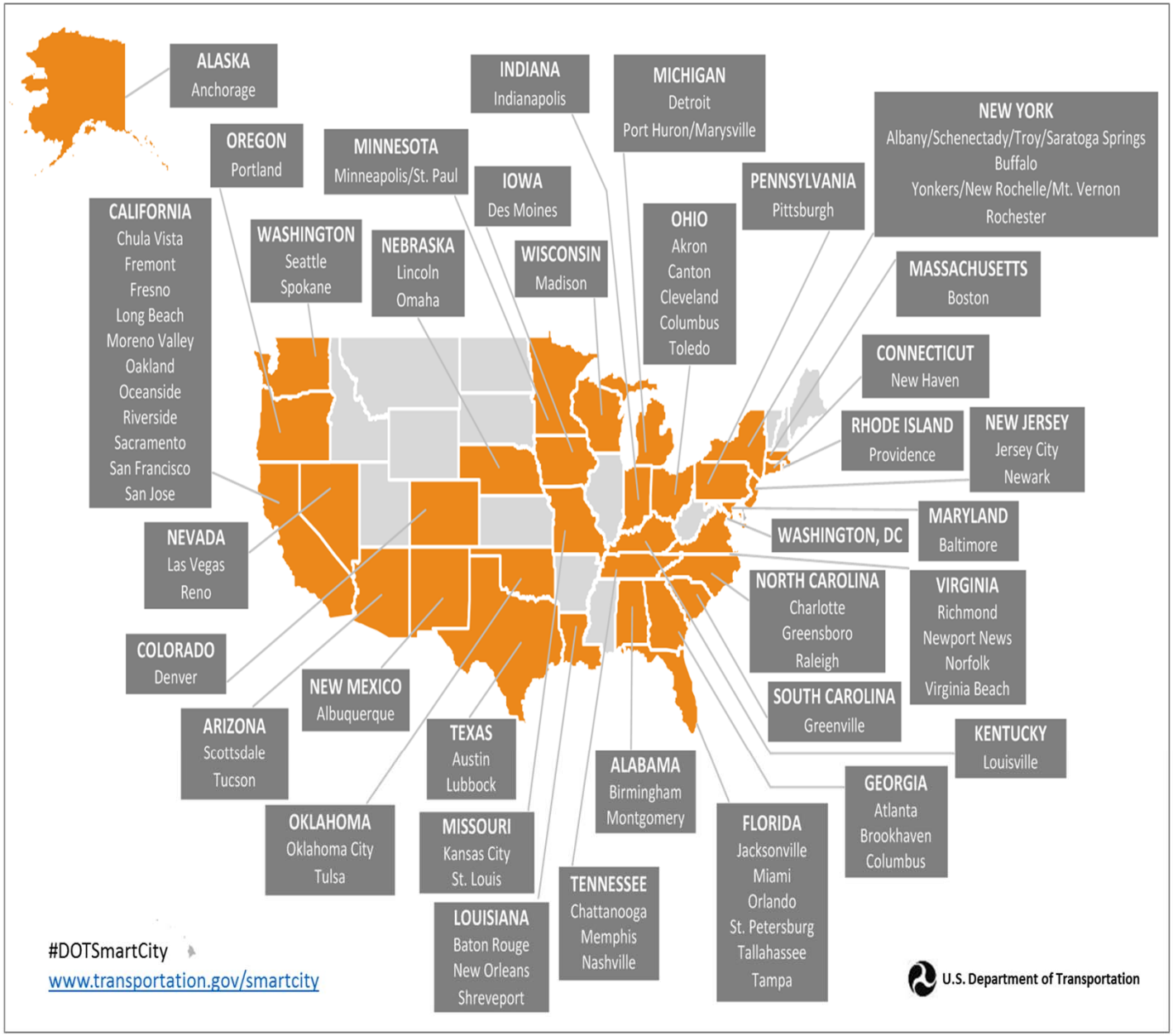
800 people participated in our Smart City Forum

300 companies have expressed interest in partnering

78 applications received for the Smart City Challenge

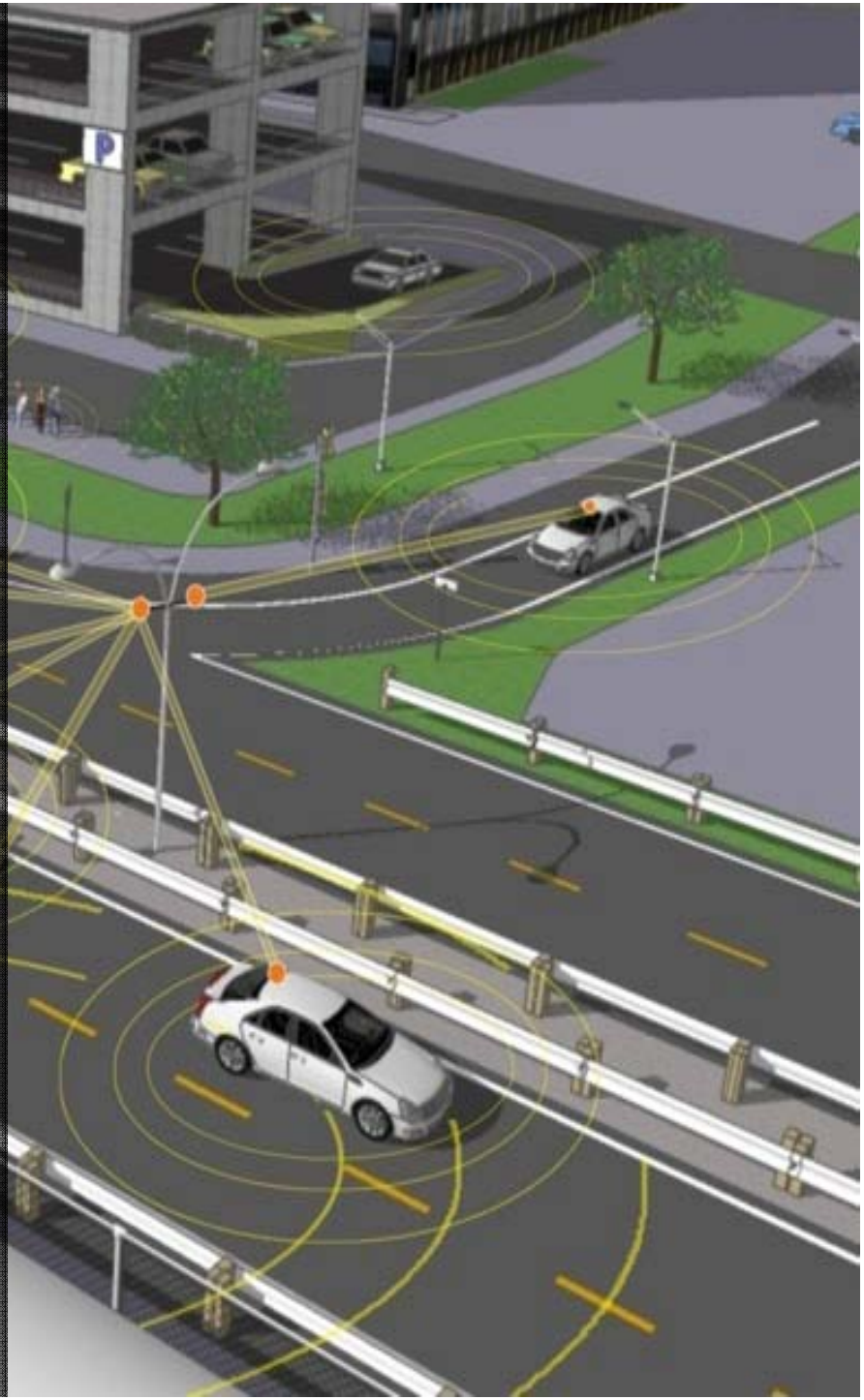
5 Smart City Challenge Finalists to be announced in March at SXSW

1 Smart City Challenge Winner announced in June



Smart Cities and Connected Vehicles

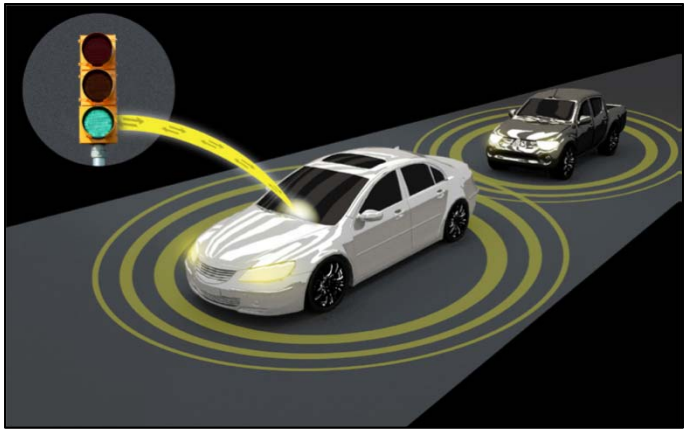
Smart Cities incorporate and expand connected transportation to ensure that connected transportation data, technologies and applications – as well as connected travelers – are fully integrated with other systems across a city, and fulfill their potential to improve safety, mobility and environmental outcomes in a complexly interdependent and multimodal world that supports a more sustainable relationship between transport and the city.



Paving the Way for Connected Vehicles

- In May 2015, Secretary Foxx announced the USDOT would accelerate the deployment of connected vehicles. NHTSA has moved ahead of its timetable for the proposed V2V rule. The proposal is expected this spring.

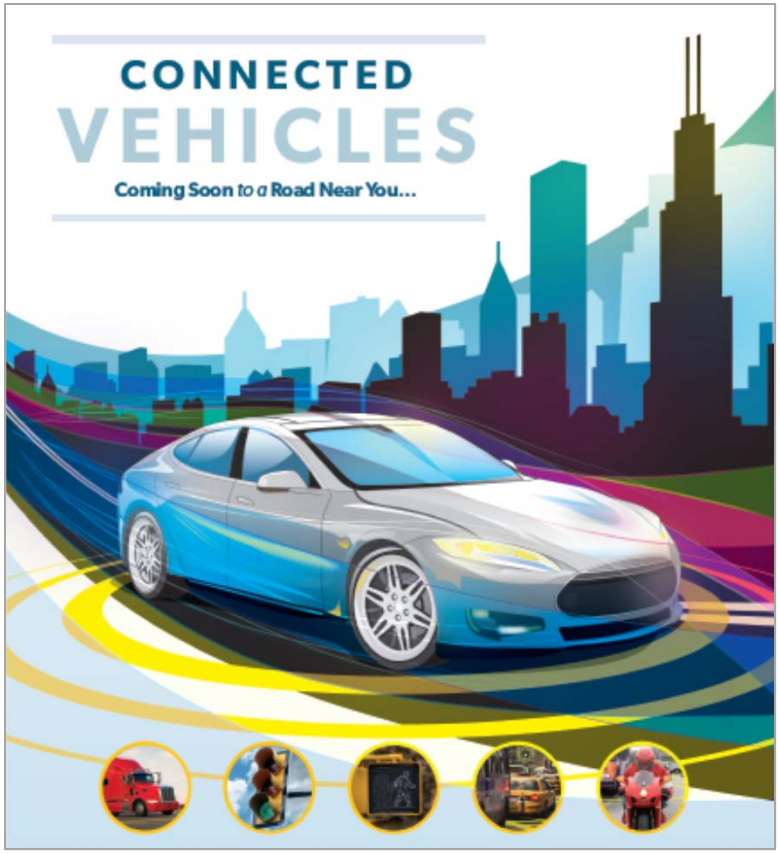
- This summer, the Federal Highway Administration (FHWA) will release a V2I guidance document to assist transportation managers and operators interested in adapting their traffic signals and other roadside devices so they are compatible with the new connected vehicles.



THE TIME IS NOW

The Time Is Now…

- First new cars with connected vehicle technology available for sale/lease in 2017
- National deployment of connected vehicles is likely by 2020
- Aftermarket devices will bring older vehicles into the connected environment



What the Public Says about Connected Vehicles

- **Nearly 50%** would be comfortable with the technology
- **65%** felt that the technology would provide safety benefits for drivers
- **55%** felt that the technology would lower the number of car accidents
- **53%** felt that the technology would make driving more convenient and efficient
- **50%** felt that the technology would help decrease insurance rates
- **49%** felt that the technology "would make me safer"

Source: NHTSA V2V Crash Avoidance Safety Technology: Public Acceptance Final Report

Why Should Leasers Be Interested?

Consumer Trends:

- Focus on new technology
- Demand for more robust real-time travel data
- Interest in greener transportation options

Connected Vehicles:

- ✓ Bring advanced technology and connectivity into the driver experience
- ✓ Millions of connected vehicles will create new robust data stream that will provide new applications for drivers
- ✓ Connected vehicle data will give drivers the information they need to make greener travel choices

How Connected Vehicles Can Help Your Business

- ***Reduce collisions*** in your parking lot
- Make your ***vehicles more appealing*** to customers
- If your local community is retrofitting traffic signals, stop signs, work zones, and other infrastructure, your vehicle fleet may have ***even more benefits***

For More Information

- Visit connected vehicle microsite for more information: **http://www.its.dot.gov/cv_basics/index.htm**.
- Visit the Connected Vehicle Technical Support Center: **www.its.dot.gov/testbed.htm**.
- Visit the ITS JPO website.