U.S. DOT Automation Program

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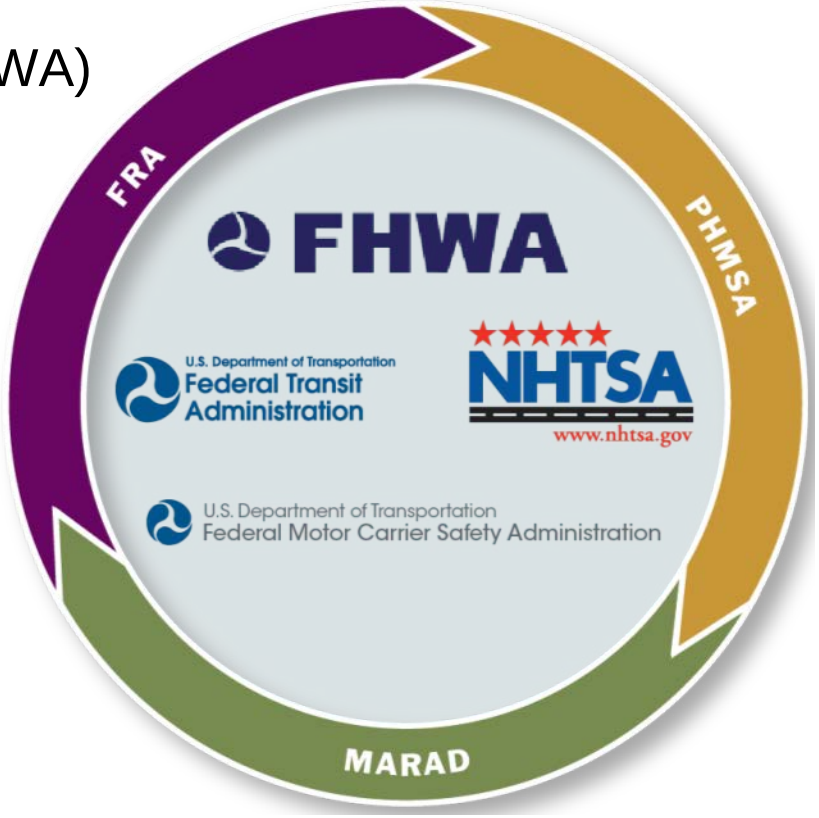
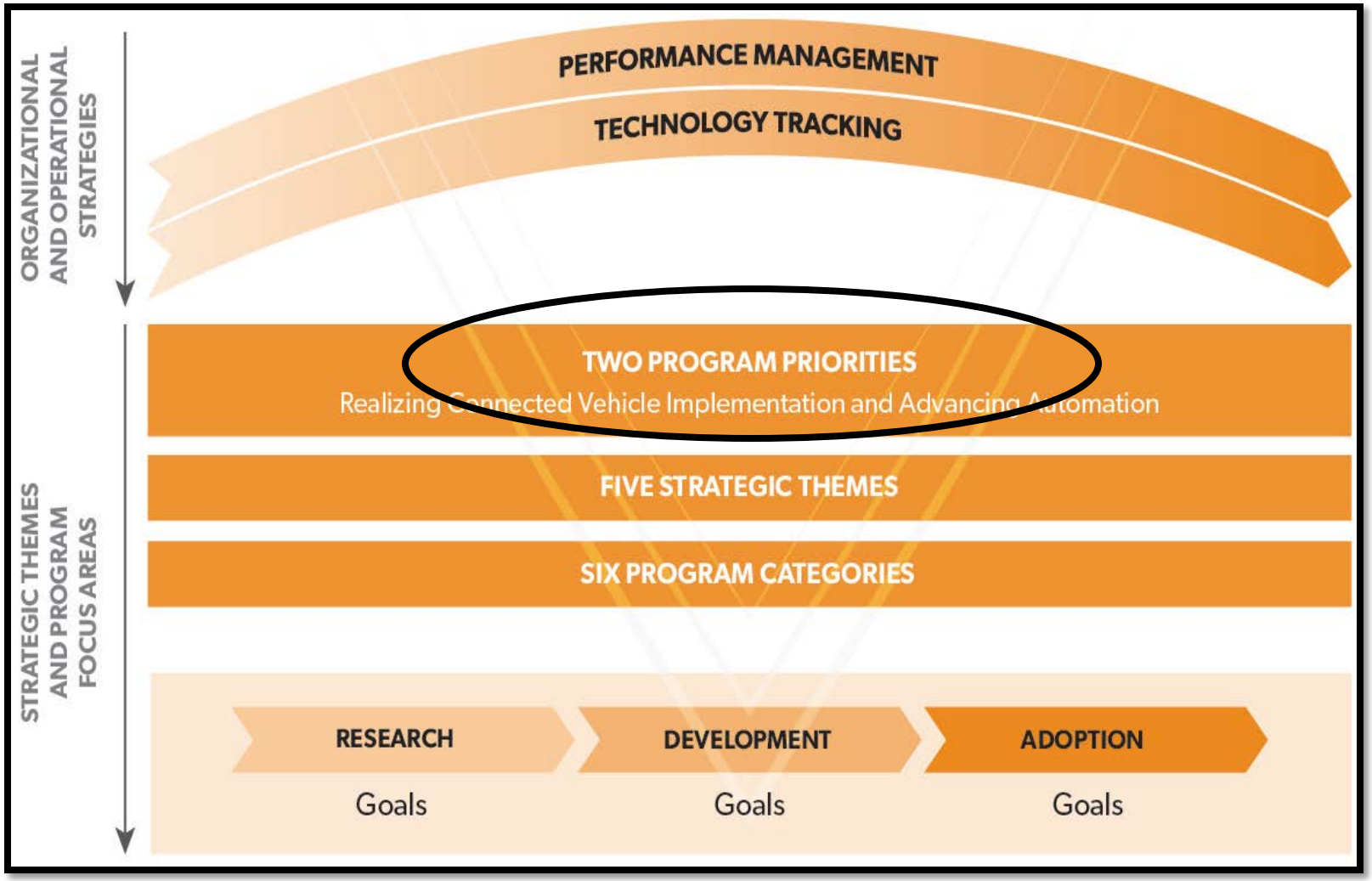
Context: ITS Joint Program Office

The ITS JPO has Department-wide authority in coordinating the ITS program and initiatives among the following DOT Offices:

- Federal Highway Administration (FHWA)
- Federal Motor Carrier Safety Administration (FMCSA)
- Federal Transit Administration (FTA)
- Federal Railroad Administration (FRA)
- National Highway Traffic Safety Administration (NHTSA)
- Maritime Administration (MARAD).



Context: ITS Strategic Plan Framework



What is an Automated Vehicle?

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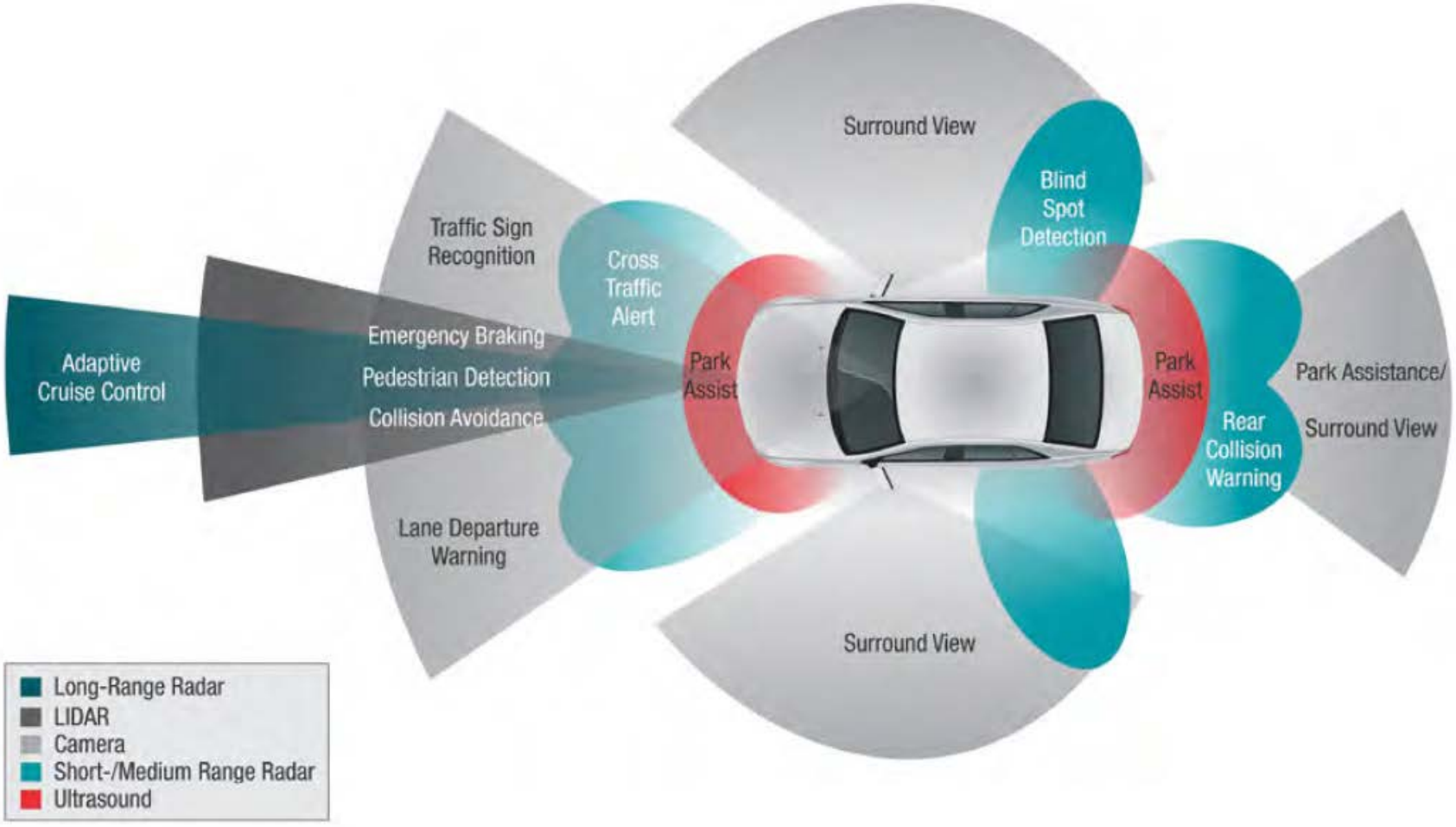
- **Automated vehicles** are those in which at least some aspect of a safety-critical control function (e.g., steering, throttle, or braking) occurs without direct driver input.
- **Connected vehicles** are those which use wireless technology to communicate between vehicles, roadside infrastructure, and other road users.

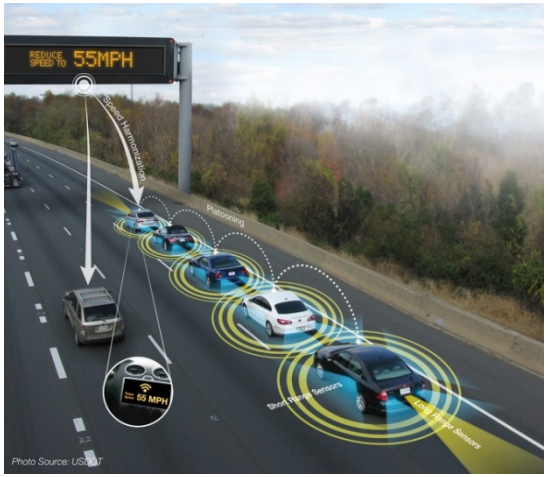
On-Vehicle Sensors



Source: Texas Instruments ADAS Solutions Guide

Automation Can Be a Tool for Solving Transportation Problems

- 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



…but connectivity is critical to achieving the greatest benefits

Connected Automation for 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

U.S. DOT Automation Program

Goal: Enable safe, efficient, and equitable integration of automation into the transportation system

Area	Example Applications	Research Emphasis
Connected Driving Assistance *Level 1-2*	Platooning, merge/weave assist, speed harmonization, and eco-approach and departure	**Benefits** (safety, mobility, sustainability) and **Application Development**
Conditional Automation *Level 2-3*	Highway autopilot, traffic jam assist, etc.	**Safety Assurance** (human factors, control system reliability, testing procedures, and cybersecurity)
Limited Driverless Vehicle Operations *Level 4*	Low-speed automated shuttles, first-last mile transportation	**Feasibility** (concept development, testing, evaluation)

Research Tracks

Enabling Technologies		
Digital Infrastructure	Communications	Technology Research

Safety Assurance			
Electronic Control Systems	Functional Safety and Electronics Reliability	Cybersecurity	Human Factors

Transportation System Performance		
CACC, Speed Harmonization, and Platooning	Lateral Control	First/Last Mile and Transit Operations

Testing and Evaluation		
Interoperability	Testing Methods	Benefits Assessment

Policy and Planning			
Standards	Federal Policy Analysis	Stakeholder Engagement	Transportation Planning

Automation and Road Weather Overview

- Today
  - Poor sensor performance under degraded environmental conditions
    - Snow, fog, dust, direct sunlight, etc.
    - Wide range of capabilities: entry-level to high-end
    - Rapid evolution
  - Driver reengagement under challenging conditions
- Looking ahead
  - Road-weather information critical for operating condition assessment
  - Potential for new opportunities for real-time road surface condition information collection
  - Potential reduction in certain weather-related crash types as sensors improve

Discussion Questions

- Working Together
  - What does the weather community want to know about automation?
  - What are effective communication tools?
- Scoping Future Research
  - How do you see the weather-related research needs for automation?
  - What would help you do your job?

www.its.dot.gov

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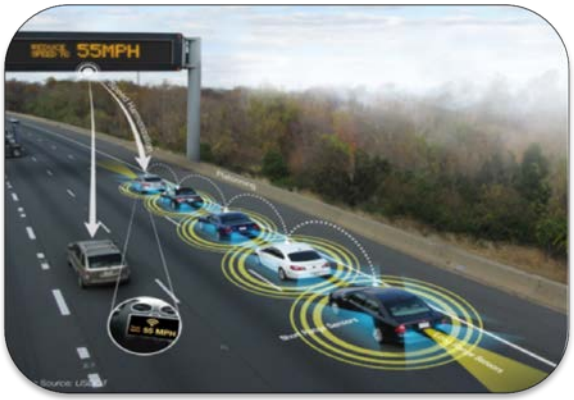
Enabling Technologies

POSITION, NAV & TIMING



MAPPING

SENSORS

COMMUNICATIONS

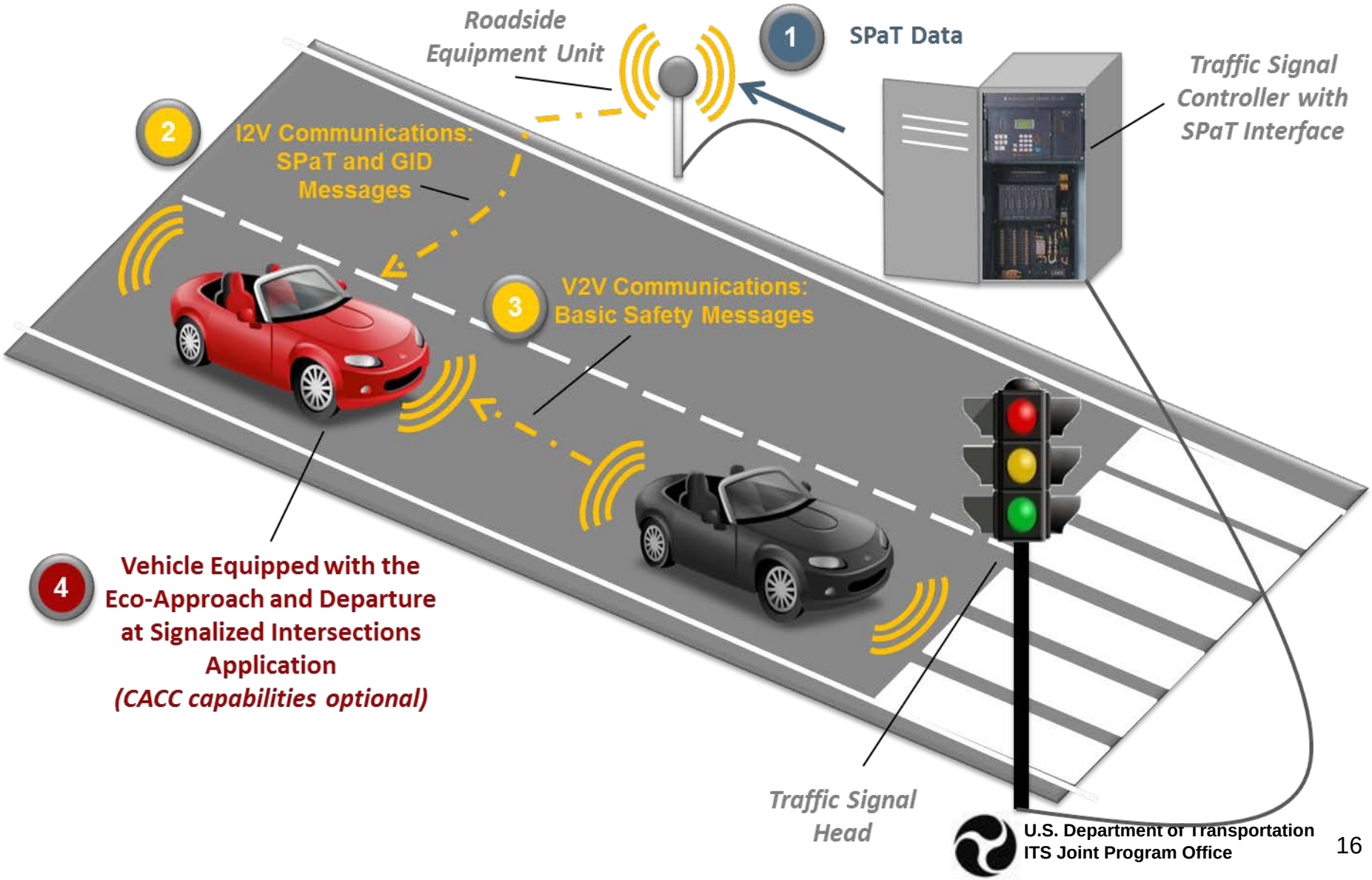
HUMAN FACTORS

Safety Assurance Example: Human Factors Research

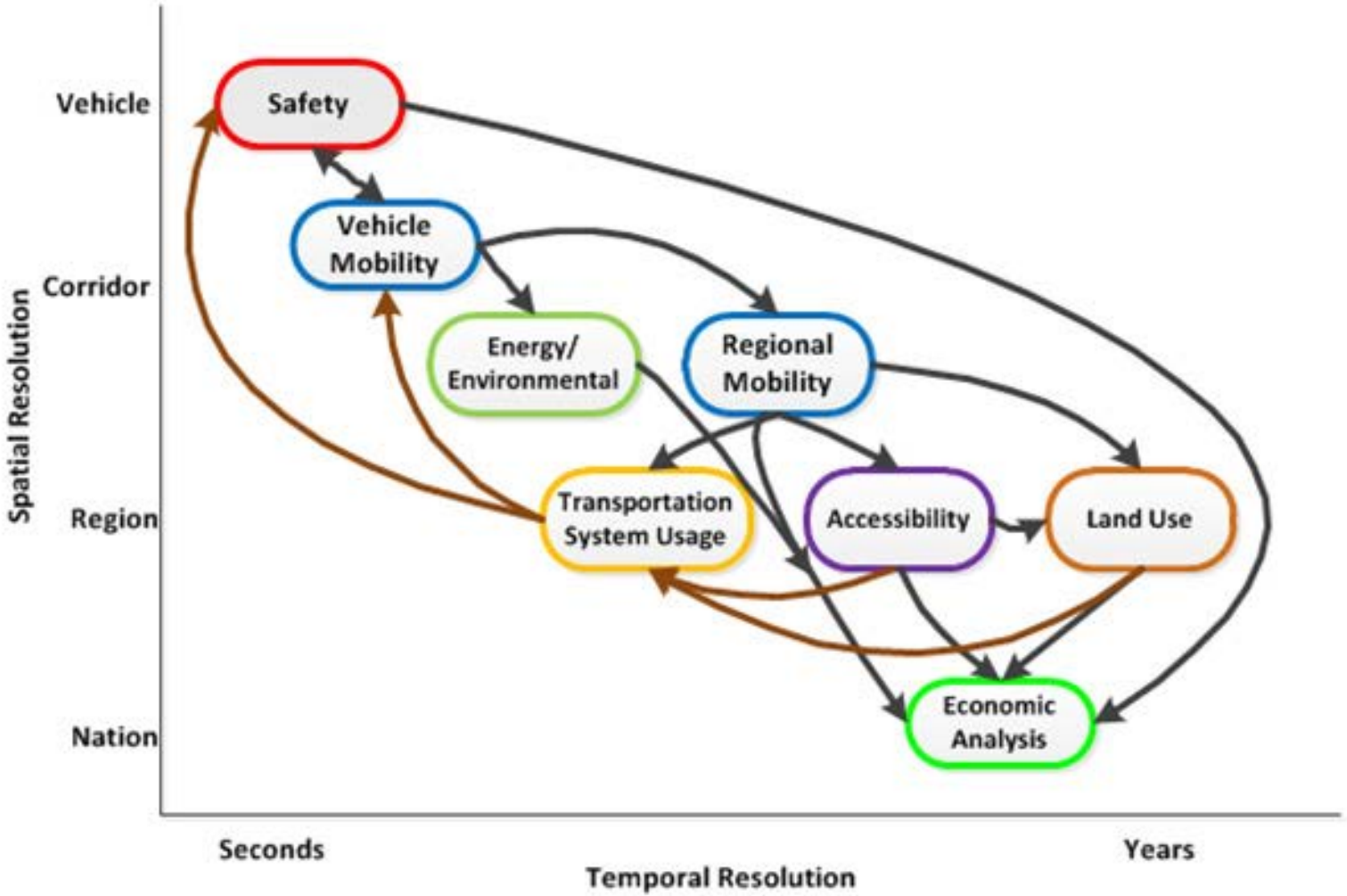
- Addresses human factors research questions focused on drivers transitioning into and out of automated driving states enabled by Level 2 (2010 Cadillac SRX) and Level 3 (Google-modified 2012 Lexus RX450h) automated driving concepts.

- Producing Driver-Vehicle Interface Design Principles

Transportation System Performance Example: Eco-Signal Operations



Evaluation and Testing Example: Benefits Evaluation Framework



Policy and Planning Example: Review of Federal Motor Vehicle Safety Standards

How could highly automated vehicles impact or change the nature of existing Federal Motor Vehicle Safety Standards (FMVSS)?

- Identifying where current FMVSS pose challenges to introduction of AVs – particularly as they move into concepts of '*human out of the loop'* or *'driverless'*

- Ensuring that existing Federal regulations do not stifle innovation and that AVs are performing their functions safely

www.nhtsa.gov

- NHTSA and ITS JPO coordinated research

Image Source: http://www.automotiveaddicts.com/wp-content/uploads/2012/08/IIHS-Crash-Test.jpg