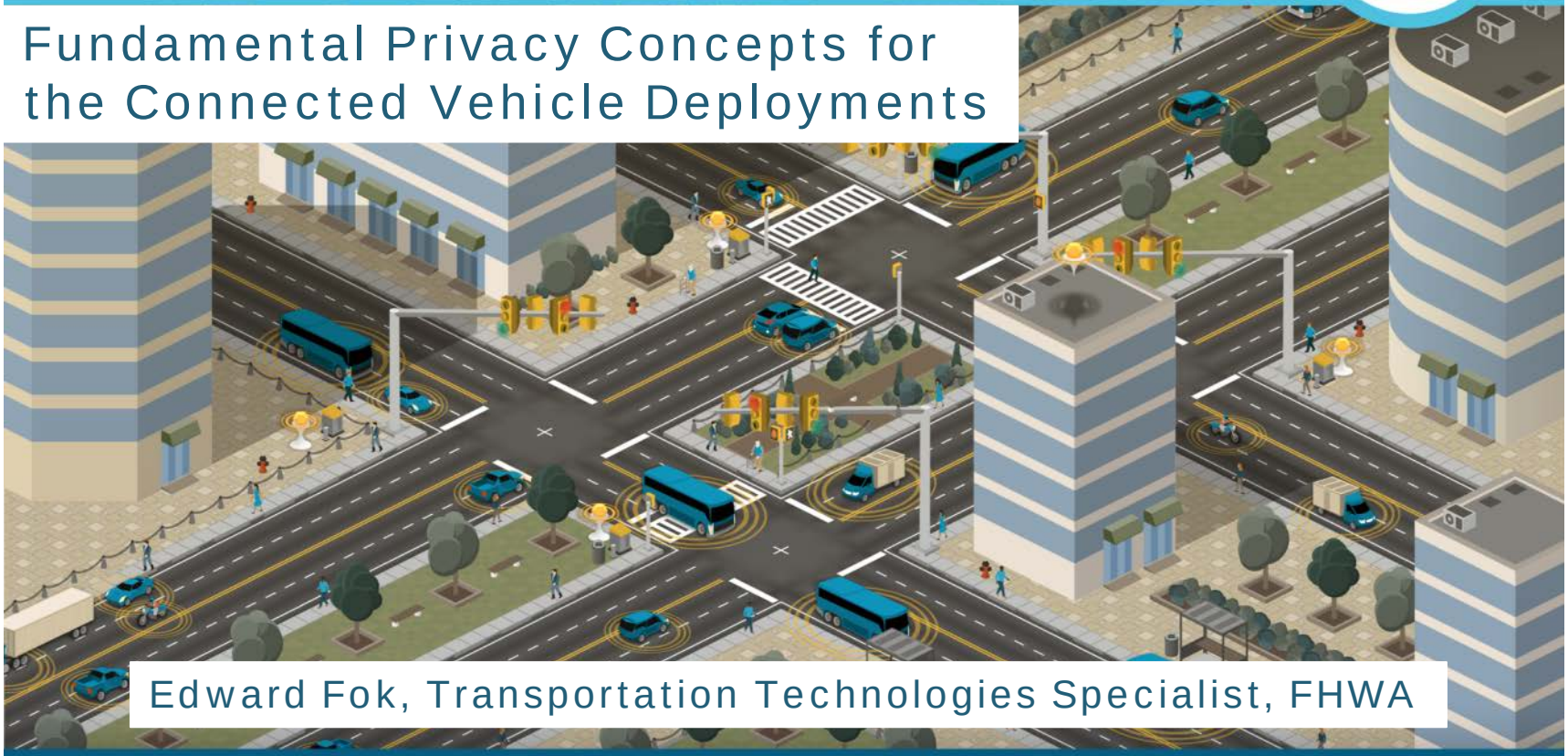
CONNECTED VEHICLE PILOT
Deployment Program

Fundamental Privacy Concepts for the Connected Vehicle Deployments



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ITS Joint Program Office

TODAY'S AGENDA

- **Purpose of this Technical Assistance Webinar Series**
  - To assist not only the three selected sites, but also other early deployers of connected vehicle technologies to conduct Concept Development activities.

- **Webinar Content**
  - Connected Vehicle Pilot Deployment Program Overview
  - Fundamental Privacy Concepts
  - Stakeholder Q&A
  - How to Stay Connected

- **Webinar Protocol**
  - Please mute your phone during the entire webinar
  - You are welcome to ask questions via chatbox at the Q&A Section
  - The webinar will be recorded except the Q&A Section
  - The webinar recording and the presentation material will be posted on the CV Pilots website within a week

CV Pilot Deployment Program Goals

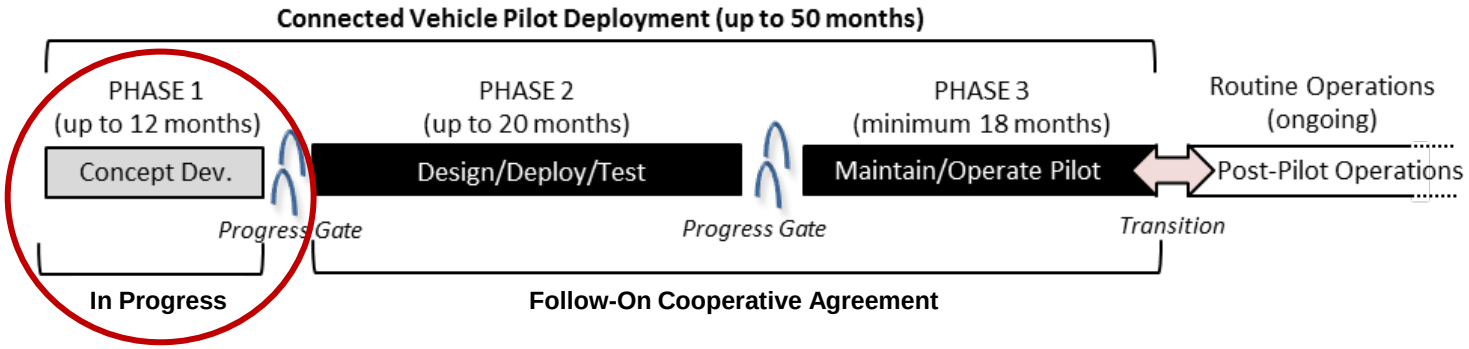
Sites Selected – 2015 Awards

- 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.

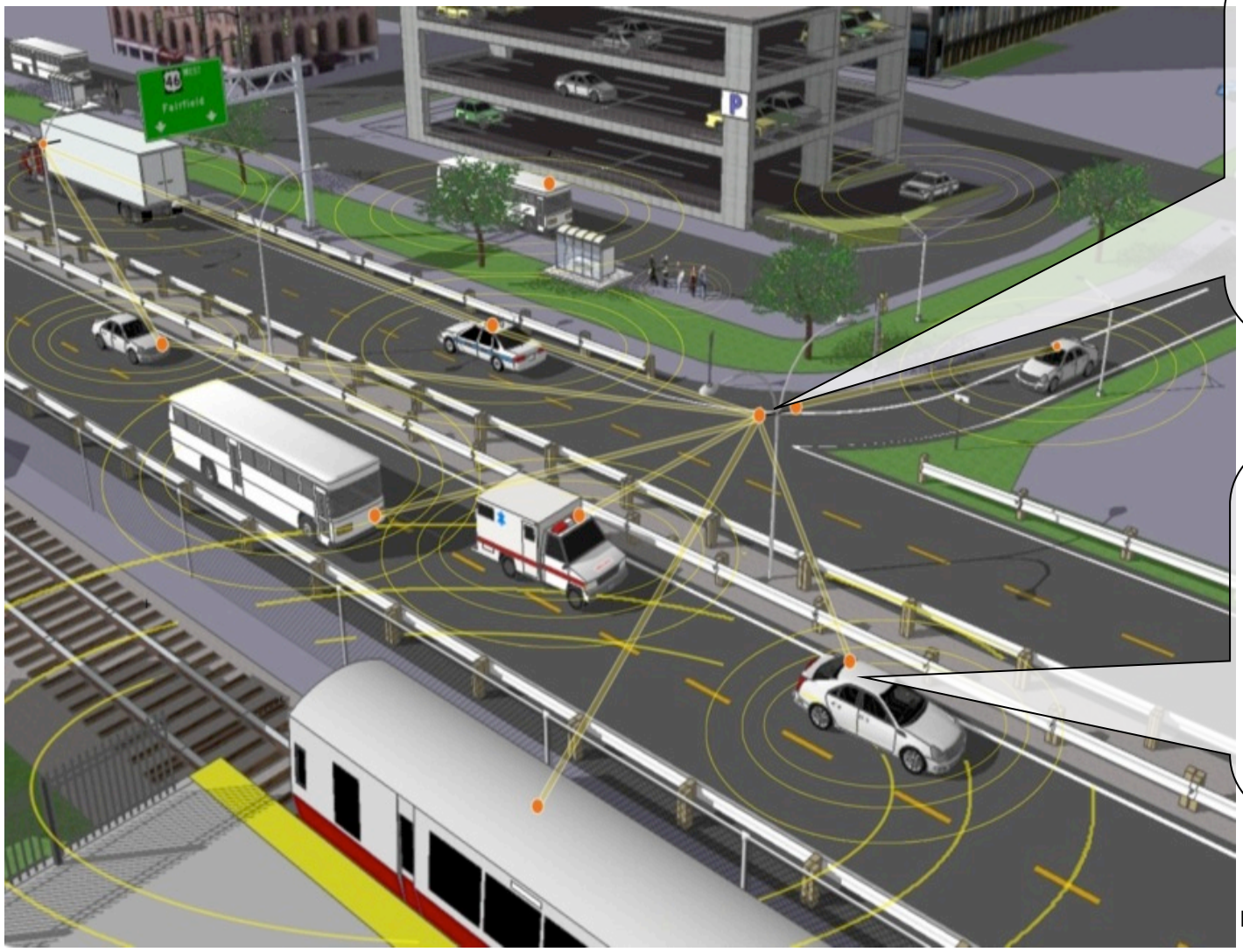
- Alleviate congestion and improve safety during morning commuting hours.
- Deploy a variety of connected vehicle technologies on and in the vicinity of reversible express lanes and three major arterials in downtown Tampa to solve the transportation challenges.

DEPLOYMENT SCHEDULE



- **Overall Deployment Schedule**
  - **Phase 1:** Concept Development
    - Creates the foundational plan to enable further design and deployment
  - **Phase 2:** Design/Deploy/Test
    - Detailed design and deployment followed by testing to ensure deployment functions as intended (both technically and institutionally)
  - **Phase 3:** Maintain/Operate
    - Focus is on assessing the performance of the deployed system
  - Post Pilot Operations (CV tech integrated into operational practice)
- **Public webinars to share the concept development activities from the three sites**
  - Concept of Operations Webinar (February – March 2016)
  - Performance Measurement Webinar (May – June 2016)
  - Deployment Plan Webinar (August 2016)

What are Connected Vehicles (CV)?



Infrastructure Data

- Traffic Signal Data
- Maneuver Assistance
- Speed Limit
- Parking Availability
- Road Weather Data

Vehicle Data

- Positon & Vector
- Speed
- Acceleration
- Steering Angle
- Brake Status
- Vehicle Size

Problems Where CV Can Help

Safety
33,561 highway deaths in 2012
5,615,000 crashes in 2012
Leading cause of death for ages 4, 11-27

Mobility
5.5 billion hours of travel delay
$121 billion cost of urban congestion

Environment
2.9 billion gallons of wasted fuel
56 billion lbs. of additional CO_2

Sources: Traffic Safety Facts: 2012 Data, National Highway Traffic Safety Administration (Nov 2013)
2011 Annual Urban Mobility Report, Texas Transportation Institute (Feb 2013

BASIC CV TECHNOLOGIES

- **Radio**
  - 5.9 GHz for safety and mobility
    - Vehicle Radio – On Board Units (OBU)
    - Infrastructure Radio – Road Side Units (RSU)
  - Integrated and retrofit options

- **Standards**
  - IEEE 802.11p - Radio
  - IEEE 1609.x - Authentication
  - SAE J2735 - Data Vocabulary

Role of Privacy

- **Connected Vehicle success depends on public acceptance**
  - Show Personally Identifiable Information (PII) are protected
  - Show safety information and warning can be trusted
- **Improvements to Safety, Mobility, and Environmental Impact only happens when CV technologies are used**
- **Privacy, security, and operational choices have to be balanced**

How is Privacy Protected?

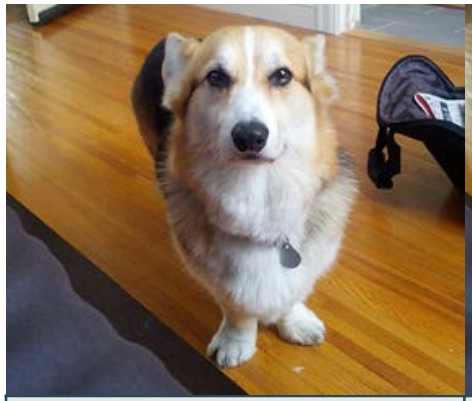
- **Privacy is protected through the use of Security Controls**
  - Physical protection of devices
  - Technical protection of information
  - Policy guides organizational procedure and processes; for instance, access controls, policies on acceptable uses of data

Personally Identifiable Information

- **Non-PII**
  - This data cannot be traced back to an individual. This includes time zone, traffic count information, general trends on network conditions, date and time.
- **Potential-PII**
  - These data elements cannot be linked to an individual unless combined with other data sources. This includes internet cookies, IP addresses, and vehicle characteristics (size, color, and make/model)
- **Actual-PII**
  - This is information that can be tracked back to an individual. Basic information includes Names, Addresses, Telephone numbers, and Vehicle Identification Numbers (VIN).
- **Locational-PII**
  - This includes information that can be used to track an individual at a particular location. This includes GPS tracking information (Lat./Long.), Roadway Video Data, Video of faces, in-vehicle video.
- **Sensitive-PII**
  - This data, if lost can pose a significant risk of economic or physical harm to the individual. Examples are: Medical Records, Social Security Numbers, Bank Account Numbers, and Passport Numbers.

Anonymity or Privacy?

- **What is Anonymity?**
  - The Quality or state of being unknown to people
- **What is Privacy?**
  - The state of being away from people

		
Identified **Not Anonymous**	**Potential Identifiable Information** • **Make** • **Model** **Not Anonymous**	**Actual Identifiable Information** • **Make** • **Model** • **License Plate** **Not Anonymous**

STANDARDS BASED APPROACH

- **NIST SP 800-53 for Federal Government**
- **National Association of State CIOs (NASCIO) offer State-based best practices**
- **FTC's Fair Information Practice Principles (FIPP)**
  - Transparency
  - Individual Participation
  - Purpose Specification
  - Data Minimization
  - Use Limitation
  - Data Quality and Integrity
  - Security
  - Accountability and Auditing

Privacy Policy and Operations

- **Federal Policies**
  - CV systems will be operated by State and Municipalities
  - Limits to what Federal Privacy Protection must be adopted

- **Commercial Practices**

Real Time Data Privacy

- **Basic Safety Message (BSM)**
  - 38 Bytes of data
  - SCMS overhead is not included in this
- **Information used to improve Safety**
- **Information used to improve mobility**

Variable	Description	Byte Count
MSGCnt	MsgCount within a stream	1
ID	Temporary ID	4
SECMark	Dsecond (0-60999 ms)	2
LAT	Latitude (-90 to +90 in 1/10 microdegree units)	4
LONG	Longitude (-180 to +180 in 1/10 microdegree units)	4
ELEV	Elevation (-409.5 to 6143.9 meters in 10cm increments)	2
ACCURACY	Positional Accuracy (semi-minor and semi-major at 0.05m units)	4
SPEED	TransmissionAndSpeed	2
	Speed meters per second in 0.02 m/s units	0-12 bits
	Transmission State (DE_TransmissionState)	13-15 bits
	Neutral	
	Park	
	Forward	
	Reverse	
	Reserved (-3 states)	
	Unavailable	
HEADING	Heading (WSG-84 north reference at 0.0125 degree units)	2
ANGLE	Steering Wheel Angle (-189 to +189 degrees in 1.5 degree units)	1
ACCELSet	AccelerationSet4Way (long, lat, vert, yaw rate, per SAE-J670)	7
BRAKES	BrakeSystemStatus	2
	wheelBrakes	4 bits
	wheelBrakesUnavailable	1 bits
	spareBit	1 bits
	traction control state	2 bits
	antilock brake status	2 bits
	stability control status	2 bits
	brake boost applied	2 bits
	auxiliary brake status	2 bits
SIZE	VehicleSize – 1cm units	3
	VehicleWidth	10 bits
	VehicleLength (front to rear bumper)	14 bits

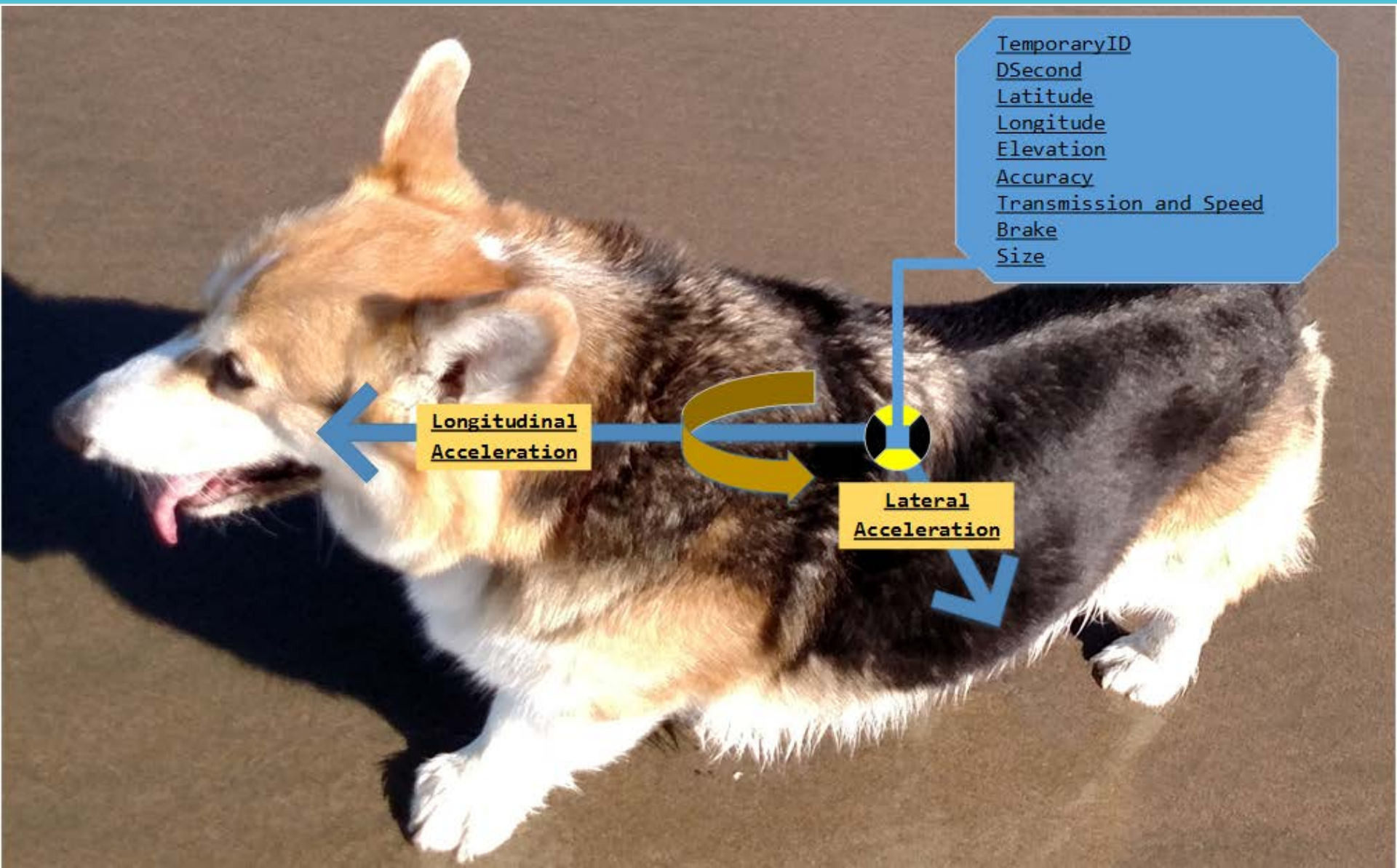
Real Time Data Protection

- **Identification and authentication using secured credentials**
  - Very short live span credentials
  - Used in a randomized manner
- **Structural protection of Credential Management Authorities**
  - Structured to obfuscate requests for credentials
  - Divide stored data at an institutional level to ensure that no one database is comprehensive

- **In a CV environment, data does not contain PII.**

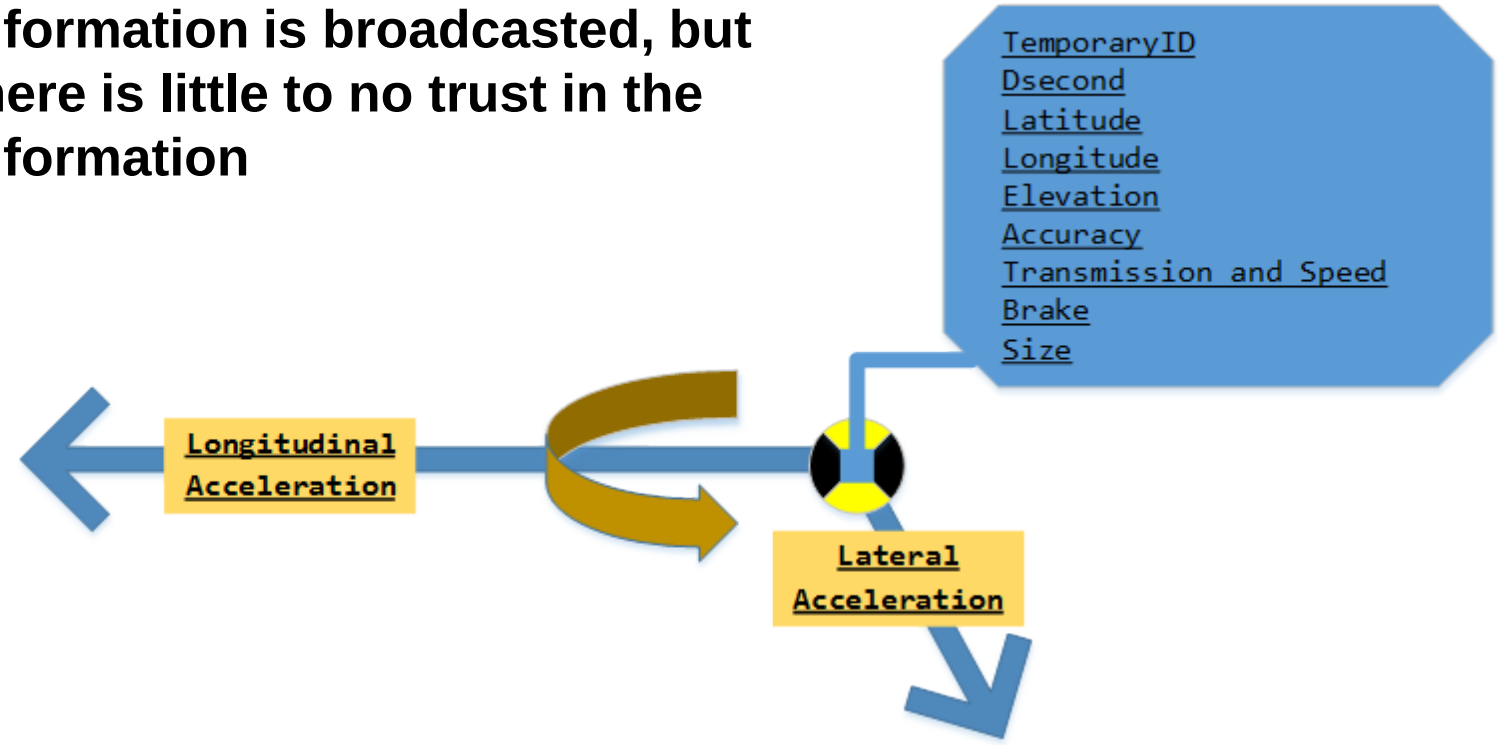
- **Institutional authorities are designed to obfuscate possible PII correlation and provides structural resiliency.**

Example of CV Privacy



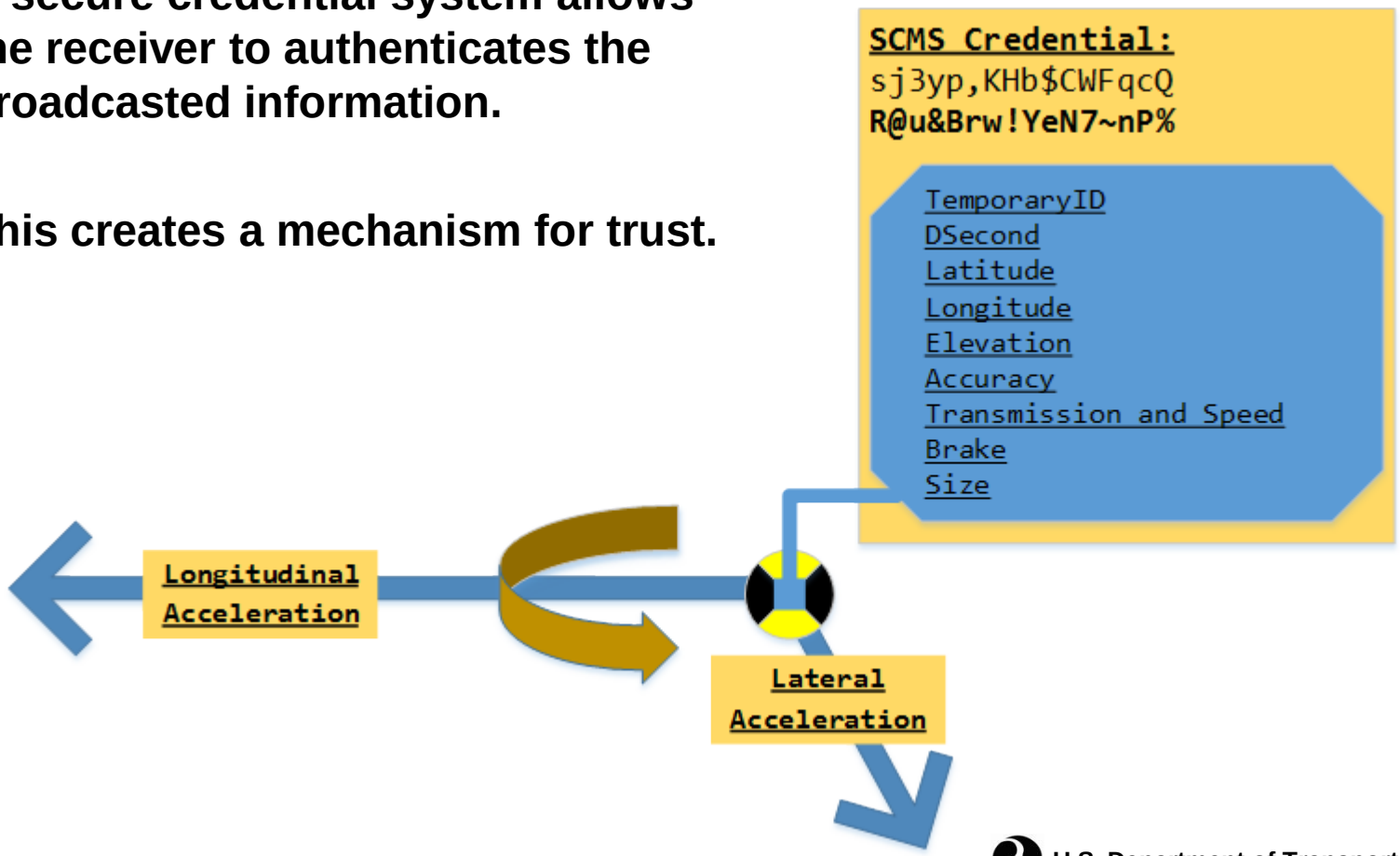
BSM Only – Trust Issues

No Personally Identifiable Information is broadcasted, but there is little to no trust in the information



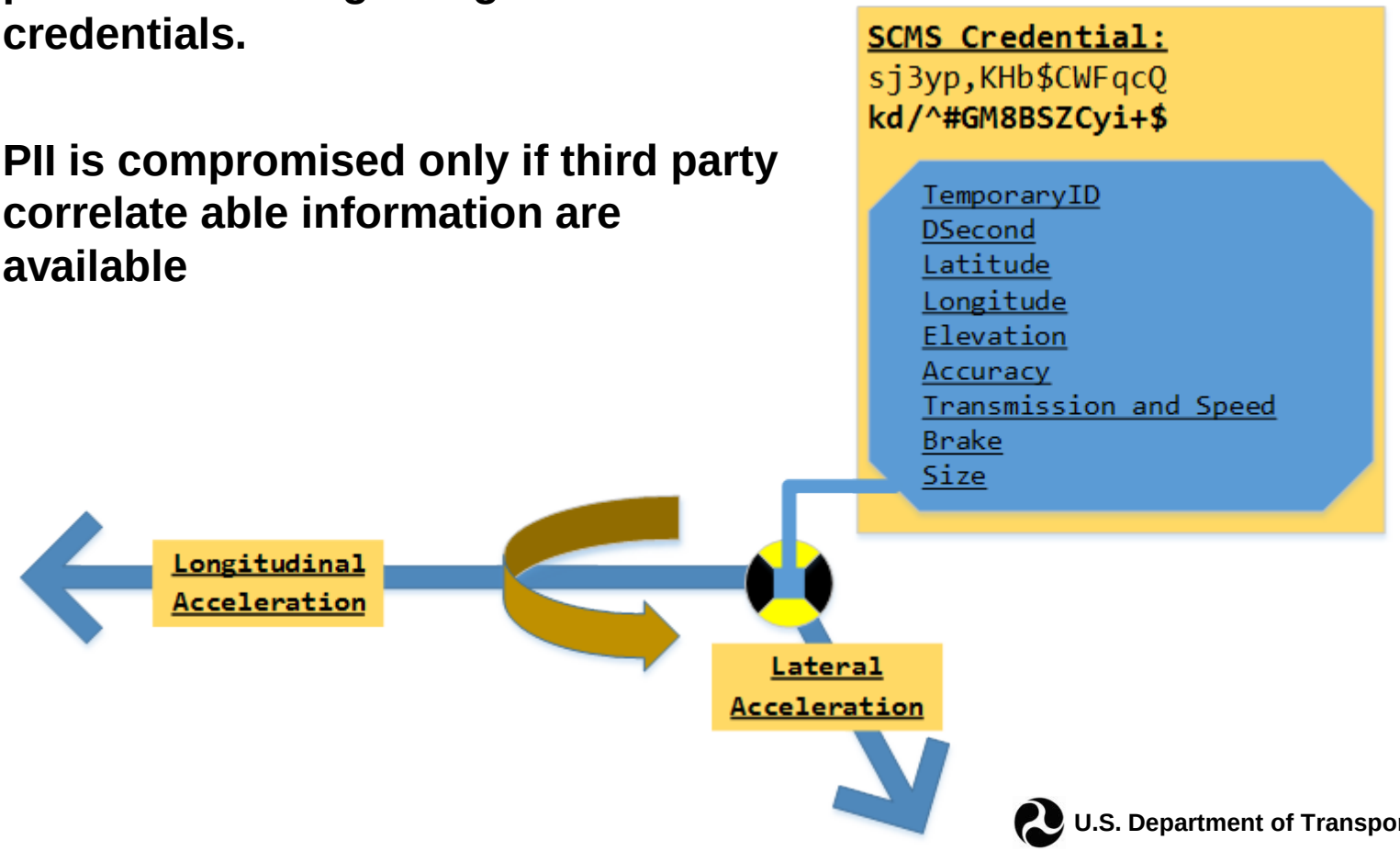
TRUSTED, BUT…

- **A secure credential system allows the receiver to authenticates the broadcasted information.**
- **This creates a mechanism for trust.**



TRUSTED WITH IMPROVED PRIVACY

- **Time based expiration of credential prevents tracking using the credentials.**
- **PII is compromised only if third party correlate able information are available**



PROBE DATA PRIVACY

- **Information used to improve regional mobility**
- **Information used to measure environmental impact and conditions**
- **Characteristics of probe data**
  - Event triggers base reporting – state changes that can indicate changes in roadway conditions
  - Start from a stop event based reporting
  - Time and speed based reporting between Roadside Unit

PROBE DATA PROTECTION

- **Experiment with vehicle data from Safety Pilot Model Deployment**

- **Results are begin analyzed for:**
  - Maximize usefulness of data while preventing release of PII.
  - Better understand vulnerabilities

- **Samples available**
  - https://www.its-rde.net
  - Most recent update – January 19, 2016
  - Two months of data from Safety Pilot Model Deployment

For More Information

Connected Vehicle Program Privacy Officers:

- Dale Thompson: Dale.Thompson@dot.gov
- Claire Barrett: Claire.Barrett@dot.gov
- Suzanne Sloan: Suzanne.Sloan@dot.gov

STAKEHOLDER Q&A

- Please keep your phone muted
- Please use chatbox to ask questions
- Questions will be answered in the order in which they were received
- This Q&A section will not be recorded, nor posted to the website

STAY CONNECTED

Contact for CV Pilots Program:

Kate Hartman, Program Manager

Kate.hartman@dot.gov

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/DOTRITA

February 2016 Webinars

Technical Assistance Webinars

- 2/1/2016, 11:00 – 12:30 pm EST
  Preparing a Privacy Concept for Connected Vehicle Deployments
- 2/9/2016, 2:00 – 3:00 pm EST
  Preparing a Performance Measurement Plan for Connected Vehicle Deployments
- 2/10/2016, 2:30 – 4:00 pm EST
  SCMS Proof-of-Concept Interface Requirements for Connected Vehicle Deployments

Public ConOps Webinars

- 2/5/2016, 1:00 – 2:00 pm EST: ICF/Wyoming
- 2/8/2016, 2:00 – 3:00 pm EST: Tampa (THEA)

Please visit the CV pilots website for the recording and the briefing material of the previous webinars.