TRB ACS60: Truck and Bus Safety Committee

2024 Annual Committee Meeting

Wednesday January 10, 2024
8:00 AM – 12:00 PM
Marriott Marquis
Salon 10 (M2)

Full Committee Minutes

1. **Welcome and Introductions: All**

2. **TRB Staff (upon arrival)**

Bernardo says we had over 14,000 registrants. Two years ago, we had 7,500 during COVID. There were over 6,000 papers with two or more reviews for each paper. We need quality reviews with substantive, objective feedback. Please do reviews, take them seriously, and provide substantive comments. Make sure you keep your MyTRB profile updated, this is how we communicate.

We need to rotate a third of it's membership every three years. Next year is a rotation year. The chair is going to pay attention to who is participating or not so when the rotation comes around we can make individuals members in the future. TRB wants committee members to be active in the committee. We are going to rotate chairs this year. Not sure how we got to six years, two three-year terms, but that's what Bob has done. We have a new chair coming in, Mouyid Islam.

Rethink about research need statements. What are those things that could actually help improve safety? We keep a large database of research needs; these needs could truly make a difference.

3. **Paper Review Summary and Discussion (Mouyid Islam)**

We're planning on taking a survey to know the members and friends' interests to make the process more efficient. We are very unique in that we allow people to pick their interests. Most committees just assign the papers, but the quality of reviews is not as good. However, with that being said, Bob admonished the committee to be kind when reviewing. Be sure to remember that there are people at the other end of the paper. They are probably undergrad students. We want to help them in their future career. Be sure to make use of the comments to clarify what we mean.

Bob is stepping down as chair. He's been chair for six years. The committee is in a good place and we are trying to form an international agenda. Even though we are a smaller committee in our outreach, we survived the purge. We were able to stay as a separate committee. However, we need more participation with international partners.

TRB is going to get more particular about tenure. You can only be on a committee for nine years, if you go longer than that, you can't be a sitting member again, for the rest of your life. This is due to NAS. They believe TRB has gone rouge. There are no exceptions. They have already allowed to many

exceptions. The rotations will happen pretty soon. Perhaps half of our members will rotate off. They used to allow you to rotate on and off and reset your time, but they will no longer allow this. Bob is commended us to remain a friend of the committee. You can never be a committee chair again after doing it once. To be a chair you need to be active, the same is true of being a committee member. In TRB, the committee gets to pick its succession plan.

4. **2023 Deborah Freund Paper Award**
   Brenda Lantz, Jerry Krueger, Scott Valentine
   - **Xueson Wang, Yang Zhou, and Salvatore Damiano Cafiso**
     TRBAM-23-04234: *Autonomous Emergency Braking System for Trucks for Longitudinal Two-wheeler Collision Avoidance*

5. **Update on Committee: Bob Scopatz**

6. **Subcommittee Reports: (See Subcommittee Reports below)**
   i. Carrier Safety Management: Olivia Dobson (Sharon Newnam's)
   ii. Operator Health and Wellness: Pierre Thiffault/designee
   iii. Data: Andrew Miller
   iv. Technology: Abby Morgan

7. **Research Coordination/Needs Statements: Nicholas Kehoe**

8. **Liaison Lightning Round (new feature, top 3 topics for each—summaries available for interested parties)**
   i. FMCSA: Robert Kreeb
      1. Safety Data, crash analysis work – Large Truck Crash Causal Factors Study will be two or three times bigger than its predecessor.
      2. Refine effectiveness models – these models look at the effectiveness of roadside inspections and interventions.
      3. New Entrant Training Program – this was mandated by congress a number of years ago
      4. ADS deployment – FMCSA is concerned about the safety of Level 2 and 3 technologies.
      5. Level 8 inspections – electronic inspections. How can we use technology to increase the number of inspections? FMCSA is very excited about it.
      6. Truck Parking – where are the hot spots
      7. ADAS – FMCSA and NHTSA are trying to move forward on a joint rulemaking concerning AEB.
      8. Innovative technology deployment grants – about $60 million for states.

   ii. NHTSA: Alrik Svenson
      1. AEB NPRM/Final Rule – Agency is working through the comments fast and furiously.
      2. Developing a test surrogate vehicle. Develop a reusable target for testing

3. NHTSA Safety Research Portfolio Meeting – Planning for Fall 2024, including heavy vehicle ADAS, ADS, human factors, and cybersecurity research. These are online meetings. They get over 1,000 attendees. NHTSA goes more in depth about their research projects
4. Enhanced Safety of Vehicles (ESV) – Next meeting will be in 2026.

iii. NTSB: Rob Molloy

1. Two new members have been nominated to the board
2. NTSB Most Wanted List will end this year. It started in 1990. It's gotten so broad that it's no longer useful. It can be the most wanted when everything is on it.
3. Ongoing NTSB Highway Investigations
    a. Grade crossing safety
    b. Rest areas – people crashing into trucks near rest areas
    c. Electric transit buses – transit vehicle caught fire while parked, first responders had a lot of difficulty putting the fire out.
    d. Fatigue – issues with ELDs, people claiming they are working in teams but was really one person. But team driving in general.
    e. Teen drivers
4. Completed
    a. Fort Worth, TX (2/11/21) – people driving poorly in bad, icy conditions
    b. Phoenix, AZ (6/9/21) – truck ran in the back of 7 vehicles traveling at 62 mph. NTSB is targeting agricultural HOS exemption. DOT needs to monitor the safety of these carriers.
    c. Greenville, AL (6/19/21) – 4 vehicles run into the back of a que, including 2 passenger vehicles and 2 trucks.
    d. Monaville, TX (12/17/21) – school bus driver rolled video
    e. Clarendon Hills, IL (5/11/22) – Driver stalled the truck on railroad crossing. He didn't have a valid CDL.

iv. CVSA: Jake Elovirta

1. Annual report released today
2. Level 8 inspections
3. Enhanced inspections for autonomous trucks
4. Large Truck Crash Casual Factor Study – CVSA is doing training for post-crash investigations which will be helpful for FMCSA when they start gathering data
5. North America Fatigue Management Training Program
6. WIM webinar (all webinars are on CVSA website)
7. Subcommittee on human trafficking – received funding from FMCSA to produce training/awareness videos

v. NIOSH: Karl Sieber & David Fosbroke
vi. Teamsters: Enjoli DeGrasse
vii. ATA: Paul Ruiz
viii. OOIDA: Tom Weakley

1. Anything that impacts the truckers via FMCSA, NHTSA, etc.
2. Parking
3. WHD – how do they define what an independent contractor is
4. Broker fraud is growing
5. NAS Driver Compensation Study
6. Truck Lease Task force
7. Downcycle in freight market
8. Speed limiters

ix. ABA: Brandon Buchanan

9. Hot Topics (½ hour each including discussion)

- **Pavle Bujanovic** (FHWA) and **Osama A. Osman** (Leidos, Inc.)
  Cooperative Driving Automation: Facilitating Interaction of Emergency Vehicles with Heavy Trucks

AVs dealing with first responders. CARMA is a joint effort of FHWA, the FMCSA, Maritime Administration, and ITS. AVs can present an obstacle to emergency vehicles along their route. There is already an issue with fatalities involving emergency vehicles after they start transporting. They showed the cases they tried to demonstrate and showed a video of one such case.

A couple questions followed concerning tire wear and also why did the CMV slow down. The Volpe Center in Boston did the testing for them, and they designed the truck to slow down. There was another question about specific use cases. Did they do a use case of an actual traffic stop? Did they have a police officer on the side of the road with their lights on and have the truck move over to the center lane? The answer is no.

- **Alexander Epstein and Peter Goldwasser**
  Working with Fleets on a Safe System Approach for Addressing Large Vehicle Blind Zones

10. Round Robin (all)

11. Additional Business and Announcements

12. Adjourn

Attendance

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Bob Scopatz	VHB	bscopatz@vhb.com
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Ryan Pietzsch	National Safety Council	Ryan.pietzsch@nsc.org
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Andrew King		
Xuesong Wang		
Dr. Cafiso		
Jerry Krueger		

Subcommittee Meeting Reports

(1) Carrier Safety Management Subcommittee, ACS60

Tuesday, January 9, 2024 | 3:45 PM- 5:30PM
Olivia Dobson, presiding

Meeting Minutes

1) Welcome and introductions

Attendees –

Bob Scopatz	bscopatz@vhb.com
Olivia Dobson	Olivia.dobson@qut.edu.au
Hillel Bar-Gera	Hillelb@rsa.org.il
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2) Update since the 2023 TRB meeting

- Jude Charlton provided an update on the Construction Logistics and Community Safety – Australia (CLOCS-A) project
    - The standard (https://clocs-a.org.au/wp-content/uploads/2023/06/CLOCS-A-Standard-v1-2.pdf) has been finalised, including a tiered approach to accreditation (Bronze, Silver, or Gold)
    - The project has evolved beyond the initial CLOCS model developed in the UK, adapted to specifically suit the Australian road environment and operators
    - The project has launched the awareness-raising Ride Along event, allowing the public (as well as stakeholders from government) to see the road from the perspective of a truck driver
    - The Chartered Institute of Logistics and Transport (who contributed to the development of CLOCS-A) has been awarded as the host of the program, and will be in charge of the long-term governance and sustainability of the program

- More information on CLOCS-A (including audit and accreditation procedure and supporting materials) can be found at www.clocs-a.org.au

3) Presentations
   a. *Evaluation of the National Road Safety Partnership Program*
      i. Olivia Dobson, Research Assistant, Queensland University of Technology (olivia.dobson@qut.edu.au)
      ii. The National Road Safety Partnership Program (NRSPP) was created to bring together businesses, researchers, and government in a collaborative network and support organisations to improve road safety.
      iii. Olivia summarised findings from a program evaluation completed by the Monash University Accident Research Centre, measuring the program's activities, outputs and impact.
      iv. The evaluation identified evidence that the NRSPP has increased its engagement in activities including knowledge production, advancement, and dissemination since its inception in 2013.
      v. Findings support the program's influence on key decision-makers, including government, external stakeholders, the research sector, and workplace organisations, as evidenced by reference to the NRSPP in policy papers, scientific reports, and stakeholder materials.
      vi. Survey results additionally demonstrate the program's positive contribution to workplace health and safety outcomes (e.g. employee safety knowledge and workplace safety culture), and highlight areas of improvement to inform the future strategic directions of the program.
      vii. Learn more about the NRSPP at: https://www.nrspp.org.au/
      viii. The full evaluation report can be accessed online at: https://www.nrspp.org.au/resources/nrspp-evaluation-report/
   b. *AI-based video analytics to understand safety issues associated with Heavy Vehicles at urban intersections*
      i. Professor Shimul Haque, Professor of Transportation Engineering, Queensland University of Technology (m1.haque@qut.edu.au)
      ii. Heavy vehicles such as trucks and buses can significantly impact overall traffic movements, particularly in urban environments. They also pose a significant risk to vulnerable road users (VRUs), such as pedestrians and bicyclists, due to large blind spots, poor visibility, longer turning manoeuvres, and wider turning radii.
      iii. The conventional safety assessments based on historical crash records are reactive, based on limited information and often rely on engineering judgment instead of evidence-based support.
      iv. A new project, led by Prof Shimul Haque, Prof Sharon Newnam and Jerome Carslake, aims to utilise Artificial Intelligence (AI)-based video analytics and traffic conflict-based safety assessment for measuring the crash risks associated with heavy vehicles at urban intersections.

v. Shimul highlighted the previous applications of AI-based video analytics on road safety, and discussed the aim and objectives of the new upcoming project on heavy vehicle safety (risk management framework).

4) Open discussion on research needs and next steps
   a. Kelly Stowe: Need for further quantitative analysis of safety culture growth over time (longitudinally) to measure the effects of strategies and interventions (e.g., training, enforcement)
      i. Kelly noted the example of the Short Line Safety Institute's work in collecting data in the rail industry. It would be useful to apply a validated methodology for collecting data on safety culture in the Truck industry
      ii. Jude Charlton noted that the Global Road Safety Partnership may have previously done work on this research priority, and will raise this at the next meeting with the GRSP.
   b. Bob Kreeb: Need for further automated driving systems to provide rigour to quality control/training/inspections
      i. Bob noted the work in Safety Management Systems present in the Aerospace industry (e.g., NASA) to ensure that incidents are investigated and appropriate follow-up is completed, tracked and documented
      ii. Olivia Dobson shared the work of Professor Sharon Newnam in creating a Systems Thinking Incident Review (STIR) app
         - STIR is a digital toolkit for investigating injuries in the workplace using a systems-thinking approach. It consists of targeted prompts and questions to assist practitioners in identifying the factors contributing to an injury across all levels of the systems, not only factors focused on the errors of frontline staff or equipment failure.
         - The App also guides practitioners in generating actions that have the capability to create systemic change, providing a standardised and accessible method for investigating injuries and generating actions to prevent future injuries.
   c. Hillel Bar-Gera has requested any guidance (e.g., materials) to assist in a study of vehicle safety in Israel
      i. Hillel is particularly interested in learning more about the ISO 39001 road traffic safety management standard and compliance with this standard or any equivalent standards in the USA, Australia or elsewhere).

(3) Truck and Bus Operator Health and Wellness Subcommittee, ACS60

Tuesday, January 9, 2024 | 8:00 AM- 9:45 AM

Pierre Thiffault, presiding

The meeting was held on Tuesday January 9th, 08:00 to 09:45, with an attendance of 24 participants.

Although the meeting went smoothly, with a total of 5 presentations, we created a situation where we were pressed for time all the way through the discussion.

It is my option, that given the relevance of the topics and the efforts invested by the authors, they could have benefited from having more time, and a more relaxed state of mind. I therefore believe that the meeting for next year should include 3 or 4 presentations maximum.

The agenda was as follow:

08:00 – 08:15 **Welcome and Introductions**

08:15 – 08:35 **Culture Reform and Dignity: The Path to Safety and Wellbeing**

Ed Watt (MSLIR)

Principal, WattADR

Ed presented an interesting discussion of organizational culture, and how toxic workplaces, where employee dignity is not respected, have significant negative impacts on employee's mental health, wellness and productivity. These notions were applied to the context of transit operations.

08:35– 08:55 **A Catalog of Health and Wellness Programs for Commercial Drivers**

Dr. Erin Mabry (Matt Camdem)
Sr. Research associate
Virginia Tech Transportation Institute

Matt presented on behalf of Erin, who attended the meeting virtually. The presentation was focused on a project that was conducted by VTTI and supported with FMCSA funds. The team conducted a large survey of motor carriers to set up a catalogue of existing H&W programs with a focus on efficiency evaluation. The report identifies successful programs, key strategies and common obstacles and challenges.

08:55 – 09:15 **Past and Future Research to Reduce Vehicle Operator Whole Body Vibration Exposures**

Peter Johnson, Ph.D.
CEO Suspension Systems Technologies

Peter explained the notion of Whole Body Vibrations (WBV) and how it impacts drivers' health and can contribute to fatigue and attention lapses. He provided a detailed description of how heavy vehicle seats can contribute to or mitigate the problem. Comparisons were made between four products, including one that his team has developed.

09:15 – 09:30 **Recent advances with wearables for driver health monitoring**

Abhijit Sarkar, Ph.D.
Sr. Research associate

Virginia Tech Transportation Institute

Abhijit spoke about the use of wearable technology in live motor carrier operations. He described advancements that were made in the past decade and how products available today can provide a vast array of physiological assessments that have the potential to be useful in operations, including stress, fatigue workload, etc. He also provided results of a pilot study that was recently conducted on a sample of 10 drivers to demonstrate how wearables can be included in live operations.

09:30-09:45 NIOSH update

Karl Sieber, NIOSH

Karl provided a very interesting presentation on a project that was recently conducted by NIOSH. The project consisted of a survey of 95 motor carrier representatives and provided an extensive list of topics that deserve further attention within the broad context of operator health and wellness.

Open Mike

We did not have time to identify Research Need Statements, although I suggest that the report from NIOSH's project can serve as a comprehensive and systematic list of potential research areas.

Attendance:

Name	Organization	Email
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David Fosbroke	NIOSH	Def2@cdc.gov
Ed Watt	WattADR	Ed@WattADR.com
Pete Johnson	University of Washington	
Erin Mabry	FMC	

Daren Hansen		
Carla Anderson	Ks DOT	Carla.anderson@ks.gov

(4) Truck and Bus Data Subcommittee, ACS60

Tuesday, January 12, 2021 | 10:00 AM- 11:30 AM

Andrew Miller, Virginia Polytechnic Institute and State University

3:45 – 3:55 pm **Welcome and Introductions**

3:55 – 4:20 pm **Truck Parking Overview, Tools, and Needs**

Jack Kong
Assistant Research Scientist
Texas A&M Transportation Institute

4:20 – 4:45 pm **ADS For Rural America**

Omar Ahmad
Deputy Director of Driving Safety Research Institute
The University of Iowa

4:45 – 5:05 **Transit Workforce Data Dashboard Overview and Discussion**

Shayna Gleason
Research Associate
International Transportation Learning Center

5:05 – 5:20 **FMCSA Advanced Analytics Division Update**

Jenny Guarino
Statistician
FMCSA Advanced Analytics Division

5:20 – 5:30 **Other discussion/research ideas**

Open Mic

Closing

Stand-in **FMCSA Data Repository for Naturalistic Data**

Zeb Bowden
Director of Technology Development & Deployment
Virginia Tech Transportation Institute

The theme for our data subcommittee meeting was to explore new data sets, discuss industry or regulatory needs from a data perspective, or just generally talk about data enrichment.

First, Jack Kong from Texas A&M Transportation Institute TTI presented on a macro/micro TXDOT tableau-style visualization tool, particularly on parking demand, with the ability to query more minute collected data. There was also a brief discussion on data accessibility, data integrity, and data product transparency related to truck parking, as well as current technologies to assess available parking. I will be providing the link for the tool along with the slides and notes.

Afterwards, Omar Ahmad from The University of Iowa presented on Iowa's ADS for Rural America Project, a grant provided under the US DOT Demonstration Program through the Federal Transit Administration. He described naturalistic data collection occurring on a circuit of rural Iowa roadways with a paratransit bus. Altogether there are 80 trips in autonomous mode across 6 different collection phases, with camera, lidar, and other sensor information available. Also, biometrics were collected from both passengers and a safety driver. The data portal, webinars, dictionaries, and other information I'll be able to disseminate as well.

Our third presentation was on a transit workforce data dashboard by Shayna Gleason and co-authors Douglas Nevins and Michaela Boneva from the Transit Workforce Center's International Transportation Learning Center. They walked through another visualization tool of Transit workforce data from both the Bureau of Labor Statistics as well as the FTA's National Transit Database. They walked through some key uses of the visualization tool as well as certain limitations from the datasets. As with the others, I'll provide slides and links for this tool.

Last we had Jenny Guarino from FMCSA's new Crash Data Analytics team present on updates to the Crash Causal Factors Program area, highlighting Data mapping in 2024 and a phased collection starting in 2026. The first phase will consist of Class 8, second phase is class 3 through 6, and the last phase on Buses. Through the project, they've mapped each state or local police crash report to determine which states align with MMUCC and which states go beyond the minimum criteria to maximize crash reconstruction capabilities. Jenny also provided an update on the picture of crashes and the included databases and data streams. Last, Olu Ajayi from FMCSA's Analysis division provided an update on the State Safety Data Quality measures, as well as an update on the A&I tools to mine registration data. Following that he provided an update on some safety analysis effort to better track carriers with exemptions to hours of service in order to compare to similarly operating carriers without these exemptions.

We have a few initiatives started to add some Research Needs Statements and other topics that have come up intra-committee so I'm happy to facilitate some of these relationships in order to create new Statements.

Attendance

NAME	WHERE FROM	EMAIL
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(6) Truck and Bus Technology Subcommittee, ACS60 (6)

Tuesday, January 12, 2021 | 12:00 PM- 1:30 PM
Abby Morgan, Kittelson & Associates, Inc. (KAI), presiding

Agenda

- Introductions
- Presentations
  - FMCSA's Advanced Technology Division Updates
    - Jeff Loftus, Federal Motor Carrier Safety Administration (FMCSA)
  - Real-World Experience with Electronic Stability Control (ESC) on Truck Tractors
    - Fred Andersky & Randy Salvatora, Bendix
    - Tom Weakley, Owner-Operator Independent Drivers Association (OOIDA)
- Brainstorming new technology research needs
- Closing

Notes:

Real-World Experience with Electronic Stability Control (ESC) on Truck Tractors
Fred Andersky & Randy Salvatora, Bendix

- Crash data shows a decrease in rollover crashes likely due to ca combination of technology availability, Federal mandate, and drivers understanding the technology due to driver training.

- Electronic Stability Control (ESC) systems build on antilock brake systems (ABS). ESC understands the driver's intent and what the vehicle is doing. Drivers can overdrive an ESC system (e.g., driving too fast for a curve, following too close, ignoring maintenance warning lights). No stability control system can address rollovers due to trucks traveling too close to soft shoulders.
- Maintenance is important. If ESC is out, you still have ABS and foundation braking. If ABS is out, you lose ESC too. Maintenance of wheel ends and tires is important for ABS and ESC.
- Brake systems are evolving. Electronic Brake Systems (EBS) are the future.
- Bendix is working on **Smart Trailers (Trailer EBS + connectivity)**

FMCSA's Advanced Technology Division Updates
Jeff Loftus, Federal Motor Carrier Safety Administration (FMCSA)

- Office is managing research on advanced driver assistance systems (ADAS), automated driving systems (ADS), roadside safety enforcement, and the Innovative Technology Deployment Grant Program.
- Presented summaries of research projects on ADAS, ADS, and Roadside Safety Enforcement Technology.
- Innovative Technology Deployment (ITD) Grant Program funds innovative safety solutions.

Real-World Experience with Electronic Stability Control (ESC) on Truck Tractors
Tom Weakley, Owner-Operator Independent Drivers Association (OOIDA)

- Messaging is important to explain the need for ADAS systems to experienced drivers. OOIDA has many multi-million mile crash-free drivers who have safely operated their trucks without advanced safety systems, like ESC or AEB. Telling them they need these systems because they are unsafe is not well received.
- Collaborate with drivers to develop training and messaging that answers their questions:
    - Why do I need the system?
    - What will it cost me?
    - Can I service it myself?

Technology Research Needs Discussed in 2024 Subcommittee Meeting:

- **Crashworthiness technologies**
- **Real-time truck parking & monitoring technologies**
    - If trucks are poorly parked, the physical number of available parking spaces may be less than the count. (FMCSA and FHWA may have grant money for this research.)
    - Need to study Electronic Logging Devices (ELDs) and truck parking availability.
    - Need to make truck parking availability data accurate so drivers can rely on it to meet ELD or Hours of Service requirements.
    - Develop performance metrics of data quality for truck parking information, develop standard APIs (similar to work zone data exchange, WZDx). Maybe the ACS60 Technology Subcommittee and Data Subcommittee can collaborate on this?
- **New data** to study: FMCSA's Large Truck Crash Causation Factors Program (LTCCFP) – crash data that includes different advanced safety technologies like electronic stability control (ESC) and automatic emergency braking (AEB).

- **ADAS False Positives / False Activations** – How prevalent are they? When do they happen?
- **Vulnerable Road User (VRU)** safety needs related to truck size and weight, Safe Streets for All (grant programs), and heavy vehicle conspicuity.

Technology Research Needs Previously Identified in 2023 Subcommittee Meeting:

- **Connecting electronic logging device (ELD) data with state DOT truck parking availability data**. Identify ways to link state DOT real-time data on truck parking availability at rest stops with ELD data to alert drivers about parking availability related to their remaining hours of service. Mandatory hours of service (HOS) requirements specify how long commercial drivers can work before taking rest breaks. Truck parking availability is an issue for the safety of drivers and the motoring public. Many states are starting to collect real-time truck parking occupancy data at public rest areas. This information is typically shared with drivers using dynamic message signs in advance of the rest areas. Connecting parking data with ELD data could help drivers learn of overcapacity issues at their estimated rest area. For example, if one hour of driving remains, and parking at a rest area 60 miles down road is full, drivers could make the informed decision to stop at a closer rest area to ensure they find a safe place to park for a mandatory rest break. What are the opportunities and challenges for also connecting private parking facility data where available?
- **Trip-Level Safety Data**. As we study truck safety, consider understanding the influence of hours into a trip (or into total hours of service for a shift), rather than studying averages over total miles traveled. Many factors influence safety that might not be constant over all miles or throughout a shift.
- **Driver Education on Levels of Automation for Commercial Driver License (CDL) Training**. Develop a training program to teach drivers the capabilities and limitations of each Level of Automation or of specific advanced driver assistance systems (ADAS).
- **Smart Trucks and Dumb Trailers: Understanding the safety of automated tractors and low-tech trailer combination units**. As advanced driver assistance systems and automated driving systems enter the market through new truck tractors, how do these systems perform in the real-world when pulling trailers that do not have new sensor and communication technologies?
- **Safe Transitions Between ADS and Human Driving Responsibility for Level 3 Automation**. How do you safely reengage a driver in a SAE Level 3 vehicle? Overcoming driver distraction or fatigue from inattentiveness.

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