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Traffic Safety Research Program

Commercial Vehicle Safety Research Summit

Best Practices for Advancing Safety Through Partnerships with Universities

2016

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COMMERCIAL VEHICLE SAFETY RESEARCH SUMMIT: BEST PRACTICES FOR ADVANCING SAFETY THROUGH PARTNERSHIPS WITH UNIVERSITIES

Summary Report

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EXECUTIVE SUMMARY

SUMMIT OVERVIEW

The *2016 Commercial Vehicle Safety Research Summit: Best Practices for Advancing Safety through Partnerships with Universities* (referred to hereafter as CV Summit), was conceived and implemented to promote partnerships between universities, law enforcement, and drivers licensing agencies. With the goal of promoting the sharing of best practices across these disciplines, in order to improve commercial motor vehicle (CMV) and commercial driver's license (CDL) enforcement and licensing compliance in the Eastern Service Center (ESC) area, the CV Summit drew more than 130 attendees representing all 16 ESC states as well as a variety of other agencies and organizations. The University of Massachusetts Traffic Safety Research Program (UMassSafe) received a grant from the Federal Motor Carrier Safety Administration (FMCSA), in part, to plan, pilot, and host the CV Summit.

FMCSA Deputy Administrator and Summit Keynote Speaker, Daphne Jefferson summed up the purpose of the CV Summit, as she addressed the full group in the first session. She said, "For us at FMCSA, safety is our middle name. It's in our DNA. It's at the forefront of what we do. As we automate, as we innovate, we have to think in terms of safety, and what that will mean for the future… The work you do over the next couple of days will help us inform how we move forward on the safety mission. And we always have to keep that in mind, because ultimately, that's why we're here."

Taking this message one-step further, Anne Ferro, a Keynote Speaker and President/CEO of the American Association of Motor Vehicle Administrators (AAMVA) stated, "…We're all under constrained resources. We're all under constrained time. We can't implement all of these tactics and all of these tools and all of these topics at one time. So that's why this collaborative piece, of bringing everybody's interests together, and making sure we're using the tools available, is so important."

The CV Summit was considered the first step in what will likely become a larger movement toward the promotion of partnerships between a wide variety of transportation safety stakeholders. During the CV Summit, participants came together as a team to share best practices across disciplines, compare successes and challenges, and to plan next steps to promote and expand partnerships. Today, a variety of emerging trends and issues exist that are brand new to the field of transportation safety. Gathering as a group, participants of the CV Summit sought to gain a more comprehensive understanding of these trends, looking at each from a variety of different angles and through the unique lens of different agencies and organizations.

The Transportation Safety Problem

In the U.S. in 2015, there was an increase in fatalities involving large trucks and buses, with over 4,600 people dying in these crashes. In the ESC area alone, fatal crashes involving large trucks cost $6.6 billion annually. In the next 20 years, freight will increase by an estimated 43%, which could mean gridlock for the country. As transportation safety stakeholders come up with strategies for lowering the incidence of crashes involving large trucks and buses, innovation is key. With a variety of emerging issues and problems that did not exist before the technological era, stakeholders need new ideas and programs to move forward.

Another emerging issue in transportation is the age of truck and bus drivers as a whole. The average age of a bus driver is over 60, while the average age of a truck driver is over 50. This statistic points to the issue of an aging driving population, with a lack of younger drivers to take over as they retire. Other issues include distracted driving, the introduction of autonomous vehicles, homeland security (large trucks used for terrorism), and the need for more comprehensive data sharing.

PROPOSED SOLUTION/NEXT STEPS

To address the problems stated above, CV Summit participants proposed the following:

1. *Engage in partnerships with universities and transportation stakeholders statewide.* More than 65% of CV Summit attendees engage in university/state government partnerships. Of these attendees, 74% want to expand the partnerships. Of the 35% of attendees that do not currently have a partnership of this kind, 95% want to develop one in the future. These partnerships are gaining popularity, and provide a unique perspective for all involved. One insight from the CV Summit is that stakeholders will have to collaborate in order to move forward and continue to make progress on the emerging issues in commercial vehicle safety. Speakers and participants suggest that for projects and programs to be successful, there must be collaboration and communication between state agencies, academia, and the private sector. Each group provides something unique to the others, and working together leads to greater progress. While collaboration in general is important, one specific task is to create a best practices document that provides detail around the utilization of universities for Commercial Vehicle Safety Plan (CVSP) development and accessing funding for projects and programs.

2. *Expand/replicate the CV Summit pilot nationally.* One message solidified at the CV Summit is that if one transportation agency has a problem, another from across the country has already solved it. While this CV Summit is a pilot for the ESC area, implementing the template on a larger scale is important. The first expansion could be to other service areas, with a goal of expanding to the entire country. A main goal of the CV Summit is to bring a variety of voices and stakeholders to the table, to share and implement best practices in a cohesive way. The more voices at the table, the better and more concise the strategies.

3. *Data sharing.* FMCSA Deputy Administrator and Summit keynote speaker, Daphne Jefferson asked, “How do we take millions of terabytes of data, turn it into information, and then turn it into action?” According to CV Summit speakers and attendees, the key to turning data into actionable information is to share resources, communicate across disciplines and across states, and to include close partnerships and agreements with universities, who have the ability to provide the integral analysis piece. In addition, attendees should work to create an inventory of data tools, including best practices for data analysis.

4. *Create clear messaging, deliver to a diverse audience.* In a world with constantly evolving media platforms, there are more options for delivering transportation safety messages than ever before. The opinion of many speakers and participants was that for each campaign, you need a variety of messages, delivered across several platforms (social media and traditional print, television, and radio). Safety stakeholders should segment messaging to speak to a variety of ages, demographics, and levels of technologically savvy.

5. *Workforce development.* As drivers of trucks and buses age, and begin to retire, it is critical that a new wave of young drivers enter the workforce. With young people eschewing cars for a more urban lifestyle, and with the rise of autonomous vehicles, it is necessary to revamp strategies for maintaining and growing the CMV driver and maintenance workforce. Participants of the CV Summit suggest partnering with local high schools, vocational or trade schools, and universities to create curricula for courses in CMV maintenance and operations. Looking at the timeline for autonomous vehicles entering as major players in the trucking industry, it is clear that we need a push in training and education around new policies, procedures and regulations. Things are going to change quickly, and we need to be ready.

6. *Create a Statewide Safety Inventory.* It is critical that states take inventory of existing safety programs, and aim to understand the interests, motivation, and expertise involved with every resource. This type of inventory will help states to understand how best to align efforts and meet future challenges, without repeating work or reinventing the wheel. Aim to understand who (which programs, and which people) are best positioned to solve the emerging issues; including autonomous vehicles, legalization of marijuana, legacy data systems, etc. If those people/programs are not sitting at the table, invite them to contribute.

CREATION OF THE ESC CMV/CDL SAFETY TECHNICAL ASSISTANCE CENTER (TAC)

As a follow up to the CV Summit, UMassSafe will develop and implement the ESC Region CMV/CDL Safety and Compliance Technical Assistance Center (TAC). Through the TAC, UMassSafe will provide one-on-one technical assistance for law enforcement and licensing agencies, as well as universities, in the development and/or expansion of partnerships, development of programs, and replication of existing programs. Building on the momentum of the CV Summit, the TAC will act as a resource and information center, increasing each stakeholder's network of support, and providing an avenue of communication regarding best practices in CDL and CMV safety and compliance.

Stakeholders will be able to study the safety countermeasures that have proven effective in other states and municipalities, along with detail regarding successes and challenges other organizations have experienced. Additionally, the TAC will provide safety-planning resources covering a variety of topics as well as offer resources on effective CMV/CDL enforcement; including topics such as improving data quality, using data to guide programming, and guiding local law enforcement to conduct traditional traffic stops with large trucks and buses.

Case studies and syntheses of reports will be available, detailing the processes of proven countermeasures and other relevant programming. Various communication platforms will be created to assist states in programming discussions. Finally, UMassSafe will expand the CV Summit website in order to distribute the presentations and findings, and to create a means of continuing the dialogue post-Summit.

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INTRODUCTION

The 2016 Commercial Vehicle Safety Research Summit: Best Practices for Advancing Safety through Partnerships with Universities (referred to hereafter as CV Summit), promotes partnerships between universities, law enforcement and drivers licensing agencies. In addition, the CV Summit promotes the sharing of best practices across these disciplines, in order to improve commercial motor vehicle (CMV) and commercial driver's license (CDL) enforcement and licensing compliance in the Eastern Service Center (ESC) area. The University of Massachusetts Traffic Safety Research Program (UMassSafe) received a grant from the Federal Motor Carrier Safety Administration (FMCSA), in part, to plan, pilot, and host the CV Summit. The CV Summit is considered the first step in what will likely become a larger movement toward the promotion of partnerships between a wide variety of safety stakeholders.

During the CV Summit, organizers and speakers asked participants to share best practices across disciplines, compare successes and challenges, and to plan next steps to promote and expand partnerships. Today, there exist a variety of emerging trends and issues, brand new to the field of transportation safety. Gathering as a group, participants of the CV Summit gained a more comprehensive understanding of these trends, looking at each from a variety of different angles and through the unique lens of different agencies and organizations.

Unlike many conferences that seek simply to inform, this CV Summit was a call to action, addressing a variety of issues surrounding CMV/CDL crash prevention; including driver distraction, autonomous vehicles, homeland security, and workforce development. Participants shared ideas, solutions, research opportunities, and lessons learned regarding their experience working across disciplines or in partnerships with universities. The objective of the call to action is to put ideas into motion, taking the thoughts of the collective and turning them into actionable tasks to take home. The hope is that the CV Summit will provide a platform for alliances and partnerships between universities and state agencies/organizations.

PANEL AND WORKSHOP SESSIONS

The following is an overview of the discussion from each panel and workshop, with a short introduction to each speaker, and a brief summary of his or her comments.

Plenary Panel: Emerging Trends, Issues, and Challenges in CMV Safety

SPEAKERS

Captain Darrin Grondel, Washington Traffic Safety Commission and Washington State Patrol
Decriminalization of Marijuana and Potential Impact on CMV Drivers

James Hisgen, Federal Bureau of Investigation
Homeland Security, Drugs and Trafficking: Mitigating the Risks of Large Truck Operations

Rebecca Brewster, American Transportation Research Institute (ATRI)
Critical Issues in the Trucking Industry

Chris Gerdes, USDOT and Stanford University
Autonomous Vehicles

PANEL OVERVIEW

The overall goal of this panel was to set the stage for a conversation regarding emerging trends, issues, and challenges facing law enforcement and drivers licensing agencies in the modern time. Dr. Mike Knodler, director of the UMass Transportation Center and UMassSafe, provided opening comments, and put forth the following question to attendees: 'Where do we want to be in 30 years'?

The speakers in this panel provided their own take on the answer to this question, and sparked the curiosity and thoughtfulness of attendees by opening the conference with this broad, yet integral brainstorming topic. While many things in transportation safety stay the same, we are in a particularly dynamic time in history, and are faced with a landscape that changes seemingly daily. The speakers in this panel aimed to provide insight, not only regarding their ideas and possible solutions, but also around the remaining questions and gaps in current research.

DECRIMINALIZATION OF MARIJUANA AND POTENTIAL IMPACT ON CMV DRIVERS

In *Decriminalization of Marijuana and Potential Impact on CMV Drivers*, Grondel provided context around the issue of legalizing marijuana, particularly from the point of view of law enforcement. As marijuana becomes legal for recreational use across the country, transportation safety stakeholders grapple with the realities and challenges inherent in the new legislation. Currently, the possession and use laws in the U.S. are described as a patchwork, as their look and structure remain very different, depending on the state. What's more, the strength of marijuana has changed dramatically over the last several decades. While most governmental studies involving marijuana involve THC levels of 3-6%, the substances now showing up in a variety of forms (flower, edibles, vaping) have THC levels closer to 30-40% and oils reaching upwards of 92% THC. While many issues around legalization of marijuana remain unclear, what we do know is that incidences of drugged driving are going up, and must be mitigated.

Emerging Issues

The overarching issue around legalization of marijuana remains the existing knowledge gap around the effects of cannabis (and other drugs) on driving. One reason for this gap is a lack of data around drugged driving; including crash and inspection data, and information about the types of drugs used, and in which combinations.

Another major issue is public indifference. Drivers tend to see drunk driving as clearly dangerous and socially unacceptable, but do not feel strongly one way or the other about drugged driving. Many people do not know the level at which drugs impair them, and have not been educated about the dangers of driving while taking something as benign-seeming as cough medicine. The Pacific Institute for Research and Evaluation conducted the Pire Roadside Survey in 2014 and 2015, where they surveyed 926 drivers in five counties. Of drivers who said they had used marijuana within two hours of driving, 67% said that it made no difference in their driving. Knowing what we do about the effects of THC on the brain, it seems unlikely that drivers would be unaffected.

What remains clear is that drugged driving is much more complicated than drunk driving, and that these types of crashes are on an upward trend. Less clear are the details around how drivers are affected, how long those effects last, and how police will know a drugged driver when they see one. This complexity also creates a concern for CMV safety managers who are only required to attend a combined 120

minutes of identifying impairment of alcohol and controlled substance training in accordance with 49 CFR 382.60. This is a singular event with no requirement for refresher training.

Current Research/Actions

Effects of THC on the Brain/Body

There is a lot of existing research regarding the effects of THC on the brain including evidence that THC binds with receptors in the brain and other parts of the body, affecting short-term memory, coordination, and unconscious muscle movement. We know that marijuana is lipid (fat) soluble, and is therefore stored in the brain, as opposed to the blood, in the case of water-soluble alcohol.

Grant Program for Drugged Driver Training

Responsibility.org, in partnership with the Governors Highway Safety Association (GHSA) is awarding grants for drugged-driver training. In 2016, four states were awarded grants, which will certify 70 Drug Recognition Expert (DRE) officers and 450 Advanced Roadside Impaired Driving Enforcement (ARIDE) officers. The grant program will continue in 2017, with the call for proposals going out in November of 2016 and the awards announced in April of 2017.

Remaining Questions/Needs for the Future

While the effects of alcohol and intoxication on driving behavior are well documented, very little is known about the ways in which marijuana (and other drugs) affect drivers. This is an incredibly important distinction, and a topic that will require time, research, and education for drivers, law enforcement officials, and the judiciary. According to Grondel, it is important to find out which products create which effects, how long the drugs stay in a user's system, how impairment from drugs presents, the synergistic effects of mixing drugs, the signs and symptom of drug impairment, etc. Another question is around the testing of drivers on the road, how officers can quickly and effectively test for impairment, the penalty for driving while drugged, and how the laws will be enforced.

While there is a large pool of research around the effects of marijuana on the body and brain, as previously mentioned, the amount of THC generally tested in federally funded projects is very low in comparison to the amount of THC found in modern marijuana products, creating a gap in usable research and data for the issue at hand today.

With regards to drugged driving-related CMV crashes, there is a lack of data. One of the reasons for this is that roadside DRE valuations for CMVs are very low. From 2013-2015, there were only 410 DRE Evaluations for CMVs, compared to 45,965 for passenger vehicles in the same period.

HOMELAND SECURITY, DRUGS AND TRAFFICKING: MITIGATING THE RISKS OF LARGE TRUCK OPERATIONS

In *Homeland Security, Drugs and Trafficking: Mitigating the Risks of Large Truck Operations*, Hisgen discussed the role of relationships and communication between the various transportation safety stakeholder groups, including the FBI. Following the terrorist attacks on September 11th, 2001, domestic terrorism moved to the forefront of national security conversations in the U.S. Large trucks were part of this conversation due to their access to areas of interstate commerce, ability to transport significant

amounts of high explosive materials through tunnels and over bridges, and lack of security checks prior to shipment.

Emerging Issues

While the terrorism threat related to the trucking industry is not a new topic, it remains a major issue, as many of the concerns that began over a decade ago, still exist. In July of 2016, in Nice, France, a 19-ton delivery truck was used as a weapon to kill 87 people and injure 434, once again showing transportation safety stakeholders that this is a grave issue to be solved.

Current Research/Actions

One way that the FBI is aiming to improve communication between states and between agencies is with Fusion Centers. Fusion Centers are run by states and have a focus on terrorism as well as criminal and public safety matters. The Commonwealth of Massachusetts Fusion Center collects and analyzes information from all available sources to produce and disseminate actionable intelligence to stakeholders for strategic and tactical decision-making, in order to disrupt domestic and international terrorism. What's more, Fusion Centers act as a central repository for data, and provide "intelligence products," such as trends, upcoming threats, and bulletins. State Police can report a suspicion to the Fusion Center, which helps the FBI to grow their database of information, identify trends, and provides a secure means for communication between agencies.

Remaining Questions/Needs for the Future

This presentation, and the discussion that followed, emphasized the need for more communication between agencies. As Hisgen said, "The FBI can't be everywhere," meaning that we need better strategies for gaining intelligence, and then communicating to the police who are engaging with the trucks and buses on the ground. To acquire this intelligence, and to improve communication, Hisgen spoke of the need for interagency collaboration in the form of task forces, Fusion Centers, and working groups. He also suggested that better dissemination of intelligence products and data; such as trends, upcoming threats, and bulletins, will be critical moving forward.

CRITICAL ISSUES IN THE TRUCKING INDUSTRY

In *Critical Issues in the Trucking Industry,* Brewster presented the top issues in the trucking industry, as gleaned from the 2016 American Transportation Research Institute (ATRI) study. While some issues have entered the fold in recent years, many are longstanding issues for both commercial vehicle drivers and carriers.

Emerging Issues

According to the 2016 ATRI research report, entitled "Critical issues in the Trucking Industry – 2016," the top 10 issues for carriers and drivers included:

1. Electronic Logging Device (ELD) Mandate
2. Hours-of-Service
3. Cumulative Economic Impact of Trucking Regulations
4. Truck Parking
5. Economy
6. Compliance, Safety, Accountability (CSA)
7. Driver Shortage

8. Driver Retention
9. Transportation Infrastructure/ Congestion/ Funding
10. Driver Distraction

For commercial drivers, the ELD mandate was the number one issue. For motor carrier executives, the driver shortage was first on the list, with the ELD mandate coming in second.

Current Research/Actions

In response to these ongoing issues, and in an effort to move toward solutions for both carriers and drivers, ATRI has conducted research in the following areas.

On the Hours of Service changes requiring a 34-hour restart period, ATRI utilized driver and carrier surveys, along with logbook diaries to conduct a study quantifying the potential impacts of these changes. Once the law was in effect, ATRI followed up with a "post rules implementation data collection," looking at the impacts on safety and operations. In response to the driver parking issue, ATRI launched a program that looks at truck parking diaries of volunteer CMV drivers. The diaries include their location, how long it took them to find a spot, the number of non-CMVs that were in spots, and the productivity lost. ATRI has also conducted crash accountability research, looking at 15 different carriers over five different crash types. They have also looked at the driver shortage by assessing the age demographics of drivers over two decades. This research, released in December of 2014, examined demographic trends in the driver workforce and calls out implications for the future.

Congestion Impact Analysis of Freight-Significant Highway Locations is a study that includes ongoing monitoring of 250 truck freight-significant locations. *Cost of Congestion to the Trucking Industry* is a report on the congestion on U.S. highways, which cost the trucking industry $49.6 billion in 2014. Lost productivity amounted to 728 million hours, which equates to 264,500 commercial drivers sitting idle for an entire year.

Remaining Questions/Needs for the Future

According to Brewster, there is a need for more and better data on the implications of electronic logging. How is ELD affecting driver productivity? Are carriers (predominantly small businesses) able to produce the funds necessary for implementing these changes? There is also a need for industry wide standards for how the information gathered using the ELD would be used. As many speakers relayed, workforce development is a major focus of future transportation planning. With the expected increase in freight movement over the next several years, young people are needed in the field, working as drivers as well as diesel technicians. One suggestion for increasing interest in these jobs is for motor carrier members to partner with local high schools, introducing a career in transportation.

AUTONOMOUS VEHICLES

In *Autonomous Vehicles***,** Gerdes discussed the potential impact of autonomous vehicles on a variety of transportation safety issues. Automation will have a potentially transformative impact across all transportation modes, increasing productivity, improving safety, and enhancing the capacity of existing infrastructure. It may also have a profound impact on the transportation workforce, changing the skills required to manage, operate, and maintain transportation vehicles and systems.

Automation is seen by many as a tool for solving transportation issues. By potentially reducing and mitigating crashes, safety on the roadways could improve. By providing more options for an aging population and enhancing the flow of traffic, accessibility and mobility improve. By improving traffic flow, and thereby lowering the incidence of congestion, environmental issues lessen. Going further, driver distraction has become an issue of critical importance, and has been a major impetus in crash incidence in recent years. The increase in interest around autonomous vehicles has come as a direct response to this (and many other issues), and continues to rapidly evolve.

Emerging Issues

Four main, emerging issues were discussed. One major issue on the roadways today is driver distraction. This is an issue that has moved to the forefront of discussion about transportation safety in recent years, due to the dramatic increase of traffic crashes due to distracted driving. Much of the research around autonomous vehicles has been spurred by the idea that removing the human element from the driving scenario is the only way to mitigate these types of crashes. According to the USDOT, 94 percent of crashes can be tied to a human choice or error. Another issue is increasing congestion and bottlenecks for freight vehicles. This situation is not only bad for productivity, but also the environment. A third issue is that older adults have very few transportation options once they can no longer drive, particularly if they live outside of a major metropolitan area with public transportation and easy access to cabs and car sharing. Automation is seen as an answer to this growing problem, increasing accessibility and mobility for a large portion of the population. Finally, there is the issue of autonomous vehicles creating new and different safety issues that will need to be mitigated. For instance, there is a question around how fully autonomous vehicles will interact with human-driven vehicles.

Current Research/Actions

The USDOT and other research organizations are in the process of testing autonomous vehicles, in a variety of scenarios and utilizing a variety of techniques. Two areas discussed were truck platooning and full automation.

Truck Platooning – Platooning involves a level one automation system, meaning there are drivers in each truck with access to steering and braking. In platooning, there are two large trucks driving one in front of the other, and the distance between them is being controlled. There are radar systems and vehicle-to-vehicle communication. When done successfully, and with 50-foot spacing between trucks, this technique can provide a fuel savings of 7% for the lead truck and 9-10% in the follow truck.

As with any new technology, there are legal and regulatory issues. Questions discussed around platooning included:

- How will the following distance be regulated?
- What distance is reasonable and prudent?
- How will law enforcement act?
    - If trucks are platooning, they should not be pulled over for tailgating
    - Trucks should not do this manually
    - How does law enforcement know the difference?

Full Automation – With full automation, no driver is required. The truck monitors the environment with LIDAR, cameras and radar. Automation controls the brakes, fuel, and steering. This technique is moving beyond the test track to actual deployment.

Questions and concerns discussed in this presentation around Full Automation included the fact that there are no Federal Motor Vehicle Safety Standards (FMVSS) covering automated vehicles. Additionally, there are questions around how the hours of service (HOS) will be interpreted and how maintenance and inspection will be handled.

In September 2016, the U.S. Department of Transportation published the Federal Automated Vehicles Policy. This policy provides:

- Vehicle Performance Guidance for Automated Vehicles, outlining best practices for the safe pre-deployment design, development and testing of highly automated vehicles (HAVs) prior to commercial sale or operation on public roads.
- Model State Policy, confirming that States retain their traditional responsibilities for vehicle licensing and registration, traffic laws and enforcement, and motor vehicle insurance and liability regimes.
- NHTSA's Current Regulatory Tools: "NHTSA will continue to exercise its available regulatory authority over HAVs using its existing regulatory tools: interpretations, exemptions, notice-and-comment rulemaking, and defects and enforcement authority. NHTSA has the authority to identify safety defects, allowing the Agency to recall vehicles or equipment that pose an unreasonable risk to safety even when there is no applicable Federal Motor Vehicle Safety Standard (FMVSS)." (Language taken from the Federal Automated Vehicles Policy, NHTSA.gov)
- New Tools and Authorities identify potential new tools, authorities and regulatory structures that could aid the safe and appropriately expeditious deployment of new technologies by enabling the Agency to be more flexible.

In addition, the USDOT has released a 15-point safety standard for the design and development of autonomous vehicles. The standard requires that states come up with uniform policies applying to driverless cars, clarified how current regulations can be applied to driverless cars, and opened the door for new regulations on the technology. Since the CV Summit, the FMCSA Administrator Scott Darling announced in January of 2017 that FMCSA would be working on a policy statement for automated vehicles. This is intended to further develop some of the 15 points of the safety assessment with considerations specific to commercial vehicles.

<u>Remaining Questions/Needs for the Future</u>

Due to the novelty of autonomous vehicles, the remaining questions are widespread. As things progress and move forward, there are questions surrounding how these vehicles will look. There are any number of possibilities, including a conventional look, more akin to a drone, more intermodal, etc. According to Gerdes, there could be CMVs of all shapes and sizes moving through the environment. Another question is how law enforcement will conduct inspections of these vehicles, how drivers will be affected, how hours of service regulations will work (or not), etc. What are the safety implications of driverless cars, for other drivers and pedestrians?

Workshop: Utilizing Innovation to Fill the Data Toolbox: Best Practices For Accessing and Using the Newest Data Tools

SPEAKERS

David A. Noyce, University of Wisconsin - Madison
WisTransPortal, Traffic Operations and Safety Laboratory

Eric Jackson, Connecticut Transportation Safety Research Center, University of Connecticut
Connecticut Crash Repository

Beau Elliot, University of Alabama
CARE, Center for Advanced Public Safety

Greg Ferrara, Institute for Transportation Research and Education (ITRE), North Carolina State University
Coverlab Analytics, Commercial Vehicle Enforcement Resource Lab

WORKSHOP OVERVIEW

A variety of data query tools exist and can be used to provide integral information to assist with crash reporting, planning, and programming. The goal of this session was to provide information about best practices for accessing and using these innovative tools to decrease the incidence of crashes. Ultimately, this information should be used to create a system for collecting, reporting, and analyzing crash data that is simple and intuitive for all users.

The four speakers in this workshop represent University programs working to develop and/or implement innovative and forward thinking data collection and/or analysis tools. The presentations offered examples of successful university/state agency partnerships. The first two presentations describe tools with a focus on collecting and analyzing data, while the second two presentations describe tools used predominantly for analysis.

The *WisTransPortal* Data Hub is a comprehensive data warehouse of traffic operations and safety data with a significant focus on web-based crash data collection, reporting, and analysis capabilities for the purpose of safety data improvements. The WisTransPortal supports a wide range of research and public agency objectives with recent development oriented towards the collection, management, and analysis of Wisconsin crash and operational data. While the system is multifaceted, this presentation focused on the data collection component. The Wisconsin Traffic Operations and Safety (TOPS) Laboratory at the University of Wisconsin-Madison in partnership with the Wisconsin Department of Transportation (WisDOT) Bureau of Traffic Operations (BTO) and the Bureau of Transportation Safety (BOTS) developed the system.

On the collection and reporting end, this tool has automated up front validation steps, a faster feedback loop for law enforcement, and has helped the State meet its goal of 100% electronic submission. Developed after collecting feedback from both data collectors and users, it includes crash fields beyond the Model Minimum Uniform Crash Criteria (MMUCC) guidelines. The data hub also includes a web-based “Resolve System,” which facilitates post-crash data management and quality control. The system includes several automated web services to support the integration of crash data with external databases and applications, including planned support for an XML extract for FMCSA SafetyNet.

One of the key objectives of the new WisTransPortal Crash Database and Resolve System is to support Wisconsin's goal to align with federal performance measures for crash data collections, i.e., the "six-pack" of timeliness, accuracy, completeness, consistency, integration, and accessibility. As a comprehensive and multifaceted data warehouse environment, the WisTransPortal is helping Wisconsin move towards its vision for an ideal traffic safety data system, which efficiently links crashes with additional functional area datasets including roadway, driver, vehicle, citation, and operational level data.

The Connecticut Crash Data Repository (CTCDR) is an online, web-based data collection, reporting, and analysis tool designed to make crash reporting easier for officers and to provide access to crash information collected by state and local police to members of the traffic safety community. While the tool is multifaceted, this presentation has a focus on the analysis of collected data.

The crash data in this tool is updated every night and made available to the public as well as DOT staff and law enforcement agencies. Developed by the Connecticut Transportation Safety and Research Center at the University of Connecticut, in partnership with the Connecticut Department of Transportation (CTDOT), this tool allows users to collect, query, store, analyze, and print/export the data for research and informational purposes. One interesting component of the crash-reporting component is an Adobe PDF tool that officers can use if electronic submission is not available for them.

The CTCDR allows for complex queries and the data can be summarized by user-defined categories to help identify trends or patterns in the crash data. CTCDR analysis includes dashboards, heat maps, and individual crash locations.

Automated Discovery for Visual Analysis, Networking and Control (ADVANCE) is a statistical dashboard and mapping tool developed by the Center for Advanced Public Safety (CAPS), at the University of Alabama**,** through sponsorship from the Alabama Criminal Justice Information Center and the Alabama Office of Highway Safety.

ADVANCE is a framework that allows users to quickly analyze and visualize data from several databases in a variety of ways. Using an analytics tool called the Critical Analysis Reporting Environment (CARE), decision-makers can mine information without requiring the assistance of a sophisticated database or statistical experts. The software components that are encapsulated within CARE to accomplish this goal include the most useful analytical functions (e.g., frequency distributions, cross-tabulations, information mining, statistical significance tests, etc.). It also encapsulates the software components required for data enrichment and various output display capabilities (e.g., dashboards, mapping functions, etc.).

*The Commercial Vehicle Enforcement Resource Lab (COVERLAB***)** is a web-based data visualization decision and decision management tool. Focused on data analysis, COVERLAB was developed by the Center for Advanced Public Safety (CAPS) at North Carolina State University. Its purpose is to assist the Motor Carrier Enforcement (MCE) section of the North Carolina State Highway Patrol (NCSHP) improve its tactical enforcement planning for reducing truck-involved fatal crashes and protecting road/bridge infrastructure from heavy truck damage.

COVERLAB Analytics provides command staff and supervisors with data-driven tools for improving enforcement effectiveness, including:

- Online scorecards to track crash reduction performance goals;
- Interactive dashboards for in-depth trend and comparison analysis;
- Dynamic reports to streamline and simplify reporting requirements; and
- Geospatial (map) analytics to identify times and locations for prioritizing enforcement activities.

This tool also has unique qualities, including that unlike others of its kind, its focus is solely on CMV data. In addition, the data is used to track and measure performance goals in the Commercial Vehicle Safety Plan (CVSP). COVERLAB is also used for enforcement planning. The analysis of data helps to drive performance accountability to the Troop level. Here, officers use the data to conduct specific, targeted enforcement.

CHALLENGES/NEXT STEPS

The main challenge gleaned from this session is the enormous amount of data that transportation safety stakeholders are handling. Having this data is a good problem. However, the task of storing and managing the information collected is immense. Another common sentiment among these University programs is the need to improve the quality of the data.

The next steps for university programs dealing with data management and analysis are already underway in many programs across the country. One action step that was mentioned by every speaker in this session was to create more comprehensive linkages between data sets. For example, to provide a more complete view of crashes, and their short and long-term consequences, information available to researchers should include data from the following jurisdictions: judicial, public health, state drivers licensing agencies, state toxicology, medical examiner, etc.

Finally, to improve enforcement of commercial vehicles, the data that is collected should be available to law enforcement personnel, either in police vehicles or in another accessible place.

Workshop: Is Anybody Listening? Delivering Your Roadway Safety Message Through Media, Marketing and Social Media Platforms

SPEAKERS

Maria Farrah Howell, Farrah Consulting Group, Inc.
The Importance of Key Messages

Marty Buss Smith, MBS Consulting
Social Media: Not Just for Millennials

Trooper Dustin Fitch, Massachusetts State Police
Sharing Examples of Using Social Media for CMV Safety

WORKSHOP OVERVIEW

The goal of this session was to provide information and guidance for transportation agencies trying to deliver consistent, memorable safety messages to constituents. The three speakers provided strategies for creating messaging for the right audience and delivering consistent messages across multiple platforms, including the variety of social media avenues available. Also included in this conversation was information around multi-generational messaging, which takes into account the various ages and technological savvy of citizens.

In *The Importance of Key Messages*, Maria Farrah Howell, the President of the Farrah Consulting Group, Inc., discussed the elements of successful public information campaigns, specifically the use of clear and consistent messaging to shape media coverage.

According to Farrah Howell, any successful public information campaign begins with straightforward, concise messaging that will resonate with the average person. For each safety issue, she suggests creating three to five key messages that should be used in all communications – interviews, external materials and social media. Government jargon and acronyms should be avoided. Coordination among all partners and spokespeople is critical. Farrah Howell explained how message consistency across all platforms will ensure that the most compelling messages reach the largest amount of people.

Social Media: Not Just for Millennials provided ideas for utilizing social media platforms as part of an overall marketing and public relations strategy. According to Marty Buss Smith, of MBS Consulting, social media can be defined as platforms for interaction, conversation, and relationships. It is a medium that connects people and creates a personalized network. For public media campaigns, social media provides an opportunity for spreading word of mouth quickly and in a cost effective way.

Smith suggests that social media is not like traditional media. Instead, it can be thought of as a democratized media, requiring a two-way conversation, relationship building, transparency, and audience participation. In addition, contrary to popular belief, social media is not free. To use these platforms as part of a larger public relations program, time and effort must be put forth each day. It is critical to develop strategy around target audiences, which social media platforms to use, and when and how to use them. Buss Smith shared information on the various social media platforms, including the target audience and appropriate strategies for each. She suggests creating a social media objective, determining 1-3 platforms to use, and creating metrics to monitor success.

Sharing Examples of Using Social Media for CMV Safety showed conference attendees how the Massachusetts State Police uses social media to increase awareness about CMV safety. Trooper Dustin Finch suggested that when posting to social media, law enforcement consider the following:

Use hashtags whenever possible. This practice takes some getting used to, but will draw more readership and help followers to easily search for the organization on social media platforms. Use photos and stories that pull at the heartstrings of readers. Children and animals tend to successfully engage readers. Avoid photos of fatal crashes. Instead, show the backed up traffic and mention the fatality in the text of the post in order to demonstrate the widespread effects of a crash of this magnitude.

Post frequently and with transparency in mind. When the media is familiar with the organization, and trusts that they will be kept up to date with accurate and timely information regarding crashes and safety events, they will call much less frequently, freeing up time for other activities. Instead of bothering command staff to gather information, they will go to social media platforms and gather the information there.

Negative comments will happen. The Massachusetts State Police has a policy, written by a lawyer, for deleting and hiding posts from readers, when necessary. However, unless the remarks are completely unacceptable, allowing constituents to voice their negative opinion online provides transparency. When readers see these comments, they know that all voices are taken seriously and will be weighed equally.

CHALLENGES/NEXT STEPS

One challenging aspect of successful safety messaging is navigating the wide variety of platforms for delivering the campaigns. The wide variety of social media, print, email, and other mediums provides a challenge for organizations with small budgets and very little people power. Particularly around social media, there is limited staff to devote and teams are sometimes unclear how to use social media effectively.

The next challenge is related to the idea of translating campaigns across different formats – from television and radio to social media – and for a variety of ages and interests. There is no longer viability in having one message, written for one type of reader, delivered through one platform. In a world of constantly evolving media, tailoring messages to the platform and the reader is critical. Another challenge is the current issue of sensationalism and a focus on entertainment in the news. Reporters are younger and less experienced, and it is relatively easy for the wrong message to be reported.

Regarding next steps, speakers brought forth ideas to move forward with safety campaigns utilizing social media. First, set clear and realistic objectives. Next, create a social media strategy that is linked to the overall organizational media/PR campaign. Determine which platforms will work best, figure out the target market, and make a plan for how much time the staff can devote to maintaining each platform. Each speaker stressed that time must be devoted to each platform utilized in order to engage followers. The next step is to create messaging in line with the organization's overall branding and tone, and that fits with the target market. Regardless of platform, the branding and tone are consistent. Finally, to track progress and success of each campaign, use analytics to measure readership and overall engagement.

Workshop: The Road to Results: An Overview of the FMCSA Grant Program, a Show and Tell of Successful Partnerships Used to Access Funding, and What to do with Research Results from Your Grant Work

SPEAKERS

Tom Keane, FMCSA
Overview of FMCSA Grant Program

Robin Riessman, UMassSafe
Examples of Successful Partnerships to Access Funding

Kevin Slater, University of Connecticut
Examples of Successful Partnerships to Access Funding

Brenda Lantz, Upper Great Plains Transportation Institute, North Dakota State University
Disseminating Research Results

WORKSHOP OVERVIEW

Securing funding for projects can be the most frustrating and complicated piece of the puzzle. This workshop provided information about where to find grant funds, whom to collaborate with to get them and how to use research results once the grant project is complete. The speakers in this session offered transferable insight into their organization's experiences with the FMCSA Grant Program, including lessons learned and needs moving forward.

In the *Overview of the FMCSA Grant Program*, Tom Keane, Director of Safety Programs at the FMCSA, talked about FMCSA's grant programs, including; formula and competitive grants, eligibility information, details about the grant management lifecycle, timelines, and how to access grant information.

Recently, nine different FMCSA grant programs were consolidated into four. The Motor Carrier Safety Assistance Program (MCSAP) now includes Basic and Incentive grants, New Entrant Safety Assurance Program grants, and Border Enforcement grants. High Priority (HP) grants now include traditional HP, Innovative Technology Deployment (ITD, formerly CVISN), Performance and Registration Information System Management (PRISM), and Safety Data Improvement Program (SaDIP). The third is the Commercial Drivers Licensing Program Improvement (CDLPI) Program, and fourth is the Commercial Motor Vehicle Operator Safety Training (CMV-OST) Program. Keane gave detailed information about many of the FMCSA grant programs.

Available only to the MCSAP agency within the state, MCSAP Basic grants help to build and maintain dedicated CMV safety programs and are considered the 'bread and butter' of the Federal and State CMV safety programs. They also include New Entrant Safety Assurance grants that provide funding for audits of new motor carrier companies in each state, and Border Enforcement grants, which focus on inspections of CMVs, engaged in international commerce.

High Priority grants are available to law enforcement, RMVs, universities, and some others. Traditional HP grants provide the opportunity to conduct innovative CMV safety projects, such as high-visibility traffic enforcement in high-crash corridors, and outreach. CVISN/ITD grants help to advance

technological capability and promote the deployment of intelligent transportation systems applications for commercial vehicle operations. PRISM grants are used to link State vehicle registration files with FMCSA files of out-of-service (OOS) carriers, working to hold them responsible for their actions via State enforcement. SaDIP grants are used to improve the quality of CMV crash and inspection data that is uploaded to FMCSA's systems.

CDLPI grants are available to States and others focused on improving commercial driver testing and licensing programs for safety. CMV-OST grants have the priority of training current and former members of the U.S. Armed Forces, including National Guard and Reservists, to obtain their CDL.

According to Keane, FMCSA disseminates Notices of Funding Availability (NOFA) at grants.gov. Information on formula grants, which are awarded directly to state agencies in charge of implementing all CMV programming, is provided at the annual MCSAP planning meetings, while information on discretionary grants is provided via webinars after NOFA publication. For FY17, NOFAs for MCSAP funding were published in June, while those for HP funding were anticipated in late November, and CDLPI and CMV-OST NOFAs are anticipated in January/February of 2017. Awards are issued between June and September of 2017.

Examples of Successful Partnerships to Access Funding offered presentations from two speakers who have successfully navigated the FMCSA funding process.

Robin Riessman, of UMassSafe, provided examples of successful partnerships between the university and a variety of state agencies, sharing examples of projects that have been supported with FMCSA grants. One example Riessman provided is the Technical Assistance Program (TAC), which is a UMassSafe program that provides the Massachusetts State Police (MSP) with data analysis and other expertise, as needed. This assistance has included high crash corridor mapping, development of a CMV Data Tool (an online interface for querying crashes and creating reports), and the CMV Enforcement Kit, which provides education around crash reporting, traffic stops, officer safety, and crash data quality.

The MSP has utilized FMCSA HP grant funding to enlist the assistance of UMassSafe with various projects. The organizations have worked together on safety belt promotion, as well as work zone and driver distraction campaigns. On these projects, UMassSafe conducted problem identification and evaluation, while the MSP conducted education and enforcement. In addition, UMassSafe, the MSP, and the MassDOT Registry of Motor Vehicles (RMV) Division have collaborated on SaDIP projects, with UMassSafe developing crash report training materials to be used by the MSP. These HP and SaDIP grant proposals were submitted by the state, with UMassSafe acting as a subcontractor. In addition, UMassSafe successfully sought CDLPI grants directly from FMCSA. This funding helped to develop a national T-Force Toolkit (www.tforcetoolkit.com) to provide one-stop shopping for CMV traffic enforcement resources, and to implement this Commercial Vehicle Safety Research Summit.

Kevin Slater, of the Connecticut Transportation Research Safety Center (CTRSC) at the University of Connecticut, shared the collaborative efforts of the Connecticut Department of Transportation (CTDOT), Department of Motor Vehicles (DMV), and CTRSC, to improve their FMCSA State Safety Data Quality (SSDQ) rating through the development and implementation of training for police officers in investigating large vehicle crashes.

After Connecticut released a new, electronic, MMUCC 4 compliant crash report form, a deficiency in officer training related to CMV crash investigation was realized. To address this issue, CTDOT applied for, and was awarded, a SaDIP grant to improve officer training related to commercial/heavy vehicles.

The SaDIP project began by targeting information that was incomplete on the Connecticut police reports. Researchers at the CTRSC located areas that were lacking information related to CMVs, and developed training to assist police. The training included two blocks, one with three hours of training, followed by one hour of 'hands on' training. Slater, a retired police officer hired by CTRSC, taught the course. In his presentation, Slater shared many aspects of the training, as well as information regarding Connecticut's new crash report form and system.

In *Disseminating Research Results*, Brenda Lantz, of the Upper Great Plains Transportation Institute at North Dakota State University, provided two methods for researchers to submit and disseminate their results utilizing the Transportation Research Board (TRB) and the Journal of the Transportation Research Record (TRR). In addition, Lantz discussed the benefits of becoming involved with a TRB standing committee or subcommittee, as well as some detail regarding the Truck and Bus Safety Committee.

According to Lantz, there are two main avenues for sharing research results with the larger transportation community. The first is to submit a paper to TRB, either for presentation, for publication, or both. If the paper is accepted, the research will reach a large audience of other transportation professionals. Regardless of the outcome, a committee provides constructive feedback and advice for edits/additions to improve the paper and the research. The submission deadline for both the TRB Annual Meeting and the TRR is August 1st each year. Papers are reviewed and decisions are sent to authors by October 1st.

The second way to disseminate research is to get involved with a TRB Standing Committee. There are more than 200 committees covering every transportation mode and topic, with the overall purpose of proposing research, sharing findings, sponsoring events, and providing a forum. This is a way to network with colleagues, stay up to date on the latest technologies and research, and share information about your organization's research results and practices. The strategies for getting involved include contacting a committee chair by email, participating in a committee meeting, or expressing your interest by volunteering to work on a committee project. Joining a committee requires a formal process, but participation is not limited to members.

Lantz talked about one committee in particular – the Truck and Bus Safety Committee (www.ugpti.org/trb/truckandbus), founded in 2003. The committee has a focus on research and evaluation in human, roadway, vehicle, operational, and organizational areas of motor carrier safety. Topics range from problem assessment and data, to driver performance and behavior. Subcommittees include Truck and Bus Operator Health and Wellness, Motorcoach Safety, Truck and Bus Safety Data Needs, Alternative Compliance, Driver Training, and Technology. The Committee also created the Domain of Truck and Bus Safety Research, which is a TRB Circular available on the TRB website.

CHALLENGES/NEXT STEPS

The main challenge regarding the FMCSA grant program is that it can be complicated and difficult to navigate. FMCSA provides funding webinars after the NOFA is published each year, and at the annual MCSAP planning meeting. There are also local resources through the FMCSA Division Offices, which exist in each state. State Program Specialists are available as local grant experts, and can assist with the funding process. As can be gleaned by the information shared during these presentations, the best way to navigate the FMCSA Grant Program process is through partnerships. University research programs are adept at rules and regulations regarding grant proposals, and can provide guidance to state departments.

Workshop: Make Data Work: Translate Data into a Valuable Asset

SPEAKERS

Jenn Gazzillo, UMassSafe
High Crash Corridors

Jeff Muttart, Crash Safety Research Center, LLC
Forensic Investigations

Bob Scopatz, VHB, Inc.
Performance Measures Matter/ How Am I Doing? Using Data to Plan and Evaluate Your Program

WORKSHOP OVERVIEW

Data can be an incredible tool, or a major headache, depending on who you ask. This workshop provided successful strategies for utilizing crash data for strategic planning, exploring crash causation, and measuring program performance.

In *High Crash Corridors*, Jenn Gazzillo of UMassSafe discussed how the organization utilizes the data available to them in the Traffic Safety Data Warehouse. Gazzillo described the Data Warehouse in detail, along with the Traffic Safety (TS) Technical Assistance Center (TAC), the services provided by the TAC, and the emerging trends she is experiencing in transportation data today.

According to Gazzillo, the Data Warehouse, located at the University of Massachusetts Transportation Center, is a central repository for data from many sources. This repository, which contains 14 datasets and various linked datasets, provides a historical view of events and a decision support system. Datasets such as the MSP Record Administration Management System (RAMS), FMCSA's SafetyNet, vehicle miles traveled (VMT), licensed drivers, registered vehicles, and collision analysis and reconstruction, to name a few, are linked within the warehouse. UMassSafe has direct warehouse access, with a web interface along with data quality and mapping components. With data in the system, UMassSafe can conduct location analysis, identifying high crash corridors. Other analyses that make use of the data warehouse include CMV crashes by severity, delay and environmental cost of CMV crashes, top cited violations in CMV crashes, and CMV inspection by day of the week. UMassSafe also conducts crash corridor mapping and analysis, looking at distracted driving, violations, teen and older drivers, and CMVs.

The TS TAC is a synergistic program conducted by UMassSafe, in cooperation with the Massachusetts State Police (MSP). UMassSafe utilizes the TS TAC to provide strategic planning, program development, grant writing, field data collection, project planning, and evaluation for the MSP. Under this program, UMassSafe has created mobile apps, web-based tools, resource toolkits, online and classroom law enforcement training, curriculum development, etc. Using the data warehouse, they conduct crash mapping, spatial analysis, and crash data analysis.

In *Forensic Investigations*, Jeff Muttart, of the Crash Safety Research Center, LLC, discussed a study based on data collected from 194 trailers from 40 states (and counting). The aim of the study (*The Evaluation of Conspicuity Tape on Trailers and Trucker Behaviors*) was to develop guidelines for the placement and inspection of retroreflective tape on large trucks.

The impetus for this study was multifaceted. First, according to Muttart, stopped vehicles on the highway are often hit. The main issue is that drivers are not good at estimating depth of field and closing speed. In short, the human ability to estimate closing speed is not as good as the ability to stop the vehicle. In addition, 50% of all crashes happen after dark, and 20% of all fatalities in large trucks are from side-impact and rear-end crashes. Furthermore, medium and heavy trucks are eight times more likely to be struck in the rear at night, than in the daylight. This is where the retroreflective "conspicuity" tape enters the conversation. When applied properly to the rear of a truck, this tape helps oncoming traffic to see the trailer from farther away, while they still have the ability to stop. The existing issue with the tape is that currently, there is only a "when new" standard. In addition, no regulations regarding this tape exist, so law enforcement vehicle inspectors have no means to deem vehicles unsafe, if tape is gone or has lost reflectivity. The tape is either present or not present, but there is no measurement protocol.

To address these issues, the team is in the process of conducting research to develop a minimum standard for safe on-road operation (of commercial trucks with tape), to develop a standard protocol for inspection of retroreflective tape, to determine the level of retroreflectivity observed on trucks today, and to determine the effects of dirt.

The data gathering to date has included trailers from Colorado, Connecticut, California, Georgia, Pennsylvania, and Massachusetts. Truck types included box, flatbed, tanker, lowboy, intermodal, livestock, grain, and car carrier. According to Muttart, one goal for the expansion of this work is to gather data from more states. In addition, in the future, the research team hopes to determine the minimum recognition threshold for retroreflective tape, meaning the distance that the tape can be recognized from in time for a safe maneuver. To provide the results of current and future studies, another goal is to develop and publish standards and protocols for retroreflective tape.

In *Using Data to Plan and Evaluate your Program*, Bob Scopatz of VHB provided information regarding performance measures, described how to best use the Commercial Vehicle Safety Plan (CVSP) to move programs forward, and discussed the unique aspects of CMV crashes.

According to Scopatz, the FAST Act and the FMCSA require states to report on fatalities, the fatality rate, serious injuries, the serious injury rate, and the sum of non-motorized (fatal + serious) injuries. However, the goal for transportation safety professionals is not only to stay the course, but also to improve. The

analytic goal is to identify opportunities. Scopatz said that the CVSP is an opportunity to identify problems in detail, suggest solutions, and allocate and focus limited resources. Performance measures, when properly identified, measured, analyzed, and evaluated, provide the justification for allocation of these resources.

Scopatz also provided insight into how CMV crashes are unique. They are under-represented in fatalities and injuries per VMT, but over-represented in fatalities per registered vehicle. They are more serious and costly (on average) than passenger-vehicle-only crashes, have a greater impact on traffic, take longer to clear, and require more on-site resources. Infrastructure damage is more serious, crash location factors are different, and mistakes made by the non-commercial driver (in multiple vehicle crashes) are a concern.

Finally, Scopatz listed the steps to creating performance measures and how to discern success in the process. The first few steps are to decide what to measure, to identify data needs, to gather data, and to analyze data. Then, the baseline is calculated, targets and countermeasures are set, and impact is evaluated, revised, and refined. The keys to success include cooperation in defining performance measures and in data governance and standards setting, use of the best analytic resources available, measurement of things that can be impacted, use of meaningful measures and baselines and targets, documentation of the impact of safety efforts, and repeating what has worked in the past. He stressed that stakeholders whose performance one is measuring ought to have a say in how they are measured to ensure that the measurements are fair and accurate.

CHALLENGES/NEXT STEPS

There exists an enormous pool of data available for transportation safety professionals. While this alone is not a problem, according to Gazzillo, when added to tightening revenue streams, scrutinized expenditures, increasing expectations for accountability and transparency of investments, and intensified public interest in economic and societal goals, big data can become overwhelming.

The next steps for utilization of existing data are to first look at whether it is adding value to the greater transportation safety conversation. Performance measures are needed, in order to identify problems that can be improved and then develop solutions. More data that looks at the unique attributes of CMV crashes is needed, and will help dictate where future research should be focused.

Workshop: Taking Action Against CMV Driver Distraction

SPEAKERS

Sergeant Chris Sanchez, Massachusetts State Police
Innovative and Effective Distracted Driving Enforcement Strategies

D.R. Iketani, Research and Education for Driving Safety (TREDS) at University of San Diego School of Medicine
Just Drive Program

Carl Stebbins, New England Tractor Trailer Training School
Training for CMV Drivers on Driver Distraction

WORKSHOP OVERVIEW

Distracted driving is both a public health and a public safety issue, due to the enormous numbers of both fatal and non-fatal crashes it causes. This workshop demonstrated that an integrated approach and effective partnerships can reduce these numbers.

In *Innovative and Effective Distracted Driving Enforcement Strategies*, Sergeant Sanchez provided an overview of distracted driving issues, as well as the associated challenges in crash investigation, sharing examples of innovative methods for investigating distracted driving crashes.

According to Sanchez, the data show a problem that is growing in severity. In 2014, 3,179 people were killed, and 431,000 were injured in motor vehicle crashes involving distracted drivers. As of December 2014, 169.3 billion text messages were sent in the U.S. every month (Cellular Telecommunication and Internet Association). Ten percent of all drivers between the ages of 15 and 19 who were involved in fatal crashes were reported as distracted at the time of the crashes.

At any given daylight moment across America, approximately 660,000 drivers are using cell phones or manipulating electronic devices while driving, a number that has held steady since 2010 (NOPUS). A 2015 Erie Insurance distracted driving survey reported that drivers do dangerous things behind the wheel, including brushing teeth and changing clothes. The survey also found that one-third of drivers admitted to texting while driving.

The problem of distracted driving is growing because smartphone ownership is growing. In 2011, 52 percent of drivers reported owning a smartphone. In 2014, according to Sanchez, that number had grown to 80 percent.

- "Smart Phones" allow the user to call, text, send videos and pictures, access the internet, access 3rd party applications, access social networking sites, store financial information, etc.
- The memory or storage capabilities of many "smart phones" has increased dramatically.
- The average "smart phone" can retain 500 to 1000 text messages, 100 call logs, 500 to 1000 contacts, and limitless pictures and videos.
- Cloud storage (iCloud, Google Drive, DropBox, etc.) has increased storage capabilities even more.
- The average 2014 "smart phone" records and retains more data that the average computer in 2005.

Sanchez described the challenges associated with the wide variety of web-based messaging mediums, and how they are used on cell phones while driving. Today, one of the tasks of police is to stay up to date on the many apps and games being used by drivers. Texting and talking is no longer the only way for people to communicate via cell phone. In 2017, almost every game and app includes some form of messaging feature, allowing participants to send messages to other players and friends in their networks. Not only does this provide more avenues for driver distraction, it creates issues when distracted driving cases are being investigated. While texts can be easily seen on cell phone records, messages, which use data, cannot be seen on these documents, and messages sent through other apps and social media networks are also not accessible in this way.

In order to obtain records that show messages sent through social media networks, games, and apps, mobile forensic technicians are required to get search warrants. Complicating the matter further, the search warrant has to name the game, app, or social media platform specifically. According to Sanchez, there is no blanket search warrant that covers every single avenue for messaging, so investigators have to know what they are looking for when they request the warrant.

The *Just Drive Program*, according to D.R. Iketani of the University of California (UC) San Diego School of Medicine, is an example of a best practice for advancing safety through partnerships with universities. Just Drive is a cooperative program between the University and the California Highway Patrol (CHP), with the goal of reducing crash-related injuries and deaths. According to Iketani, the UC San Diego School of Medicine thinks of the program as being about public health, with research, education, and evaluation added to that base. The CHP approaches it slightly differently, with a focus on public safety and "3 E's," which include education, engineering, and enforcement. Education is where the two organizations meet.

Just Drive is provided to the general public, first responders, and CMV drivers at no cost. The format is composed of a one-hour class, delivered by two presenters, including one uniformed officer from CHP. The instructional tools include a PowerPoint presentation, group participation, impactful videos, a pledge card, and post class handouts. The evaluation consists of a 2-page paper survey of 29 questions, for a comparison of pre and post-training responses. In the program, four main topics are addressed, along with additional resources that participants can access later. Topics include a distracted driving overview, risks, legal and personal consequences, practical strategies to reduce distracted driving, and the California Vehicle Code. The program covers how drivers become distracted, even when they think they have their eyes on the road. Iketani provided examples from the training that included discussion around inattention blindness, tunnel vision, and texting and driving.

A total of 8,774 participants attended 151 classes between March 2014 and February 2016. There were 6,335 surveys collected. According to the participant responses, the curriculum resulted in substantial increases in awareness of risks, as well as motivation to change behavior. Feedback was positive, indicating that the course was well received. Iketani stressed that the collaborative partnership between public health and law enforcement is instrumental in the effectiveness of Just Drive, or any partnership of its kind. In 2017, the program goals include the creation of a 3-month post-assessment survey, increasing the participation target, and reaching out to new agencies and worksites.

In *Training for CMV Drivers*, Carl Stebbins, of the New England Tractor Trailer Training School (NETTTS), provided insight into distracted driving, and how NETTTS is training CMV operators to limit these hazardous activities while operating their vehicles. NETTTS Defensive Driving courses are certified by the National Safety Council. The classes are four or eight hours, and each student receives a certificate of completion. Distracted Driving is a component of the defensive driving courses. However, at NETTTS, distracted driving is part of the overall curriculum, which is a 600-hour course. In the first part of the presentation, Stebbins provided scenarios that would be considered distracting. The list included adjusting the temperature in the car or CMV, eating and drinking, looking at a map, resetting the GPS, tuning the radio, texting, making a phone call, reading a billboard, and having a conversation with a passenger.

Stebbins pointed out that it is unlikely that all driving distractions will be eliminated entirely. However, in order to minimize distractions, driver's must commit to not driving while distracted, watch out for other distracted drivers, and respond appropriately once a distracted driver has been identified. The first step in fighting distracted driving is hazard awareness. Distractions are everywhere, and with the increase of available technology, distractions have more than doubled in the past 20 years.

According to Stebbins, distractions can be placed into four basic categories; including visual, physical, mental, and inattention blindness (also mentioned by Iketani). Visual distractions include anything that lures the eye from the road. Physical distractions trigger the driver to take their hands off the wheel. Mental distractions create a wandering of the mind to something other than driving, and inattention blindness is when the driver has no recollection of the last few miles driven. Texting is one of the deadliest distractions drivers face. According to Stebbins, some experts regard texting as being more dangerous than driving under the influence of alcohol (OUI). Research shows that the odds of being involved in a safety critical event (meaning a crash, near crash, or drifting out of the lane), is greater for CMV drivers who text while driving.

Strategies for minimizing distractions include staying focused on driving, recognizing the signs of a distracted driver, remaining aware of what is going on around the vehicle, and managing distracted drivers instead of ignoring them.

CHALLENGES/NEXT STEPS

According to Iketani, distraction is the second leading cause of death for all large truck drivers involved in fatal crashes. Compounding this issue is the growing popularity of cell phones and hand held devices. According to Iketani, in 1985, 1.4 percent of the U.S. population owned a cell phone. In 2015, 118 percent of the population subscribed (this statistic is over 100% due to the number of people who own more than one phone). According to NHTSA, in 2009, 995 people were killed in crashes that involved their use of cell phones. Going beyond cell phones to other forms of distraction, in 2014, 431,000 people were injured in crashes involving some type of distracted driving. That is equal to 8.7 people per day, or one person every 2.75 hours.

The next steps, according to these speakers, include more training and education for the general public, first responders, and CMV drivers. In addition, more complete data is needed to begin looking at the bigger picture of distracted driving.

Workshop: Integrated Safety Planning: A State's Team Approach

SPEAKERS

Anne L. Collins, FMCSA
Overview: Building a Single Strategy for Safety, Including all State Agencies

Debra Rood, Institute for Traffic Safety Management and Research, University of Albany
Commercial Vehicle Safety Planning in New York State

Daniel Blower, University of Michigan Transportation Research Institute
Michigan Truck Safety Commission

WORKSHOP OVERVIEW

Many hands make light work, and partnerships are one way to bring many hands to problem solving. This session provided insight from the people already working together in this way, sharing their unique knowledge and collectively creating a path toward a safer future.

Anne Collins, of the FMCSA, shared her presentation: *Building a Single Strategy for Safety, Including All State Agencies*. In the discussion, Collins talked about the best ways to align stakeholders and strategies in order to successfully meet current and future safety challenges. Collins began by asking participants to identify the transportation safety stakeholders in their states, and whether they are currently sitting at the table, involved in the discussion. Stakeholders may include federal granting agencies, such as the FMCSA, NHTSA, and FHWA, state regulatory and operational agencies, including the DOT and state police, as well as the courts, universities and colleges, legislative committees and key legislators, interest groups, the media, etc.

Generally, Collins said that transportation safety strategies often include the five (or sometimes six) E's: engineering, education, enforcement, emergency medicine, encouragement, and evaluation. There are also structures for moving these strategies forward, which are in addition to agency-specific silo programs. These structures include the Strategic Highway Safety Plan (SHSP) Group, the Traffic Records Coordinating Committee (TRCC), the Governor's Highway Safety Commissions (GHSC), the Public Private Safety Commissions (PPSC), and the array of University programs. According to Collins, these structures are important to the result. If there is no plan for succession, the person running the program retires or moves on, and there is no plan for moving forward.

Collins went further by exploring the topics and tactics often tackled and utilized in statewide strategic planning. Topics are wide-ranging and can include anything from work zone safety, to teens and trucks, to bike and pedestrian safety, and anything in between. Tactics range from improving roads, sidewalks, and bike paths, to conducting research and releasing reports. Tools used to move these projects forward include grants, help from consultants, and support from universities.

Collins ended her presentation by introducing the other two speakers, explaining that both the Institute for Traffic Safety Management and Research (ITSMR), as well as the University of Michigan Transportation Research Institute (UMTRI), are excellent examples of building a single state strategy utilizing a diverse group of transportation safety stakeholders.

Debra Rood, of the ITSMR, discussed *Commercial Vehicle Safety Planning (CVSP) in New York State*, providing an overview of the planning processes that ITSMR is involved with, as well as some detail around their work with the Motor Carrier Safety Assistance Program (MCSAP) and the CVSP annual planning meeting.

ITSMR, which has been affiliated with the State University of New York at Albany since 1978, is a completely grant-funded organization that acts as a bridge between state agencies and the expertise and resources of the university. In this role, ITSMR provides data and analytical support for the various components of New York's integrated traffic safety planning process, including the Governor's Traffic Safety Committee (GTSC), the Traffic Records Coordinating Council (TRCC), and the MCSAP. ITSMR also assists in the preparation of the State's major planning documents including the Highway Safety Plan

and the SHSP, as well as the CVSP. Rood talked about their work specifically with the CVSP planning committee, mentioning that a variety of stakeholders participate. These groups include the NYS DOT, the State Police, FMCSA, the NYS DMV, the GTSC, the NY Motor Truck Association, and Rood's group, ITSMR. ITSMR's role in the CVSP planning process is to review the national priorities in the Notice of Funding Availability (NOFA), compile and present data to support problem identification, update performance measures and set targets, conduct analysis and prepare tables/charts, and facilitate discussion. ITSMR also conducts an annual assessment of activities conducted under the CVSP and progress made toward the established goals. Ad hoc analysis and assistance is also provided throughout the year.

According to Rood, there are several keys to the long-term sustainability of ITSMR. First, the organization has been able to build strong and lasting relationships with local and state agencies dedicated to improving highway safety. Next, ITSMR staff members have developed extensive knowledge and expertise in a wide range of highway safety areas. Another factor contributing to ITSMR's longevity is the ability to adapt quickly to changing priorities, emerging issues, and new technologies which enables ITSMR to anticipate and continue to be responsive to the needs of its sponsors. Finally, ITSMR has access to other academic resources and specialized expertise that can be called upon when needed.

Daniel Blower, of the University of Michigan Transportation Research Institute (UMTRI), discussed the *Michigan Truck Safety Commission (MTSC)*. According to Blower, the MTSC is unique, and is made up of an 11-member commission that is appointed by the Governor and approved by the Senate. The MTSC is administered by the Office of Highway Safety Planning (OHSP), within the Michigan State Police (MSP), and the official charge to the Commission is to "promote truck safety through truck driver safety education programs, research and demonstration projects, truck safety enforcement efforts, and other methods it deems appropriate with the state."

The members of the MTSC include the Michigan Truck Association, organized labor, MSP, Transportation Commission, OHSP, Secretary of State, for-hire carriers, four-year colleges and universities, two-year community colleges, and the general public. MTSC programs have a dedicated revenue stream of approximately $2.4 million annually, and cover three broad topics; including education around truck safety ($1 million annually), enforcement (at least $750,000), and research (whatever is leftover).

Blower discussed several of the MTSC programs. One educational program is the Michigan Center for Truck Safety (MCTS). The MCTS has many offerings for CMV drivers, motor carriers, and the general public; including Mobile Simulator Training. The simulator provides free training to commercial drivers on topics ranging from very specific collision avoidance to basic hazard perception methods. The training is conducted in a controlled, risk-free environment, and any scenario can be recreated or practiced. Other offerings at MCTS include training around defensive driving, cargo securement, safety management, fatigue management, and recovery maneuvers. The MCTS provides literature for truck drivers, including the Truck Driver Guidebook, as well as support for the CMV enforcement division, conducts research around training needs, evaluates training programs, and develops strategies to reduce CMV crashes in Michigan.

CHALLENGES/NEXT STEPS

Anytime there is an effort to combine forces with multiple state agencies, there will be challenges. One such challenge is getting all of the players/stakeholders to the table. There are non-traditional partners that could be adding to the conversation and bringing unique resources and knowledge, but often times these groups are left out. These groups may include the media, the courts, insurance companies, universities, the trucking associations, or school bus drivers. Another challenge for the CMV safety community is getting this issue added to the lists of stakeholder groups that are not involved with CMVs on a day-to-day basis. With long lists of issues and tightening budgets, programs tend to stick with what they know works, and with the issues they have tackled in the past. Finally, different agencies in the same state often have different data.

Collins laid out a template for moving forward on the issue of unifying agencies and organizations under one strategic plan. As Collins mentioned in her presentation, one goal of these partnerships is to align efforts in order to better meet future challenges. To do that, she suggested developing a safety inventory that looks at all of the programs in the state. Understand the interests, motivation, expertise, and resources available from each stakeholder. Identify mutual dependencies and natural competition that may exist. Address all modes, creating mutually supportive messaging to reinforce themes. Make use of data to understand the areas of leverage and gaps between programs. Finally, figure out who is best positioned to help solve the emerging issues; including autonomous vehicles, the legalization of marijuana, distracted driving, and the changes to the legacy data systems.

Plenary Panel: Technologies Impact On Transportation Today: What Has Gone By The "Weigh-Side?"

SPEAKERS

Heather Rothenberg, Uber
Leveraging Technology for Safety: Learning from Uber

Steve Vaughn, HELP, Inc.
PrePass Weigh Station Bypass

Anand Rao, PwC
Insurance Implications of Autonomous Vehicles

PANEL OVERVIEW

Providing digital services in a physical world has its challenges; but the highway safety benefits are impressive. This workshop explored proven and developing technologies aimed at advancing the safety and efficiency of the commercial transportation industry. The speakers in this panel provided three distinct ideas regarding the benefits of evolving technology, the trends and emerging problems on the minds of industry stakeholders, and the ways in which their organizations are addressing both.

LEVERAGING TECHNOLOGY FOR SAFETY: LEARNING FROM UBER

In *Leveraging Technology for Safety: Learning from Uber*, Rothenberg discussed the safety focus of Uber as well as how they have utilized smartphone technology to provide feedback to drivers and safety features for passengers. In addition, as part of her presentation, Rothenberg shared some partnerships that have grown between Uber and other safety-focused organizations, such as Mothers Against Drunk Driving (MADD) and the Governor's Highway Safety Association (GHSA).

Currently, Uber has over 1.5 million driver partners on the road in over 500 cities, in 70 countries across the globe. According to Rothenberg, Uber is leveraging this tremendous reach, as well as technology, to improve safety for every driver and passenger, before, during, and after every trip.

EMERGING ISSUES

Current issues in transportation safety have not only increased the need for ride share options like Uber, but have been the impetus for Uber to create the unique safety features that the app offers to drivers and passengers. Drunk and drugged driving remains a major issue in transportation safety. According to the U.S. Department of Transportation (USDOT) Bureau of Transportation Statistics, every two hours, three people are killed in alcohol-related highway crashes. The consequences of drinking and driving are arrests, property damage, injuries, and thousands of deaths annually. Another issue is distracted driving. Ride share drivers are using apps and the GPS in their phones, which may contribute to distracted driving.

CURRENT RESEARCH/ACTIONS

Leveraging Technology

To build safety into every trip, Uber utilizes the technology that is already built into every smartphone; including the GPS, accelerometer, and gyroscope. This technology provides Uber with the data needed to deliver feedback to the drivers about how their driving patterns compare to city averages. Smooth driver stats, such as braking and accelerating patterns, are recorded by Uber and then given back to the driver in the form of a daily report. Along with their stats, drivers are given tips on providing smoother, safer rides. In addition, in an effort to combat the growing issue of distracted driving, the data collected through driver smartphones is being used to detect phone movement. When movement is detected, the driver will get a reminder after their trip, encouraging them to mount their phone to the dashboard. According to Rothenberg, in cities where this was tested, there was a 5% reduction in drivers holding their phones while the vehicle was in motion.

Uber is currently pilot testing a Speeding Alert that shows when drivers are driving excessively fast – particularly on highways. Rothenberg described this program as a "high level" measure, which utilizes the National Highway Traffic Safety Administration's (NHTSA) definition of excessive speed. The technology for this program is currently being tested and refined. Another pilot being launched in 20 cities in the U.S., Asia, and Europe, is the Recharge Reminder. This is a pop up that reminds drivers (randomly) to stop and take a break.

Ensuring the Safety of Uber Users

Smartphone data is also used to ensure passenger safety. If someone requests a ride with the Uber app, they can instantly see when the car will arrive, who is driving, and the kind of car they have. This enables passengers to stay inside until the car arrives, so waiting on the street is not necessary. In addition, once in the vehicle, the passenger can use the "Share My ETA" feature, sending friends and family information about their trip, including arrival time. Passengers can also submit feedback on their experience through the Uber app.

Unique Partnerships

Finally, Rothenberg shared some of Uber's unique safety partnerships. "Don't Forget to Buckle Up in the Back," is a campaign that created a partnership between Uber, the National Click it or Ticket campaign, and the Governor's Highway Safety Association (GHSA). Uber has also partnered with Mothers Against Drunk Driving (MADD), to provide free and discounted rides on July 4th weekend in 25 cities. Ride share companies, like Uber, provide alternatives for people who are intoxicated and should not be driving. According to Rothenberg, Uber's busiest time is closing time for the bars.

Remaining Questions/Needs for the Future

In a world dependent on technology, things change quickly, new questions arise, and needs for the future become clear. According to Rothenberg, Uber is actively pilot testing new programs and features, in response to both user and driver feedback, as well as national and global transportation safety policy goals. Remaining questions include the impact of the long-term effect of ride sharing on the taxi system around the world, and how to continue improving the safety of the entire experience for the driver and passenger.

PRE-PASS WEIGH STATION BYPASS

In *Pre-Pass Weigh Station Bypass*, Vaughn discussed the strategies employed by HELP Inc. to utilize technology to hasten commercial vehicle inspection and enforcement. HELP Inc. – Heavy-Vehicle Electronic License Plate – is a non-profit public/private partnership formed to improve highway safety and efficiency. In order to overcome the distrust that existed between public agencies (operators of the infrastructure, such as departments of transportation) and industry (trucking companies and drivers), HELP Inc. became the objective third-party, managed by a public/private Board of Directors and a professional staff – to provide the objectivity and strict adherence to standards of safe and efficient operation.

HELP Inc.'s PrePass e-screening and weigh station bypass offers states and motor carriers a safety screening service with leading edge technology. According to Vaughn, the screening pre-clears 40% of the mainline truck traffic, freeing up space in inspection facilities for thorough inspection of non-compliant carriers. The 360 SmartView electronically the remaining 60% of mainline and ramp traffic, and provides inspection guidance for enforcement officials.

Emerging Issues

According to Vaughn, there are a variety of current trends/issues pertinent to the impact of technology on transportation today. First, regarding economics and policy, there has been an increase not only in truck traffic, but also in the share of goods being moved by commercial trucks. In addition, resources are

limited, particularly around enforcement and infrastructure projects. As discussed in other sessions during this conference, and by Vaughn in this presentation, there is a shortage of truck parking that is affecting the ability of drivers to work effectively.

Vaughn also discussed trends in the evolution of technology related to inspection; including license plate recognition (LPR), weight in motion (WIM), ramp and mainline e-screening, virtual weigh stations, and pre-clearance for qualified fleets.

Finally, Vaughn suggested that HELP Inc. and others are considering the evolution of in-vehicle technology; including the use of on-board status monitoring, mobile devices like tablets and smartphones, short range communications – 915 MHz RFID for preclearance and toll pay, and long range communications – (CMRS) for fleet management/preclearance. Another trend related to technology is connected and autonomous vehicles.

Current Research/Actions

Electronic Screening

HELP Inc. provides the service of by-pass/e-screening to simplify safety inspections for the trucking industry and state agencies. The electronic screening components include WIM, over-height/over-length dimensioning for permitting, virtual weigh stations, LPR and DOT recognition, thermal brake imaging, and mobile enforcement solutions. 360SmartView is a tool that provides secure data on trucks passing through inspection facilities for highway planning, audit, and enforcement purposes. The system employs a license plate reader, which sends information directly to the enforcement officer as the truck pulls into the station.

Remaining Questions/Needs for the Future

According to Vaughn, moving forward with electronic screening, performance standards for technology will be needed. Currently, the FMCSA is working to develop these standards, so that any outside company can build their technology to meet the same requirements. Another need for the future is device convergence for drivers, as distracted driving remains an issue for all drivers and employers of drivers. There is also a question of fault – if a driver is using their phone for work purposes, and there is a crash due to distraction - who is to blame? Similar to many other presenters, data issues – accuracy, security, privacy, and timeliness – are on the minds of industry and government professionals. Wrapped in this issue is the ongoing question/concern regarding driver privacy.

INSURANCE IMPLICATIONS OF AUTONOMOUS VEHICLES

In *Insurance Implications of Autonomous Vehicles*, Rao described ridesharing, automated driver assistance systems (ADAS), autonomous vehicles (AV) and electric vehicles (EV) as disrupting the auto industry ecosystem. Young people living in urban centers are making a shift toward sharing, as opposed to owning, assets – including cars. This shift will fundamentally change the way we think about transportation safety. According to data presented by Rao, 93% of traffic crashes are caused by human error. Due in great part to these errors, 1.3 million fatalities and 50 million injuries occur globally every year. In 2015, 38,300 deaths and 4.4 million injuries occurred due to traffic crashes in the U.S. alone.

Carrying this line of thought forward, if human error is reduced, or completely removed, due to the introduction of ADASs and AVs, then insurance companies will be impacted. Rao suggested that insurers need to be prepared to innovate with their offerings, targeting new business customers, and eventually seeking alternative areas of growth.

Emerging Issues

The main issue discussed in this presentation is the potential impact of these new technologies on the car insurance industry. According to Rao, automated driver assistance technologies will impact both severity and frequency of crashes. Car sharing, ADAS, and AV will reduce the number of vehicles on the road. When the reduction of crashes is combined with lower car ownership overall, the result is a reduction in projected insurance premium losses by 31% by 2025 and 52% by 2035. Rao mentioned that the impact on insurance would be small at first, accelerating once AV adoption reaches a "tipping point", and substantially reducing the auto insurance market.

Current Research/Actions

Autonomous buses, trucks, pods, and convoys are currently being piloted across the world. CitiMobil2 is a pilot being tested across the European Union (EU), which is demonstrating automated road passenger transport. The Mercedes Benz Future Truck 2025 is looking at the future of commercial trucking. Currently, it is illegal to drive autonomous vehicles on the road in Europe, so manufacturers are waiting for new legislation to come through.

OTTO was responsible for the first commercial use of a self-driving truck, hauling a Budweiser shipment across the roads of Colorado. This was a multi-agency project, with cooperation by the Colorado Department of Transportation, the Colorado State Patrol, the RoadX Program, road construction contract partners, and more. The truck was required to drive the route eight times without the driver touching the steering wheel, before the team felt comfortable setting the truck to drive fully autonomously. Involvement was multifaceted. The roadway was swept of debris, the team ensured that no vehicles were broken down on the side of the highway, and construction contract partners were contacted to make sure no unexpected roadway projects would affect the traffic conditions. The delivery was successful, and paved the way for more of its kind in the future.

Remaining Questions/Needs for the Future

When thinking about vehicles with ADASs, the question of fault arises. When a human driver is at fault in a crash, a claim is submitted to the insurance company. The risk and the fault lie with the human driver. With ADASs, it starts to get a bit more grey. The manufacturer of the car installed the assistive system, and the driver was involved in a crash. Who is at fault? The driver or the manufacturer. Going further, if the car is fully autonomous, the fault seemingly transfers fully to the manufacturer. This question of fault and risk will be ongoing.

The looming question is how quickly these changes will happen, and to what extent the insurance industry will be effected. Rao laid out four possible scenarios for the next two decades, ranging from slow adoption of AV technology (where premium growth makes up for loss reduction), to the death of the auto insurance industry (with a complete elimination of losses). Rao also laid out a proposed plan for insurers who want to survive this fundamental shift in how their business is conducted.

Innovation, New Partners, and Flexible Planning for the Future

Rao suggests that insurance companies start immediately to innovate and better understand the changing ecosystem. In the short-term, insurance companies should start looking at alternative forms of insurance. In addition, they should partner with auto manufacturers to collect data on ADAS and AV technologies. In the medium-term, companies should shift their primary focus toward auto-manufacturers and project management as service (PMaaS) providers for marketing, distribution, and product development. In addition, they should develop innovative products, including bundled insurance and 'self-drive' mode insurance. Over the long-term, Rao suggests consolidating personal and commercial auto insurance, and exploring alternative revenue streams; including commercial auto logistics and becoming a PMaaS provider.

As liability shifts from driver to product manufacturer (because the car is no longer being operated by a human driver), the business model of insurance companies will fundamentally change. Ownership will shift to sharing or renting, and distribution will shift from consumers to manufacturers. In order to stay relevant, insurance companies will have to reimagine the future of their industry.

CONFERENCE CONCLUSIONS

The *2016 Commercial Vehicle Safety Research Summit* was a call to action, not only in spirit, but also in the solidifying of real, actionable steps, shared by speakers and participants over the course of two days in Northampton, MA. The CV Summit was the first of its kind, uniting transportation safety stakeholders from across the country, and asked that instead of simply attending the conference, that attendees become real participants.

As a call to action, the conference asked for participation from the attendees, not only in response to the topics of the presentations, but also in response to the ideas and challenges they knew were missing from the conversation. Ferro said, "We are strong in the groups that we represent, and many of us reach out to other partners. But there are a lot of people not in the room that are engaged in this battle for safety on our highways."

This sentiment became a theme over the two days, as speakers and attendees pushed themselves to ask this question. Who is missing? Which organizations should be at this table? Which voices do we need in order to round out the conversation?

A variety of topics were covered by an even greater variety of presenters. Speakers represented state agencies, universities, and the private sector as well as the federal government. Panel/Workshop topics included emerging issues such as the arrival of autonomous vehicles, legalization of marijuana, and the complications surrounding grant funding for projects. Presenters approached each topic from their unique perspectives, and challenged participants to see things through a different lens. This communication, coupled with listening and open minds, created a platform for growth and change that sparked innovative ideas from all sectors.

SUGGESTED NEXT STEPS

Over the two-day Summit, speakers and attendees suggested the following action steps:

1. *Engage in partnerships with universities and transportation stakeholders statewide.* More than 65% of Summit attendees are engaged in university/state government partnerships. Of these attendees, 74% are interested in expanding the partnerships. Of the 35% of attendees that do not currently have a partnership of this kind, 95% are interested in developing one in the future. These partnerships are gaining popularity, and have shown to provide a unique perspective for both sides. One insight from the Summit is that in order to move forward and continue to make progress on the emerging issues in commercial vehicle safety, there will need to be an influx in collaboration, between agencies within the same state, as well as across state lines. There was overwhelming agreement by all speakers and many participants that for projects and programs to be successful, there must be collaboration and communication between state agencies, academia, and the private sector. Each group provides something unique to the others and working together leads to greater progress. While collaboration in general is important, one specific step will be to create a best practices document regarding utilization of universities for CVSP development and to access funding for projects and programs.

2. *Expand/replicate the CV Summit pilot nationally.* One overall message of the CV Summit was this – if someone has a problem, someone across the country has already solved it. While this CV Summit was a pilot for the ESC area, implementing the template on a larger scale is important. The first expansion could be to other service areas, with a goal of expanding to the entire country. A main goal of the CV Summit is to bring a variety of voices and stakeholders to the table to share and implement best practices in a cohesive way. The more voices at the table, the better and more concise the strategies.

3. *Data sharing.* According to CV Summit speakers and attendees, the key to turning data into actionable information is to share resources, communicate across disciplines and across states, and to include close partnerships and agreements with universities, who have the ability to provide the integral analysis piece. In addition, attendees should work to create an inventory of data tools, including best practices for data analysis.

4. *Create clear messaging, deliver to a diverse audience.* In a world with constantly evolving media platforms, there are more options for delivering transportation safety messages than ever before. The opinion of many speakers and participants was that for each campaign, a variety of messages are required, and should be delivered across several platforms (social media and traditional print, television, and radio). Messaging should be segmented to speak to a variety of ages, demographics, and levels of technologically savvy.

5. *Workforce development.* As drivers of trucks and buses age and begin to retire, it is critical that a new wave of young drivers enter the workforce. With young people eschewing cars for a more urban lifestyle, and with the rise of autonomous vehicles, it is necessary to revamp strategies for maintaining and growing the CMV driver and maintenance workforce. Participants of the CV Summit suggested partnering with local high schools, vocational or trade schools, and universities to create curricula for courses in CMV maintenance and operations. Looking at the timeline for autonomous vehicles entering as major players in the trucking industry, it is clear

that we will need a push in training and education around new policies, procedures, and regulations. Things are going to change quickly, and we need to be ready.

6. *Create a Statewide Safety Inventory.* It is critical that states take inventory of existing safety programs, and aim to understand the interests, motivation, and expertise involved with every resource. This type of inventory will help states to understand how best to align efforts and meet future challenges, without repeating work or reinventing the wheel. Aim to understand who (which programs, and which people) are best positioned to solve the emerging issues; including autonomous vehicles, legalization of marijuana, legacy data systems, etc. If those people/programs are not sitting at the table, they invite them to contribute.

CREATION OF THE ESC CMV/CDL SAFETY TECHNICAL ASSISTANCE CENTER (TAC)

As a follow up to the CV Summit, UMassSafe will develop and implement the ESC Region CMV/CDL Safety and Compliance Technical Assistance Center (TAC). Through the TAC, UMassSafe will provide one-on-one technical assistance for law enforcement and licensing agencies, as well as universities, in the development and/or expansion of partnerships, development of programs, and replication of existing programs. Building on the momentum of the CV Summit, the TAC will act as a resource and information center, increasing each stakeholder's network of support, and providing an avenue of communication regarding best practices in CDL and CMV safety and compliance.

Stakeholders will be able to study the safety countermeasures that have proven effective in other states and municipalities, along with detail regarding successes and challenges other organizations have experienced. Additionally, the TAC will provide safety-planning resources covering a variety of topics as well as offer resources on effective CMV/CDL enforcement; including topics such as improving data quality, using data to guide programming, and guiding local law enforcement to conduct traditional traffic stops with large trucks and buses.

Case studies and syntheses of reports will be available, detailing the processes of proven countermeasures and other relevant programming. Various communication platforms will be created to assist states in programming discussions. Finally, UMassSafe will expand the Summit website in order to distribute the presentations and findings, and to create a means of continuing the dialogue post-Summit.