

# Level One Truck Platooning: Commercial Deployment Status

Richard Bishop  
Florida Automated Vehicles Summit  
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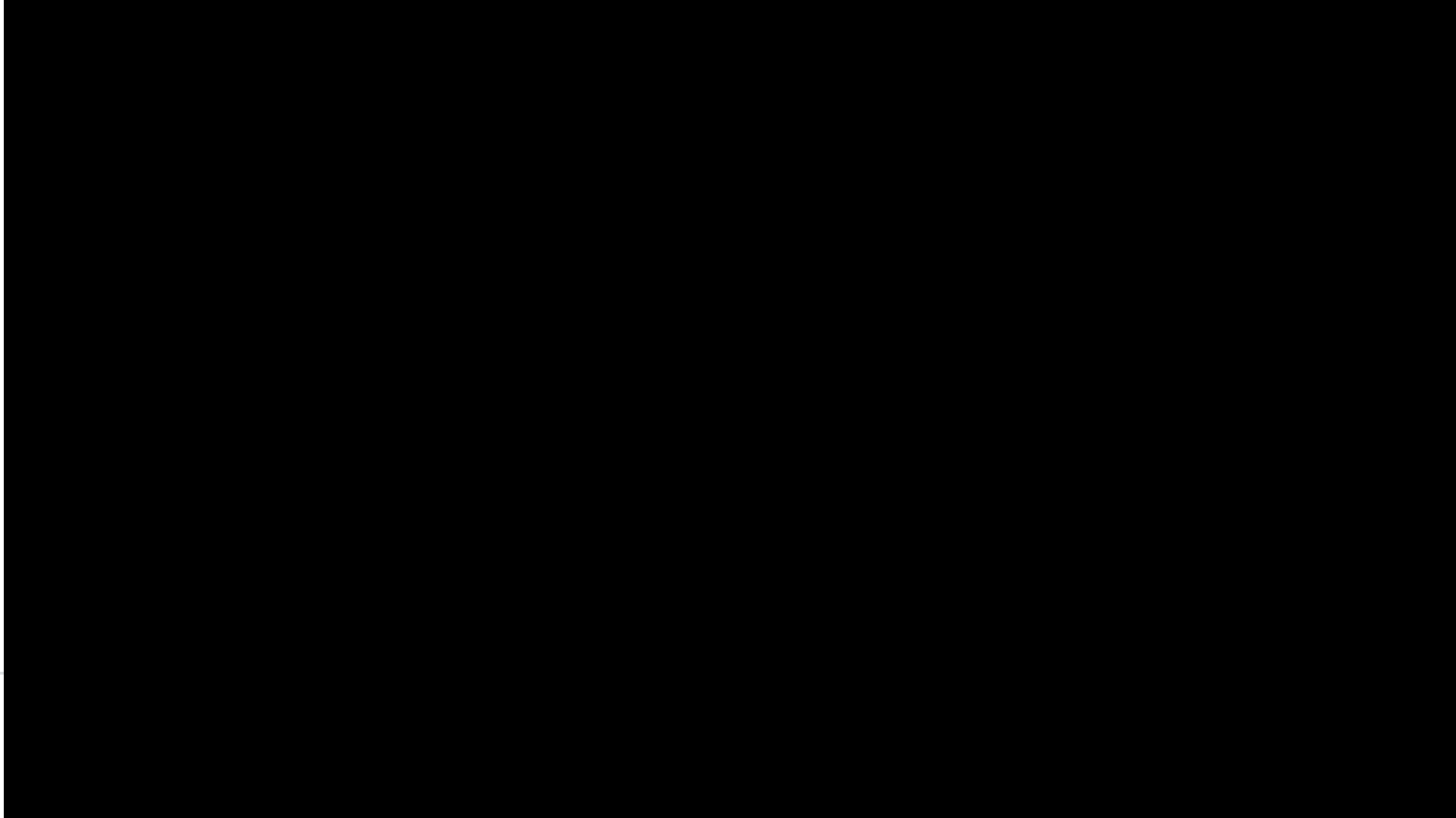
# Truck Platooning Commercial Deployment: Outline

- Who's in the Game?
- How Does It Work?
- Regulatory Factors
- Summary

# December 2017: Driver Assistive Truck Platooning Pilot on Florida's Turnpike



# PlatoonPro: View from Follow Driver's Perspective



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# Truck Platooning: Who's In The Game?

# Platooning Seeing Extensive Validation of 1<sup>st</sup> Gen Products, Evaluation of Advanced Capabilities

Commercial/Research	Country	Organization	Automation Level Leader	Automation Level Follower	Number of Trucks	Year of Operations
Commercial	USA	Peloton	L1	L1	2	2018
Commercial	USA	Freightliner	L1	L1	2	2018
Research	USA/Canada	Auburn University	L1	L2	2-4	2018
Commercial	Germany	MAN	L1	L2	2	2018
Research	UK	Transp. Research Lab (Helm-UK)	L1	L2	3	2018
Research	NL	Rijkswaterstaat	L1	L1	2	2019
Research	Sweden	Volvo/Scania	L1	L2	2	2019
Commercial	Finland	Scania	L1	L2	3	2019
Research	Europe	ENSEMBLE, EC	L1	L2	2	2019
Research	Singapore	Port of Singapore	L1	L4 Driverless	2	2019
Research	Japan	METI	L1	L4 Driverless	3	2019

# Auburn University: Quebec (November 2018)



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**Real world deployment is defined by what commercial companies are doing!**



# Freightliner Bringing Two-Truck Platooning to Market Based on Daimler Three-Truck Testing



Platooning plus limited lateral control assistance.

# Trucks

## ON-HIGHWAY PLATOONING SHOWCASE

- First public on-highway platooning showcase between a truck OEM and transporter in the U.S
- Volvo Trucks in platooning research collaboration with FedEx and North Carolina Turnpike Authority
- Volvo's Cooperative Adaptive Cruise Control (CACC) using wireless vehicle-to-vehicle (V2V) communication technology



# MAN Trucks Pilot in Bavaria w/ DB Schenker

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# Peloton Technology:

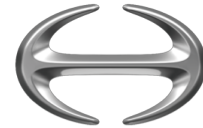
“connected and automated vehicle technology company”

- Startup founded 2011, backed by ten Fortune Global 500 companies.
- 2019 launch of Level 1 two-truck platooning augmented by Cloud Support.
- Offering system as factory option across several OEMs.
- Most visible player....



# Driver-Assistive Truck Platooning Market Overview

Many Companies in US, Europe, and Asia Involved with Bringing Truck Platooning to Market



A PACCAR COMPANY



A PACCAR COMPANY



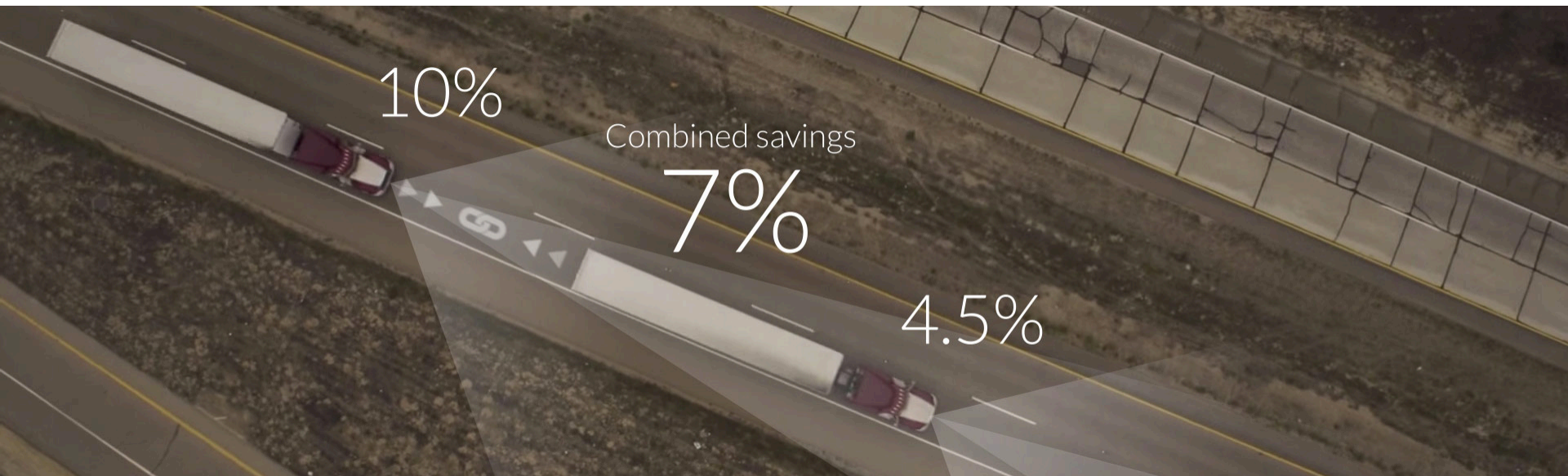
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# Truck Platooning: How Does It Work?

# First Generation Platooning: Not Driverless!

- Level One Automation per SAE J3016
- Leader:
  - driver drives normally
  - may or may not use Adaptive Cruise Control
  - Forward Collision Avoidance and Mitigation always on
- Follower:
  - truck driver still responsible for steering and adjusting to road conditions in real-time (cut-ins, traffic, weather)
  - longitudinal control (throttle, brakes) is automated
  - Forward Collision Avoidance and Mitigation always on
- “Driver-Enhanced” rather than “Driver-less”
  - both drivers in direct radio contact and benefit from teamwork.

# Power of V2V



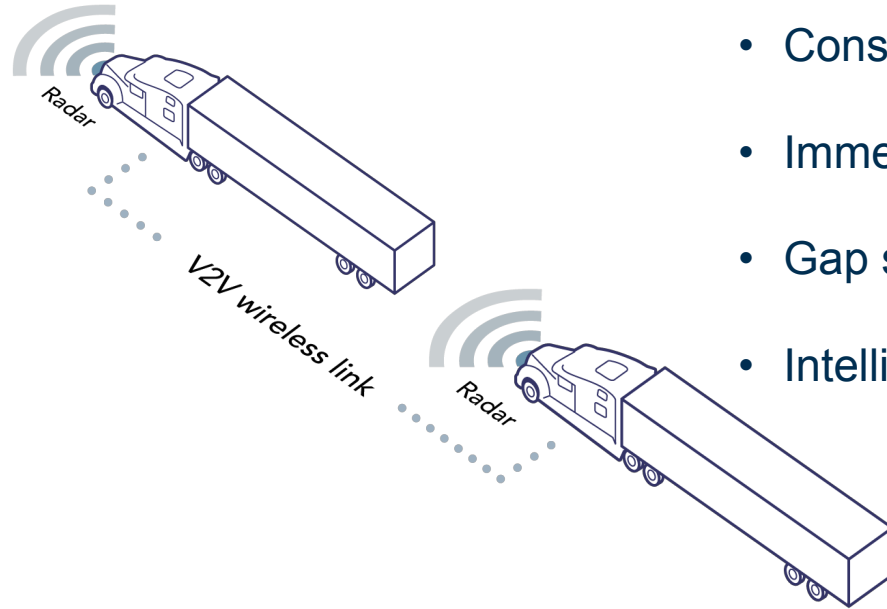


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# **CONNECTED BRAKING KEY TO SAFE TRUCK PLATOONING**

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# Making Close Following Safe: V2V

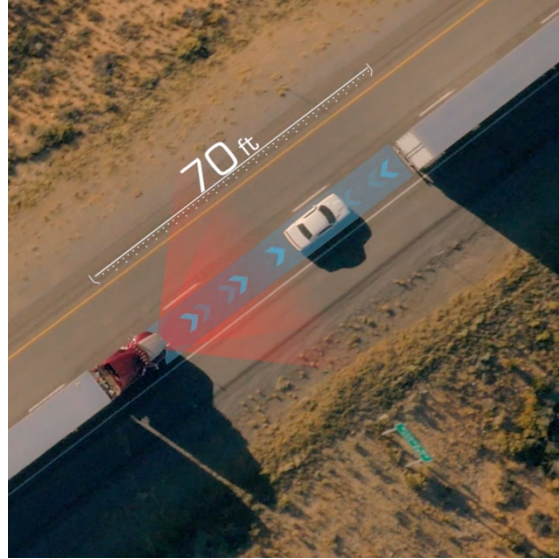


- Constant communication
- Immediate knowledge of required braking
- Gap set to ensure safety
- Intelligent ordering

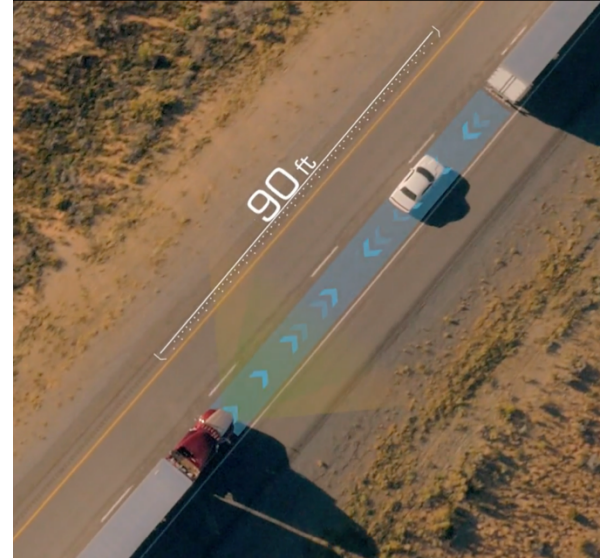
# Safety: Handling Vehicle Cut-ins



Driver sees car cutting in and backs off  
OR



If driver does not respond, system radar detects cut-in vehicle and automatically begins to back off follow truck



Follow truck will continue to back off to safe manual following distance (100+ ft) and then give full manual control back to follow driver 19

# Safety: Only Enabled for Suitable Roads & Conditions

Peloton Network Operations Cloud (NOC) and Procedures limit platooning to:

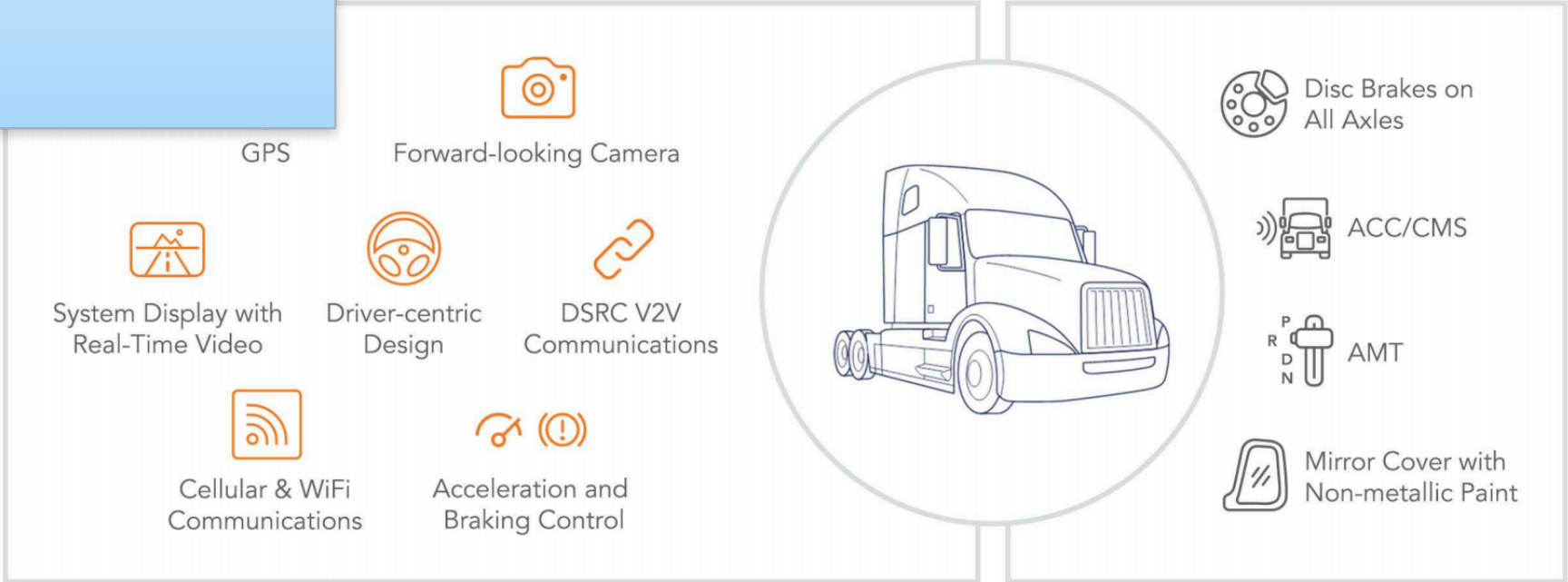
- Multi-lane, divided, limited access highways
- Moderate or low traffic conditions
- Good traction conditions (no heavy rain, sleet, ice or snow)
- Appropriate topography (good line of sight; no steep grades)

NOC provides over-the-horizon alerts to drivers on roadway conditions



ing of lower components

### BASE TRUCK CONFIGURATION



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# **BUSINESS MODEL / DEPLOYMENT**

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## Main Use Case: Same-Fleet, Hub-to-Hub Routes

- 50+ “return-to-hub” runs per week
- Drivers are fleet employees
- Scheduled and manual NOC pairing
- Homogenous tractor configurations



# Maximize Platooning Usage

Low Hanging Fruit

Long-Term

Intra-Fleet

Facilitated/  
Coordinated

Ubiquitous  
Platooning

- Major Shippers
- Brokerages/3PLs
- Peloton NOC
- Telematics Partnerships



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**Still limited to suitable highways and conditions!**

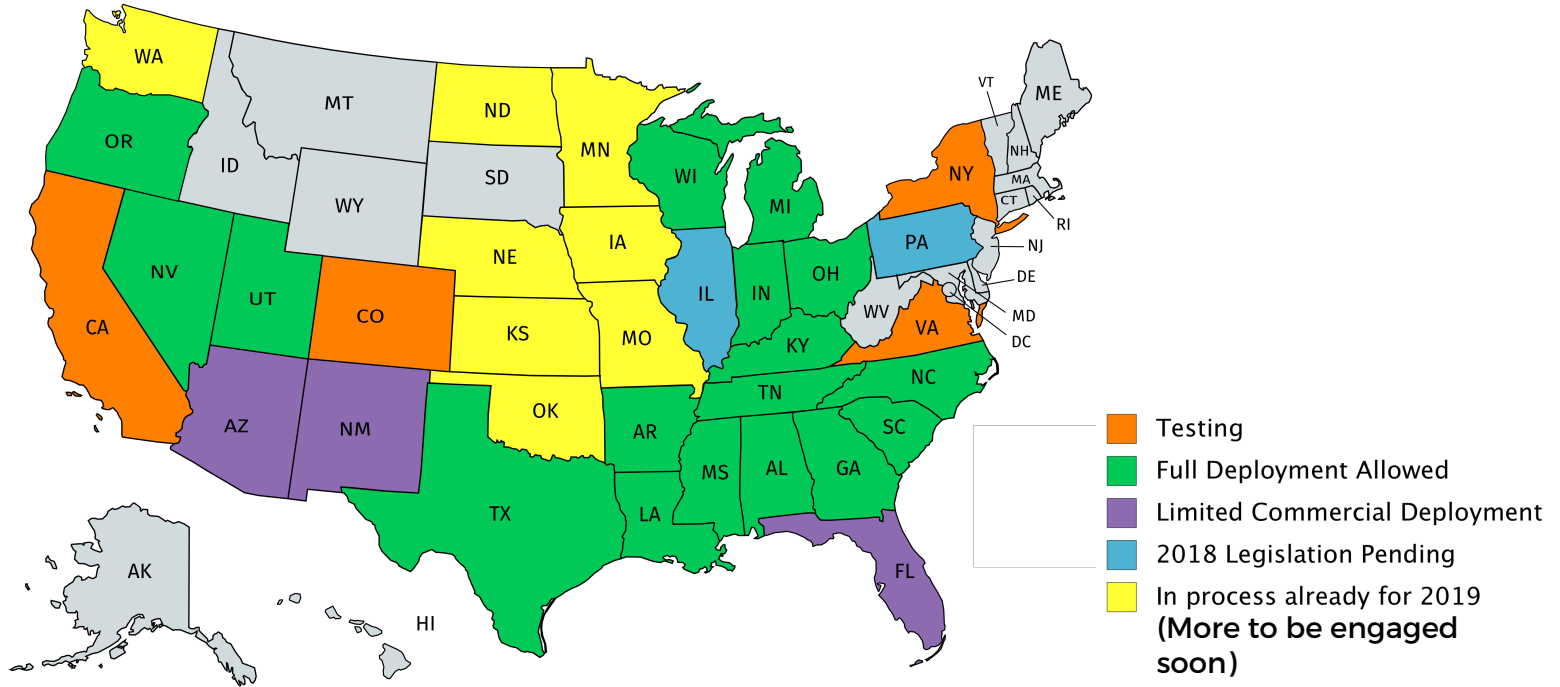
# Platooning Business Models

- One-shot: sell platooning capability as a feature
- Platooning as a Service:
  - system offered at cost
  - initial fuel savings enable fleet to recoup cost
  - going forward: fee per mile of platooning
- Inter-fleet / inter-brand operations
  - same system may be offered as an option by multiple OEMs
  - standardization of inter-vehicle communications will depend on customer demand

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# Truck Platooning: Regulatory Factors

# Progress on Allowance of Truck Platooning in the US (state following distance laws)



# State Allowance of Truck Platooning

- States allowing commercial deployment of truck platooning:
  - most are “carte blanche”
  - a few require “platooning plan” or “notification”
- Currently no permits are required in states with platooning commercial allowance laws.
- Self-certification of safe operations and practices is the norm.
- **Border crossings not an issue!**
  - allowance / non-allowance, other parameters, adjusted automatically when entering new jurisdiction if needed.

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# Summary

# Summary

- While driverless trucks are in the limelight, platooning provides significant business and societal benefits at a low level of automation where drivers are fully engaged.
- With commercial availability in 2019, fleets will be more involved in regulatory discussions.
- Platooning systems with best-in-class safety equipment combined with best practices for safety design improve safety of the roadway.
- As long as safety measures are adequate, other impacts can be assessed in parallel with deployment.
- As truck platooning comes into use, empirical data should be collected to further understand safety and traffic factors.

# Thank You

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