



# CONNECTED VEHICLE PILOT Deployment Program



Tampa Hillsborough Expressway Authority  
Pilot Update at the Application Design  
Stage



Govind Vadakpat, USDOT  
Dave Miller, Siemens

ITS Joint Program Office



# Today's Agenda



- Purpose of this Webinar
  - Share experiences of designing CV applications
  - Talk about how these applications are being designed/developed
  - Identify technical and other barriers and how they are being overcome
  - Discuss how these apps will eventually be tested and their performance measured
  
- Webinar Content
  - Connected Vehicle Pilot Deployment Program Overview
  - Tampa (THEA) CV Application Design Experiences
  - Stakeholder Q&A
  
- 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 recording and the presentation material will be posted on the CV Pilots website





# CONNECTED VEHICLE PILOT DEPLOYMENT PROGRAM

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



WYDOT



NYCDOT



Tampa (THEA)

STAY CONNECTED

- Participate in **Design/Build/Test Phase Webinars/Conference Presentations** from the three Pilot Sites (see website for exact dates and times)

Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018
●	◆	◆	●	◆	◆	◆
TRB	Application Deployment		SXSW	Operational Readiness		

◆ Public Webinars      ● Conference Presentations

- Visit Program Website for Updates: <http://www.its.dot.gov/pilots>
- Contact: Kate Hartman, Program Manager, [Kate.Hartman@dot.gov](mailto:Kate.Hartman@dot.gov)





# Tampa Hillsborough Expressway Authority CV Pilot Deployment Overview

Dave Miller



# Pilot Site Overview



Source: HNTB

## Pilot Location

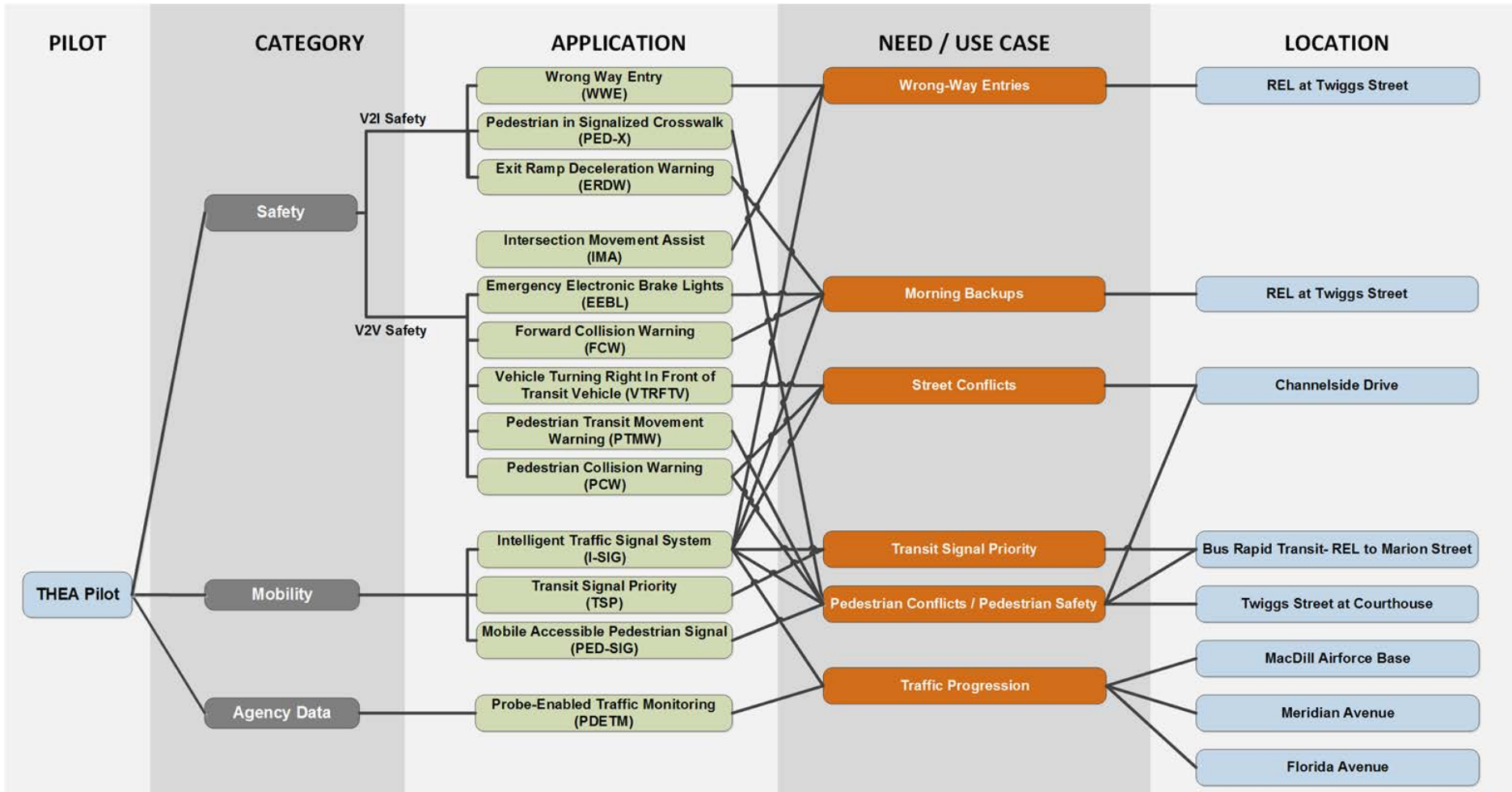
- Tampa FL
- THEA
  - Selmon Expressway
  - Meridian Signals
- West: Brandon
- East: MacDill AFB
- Study area
  - Midway of Selmon
  - Red box



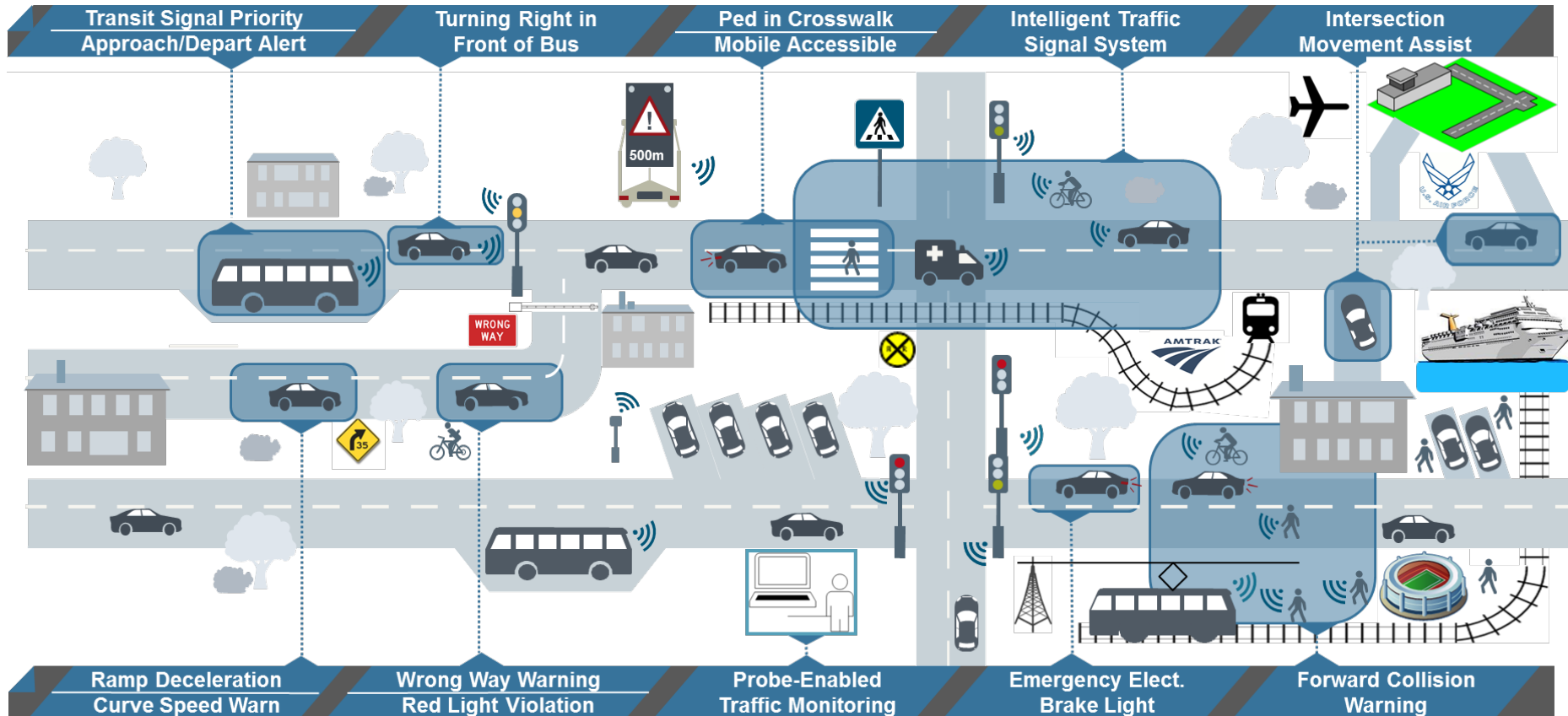
# Focused Deployment Area



# Pilot Site Overview



# Pilot Site Overview



Source: Siemens Industry Inc.





# Pilot Site Overview



PHOTO: THEA

**1,600**

**Privately Owned  
Vehicles**

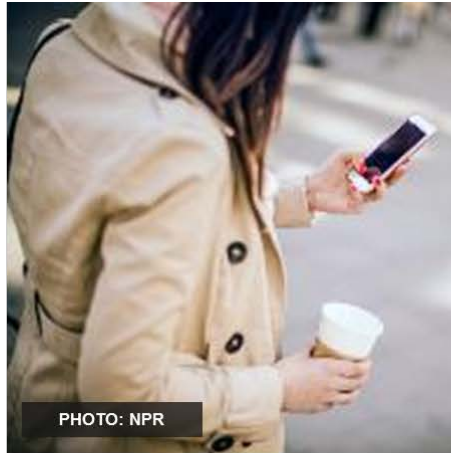


PHOTO: NPR

**500+**

**Pedestrian  
Smartphones**  
(Android devices only)



PHOTO: THEA

**10**

**TECO Line  
Streetcar Trolleys**



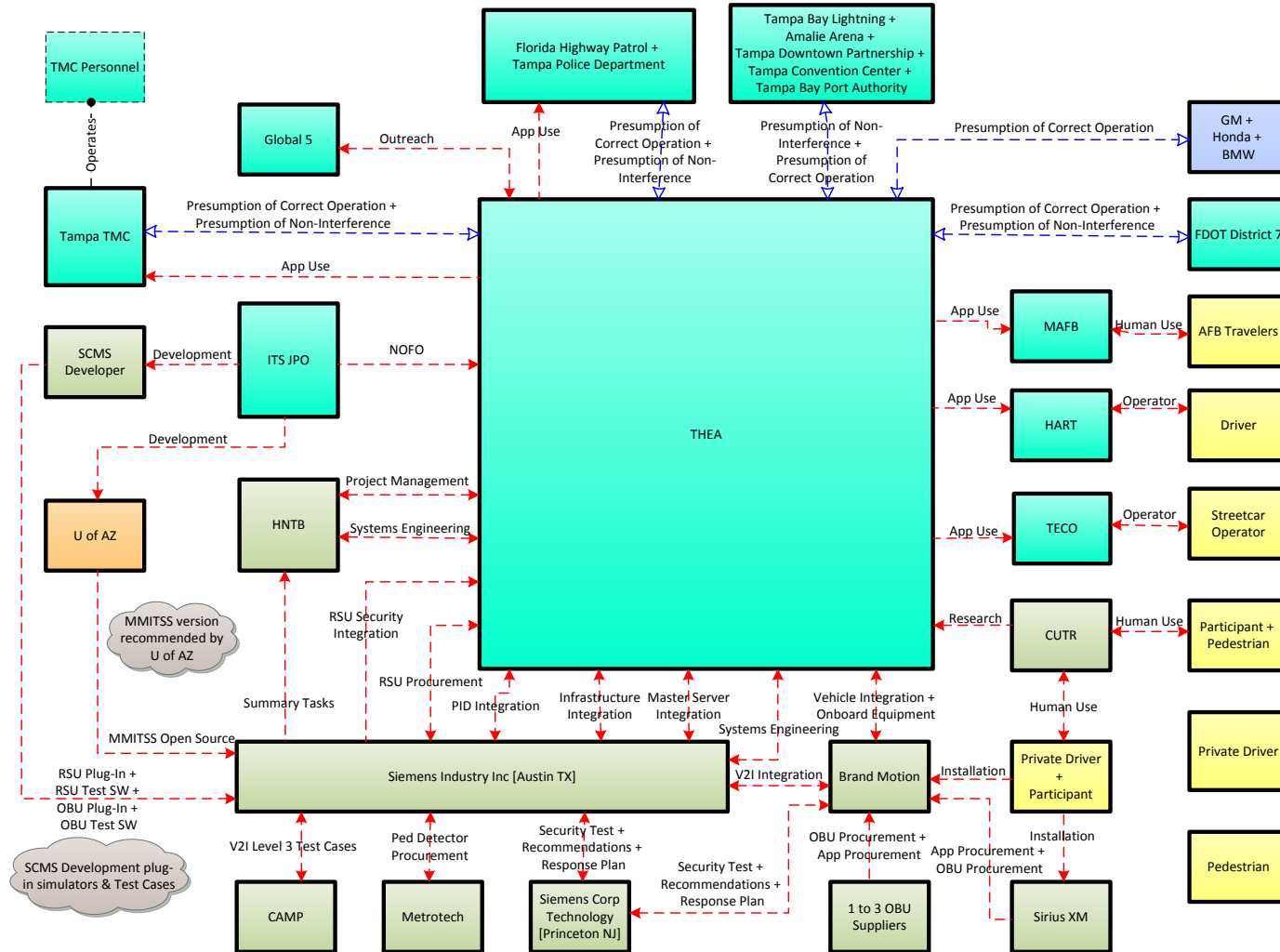
PHOTO: THEA

**10**

**Hillsborough Area  
Regional Transit  
(HART) buses**



# Pilot Site Enterprise View



0: THEA Enterprise			
3	Enterprise View (Operations)	Dec 27 2016	DDM







# THEA CV Application Design Experiences

Dave Miller



# Design Experience: The Plan



Fully-realized Connect Vehicle system that fulfills the project Scope

-  Identify existing real-world safety and mobility issues
-  Measure the Current Situation: “Before” metrics
-  Apply existing Connected Vehicle technology as mitigation
-  Measure the Effect: “After” metrics

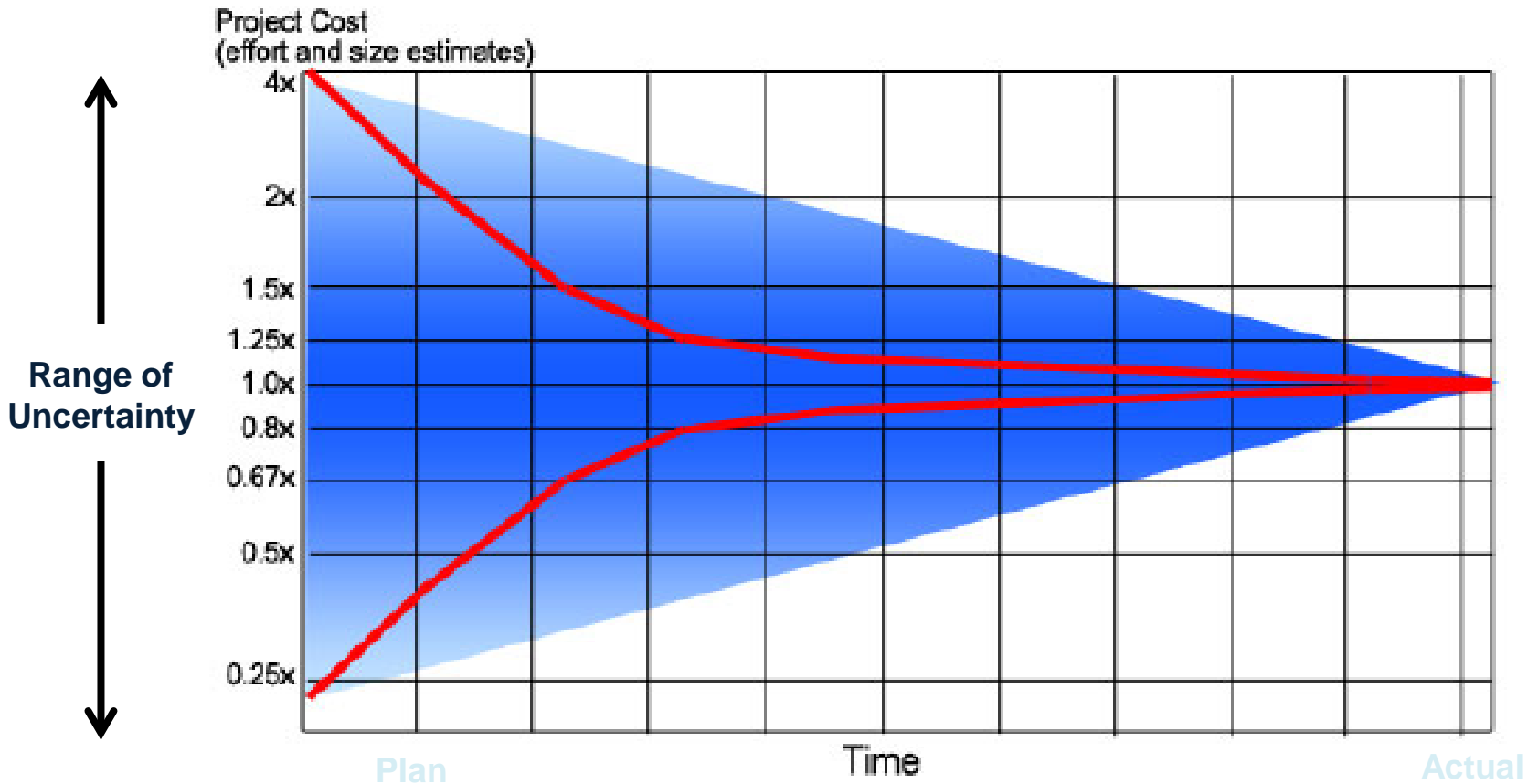
Measures of Success

-  Success = Effective CV apps are promoted for wider deployment
-  Success = Ineffective CV app are retired, sunk cost = \$ 0

# CV Design Experience: The Plan



Systems Engineering with a Difference: No planned app “Design”

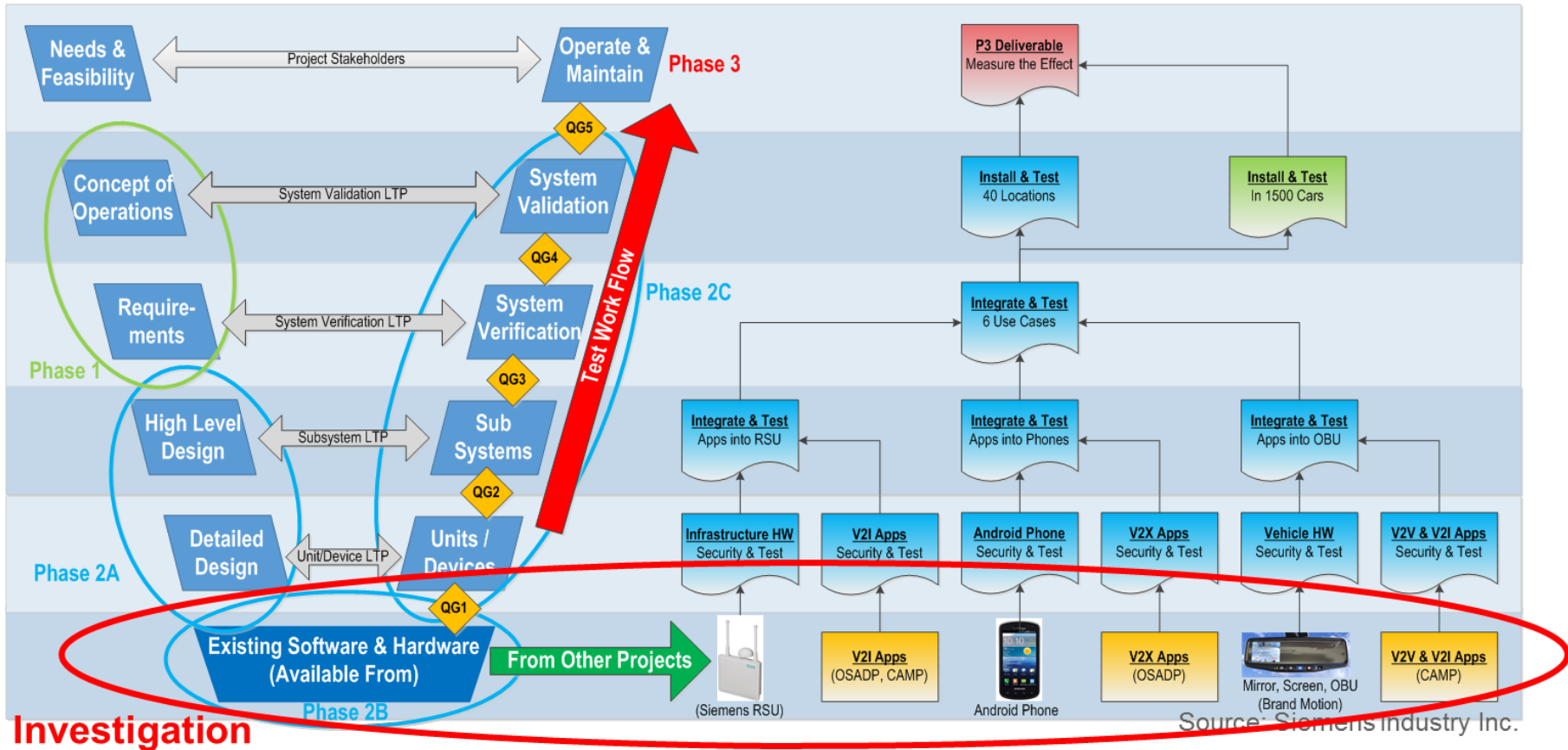


Source: Siemens Industry Inc.

# CV Design Experience: The Plan



Systems Engineering with a Difference: No planned app "Design"



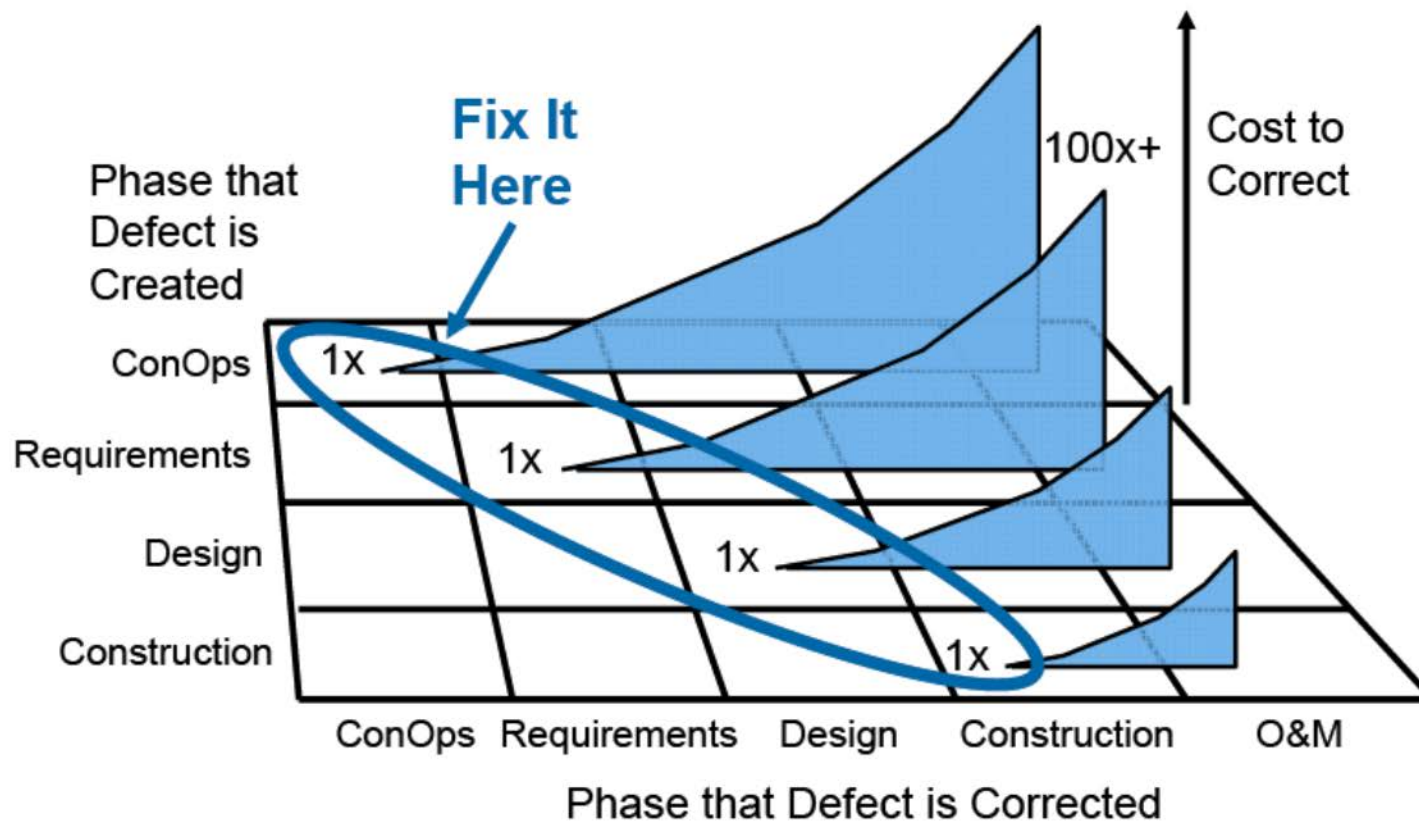
Source: Siemens Industry Inc.



# CV Design Experience: The Plan



Systems Engineering with a Difference: No planned app “Design”



Source: FHWA

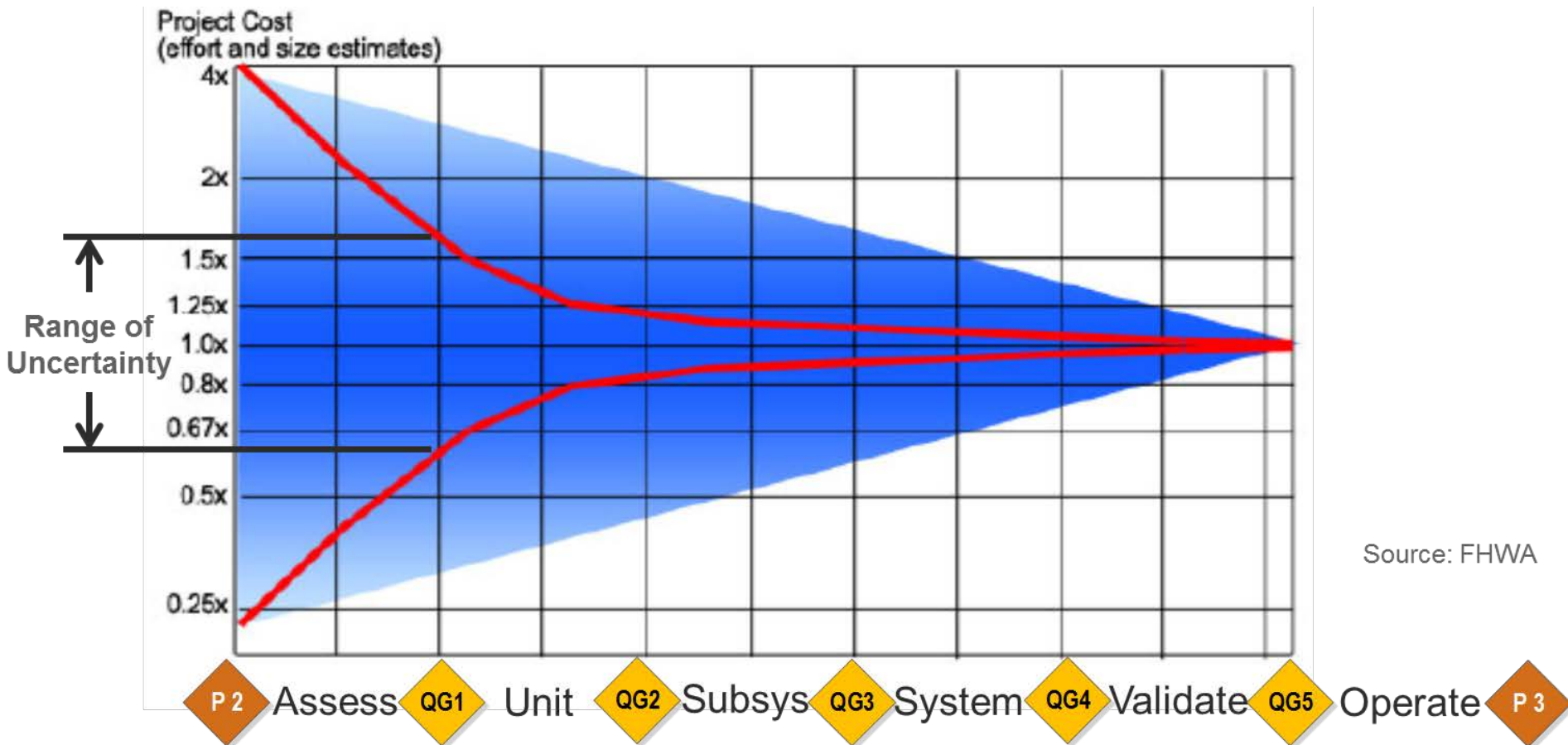
Source: Siemens Industry Inc.



# CV Design Experience: The Plan



Systems Engineering with a Difference: No planned app “Design”



Source: FHWA

Source: Siemens Industry Inc.





# CV Design Experience: Actual v Plan



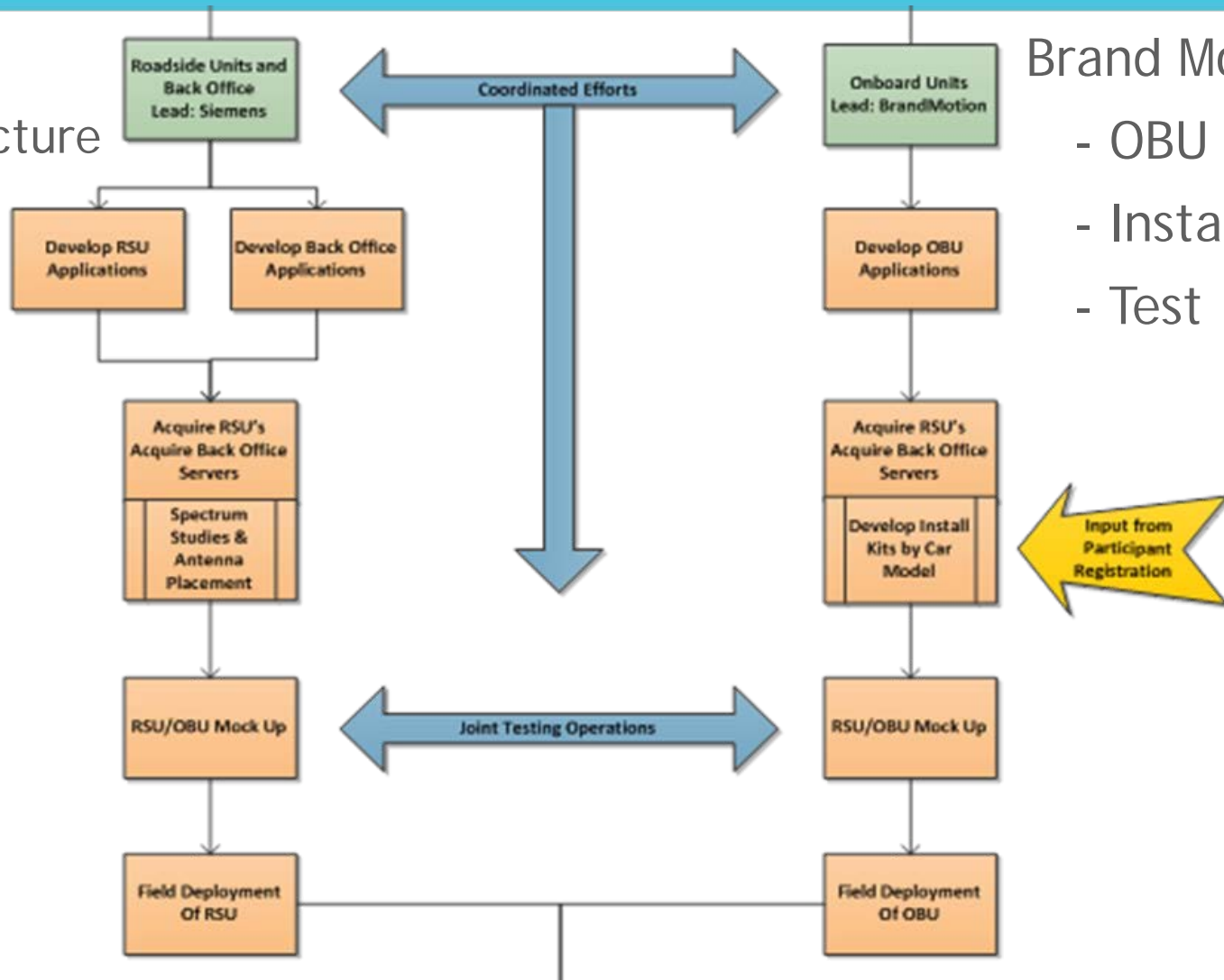
APPLICATION	App	ADP	Actual	Barrier Overcome
Wrong Way Entry (WWE)	WWE	CAMP	Tier 1	RLV → WWE, SPaT no CU
Pedestrian in Signalized Crosswalk (PED-X)	PED-X	CAMP	Tier 1	IMA → PCW
Exit Ramp Deceleration Warning (ERDW)	ERDW	CSW	Tier 1	CSW → ERDW, MAP no CU
Intersection Movement Assist (IMA)	IMA	CAMP	Tier 1	Over the Air Updates (3 OBU)
Emergency Electronic Brake Lights (EEBL)	EEBL	CAMP	Tier 1	Over the Air Updates (3 OBU)
Forward Collision Warning (FCW)	FCW	CAMP	Tier 1	Over the Air Updates (3 OBU)
Vehicle Turning Right In Front of Transit Vehicle (VTRFTV)	VTRFTV	TRP	Tier 1	TRP → VTRFTV
Pedestrian Transit Movement Warning (PTMW)	PTMW	New	Siemens	PCW accuracy → PTMW
Pedestrian Collision Warning (PCW)	PCW	CAMP	Tier 1	IMA → PCW J-2735 2016
Intelligent Traffic Signal System (I-SIG)	I-SIG	OSADP	OSAPD	Generalize → OSADP
Transit Signal Priority (TSP)	TSP	OSADP	OSADP	Add TSP Central
Mobile Accessible Pedestrian Signal (PED-SIG)	PED-SIG	OSADP	OSADP	Generalize → OSADP
Probe-Enabled Traffic Monitoring (PDETM)	PDETM	NEW	Siemens	CAM→BSM, DENM→TIM



# Realization: Parallel Efforts

Siemens

- Infrastructure
- Central
- PSD
- Security



Brand Motion

- OBU
- Installation
- Test



# Wrong-Way Entry



**Wrong-way  
Entry**

**Intersection  
Movement  
Assist (IMA)**

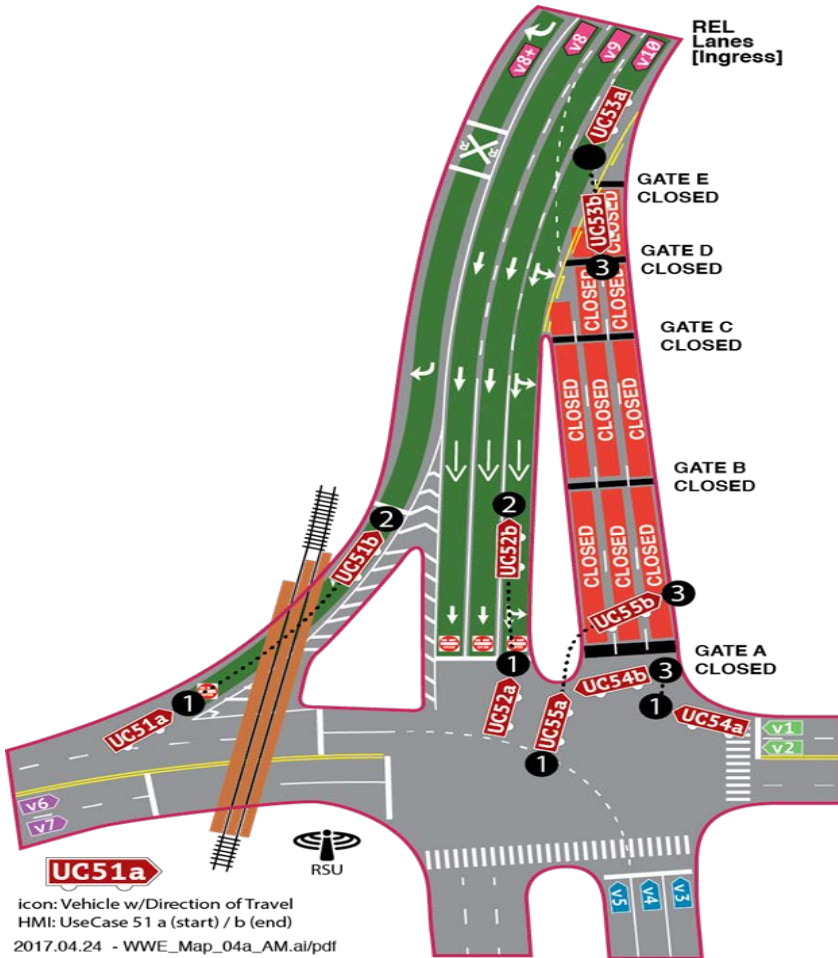
**MAP**

**Signal  
Phasing and  
Timing (SPaT)**

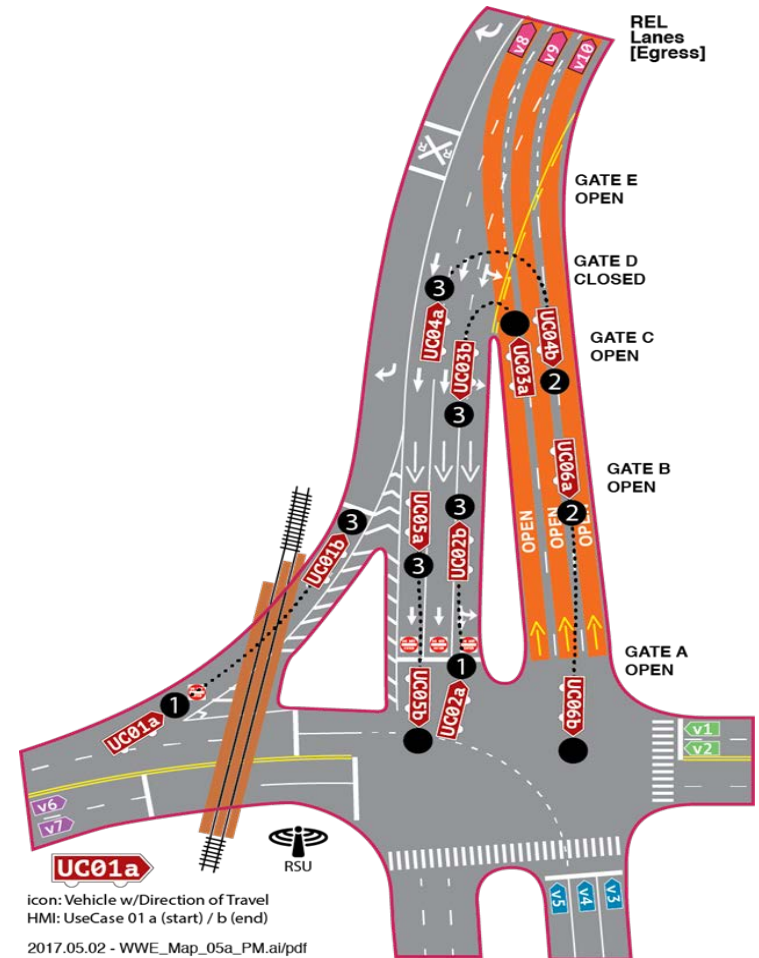
# WWE: What the OBU "Sees"



Morning



Afternoon



Source: Siemens Industry Inc.

# Wrong Way Entry



## In Car Wrong Way Driver Alerts - :19

This demonstration on the Tampa Hillsborough Expressway Authority's Reversible Express Lanes leaving downtown Tampa occurred while the road was closed to regular traffic.

Recorded on September 18, 2017

# Wrong Way Entry



# Wrong Way Entry



# Wrong Way Entry





# Wrong Way Entry



# Wrong Way Entry



# Wrong Way Entry



# Pedestrian Safety

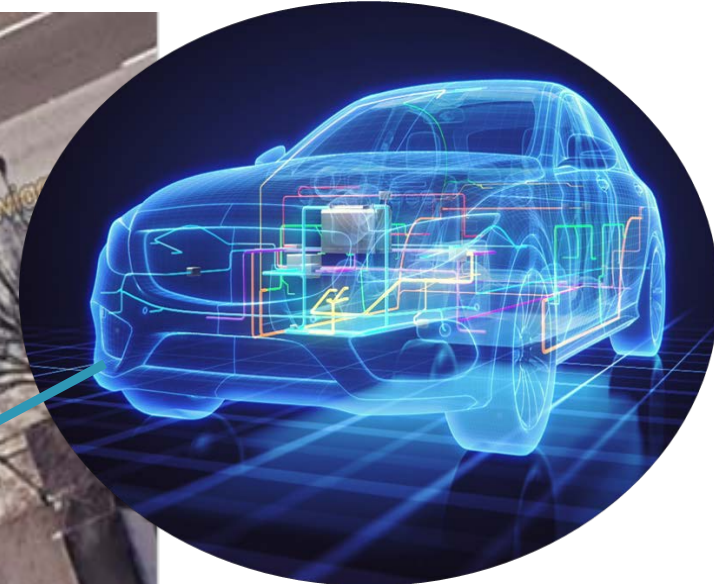
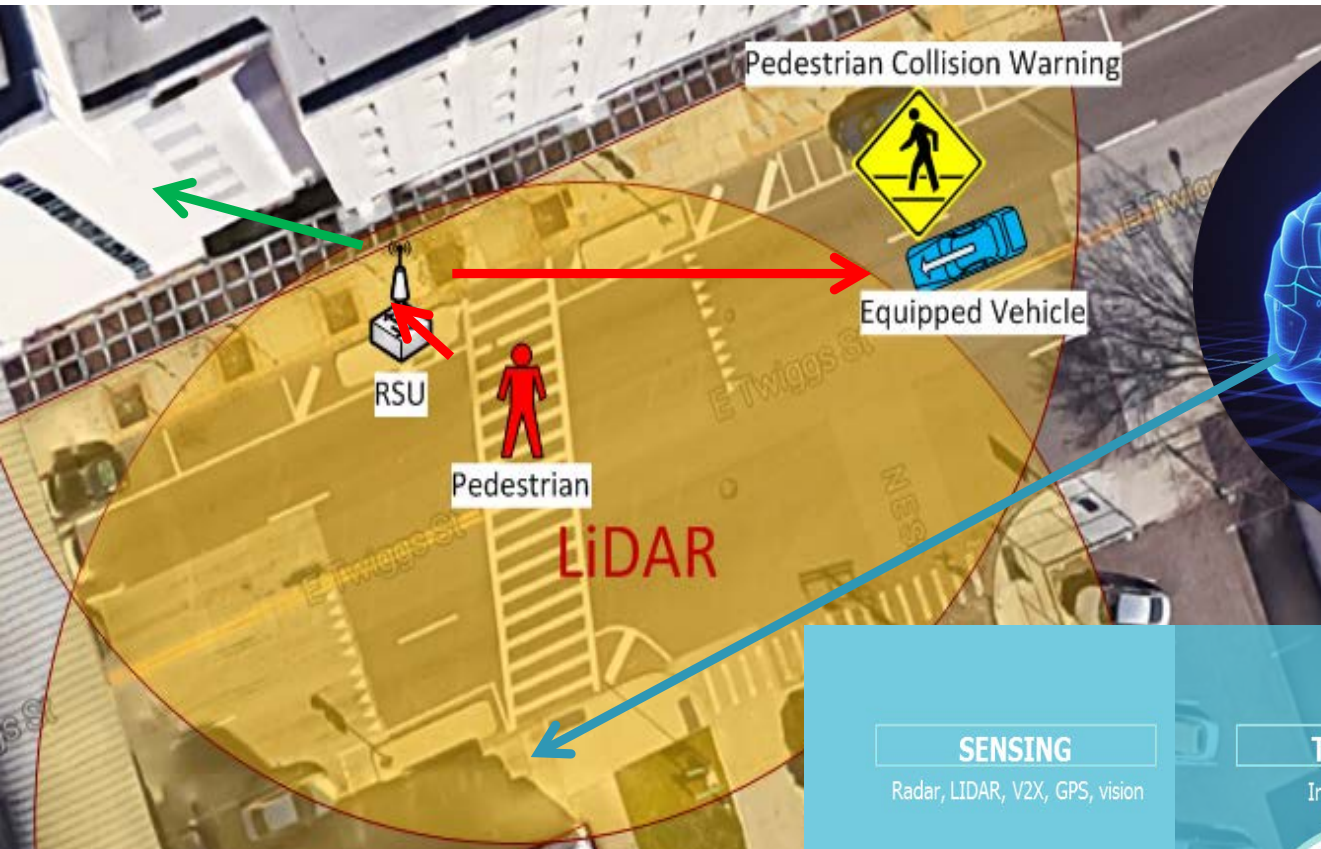


**Pedestrian in  
a Signalize  
Crosswalk  
Warning  
(Ped-X)**

**Pedestrian  
Collision  
Warning  
(PCW)**



# PCW: What the OBU “Sees”



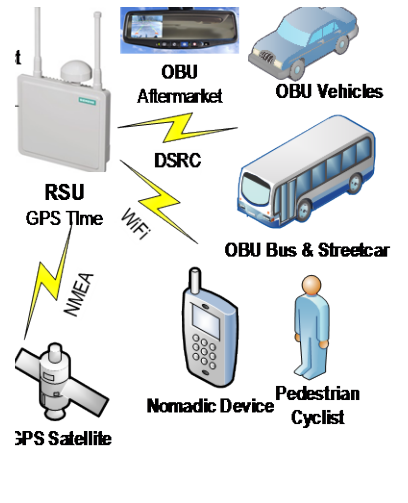
Source: Mentor, a Siemens Business

Source: Siemens Industry Inc.

- No False Positives
- No False Negatives
- CUTR: Lidar vs. PSD location service
- Use for PTMW Geo Fence settings



# Challenge: Collect All Data



# Challenge: Phase 3 Cyber Security



## Guide

**Oversee** the entire security implementation

**Ensure** security experts are available for consultation for *all project participants*

**Define** security and privacy program

Ensure the project and system achieve the desired protection level

## Implement

**Harden** system components

**Integrate** certificate management system

**Train** operational personnel

Protect individual elements and interactions adequately

## Assure

**Monitor** component vulnerabilities

**Assess** interactions and subsystems

**Perform** red / blue team and incident response exercises.

Enable operational confidence with robust testing and validation

Source: Siemens Corporate Technology



# 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





# Stay Connected



## Join us for the *Getting Ready for Deployment Series*

- Discover more about the CV Pilot Sites
- Learn the Essential Steps to CV Deployment
- Engage in Technical Discussion

## Visit the Pilot Site Websites for more Information:

- NYCDOT Pilot:  
<https://www.cvp.nyc/>
- Tampa (THEA):  
<https://www.tampacvpilot.com/>
- Wyoming DOT:  
<https://wydotcwp.wyoroad.info/>

## Contact for CV Pilots Program:

Kate Hartman, Program Manager

[Kate.Hartman@dot.gov](mailto:Kate.Hartman@dot.gov)

## Contact for Pilot Sites:

- Kate Hartman, WYDOT Site AOR  
[Kate.Hartman@dot.gov](mailto:Kate.Hartman@dot.gov)
- Jonathan Walker, NYCDOT Site AOR  
[Jonathan.b.Walker@dot.gov](mailto:Jonathan.b.Walker@dot.gov)
- Govind Vadakpat, THEA Site AOR  
[G.Vadakpat@dot.gov](mailto:G.Vadakpat@dot.gov)

