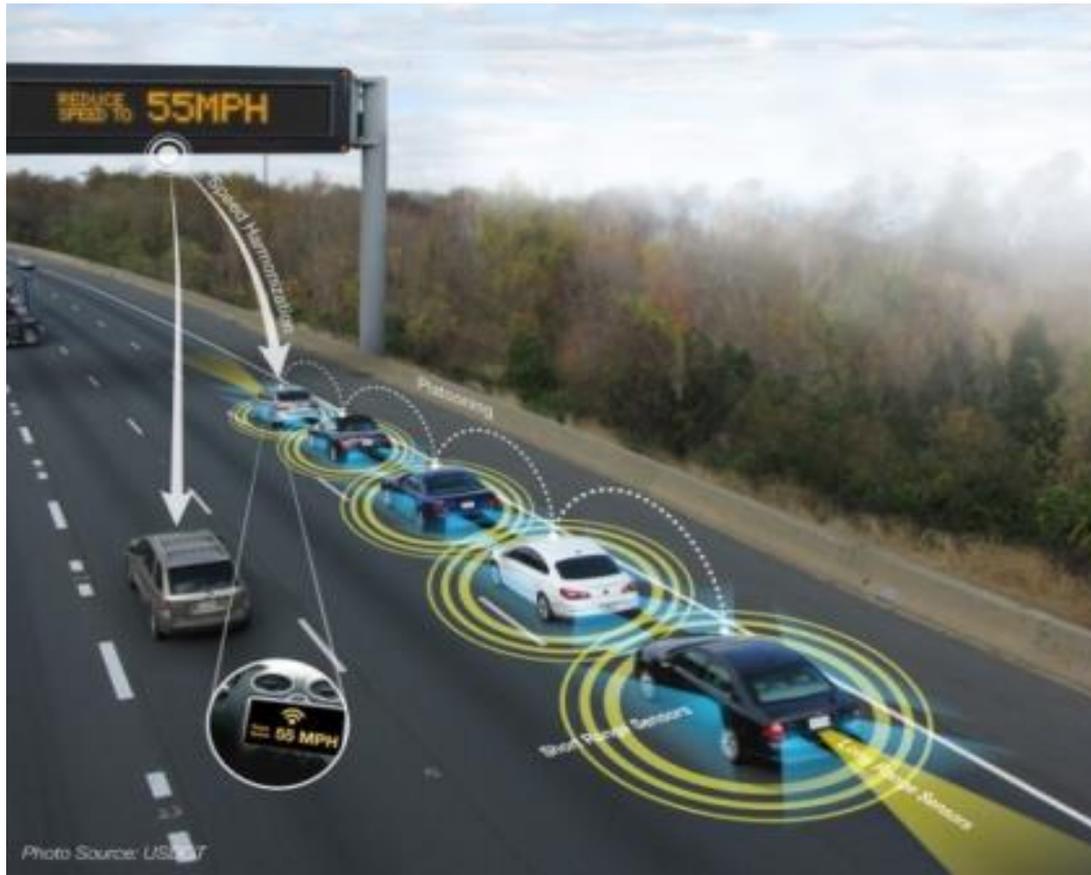


# Connected & Autonomous Vehicles

## *Starting the conversation*



Daniel Yeh  
Wisconsin DOT  
September 13, 2017



# Presentation goals

- ▶ Establish a common set of terms for autonomous vehicles (AV) and connected vehicles (CV)
- ▶ Provide background and ideas for the Steering Committee to continue the discussion
- ▶ Examine existing executive and legislative efforts at the federal and state levels

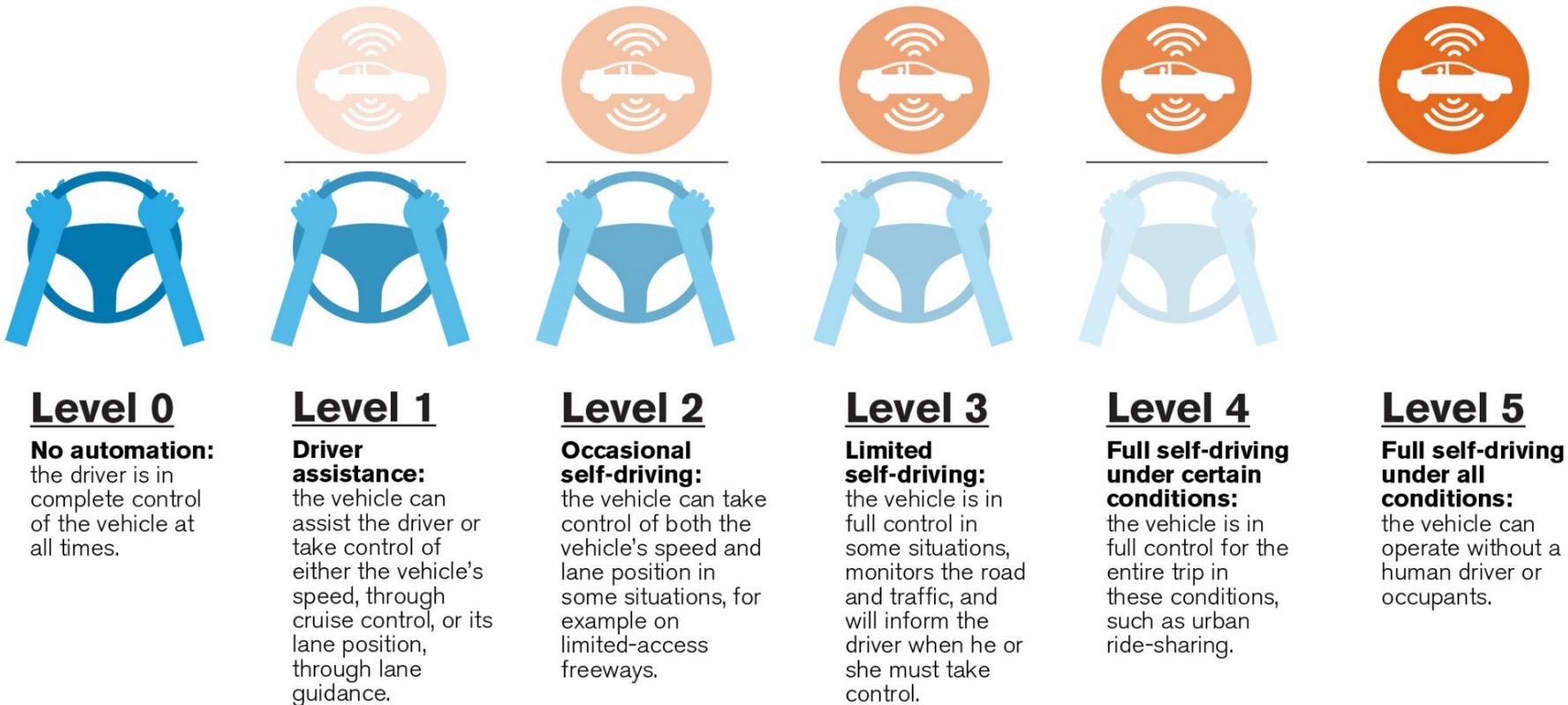


# Autonomous Vehicles (AV)

- ▶ AV utilizes independent, in-vehicle technology
  - Sensors
  - GPS
- ▶ AV is occurring in stages
  - Parking assist
  - Lane deviation
  - Adaptive cruise control
  - Collision avoidance
- ▶ AV features may be passive or active



# Five Levels of Vehicle Autonomy



Source: SAE & NHTSA

# Connected Vehicles (CV)

- ▶ Two types of connectivity
  - Vehicle to vehicle (V2V)
  - Vehicle to infrastructure (V2I)
- ▶ CV is two-way communication; both receive and transmit
- ▶ CV needs communication infrastructure
- ▶ CV features are typically only passive / warning



# Some applications of CV

- ▶ Identify hazards not visible to sensors
  - Several vehicles ahead or far down the road
  - Crossing roadways
- ▶ Information to/from infrastructure & vehicle
  - Weather
  - Traffic / speeds
  - Work zones
  - Signals



# CV / AV may happen simultaneously

## Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors



## Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities



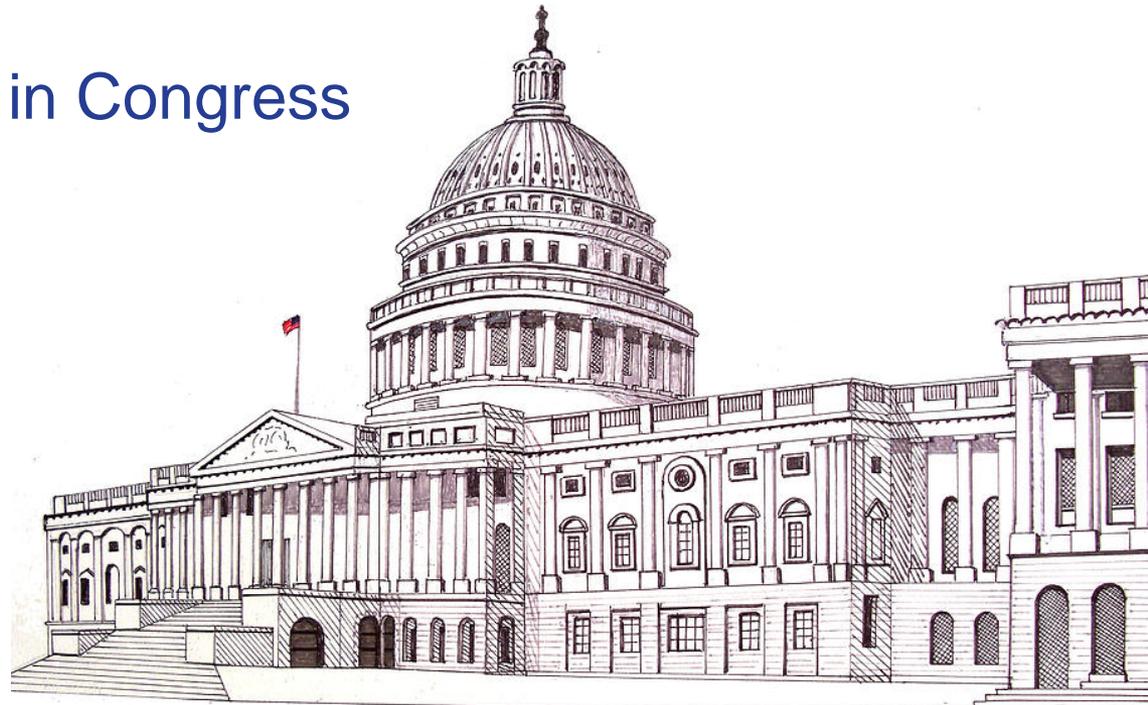
## Connected Vehicle

Communicates with nearby vehicles and infrastructure



# Federal activities

- ▶ US DOT agency actions
- ▶ Proposed legislation in Congress



# Connected vehicle pilots

- ▶ September 1, 2016 ... US DOT awarded \$45 million to initiate a Design/Build/Test phase for CV pilot projects
  - Wyoming - connect plows, trucks, traffic centers and roadside equipment to provide enhanced travel advisories on I-80
  - New York City – use V2V and intersection technologies to improve vehicle flow and pedestrian safety
  - Tampa - deploy safety and mobility applications on and in proximity to reversible freeway lanes downtown



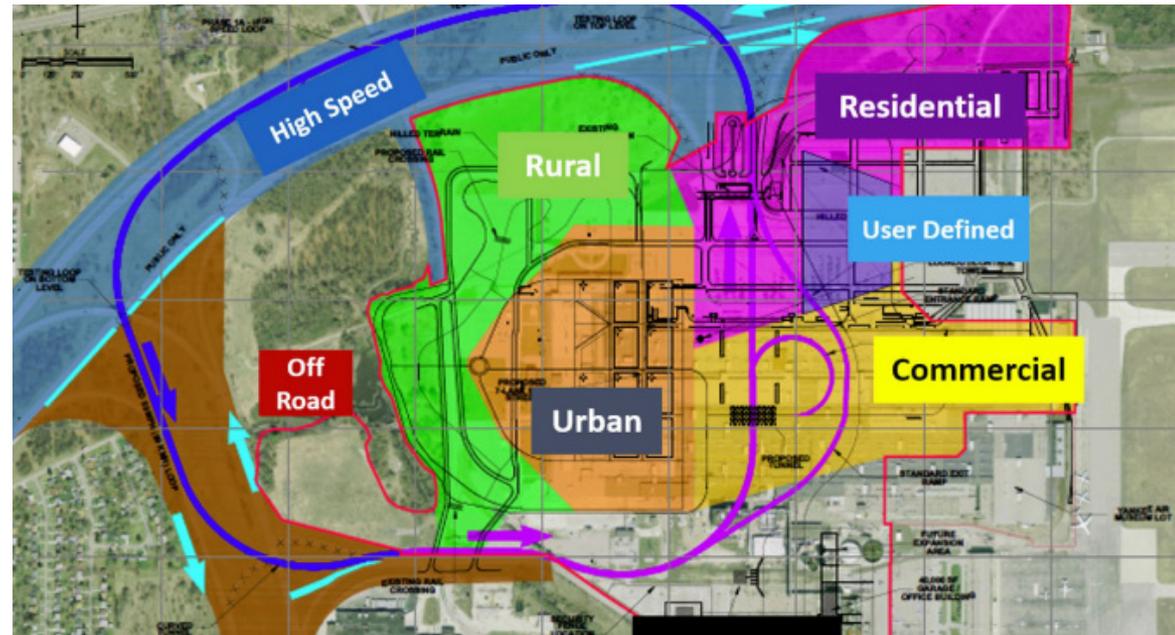
# Policy proposal

- ▶ September 20, 2016 ... US DOT / NHTSA issued a proposed Federal Automated Vehicles Policy
  - New term – Highly Automated Vehicle (HAV)
  - Proposed division of federal / state responsibilities
  - Model state policy to regulate testing, deployment and operation
  - US DOT Secretary Chao announced updated policy on September 12, 2017



# AV test ground designation

- ▶ January 19, 2017 ... US DOT designates ten proving ground sites for automated vehicle technologies
  - California (2)
  - Florida
  - Iowa
  - Maryland
  - Michigan
  - North Carolina
  - Pennsylvania
  - Texas
  - Wisconsin



## Pending federal legislation

Bill number	HR 3388
Title	Safely Ensuring Lives Future Deployment and Research In Vehicle Evolution (SELF DRIVE) Act
Summary	Designates NHTSA as the federal agency to set minimum regulations HAVs for passengers; does not currently address commercial vehicles; creates HAV advisory committee; allows limited rollout of HAVs on public roads
Impact to states	States can set stricter (but not less strict) requirements on HAVs; states could still regulate registration, licensing, education, insurance, enforcement, traffic, emissions and other aspects of HAV operation
Action	Approved in the House on September 6



# State activity (from NCSL)

- ▶ Twenty states have passed legislation; at least 41 states have introduced AV / CV legislation:
  - 2017 ... legislative activity in 33 states
  - 2016 ... legislative activity in 20 states
  - 2015 ... legislative activity in 16 states
- ▶ Governors in Arizona, Massachusetts, Washington and Wisconsin issued executive orders
- ▶ <http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx>



# Common legislative topics

- ▶ Most recent successful state legislation involves testing, maintaining following distance and connected brake systems for commercial vehicles
- ▶ Common topics of pending legislation:
  - Insurance and liability
  - Infrastructure and connected vehicles
  - Cybersecurity and data privacy/ownership
  - Vehicle inspection



# Commissions / committees

- ▶ At least 15 states have expired, existing or planned commissions, task forces or steering committees
- ▶ Iowa, Kentucky, Pennsylvania and Utah have published reports / results from commissions
- ▶ Michigan, Ohio and Pennsylvania are partners in the “Smart Belt” Coalition



# Recent publication

National Cooperative Highway Research Program (Transportation Research Board)

“Advancing Automated and Connected Vehicles: Policy and Planning Strategies for State and Local Transportation Agencies”

Topics: legalization, stimulation, driver training, public awareness of benefits and risks, transit, parking, land use, insurance, infrastructure, lane designations



# Selected state DOT initiatives

CA: [http://www.dot.ca.gov/hq/research/operations/one\\_california/index.htm](http://www.dot.ca.gov/hq/research/operations/one_california/index.htm)

CO: [www.codot.gov/programs/roadx](http://www.codot.gov/programs/roadx)

FL: <http://floridaav.hntb-tsc.com/>

IA: [https://www.iowadot.gov/pdf\\_files/IowaVisionDocument.pdf](https://www.iowadot.gov/pdf_files/IowaVisionDocument.pdf)

MI: [www.planetm.com](http://www.planetm.com)

NV: <http://www.dmvnv.com/autonomous.htm>



# Discussion

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