

MEETING NOTES

Iowa Advisory Council on Automated Transportation (ATC)

Wednesday, March 16, 2021

1 pm – 3 pm CT



<https://iowadrivingav.org/>

Action Items:

- ATC and subcommittees explore opportunities for advanced technologies projects

Attendees – 66 people

- Scott Marler (ATC Chair) – Director, Iowa DOT
- Finch Fulton – Locomotion
- Jill Lippincott – Iowa Economic Development Authority
- Scott Golberg – Fiber Utilities
- Shannon Landauer – Iowa Lakes Corridor Development Corporation
- Shirley Mcguire – Federal Motor Carrier Safety Administration
- Commissioner Stephan Bayens - Iowa Department of Public Safety
- Heather Thomas – City of Marshalltown
- Dave Ness – City of Dubuque
- Tammie Krausman – Iowa Department of Natural Resources
- Ray Warner – Aureon
- Paul Steier – American Association of Motor Vehicle Administrators (AAMVA)
- Rob Denson – Des Moines Area Community College (DMACC)
- Steve Spears – University of Iowa, School of Planning and Public Affairs
- Brooke Lovelace – Iowa Department of Human Services
- Brian Keierleber – Buchanan County
- Randy Goddard, Eric Porter – Iowa Communications Network
- Peter Rafferty – Gannett Fleming
- Blake Hansen – Olsson
- Jeremy Johnson-Miller – National Aging and Disability Transportation Center
- John Gibson – Iowa Division of the Federal Highway Administration
- Meredith Mitts – AAA The Auto Club Group
- John Hartog – Northwest Iowa Community College
- Christina Aizcorbe, Austin Wilson – Velodyne
- Pete Marshall - HDR
- Eric Bakker - Iowa Senate
- Andy McGuire – Mahaska County
- Susan DeCourcy – National Highway Traffic Safety Administration
- Omar Ahmad, Jacob Heiden, Cher Carney, Dan McGehee – University of Iowa, National Advanced Driving Simulator
- Zach Hans, Skylar Knickerbocker – Iowa State University, InTrans

- Newman Abuissa, Emma Borchers, Clayton Burke, Steve Gent, Josh Halterman, Samuel Hiscocks, Ashley Hochberger, Benjamin Hucker, Joe Drahos, Kelli Huser, Renee Jerman, Dennis Kleen, Andy Lewis, Hossein Naraghi, Garrett Pedersen, Adam Shell, Toni Smith, Steve Stonehocker, Tim Simodynes, Sam Sturtz, Mark Van Dyke, Andrea White, Daniel Yeh – Iowa DOT

1. Welcome – Scott Marler, Iowa DOT Director & ATC Chair

- Guests
- New Members
 - Paul Steier is the Director of Vehicle Programs at the American Association of Motor Vehicle Administrators (AAMVA). Paul formerly worked at the Iowa DOT as a Motor Vehicle Enforcement officer and as bureau director within the Motor Vehicle Division.
 - Eric Porter is a new Iowa Communications Network (ICN) delegate.

2. General Announcements – Scott Marler

Iowa DOT Staffing

- Iowa DOT has welcomed new staff members to new positions related to emerging technologies. These positions reflect the DOT’s need to adapt and be flexible while supporting citizens of Iowa
 - Emma Borchers is a Transportation Planner in the Public Transit Bureau and Transportation Development Division. Emma’s focus areas include mobility, policy, & emerging technologies as it relates to public transit
 - Toni Smith is responsible as the Emerging Technology Program Manager in the Central Program Bureau in the Motor Vehicle Division. Toni’s focus areas include mobile ID and driver licenses, the Real ID program, as well as leading and supporting registration and titling of automated driving system requests in Iowa

Federal Activity

- [U.S. House of Representatives Highway & Transit subcommittee Testimony \(House Website\)](#)
 - The U.S House of Representatives, Highway & Transit subcommittee held a virtual hearing on Wednesday, Feb 2nd, 2022. The purpose of the hearing was to explore the impact of automated vehicle deployment, including automated trucks and buses, on mobility, infrastructure, safety, workforce, and other economic and societal implications or benefits.
 - Iowa DOT Director Scott Marler was one of eight witnesses and represented the American Association of State Highway and Transportation or AASHTO which includes all 50 states, the District of Columbia and Puerto Rico. This was an exciting opportunity to:
 - Share the critically important work being done nationally by State DOTs and local partners including the efforts here in Iowa by the ATC
 - Emphasize the anticipated benefits and opportunities of CAVs to improve safety, equity, and sustainability of the nation’s transportation system
 - While deployment timelines by the CAV industry are unclear and continually changing coupled with associated economic, political, and technology challenges, it’s critical we continue the conversation to learn, become smarter, and identify partnerships to ensure the safe and equitable integration of automated systems in the future
- [National Roadway Safety Strategy \(NRSS\)](#)
 - In late January, the US Department of Transportation or US DOT released the federal government’s new comprehensive National Roadway Safety Strategy or NRSS, a roadmap for addressing roadway fatalities and serious injuries.

- b. The NRSS outlines USDOT’s approach to reducing serious injuries and deaths on highways, roads, and streets—the first step in working toward a long-term goal of reaching zero roadway fatalities.
 - c. The NRSS adopts the “Safe System Approach” principles to guide safety actions.
3. Federal Rulemaking
- a. [FMCSA Authorized Windshield Area for the Installation of Vehicle Safety Technology](#)
 - b. [NHTSA New Car Assessment Program \(NCAP\) for ADAS](#)
 - c. [NHTSA Finalizes First Occupant Protection Safety Standards for Vehicles Without Driving Controls](#)

3. Opportunities and Challenges for Automated Vehicles in Rural Areas– Omar Ahmad, Deputy Director at the National Advanced Driving Simulator, University of Iowa

Project Background

1. Omar Ahmad is the deputy director of the National Advanced Driving Simulator (NADS) and is actively engaged in work related to connected and automated vehicles, including project manager for ADS for Rural America. Mr. Ahmad has served as the project manager for a number of simulation-based research studies related to studying vehicle safety and human performance in the areas of active safety, impairment, driver distraction, and driver modeling.
2. NADS was awarded one of the U.S. DOT’s Automated Driving Systems (ADS) demonstration grants, and their project *ADS for Rural America* is focusing on transportation on the rural roads aspect and on enhancing mobility. The goals of the ADS for America project include:
 - a. **Improving safety** on roadways with the integration of Automated Driving Systems (ADS): Rural Roadways are under-represented in AV testing and demonstrations, and while 19% of people in the U.S. live in rural areas, nearly 50% of traffic fatalities occur there. The characteristics of rural roads make them more dangerous, including sharp curves, limited line of sight, slow moving vehicles on the road, varying types of surfaces and markings or no markings.
 - b. **Enhance mobility:** The aging and mobility-impaired populations need more options. With public transportation non-existent in many rural areas, these people still need access to healthcare and other services. This project is looking to show the benefits to this population and in the long run improve their quality of life.
 - c. **Provide data to U.S. DOT:** The project will produce a publicly available dataset detailing the things that automated technology can and can’t handle at this point and why.

ADS Vehicle

1. A Ford Transit shuttle bus has been outfitted at [Hexagon | AutonomouStuff](#) with custom technologies to allow the vehicle to perform at different levels of automation. The vehicle is wheelchair accessible (ADA compliant) and was purchased as part of the Buy America Act. The tech partners are also based in the Midwest: AutonomouStuff in Illinois for outfitting the vehicle with automated features, and Mandli Communications in Wisconsin for high-definition road mapping. Equipment on the vehicle includes:
 - a. GPS antenna
 - b. DSRC antenna
 - c. High-definition cameras

- d. Velodyne Lidars
 - e. Webcam video camera
 - f. Mobileye collision avoidance system
 - g. Vaisala mobile detector: road, surface, and weather data
 - h. Long range radars
2. A trained safety driver and co-pilot carefully monitor—and at times drive manually—the partially automated shuttle bus along a set 47-mile route that has been specially mapped for automated driving. The safety driver easily and quickly switches to manual driving at any time (as easy as taking a vehicle out of cruise control). The passengers in the vehicles are research participants over age 65 or those 25 and older with a disability that affects their ability to drive.
 3. A center passenger display is inside the vehicle showing the route, the destinations & arrival times, and the automation status. The automation status indicates if the vehicle is operating under automation or if it's being driven manually by the human safety driver. Participants also have a handheld tablet that shows the same map and gives them access to internet, weather info, and to complete surveys.

Route

1. The ADS vehicle travels on a 47-mile loop, driven clockwise, with four stops at the Iowa City Marketplace, Hills Community Center, Riverside Casino, and Kalona Public Library. The vehicle will collect unique data from different road types including marked, unparked, and unpaved, and it will also operate during all four seasons at different times of the day. It will encounter construction zones as well as different types and speeds of roads users.
2. The route is mapped in high-definition—much more accurate than a standard GPS. This high-definition map works in tandem with the vehicle's on-board sensors to accurately place the vehicle on the road: either between lane markings (when available) or to the appropriate spot on the road (when lane markings are not present). HD maps are vital to automated driving but require updates overtime. The route for the ADS for Rural America project will be mapped a total of three times before the end of the project.

Results

1. The ADS vehicle will collect data in six phases over multiple years; each phase the vehicle will increase in automation. Phase 1 is complete with automation in controlled-access roadways, and Phase 2 is underway. Phase 1 included 12 completed drives with 24 participant riders. The vehicle recorded 587 miles, 330 of those in automation mode. The amount of data produced was 913 GB.
2. Reasons for automation disengagements include:
 - a. Decrease in speed limit (not recognized by system)
 - b. Stop at traffic light
 - c. Vehicle passing the vehicle in no passing zone
 - d. Stop at stop sign
 - e. Exit highway
 - f. Vehicle brakes inappropriately
 - g. Approaching blind hill

- h. Others (less frequent occurrences)
3. The vehicle encountered the following vehicles and vulnerable road users:
 - a. Horse and buggy
 - b. Cyclists
 - c. Pedestrians
 - d. Semis
 - e. Farm equipment
 - f. Stopped vehicles
 - g. Emergency vehicles
 4. After Phase 1, the project team learned that a dedicated safety driver and co-pilot is needed for consistent and safe remote monitoring. Close communication is essential with the technology provider for questions and development needs, and on-site staff need to be trained to troubleshoot simpler issues. Takeaways from the automation behavior include:
 - a. Max speed in automation mode was 50mph on all roadways.
 - b. Automation drives gravel roads like a normal road
 - c. The vehicle is slow to start from stopped (railroad crossings, stop signs), which is annoying to drivers behind
 - d. Automation requires precision timing that needs frequent rebooting of electronics and syncing.

4. Federal and 50 State Overview of Autonomous Trucking Regulations – Finch Fulton, Vice President of Policy and Strategy at Locomotion

Company Overview

1. Finch Fulton joined Locomotion as the VP of Policy and Strategy in February 2021. He previously served at the US Department of Transportation under Secretary Elaine Chao from 2017-2021, was the Deputy Assistant Secretary for Transportation Policy and was the nominee to be Assistant Secretary for Transportation Policy. There, he led the USDOT's efforts around the safe integration of technologies into the US transportation system, including automated vehicles.
2. [Locomotion](#) is a US-based autonomous technology company founded in 2018 by five autonomy experts from Carnegie Mellon. The company focuses on middle mile freight automation, the most critical link in the supply chain and one of the best suited to integrate human-guided autonomous technology. At a time when demand has never been stronger, persistent driver shortages create capacity constraints that force carriers to turn down orders. Locomotion is working to solve this problem.

Trucking Industry Challenges

1. The trucking industry is facing multiple problems:
 - a. Shortage of 80,000 drivers
 - b. New drivers can be found, but there is an extremely high turnover rate due to lower-than-expected pay, depression, and loneliness.

- c. The trucking industry faces challenges related to asset utilization (time wasted waiting for loads, hour-of-service limits, etc.), environmental impacts, safety, parking shortages, and low margins for operators.
2. Organized labor has opposed the recent “laissez faire approach” from the Federal government to automated trucking. They oppose legislation providing framework for automated Commercial Motor Vehicles (CMVs) and would require a human to be present to take over the operation. They are pushing for a labor plan to be developed in case AVs displace workers. Workers now have a priority “seat at the table” in advancing automated trucking, along with industry and federal regulators.
3. The status quo for the safety of large truck operations is not okay. Safety outcomes have the potential to be improved with automated vehicles. In 2019, there were 5,005 people killed and an estimated 159,000 people injured in crashes involving large trucks. The critical precrash event for 74 percent of large trucks in fatal crashes was another vehicle, person, animal, or object. 32 percent of fatal crashes involving large trucks reported at least one driver-related factor, with speeding being the leading driver-related factor (NHTSA).

Automated Trucking Opportunities

1. The trucking market is suited for autonomy and will be an early use case for AVs in the US. Freight demand is increasing with growth expected in total shipments and expectations for fast turnaround times from customers. Automation has the potential to improve efficiency and truck usage as well as safety and workforce retention.
2. Human-guided autonomy is expected to dramatically improve driver well-being and reverse tide of driver attrition. Combining human cognition and machine precision will dramatically reduce truck-involved fatal crashes. Autonomous Relay Convoy and Drone Follower system can deliver emissions goals for positive climate impacts. Medium- and heavy-duty vehicles account for 23% of all transportation greenhouse gas emissions despite being only 4% of vehicles on the road. The Autonomous Convoy approach reduces greenhouse gas emissions by 22%.

Automated Trucking – Industry Players

1. Companies like Locomotion are working today to address these issues through automation.
2. Waymo and Aurora are developing passenger cars and trucking solutions.
3. TuSimple, Embark, and Kodiak are all only working towards fully autonomous trucking solutions.
4. Locomotion and Plus emphasize human-centric models toward driverless trucks.
5. Robotic Research, Einride, and Gatik are companies that are working on off-road and middle mile autonomy solutions.

Locomotion Business Model

1. Locomotion’s model includes two trucks led by a human driver in the front vehicle. The human in the second truck enables the automated system and their time isn’t counted toward driving hours-of-service in this mode. This system with two human drivers allows trucks to be on the road for more hours during the day leading to more profits and combatting issues drivers experience with loneliness and being away from home. This solution has the potential to solve the driver retention problem.

2. Locomotion’s model is different than previous platooning work that has since been abandoned from Peloton and Daimler. Locomotion trucks still platoon to reach fuel efficiency goals, but their automated driving system including the trucks (the what), the network (the where), and the digital system (the how) helps customers identify profitability and optimization.

National Guidance & Industry Governance

1. Federal

- a. The [Automated Vehicles Comprehensive Plan](#) (AV 4.0) was published by the US Department of Transportation (USDOT) in January 2021. This plan defined three goals to achieve USDOT’s vision for Automated Driving Systems (ADS). Types of automated vehicles were defined and included occupant-less low speed vehicles, passenger vehicle conditional driving automation, passenger vehicle automated driving systems, automated trucking operations, and low-speed passenger shuttles. Each type of AV will be treated differently and have different requirements. Locomotion is focusing on automated trucking operations.
- b. Industry is governed by a few main Federal bodies and individual State agencies. Federal guidance prevails in the absence of established state autonomous vehicle regulation. Regulation passed at the Federal level supersedes any local or State law. States have the authority over the operations of both human-led and automated vehicles through the issuance of licenses and enforcement activities. Iowa has been proactive in adopting State rules for AVs.
- c. The federal regulatory landscape has been guided incrementally through the Obama, Trump, and now Biden administrations in a bipartisan manner. The USDOT has released AV plans (Google Interpretation, Federal AV Policy, ADS 2.0, AV 3.0, AV 4.0, AVCP) as the technology and policy has evolved. AV 3.0 issued guidance that the driver of a vehicle can be a human or an AV. Regardless of a human or AV driver, the vehicle must still be safe.
- d. Driver-out trucks cannot engage in interstate commerce until final federal rules for autonomous trucking are passed. The Federal Motor Carrier Safety Administration (FMCSA) expects a notice of proposed rulemaking in November of 2022 that will define the non-human ways to satisfy non-driving safety requirements in current regulations. This rulemaking will address many other automated trucking details including cargo securement, railroad crossing, inspection, repair, law enforcement plans, and more.
- e. NHTSA is working on a framework for “proving” the safety of automated vehicles. This rulemaking marks the first ever framework for the safe operations of an AV, instead of the standard focus on the vehicle equipment. The rulemaking would preempt States on rules for the operation of a vehicle that does not require, or in some cases allow, a human driver. The rulemaking is fundamentally based on the same “Safety Case” approach incorporated into [UL 4600](#). Companies would be wise to incorporate these future standards for all phases of their deployments.

2. AAMVA

- a. Locomotion follows American Association of Motor Vehicle Administrators’ (AAMVA’s) best practices for safe testing and deployment of automated vehicles. They work with state departments of transportations, DMVs, law enforcement agencies, and other stakeholders to ensure clear communication about a vehicle’s operation. One of the main requirements is companies needing to certify enough testing and validation to prove safe deployment on public roads.

Federal Research

1. Developed out of AV 4.0 efforts, U.S. DOT's [Virtual Open Innovation Collaborative Environment for Safety \(VOICES\) Proof of Concept](#) (PoC) will be a distributed virtual platform that will enable stakeholder virtual collaboration in an intellectual property-protected virtual collaborative environment for research and interoperability testing of prototype Cooperative Driving Automation (CDA) applications.
 2. The initial PoC project will focus on the utility of VOICES to advance CDA-based solutions. The goals are to establish a community of practice, establish requirements for and demonstrate a distributed synthetic test environment, and transfer this technology to the private sector. The community of practice working group topics are cooperative perception, platooning, eco approach and departure, system integration and testing, and technology transfer. VOICES is focusing on work zones, inspection capabilities, interactions with first-responders, and rail-grade crossings.
 3. Federal studies have looked at the impacts of automation on workforce. [Driving Automation Systems in Long-Haul Trucking & Bus Transit: Preliminary Analysis of Potential Workforce Impacts](#) found that 300,000-500,000 trucking jobs will be impacted over time by autonomous vehicle technology. However if you are a trucker today, you will probably be able to retire as a trucker. This is due to the amount of time it will take for AV fleet adoption. In addition, the technology could create more jobs and better jobs.
 4. Another Federal report - [Macroeconomic Impacts of Automated Driving Systems in Long-Haul Trucking](#) – found that autonomous trucking will increase total U.S. employment by 26,400 to 35,100 jobs per year on average during the analysis period. The transition will raise annual earnings for all U.S. workers by \$203 to \$267 per worker per year due to economy-wide productivity gains.
- 5. Update on AT in the State Long Range Transportation Plan** – Garrett Pedersen, Planning Team Leader, Systems Planning Bureau – Iowa DOT

Plan Background

1. Garrett Pedersen is the Planning Team Leader in the Systems Planning Bureau at the Iowa DOT. Garrett provided an update of how automated transportation is being included the State Long Range Transportation Plan update.
2. The Iowa DOT is updating the multi-modal long-range transportation plan referred to as [Iowa in Motion](#). Iowa is required to have such a plan by both federal and state code. The plan is updated every five years to account for changing demographics, land use, travel behaviors, technology, funding, and more. Stakeholders have been actively involved in the process before the draft was completed, including the breakout sessions at the last [ATC meeting in September 2021](#).
3. The breakout discussions from that meeting produced the following takeaways:
 - a. Challenges & Uncertainties
 - a. Public education will be key to proper use and understanding of technology
 - b. Iowa's varied weather and rural roadway environments will impact operations
 - c. How and who will pay for the needed infrastructure improvements
 - d. Liability concerns
 - b. Opportunities & Key Considerations

- a. Physical, digital, communications, and cyber-security readiness
- b. Collaboration across jurisdictions and sectors is needed
- c. Increasing workforce size and skills is necessary
- d. Environmental justice and accessibility advancements

Current Status

1. The Iowa DOT has been working on enhancements to the plan such as clearly defined system objectives, rightsizing policy guidance, infrastructure resiliency, accessibility & equity, and clarifying the plan's role in project development. Top priorities identified by transportation stakeholders include funding, resiliency, workforce, technology, and asset management.
2. Automated transportation topics were included:
 - a. No-hype summary: current state of the technology and estimated adoption/fleet integration timelines
 - b. Rightsizing policy: statement regarding consideration of emerging technologies, risk of over/underestimating the influence on intended benefit of improvements. The plan seeks to scope AT projects in a way that meets defined needs and adds safety enhancements without overspending to realize smaller gains.
 - c. CAT in Planning guidance: the plan is integrating aspects of the CAT in Planning document, developed by a working group of the Policy & Legislation subcommittee. The plan will use "pause points" into project development and programming, seek investments with dual benefits for today's and tomorrow's users, and monitor & support research into AT use cases.
3. The update is expected to be adopted by the Iowa Transportation Commission in May of 2022. A draft to the public until April 7, 2022 for a comment period allowing stakeholders final input on the drafted plan. ATC members are encouraged to review the plan and provide feedback.

6. Subcommittee Updates and Future Opportunities – Adam Shell & Scott Marler

- a. Infrastructure Readiness
 - The Infrastructure Readiness subcommittee met back in December 2021 and heard a presentation by Iowa DOT staff concerning the weather and road condition technology solutions and strategies the Iowa DOT has available and are implementing or working to do so in the future and how this might align and support CAV operations going forward.
- b. Economic Development
 - The Economic Development subcommittee last met in early January of this year and heard a presentation by two federal research employees and a professor from the University of Memphis that highlighted the national workforce development efforts to support the deployment and maintenance of Intelligent Transportation Systems or ITS – which includes such things as fiber optic networks, camera systems, and advanced technology that can monitor infrastructure, roadway operations, and interact with vehicles.
- c. Policy & Legislation

- The Policy & Legislation subcommittee last met in mid-January of this year and heard a presentation by the City of Austin and their experience in deploying personal delivery devices or PDDs which doesn't allow for a human to physically operate it and supports last mile delivery of small, packaged goods. The Iowa legislature has passed legislation in recent years that allows for the operations of such technology. Cross-cutting opportunities exist to continue the conversation between ATC subcommittees as it relates to policy, enforcement, and infrastructure needs.
- d. [Public Safety & Enforcement](#)
 - The Public Safety & Enforcement subcommittee met in late January of this year and heard a presentation by research staff at the Virginia Tech Transportation Institute. The presentation highlighted work being done to prepare law enforcement, first responders, and crash investigators for advanced driver assistance systems and automated driving systems.
- e. [Iowa AT Vision](#)
 - The Iowa Advisory Council on Automated Transportation is intended to increase roadway safety, personal mobility, and freight movement within the state of Iowa by advancing highly automated vehicle technologies. The ATC and its subcommittees are encouraged to:
 1. Explore opportunities to deploy advanced technologies this year
 2. Focus on freight, mobility, or safety
 3. Pursue discretionary grants

7. **Wrap-up** – Adam Shell

- a. Upcoming Events
 - i. MAASTO Annual Meeting – July 26 & 27, 2022 - <https://maasto2022.com/>
- b. Next Meetings
 - i. ATC subcommittee – 2nd Quarter 2022
 - ii. ATC Late Quarter 3 2022
- c. Adjourn



IOWA ADVISORY COUNCIL ON AUTOMATED TRANSPORTATION

Council Meeting
March 16, 2022



MEETING AGENDA

1. **Welcome and introductions** – Scott Marler, Iowa DOT Director and ATC Chair (5 minutes)
2. **General Announcements** – Scott Marler (10 minutes)
 - a) Iowa DOT Staffing
 - b) U.S. House of Representatives Highway & Transit subcommittee Testimony
 - c) National Roadway Safety Strategy (NRSS)
 - d) Federal Rulemaking
 - a) FMCSA Authorized Windshield Area for the Installation of Vehicle Safety Technology
 - b) NHTSA New Car Assessment Program (NCAP) for ADAS
 - c) NHTSA Finalizes First Occupant Protection Safety Standards for Vehicles Without Driving Controls
3. **Opportunities and Challenges for Automated Vehicles in Rural Areas** – Omar Ahmad, Deputy Director at the National Advanced Driving Simulator, University of Iowa (25 minutes)
4. **Federal and 50 State Overview of Autonomous Trucking Regulations** – Finch Fulton, Vice President of Policy and Strategy at Locomotion (45 minutes)
5. **Update on AT in the State Long Range Transportation Plan** – Garrett Pedersen, Systems Planning Bureau – Iowa DOT (10 minutes)
6. **Subcommittee Updates and Future Opportunities** - Adam Shell & Scott Marler (20 minutes)
 - a. Infrastructure Readiness
 - b. Economic Development
 - c. Policy & Legislation
 - d. Public Safety & Enforcement
7. **Wrap-up** – Adam Shell (5 minutes)
 - a. Upcoming Events
 - b. Next Meetings
 - c. Adjourn

WELCOME

Scott Marler, Iowa DOT
Director & ATC Chair

Automated drive

Destination: 50° 43' 50.34" N - 6° 10' 55.294" E
Arrival: 08:55 pm - Distance 783 miles

TCP/IP: 192.56.327.684.1
SYNC: **enabled** | Sensors: **active** | Cameras: **active**

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WELCOME

Council Members - *New agency members are in bold*

- Iowa Department of Transportation
- Iowa Department of Public Safety
- Iowa Economic Development Authority
- Iowa League of Cities
- Des Moines Area MPO
- Iowa Department of Public Safety
- Iowa Motor Truck Association
- Des Moines Area Community College
- Technology Association of Iowa
- Iowa Association of Business and Industry
- Associated General Contractors of Iowa
- Iowa Communications Network
- Iowa Department of Revenue
- Iowa Public Transit Association
- Iowa Bicycle Coalition
- Freight Advisory Council
- Iowa Insurance Division
- Iowa State Association of Counties
- Iowa Department of Agriculture & Land Stewardship
- Iowa Department of Natural Resources
- National Advanced Driving Simulator, University of Iowa
- Institute for Transportation, Iowa State University
- **American Association of Motor Vehicle Administrators**
- Federal Highway Administration, Iowa Division
- Federal Motor Carrier Safety Administration
- National Highway Traffic Safety Administration
- Iowa Senate

HOUSEKEEPING ITEMS

- Please mute your audio!
- If available, encourage the use of video when speaking
- Please use the chat box and raise hand features to ask questions or make a comment



- Recorded Meeting
- Disable Virtual Private Network (VPN) connections



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Scott Marler – Iowa DOT Director & ATC Chair

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OPPORTUNITIES AND CHALLENGES FOR AUTOMATED VEHICLES IN RURAL AREAS

Omar Ahmad, Deputy Director at the National Advanced Driving Simulator, University of Iowa

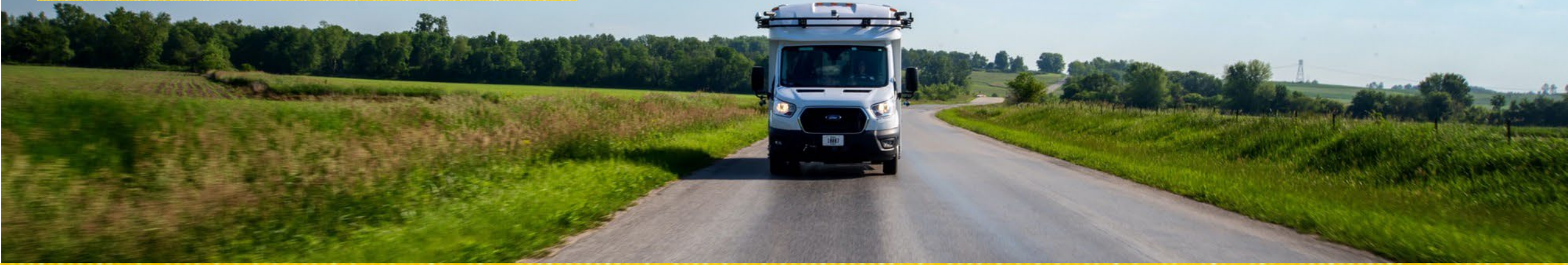
Opportunities and Challenges for Automated Vehicles in Rural Areas



Iowa DOT Automated Transportation Council

March 16, 2022

Omar Ahmad, *project manager*



Project Goals



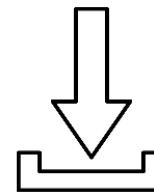
Improve safety on our nation's roadways with ADS



Represent **rural roads** in ADS testing



Enhance mobility



Provide data

IOWA

National Advanced Driving Simulator



Rural Challenges

- Roads with vehicles traveling at large speed differentials
 - bicycles, pedestrians, animals, school buses, farm equipment, horse buggies, ATVs
- Many points of entry and exit
 - Uncontrolled intersections, seemingly random locations
- Varying road surfaces and conditions
- Varying lane markings or lack of
- Road curvature and/or steep grades limiting line of sight
- Varying speed limits on same road
- Unique parking needs

ADS Vehicle

1. GPS antenna
2. DSRC antenna
3. High-definition cameras
4. Velodyne Lidars
5. HD cameras
6. Mobileye collision avoidance system
7. Vaisala mobile detector: road, surface, and weather data
8. Long range radars



IOWA



Accessibility

ADA compliant



IOWA

National Advanced Driving Simulator

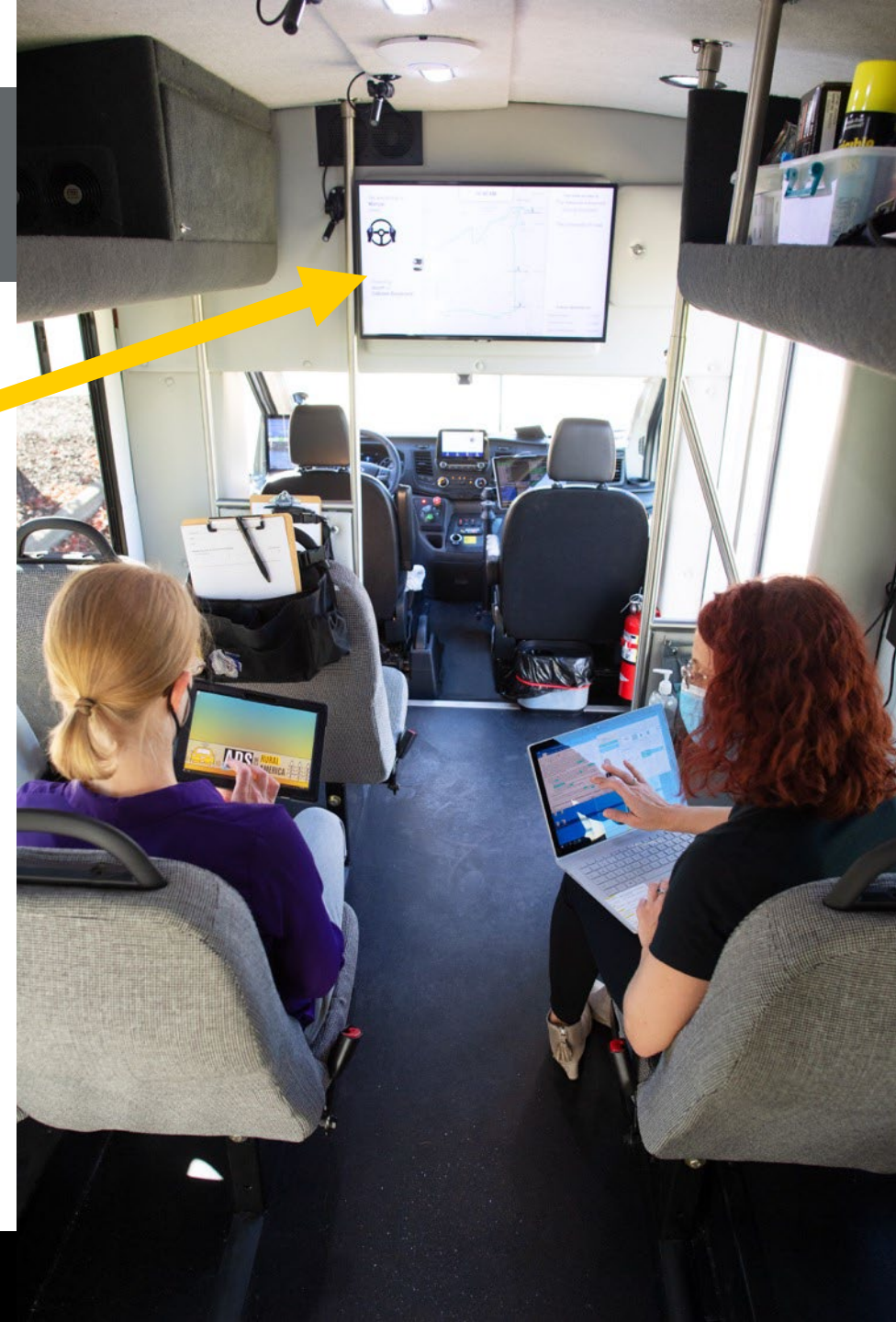
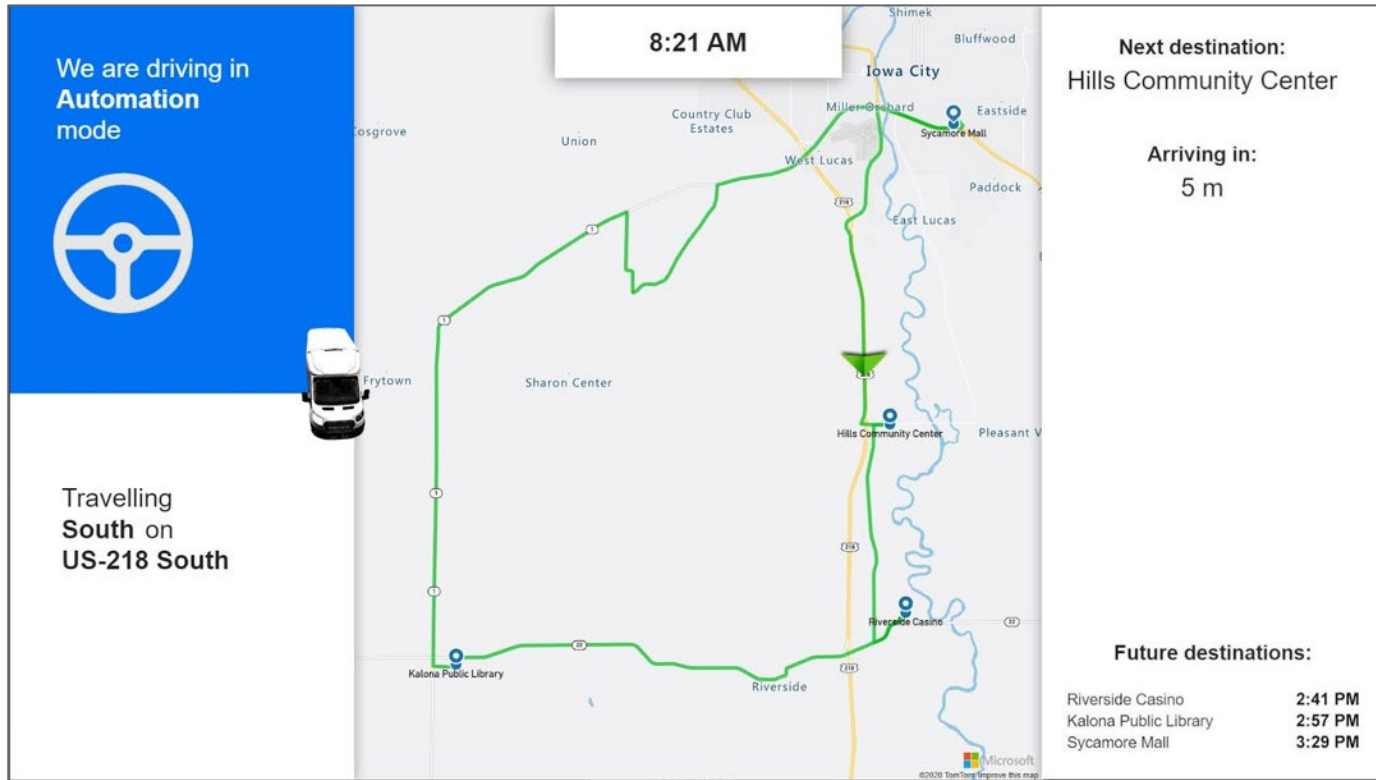
Route

- 47-mile loop, driven clockwise
- Different road types
 - Marked, unmarked, unpaved
- Driven all 4 seasons
- Different times of day
- Mapped in high-definition
- Construction along route
- Phase 1 (out of 6) data collection complete
- Phase 2 data collection in progress

IOWA

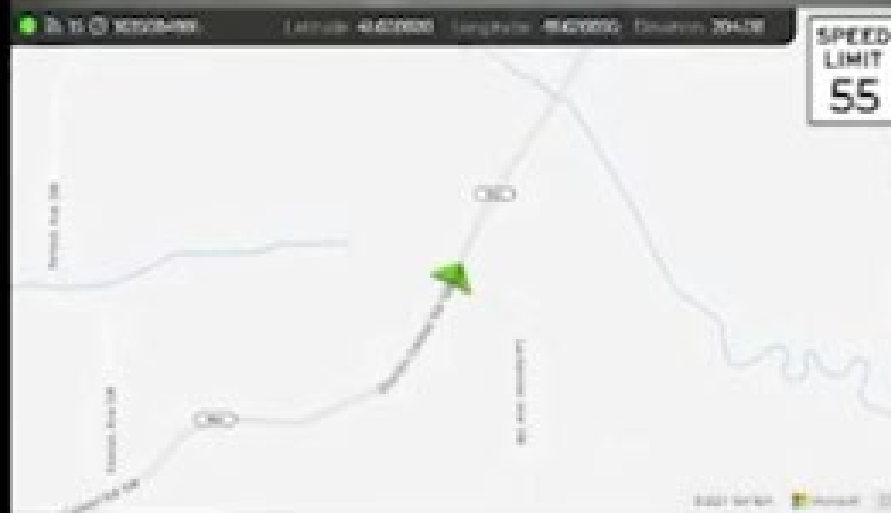


Center Passenger Display

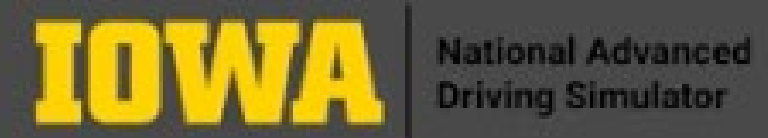


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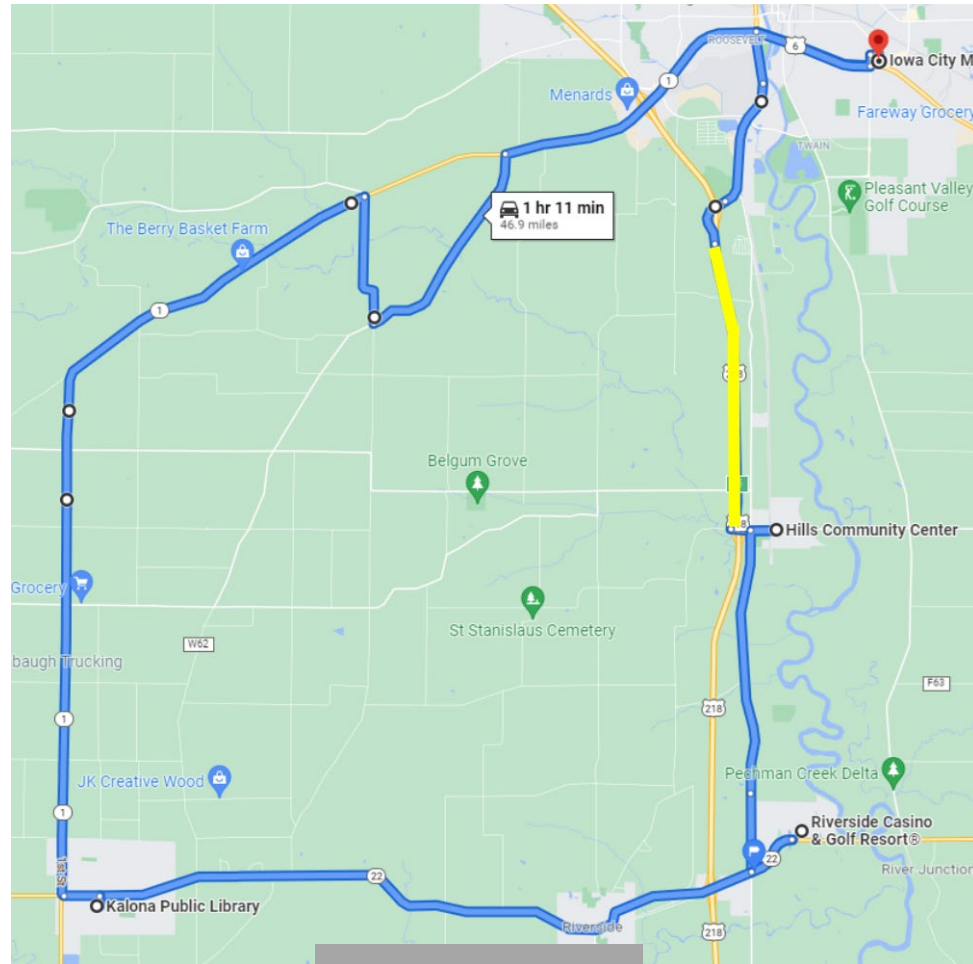
National Advanced Driving Simulator



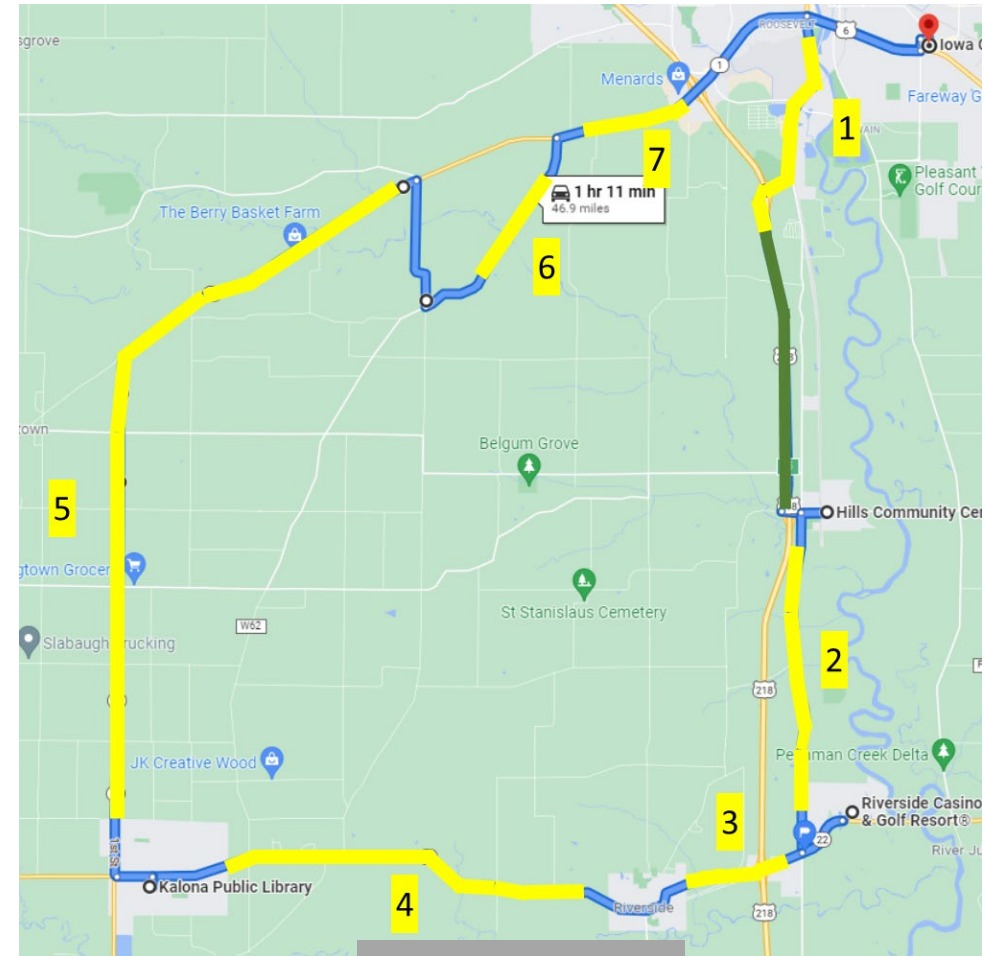
[YouTube Link to Video](#)



Phase 1 Automation (Controlled-Access Roadways)



EXPECTED



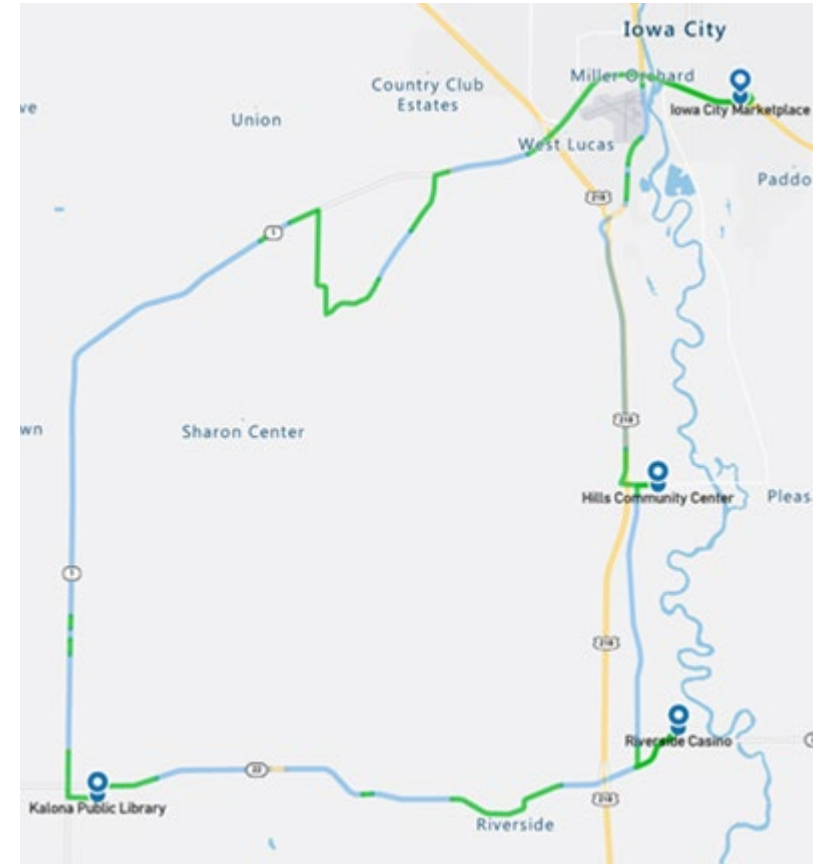
ACTUAL

IOWA

National Advanced Driving Simulator

Phase 1 Stats

- 12 completed drives
- 587 miles recorded
- 330 miles recorded in automation mode
- Amount of data collected: 913 GB
- 24 participant riders



Reasons for Disengagement

Reason for disengagement	Number of instances
Decrease in speed limit (not recognized by the system)	31
To stop at a traffic light	19
A vehicle passing the Transit in a no passing zone	17
To stop at a stop sign	13
To exit the highway	12
The Transit brakes inappropriately	9
Approaching blind hill	8
Too much traffic for merge	6
To make a right turn from highway	6
Traveling too fast for a curve	3
An object located on the roadway (e.g., carcass, tire, etc.)	3
Transit crosses the center line	3
Transit responds late to lead vehicle braking	2
An abrupt lane change	2
Transit crosses lane boundary near shoulder	2
Aggressive cornering on on-ramp	1

Encounters with Vulnerable Road Users

In Automated Mode	In Manual Mode
<ul style="list-style-type: none">• 29 horse and buggy• 3 cyclists• 1 pedestrian• 1 semi• 4 farm equipment• 3 stopped vehicles	<ul style="list-style-type: none">• 4 horse and buggy• 3 cyclists• 10 pedestrians• 1 semi• 4 farm equipment• 1 emergency vehicle

Data Collection Phase Plan

Phase	Description	# of Drives	Date	Status
1	Controlled Access Roadways	10	11/2021	Complete
2	Highways & Ramps	20	03/2022	In Progress
3	Urban Areas	10	07/2022	Planning
4	Unmarked Roads	10	10/2022	Planning
5	V2X	10	01/2023	Planning
6	Parking Areas / Full Route	20	05/2023	Planning

Lessons Learned

Team

- Roles
- Communication
- Training



Lessons Learned *(continued)*

Automation Behavior

- Max speed
- Gravel roads
- Slow to start from stops
- Rebooting/syncing

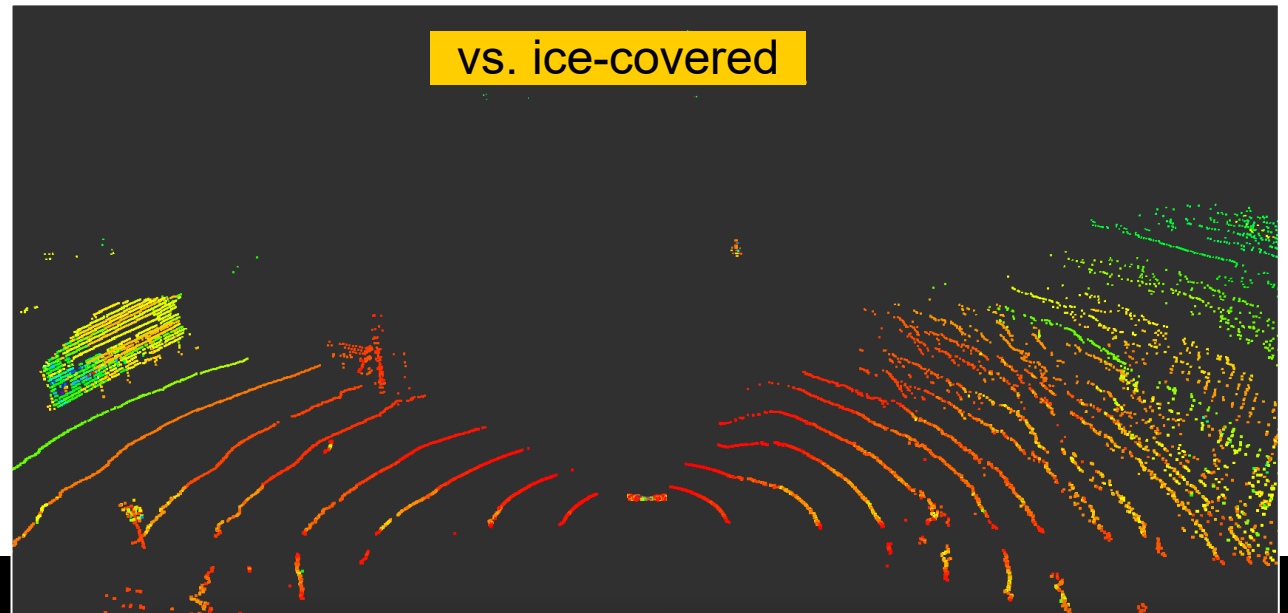
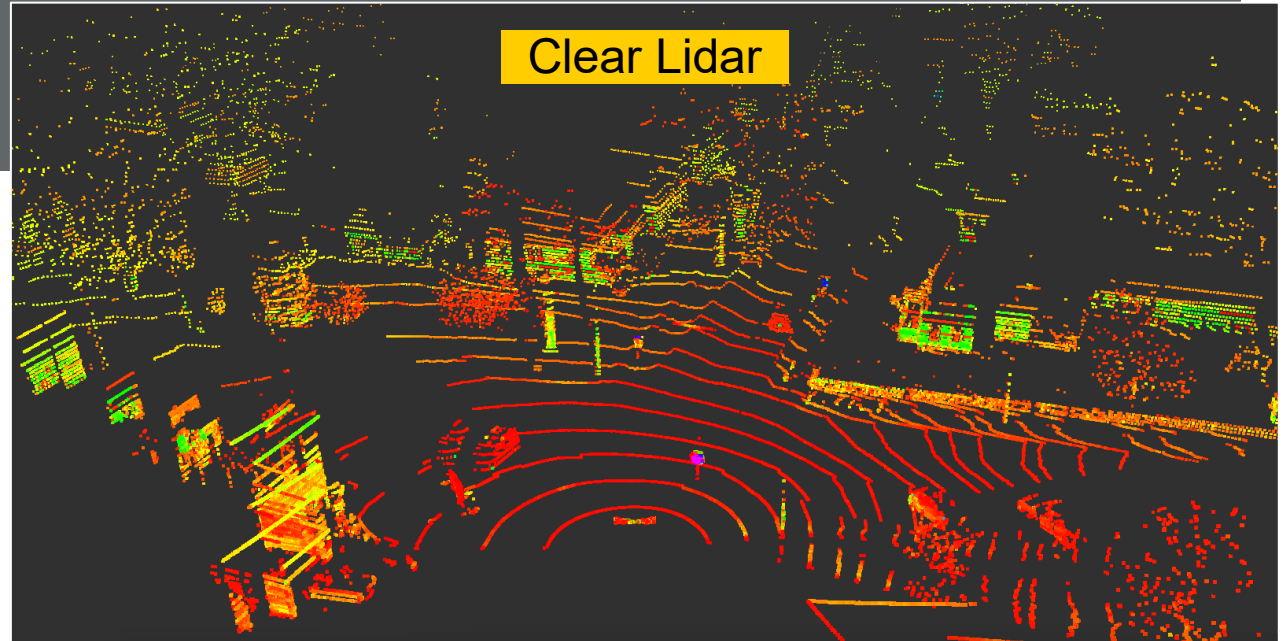


Lessons Learned

(continued)

Weather Concerns

- Poor weather: Automation doesn't adapt
- Snow accumulation paths, banks
- Ice on sensors:



ADS for Rural America Team



Dan McGehee
Associate Prof.
•Principal Investigator



Omar Ahmad
•Project Manager



Steve Cable
•Data Management Lead



Cher Carney
•Research Lead



Alec Lavelle
•Safety Driver & Data Request Manager



Cheryl Roe
•Safety Lead



Kristine Roggentien
•Communications Lead



Greg Wagner
•Vehicle Lead
•Connected Infrastructure



IOWA

National Advanced Driving Simulator

IOWA

National Advanced
Driving Simulator



ADSforRuralAmerica.uiowa.edu

Omar Ahmad, project manager
omar-ahmad@uiowa.edu
319-335-4788



FEDERAL AND 50 STATE OVERVIEW OF AUTONOMOUS TRUCKING REGULATIONS

Finch Fulton, Vice President of Policy and
Strategy at Locomotion

LOCOMOTION



IOWA ADVISORY COUNCIL ON
**AUTOMATED
TRANSPORTATION**

Federal Guidance

50 State Approach

Upcoming federal
rulemakings

March 2022



Who I am

Finch Fulton – VP of Policy and Strategy at Locomotion

- Joined Locomotion in February 2021.
- Previously served at the US Department of Transportation under Secretary Elaine Chao from 2017-2021, was the Deputy Assistant Secretary for Transportation Policy and was the nominee to be Assistant Secretary for Transportation Policy. There, he led the USDOT's efforts around the safe integration of transportation technologies into the US transportation system.
- Also served as a staffer in the US House of Representatives and in the Senate, as well as spending time in the private sector focused on the State and local integration of technology.
- He is a native of Mobile, Alabama, a graduate of the University of Alabama, received his MBA from Johns Hopkins University, and has been involved in trucking and logistics through his family's business his entire life.



Who We Are

We are a US-based autonomous technology company that is growing quickly



- Founded in 2018 by five autonomy experts from Carnegie Mellon's NREC
- >100 Headcount | \$60M+ in funding
- New facility in Pittsburgh's Robotics Row
- Permanent space at the Transportation Research Center for high throughput testing



Purpose of this Presentation

What is the right mix of autonomy for trucking?

Missing gaps & novel opportunities for innovation

- How did we get here? The business case for why autonomous vehicle companies have shifted focus to trucking
- What are the Federal and State rules that will shape deployments?
- What are the missing gaps and what are the opportunities for innovation for automated trucking?
- Human-led Autonomous Relay Convoys - the evolutionary step towards self-driving trucks



THE CURRENT MARKET

Types of Automated Vehicles

Occupant-less Low-Speed Vehicles

Passenger Vehicle
Conditional Driving
Automation

Passenger Vehicle
Automated Driving Systems

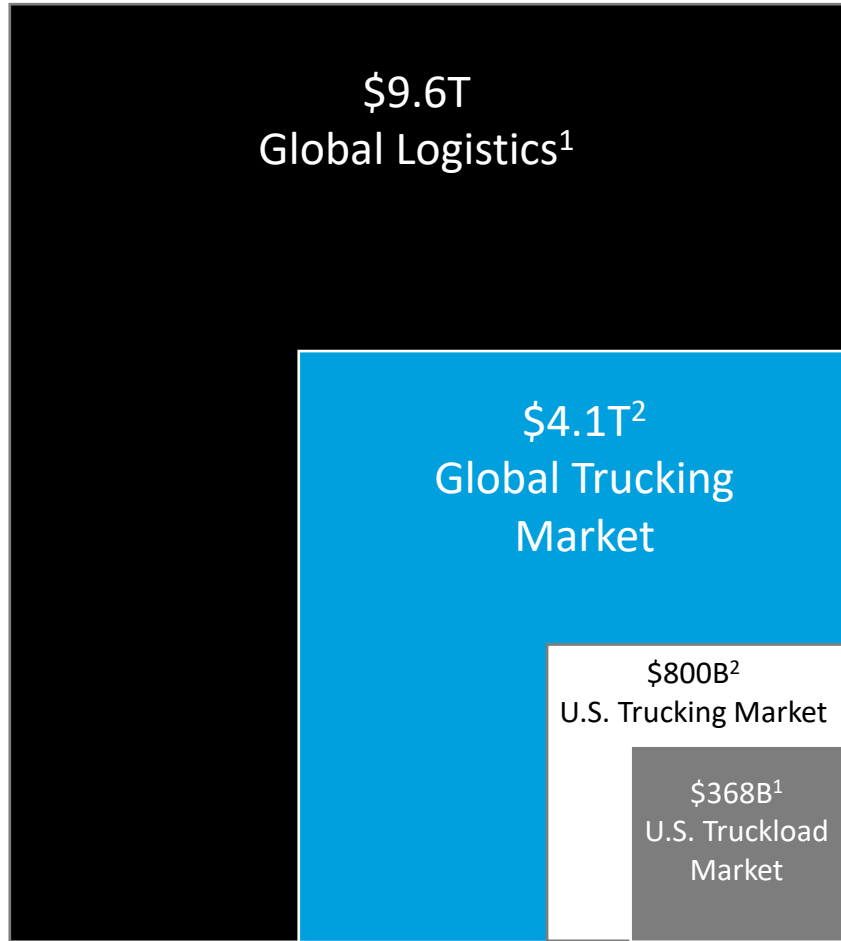
Automated Trucking
Operations

Low-Speed Passenger
Shuttle



The U.S. Long-Haul Trucking Market Is At The Vanguard Of Autonomy

A large market uniquely suited for autonomous deployment at scale



Adoption As A Necessity

- 22%** Growth in U.S. freight shipments expected from 2020 - 2040³
- 90K** Estimated shortage of U.S. truck drivers & growing⁴
- 24%** U.S. transportation sector GHG emissions due to medium- and heavy-duty trucks⁵
- 48%** Increase in fatalities involving semi-trucks from 2009-2019⁶



Adoption As An Opportunity

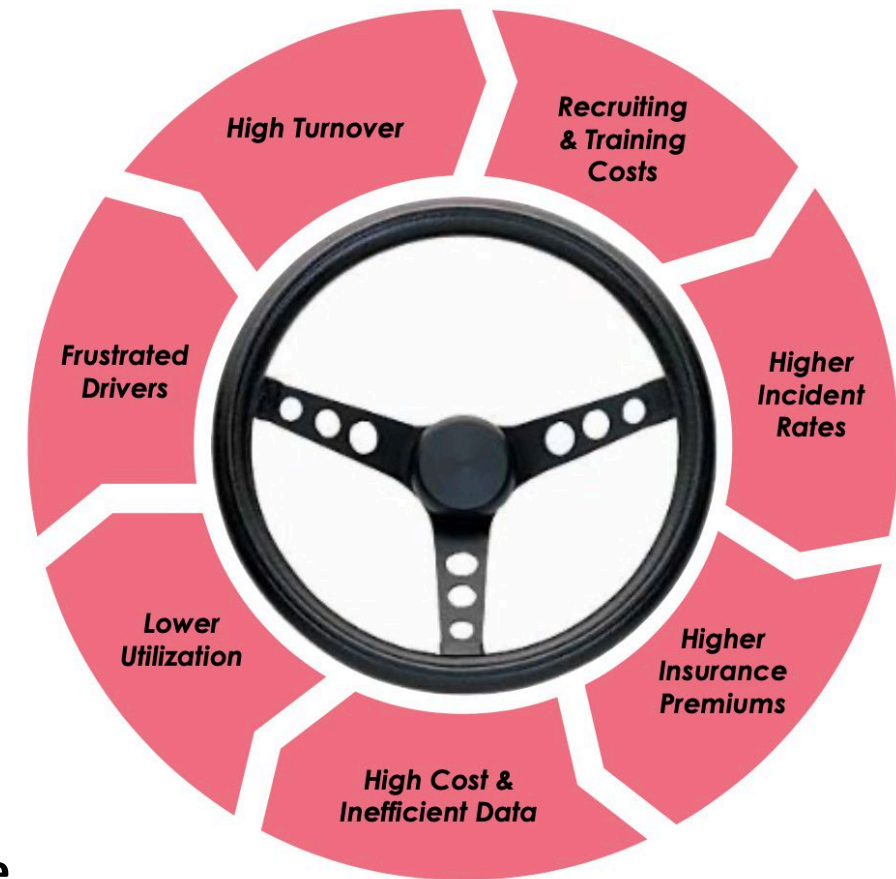
- <10%** Average operating margin for large truckload carriers⁷
- 30%** Average truck utilization per day⁸
- 90%** Class 8 miles driven that are “middle” miles⁹
- \$80B** US rail market opened to disruption¹⁰

1. FreightWaves. 2. JP Morgan Research. 3. Transportation.gov. 4. FreightWaves and CNN. 5. Environmental Protection Agency. 6. National Highway Traffic Safety Administration. 7. Average operating ratio of six large publicly traded carriers. 8. Assumes tractor travels an average of 89,000 miles per year (356 miles per day) per American Transportation Research Institute and a theoretical maximum daily distance of 1,200 miles. 9. Management estimate. 10. IBISWorld.

Industry Pain Points

What problems are we solving?

- ✓ **Shortage of 80,000 truck drivers**
- ✓ **Extremely high turnover of truck drivers**
 - Lower than expected pay, depression, loneliness
- ✓ **Very poor asset utilization**
 - Time wasted waiting for loads
 - 16% miles are deadhead
 - Hours-of-Service limitations
- ✓ **Impact on the environment**
- ✓ **Truck driver parking shortage**
- ✓ **Safety - truck driving is the 4th most dangerous job in the US**
- ✓ **Low margins for operators**
 - Gas prices
 - Labor prices



X Dislocated Driver-Based Network
Restricted by Hours Of Service

Major Players: Passenger Cars to Trucking

Waymo and Aurora have expanded to include autonomous trucking



Major Players: Solo-driverless Trucking

TuSimple, Embark, Kodiak move towards fully autonomous solutions



Major Players: Human-Centric Approach

Locomotion and Plus emphasize human-centric models towards driverless trucks



LOCOMOTION



Plus

Major Players: Other Examples

Robotics Research/RR.AI, Einride, and Gatik



E/NRIDE



Platooning v. Convoying

Peloton & Daimler's Abandoned Approaches



 **Peloton**

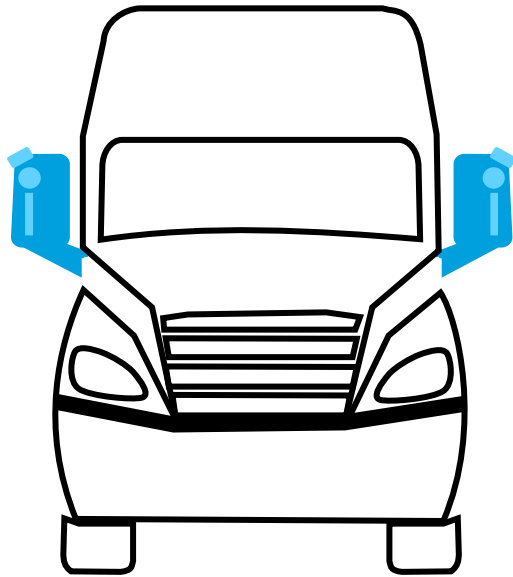


DAIMLER

Autonomy Requires More Than Trucks

Locomotion helps customers identify profitability & optimization

Autonomous Trucks



WH
AT

Integrated Logistics

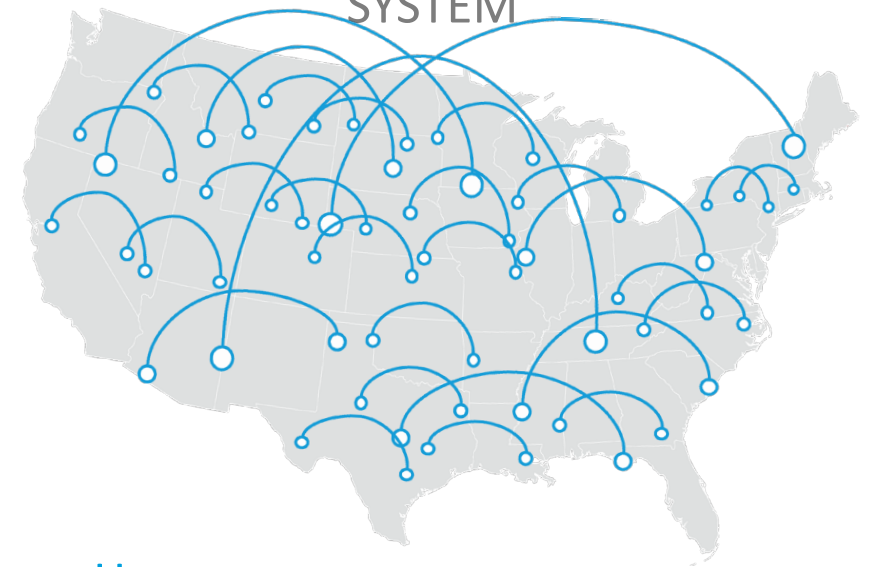
AUTONOMOUS RELAY
NETWORK



Where

Autonomous trucks can
operate safely and profitably

DIGITAL TRANSPORTATION
SYSTEM



How

Autonomy is integrated into a
carrier's daily operations



THE REGULATORY LANDSCAPE

Levels of Automation

Where does ARC fit?



SAE J3016™ LEVELS OF DRIVING AUTOMATION™

Learn more here: [sae.org/standards/content/j3016_202104](https://www.sae.org/standards/content/j3016_202104)

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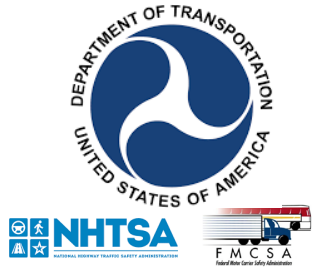
SAE LEVEL 0™	SAE LEVEL 1™	SAE LEVEL 2™	SAE LEVEL 3™	SAE LEVEL 4™	SAE LEVEL 5™
You <u>are</u> driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You <u>are not</u> driving when these automated driving features are engaged – even if you are seated in “the driver’s seat”		
You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	

What does the human in the driver’s seat have to do?

Regulatory Landscape

Industry governed by a few main Federal bodies and individual State agencies

Federal



- NHTSA sets and enforces safety standards for new motor vehicles and equipment
- FMCSA has authority over the operations of commercial motor vehicles, including drivers, licensing and operational requirements



- Regulates communications by radio, television, wire, satellite and cable
- Includes control of the spectrum used for vehicle connectivity applications



- Sets standards for driver pay, but plays a secondary role to the USDOT for truck drivers
- Limited by drivers generally being independent contractors



- Works with NHTSA to set fuel economy standards and emissions for new trucks

State

- Today, states have authority over the operations of both human-led and automated vehicles and do so through the issuance of licenses and enforcement activities



Federal guidance prevails in the absence of established state autonomous vehicle regulation

Regulation passed at the Federal level supersedes any local or State law

There is no need for Congress to act on autonomous vehicle legislation and many drafts exclude vehicles over 10,000 lbs

Hours of service (HOS) rules for truck drivers

Federal rules in place to ensure safety also limit efficiency

11-Hour Driving Limit: after 10 consecutive hours off-duty.

14-Hour Window: Off-duty time does not extend the 14-hour period.

30-Minute Driving Break: Drivers must take a 30-minute break when they have driven for a period of 8 cumulative hours without at least a 30-minute interruption.

Sleeper Berth Provision: All sleeper berth pairings (not more than two periods) must add up to at least 10 hours. When used together, neither time period counts against the maximum 14-hour driving window.

In theory, drivers could travel ~700 miles in a straight line at 65mph in 11 hours.

In reality, drivers typically only average driving 6.5 hours of the 11 hours available within the 14 hour window. They must then park and wait for their HOS clock to reset.

Truck drivers spend 56 minutes a day on average looking for parking, and shippers generally have few incentives to help truck drivers get their loads efficiently.

Traffic delays costs more than \$74 billion each year in wasted fuel and lost truck driver wages, 1.2 billion hours in wasted trucker time and imposed a cost on each truck on the highway an average of \$6,478 throughout the year. The ability to drive during off-peak times can increase average vehicle speeds [from a low of 14mph] to 55 mph, which is projected to save 4.5 million gallons of fuel annually.

Incorporating automated technologies can reduce shipping time by 37% (from 33 hours to 21 hours in 1,000 mile route example).

In addition: trucks idle between five to eight hours per day, over 300 days per year.

Reducing / removing idling would save 24,000lbs of CO2 per year / 1,200 gallons of fuel / ~\$3K a year in fuel costs per truck.

Regulatory Landscape

Google Interpretation, FAVP, ADS 2.0, AV 3.0, AV 4.0, AVCP

NHTSA

← SEARCH INTERPRETATIONS

Google -- compiled response to 12 Nov 15 interp request -- 4 Feb 16 final

As a foundational starting point for the interpretations below, NHTSA will interpret "driver" in the context of Google's described motor vehicle design as referring to the SDS, and not to any of the vehicle occupants. We agree with Google its SDV will not have a "driver" in the traditional sense that vehicles have had drivers during the last more than one hundred years. The trend toward computer-driven vehicles began with such features as

AUTOMATED DRIVING SYSTEMS 2.0

A Vision for Safety

U.S. Department of Transportation

Ensuring American Leadership in Automated Vehicle Technologies

Automated Vehicles 4.0

A Report by the NATIONAL SCIENCE & TECHNOLOGY COUNCIL and the UNITED STATES DEPARTMENT OF TRANSPORTATION

January 2020

U.S. Department of Transportation

Federal Automated Vehicles Policy

Accelerating the Next Revolution In Roadway Safety

September 2016

Automated Vehicles 3.0

PREPARING FOR THE FUTURE OF TRANSPORTATION

U.S. Department of Transportation

AUTOMATED VEHICLES

Comprehensive Plan

Regulatory Landscape: AV 3.0 Guidance

The driver of a vehicle can be a human or an AV

USDOT's [Automated Vehicles 3.0 Preparing for the Future of Transportation](#) asserted that:

“FMCSA regulations will no longer assume that the [commercial motor vehicle] driver is always a human or that a human is necessarily present onboard a commercial vehicle during its operation.”

“Notably, however, in the case of vehicles that do not require a human operator, none of the human-specific FMCSRs (i.e., drug testing, hours-of-service, commercial driver’s licenses (CDL)s, and physical qualification requirements) apply.”



Autonomous Trucking Deployment Map

Where can L4 CMVs deploy in compliance with State rules?

Dark Blue:

State law explicitly allows L4 CMV deployment

Light Blue:

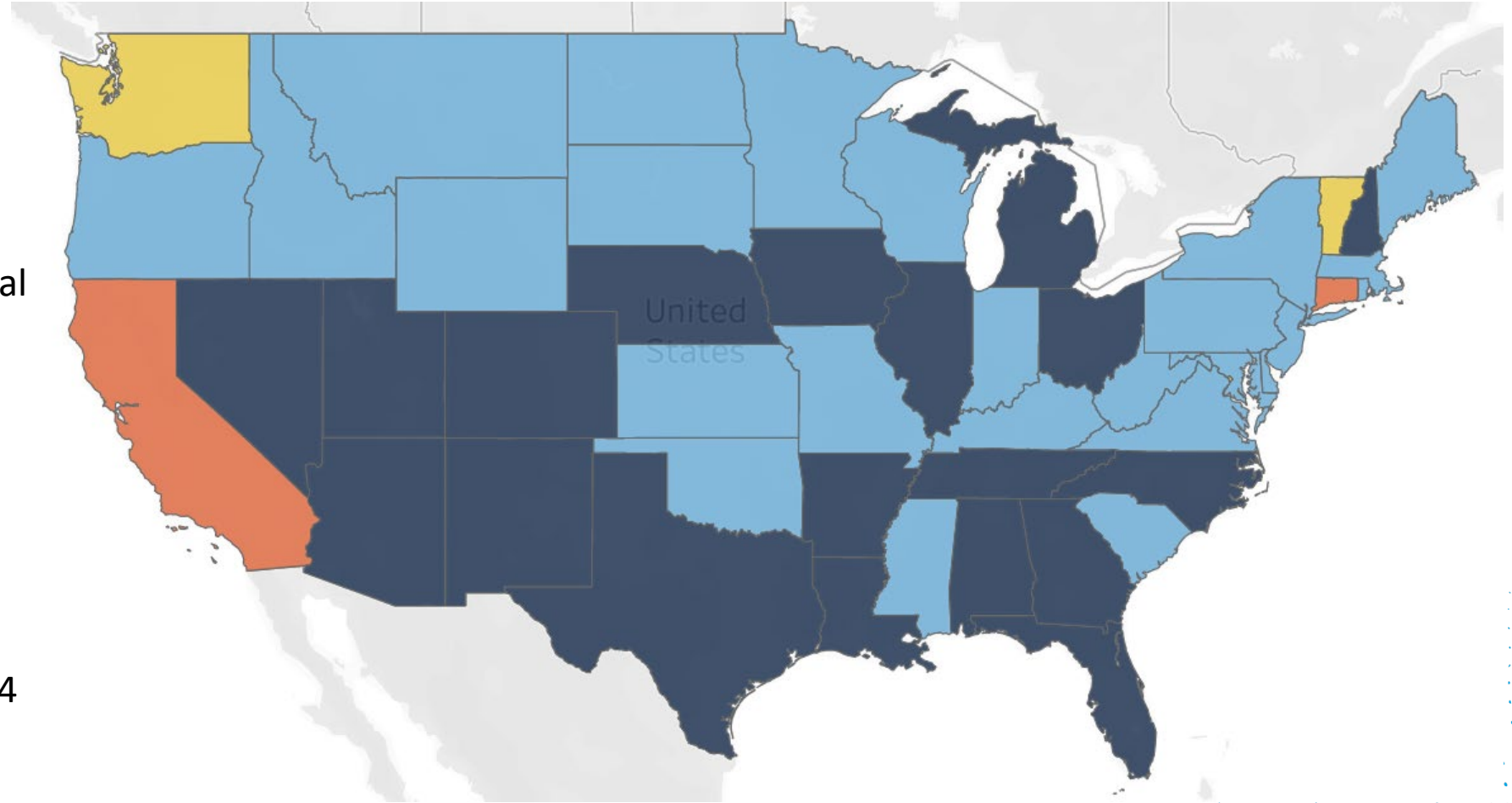
In absence of State law, Federal guidance prevails, L4 CMV deployment allowed

Yellow:

State law explicitly allows L4 CMV testing, deployment questionable

Red:

State law explicitly prohibits L4 CMV deployment



State of Play in Iowa

Iowa is in great shape!

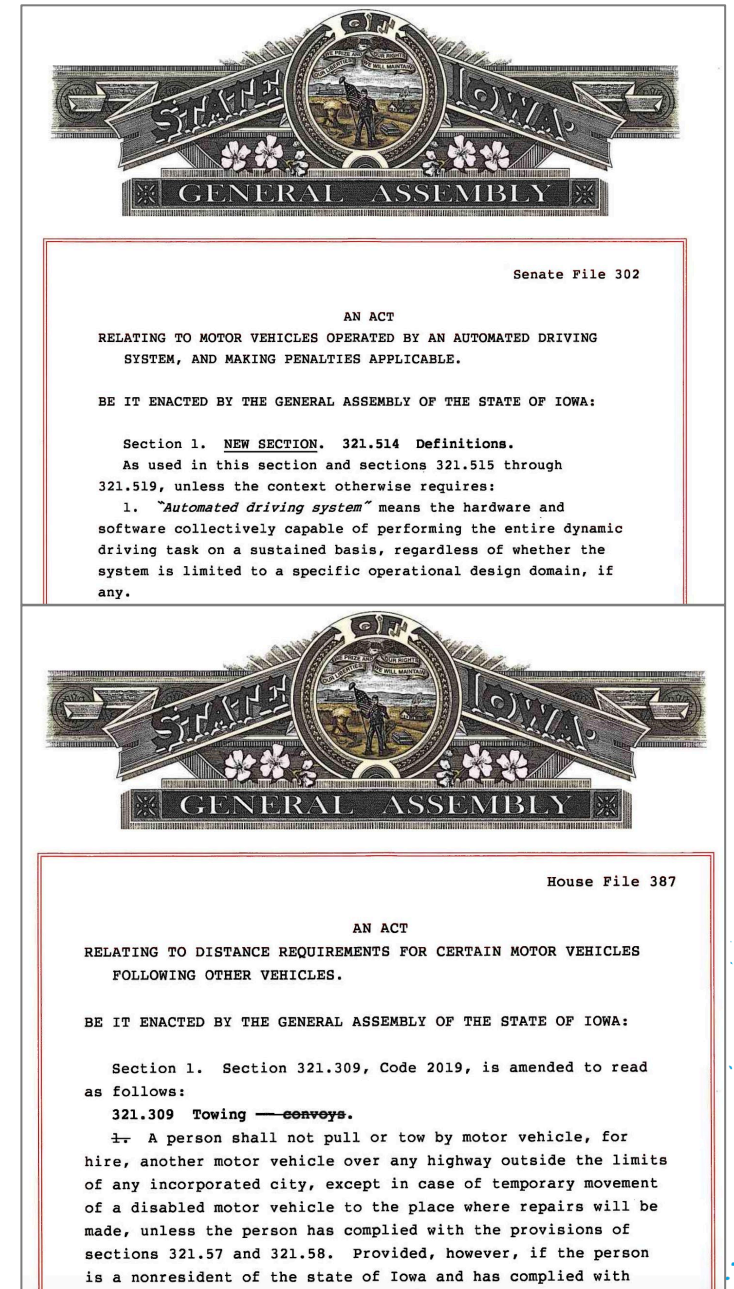
What has Iowa done, and what does that mean?

2019 S 302 explicitly allows autonomous operation on public highways without a driver in the vehicle subject to compliance, not CMV specific.

Mostly standard trucking rules apply, except:

- only allowed on "public highways"
- [No U-turning near hills](#)

Iowa following distance laws were removed per **HF 387**, also signed into law in May 2019 as well. This legislative change removed the following distance requirements in Iowa (300 ft for motor trucks or a motor vehicle drawing another vehicle and 500 ft for motor vehicles following another in convoy or caravan) and maintained the reasonable and prudent distance requirement.

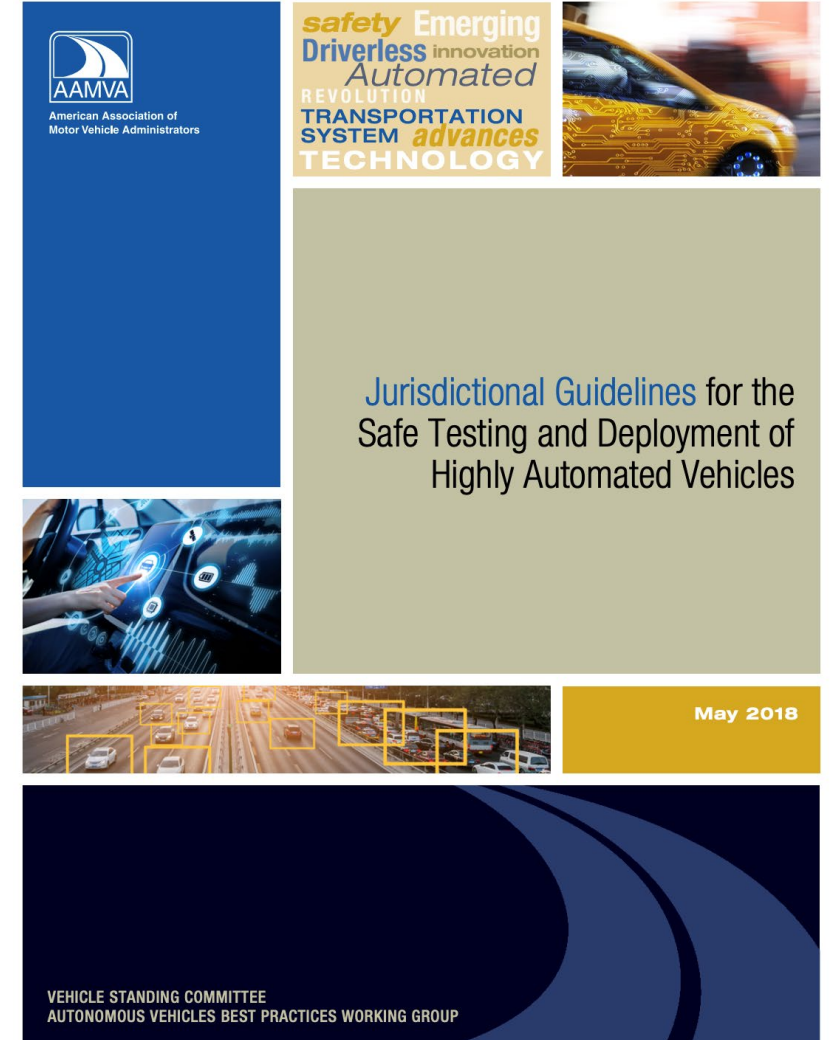


AAMVA Best Practices

Requirements for testing & deployment (California Example)

What are the 10 Things You May Have to Do:

1. Get the basic vehicle registrations
2. Self-certify that we meet basic standards (FMVSS; FMCSRs)
3. Self-certify areas unique to ADS (make inoperative, ability to respond to roadway situations)
4. Describe the ODD, and how vehicles won't operate outside ODD, as well as SAE level
5. Be ready in case of a crash (proof of insurance, driver information, data recorders)
6. Cybersecurity, communications and privacy (current industry standards, non-safety critical info about drivers, 2-way communications with vehicles)
7. Driver education plan for current and future drivers
8. Law enforcement interaction plan
9. Share any voluntarily shared information we've provided elsewhere with California
10. Certify that we've done enough testing and validation to prove we are safe for deployment on public roads



My combination of AAMVA Best Practices and California rules for light-duty vehicles.

Updates from the Fall Regulatory Agenda

Relevant rules for autonomous trucking

The FMCSA AV rule was broken into multiple pieces

- Safe Integration of ADS-equipped CMVS
- Unique Electronic Identification of CMVs
- Passenger and Hazardous Materials Vehicle and Railroad Highway Grade Crossings

Other rulemakings of importance for trucking

- Electronic Logging Device Revisions
- Work Zones
- Heavy Vehicle Automatic Emergency Braking Systems
- Updating Event Data Recorder Standard for Time Capture





Key NHTSA rulemakings moving

- Framework for Automated Driving Systems Safety
- Fuel Efficiency and Greenhouse Gas Standards for Medium- and Heavy-Duty Engines and Vehicles

Rule	Mode	Summary	Fall 2024 Update	Spring 2025 Update	Fall 2025 Update	January 2026 Regulatory Report	Stage	Notes	Reg Number	Link
Analysis done by Fleck Fabian, VP of Policy and Strategy at Locomotion										
Safe Integration of Automated Driving Systems Equipped Commercial Motor Vehicles	FMCSA	FMCSA proposes to amend certain Federal Motor Carrier Safety Regulations (FMCSRs) to ensure the safe introduction of automated driving systems (ADS) equipped commercial motor vehicles (CMVs) onto the Nation's roadways. The proposed changes to the CFR regarding registration, testing, and maintenance requirements are being published in the Federal Register. The proposed changes also address the unique identification of CMVs, and integrate the relationship between operator and ADS.	TRD	October 2021	June 2022	November 2023	NPRM	Originally published for March 2021	2126-AC17	https://www.federalregister.gov/documents/2021/03/22/2021-05117
Electronic Logging Device (ELD) Revisions	FMCSA	The ELD rule effective February 18, 2016, established minimum performance and design standards for basic electronic (BDS) ELDs, requirements for the mandatory use of on-board devices to derive accurately required to prepare HOS records of duty status (HOS), and requirements concerning ELD logging, download, and secure storage. The proposed changes to the rule are being published in the Federal Register. The proposed changes also address the unique identification of CMVs, and integrate the relationship between operator and ADS. The proposed changes also address the unique identification of CMVs, and integrate the relationship between operator and ADS.			April 2022		ANPRM		2126-AC39	https://www.federalregister.gov/documents/2022/04/04/2022-07441
Unique Electronic Identification of Commercial Motor Vehicles	FMCSA	FMCSA proposes to amend the Federal Motor Carrier Safety Regulations (FMCSRs) to require every commercial motor vehicle (CMV) operating in interstate commerce to be equipped with an electronic device capable of communicating a unique identification number assigned by a roadside camera. The proposed changes to the rule are being published in the Federal Register. The proposed changes also address the unique identification of CMVs, and integrate the relationship between operator and ADS.			June 2022		ANPRM	CVSA notified New	2126-AC54	https://www.federalregister.gov/documents/2022/06/06/2022-11214
Passenger and Hazardous Materials Vehicle and Railroad Highway Grade Crossing	FMCSA	FMCSA proposes to amend the Federal Motor Carrier Safety Regulations (FMCSRs) related to driving a passenger, divided into two sections, would be amended and consolidated into one section. The rule would eliminate the mandatory stop or grade crossing requirements for drivers of certain CMVs and prohibit drivers of all CMVs from driving onto a grade crossing without ensuring the crossing is clear. The proposed changes also address the unique identification of CMVs, and integrate the relationship between operator and ADS.			December 2021		NPRM		2126-AC29	https://www.federalregister.gov/documents/2021/12/01/2021-23019
Safety Strategy for Automated Driving Systems - Framework for Automated Driving System Safety Model	NHTSA	This notice seeks comment on regulatory approaches to motor vehicle equipped with an ADS. The proposed changes to the rule are being published in the Federal Register. The proposed changes also address the unique identification of CMVs, and integrate the relationship between operator and ADS.	ANPRM published	'Analyzing comment' start on November 18, 2021	No change over through that date in the past		Comment period extended to May 2021		2127-AM11	https://www.federalregister.gov/documents/2021/11/18/2021-21117
Facilitating New Automated Driving System Models for the Crash Avoidance Testing	NHTSA	This notice seeks comment on crash avoidance test procedures to facilitate the safe introduction and use of new vehicle designs equipped with automated driving systems (ADS). The proposed changes to the rule are being published in the Federal Register. The proposed changes also address the unique identification of CMVs, and integrate the relationship between operator and ADS.	Dec-20	'Analyzing comment' start on December 01, 2021	ADSRM published December 01, 2021	September 30, 2022	ANPRM	Comments closed August 2019	2127-AM09	https://www.federalregister.gov/documents/2021/12/01/2021-23019
Consideration for Tilted, Indicators and Warning in ADS Vehicles	NHTSA	This action seeks comment on amending the Federal motor vehicle safety standards to address the applicability and appropriateness of safety managing tiltbars, indicators and warnings in vehicles without conventional driver controls.	Mar-20	March 2022	September 2021	September 30, 2022	ANPRM		2127-AM10	https://www.federalregister.gov/documents/2021/03/22/2021-05117
Consideration for Tilted, Indicators and Warning in ADS Vehicles	NHTSA	This action seeks comment on amending the Federal motor vehicle safety standards to address the applicability and appropriateness of safety managing tiltbars, indicators and warnings in vehicles without conventional driver controls.	Mar-20	March 2022	September 2021	September 30, 2022	ANPRM		2127-AM10	https://www.federalregister.gov/documents/2021/03/22/2021-05117
Update to the Manual on Uniform Traffic Control Devices	FHWA	This rulemaking would update the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) suspended by reference at 23 CFR part 655. The new edition will update the technical provisions of the 2009 edition to incorporate technological and operational practices that are not currently allowed in the MUTCD.	Apr-21	No update since comment period ending May 2021	September 2022	September 30, 2022	Final Rule		2125-APR4	https://www.federalregister.gov/documents/2021/04/21/2021-08114
Work Zones	FHWA	This rulemaking would amend the regulations in 23 CFR part 610, subpart J (Work Zone Safety and Mobility) and K (Temporary Traffic Control Devices). This rulemaking would consider changes to the process for reviewing these process requirements of the effectiveness of work zone safety and mobility programs. This rulemaking would also address areas of ambiguity in the regulations and may include other updates to facilitate.			March 2021		NPRM	New! 'Ten to Eleven'!	2125-AG08	https://www.federalregister.gov/documents/2021/03/22/2021-05117
Outgoing Provisions for Automated Driving Systems	NHTSA	This action proposes to amend administrative regulations that may be necessary to facilitate the certification of motor vehicles equipped with ADS. The agency published a Federal Register notice on January 16, 2019 regarding comment on interim regulatory barriers that may block the introduction and certification of ADS-equipped vehicles, particularly those without human operators. In response to comment received from the January notice, the agency invited this NPRM to begin the rulemaking process. NHTSA will consider comments received from this notice, agency research, stakeholder engagement, and internal agency analysis to improve administrative and regulatory barriers.	3/29/2021	Final rule expected October 2021	February 2022	March 16, 2022	Final Rule	This was published and used for the use of the agency. Admin notice published on 3/16/2022.	2127-AM10	https://www.federalregister.gov/documents/2021/03/22/2021-05117
Exemption of Temporary Exemption Provisions for Domestic Manufacturers for Research, Development, and Other Purposes	NHTSA	This NPRM proposes a new regulation allowing entities to request exemptions to operate experimental vehicles on public roads for purposes of research, development, demonstration, testing, competitive racing events, show, or display, but not sale or lease. The NPRM proposes new administrative and reporting requirements for vehicles to be exempted under the new regulation, mirroring those applicable to exempted imported vehicles.	Jun-20	December 2021	April 2022		NPRM		2127-AM10	https://www.federalregister.gov/documents/2021/06/01/2021-11017
Heavy Vehicle Automatic Emergency Braking	NHTSA	This notice will seek comment on a proposal to require and/or standardize equipment performance for automatic emergency braking (AEB) systems on heavy trucks. The agency previously published a notice (80 FR 28427) on October 16, 2015, granting a petition for rulemaking submitted by the Truck Safety Coalition, the Center for Auto Safety, Adaptive Truck Highway and Auto Safety and Road Safe America dated February 19, 2015, to include AEB systems on certain heavy vehicles. For several years, NHTSA has conducted forward-looking research and evaluation on AEB systems for heavy vehicles, including operational testing and real-world performance testing. This rulemaking proposal sets procedures for measuring performance of these systems.			April 2022	April 16, 2021	NPRM	Probably 9-3 year with loading regime after rule finalized	2127-AM10	https://www.federalregister.gov/documents/2021/04/16/2021-08114
Automatic Emergency Braking System	FMCSA	The National Highway Traffic Safety Administration (NHTSA) will be seeking comment on a proposal to require and/or standardize equipment performance for automatic emergency braking (AEB) systems on heavy trucks (GVW 45,000 lbs). The rulemaking is expected to propose performance standards for AEB systems on heavy trucks and accompanying test procedures for measuring the performance of the AEB system. NHTSA compliance testing. In support of the rulemaking, FMCSA is seeking information and comment concerning the maintenance and operation of AEB by motor carriers.			June 2022		ANPRM		2126-AC48	https://www.federalregister.gov/documents/2022/06/06/2022-11214
Fuel Efficiency and Greenhouse Gas Standards for Medium- and Heavy-Duty Engines and Vehicles	NHTSA	This notice addresses coordination between NHTSA and the Environmental Protection Agency (EPA) to ensure that efficiency and greenhouse gas standards for medium and heavy-duty engines and vehicles.		April 2022	September 2022	September 30, 2022	NPRM		2127-AM10	https://www.federalregister.gov/documents/2022/04/04/2022-07441
Alternative Options for Review Notices	NHTSA	This notice seeks public comment on the safety standard for rear visibility to facilitate new designs regarding the introduction and certification of camera replacing mirror systems.		December 2021	September 2022		Analyzing Comments		2127-AM10	https://www.federalregister.gov/documents/2021/12/01/2021-23019
Assessment of FMVSS Test Procedures	NHTSA	This notice seeks public comment on FMVSS test procedures that may not account for today's new vehicle designs, including electric vehicles.	Comment period ended Feb 2021	June 2021	September 2022		Analyzing Comments		2127-AM10	https://www.federalregister.gov/documents/2021/06/01/2021-11017
Updating Event Data Recorder Standard for Time Capture	NHTSA	In accordance with the 2015 Fixing America's Surface Transportation Act (FAST Act) (2015), this rulemaking proposes to amend 49 CFR part 563, "Event Data Recorders," to update the current crash recording duration for motor vehicles equipped with EDR data recorders. For motor vehicles equipped with an event data recorder, the current regulation requires a 3-second pre-crash recording period at a frequency of 100 Hz (cycle/second).			June 2022		NPRM		2127-AM10	https://www.federalregister.gov/documents/2022/06/06/2022-11214
Pilot Program for Collaborative Research on Motor Vehicles with High or Full Driving Automation	NHTSA	NHTSA plans to withdraw its October 18, 2018 Advance Notice of Proposed Rulemaking (ANPRM) that sought public comment on NHTSA's program to develop a pilot program for the establishment of a pilot research program for the safe, controlled testing and development of the emerging advanced safety vehicle technologies.	Jan-20	Withdrawn July 2021			Analyzing Comments		2127-AL19	https://www.federalregister.gov/documents/2021/01/20/2021-02119
Passenger Bus Delivery Vehicles Equipped with Automated Driving Systems	NHTSA	This action seeks comment on amending regulations that may be necessary to facilitate the certification of motor vehicles without a driver operator. The agency published a Federal Register notice on January 19, 2019 regarding comment on interim regulatory barriers that may block the introduction and certification of ADS-equipped vehicles, particularly those without human operators. In response to comment received from the January notice, the agency invited this NPRM to begin the rulemaking process. NHTSA will consider comments received from this notice, agency research, stakeholder engagement, and internal agency analysis to identify appropriate requirements that may exist in the agency's continued focus on safety while enabling innovative vehicle designs.	Oct-20	June 2022			ANPRM		2127-AM10	https://www.federalregister.gov/documents/2021/10/20/2021-21117
Specialized Motor Vehicles with Automated Driving Systems	NHTSA	This notice seeks comment on stabilizing regulatory requirements specific to classes of operational motor vehicles equipped with automated driving systems (ADS). The agency published a Federal Register notice on January 19, 2019 regarding comment on interim regulatory barriers that may block the introduction and certification of ADS-equipped vehicles, particularly those without human operators. In response to comment received from the January notice, the agency invited this NPRM to begin the rulemaking process. NHTSA will consider comments received from this notice, agency research, stakeholder engagement, and internal agency analysis to identify appropriate requirements that may exist in the agency's continued focus on safety while enabling innovative vehicle designs.	Sep-20	June 2022			ANPRM		2127-AM10	https://www.federalregister.gov/documents/2021/09/19/2021-20117
New Car Assessment Program	NHTSA	Light duty side-impact safety heavy duty NHTSA is a big fix.		June 2022			RFC	Has not yet started		
Updating the Process for Temporary Exemptions	NHTSA	This notice seeks comment on revising motor vehicle safety regulations to the introduction and certification of innovative motor vehicle technologies. This action is intended to update 23 CFR Part 655, Temporary Exemption from Motor Vehicle Safety and Biopack Standards. NHTSA seeks to make the temporary exemption process more streamlined and efficient to accommodate the introduction of innovative technologies. NHTSA seeks comment on strategies to update the temporary exemption process.	Jan-20	June 2022			NPRM		2127-AM11	https://www.federalregister.gov/documents/2021/01/20/2021-02119

Important Upcoming Federal Rules For Autonomous Trucking

Driver-out trucks cannot engage in interstate commerce until final rules are passed

Summary Of Key Rulemakings		Advanced Notice of Proposed Rulemaking	Notice of Proposed Rulemaking	Final Rulings Expected	
Agency	Rule				
	Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles (2126-AC17)	May 2019	November 2022 ¹	???? ²	<ul style="list-style-type: none"> • Non-human ways to satisfy non-driving safety requirements in current regulations
	Framework for Automated Driving Systems Safety (2127-AM15)	December 2020	???	????	<ul style="list-style-type: none"> • Autonomous vehicle operations standards – State regulations on autonomous operations apply until this rulemaking passes
	Unique Electronic Identification of Commercial Motor Vehicles (2126-AC54)	June 2022 ¹	???	????	<ul style="list-style-type: none"> • Automated electronic inspection capabilities for law enforcement
	Railroad Highway Grade Crossings (2126-AC39)		December 2021 ^{1,3}	????	<ul style="list-style-type: none"> • Non-human ways to check for oncoming trains at rail-grade crossings

1. Current USDOT proposed timeline. 2. For non-controversial rules it can take 12-18 months for the rule to go through the Federal processes. 3. Rulemaking already behind schedule.
 Note: Rulemakings ordered by level of controversy

Summary of FMCSA's Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles (2126-AC17) rule

Ten FMCSA Questions and Potential Answers

1. Do the FMCSRs require a human driver?

- No

2. Do you need special Commercial Driver's License (CDL) Endorsements?

- No

3. How do Drivers' Hours of Service (HOS) Rules Apply?

- If there is a human driver, they count. If the human is in the sleeper berth or not present, they don't.

4. Any changes to Medical Qualifications for Human Operators?

- No. If a human driver is involved, they still need them.

5. What about rules regarding Distracted Driving and Monitoring?

- They apply when humans are in control.

6. What about Safe Driving and Drug and Alcohol Testing?

- No change. Humans still need them. This section does highlight rules around **rail-grade crossings** that automated trucks may find difficult.

7. What about rules around **Inspection, Repair, and Maintenance**?

- FMCSA and industry needs to figure out alternative means of compliance when no human is present, such as how the vehicle will indicate it is working properly for law enforcement.

8. Same with Roadside Inspections?

- Another big one. Efforts are underway around alternate means of compliance for things like **cargo securement and roadside warning markers**. This section has some of the most questions.

9. What did they say on Cybersecurity?

- No easy answers. Working on it with industry groups.

10. How will FMCSA handle Confidentiality of Shared Information?

- FMCSA will protect it, unless legally compelled otherwise.

View Rule

DOT/FMCSA RIN 2126-AC17 Publication ID: Spring 2021

Title: Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles

Abstract: FMCSA requests public comment about Federal Motor Carrier Safety Regulations (FMCSRs) that may need to be updated, modified, or eliminated to facilitate the safe introduction of automated driving systems (ADS) equipped commercial motor vehicles (CMVs) onto our Nation's roadways. FMCSA requests comment on specific regulatory requirements that are likely to be affected by an increased integration of ADS-equipped CMVs. However, the Agency is not seeking comments on its financial responsibility requirements because they are not directly related to CMV technologies and because future insurance requirements will depend in part on the evolution of State tort law with respect to liability for the operation of ADS-equipped vehicles.

Agency: Department of Transportation(DOT) Priority: Other Significant

Risk Status: Previously published in the Unified Agenda Agenda Stage of Rulemaking: Proposed Rule Stage

Major: Undetermined Unfunded Mandates: Undetermined

CFR Citations: 49 CFR 392 49 CFR 392 49 CFR 392 49 CFR 392 49 CFR 392 49 CFR 392

Legal Authority: 49 USC 31136

Legal Deadline: None

Timeframe	Action	Date	FR Cite
ANPRM		05/26/2019	84 FR 26489
ANPRM Comment Period End		07/26/2019	
End of Extended Comment Period		08/26/2019	
NPRM		10/02/2021	

More on Inspection, Maintenance, Work Zones & Law Enforcement

What else did the ANPRM say?

At a minimum, FMCSA believes consideration should be given to requirements around:

- Pre- and post-trip inspections before and after dispatching ADS-equipped CMVs;
- A means for en-route inspection for cargo securement devices to ensure proper tension—currently the driver is required to check the devices, but there may be alternative solutions based on improved technology;

FMCSA expects

- Level 4 and 5 ADS-equipped vehicles would be marked to enable identification by Federal and State personnel,
- Roadside inspectors must be able to verify that ADS components are functioning properly,
- ADS to be able to detect emergency vehicles such as police, fire, and rescue, and move out of the path of first responders,
- ADS to take appropriate action while driving through work-zones.

There isn't consensus on how to achieve this yet. But there are tools being developed to do so.

Organized Labor Demands

What have unions asked Congress and regulators for?



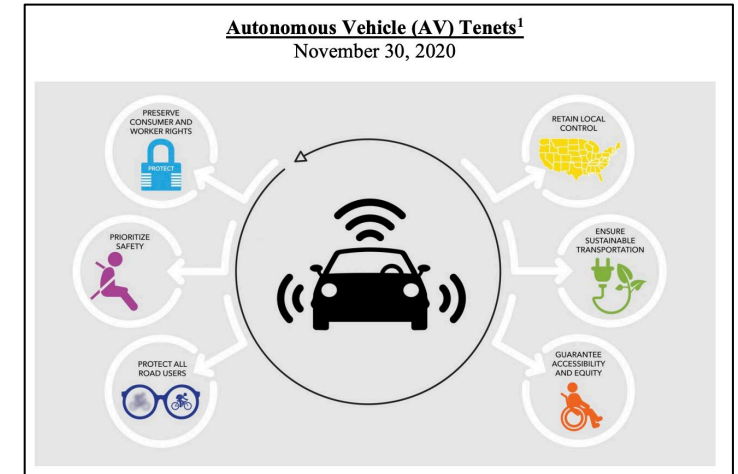
Strongly critical of recent “laissez faire approach”.

Oppose legislation providing framework for automated Commercial Motor Vehicles (CMVs), or vehicles over 10,000lbs, and would require a human to be present and able to take over operation of the CMV.

AVs under 10,000lbs providing passenger service must have human drivers.

A labor plan must be developed in case AVs displace workers.

AVs should pass a required “vision test” of some kind as part of an AV type approval. Where vehicles can operate (their operational design domain) also must be approved by NHTSA.

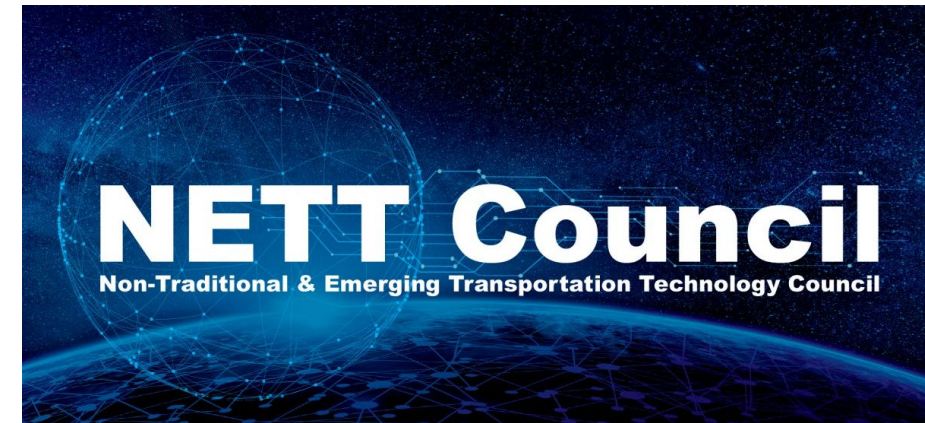
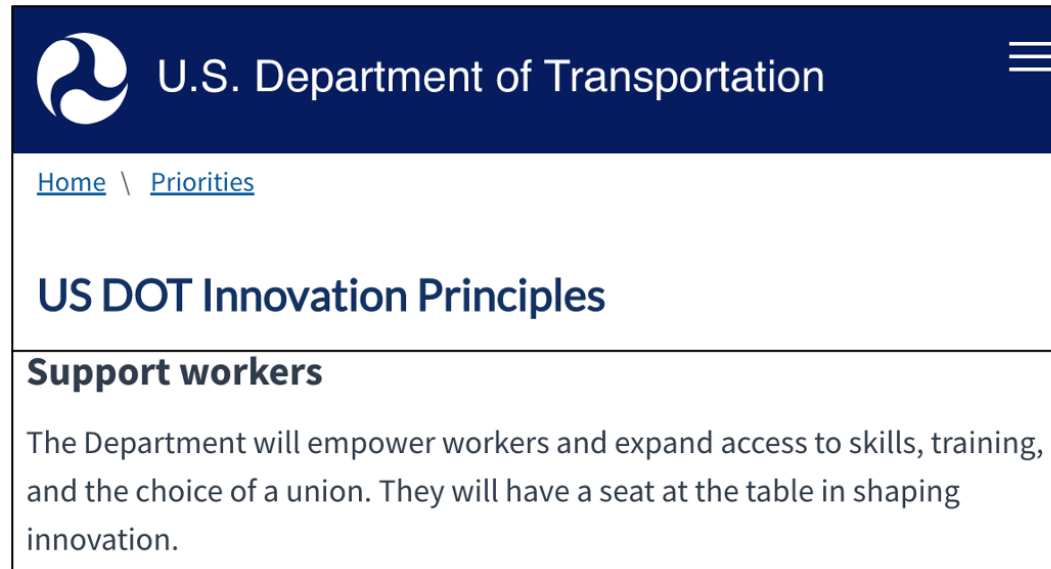
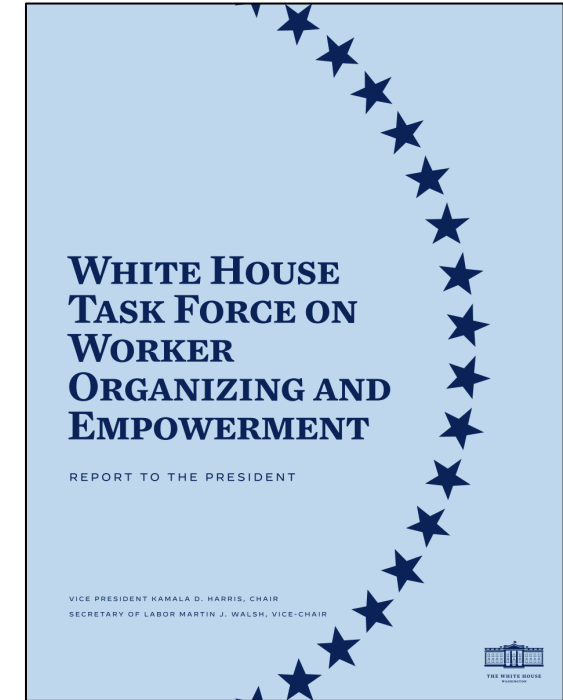


Why Do Their Demands Matter So Much?

They now have a priority "seat at the table"





Update Innovation Principles and Reorient NETT Council

Recommendation: Instruct the Department of Transportation to issue a new set of principles on innovation, and reframe institutions such as the Non-Traditional and Emerging Transportation Technology (NETT) Council that screens emerging technologies, to focus on key priorities and ensure labor's involvement in discussions of autonomous vehicles and automation in transit systems and trucking.



Important Upcoming Federal Rules For Autonomous Trucking





Driver-out trucks cannot engage in interstate commerce until final rules are passed

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Important Upcoming Federal Rules For Autonomous Trucking

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Usdot's voices initiative

Proof of Concept (PoC) Project



Developed out of AV 4.0 efforts, VOICES PoC will be a distributed virtual platform that will enable stakeholder virtual collaboration in an intellectual property-protected virtual collaborative environment for research and interoperability testing of prototype Cooperative Driving Automation (CDA) applications.

The initial PoC project will focus on the utility of VOICES to advance CDA-based solutions. The goal of the PoC is threefold:

1. Establish a community of practice (CoP)
2. Establish requirements for and demonstrate a distributed synthetic test environment (DSTE) that meets the needs of the CoP
3. Transfer this technology to the private sector.

The CoP working groups topics are:

- Cooperative perception.
- Platooning.
- Eco approach & departure.

- System integration & test.
- Technology transfer.

Source: <https://usdot-voices.atlassian.net/wiki/spaces/VP/overview>

How Do we overcome the regulatory issues?



Potential with USDOT VOICES Initiative

Work Zones	Industry is currently working with the USDOT, through the VOICES Initiative, to safely update the operational design domain for connected and automated commercial motor vehicles to include work zones.
Inspection Capabilities	FMCSA' ACE research project is focused on developing automated electronic inspection capabilities. This project started August 2021 and runs through July 2023. Concurrently, the Advanced Notice of Proposed Rulemaking (ANPRM) is set for June 2022. This will tie in to VOICES and ongoing efforts from law enforcement groups to determine updated protocols.
Interactions with First-Responders	Once protocols are established for communicating with first responders, these can be used to ensure ADS responsiveness to detect and make way for these vehicles.
Rail-Grade Crossings	Commercial motor vehicle must stop, listen and look in each direction along the tracks for an approaching train; and ascertain that no train is approaching. FRA has research supporting the use of V2V connections for rail-grade crossings.



**SAFETY, WORKFORCE & ENVIRONMENTAL
IMPACT**

Safety of large truck operations

The status-quo is not okay

In 2019 there were **5,005 people killed** and an estimated 159,000 people injured in crashes involving large trucks. An estimated 538,000 large trucks were involved in police-reported traffic crashes nationwide during 2019. (NHTSA)

- **71% of the people killed were the occupants of the other vehicles.**

The critical precrash event for 74 percent of the large trucks in fatal crashes was another vehicle, person, animal, or object in the large truck's lane or encroaching into it. (FMCSA)

Twenty-three percent of the large trucks in fatal crashes had critical precrash events of their own movement or loss of control. (FMCSA)

In 2017, 32 percent of fatal crashes involving large trucks reported at least one driver-related factor, with **speeding being the leading driver-related factor.** (NHTSA)

13 percent of commercial motor vehicle drivers were considered to have been **fatigued** at the time of their crash. (FMCSA)

NHTSA: Framework for Automated Driving Systems Safety

The path ahead for “proving” the safety of AV operations

This rulemaking marks the first ever framework for the safe operations of an AV, instead of the standard focus on the vehicle equipment. This rulemaking would preempt States on rules for the operation of a vehicle that does not require, or in some cases allow, a human driver.

The rulemaking is fundamentally based on the same “Safety Case” approach incorporated into UL 4600.

Locomotion is already incorporating UL 4600 into the development of our safety case, as well as other industry-developed consensus-based standards.

Companies would be wise to incorporate these future standards for all phases of their deployments.

The screenshot shows the Federal Register entry for the rulemaking. At the top, it features the National Archives logo and the text "FEDERAL REGISTER The Daily Journal of the United States Government". To the right is the seal of the National Archives and Records Administration. A blue banner indicates "Proposed Rule". The title of the rule is "Framework for Automated Driving System Safety", and it is dated 12/03/2020. Below the title, there is a "PUBLISHED DOCUMENT" section with a sidebar containing icons for a menu, comments (693), and a share icon. The main content lists the "AGENCY" as the National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT), and the "ACTION" as an "Advance notice of proposed rulemaking (ANPRM)". To the right, a "DOCUMENT DETAILS" section lists the "Printed version" as a PDF, the "Publication Date" as 12/03/2020, and the "Agencies" as the National Highway Traffic Safety Administration. The "Dates" section is currently empty.

Framework of a Safety Case

What does it take to make a Safety Case?

SAFETY CULTURE

- Grounding Process

ENGINEER IT RIGHT

- Faulted Behavior (Functional Safety)
- Nominal Behavior (SOTIF)
- Cyber-security
- Verification and Validation Testing
- Vehicle Regulatory Compliance

MANUFACTURE IT RIGHT

- Component Supplier
- Module Supplier
- Vehicle Upfitter/Assembler

OPERATE IT RIGHT

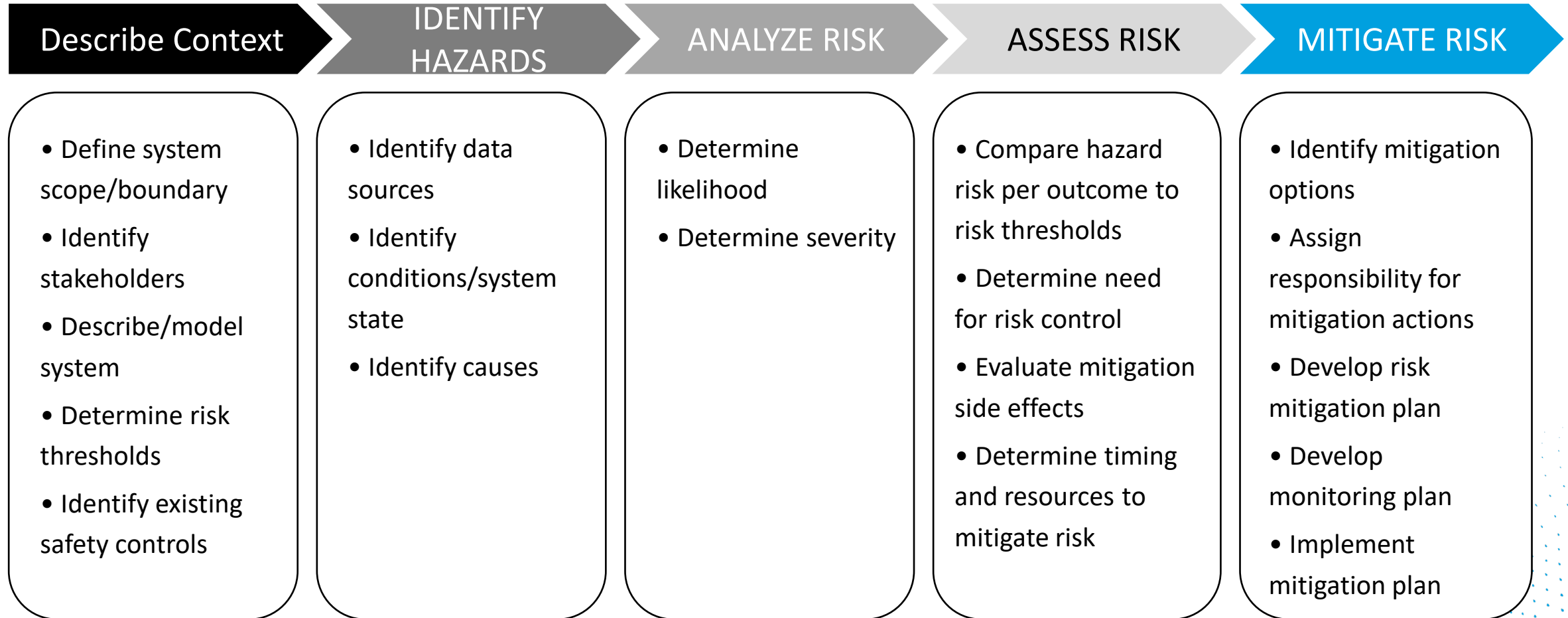
- Safety Drivers
 - Driver Training
- Driver Human-Machine Interface
- Driver Monitoring
- Operator Regulatory Compliance
- Vehicle Maintenance & Service Calibration
- Pre- and Post-Trip Inspections
- Standard Operating Procedures
- Data Recording
- Accident Response Plan

IMPROVE IT RIGHT

- Field Monitoring
- Continuous Improvement

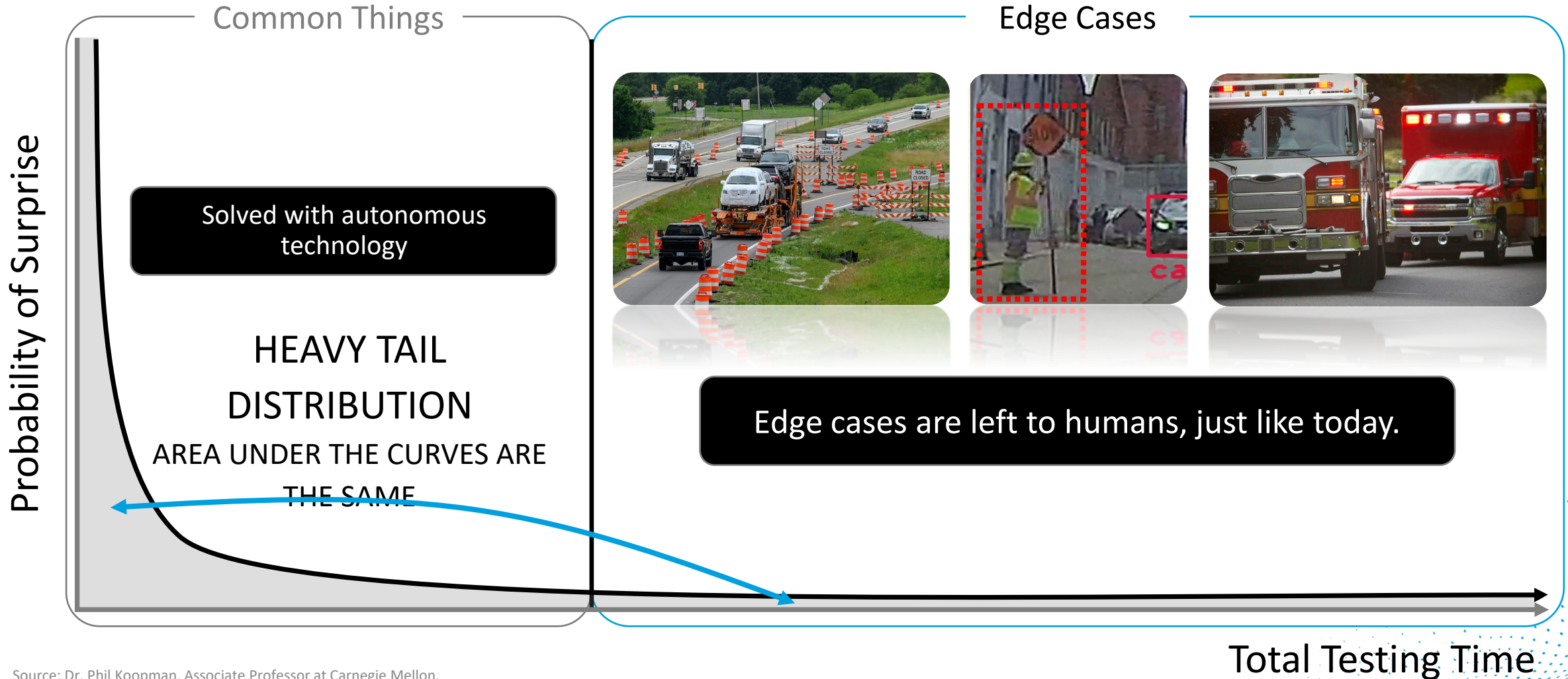
Safety Risk Management Process

Safety Culture



Combining Autonomy & Humans To Solve The Edge Case Problem

Human-guided autonomy will launch earlier and deliver significant value



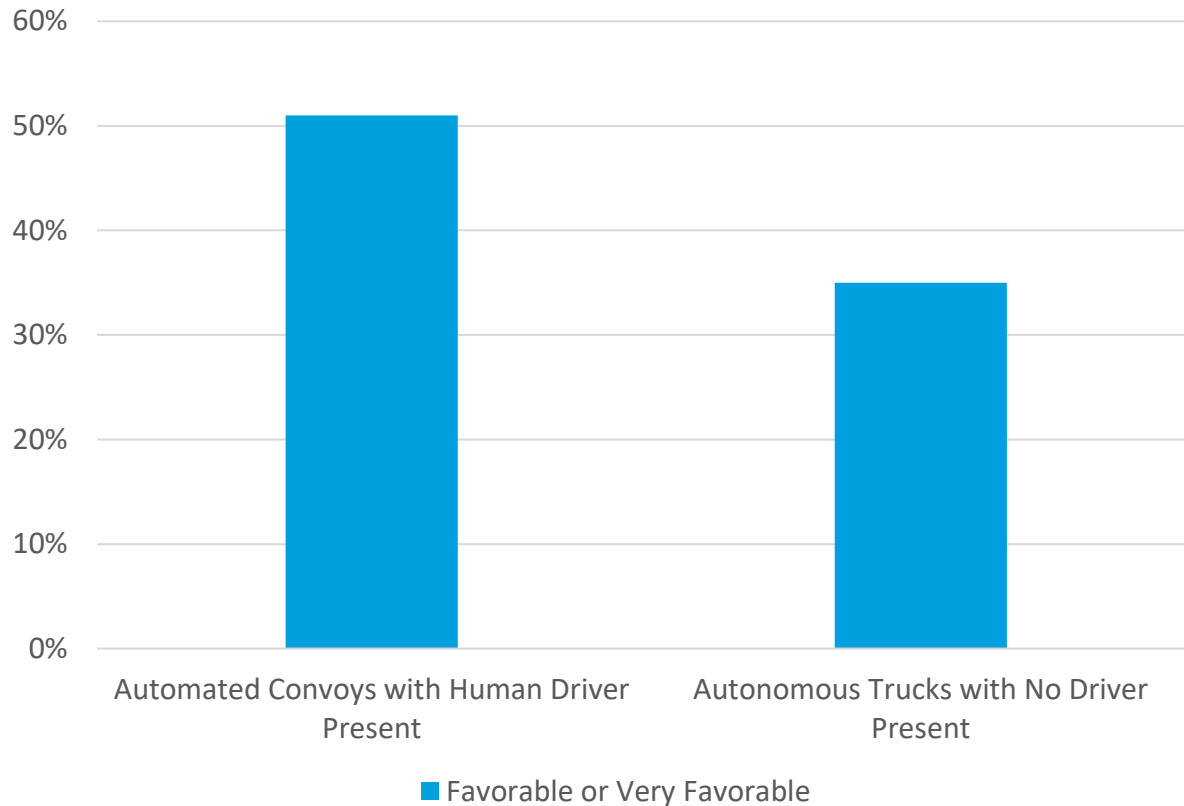
Source: Dr. Phil Koopman, Associate Professor at Carnegie Mellon.

Public Perception

Very context specific

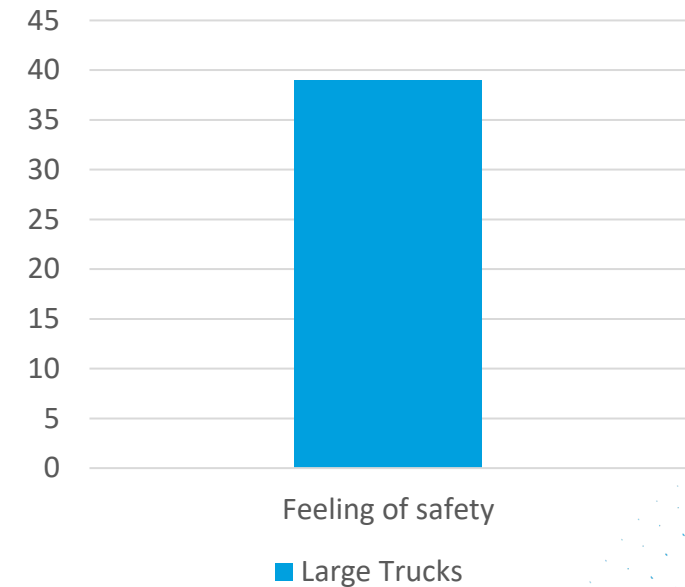
A slim majority report feeling favorable to automated convoys. A clear majority do not feel comfortable driving near large commercial trucks.

Favorable or Very Favorable



Source: CTA Self-Driving Vehicles: Consumer Sentiment 2021

Driving Near Large Trucks



Source: AAA Foundation

Note: these are different polls with different baselines conducted for different purposes with different context.

Safety and quality of life

What it means to do this right

There were **843 truckers killed on the job in 2019**. (BLS)

“The quality of life for truckers in the long-haul trucking space is arguably very challenging as suicide rates are among the top five professions in the country.” ([2016: The Misery of Long-haul Trucking](#))

There are over 3 million truck drivers employed in the commercial transportation and material moving occupations, one of the largest occupational groups in the United States. In 2016, the suicide rate was ~30 for every 100,000 in the Transportation and Warehousing and the Transportation and Material moving categories. ([CDC](#))

So, in the broader category, **~900 people are estimated to have committed suicide**.

Surveyed truckers were found to have significant issues affecting their mental health, such as loneliness (27.9%), depression (26.9%), chronic sleep disturbances (20.6%), anxiety (14.5%), and other emotional problems (13%). ([NIH](#))

High stress is one of the two primary causes of the high rates of driver turnover fleets see today, along with the older age of the driving population.

The most common stressors were financial, with 66% of drivers saying they did not have enough savings to cover 60 days of expenses. ([Idelic](#))

Impacts to Real, Human Drivers

Federal Studies on Workforce Impacts of Automation

WHAT DID THEY FIND?

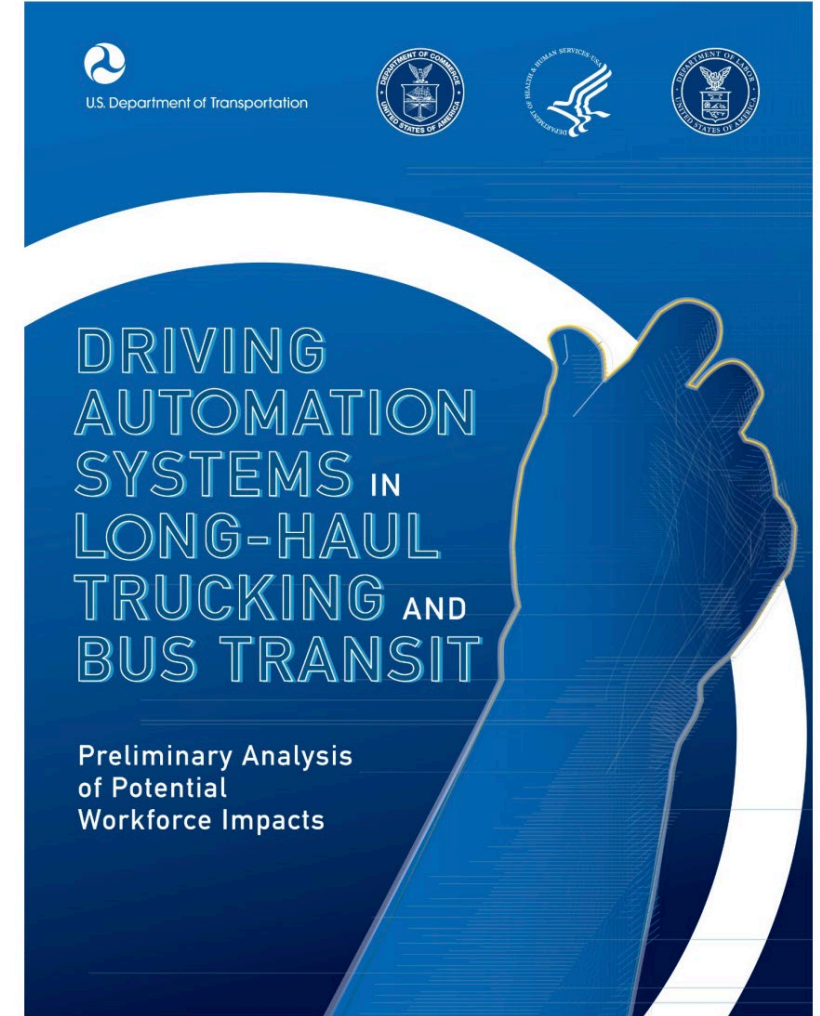
Driving Automation Systems in Long-Haul Trucking & Bus Transit:

Preliminary Analysis of Potential Workforce Impacts

- 300,000 – 500,000 trucking jobs will be impacted over time by autonomous vehicle technology

Key Takeaway:

If you are a trucker today, you will probably be able to retire as a trucker

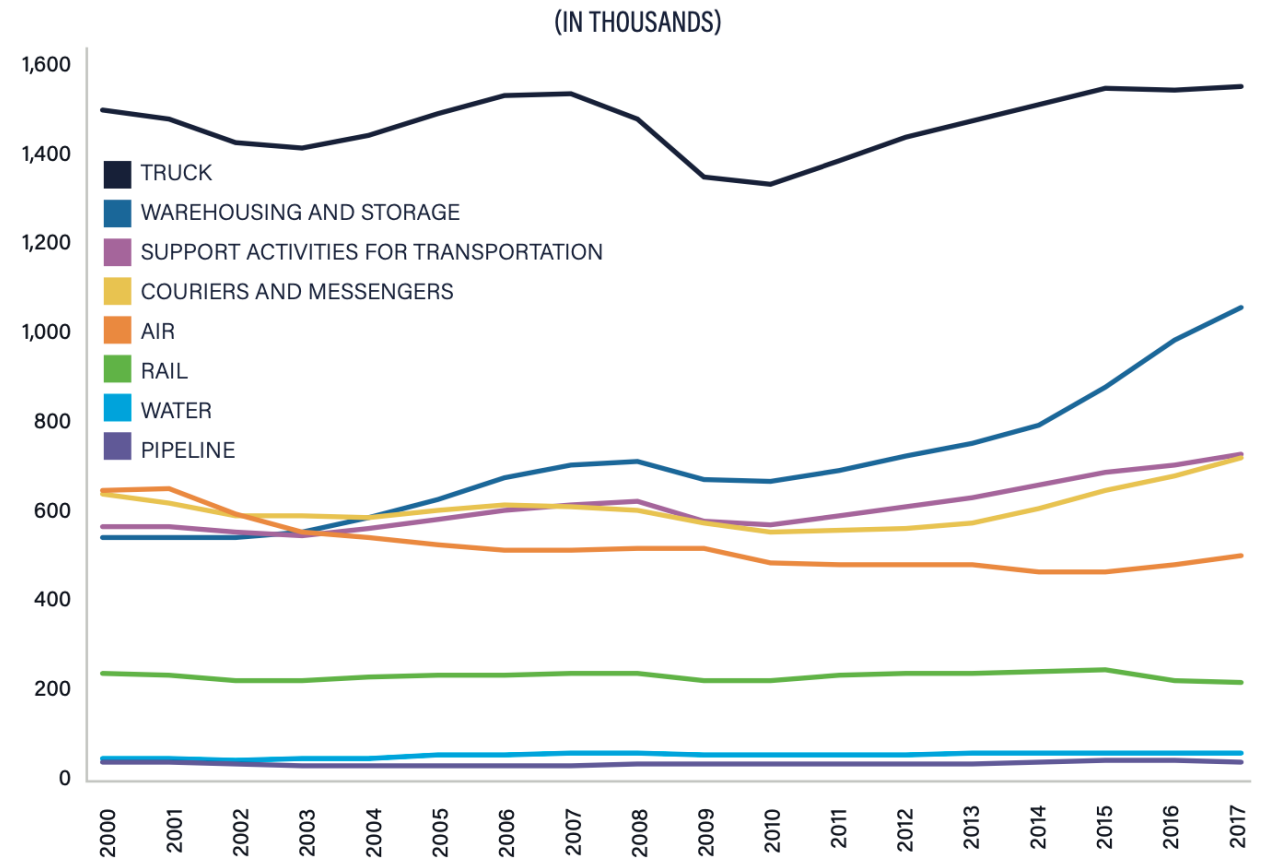


Driving Factors Around Workforce Impacts

The technology will create more jobs and better jobs

- Many trucking jobs aren't in the truck.
- There are nearly eight million people employed in trucking-related occupations, but only 3.6 million truck drivers. (1.8M heavy duty truck drivers)
- Goods movement now provides a greater source of job growth than manufacturing.
- The history of ATMs a good example

FIGURE 19. EMPLOYMENT IN FOR-HIRE TRANSPORTATION¹⁰⁷



Driving Factors Around Workforce Impacts

Demographics of Truck Drivers

- Today, the average truck driver is 48 years old.
- Every year, a little over 10% of truckers retire or leave the occupation.
- In 10 years, 28% of the current heavy truck driving workforce will be 65 years or older and in 15 years, the number will be 42%.
- Many of today's truckers won't even have the chance to be impacted by self-driving trucks.

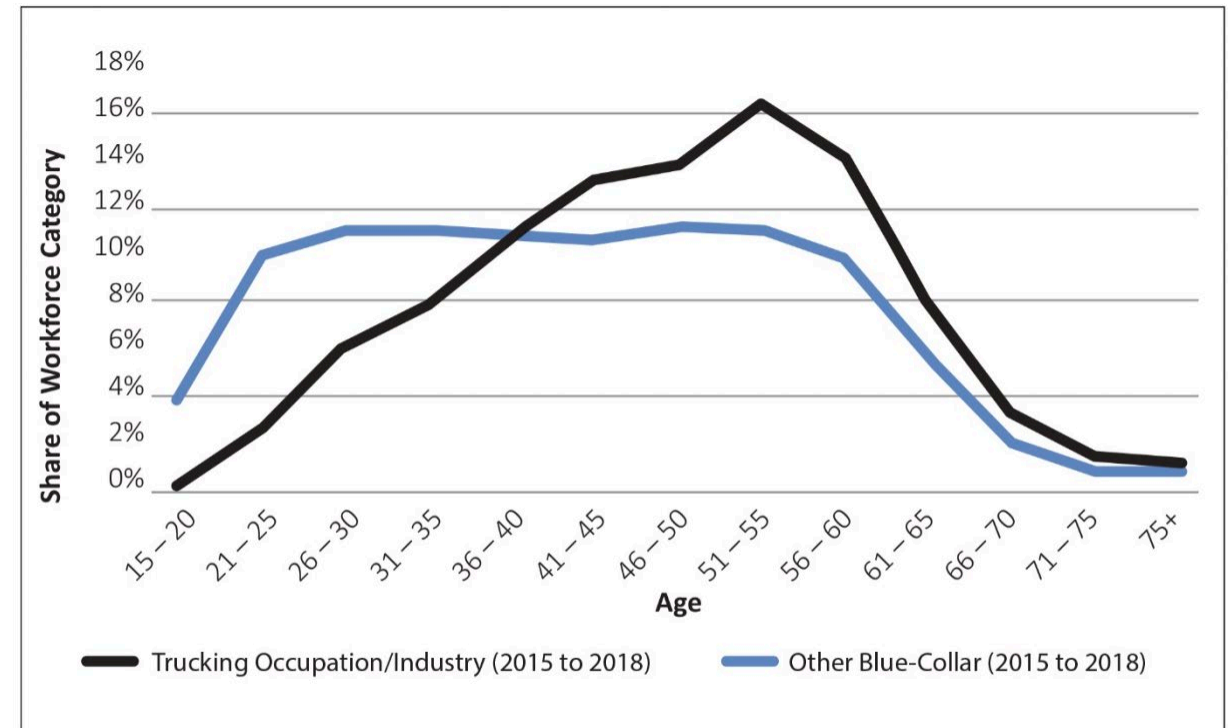


Figure 2.1. Share of Workforce by Age (2015 to 2018): Driver/Sales Worker and Truck Drivers in the Truck Transportation Industry vs. Other Blue-Collar Occupations⁴⁵

Driving Factors Around Workforce Impacts

It is about more options, not having options removed

The average trucker chooses trucking later in their career

- 61% of new truck drivers are older than 40, and 33% are older than 50.
- More than 10% of truck drivers are veterans, far higher than the percentage in the general workforce.

It means that in the future, a person interested in changing careers will be able to evaluate their options and choose to be trained for a premium AV Trucking Operations Manager position, a warehousing and logistics position, or an AV Hub operator.

Macroeconomic impacts

When you make something better, you get more of it

Macroeconomic Impacts of Automated Driving Systems in Long-Haul Trucking

www.its.dot.gov/index.htm

Final Report – January 28, 2021
FWHA-JPO-21-847



U.S. Department of Transportation

- Autonomous trucking will “Increase total U.S. employment by 26,400 to 35,100 jobs per year on average during the analysis period.”
- The transition will raise annual earnings for all U.S. workers by \$203 to \$267 per worker per year due to economy-wide productivity gains.

Reducing Environmental Impact & Improving Community Well-Being And Safety

Human Capital And Safety

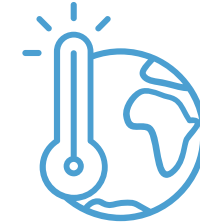


Human-guided autonomy is expected to dramatically improve driver well-being and reverse the tide of driver attrition

Combining human cognition and machine precision will **dramatically reduce truck-involved fatal crashes**

Locomotion is using **industry-leading safety standards and processes** to prioritize safety outcomes

Climate



Autonomous Relay Convoy and Drone Follower deliver a **22% CO₂ reduction** per truck per year

Emissions reductions **validated by independent third-party¹** environmental impact assessment report

- Science-based, data-driven approach, grounded in the proven methodology of **Life Cycle Assessment** to validate Scope 1, 2 and 3 greenhouse gas emissions

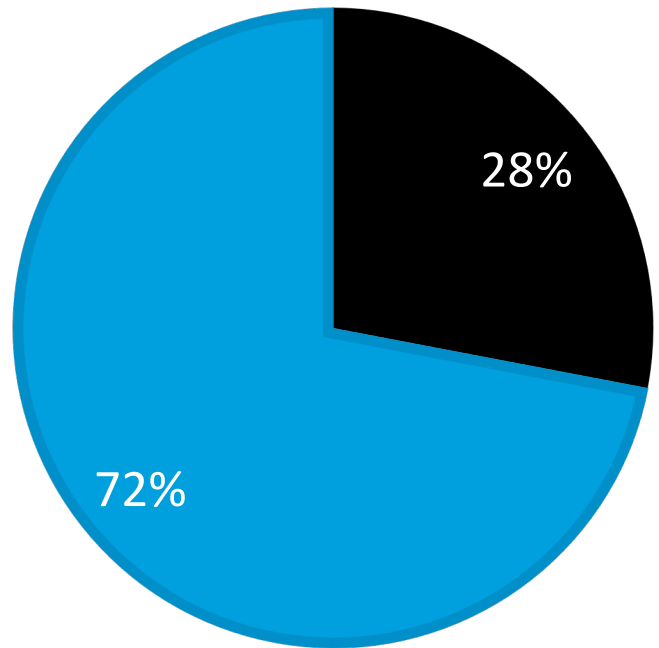
1. Boundless Impact Research and Analytics.

Greenhouse Gas Emissions

Improvements to trucking can drive massive pollution reduction improvements

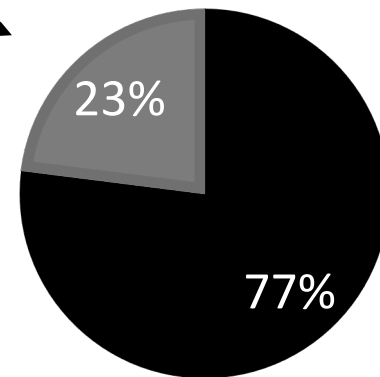
GHG EMISSIONS

■ Transportation ■ Everything Else



Medium-and heavy- duty vehicles account for 23% of all transportation greenhouse gas (GHG) emissions despite comprising merely 4% of vehicles on the road. ([Source](#))

■ All Other Transportation
■ Medium- and Heavy-Duty Trucks



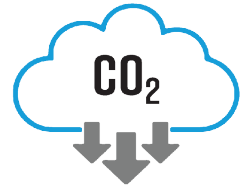
A graphic illustrating a 22% reduction in CO₂ emissions. It features a blue box with '-22%' and a cloud icon with 'CO₂' and three downward-pointing arrows.

Locomotion's linked-convoy approach reduces GHG emissions by 22%.

Greenhouse gas (GHG) impact

Results of the independent third-party environmental impact assessment report

- The estimated GHG Footprint of a long-haul class 8 truck with a 20-ton payload using Locomotion's ARC technology is 0.072 kg of CO₂ equivalent per tonne-kilometer, 22% lower than a traditional truck.
- The majority of the GHG Footprint is attributed to the combustion of fuel during movement or idling. Emissions due to idling represent 6.5% of the total emissions of a conventional class 8 truck.
- Considering the information provided by Locomotion, Boundless estimated that the emissions per tonne-kilometer associated with idling can be reduced by 97% and the emissions that occur while driving can be reduced by 16%.
- This also translates to a 19% reduction in operating cost, a 21% reduction in fuel burn and a 22% reduction in Photochemical Ozone Formation.





CLOSING THOUGHTS



QUESTIONS?

Finch Fulton, (251) 605-3719 • finchfulton@locomotion.ai

THANK YOU

UPDATE ON AT IN STATE LONG RANGE PLAN

Garrett Pedersen – Planning Team Leader, Systems Planning Bureau, Iowa DOT



LONG-RANGE PLAN UPDATES

- State Transportation Plan (*Iowa In Motion*) update due May 2022
 - Comprehensive long-range plan for all modes
 - Federally required, and required in Iowa Code
- State Freight Plan update due July 2022
 - Comprehensive long-range plan for freight modes (aviation, highway, rail, water)
 - Federally required
- 24-month development timelines
- Both plans have been developed in parallel



CONSIDERING EMERGING TECHNOLOGIES IN LONG-RANGE PLANNING

Initial game plan:

- ✓ **No-hype summary:** current state of technology and estimated adoption/fleet integration timelines
- ✓ **Rightsizing policy:** statement regarding consideration of emerging technologies, risk of over/underestimating influence on intended benefit of improvements
- ~~**Travel Demand Model:** potential “conservative adoption” scenario with lane capacity adjustments tied to conservative fleet integration~~



CONSIDERING EMERGING TECHNOLOGIES IN LONG-RANGE PLANNING

In-game adjustment:

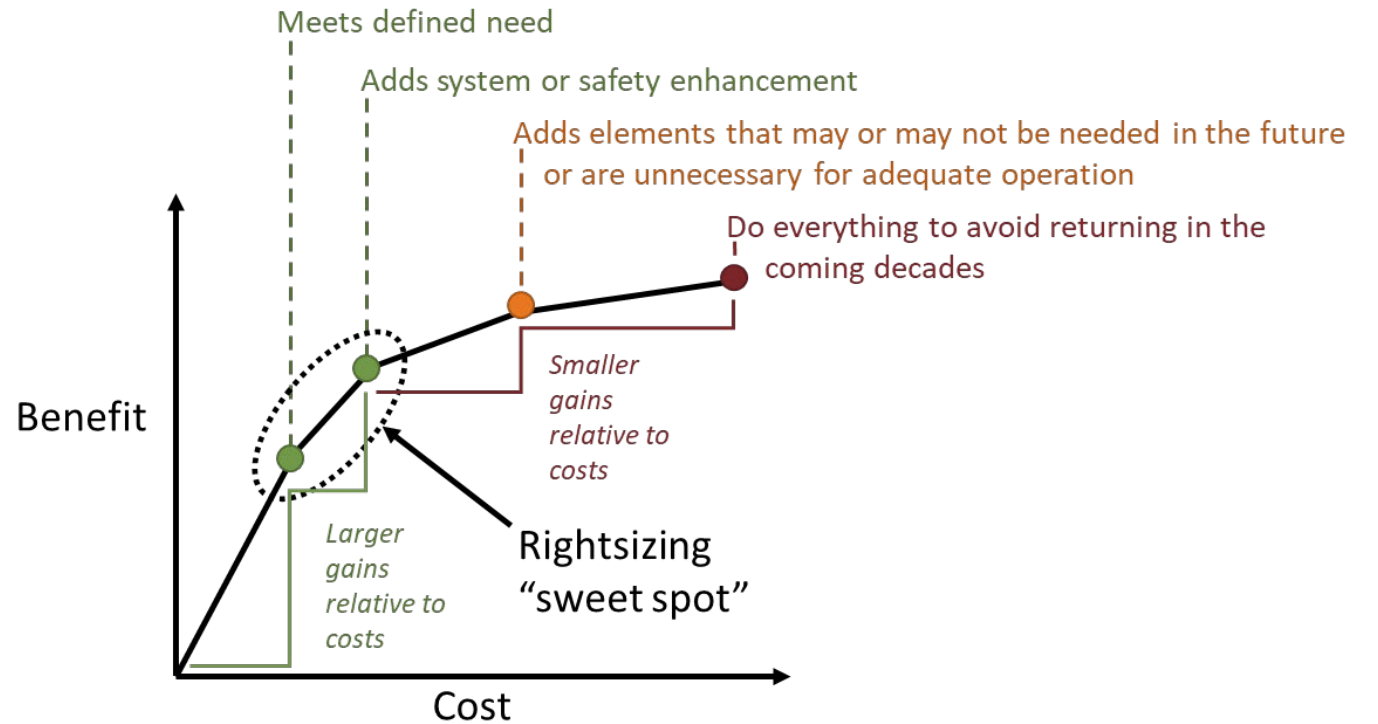
✓ **Strategies derived from “CAT in Planning” guidance:**

- Integrating “pause points” into project development and programming
- Seeking investments with dual benefits; today’s users & tomorrow’s technology
- Monitoring/supporting research into AT use cases



RIGHTSIZING POLICY

- Rightsizing means seeking an appropriate level and type of investment that avoids overinvesting or underinvesting, overbuilding or underbuilding, and overserving or underserving the market based on user and system needs.



RIGHTSIZING POLICY: EMERGING TECHNOLOGIES

- *All improvements shall **consider the impact of underestimating or overestimating the influence of emerging technologies** on the intended benefit of the improvement over its useful life. In considering such impacts, the department should evaluate probable rates of technological deployment/adoption, projected impacts of technologies on the performance of the multimodal transportation system, and the sensitivity of return-on-investment to various deployment/adoption scenarios.*



CONSIDERING EMERGING TECHNOLOGIES IN LONG-RANGE PLANNING

Travel Demand Model Scenario Analysis

- Potential “conservative adoption” scenario with lane capacity adjustments tied to conservative fleet integration
- Highway Capacity Manual – Draft Capacity Adjustment Factors (CAFs)
- Could be applied to roadway segments (Freeway example below)

Proportion of CACC-Capable Vehicles in Traffic Stream	Adjusted Segment Capacity		
	2,400 pc/h/ln	2,100 pc/h/ln	1,800 pc/h/ln
0	1.00	1.00	1.00
20	1.02	1.02	1.15
40	1.07	1.10	1.27
60	1.13	1.25	1.40
80	1.22	1.37	1.60
100	1.35	1.53	1.82

Notes: CAV = connected and autonomous vehicle, CACC = cooperative adaptive cruise control.
Interpolate for other CAV proportions and adjusted segment capacities.

Exhibit 26-15
Capacity Adjustment Factors
for CAVs for Basic Freeway
and Freeway Diverge
Segments

Proposed

ATC INPUT FOR IOWA IN MOTION - TAKEAWAYS

Challenges & Uncertainties

- Misuse and misunderstanding of the current technology in vehicles; public education will be key
- Iowa's varied weather and rural roadway environments will impact operations
- How and who will pay for the needed infrastructure improvements
- Liability concerns

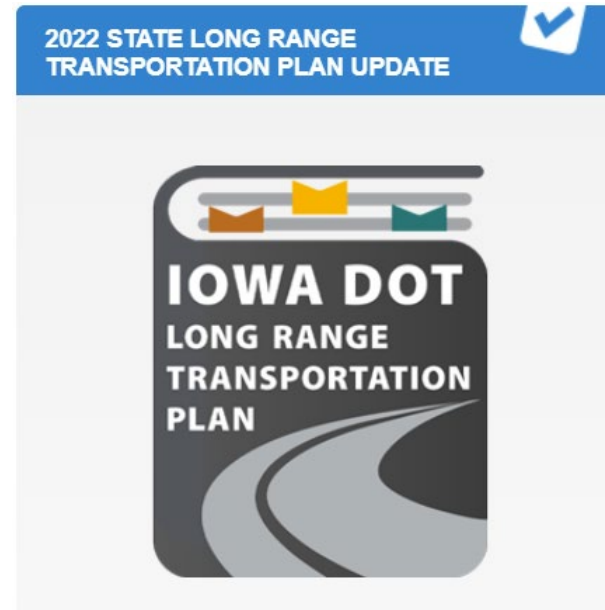
Opportunities & Key Considerations

- Physical, digital, communications, and cyber-security readiness
- Collaboration across jurisdictions and sectors is needed
- Increasing workforce size and skills is necessary
- Environmental justice and accessibility advancements



PLEASE SHARE YOUR COMMENTS

- Draft State Transportation Plan and State Freight Plan available for public comment
- Closes April 7
- iowadot.gov/iowainmotion/
- Iowa.Motion@iowadot.us



SUBCOMMITTEE UPDATES & FUTURE OPPORTUNITIES

Adam Shell – AT Program Manager, Traffic Operations Bureau, Iowa DOT

Scott Marler – ATC Chair & Iowa DOT Director



INFRASTRUCTURE READINESS – DECEMBER 13TH, 2021

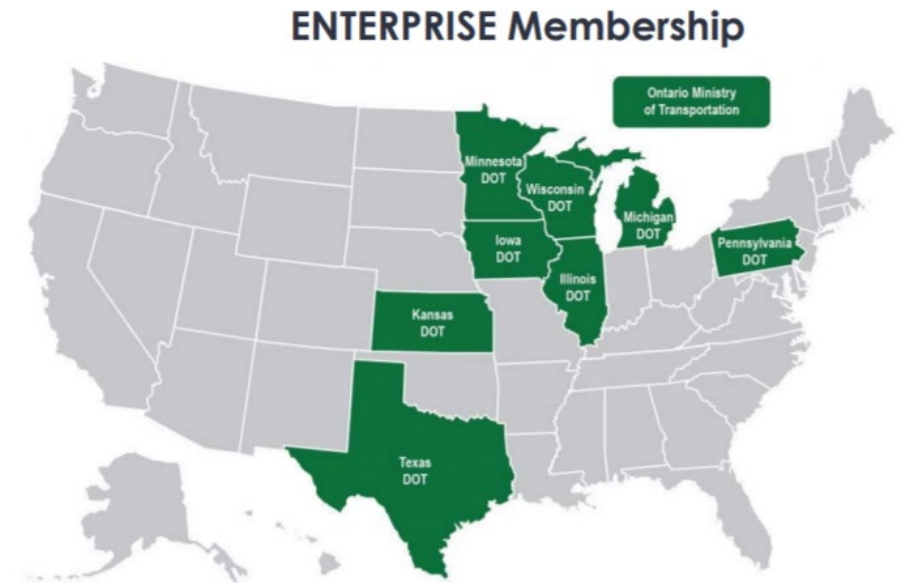
Erin Mullenix, IR Chair

Summary:

- Short Term Road Condition Forecasts: Enabling Practical Trip Modification in Adverse Weather
- AT Readiness Updates (e.g. National Guidance and Research, Work Zone Data)

Ongoing Actions:

- Improve Pavement Markings
- Build Out Fiber Backbone
- Connected Technology
- Work Zone Data



[ENTERPRISE Pooled Fund Study -
Understanding Infrastructure Operations
Impacts based on AV Demos](#)

ECONOMIC DEVELOPMENT – JANUARY 5TH, 2022

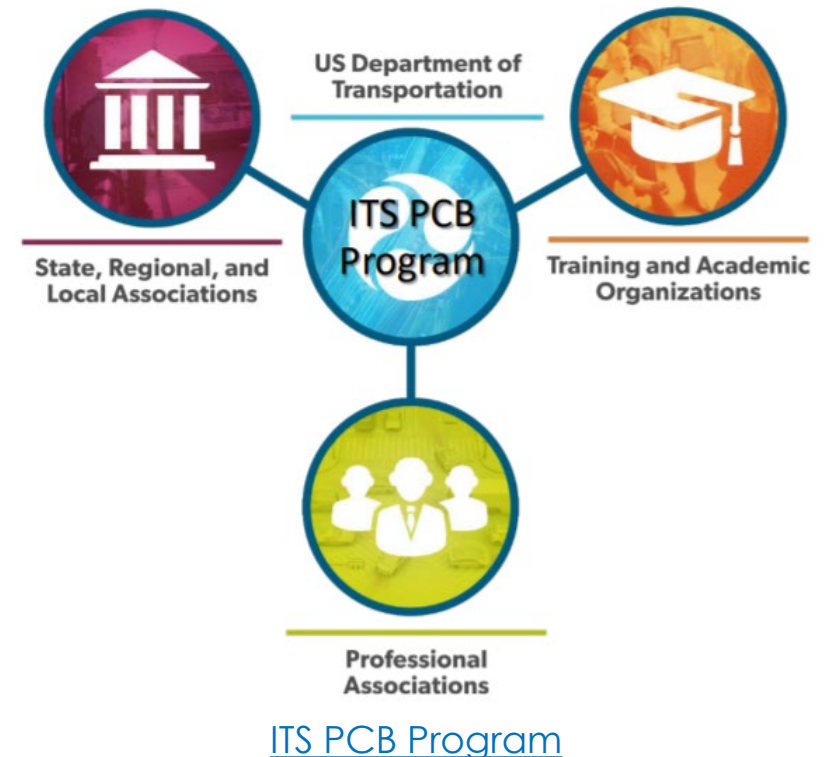
Rick Petersen, EcDev Chair

Summary:

- Intelligent Transportation Systems (ITS) Joint Program Office (JPO) Professional Capacity Building (PCB) Program
- Engage with Iowa Community Colleges

Ongoing Actions:

- Workforce Development
- Increase Freight Movement
- Align and engage with other subcommittees



POLICY & LEGISLATION – JANUARY 19TH, 2022

Dylan Mullenix, P&L Chair

Summary:

- Austin, TX Personal Delivery Device Deployment Experience
- Ensuring CAT in Planning

Ongoing Actions:

- Cooperative Automated Transportation (CAT) in Planning Working Group has been formed and is finalizing a white-paper resource and guidance document
- Improve Equity & Accessibility



[Refraction Rev-1](#)

PUBLIC SAFETY & ENFORCEMENT – JANUARY 25TH, 2021

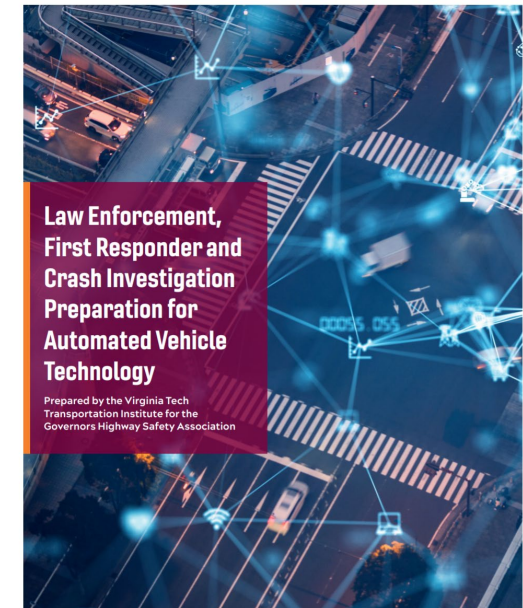
Col. Nathan Fulk, PS&E Chair

Summary:

- Law Enforcement, First Responder, and Crash Investigation Preparation for Automated Vehicle Technologies
- AV Crash Data Working Group

Ongoing Actions:

- AV Crash Data and Incident Reporting working group will meet in Spring/Summer 2022
- US DOJ sponsored research project related to *Public Safety Considerations for ADS*
- VRU safety requirement in State Highway Safety Plans (SHSP) – [website](#)



[Final Report](#)

IOWA AT VISION



Vision

To create an AV-ready driving environment in Iowa for the safe movement of people and freight for a thriving Iowa economy



Mission

Lead, coordinate, and enable the advancement of automated transportation systems in Iowa

THE CHARGE

- Explore opportunities to **deploy** advanced technologies this year
- Focus on freight, mobility, or safety
- Pursue discretionary grants



FUTURE OPPORTUNITIES

Upcoming Activities

- Review national safety or CAV efforts and related policy principles to determine alignment with the Iowa AT Vision
- Identify funding streams and pursue projects and partnerships to support Iowa AT Vision tactics or other related activities
- Hold focused discussions at upcoming subcommittee meetings to determine next steps
- Subcommittee leaders to coordinate and identify priority activities going forward, ATC update later this year

Competitive Federal Funding & Alignment Opportunities

- Infrastructure and Investment Jobs Act (IIJA) Discretionary Grants
 - Resources: [AASHTO](#), [FHWA](#), [U.S. DOT](#), [National Association of Counties](#), & [National League of Cities](#)
- NSF Smart and Connected Communities - Proposals accepted anytime until April 2024 ([website](#))
- U.S. DOT Small Business Innovation Research program - FY22 Solicitation closed March 7 ([website](#))
- University Transportation Center (UTC) Programs – Competition in 2022 ([website](#))
- Others?



WRAP-UP

- **Upcoming Events**

- MAASTO Annual Meeting – July 26 & 27, 2022 - <https://maasto2022.com/>

- **Next Meetings**

- ATC subcommittee – 2nd Quarter 2022
- ATC Late Quarter 3 2022

- **Press Clippings**

- Bi-weekly update via email
- Sign-up here: <https://iowadrivingav.org/clippings.aspx>

- **Adjourn**





THANK YOU