



MIAMI-DADE  
METROPOLITAN  
PLANNING  
ORGANIZATION

# Connected and Autonomous Vehicles



CAV Task Force  
Meeting

September 16, 2016

10 am to 3 pm

# CAV Task Force Meeting

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welcome



# Introductions

# Morning Session

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- Introductions
- Opening Remarks
- Mission Statement and Role
- CAV 101: An Orientation
- Overview: Miami-Dade County “Ollie” Pilot Project with IBM/Local Motors



# Mission Statement and Role

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## MISSION

- Enhance interagency dialogue and collaboration
- Facilitate CAV project development and deployment in Miami-Dade County

## ROLE

- Build community awareness of CAV
- Support pilot project implementation
- Identify other potential CAV projects



# CAV 101: An Orientation



# Connected and Automated VEHICLES



# Levels of Vehicle Automation

```
graph LR; A((Levels of Vehicle Automation)) --- B(Level 0); A --- C(Level 1); A --- D(Level 2); A --- E(Level 3); A --- F(Level 4); B --- G[The driver is in complete and sole control of the primary vehicle controls – brake, steering, throttle, and motive power – at all times.];
```

**Level 0**

**Level 1**

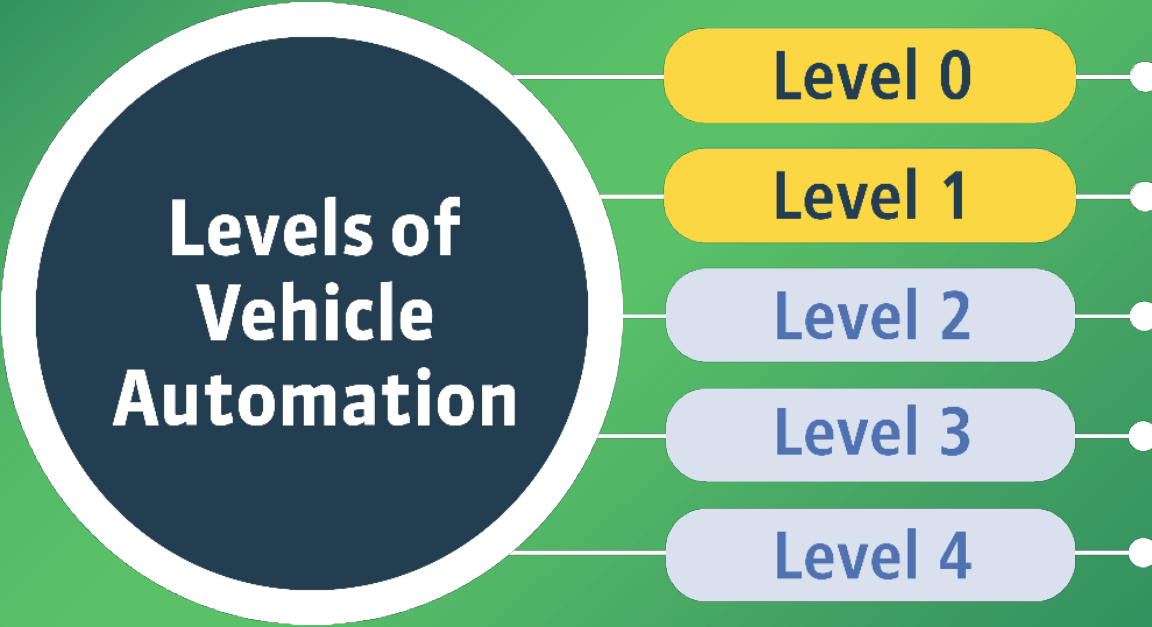
**Level 2**

**Level 3**

**Level 4**

The driver is in complete and sole control of the primary vehicle controls – brake, steering, throttle, and motive power – at all times.

# Levels of Vehicle Automation



Level 0

Level 1

Level 2

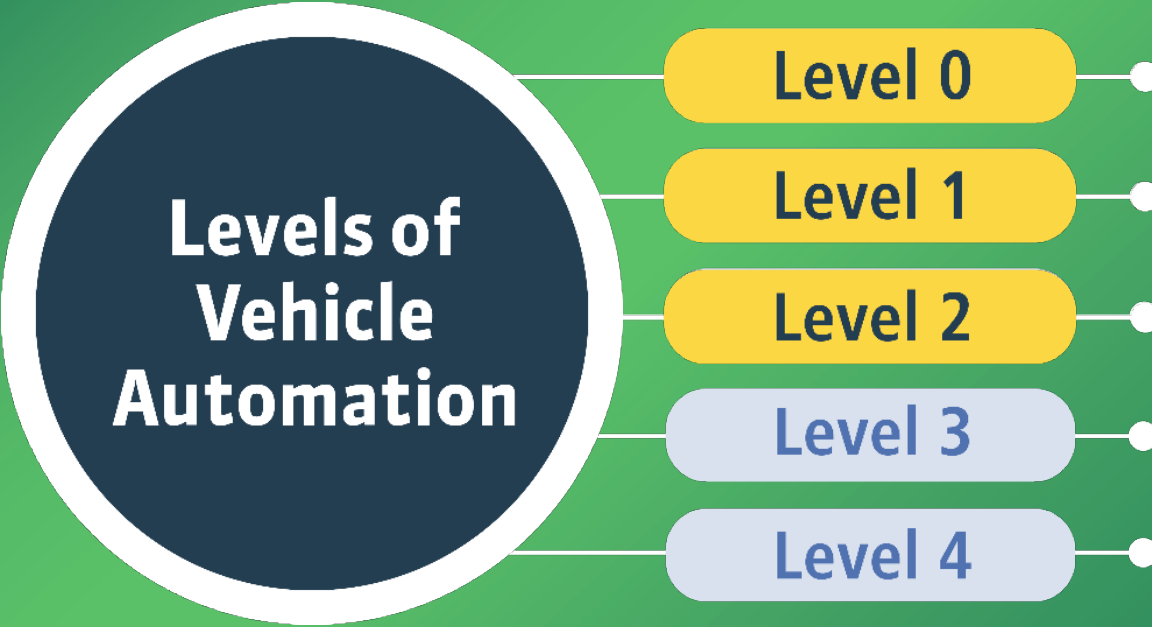
Level 3

Level 4

Automation at this level involves one or more specific control functions.

Examples include electronic stability control or pre-charged brakes, where the vehicle automatically assists with braking to enable the driver to regain control of the vehicle or stop faster than possible by acting alone.

# Levels of Vehicle Automation



```
graph LR; A((Levels of Vehicle Automation)) --- B[Level 0]; A --- C[Level 1]; A --- D[Level 2]; A --- E[Level 3]; A --- F[Level 4];
```

Level 0

Level 1

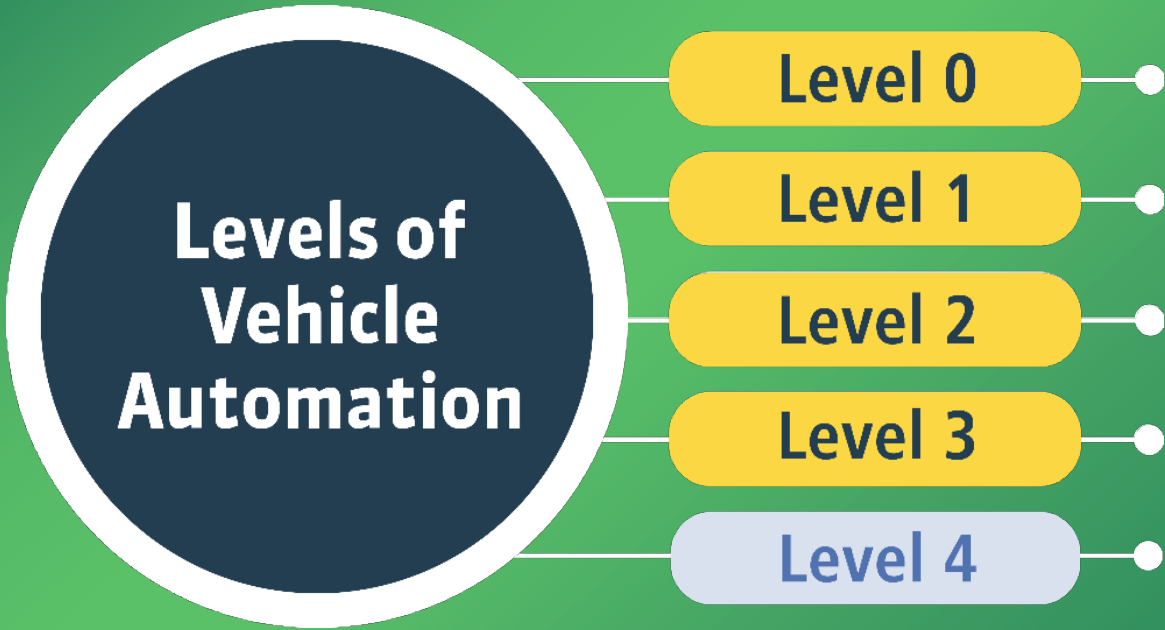
Level 2

Level 3

Level 4

This level involves automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions. An example of combined functions enabling a Level 2 system is adaptive cruise control in combination with lane centering.

# Levels of Vehicle Automation



```
graph LR; A((Levels of Vehicle Automation)) --- B[Level 0]; A --- C[Level 1]; A --- D[Level 2]; A --- E[Level 3]; A --- F[Level 4];
```

Level 0

Level 1

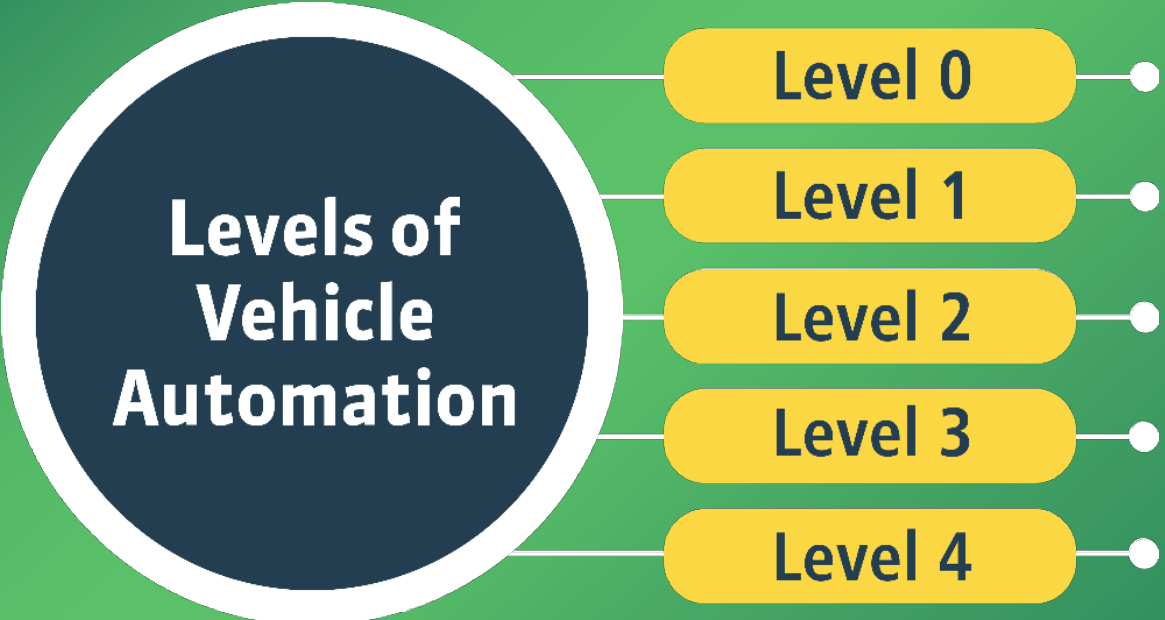
Level 2

Level 3

Level 4

Vehicles at this level of automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions and in those conditions to rely heavily on the vehicle to monitor for changes in those conditions requiring transition back to driver control. The driver is expected to be available for occasional control, but with sufficiently comfortable transition time. The Google car is an example of limited self-driving automation.

# Levels of Vehicle Automation



A diagram illustrating the levels of vehicle automation. On the left, a dark blue circle with a white border contains the text 'Levels of Vehicle Automation'. Five horizontal white lines extend from the right side of this circle to five yellow rounded rectangular boxes stacked vertically. Each box contains a level number from 0 to 4. To the right of each box is a small white dot, and a single vertical line connects all five dots.

Level 0

Level 1

Level 2

Level 3

Level 4

The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip. Such a design anticipates that the driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip. This includes both occupied and unoccupied vehicles.

# AV Market Development



## STAIRS

Add automated features and applications one at a time.  
(Most traditional OEMs)



## ESCALATOR

Announce autonomy by a certain date while keeping non-autonomous vehicles available for purchase



## ELEVATOR

Currently designing and manufacturing fully autonomous vehicles  
(no staged implementation)

# > Key AV Considerations

## **All fully autonomous vehicles must independently:**

- function in all weather conditions
- recognize road lanes
- recognize road signage
- recognize other vehicles, obstacles, people, and bicycle

## **Auto manufactures have said they want:**

- No laws
- Clear lane striping
- Clear signage

RESPONSIBILITY OF VEHICLE MANUFACTURERS



POTENTIAL RESPONSIBILITY OF AGENCIES



## Connected Vehicle Development Timeline

1999

- Federal Communications Commission allocates 5.9 GHz

Oct 2008

- New York City World Congress, first urban deployments of 5.9 GHz systems

2012

- US DOT Ann Arbor Safety Pilot

Sep 2014

- GM's Mary Bara announced that the 2017 Cadillac CTS will have 5.9 GHz-based equipment in the vehicle

Feb 2015

- NHTSA Advanced NPRM

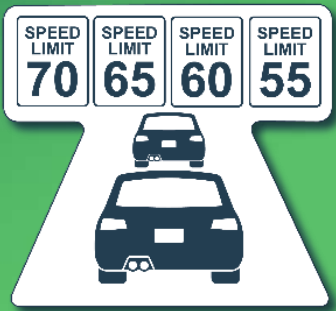
Now

- NHTSA NPRM

Dec 2016

- NHTSA Rulemaking

# Applications



Speed  
Harmonization



Wrong Way  
Driving  
Detection



Intelligent  
Traffic Signal  
System



Traffic Signal  
Priority

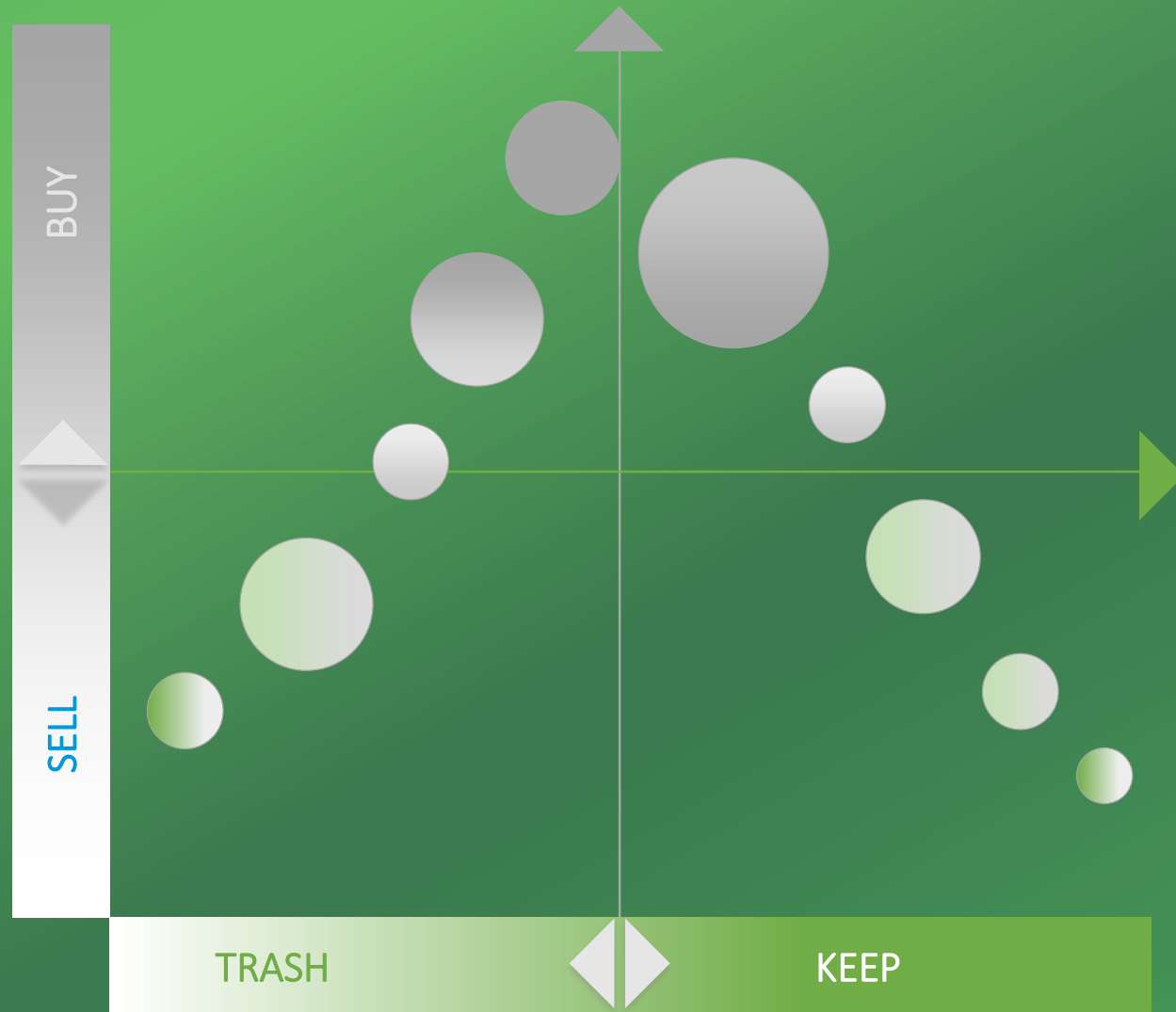


Multi-modal  
Integration



Pedestrian/  
Bike

# Data Considerations





# Privacy

- Will I be tracked?
- Law enforcement applications?



Connected and Automated  
VEHICLES

Q&A

# The IBM “Ollie” Pilot Project



# LUNCH

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- Video of industry initiatives
- Further discussion



# Afternoon Session

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- More about the technology
- Deployment considerations
- Briefings from technology leaders
- Other potential CAV projects in Miami-Dade County
- Emerging Priorities
- Summary and Closing Remarks



# More About the Technology



# Deployment Considerations

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- Privacy
- Safety
- Liability



# Technology Briefings

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- Technology Briefings: Remarks from Industry Leaders



# Emerging Priorities

- Safety and mobility
- Shared mobility on-demand
- Addressing mobility congestion
- Using existing infrastructure
- Scalability
- Differently abled (disabled, seniors, etc...)
- Somewhat improving technology
- Preservation of mobility



## Other Potential CAV Projects



# Summary & Closing Remarks





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Thank you