

Preparing for Automated Vehicles: Traffic Safety Issues for States

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In the next 10 minutes

- **What's an AV?**
- **AV status and projections**
- **AV safety issues**
- **Recommendations for states**

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What's an AV?

- **Level 0: no automation, driver in complete control**
- **Level 1: driver assistance**
 - Cruise control or lane position, driver monitors at all times
- **Level 2: occasional self-driving**
 - Control both speed and lane position in limited situations, like Interstates; driver monitors at all times

- **Level 3: limited self-driving in some situations, like Interstates**
 - Vehicle in full control, informs when driver must take control
- **Level 4: full self-driving under certain conditions**
 - Vehicle in full control for entire trip, such as urban ride-sharing
- **Level 5: full self-driving at all times**

What's an AV?

Automated Vehicle Terminology and Levels

		Automated Driving Systems (ADS)					
		Level 0 No Automation	Level 1 Driver assistance	Level 2 Partial automation	Level 3 Limited self-driving (conditional automation)	Level 4 Full self-driving under certain conditions (high automation)	Level 5 Full self-driving under all conditions (full automation)
Vehicle		No automation.	Can assist driver in some situations.	Can take control of speed and lane position in certain conditions.	Can be in full control in certain conditions and will inform the driver to take control.	Can be in full control for the entire trip in these conditions and can operate without a driver.	Can operate without a human driver and need not have human occupants.
Driver							
		In complete control at all times.	Must monitor, engage controls, and be ready to take over control quickly at any moment.	Must monitor and be ready to take over control quickly at any moment.	Must be ready to take control quickly when informed.	Not needed	Not needed

AV status 2018

- **Level 1 available for many years**
 - Adaptive cruise control, lane-keeping assistance
- **Level 2 available now**
 - BMW, GM, Mercedes, Tesla, VW, ...
- **Levels 3-5 coming soon**
 - Waymo (Google) test fleet: 7 million miles as of June 2018
 - 54 companies with AV testing permits in CA as of June 2018
 - By 2020: available (perhaps) from Audi, BMW, Ford, GM, Mercedes, Tesla, Toyota, Volvo, VW; Delphi, FCA, JLR, Lyft, NuTonomy, Uber, Waymo, ...

AV projections

FIGURE 5: PREDICTIONS OF SALES, VEHICLES ON THE ROAD, AND TRAVEL FOR LEVEL 4 AND 5 VEHICLES

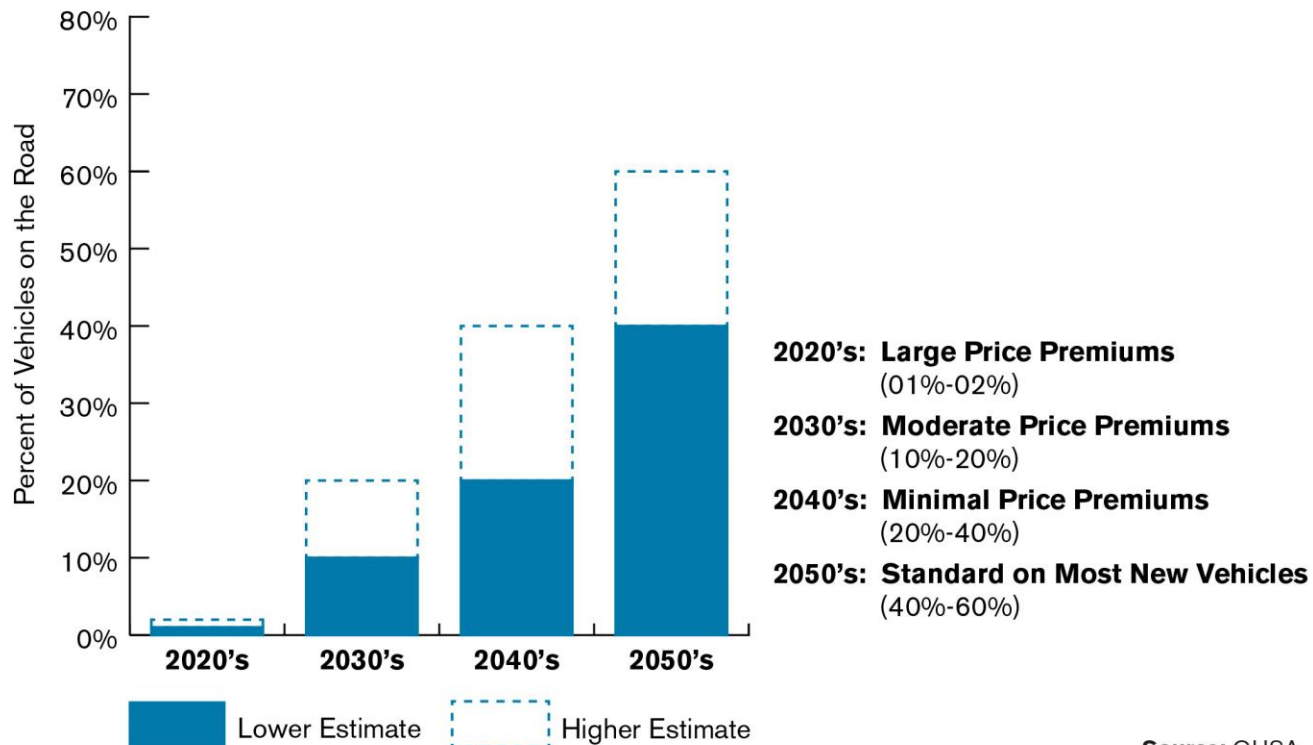
Stage	Decade	Vehicle Sales	Vehicle Fleet	Vehicle Travel
Large price premium	2020s	2-5%	1-2%	1-4%
Moderate price premium	2030s	20-40%	10-20%	10-30%
Minimal price premium	2040s	40-60%	20-40%	30-50%
Standard feature on most new vehicles	2050s	80-100%	40-60%	50-80%
Saturation (everybody who wants it has it)	2060s	?	?	?
Required for all vehicles on road	???	100%	100%	100%

Source: Littman (2018)

AV projections

Autonomous Vehicle Fleet Projections

(as a percentage of all vehicles on the road)



Source: GHSA

The big takeaway

- **AVs and DVs (driver-controlled vehicles) will share the road for a long time – perhaps forever**



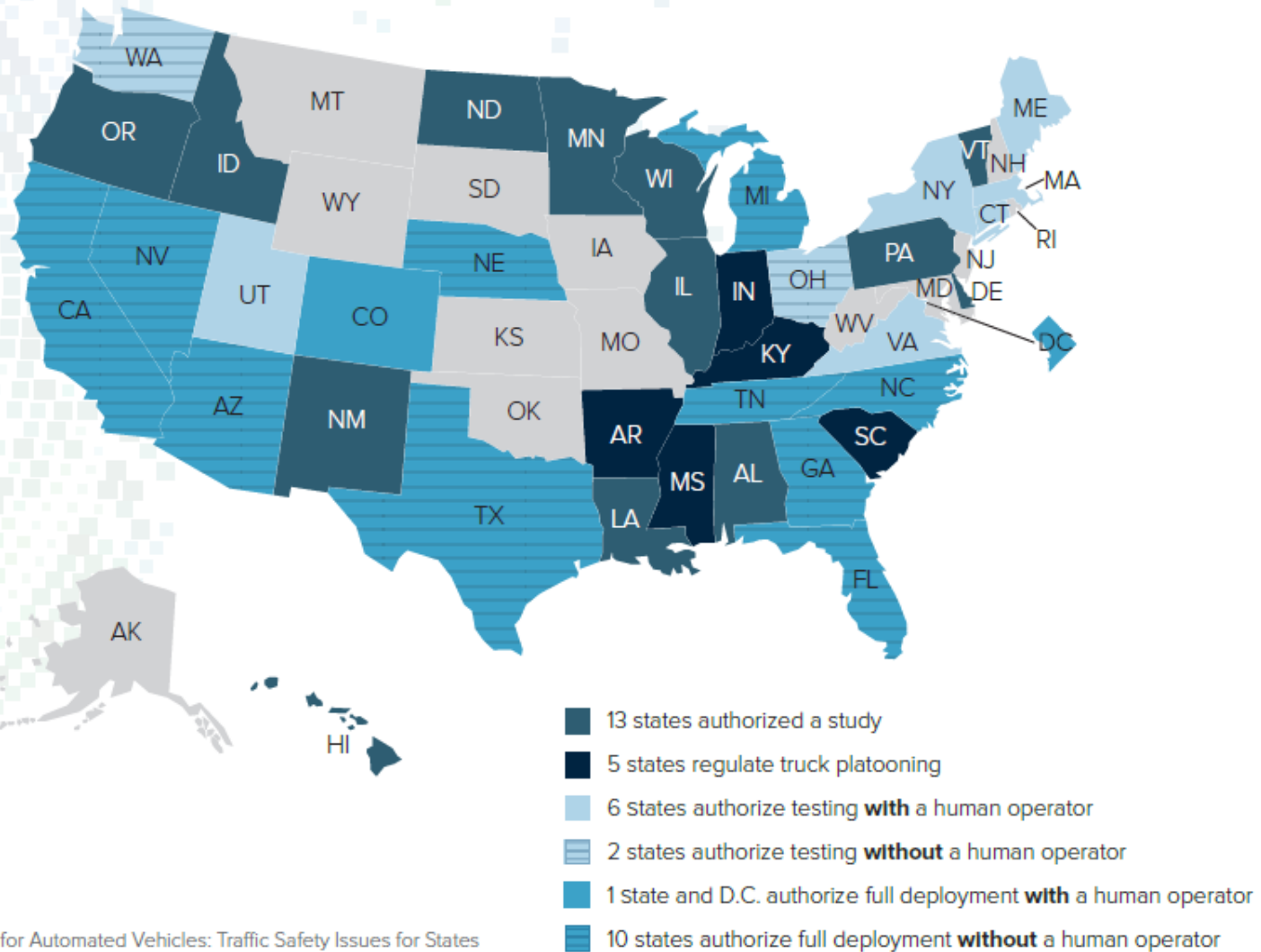
State AV activities

- **February 2018 survey of SHSOs; 35 responses**
- **AV development and testing**
 - 17 actively encouraging; 10 with testing underway
 - 6 observing
 - 12 no involvement
- **21 with an AV task force**
 - 13 with SHSO involvement
- **11 with law enforcement involvement in testing or task force**

FIGURE 7

Laws and Legislation relating to AVs

AS OF JUNE 2018



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AV safety issues

- **AV operational issues**
 - Compliance with traffic laws
 - Local customs
 - Decision rules
- **AV driver issues**
 - Level 2
 - Level 3
 - Level 4
 - AV drivers switching to manual operation
- **Other road user issues**
 - Understanding AV operations
 - Communicating with AVs

AV safety issues

- **Law enforcement issues**
 - Identifying AVs
 - Communicating with AVs
 - Crash response
- **Data issues**
 - Identifying AVs in vehicle title, registration, crash data systems
 - Access and use of data produced by AVs
- **Crash liability issues**
 - Who's responsible: occupant, owner, vehicle manufacturer, software developer, all of the above?

AV recommendations for states

- **Management**
 - Lead agency
 - AV task force
 - AV testing and deployment plan
- **Traffic laws to consider**
 - Authorize driverless Level 4 and 5 AVs
 - Distracted driving for Level 3 AV drivers
 - Following too closely

AV recommendations for states

- **AV testing**
 - Requirements for organizations conducting AV testing
 - Traffic law changes or exemptions
 - Law enforcement coordination
 - Information for public and media
 - Oversight and reporting
- **AV deployment**
 - Licensing and registration procedures
 - Education for AV owners and other road users
 - State data systems
 - Access to data produced by AVs
 - AV vehicle insurance
 - Law enforcement policies and procedures

For more information

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Download the report: www.GHSA.org