



The Only Certainty is Change: Emerging Topics in Transportation Planning, Part I

Connected Vehicles Pilots, Smart Cities and the FAST Act

Monday, June 27, 2016

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Managing Director, Intelligent Transportation System Joint Program
Office

(ITS JPO)

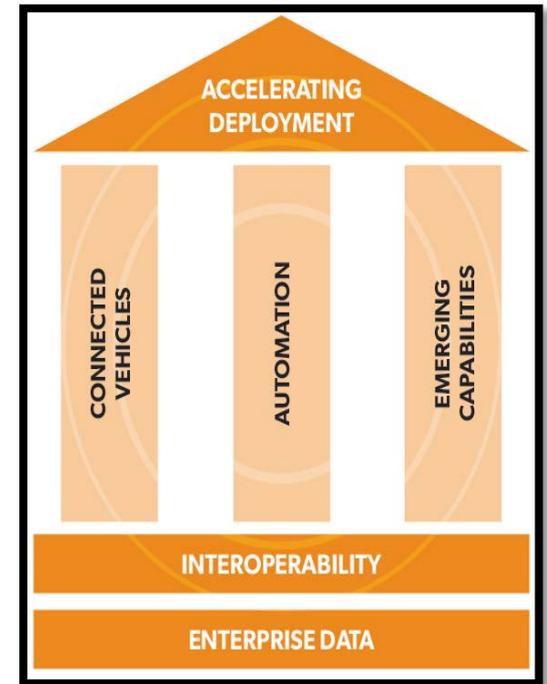
U.S. Department of Transportation (USDOT)

ITS Strategic Plan 2015-2019



Program Categories

- **Connected Vehicles** program category will be primarily focused on adoption and eventual deployment of the system.
- **Automation research** will focus on topics related to automated road-vehicle systems and related technologies that transfer some amount of vehicle control from the driver to the vehicle.
- **Emerging Capabilities** will focus on future generations of transportation systems.
- **Enterprise Data** programs will continue existing efforts in operational data capture from stationary sensors, mobile devices, and connected vehicles, and expand into research activities involving the development of mechanisms for housing, sharing, analyzing, transporting, and applying those data for improved safety and mobility across all modes of travel.
- **Interoperability** focuses on how to ensure effective connectivity among devices and systems.
- **Accelerating Deployment** advances the work from adoption to wider scale deployment in coordination with several other DOT agencies.





- USDOT Action – “Facilitate the appropriate consideration of Connected Vehicles in transportation planning activities carried out by States, MPOs and local agencies”
 - How should connected vehicles be considered across a range of planning activities?
 - What changes are needed in techniques, tools, supporting data, organizational skills and expertise?
 - What new stakeholders will be involved and how will the role of existing stakeholders change?
 - How will needs vary in different contexts?



CONNECTED VEHICLES



- Connected Vehicles (CV) are vehicles that can communicate with each other, roadside devices (traffic signals), or non-motorized users (smart phones and other advanced devices)
 - Vehicle to Vehicle (V2V)
 - Vehicle to Infrastructure (V2I)
 - Vehicle to Anything (V2X)



Illustration of communications between C/AV-enabled vehicles and infrastructure

AUTONOMOUS VEHICLES



- Autonomous & Driverless Car
 - Array of sensors to detect other vehicles and obstacles
 - Requires Detailed map
 - Use machine learning to make software smarter
 - Doesn't rely on communication with other vehicles

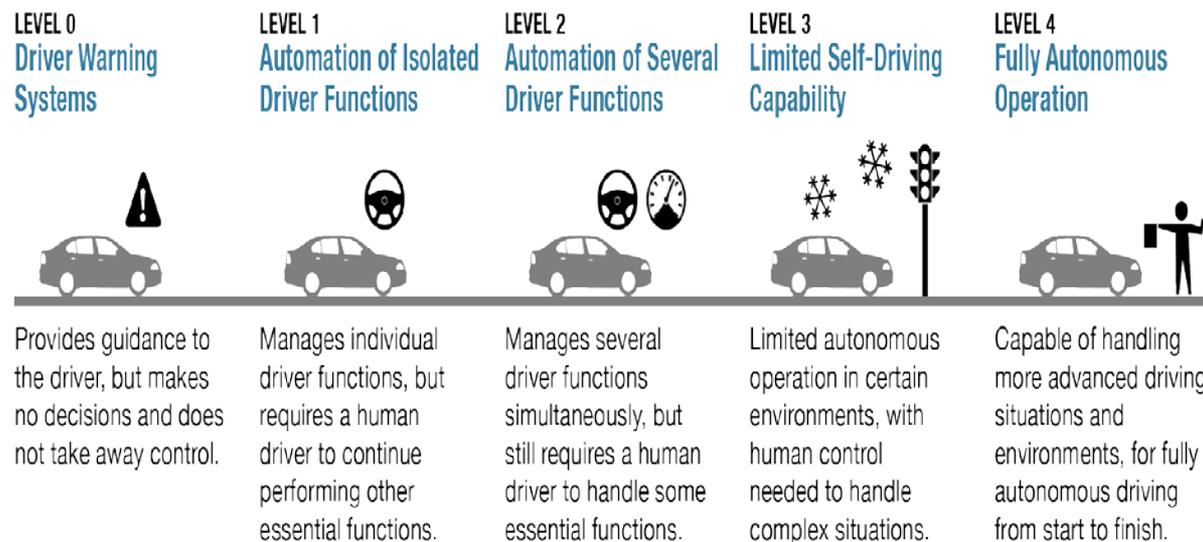


Google's automated vehicle



Automation builds off current driver assistance technologies such as adaptive cruise control, lane departure warning and left turn assist

- NHTSA has defined 5 levels of automation
- Various combinations of levels 1,2, and 3 are on the road today

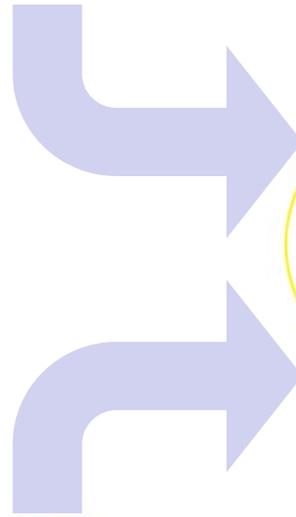


CONNECTED AUTOMATION - GREATEST BENEFITS



Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors



Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities

Connected Vehicle

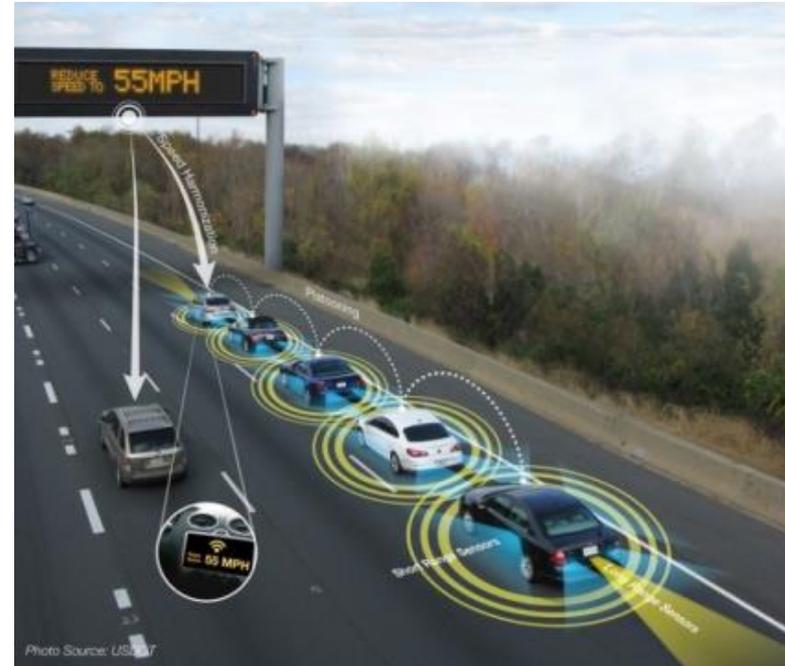
Communicates with nearby vehicles and infrastructure



CONNECTED AUTOMATION - GREATEST BENEFITS



- **Improving safety**
 - Reduce and mitigate crashes
- **Increasing mobility and accessibility**
 - Expand capacity of roadway infrastructure
 - Enhance traffic flow dynamics
 - More personal mobility options for disabled and aging population
- **Reducing energy use and emissions**
 - Aerodynamic “drafting”
 - Improve traffic flow dynamics



...connectivity is critical to achieving the greatest benefits





- Technologies will advance – and roles will change
 - As an example, the relationship between connected and automated will evolve and change as it matures.
- Planners don't need to know “guts” of technology but need to track developments
 - Conceptual knowledge of systems and technological readiness
 - Timeframes for implementation (is implementation referring to technology or project?)
 - Funding – who pays and how?
 - Societal/organizational impacts
 - Adapting to disruption in both public and private sectors
 - Understand data outputs to support planning needs



The Planning Process



- Where do we/you want to go?
- How are we/you going to get there?
- What will it take?
- How did we do?





Where do we/you want to go?

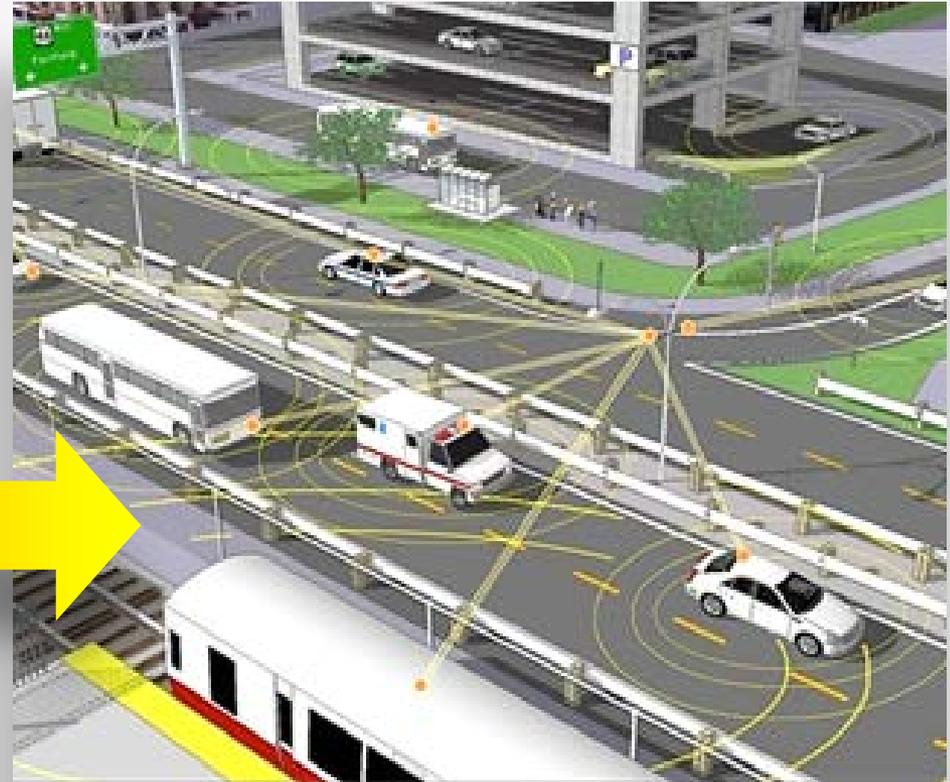


...Where do we/you want to go?

- Today (Not Connected)



- Future CV Environment



Transportation Challenges



Safety

32,675 highway deaths in 2014

- 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 CO₂



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

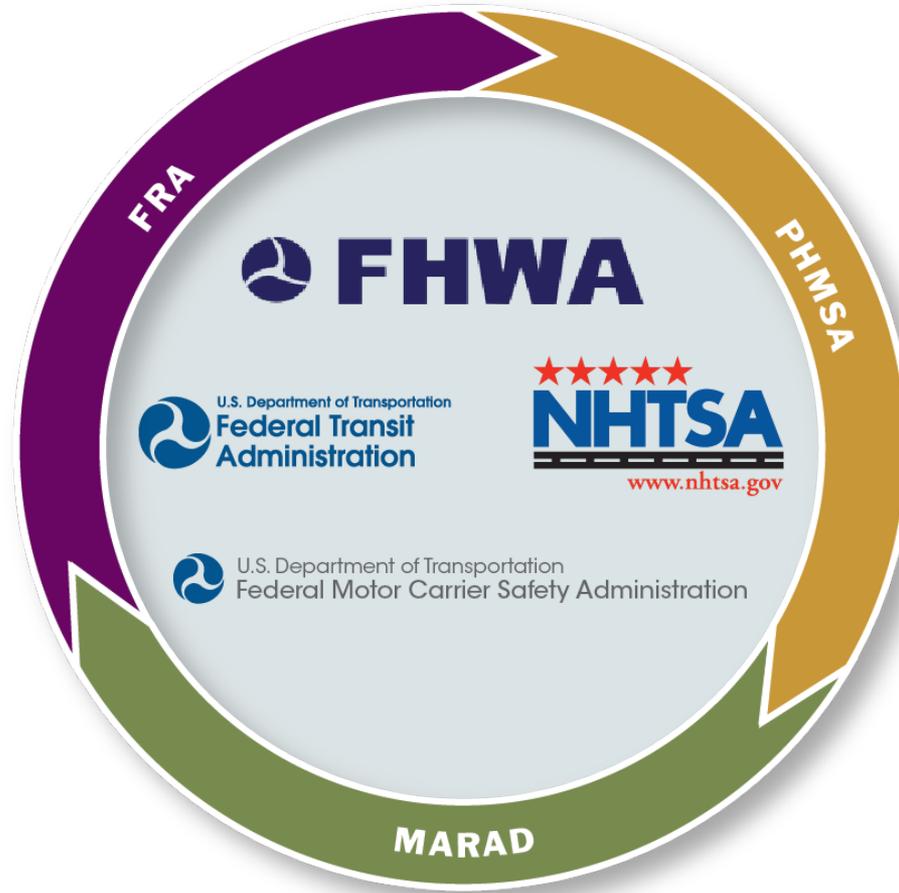


Connected Vehicles: *What Can They Do?*

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



Internal Stakeholders



External Stakeholders



Vehicle Manufacturers



Academia



Public Agencies



Industry



Associations/Standards Developers



Planning Stakeholders



Public Agencies



Transportation Associations



Governance & Planning Associations

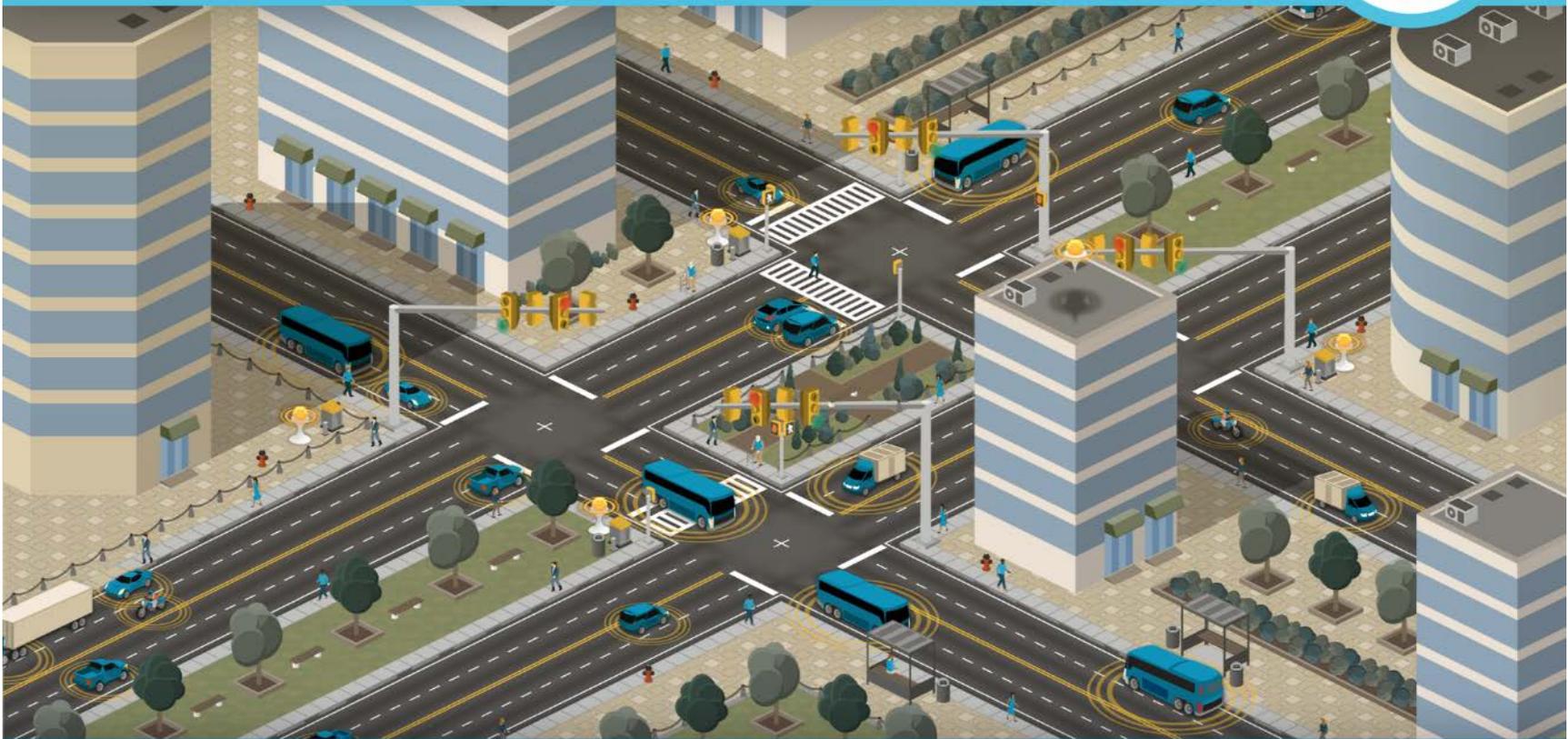


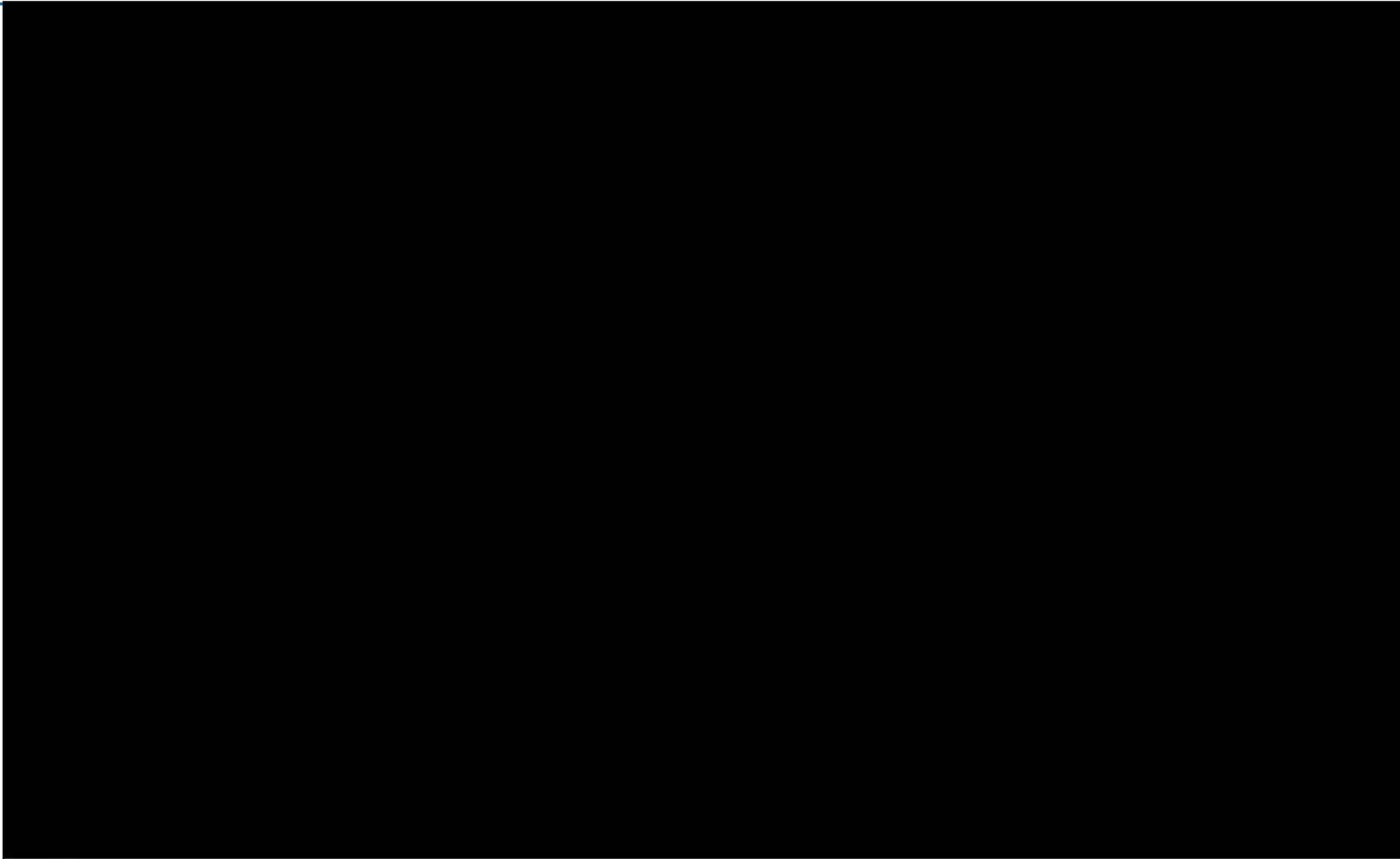
American Planning Association





How are we/you going to get there?





Safety Pilot Model Deployment Program



- 73 miles of instrumented roadway with 27 roadside units in Ann Arbor, MI
- Over 2,800 vehicles equipped with a variety of device types
- Various V2V and V2I applications
- Testing of prototype security mechanisms and device certification processes
- 1 year of data collection to support 2013 NHTSA decision
- Transitioned to an operational environment



Key Policy Program Focus Areas



- I. SECURITY POLICY**
- II. COMMUNICATIONS POLICY**
- III. DATA POLICY**
- IV. INTEROPERABILITY POLICY**
- V. DEPLOYMENT STRATEGIES
and DEPLOYMENT
READINESS**
- VI. FEDERAL ROLE IN POLICY**



Key Technical Program Focus Areas



- I. SECURITY CREDENTIAL MANAGEMENT SYSTEM**
- II. CERTIFICATION**
- III. ARCHITECTURE**
- IV. STANDARDS**
- V. INTERNATIONAL HARMONIZATION**

Guidance and Rulemaking



I. V2V Rulemaking

II. V2I Guidance

III. Performance Management

IV. Planning



CONNECTED VEHICLE PILOT Deployment Program



ITS Joint Program Office



CV PILOT DEPLOYMENT PROGRAM GOALS



Spur Early CV Tech Deployment



Wirelessly Connected Vehicles



Mobile Devices



Infrastructure

Measure Deployment Benefits



Safety



Mobility



Environment

Resolve Deployment Issues



Technical



Institutional



Financial



PILOT SITES AND DEPLOYMENT SCHEDULE



■ Pilot Sites



ICF/WYDOT

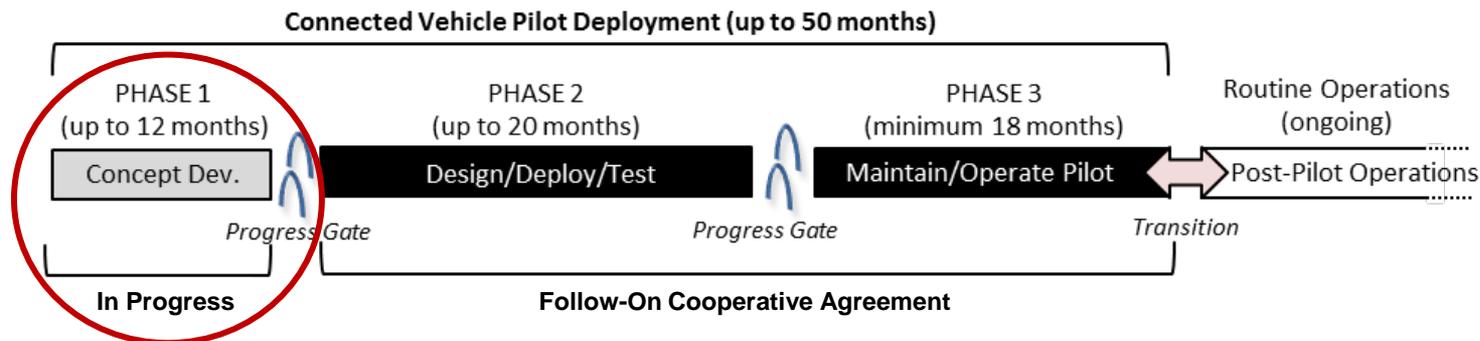


NYCDOT



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)



CONCEPT DEVELOPMENT ACTIVITIES AND PUBLIC EVENTS



Task	Sep 2015	Oct 2015	Nov 2015	Dec 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Jul 2016	Aug 2016	Sep 2016
Task 1 – Program Mgt.													
Task 2 – Concept of Operations						◆◆	◆						
Task 3 – Security Concept													
Task 4 – Safety Plan													
Task 5 – Performance Measurement										◆◆◆			
Task 6 – System Requirements													
Task 7 – App Planning													
Task 8 – Human Use Approval													
Task 9 – Training Plan													
Task 10 – Partnership													
Task 11 – Outreach Plan													
Task 12 – Deployment Plan												◆◆◆	
Task 13 – Readiness Summary													

◆ Public webinars to share the concept development activities from the three sites (see website for exact dates and times)



ICF/Wyoming DOT



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

ICF/WYDOT PILOT DEPLOYMENT OVERVIEW



Objective:

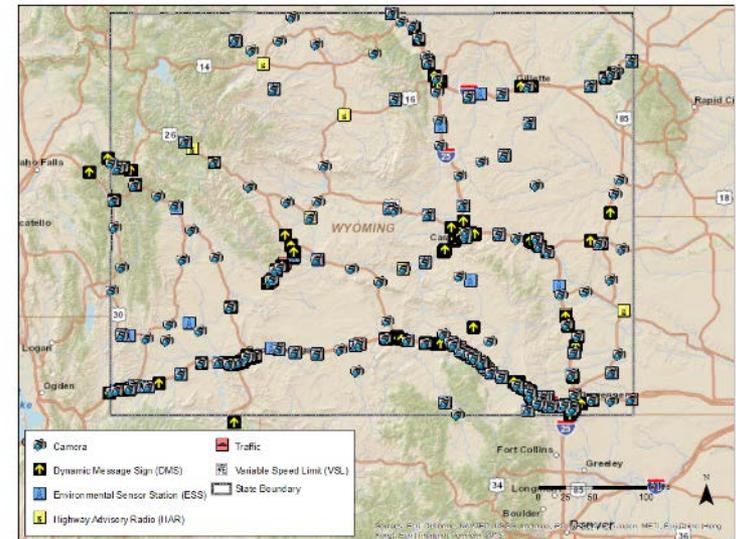
- Reduce the number and severity of adverse weather-related incidents (including secondary incidents) in the I-80 Corridor in order to improve safety and reduce incident-related delays.
 - Focused on the needs of the commercial vehicle operator in the State of Wyoming

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

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



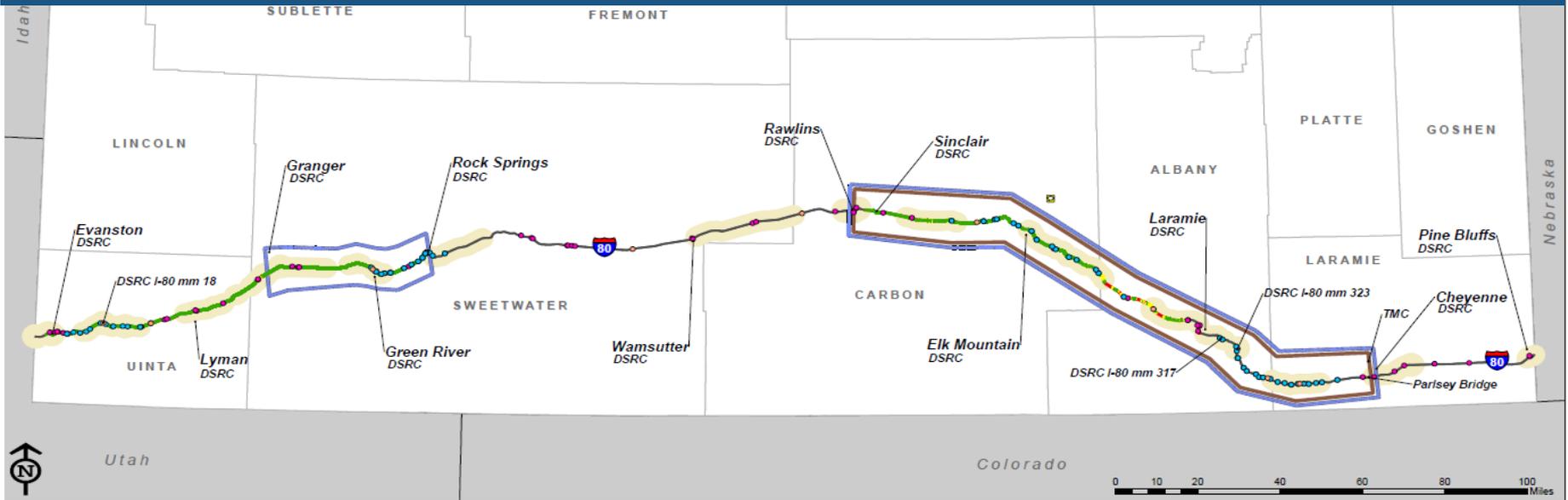
Source: Wyoming DOT



ICF/WYDOT PILOT DEPLOYMENT SITE: HIGH PRIORITY CORRIDOR



Wyoming I-80 Corridor – Connected Vehicle Map



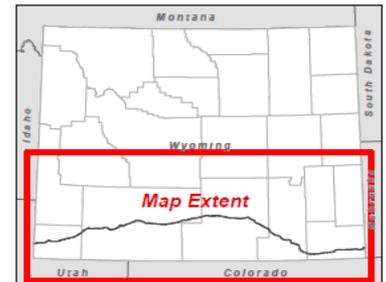
Created by: mdrake Date: 3/23/2015



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 of each town off I-80 for supporting VSL 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)



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				✓



ICF/WYDOT Pilot Deployment Vision



- 450 - 500 Equipped Trucks:
- 100 WYDOT Snow Plows/ Highway Patrol vehicles
 - 200-250 Other WYDOT Maintenance, Cities & Fleet Vehicles
 - 150-200 Commercial vehicles



30-50 RSU



122 VSL Signs



300 Miles of I-80

55 Parking Locations



Note: The number is a rough estimate for the concept development phase.

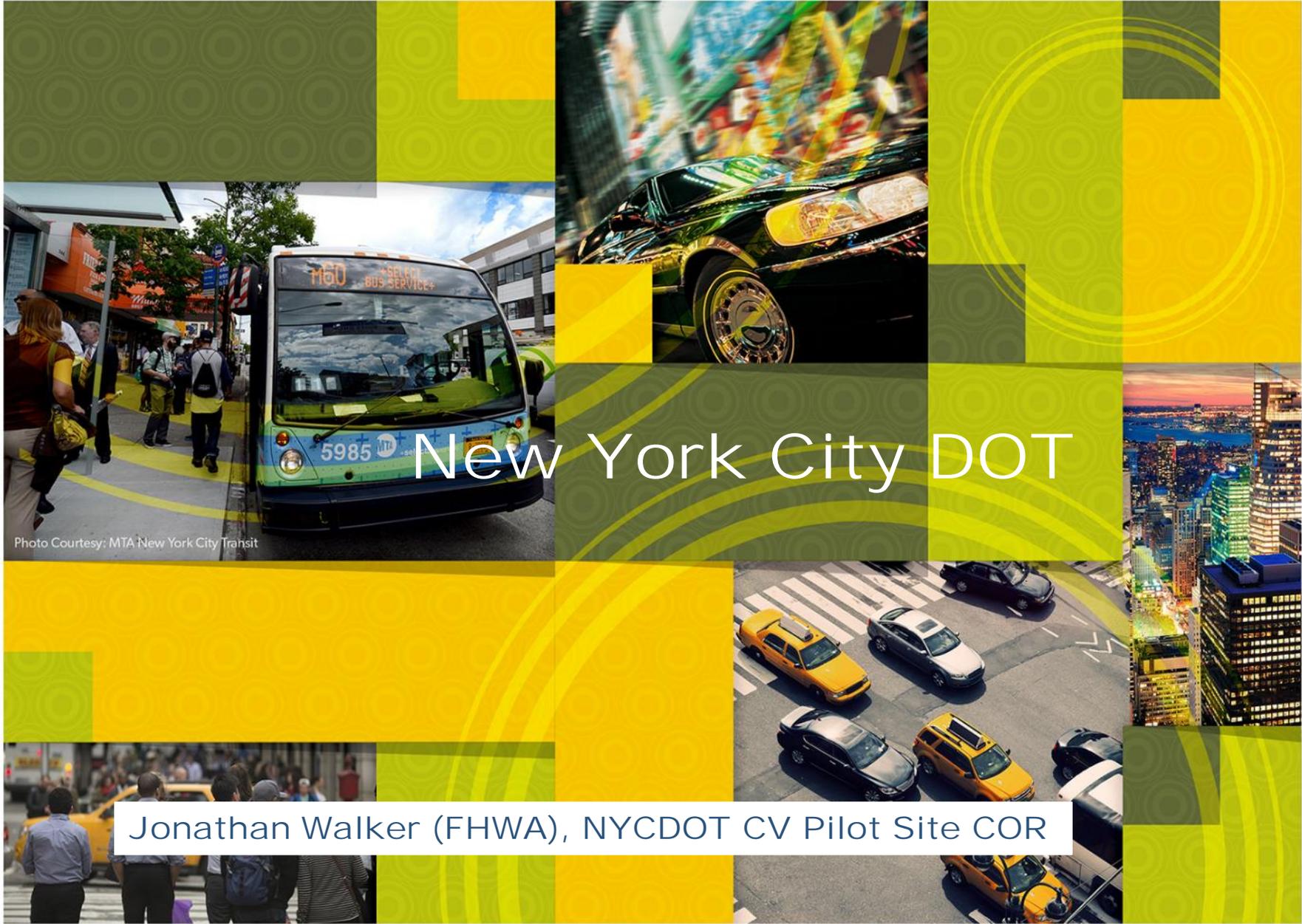


Photo Courtesy: MTA New York City Transit

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

Deployment Team:

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



Source: NYC DOT



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



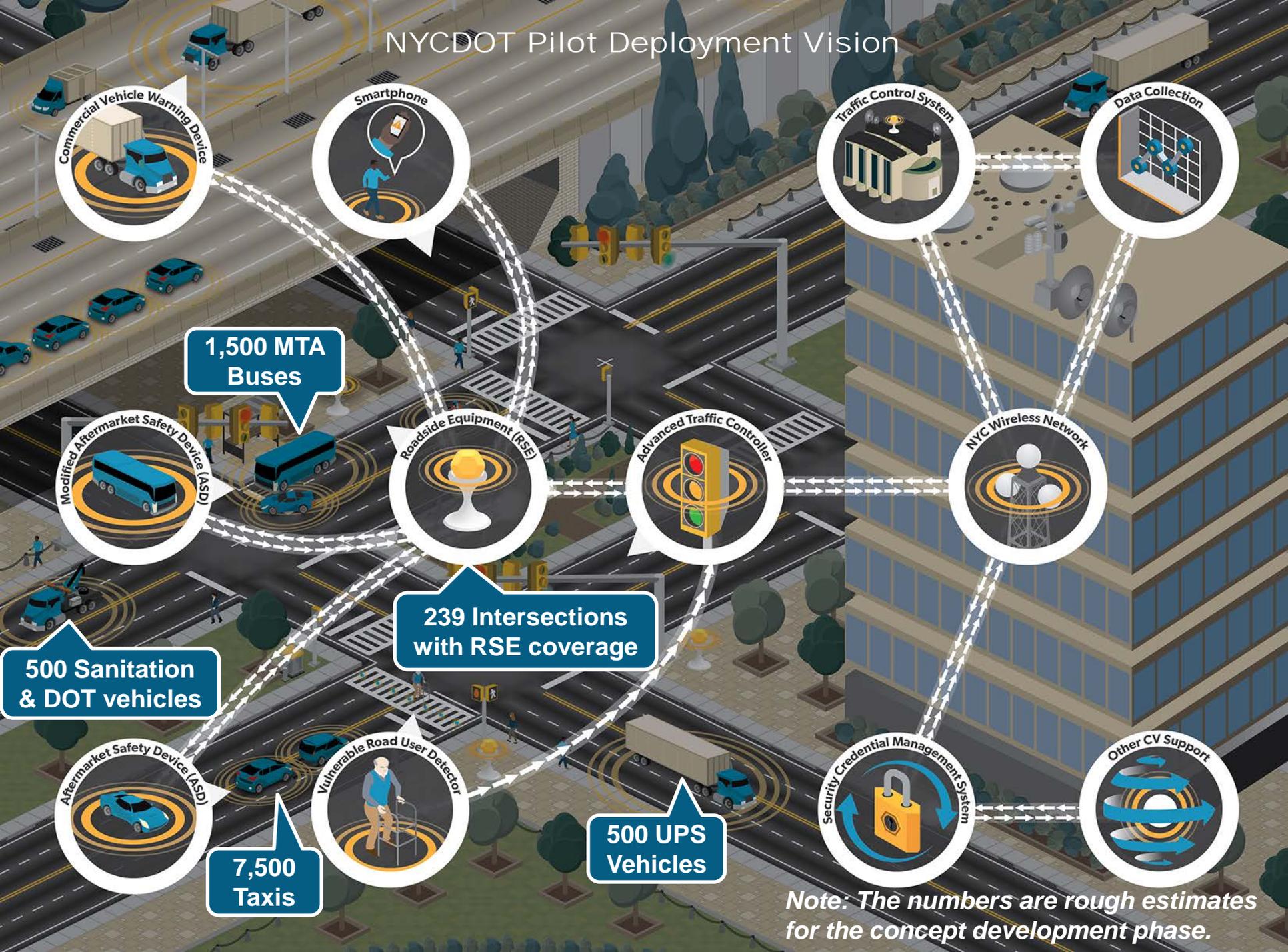
NYCDOT PILOT DEPLOYMENT PROPOSED CV APPLICATION-FLEET DISTRIBUTION



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	✓	✓	✓	✓	



NYCDOT Pilot Deployment Vision



Note: The numbers are rough estimates for the concept development phase.



Tampa (THEA) Tampa Hillsborough Expressway Authority

Govind Vadakpat (HRDO), Tampa (THEA) CV Pilot Site COR



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.

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

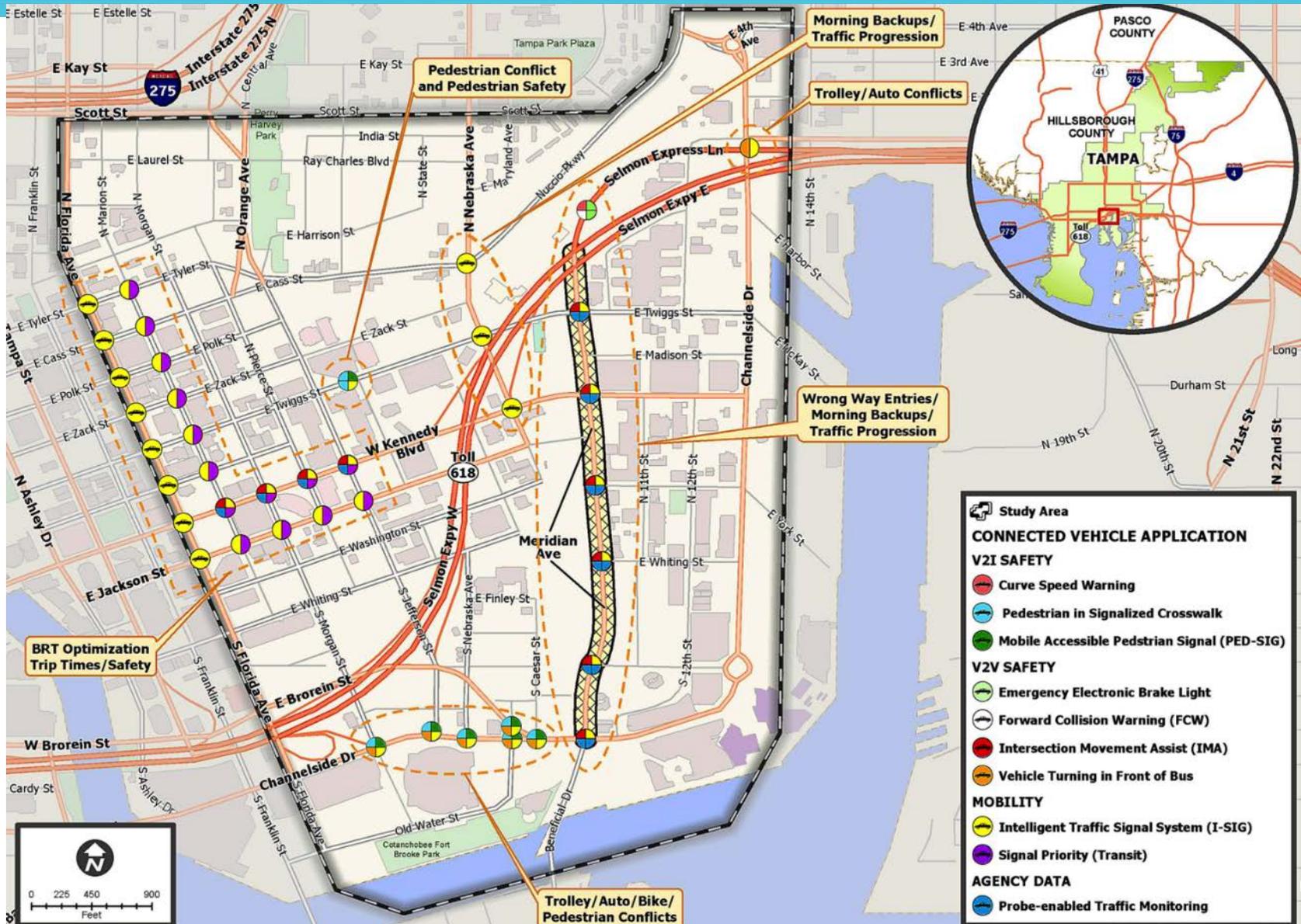


Source: THEA

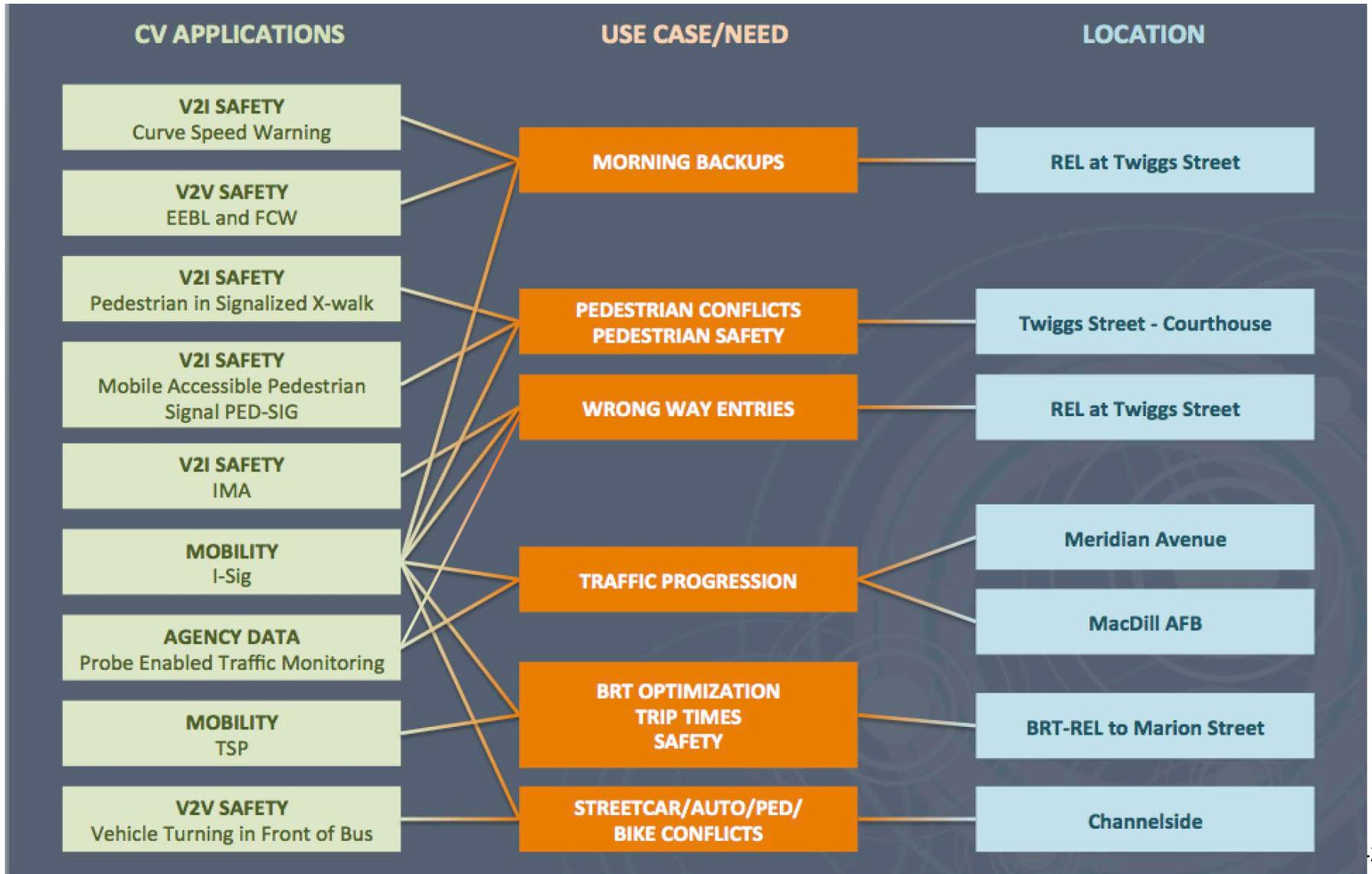


TAMPA (THEA) PILOT DEPLOYMENT SITE

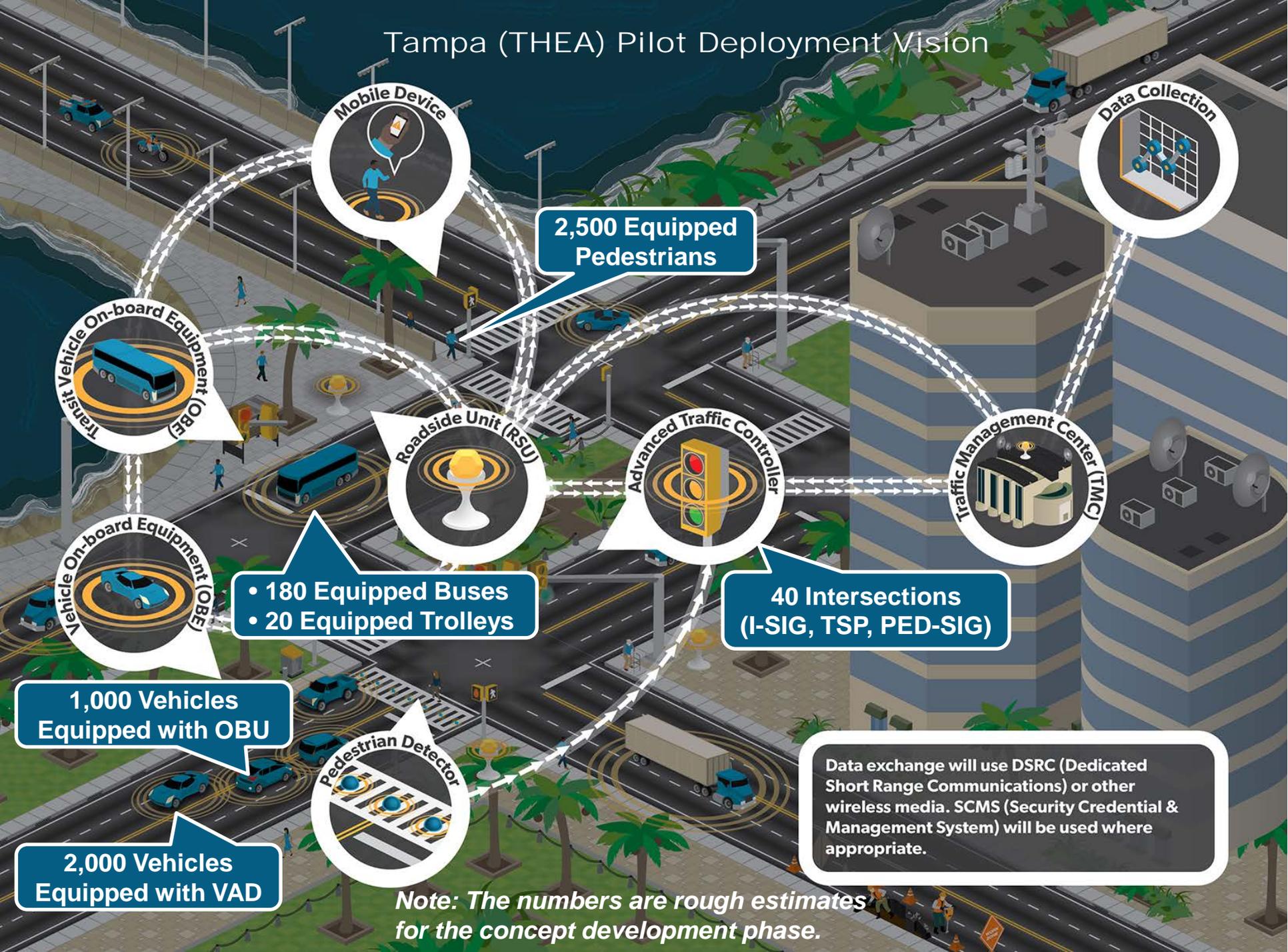
AN OVERVIEW OF DOWNTOWN TAMPA



TAMPA (THEA) PILOT DEPLOYMENT SITE NEEDS: ISSUES AND APPLICATIONS RELATIONSHIP



Tampa (THEA) Pilot Deployment Vision



2,500 Equipped Pedestrians

Data Collection

Transit Vehicle On-board Equipment (OBE)

Roadside Unit (RSU)

Advanced Traffic Controller

Traffic Management Center (TMC)

Vehicle On-board Equipment (OBE)

- 180 Equipped Buses
- 20 Equipped Trolleys

40 Intersections (I-SIG, TSP, PED-SIG)

1,000 Vehicles Equipped with OBU

Pedestrian Detector

2,000 Vehicles Equipped with VAD

Data exchange will use DSRC (Dedicated Short Range Communications) or other wireless media. SCMS (Security Credential & Management System) will be used where appropriate.

Note: The numbers are rough estimates for the concept development phase.



■ 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

How Can This Approach Help You to Achieve a Successful CV Deployment?

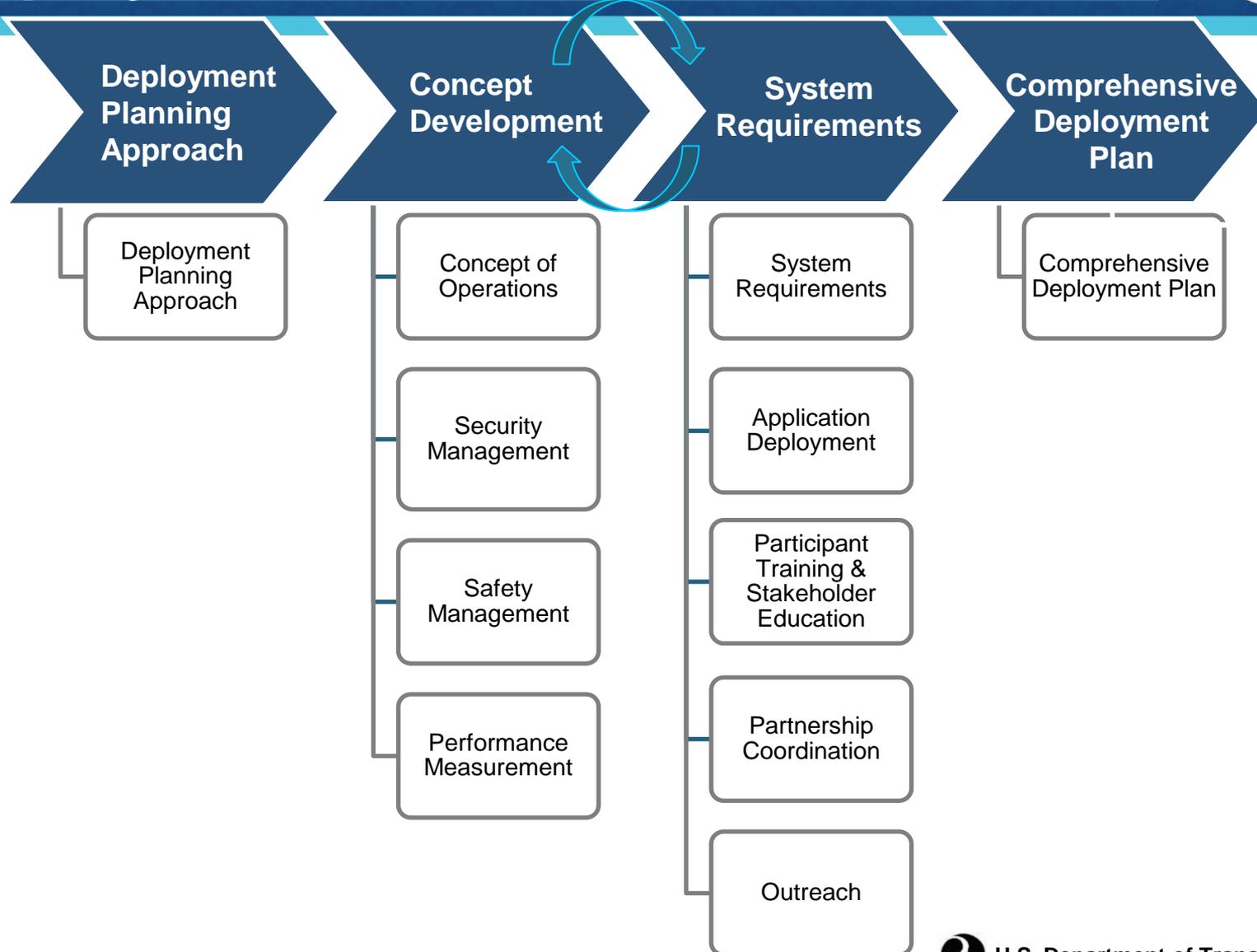


- **Successful deployment begins with disciplined Concept Development and System Planning**
 - To mitigate technical, institutional, and financial risk
 - To design and deploy on schedule and within budget
 - To routinely assess safety, mobility and environmental impacts
 - To create long-term technical and financial sustainability

- **Leverage Material from the CV Pilots (on-line)**
 - Tasks and deliverables
 - Guidance and technical assistance material (e.g., on-line webinars)
 - Examples from 3 Pilot Sites
 - Available @ <http://www.its.dot.gov/pilots/index.htm>

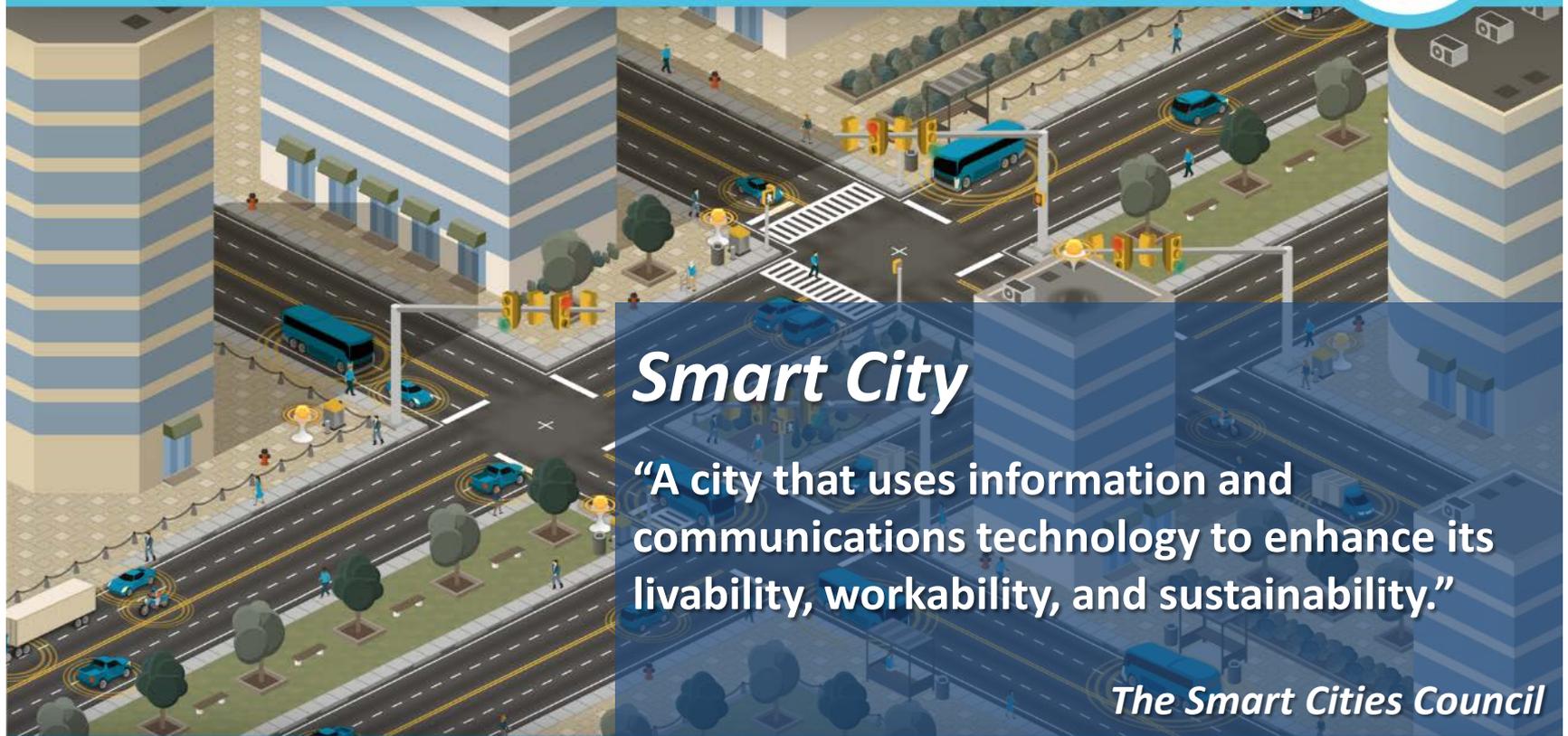


Deployment Planning Process





SMART CITY



Smart City

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

The Smart Cities Council



“Beyond Traffic 2045”

The USDOT’s new 30 Year Framework for the future addresses many of the issues around Smart Cities and provides additional food for thought



Source: USDOT

- How will we move?
- How will we move things?
- How will we move better?
- How will we adapt?
- How will we align decisions and dollars, and invest the trillions of dollars our transportation system needs in the smartest way possible?

<http://www.dot.gov/BeyondTraffic>





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

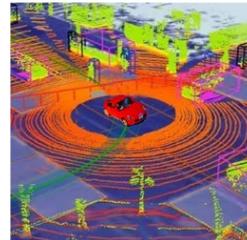
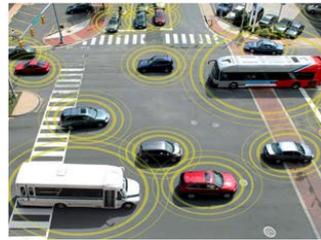
Vehicle Automation

Internet of Things

Machine Learning

Big Data

Sharing Economy



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





USDOT Smart City Challenge

Vision Elements

TECHNOLOGY ELEMENTS



Vision Element #1
Urban Automation



Vision Element #2
Connected Vehicles



Vision Element #3
Intelligent, Sensor-Based Infrastructure

INNOVATIVE APPROACHES TO URBAN TRANSPORTATION ELEMENTS



Vision Element #4
User-Focused Mobility Services and Choices



Vision Element #5
Urban Analytics



Vision Element #6
Urban Delivery and Logistics



Vision Element #7
Strategic Business Models & Partnering

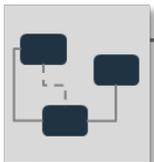


Vision Element #8
Smart Grid, Roadway Electrification, & EVs



Vision Element #9
Connected, Involved Citizens

SMART CITY ELEMENTS



Vision Element #10
Architecture and Standards



Vision Element #11
Low-Cost, Efficient, Secure, & Resilient ICT



Vision Element #12
Smart Land Use



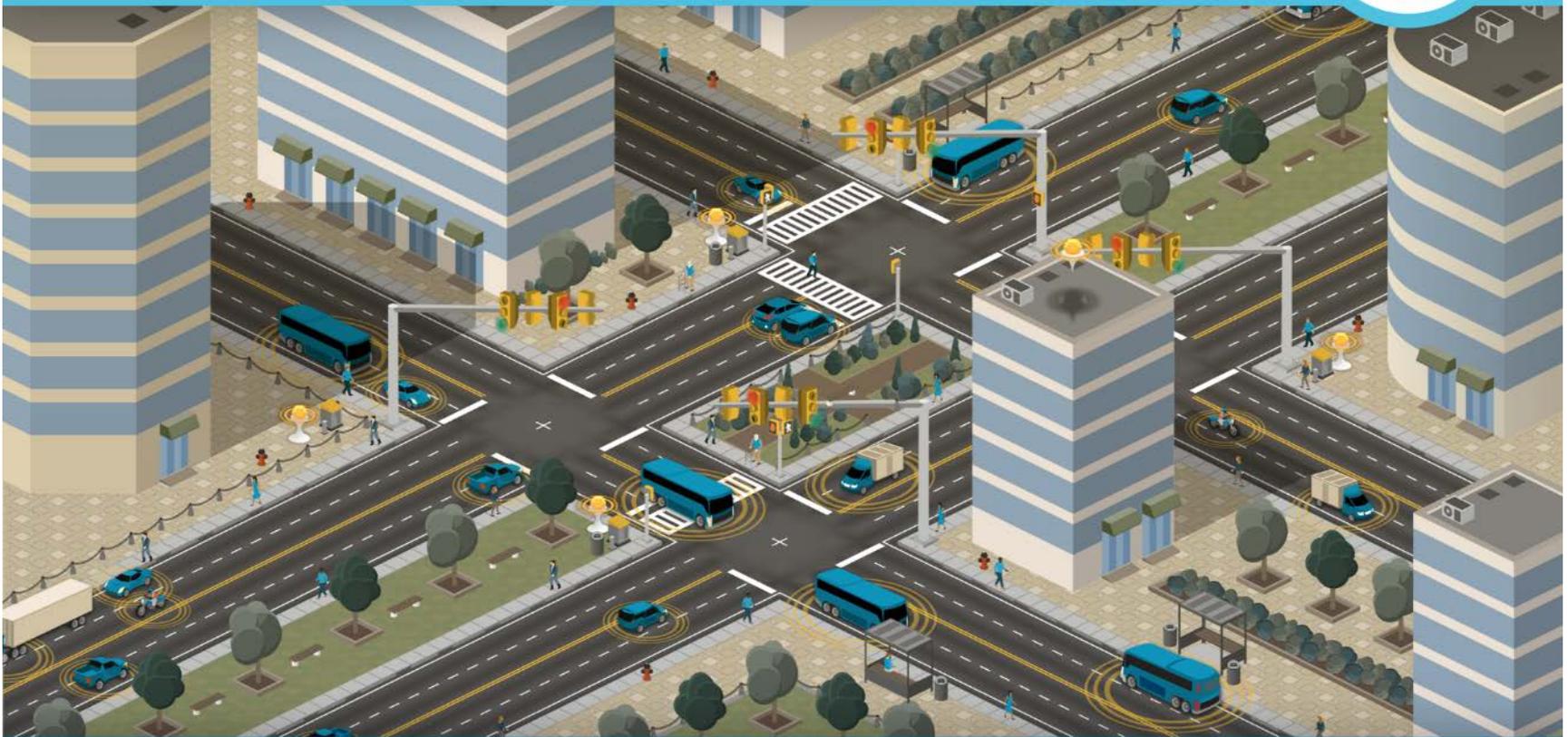


https://www.youtube.com/watch?v=cP-qppymE_w&list=PLE0JbKk9QnJ39QDizBR8pluuY6dfB9kAZ&index=10

[Columbus Smart City video](#)



What will it take?



Funding for ITS Deployment



- General eligibility
 - CV deployments are eligible for Federal aid funding where eligibility for ITS investments have been previously established

National Highway Performance Program
Surface Transportation <u>Block Grant</u> Program
<i>Transportation Alternatives Set-aside</i>
<i>Recreational Trails Program Set-aside</i>
<i>Surface Transportation Block Grant Program (net of TA & Rec Trails)</i>
Congestion Mitigation & Air Quality Improvement
Highway Safety Improvement Program
Railway-Highway Crossings Program
Metropolitan Planning
National Highway Freight Program



Funding for ITS Deployment (cont.)



- **Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Grants:** \$60M annually in competitive grants between 2016 and 2020 for the development of model deployment sites for large scale installation and operation of advanced transportation technologies to improve safety, efficiency, system performance, and infrastructure return on investment. <http://www.grants.gov/custom/viewOppDetails.jsp?oppld=282433>
- **Mobility on Demand (MOD) Sandbox:** Provides a venue through which integrated MOD concepts and solutions are demonstrated in real-world settings. FTA seeks to fund \$8M for project teams to innovate, explore partnerships, develop new business models, integrate transit and MOD solutions, and investigate new, enabling technical capabilities. **Proposals Due: 7/5/16** <https://www.transit.dot.gov/research-innovation/mobility-demand-mod-sandbox-program>





U.S. DOT and Commerce Discretionary Grant Programs

Transportation Investment Generating Economic Recovery (TIGER)

- Application Deadline: April 29, 2016

University Transportation Center (UTC)

- Application Deadline: May 13, 2016

FTA – Buses and Bus Facilities & Low or No Emission

- Application Deadline: May 13, 2016



U.S. DOT and Commerce Grant Programs (continued)



FTA – Tribal Transit Program

- Application Deadline: May 13, 2016

FRA – Railroad Safety Technology for Positive Train Control (PTC)

- Application Deadline: May 19, 2016

FHWA – Surface Transportation System Funding Alternatives (SFTSA) Program

- Application Deadline: May 20, 2016





U.S. DOT and Commerce Grant Program (continued)

FTA – Enhanced Mobility/Rides to Wellness/Innovative Coordinated Access

- Application Deadline: May 31, 2016

FTA – Mobility on Demand

Application Deadline: July 5, 2016

EDA – Regional Innovation Strategies (RIS) Program

- Application Deadline: June 25, 2016





Keys to the Federal-Aid Program – Through the Planning Process

The Planning Rule



- On Friday, May 27, 2016, the U.S. Department of Transportation's (USDOT) Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) published the Final Rule on Statewide and Nonmetropolitan Transportation Planning and Metropolitan Transportation Planning in the Federal Register.
- This rule implements the changes to the planning process established by the Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America's Surface Transportation Act (FAST Act).
- The Notice of Proposed Rulemaking (NPRM) was published in the Federal Register on June 2, 2014.



The Planning Rule (continued)



The [final rule](#) on Statewide and Nonmetropolitan Transportation Planning and Metropolitan Transportation Planning, published May 27, implements certain planning and environmental provisions of MAP-21 and the FAST Act changes to the transportation planning process, including:

- **requiring a performance-based approach to planning**
- a new emphasis on the nonmetropolitan transportation planning process, by requiring States to have a higher level of involvement with nonmetropolitan local officials and providing a process for the creation of regional transportation planning organizations
- adding a structural change to the membership of large metropolitan planning organizations (MPOs) to include representation of transit providers
- **adding a framework for voluntary scenario planning**
- implementing new authority for integrating the planning and environmental review processes as well as programmatic mitigation plans



The Planning Rule (continued)



- MAP-21 transformed the Federal-aid program by establishing new requirements for performance management and performance based planning and programming to ensure the most efficient investment of Federal transportation funds.
- The FAST Act continued the performance management and performance based planning and programming requirements of MAP-21 with minor changes.
- Performance management and performance based planning and programming increases the accountability and transparency of the Federal-aid program and provides for a framework to support improved investment decision making through a focus on performance outcomes for key national transportation goals.
- The State DOTs and MPOs are expected to use the updated regulations to make better informed transportation planning and programming decisions.
- The new performance aspects of the Federal-aid program would allow FHWA and FTA to better communicate a national performance story and more reliably assess the impacts of Federal funding investments.



Potential Benefits of ITS – Key Solution



- **Safety.** The injuries and fatalities of both vehicle occupants and vulnerable road users will be reduced and mitigated.
- **Mobility.** The information about travel conditions and options for both system users and operators will be increased and improved.
- **Environment.** The impact of vehicle travel will be reduced by promoting greener transportation choices and driver/vehicle behavior.
- **Data.** New and cost-effective data sources and collection methods will be introduced that will improve asset management, network operations, just-in-time maintenance, and incident response, among other functions

Benefits are expected to grow over time as more vehicles, infrastructure and travelers are equipped



Typical Planning Products and Processes



- Long-range visioning
- Metropolitan Transportation Plan
Statewide/regional long-range transportation plan
- Transportation Improvement Program
- Short-range transportation plan
- Congestion management plan
- Asset management plan
- ITS and operations plan
- ITS Architecture
- State implementation plan
- Strategic Highway Safety Plan
- Highway Safety Improvement Program
- Transit development plan
- Transportation demand management plan
- Non-motorized (bicycle and pedestrian) plan
- Corridor studies (modal or multimodal)
- Public involvement plan
- Freight plans
- Financing plans



Metropolitan Transportation Plan (MTP) Statewide/Regional Long-Range Transportation Plan



- Both States and MPOs develop long-range transportation plans (LRTPs)
- MTPs guide decision-making and investments across all modes of surface transportation over a 20+ year horizon
- During this 20+ year horizon, emerging CV technology may revolutionize transportation, making it important that MTPs start including plans for the infrastructure, data, etc. that regions will need to support CV
- CV will also provide more comprehensive, more granular, and (in some cases) more reliable data to track performance measures in the performance-based MTP



NPRM to Propose National Performance Management Measures



- On Friday, April 22, the Federal Highway Administration (FHWA) published in the Federal Register a Notice of Proposed Rulemaking (NPRM) to propose national performance management measure regulations to assess the performance of the National Highway System, Freight Movement on the Interstate System, and the Congestion Mitigation and Air Quality Improvement Program, as required by the Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America's Surface Transportation Act ("FAST Act").



NPRM to Propose National Performance Management Measures



This NPRM proposes regulations that would make progress towards the following national goals:

- Congestion reduction - To achieve a significant reduction in congestion on the NHS.
- System reliability - To improve the efficiency of the surface transportation system.
- Freight movement and economic vitality - To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- Environmental sustainability - To enhance the performance of the transportation system while protecting and enhancing the natural environment.

In addition, this NPRM:

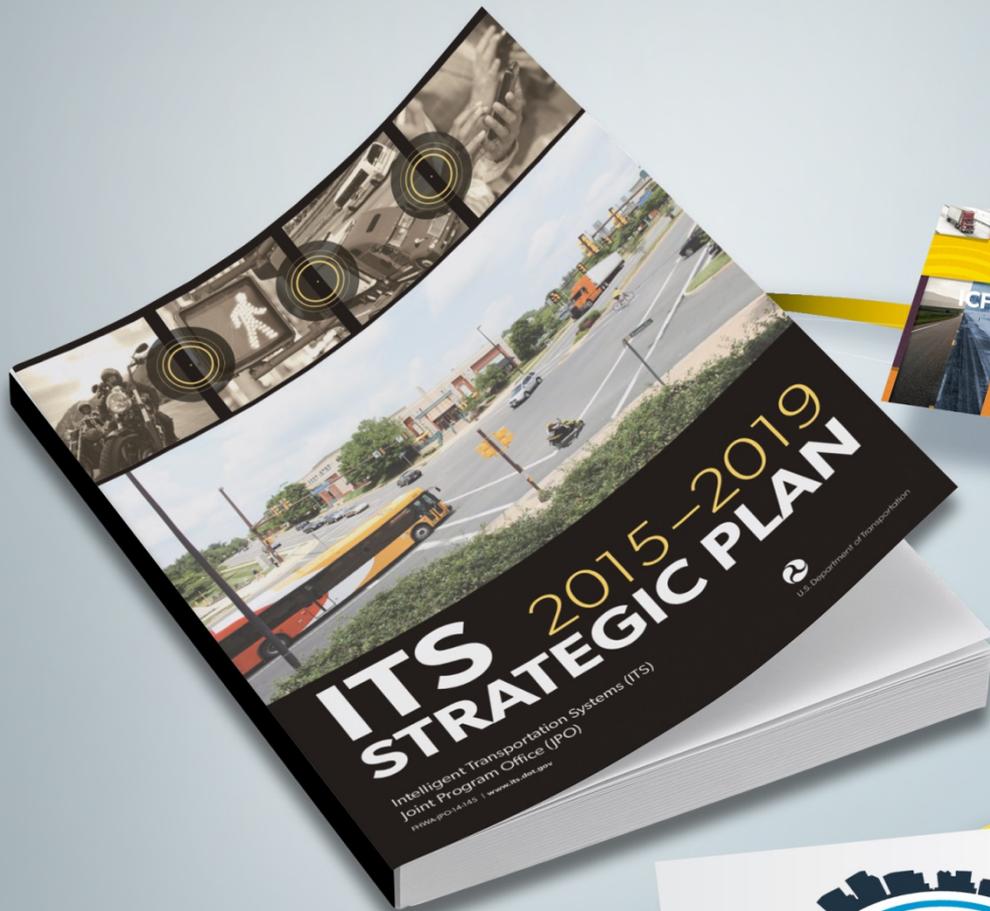
- Provides for greater consistency in the reporting of condition/performance;
- Proposes requirements for the establishment of targets that can be aggregated at the national level;
- Proposes reporting in a consistent manner on progress achievement; and
- Proposes a process for determining a State DOT's significant progress.





How did we do?





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



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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



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