

Automated Trucks and Public Policy

Implementation Challenges and Opportunities

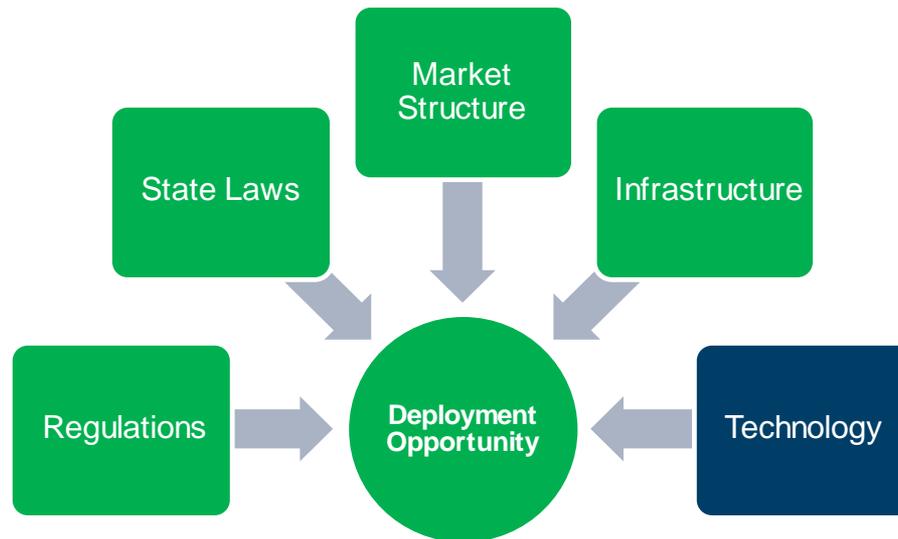
Larry O'Rourke, ICF

7/19/2017



Overview

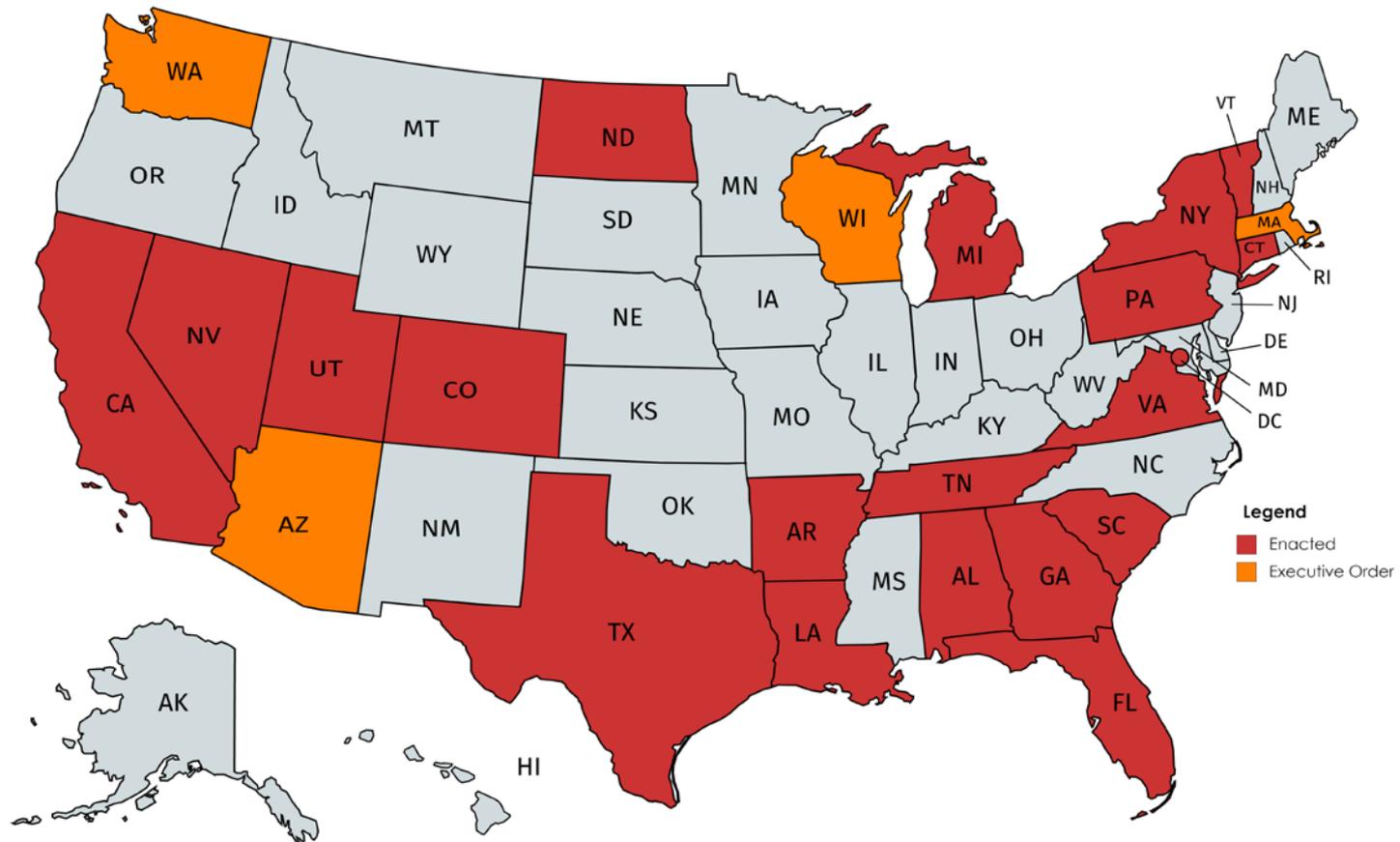
- **Technology**
- **State laws**
- **Regulation**
- **Planning & infrastructure**
- **Market structure**



Automation Technologies

- **Level 0 – No Automation**
 - Lane departure warnings
- **Level 1 – Driver Assistance**
 - Lane keeping
 - Automatic braking
 - Adaptive cruise control
 - Platooning with automated longitudinal control
- **Level 2 – Partial Automation**
 - Platooning with automated lateral and longitudinal vehicle control
- **Level 3 - Conditional Automation**
 - Freightliner Inspiration Truck
 - Traffic Jam Assist
- **Level 4 - High Automation**
- **Level 5 - Full Automation**

19 State Autonomous Vehicle Laws Enacted

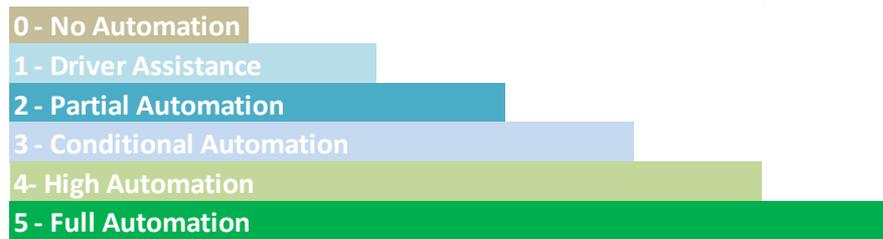


Created with mapchart.net ©

Source: National Conference of State Legislatures

Patchwork of State Autonomous Vehicle Laws

➤ Define autonomous vehicles differently



SAE Levels of Automation

➤ Some states authorize:

- Testing of autonomous vehicles
- Use of autonomous vehicles by the public
- Testing of “driverless vehicles” under certain conditions
- Operation without drivers

➤ Some states require:

- A special license for the driver of a test vehicle
- Black boxes

State Laws Treat Platooning Differently

- **Seven states have enacted legislation authorizing the deployment of Level 1 truck platooning**
 - Including Arkansas, Georgia, Michigan, Nevada, South Carolina, Tennessee and Texas



- **Following distance of trucks treated differently**
 - Reasonable and prudent standard
 - Require that trucks follow at specific distances
 - Or at a certain duration of time behind another vehicle

Incorporating Automated Trucks into State Laws

- **Reviewing existing state law for relevance to automated trucks**
- **Develop common legal and regulatory definitions**
- **Harmonizing laws between states**
 - Following distance for platoons
 - Treatment of platooning video systems
 - Treatment of closely spaced vehicles and pavement damage

Federal Regulations

➤ **Federal Motor Vehicle Safety Standards**

- Current regulations assume a driver
- Volpe National Transportation Systems Center concluded that few of the existing FMVSS standards serve as a barrier to standard designs
- Federal legislation to regulate automated vehicles in the US was introduced on June 20th
- Increases FMVSS exemption caps from 2,500 to 100,000
- Heavy-duty vehicles not included in the NPRM - Mandating V2V communications

➤ **FMCSA**

- Hours of Service Regulations

➤ **Security, Privacy & Others**

Planning and Infrastructure

- **Lane striping**
- **Quality of data on truck restrictions**
 - Bridge heights
 - Load restrictions
 - Truck routes
 - Operational constraints – turning radius
- **Understanding future demand**
- **V2I infrastructure**
 - DSRC stoplights, work zone units, signage

Quality of Lane Striping Affects
Lane Keeping System Performance



Source: Ken Lund, <https://www.flickr.com/photos/kenlund/16235995526>

Market Structure – Area of Operation

- **Most trucks are single unit vehicles operating close to their home base**
- **Long-haul combination vehicles operate more than half the vehicle miles travelled**
- **Greatest early opportunity for automation**

Truck Type	Area of Operation	Trucks	VMT (Millions)
Single-Unit	Under 150 miles	7,150,695	71,901
	Long Haul	975,312	34,681
	Total	8,126,007	106,582
Combination	Under 150 miles	346,056	7,414
	Long Haul	2,125,293	161,022
	Total	2,471,349	168,436
Total		10,597,356	275,018

Source: Truck and VMT sub-totals from FHWA, Highway Statistics; range distribution based on U.S. Census, Vehicle Inventory and Use Survey.

Market Structure Impact on Platooning Opportunity

- **Most truck tractors are in private fleets**
- **Companies operating large private fleets, with homogeneity in their tractor OEM, and predictable routes may gain the best savings along their high density routes from platooning**
- **LTL carriers operating long-haul trucks on fixed routes between terminals.**
- **TL carries operating on high density lanes.**

Operation Type	Firms	Tractors	VMT
Private	82.3%	58.0%	32.0%
TL	17.1%	35.0%	60.0%
LTL	0.3%	5.0%	6.0%
Parcel	0.3%	2.0%	2.0%

Deployment of Automated Trucks

- **Improved working environment for the driver in large long haul fleets is an opportunity. Large truckload carriers had a 74% turnover rate for drivers in first quarter 2017**
- **Firms operating long haul trucks with team drivers provides an opportunity for large labor productivity benefits from highly automated trucks. Some labor productivity benefits depend on Hours of Service Rule changes.**
- **Larger carriers internalize safety risk, tend to invest first in safety**
- **Almost all carriers expect a payback on investment in truck automation technology in three years or less.**

Principles for Policy Making

- **Maximize options - don't be overly prescriptive**
- **Understand what level of autonomous truck you are making policy for**
- **Different approach for low speed and high speed operation?**
- **Include autonomous trucks in all plans**
- **Educate policymakers – policy makers may not be technical experts**
 - **Technology caucus – connect policymakers with engineers and technical experts**

Contact Information

- **Larry O'Rourke, ICF**
- **617-250-4226**
- **Larry.orourke@ICF.com**