



U.S. Department of Transportation



Connected Vehicle Field Tests in the U.S.

Kate Hartman

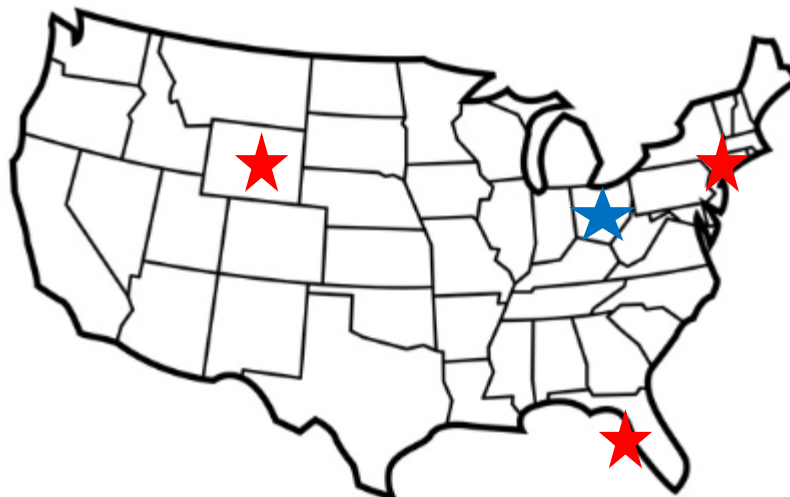
Chief – Research, Evaluation and Program Management
ITS Joint Program Office

October 10, 2016

OVERVIEW



- Overview of the Connected Vehicle Pilot Program Award Sites
 - Wyoming DOT (WYDOT) CV Pilot Deployment
 - New York City (NYC) DOT CV Pilot Deployment
 - Tampa (THEA) CV Pilot Deployment
- Overview of the Smart City Challenge
 - Columbus, Ohio



CV PILOT DEPLOYMENT PROGRAM GOALS



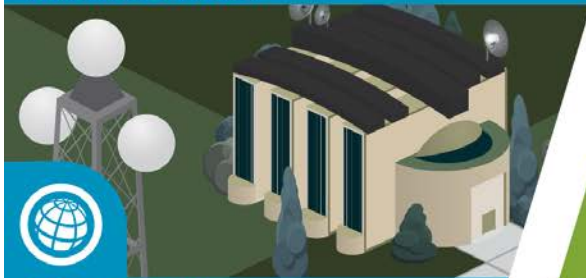
Spur Early CV Tech Deployment



Wirelessly Connected Vehicles



Mobile Devices



Infrastructure

Measure Deployment Benefits



Safety



Mobility



Environment

Resolve Deployment Issues



Technical



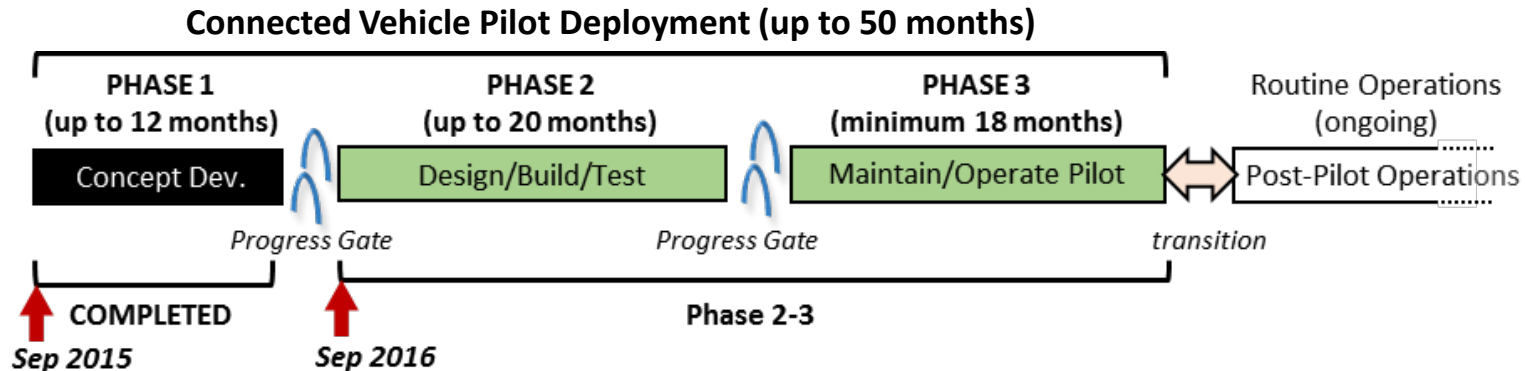
Institutional



Financial



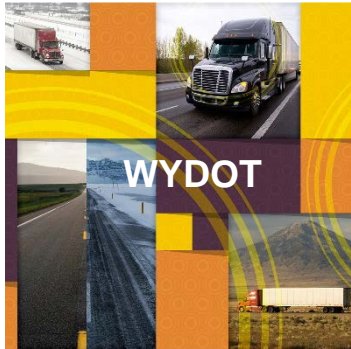
CV PILOT DEPLOYMENT SCHEDULE



- **Phase 1: Concept Development (COMPLETE)**
 - Creates the foundational plan to enable further design and deployment
 - **Progress Gate: Is the concept ready for deployment?**
- **Phase 2: Design/Deploy/Test (CURRENT PHASE- began September 1, 2016)**
 - Detailed design and deployment followed by testing to ensure deployment functions as intended (both technically and institutionally)
 - Progress Gate: Does the system function as planned?
- **Phase 3: Maintain/Operate**
 - Focus is on assessing the performance of the deployed system
- **Post Pilot Operations (CV tech integrated into operational practice)**



THE THREE PILOT 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 8,000 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.



OVERVIEW OF PILOT DEPLOYMENT PROPOSED CV APPLICATIONS



Category	WYDOT – CV Application
V2V Safety	Forward Collision Warning (FCW)
V2I/I2V Safety	I2V Situational Awareness*
	Work Zone Warnings (WZW)*
	Spot Weather Impact Warning (SWIW)*
V2I and V2V Safety	Distress Notification (DN)
Category	Tampa (THEA) – CV Application
V2I Safety	Curve Speed Warning (CSW)
	Pedestrian in Signalized Crosswalk Warning (PED-X)
	Red Light Violation Warning (RLVW)
V2V Safety	Emergency Electronic Brake Lights (EEBL)
	Forward Collision Warning (FCW)
	Intersection Movement Assist (IMA)
	Vehicle Turning Right in Front of a Transit Vehicle (VTRFTV)
Mobility	Mobile Accessible Pedestrian Signal System (PED-SIG)
	Intelligent Traffic Signal System (I-SIG)
	Transit Signal Priority (TSP)
Agency Data	Probe-enabled Data Monitoring (PeDM)

Category	NYCDOT – CV Application
V2I/I2V Safety	Speed Compliance
	Curve Speed Compliance
	Speed Compliance/Work Zone
	Red Light Violation Warning
	Oversize Vehicle Compliance
	Emergency Communications and Evacuation Information
V2V Safety	Forward Crash Warning (FCW)
	Emergency Electronics Brake Lights (EEBL)
	Blind Spot Warning (BSW)
	Lane Change Warning/Assist (LCA)
	Intersection Movement Assist (IMA)
	Vehicle Turning Right in Front of Bus Warning
V2I/I2V Pedestrian	Pedestrian in Signalized Crosswalk
	Mobile Accessible Pedestrian Signal System (PED-SIG)
Mobility	Intelligent Traffic Signal System (I-SIGCVDATA)

** The applications have mobility/ efficiency as a secondary benefit.*



OVERVIEW OF PILOT DEPLOYMENT PROPOSED CV DEVICES



WYDOT – Devices	Estimated Number
Roadside Unit (RSU)	75
WYDOT Fleet Subsystem On-Board Unit (OBU)	100
Integrated Commercial Truck Subsystem OBU	150
Retrofit Vehicle Subsystem OBU	20-30
Basic Vehicle Subsystem OBU	100-150
<i>Total Equipped Vehicles</i>	<i>400</i>

Tampa (THEA) – Devices	Estimated Number
Roadside Unit (RSU) at Intersection	40
Vehicle Equipped with On-Board Unit (OBU)	1,500
Pedestrian Equipped with App in Smartphone	500
HART Transit Bus Equipped with OBU	10
TECO Line Street Car Equipped with OBU	10
<i>Total Equipped Vehicles</i>	<i>1,520</i>

NYCDOT – Devices	Estimated Number
Roadside Unit (RSU) at Manhattan and Brooklyn Intersections and FDR Drive	353
Taxi Equipped with Aftermarket Safety Device (ASD)*	5,850
MTA Fleet Equipped with ASD*	1,250
UPS Truck Equipped with ASD*	400
NYCDOT Fleet Equipped with ASD*	250
DSNY Fleet Equipped with ASD*	250
Vulnerable Road User (Pedestrians/Bicyclists) Device	100
PED Detection System	10 + 1 spare
<i>Total Equipped Vehicles</i>	<i>8,000</i>

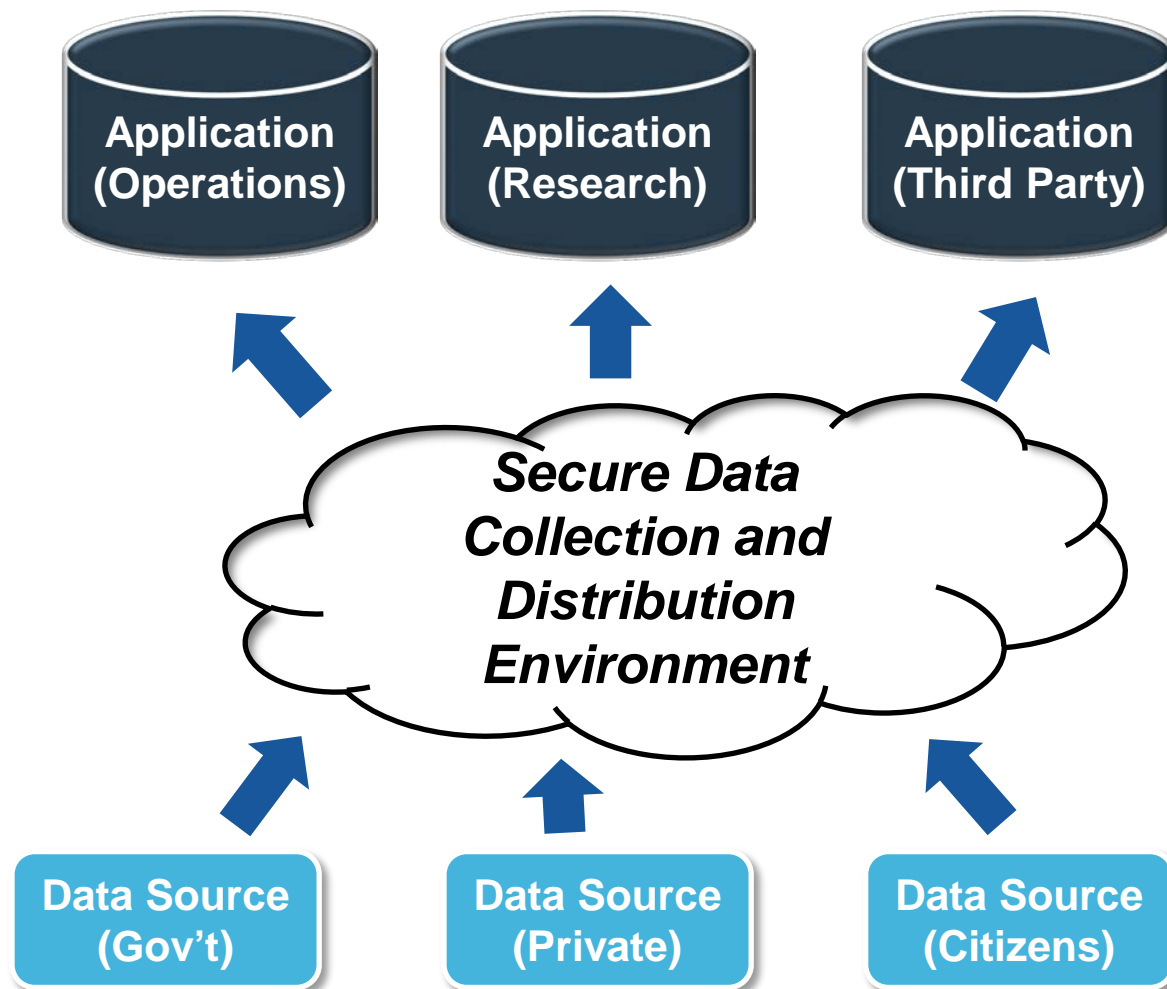


MODULAR DATA MANAGEMENT



Key Concepts:

- Over-internet data transfer and storage
- On-demand, programmatic access for multiple applications (**APIs**)
- Programmatic, revocable access controls
- **Agile** development principles and **open** interfaces – *not* a tightly coupled, closed data system



Data Management Planning



- Systems deployed as part of each CV Pilot deployment must be capable of showing how well the systems are performing with respect to **performance measures** and targets identified in the Performance Measurement Plan.
- To support **independent evaluation**, each team shall securely transmit data to support evaluation, on a schedule and using a medium agreed upon with the Independent Evaluator, to the Independent Evaluator's location.
- Appropriately prepared system control, performance and evaluation data are expected to be shared with the USDOT and posted in timely fashion on resources such as the **Research Data Exchange (RDE)** (www.its-rde.net) stripped of PII.
- The Data Sharing Framework (part of the Data Management Plan) will describe how these data transfers will happen.



Data Management Plan



The Data Management Plan should describe:

How data will be collected, managed, integrated, and disseminated before, during, and after the CV Pilot operation. This includes **real-time** and **archived data** that are inputs to and outputs from systems managed by the site and its partners.

The Data Management Plan should also describe:

The data the site **currently collects and plans to collect**
The **terms of existing and future data sharing agreements** that will be put in place

If the site plans to partner with outside organizations (nonprofits, universities, corporations, etc.) it shall address whether and specify how (e.g., limitation on sharing or use) data from those organizations will be collected, managed, and shared.

Practices that safeguard data, privacy, and physical assets



Data Privacy Plan



- Draft, Revised, and Final
- Consistent with the Phase 1 Security Management Operating Concept, which includes a Privacy Operational Concept
- Consistent with an overall Privacy Management Plan (not a required deliverable, but each team must certify that it has been finalized)
- Documents planned policies and procedures consistent with USDOT data privacy policy in the areas of:
 - Collection of Personally Identifiable Information (PII)
 - Notice to Human Subjects
 - Security
 - Maintenance and Disposal
 - Privacy Documentation and Reporting





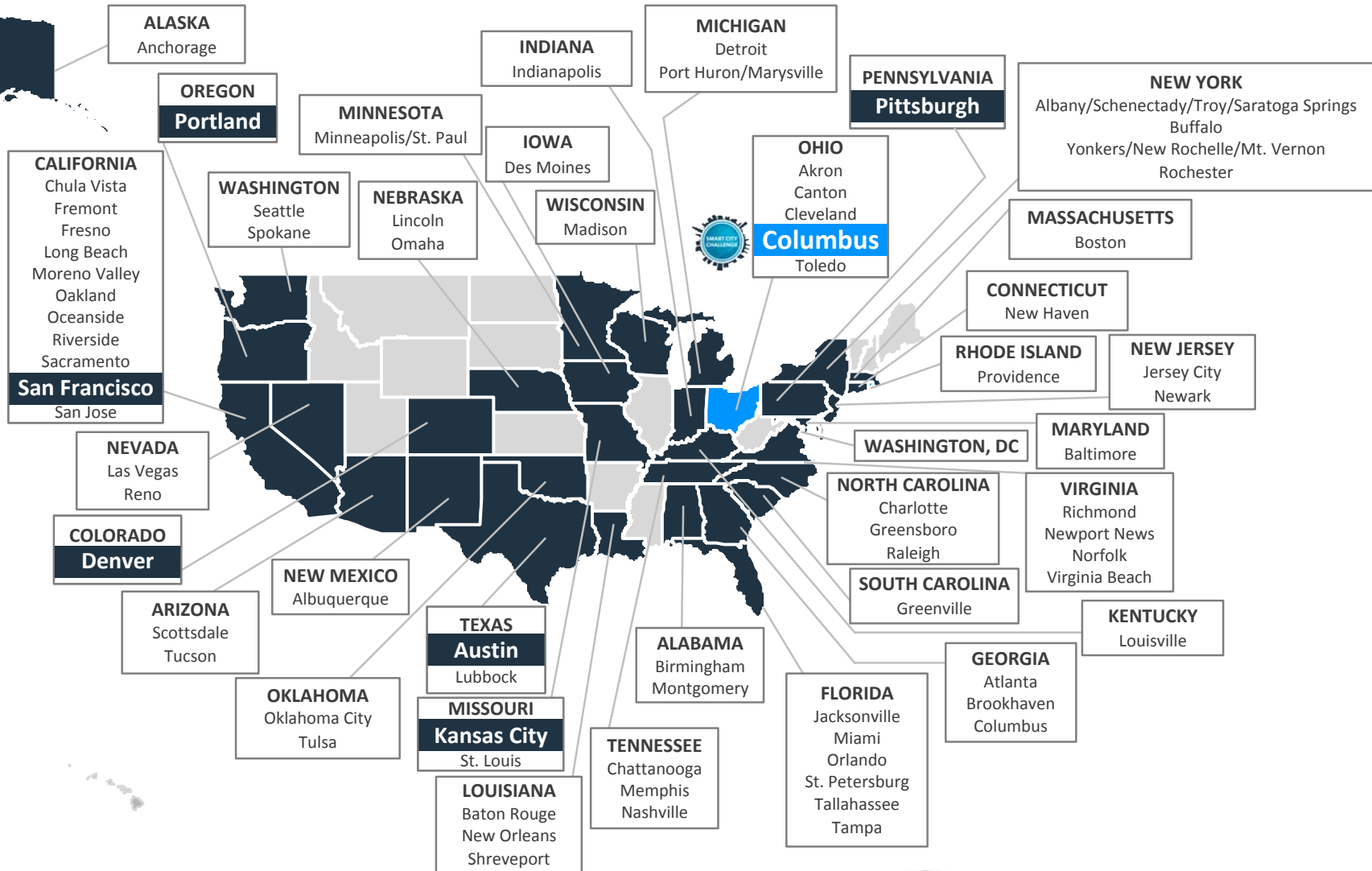
The Smart City Challenge

- Encourage cities to put forward their best and most creative ideas for innovatively addressing the challenges they are facing.
- Demonstrate how advanced data and intelligent transportation systems (ITS) technologies and applications can be used to reduce congestion, keep travelers safe, protect the environment, respond to climate change, connect underserved communities, and support economic vitality.



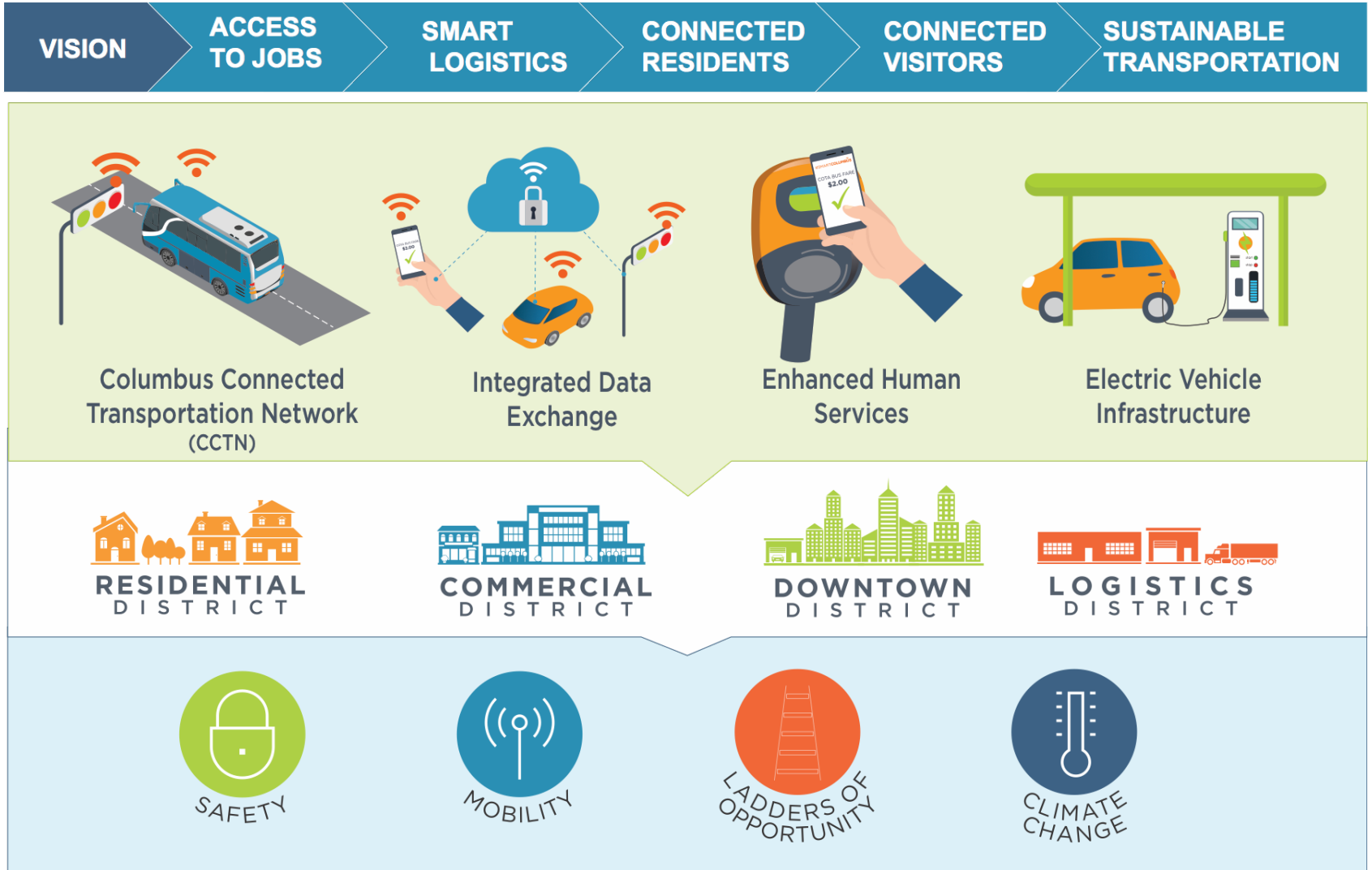


The Smart City Challenge





SMARTCOLUMBUS



Source: The City of Columbus





CCTN Components

200 DSRC Roadside Units

3,000 Connected Vehicles

200 Smart Street Lights with Wi-Fi

350 Mobileye Shield + and Enhanced Transit Safety Retrofit

12 Bus Stop Pedestrian Warning Systems

100 Traffic Signal Controller Upgrades

10 Multimedia Kiosks

10 Parking Detection Systems

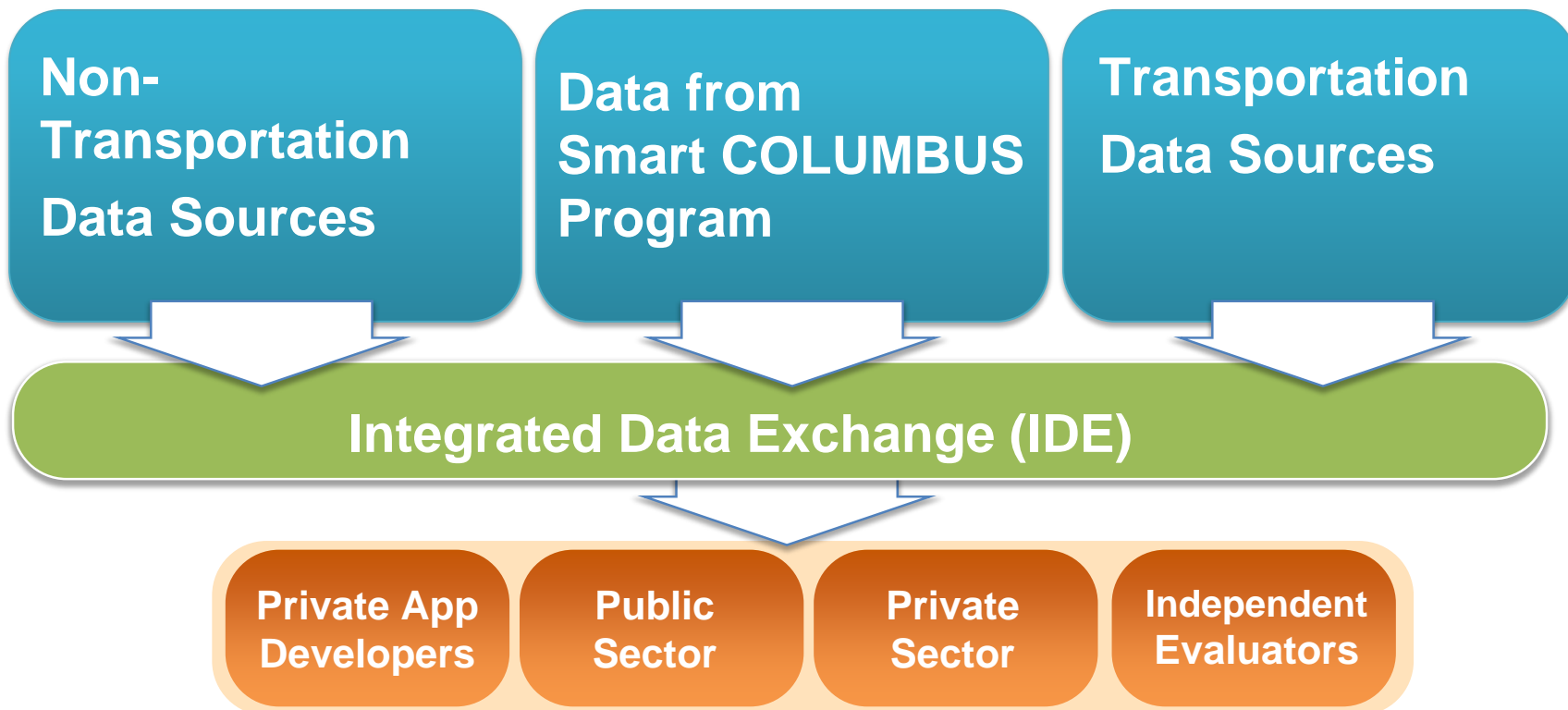
50,000 RFID Customized Windshield Stickers

10 Point of Service RFID Readers





Integrated Data Exchange (IDE)



Source: The City of Columbus





Kate Hartman

ITS Joint Program Office

Phone: (202) 366-2742

Email: Kate.Hartman@dot.gov

Ariel Gold

JPO Data Program Director

Phone: (202) 366-4374

Email: Ariel.Gold@dot.gov

