

#### Florida Automated Vehicles (FAV) Summit:

#### Improving Mobility Across Multiple Modes

11/28/18

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### **Speed of Adoption for Major Technology Innovations**



### Estimated Autonomous and Connected Vehicle Adoption Rates



Connected Vehicle & Autonomous Vehicle adoption rates will differ based on rate of technology innovation and regulatory environment.

# Set the Stage for CV Technology Adoption



# 2030 Set the Stage for AV Technology Adoption



## 2040 Embrace a Fully Connected Transportation Network while Increasing AV Facilities



## Set the Stage for AV Technology Adoption



## **Electrification: What's Need to Achieve a CAV Reality**



22K Public Level 2 or DC Fast Chargers in the US/Canada, as of July 2018 The US Department of Energy estimates there will need to be **330,000** chargers by 2025 to support electric vehicles which is a total investment of \$4.7 Billion. Wireless charging and wireless roadways will become an increasingly interesting option for charging as costs fall.

Map of EV Chargers in the Tampa St. Pete area https://map.openchargemap.io/.

## The Autonomous Vehicle Space ...



## **Huge, Complicated & Growing!**

Comet Labs 263 Self-Driving Car Startups to Watch 05.10.17 https://blog.cometlabs.io/263-self-driving-car-startups-to-watch-8a9976dc62b0

## Unbundling the Autonomous Vehicle ... A Closer Look.



CB Insights Unbundling the Autonomous Vehicle 10.31.18 https://www.cbinsights.com/research/startups-drive-auto-industry-disruption/

## Bike and Scooter Tech ... A Bit Player in Micro Mobility



CB Insights Disrupting the Car 09.05.18 https://www.cbinsights.com/research/disrupting-cars-car-sharing-scooters-ebikes/

## Critical Enabling Technologies Allows CAV to Operate ... Today

#### **Connected and Autonomous Vehicles**

- V2V, V2I, V2X
- Operator "free" travel eliminates or greatly reduces role of driver
- Safety improvements
- Reduced operational costs

### **Enabling Technologies**

- Connected Vehicle Dedicated Short Range
   Communications
- 4G/5G Cellular/Wireless
- LiDAR, Radar, Vision-based cameras
- Ultrasonic sensors, GPS



## **Emerging Technologies will Allow CAV to Flourish ... Tomorrow**

### **Transit Specific Technologies**

- Retrofit pedestrian and vehicle detection and warning systems
- Fully autonomous transit vehicles
- Alternative fuel technology

### **Enabling Technologies**

- Connected Vehicle Dedicated Short Range
   Communications
- Vision-Based cameras/sensors
- Battery technology
- Inductive charging systems



## Future Technology Integration will Allow CAV to Truly Connect

#### **Truly Connected Travelers**

- Communicates directly with vehicles in real-time
- Travel information is readily accessible
- Enables dynamic trip requests/routing
- Pedestrian warning systems
- Enhanced fare payments

### **Enabling Technologies**

- Connected Vehicle Dedicated Short Range
   Communications
- 4G/5G Cellular/Wireless
- Dual-Chip fare cards/transit fare collection
- Mobile Phone payment systems



### CAV First & Last Mile

### **Use Cases for Today & Tomorrow**







# **City Centers**





Train Stations



Retirement

Homes



Industrial Sites



Hospitals



Theme Parks/ Cultural Sites



# Campus

### Just a brief CAV Snapshot ... But There Lessons Learned Based on Current CAV Deployments



# Lessons Learned: Current CAV Deployments

## About HDR

HDR is a nationally recognized architectural, engineering, design, planning and consulting services firm with nearly 10,000 employee-owners providing services to public and private clients throughout the United States, including much experience in California and around the Los Angeles area region.

HDR is an industry leader in advanced transportation and technology implementations including comprehensive expertise in the piloting and implementing of AV microshuttles and other CAV technologies.

#### HDR's Advanced Technology Project Experience in Last Two Years

HDR's CAV and emerging transportation technology expertise includes the delivery of 25 technology oriented plans, policies, guidance, environmental, and design projects across the United States as shown in the Figure below.



## **NHTSA: Permitting Low Speed Micro Shuttles**

**All** vehicles that operate on public roads **must** meet Federal Motor Vehicle Safety Standards (**FMVSS**).

Vehicles not imported and that do not meet FMVSS **are not permitted** to operate on public roads without a waiver which can be granted under prescribed conditions.

Vehicles imported into the United States can receive a waiver to the relevant FMVSS and **legally** be allowed to operate on public roads.

The waiver allows for vehicles to be temporarily imported for research or demonstration purposes **only**.

An importer of a non-compliant vehicle **must receive** a permission letter from NHTSA prior to importation.

Guidelines to receiving a letter are found at: <u>www.nhtsa.gov/cars/rules/import</u>

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## **NHTSA: Permitting Low Speed Micro Shuttles Con't**

NHTSA has a more in-depth process for approving novel technology not commonly found on vehicles in use in the United States.

NHTSA may solicit from the applicant information concerning the vehicle so that the agency can properly assess any potential safety risk the vehicle may pose if it were to be placed in use on public roads or highways in the United States.

In the case of nonconforming vehicles equipped with Automated Driving Systems (ADS), NHTSA commonly requests additional information from the applicant addressing a multitude of issues including:

- Speed
- State/Local Authorization
- Power Source
- Automation Level (SAE 1-5)
- Testing Perimeters, Location (Map), Exact Route
- Operator Involvement
- Members of the Public

This process has become stricter and with recent events, NHTSA is willing to pull the plug on demo's

## **HDR CAV Projects: Lessons Learned**

- Plan & Design
- Technology & Infrastructure Needs
- Federal, State & Local Regulations
- Financing
- Insurance & Liability
- Stakeholder Engagement
- Data, Data, Data
- Defining Success



## **HDR CAV Projects**



Lincoln AV Micro Shuttle Program Implementation



Boise Downtown Circulator AA w/ AV Shuttle Options



Micro On-Demand Shuttle for Arlington



Florida Statewide Transit Technology Primer



Destination Medical Center Transit AA w/ AV Shuttle Option Rochester



Connecticut Statewide AV Micro Shuttle Program



Jacksonville Transportation Authority Shared Mobility



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