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

What the Public Works Community Needs to Know about Connected Vehicles

PWX: Public Works Expo

August 30, 2016

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U.S. Department of Transportation

Presentation Overview

- Our Transportation Challenges
- USDOT Multimodal Collaboration
- ITS Over the Past 20 Years
- Where We're Headed – the ITS Strategic Plan
  - Connected Vehicles
  - Smart Cities
  - Deployment Resources

Today's Transportation Challenges

Safety

- 35,200 highway deaths in 2015
- 6.1 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:

Early Estimate of Motor Vehicle Traffic Fatalities in 2015, National Highway Traffic Safety Administration (July 2016); 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

Today's Transportation Challenges

Safety

- 35,200 highway deaths in 2015
- 6.1 million crashes in 2014
- Leading cause of death for ages 11, 16-24

In, particular, in 2014 there were approximately…

- 8,664 fatalities at intersections
- 669 crashes in work zones
- 5,897 fatalities from weather-related crashes

Data Sources:

2014 Motor Vehicle Crashes: Overview (Traffic Safety Facts Research Note), National Highway Traffic Safety Administration (March 2016); Fatality Analysis Reporting System (FARS) 2014 ARF, NHTSA; Ten-year averages from 2005 to 2014 analyzed by Booz Allen Hamilton, based on NHTSA data

USDOT Modal Collaboration and Partnership

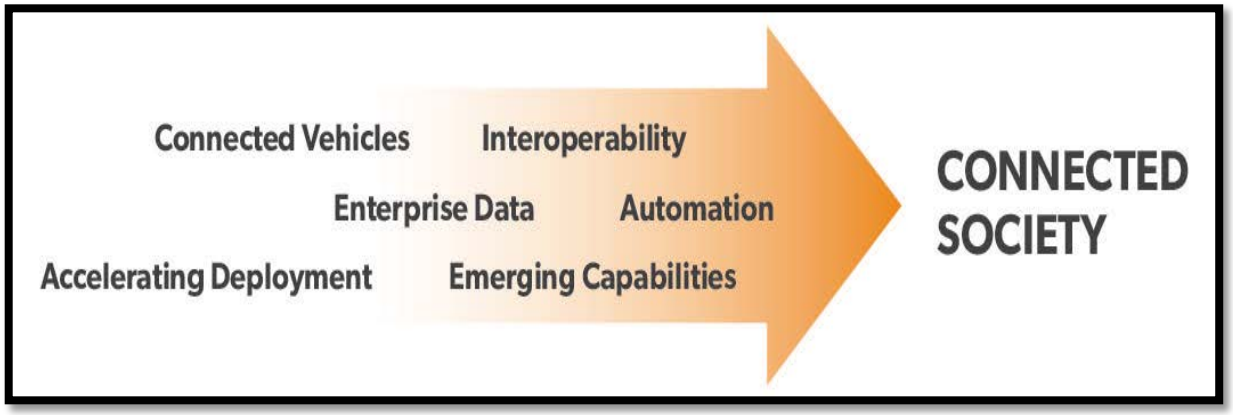
ITS Strategic Plan 2015-2019

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

Vision and Mission

VISION

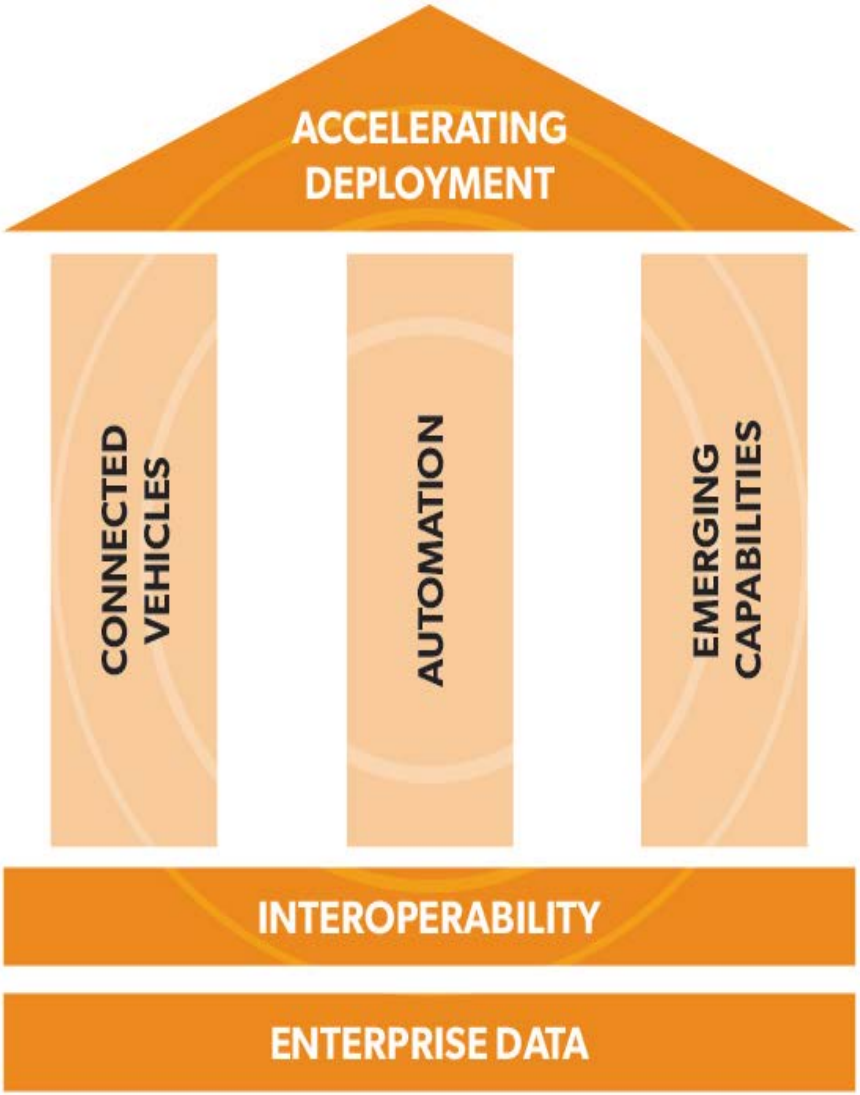
Transform the Way Society Moves



Conduct research, development, and education activities to facilitate the adoption of information and communication technology to enable society to move more safely and efficiently.

Strategic Plan
Program Categories

- **Connected Vehicles:** Focuses on adoption and deployment
- **Automation:** 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
- **Accelerating Deployment:** Advances ITS work from adoption to wider scale deployment in coordination with multiple disciplines and stakeholders



Connected Vehicles

Imagine a Transportation System in which
VEHICLES CAN SENSE & COMMUNICATE
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

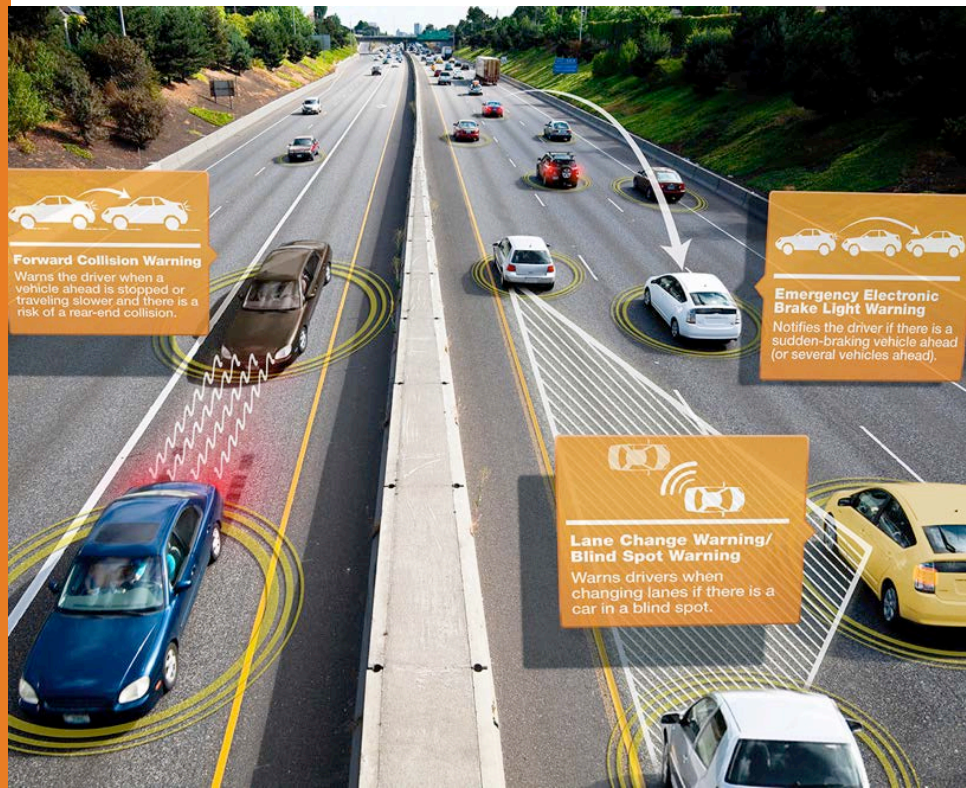
Connected Vehicles

What are they?

Connected Vehicles

What can they do?

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



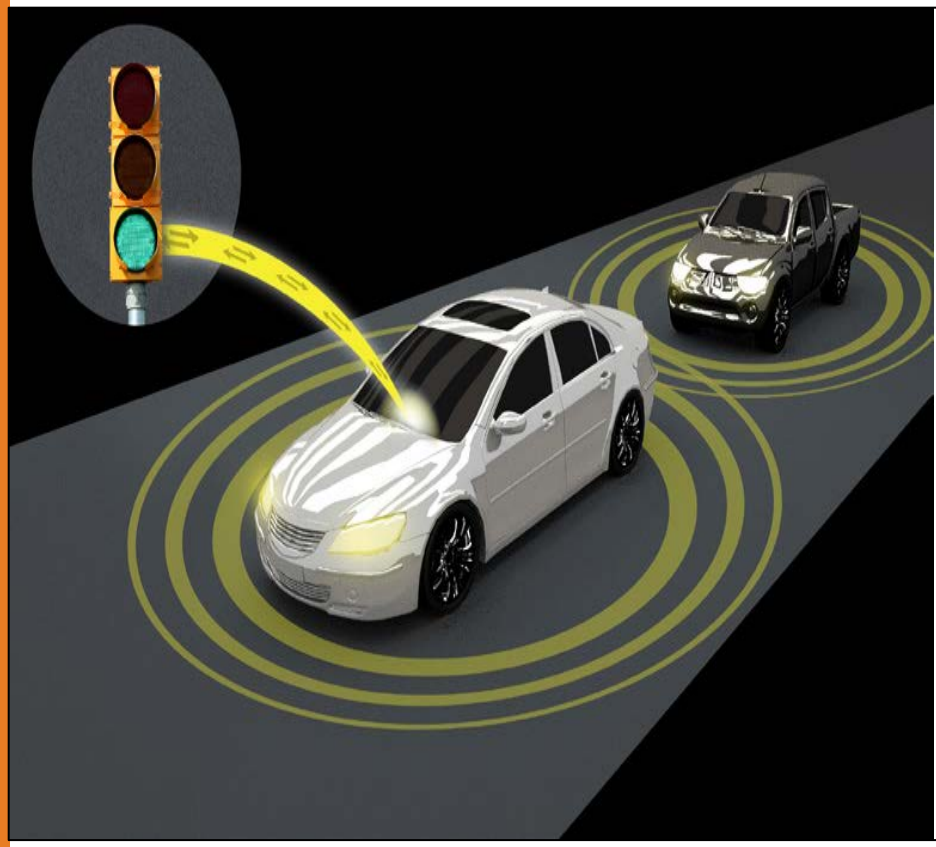
Connected Infrastructure

Devices installed along the roadway capable of sending and receiving messages…and can interface with traffic control systems (e.g., traffic signal controllers)

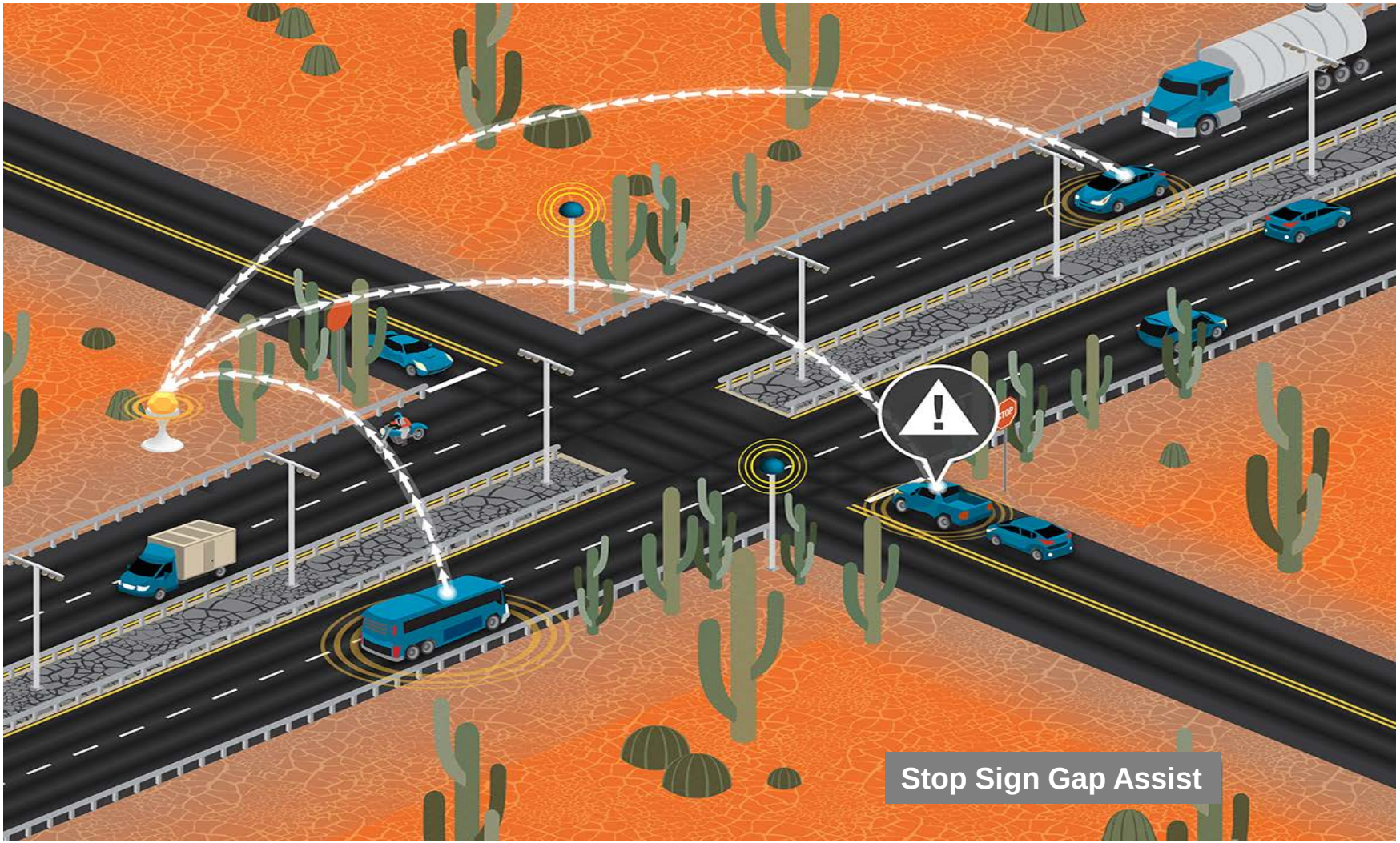
Communication with Infrastructure Presents Tremendous Opportunities

The USDOT is developing V2I applications in areas such as:

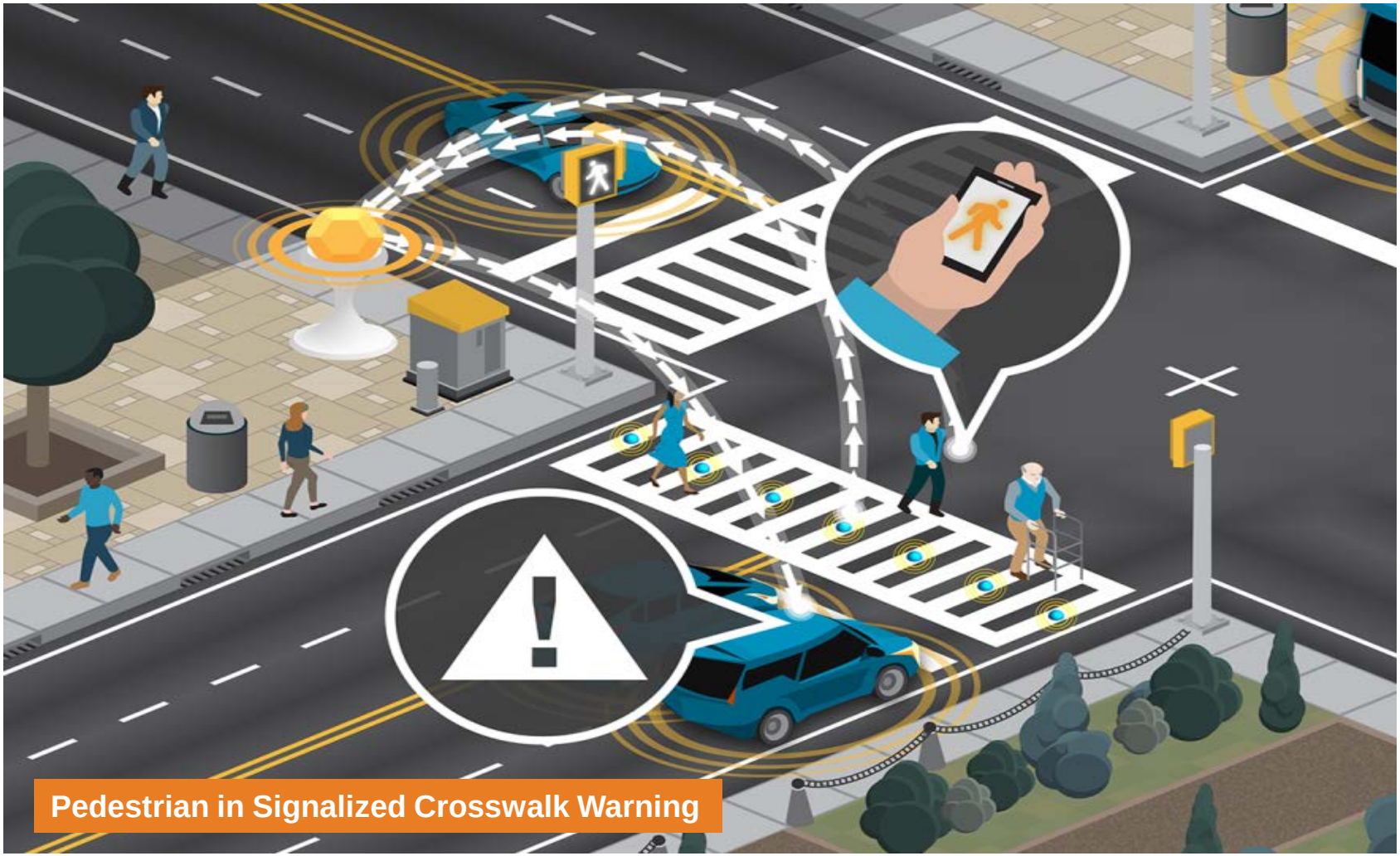
- Signage/Intersections
- Work Zones
- Road Weather
- First Response
- Transit



Connecting Our Signage

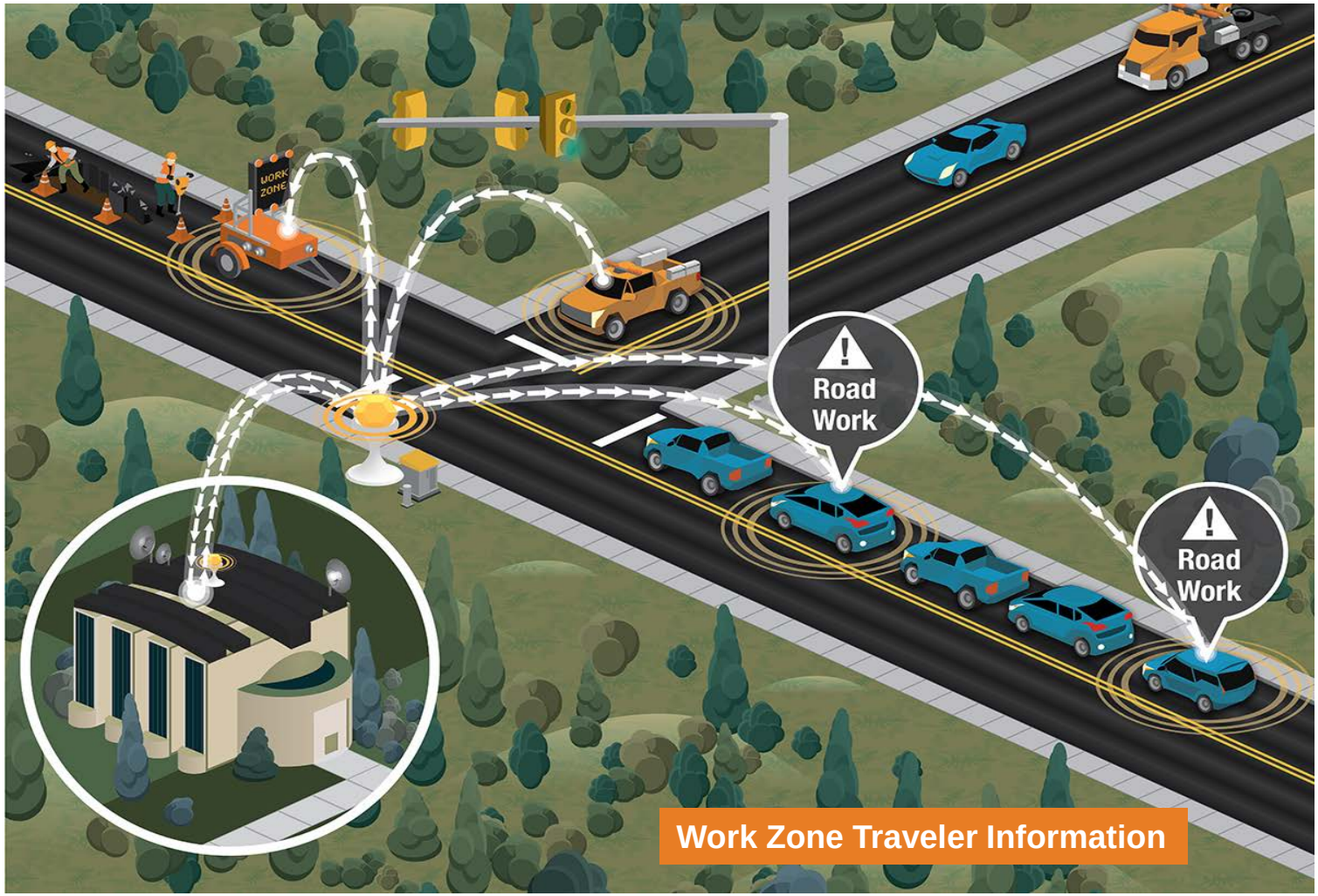


Connecting Our Pedestrians



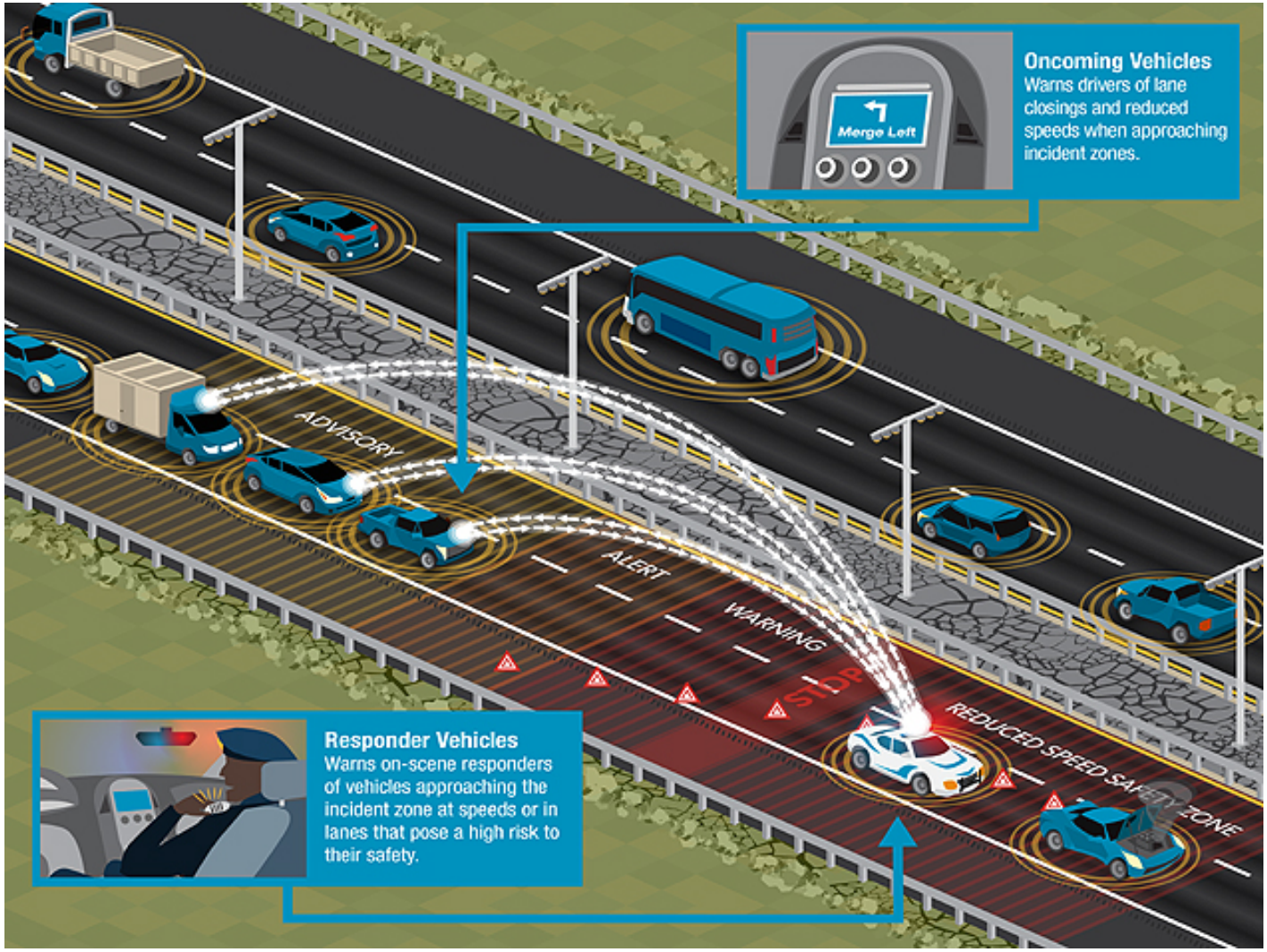
Pedestrian in Signalized Crosswalk Warning

Connecting Our Work Zones



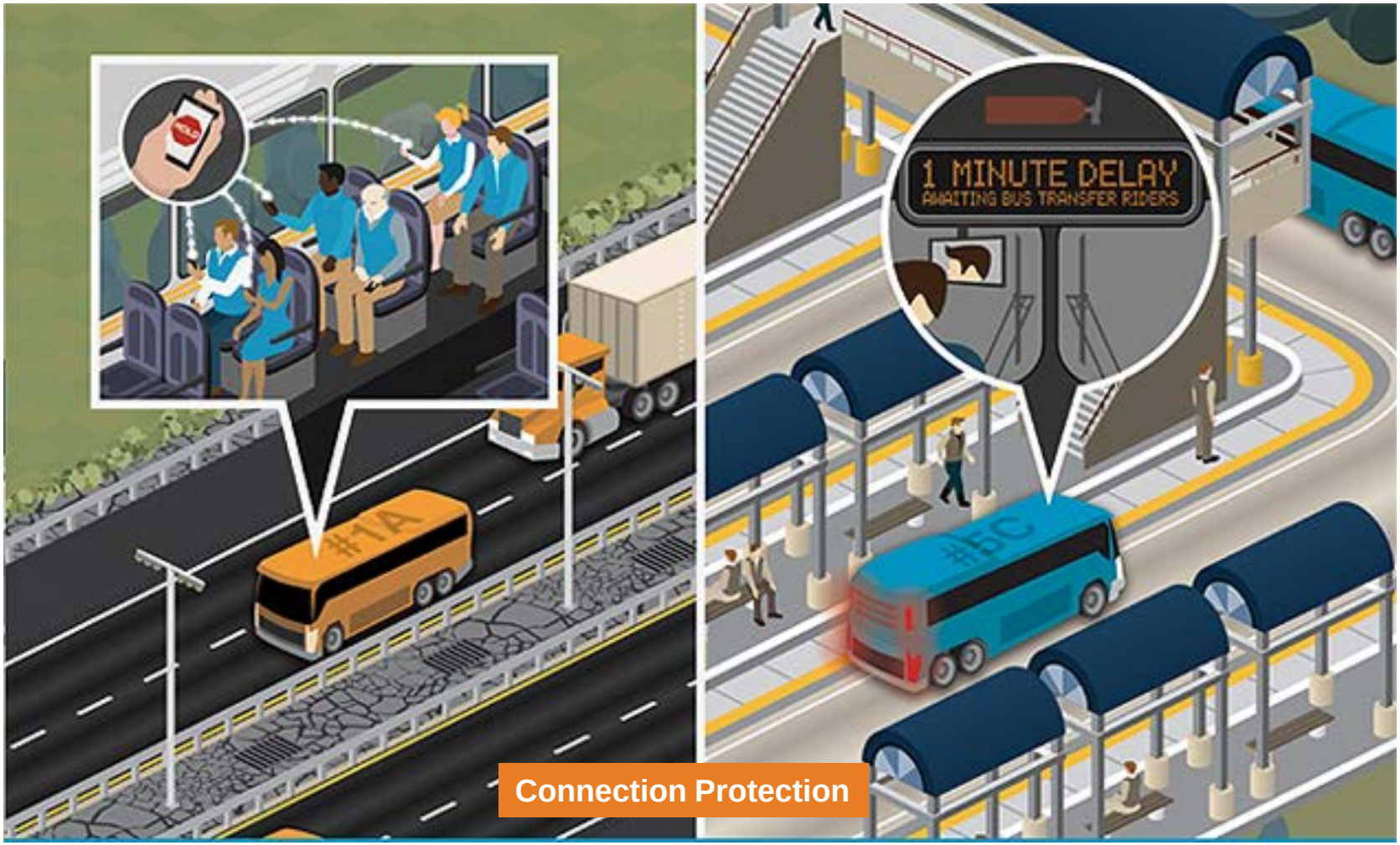
Connecting Our Snow Plows

Connecting Our First Responders



Connecting Our Transit

Connecting Passengers and Public Transit

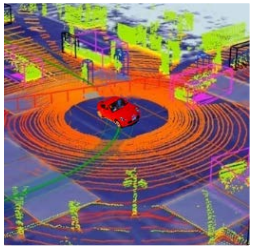


Connection Protection

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



Connected-Automated Vehicles

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

Smart Cities

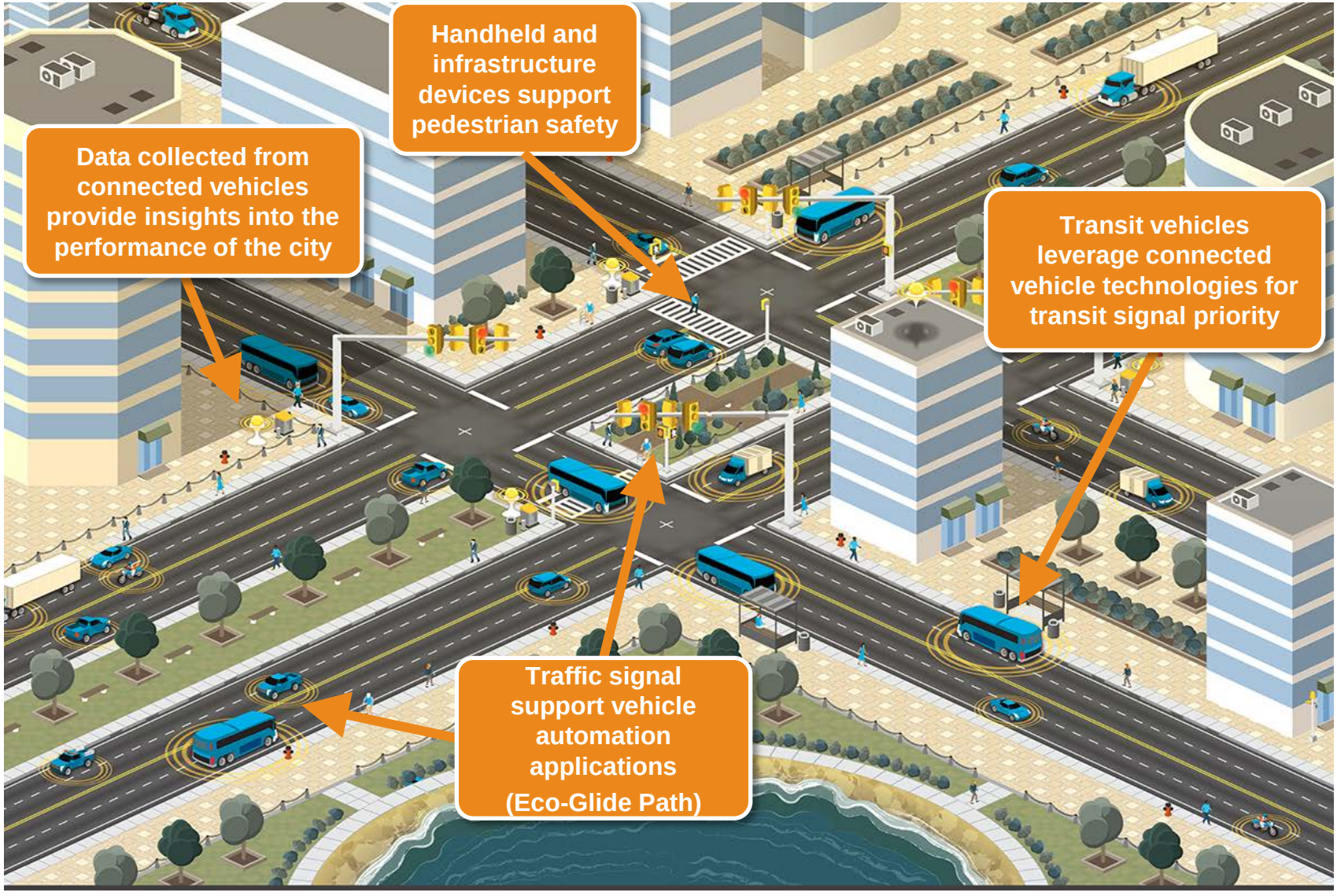
Benefits

- 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

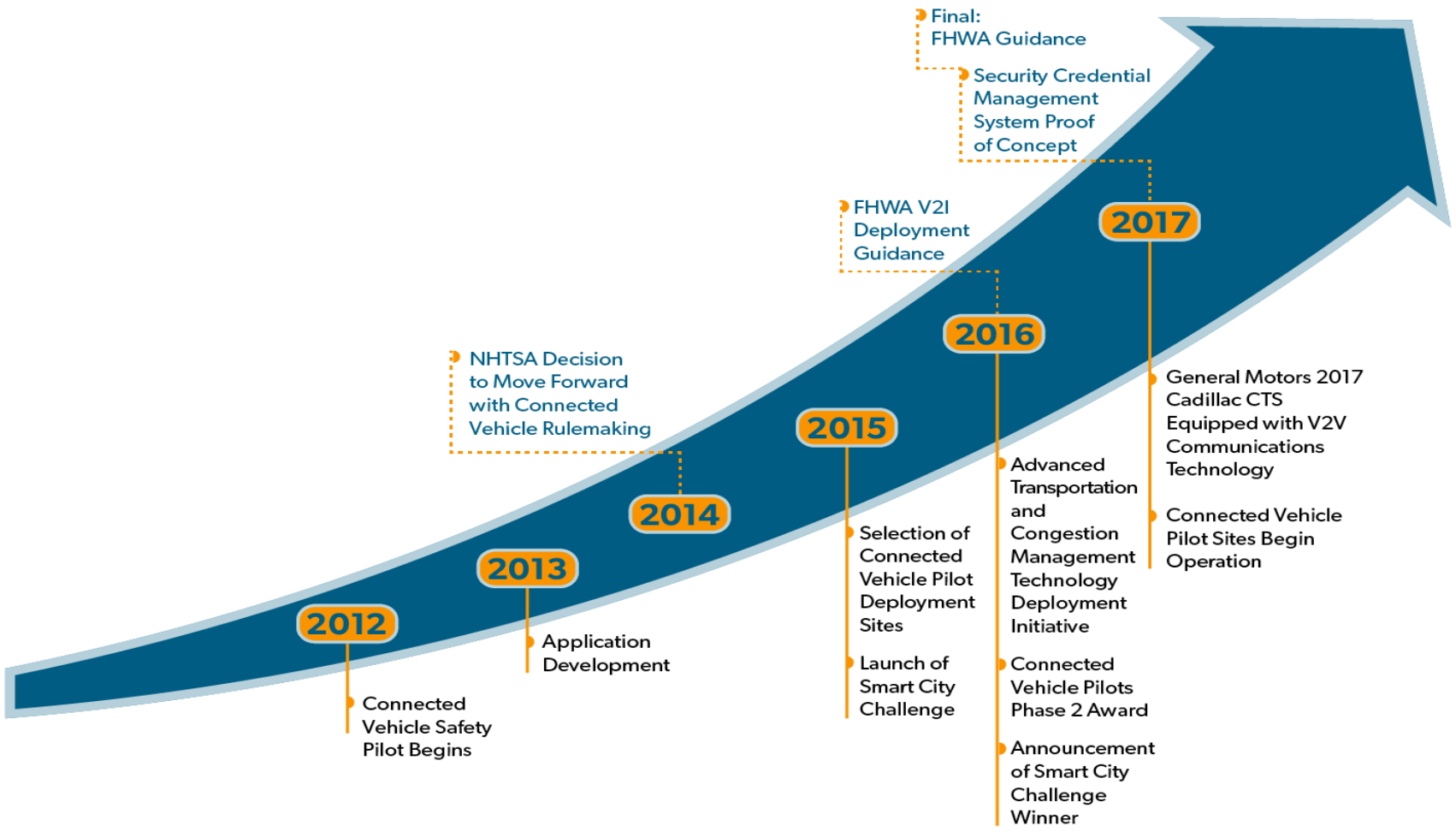
Smart Cities and Connected Vehicles

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.

Example Deployment in a Smart City



Paving the Way for the Connected Vehicle Ecosystem



Infrastructure Deployment Planning

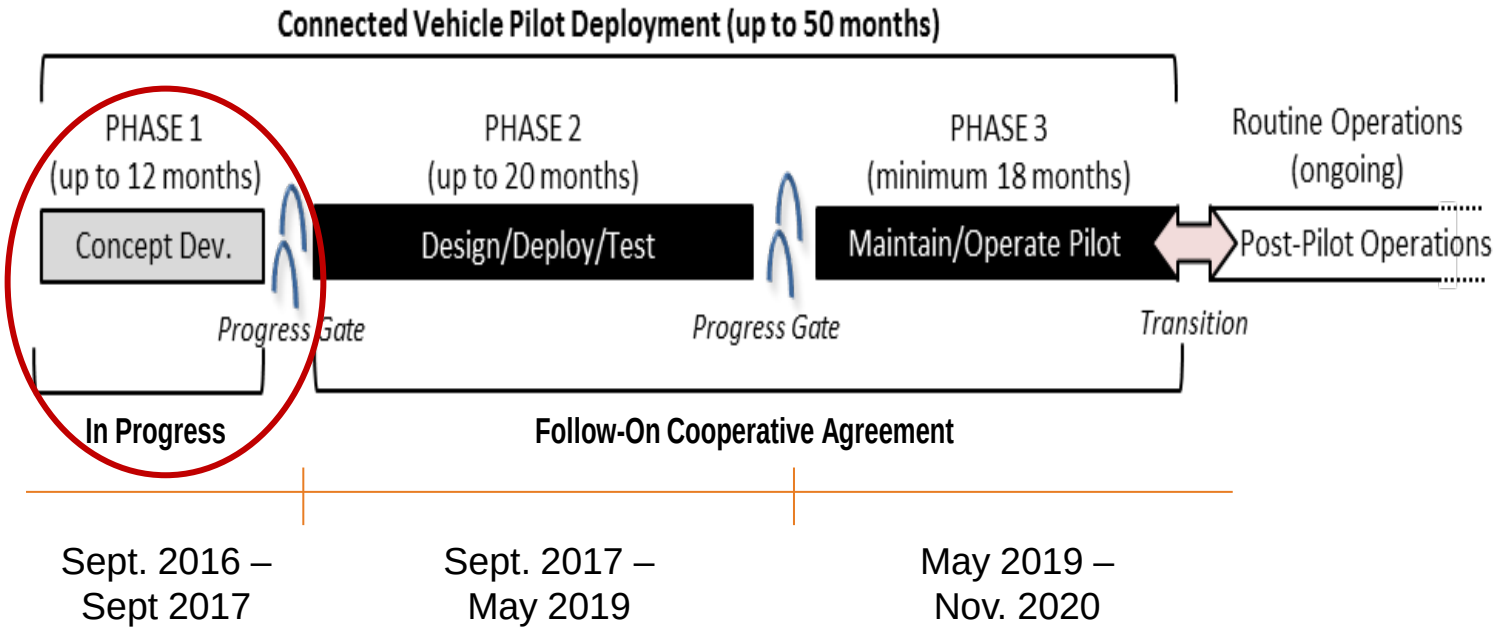
- National Cooperative Highway Research Program (NCHRP 03-101)
  - Costs and Benefits of Public-Sector Deployment of Vehicle to Infrastructure Technologies
- AASHTO National Connected Vehicle Field Infrastructure Footprint Analysis
- Standardized interfaces (CVRIA)
- Certification processes
- Nationwide Security Credential Management System (SCMS)
- State and local agency test beds

FHWA V2I Deployment Guidance

FHWA V2I Deployment Guidance: *Helping Prepare for Connected Vehicles*

- Guidance includes policy positions, guidance, guidelines, whitepapers, and practitioner tools
- Assists in planning for future investments and deployment of V2I systems
- Does not impose any new requirements on local governments
- Work will be harmonized with related efforts by other USDOT modal agencies
- Subsequent guidance updates will also incorporate ITS research findings

Connected Vehicle Pilot Deployment Program



PILOT SITES

New York City

ICF/Wyoming

Tampa (THEA)

Connected Vehicle Pilot Deployment Sites

ICF/Wyoming

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

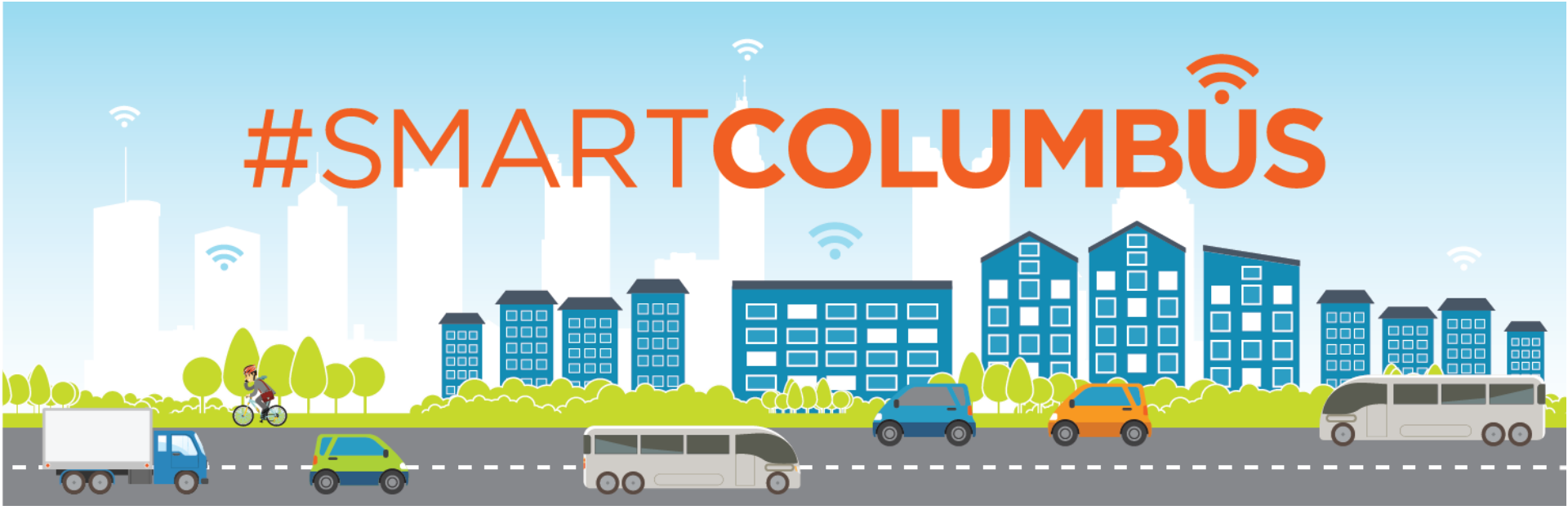
New York City

- 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.

Tampa (THEA)

- 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.

Smart City Challenge Winner



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

ITS JPO Offers Free Resources to Assist in Deployment

- Research Data Exchange
- Connected Vehicle Test Bed
- Professional Capacity Building ITS Training
- Connected Vehicle Test Beds
- Connected Vehicle Basics Microsite
- Research Fact Sheets
- National Transportation Library
- Connected Vehicle Help Desk
- Connected Vehicle Pilots

For More Information

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