MEETING SUMMARY

Meeting: Executive Committee, Meeting #10
Location: Virtual Meeting only
Date: July 27, 2021

Members in Attendance:

Member*	Organization	Present (Y/N)	Rep Sent in Place (Y/N)
James A. Restucci (Chair)	Washington State Transportation Commission	Y	--
Shiv Batra (Vice Chair)	Washington State Transportation Commission	Y	--
Senator Curtis King	Washington State Legislature	N	N
Senator Ann Rivers	Washington State Legislature	N	N
Senator Joe Nguyen	Washington State Legislature	N	N
Senator Mona Das	Washington State Legislature	N	N
Rep Sharon Shewmake	Washington State Legislature	Y	--
Rep Shelley Kloba	Washington State Legislature	Y	--
Rep Mary Dye	Washington State Legislature	Y	--
Rep Matt Boehnke	Washington State Legislature	N	N
John Batiste	State Patrol	N	Y – Scott McCoy
Shelly Baldwin	State Traffic Safety Commission	Y	--
Mike Kreidler	State Insurance Commission	N	N
Teresa Bertsen	Department of Licensing	N	Y – Beau Perschbacher
Roger Millar	Department of Transportation	Y	Y – Marshall Elizer
Joel Sacks	Department of Labor & Industries	N	N
Laura Johnson	Department of Health	Y	--
Suzan LeVine	Employment Security Department	Y	--
Jim Weaver	State Chief Information Office, WaTech	N	Y – Zack Hudgins
Debbie Driver	Governor's Office	N	N
Dr. Yinhai Wang	Smart Transportation Applications & Research Laboratory (STAR Lab), University of Washington	Y	--
Justin Leighton	Washington State Transit Association	Y	--
Tom Alberg	ACES Northwest	N	N
Sam Zimbabwe	City of Seattle Transportation Department	N	Y – Ann Sutphin
Curt Augustine	Alliance for Automotive Innovation	Y	--
Brenda Wiest	Teamsters Local 117	Y	--
Todd O'Brien	Adams County	Y	--
Jessica Ramirez	Puget Sound Sage	N	N
Bryan Mistele	INRIX	N	N
John Milbrath	AAA	Y	--
Bryce Yadon	Futurewise	Y	--
Ariel Wolf	Self-Driving Coalition for Safer Streets	Y	--
Steve Gordon	Gordon Truck Centers	Y	--
Anna Zivarts	Disability Rights Washington	Y	--
Annabel Chang	Waymo	Y	--

MEETING SUMMARY

A full recording of the virtual meeting and meeting materials are available on the WA AV Work Group website:

Meeting session recording: https://www.youtube.com/watch?v=249Ucvo_-cM

Meeting agenda and presentation materials: https://avworkgroupwa.org/committee-meeting/executive-committee-meeting-10

WELCOME AND INTRODUCTIONS

Jim Restucci, Chair of the AV Work Group, opened the meeting with introductions of Executive Committee members, an overview of the meeting agenda, and a walk through of virtual meeting operations and functionality.

AV WORK GROUP FUTURE PATH UPDATE
Scott Shogan, Vice President, *WSP USA*

Scott Shogan, Vice President for WSP USA, provided an overview of the May 25th Executive Committee polling exercise to evaluate the Work Group's key areas of focus moving forward. The polling exercise highlighted three key takeaways: public awareness is a key area of focus, there is interest in bringing AV testing to Washington and state investment to attract it, and there is a focus on long term and looking towards the future.

Mr. Shogan acknowledged that these results support a recommendation to the Work Group to shift its focus moving forward towards long-term preparations and planning. This shift in focus includes the development of a Roadmap that looks beyond the Work Group's purview (end of 2023) that will identify key areas for exploration and development, for future considerations of AVs on Washington's public roadways. This shift would also leverage the Work Group's structure differently than it has to date, with the WSTC and AV Work Group lead Agency staff convening regularly to identify focus areas and specific topics to explore, using subcommittees as a vetting body for more developed ideas. The Commission would put forth proposed approaches and content for Roadmap areas of focus, and the Executive Committee evaluating matured recommendations with the lens of supporting the overall Roadmap development.

The Executive Committee used a polling tool to vote on the proposed shift in Work Group structure. Of the 24 members in attendance, 17 voted in support of the shift in Work Group structure, zero "no" votes, and 7 members that did not participate in the polling vote.

MEETING SUMMARY

AV INDUSTRY PANEL ON SSB5460
Curt Augustine, Senior Director, State Affairs, *Alliance for Automotive Innovation*
Ariel Wolf, Counsel, *Self-Driving Coalition for Safer Streets*

Ariel Wolf on behalf of the Self-Driving Coalition and Curt Augustine on behalf of the Alliance for Automotive Innovation spoke to their concerns with the Substitute Senate Bill (SSB) 5460[1], which passed earlier this year, and the reasoning for lobbying to have the House Bill (HB) 2676 Section 2 implementation date pushed out one year, to October 2022, to allow for further collaboration and refinement of the language to best serve all involved parties.

The Coalition and Alliance presented on the industry approach to AV regulation, which focuses on supporting state efforts to facilitate AV testing and deployment of fully autonomous vehicles, preserving traditional state and federal roles regarding motor vehicles, coordinating policies across states on existing statutory and regulatory motor vehicle frameworks, and working collaboratively with regulators and lawmakers to advance the deployment of AVs.

The Coalition and Alliance also presented on how states' approaches to AV regulation vary greatly across the country, with some states expressly enabling testing and deployments, others expressly enabling testing and pilots, others defining studies and local preemption, and some states with no express regulation at all.

Mr. Wolf and Mr. Augustine noted three key areas for possible clarification and improvement in SSB 5460 and HB 2676 language:

1) Law enforcement notification: In current language, companies must notify each law enforcement entity individually if there are plans to test in the area. Industry recommends a centralized way to notify and report to law enforcement, which can be used to disseminate to the appropriate entities. The industry representatives recommended to augment the notification requirement to have companies testing be able to give law enforcement a working plan to inform how to respond appropriately as situations arise.
2) Crash notification: Industry's key concern was that this requirement creates a lot of data, but not a lot of information. The industry wants to ensure it provides relevant and helpful information in an efficient manner. Industry representatives recommended that if the incident is non-AV caused, to use existing reporting laws, and to create a separate mechanism for reporting AV-caused incidents.
3) Path to deployment: Washington does not currently expressly allow for the deployment of AVs. Setting up a clear path to deployment is a significant step the state can take to attract testing. Limiting AV operations only to testing is often a deterrent. Setting up operations in a state can be resource intensive, so being able to commercialize operations can encourage a company to establish operations in a state.

Questions and responses can be found in the Presentation Questions Log table at the end of this document.

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[1] SSB 5460: https://app.leg.wa.gov/billsummary?BillNumber=5460&Initiative=false&Year=2021

MEETING SUMMARY

WSTC ADAS SURVEY AND EDUCATION PLAN PROJECT
Debi Besser, Program Manager, *Washington Traffic Safety Commission*
Erin Allingham, Associate Director, *C+C*

Debi Besser, Program Manager for the Washington Traffic Safety Commission (WTSC), provided background on the WTSC's study to understand where Washingtonians are now with understanding of ADAS in vehicles today, with specific focus on adaptive cruise control (ACC) and lane keeping assist (LKA) technologies.

Erin Allingham, Associate Director with C+C, presented on the findings of the WTSC ADAS survey study. The study surveyed over 1,000 drivers whose primary vehicle was a 2017 model or newer that had at least one of the ADAS technologies of interest. The survey polled participants on their understanding of several ADAS technologies and their functionality, including forward collision warning, automatic emergency braking, adaptive cruise control, lane keeping assist, and lane departure warning. Key points highlighted that although drivers of vehicles that are ADAS-equipped generally understand the technology and its capabilities, there are still gaps in knowledge and a need for further education.

A full overview of the survey results, key points, and supporting data can be found in the July 27th meeting presentation deck, available on the AV Work Group's website.

Questions and presenter responses can be found in the Presentation Questions Log table at the end of this document.

AUTOMATED TECHNOLOGIES SAFETY PANEL
(Moderator) Shelly Baldwin, Director, *Washington Traffic Safety Commission*
Dr. Alexandra Mueller, Research Scientist, *Insurance Institute for Highway Safety*
George Ivanov, Head of International Policy and Government Affairs, *Waymo*

Shelly Baldwin, Director for the Washington Traffic Safety Commission, moderated an automated technologies safety panel with representatives from the AV industry and the research community to explore what is being done in automated technology safety research at various levels of automation.

Dr. Alexandra Mueller, Research Scientist with the Insurance Institute for Highway Safety (IIHS), presented on research in driver attention and partial driving automation. Drivers of level 2 systems can find it difficult to maintain attention while using the level 2 features. Driver attention is highly important in level 2 vehicles, as level 2 systems frequently encounter conditions they cannot handle. Dr. Mueller discussed an IIHS-developed proof of concept to evaluate if drivers noticed surprise events during the course test. The proof of concept found that drivers familiar with level 2 technology that was turned on in the test vehicle had higher recall of the surprise events, while drivers unfamiliar with the level 2 technology on in the vehicle had lower recall than unfamiliar drivers that did not have any level 2 technology enabled. A key point of the study

is that these systems need to be designed in a way to be effective and robust in their monitoring and management of drivers in order to keep drivers engaged in the driving task. Dr. Mueller also discussed guidance the IIHS recently published on driver attentiveness, such as driver monitoring, attention reminders and countermeasures, cooperative lane centering, automated lane changing and overtaking maneuvers, and communicating proper system use.

George Ivanov, Head of International Policy and Government Affairs for Waymo, presented on Waymo's approach to safety, road safety performance data and a recent publication Waymo published on Waymo's Driver performance in simulated high severity fatal crash scenarios.

Waymo identified a key issue when developing and testing lower-level automation in vehicles – drivers get distracted easily. In 2015, Waymo elected to stop developing lower-level automated vehicles and focused on highly automated vehicles that do not require a driver instead. Waymo published the world's first safety framework for fully autonomous driving, that describes how Waymo develops, evaluates, rolls out, and manages its vehicles in the real world in a layered approach to safety.

Mr. Ivanov discussed conducted a study Waymo undertook to simulate high severity fatal crash scenarios, replacing the human driver with the Waymo "driver" system to see how it would perform hypothetically in real life situations. As the "Initiator" (entity that caused the crash), Waymo Driver avoided 100% of crashes, and as the "Responder" (entity that was crashed into), Waymo Driver avoided or mitigated 100% of crashes. For mitigated crashes, driver was 1.3 to 15 times less likely to sustain a serious injury. The Waymo driver performed both evasive and non-evasive measures to avoid or mitigate crashes. Mr. Ivanov acknowledged this data as important to highlight the safety benefits of AVs in real-world scenarios.

Director Baldwin moderated a question and answer discussion with Dr. Mueller and Mr. Ivanov, questions and presenter responses can be found in the Presentation Questions Log table at the end of this document.

AAMVA AUTOMATED DELIVERY VEHICLES AND DEVICES WHITE PAPER
Brian Ursino, Director of Law Enforcement, *AAMVA*
Daniel Yeh, Manager, Vehicle Services, *Iowa Department of Transportation*

Brian Ursino, Director of Law Enforcement for the American Association of Motor Vehicle Administrators (AAMVA), and Daniel Yeh, Manager of Vehicle Services for the Iowa Department of Transportation, presented on AAMVA's recently published Automated Delivery Vehicles and Devices Whitepaper.

AAMVA published two editions of Safe Testing and Deployment of Vehicles Equipped with Automated Driving Systems Guidelines, to facilitate a consistent regulatory framework to balance public safety with advancements in vehicle innovations. Following release of Edition 2, it was acknowledged that the Guidelines did not adequately address automated delivery vehicles and devices, which was noted as an immediate need of the AAMVA community.

MEETING SUMMARY

AAMVA elected to develop an adjunct document to address this. Mr. Ursino and Mr. Yeh provided an overview of the whitepaper and top lessons learned, which include a clear distinction between delivery vehicle and device types, and that jurisdictions should develop oversight processes for PDDs involving state, local, and enforcement agencies.

AAMVA is committed to keeping pace with the evolution of vehicle technology and has started work on Edition 3 of the Guidelines, with publication anticipated no later than September 2022.

EXECUTIVE COMMITTEE MEMBER ITEMS
Open forum

Executive Committee members in attendance were given the opportunity to offer thoughts, insights, and observations.

- Vice Chair and Commissioner Shiv Batra noted per presentations at this meeting and in the past have indicated that level 4 automated vehicles are here, it is not long term as level 5 is indicated to be. Vice Chair Batra asked if the Work Group should refine its focus to advancing level 4 specifically in the near term. Chair Restucci acknowledged that although government needs to be a partner in this, industry will drive whether focus will be on level 4 and or level 5 for near- and long-term efforts.
- Representative Shelley Kloba commented that Washington was early on regulating personal delivery devices (PDD), which transport goods using pedestrian infrastructure. This Work Group has mostly focused on vehicles meant to transport humans. The AAMVA presentation discussed automated delivery vehicles that is operating on the street delivering goods. Representative Kloba asked if was there a desire or obligation to address automated delivery vehicles within Washington's legislative framework, starting that discussion in this group? Chair Restucci commented that it may be best to start discussion of personal delivery devices and vehicles at the city and local level, as they manage curbs, sidewalks, etc.
- Beau Perschbacher noted the Licensing Subcommittee would be happy to provide input on the suggestions the industry is looking to make in HB 2676 Section 2.
- Representative Sharon Shewmake commented there seems to be a lack of education with level 2 technology and asked if there are plans to do more education, such as with dealerships and rental companies.
    - Chair Restucci agreed and stated he would like to see the Washington Traffic Safety Commission (WTSC) take something up on this topic. Director Baldwin of the WTSC stated that most of the WTSC funding is federal dollars. WTSC has the knowledge and infrastructure to work with partners, however an education campaign would require funding, which is not currently available federally, but may be included in a future reauthorization.
    - Representative Sharon Shewmake asked if education on these technologies included in driver's education? Debi Besser of WTSC stated that it is part of

the required curriculum, however WTSC is working on providing better materials to drivers ed classes.

- o Dr Yinhai Wang noted that the American Society of Civil Engineers Connected and Autonomous Vehicle Impact Committee recently completed a "Transportation Primer", targeting education of these types of technologies. Dr. Wang also noted that the University of Washington (UW) recently launched a workforce development institute and developed training resources to Alaska DOT, WSDOT, and others who may need this type of training. The UW is working with the summer youth program to setup a K-12 course about what autonomous vehicles are, hoping to offer in 2022.

- An anonymous attendee asked if something can be done to address the driver's education course requirements for addressing ADAS and related equity issues. The attendee noted the only way to get your license prior to turning 18 is to pay $600 for a private driver's education course.
  - o Beau Perschbacher of DOL noted this is an issue the DOL has looked at. Mr. Perschbacher stated that traffic safety data shows those who wait until turning 18 to obtain their license (without taking the driver's education course) are twice as likely to be a vehicle crash fatality. Mr. Perschbacher noted this is a complex issue, some states have explored providing subsidized training.
  - o The attendee noted Washington school districts used to teach these courses but stopped due to liability issues. Chair Restucci asked Work Group staff to coordinate with the Liability Subcommittee to look into this topic further.

CLOSING REMARKS

Executive Committee members were asked to indicate their interest and comfort level in holding the October 5th Work Group meeting in person, rather than virtually. less than half of the members were comfortable meeting in person, the Work Group elected to continue the course of holding the meeting virtually on October 5th.

Chair Jim Restucci thanked the presenters, organizers, and Executive Committee members and adjourned the meeting.

MEETING ADJOURNED.

Important Dates:

- **October 5, 2021** – Executive Committee meeting
- **October 19-20, 2021** – Transportation Commission Meeting *(presenting the AV Work Group 2021 Annual Report)*
- **November 15, 2021** – AV Work Group 2021 Annual Report due to Governor and Legislature

MEETING SUMMARY

PRESENTATION QUESTIONS LOG

Presentation	Participant	Question / Comment	Presenter Response
AV Industry Panel on SSB5460	Representative Shelley Kloba	In addition to a regulatory framework, what are some other factors that drive companies to test or not test in a certain area?	• Geography, weather conditions (warm, smooth vs. snowy, etc.), urban density aspects • Access to workforce, engineers • Clarity on deployment and stability of regulatory landscape are key
AV Industry Panel on SSB5460	Representative Shelley Kloba	Regarding potential burden of reporting data to law enforcement – AV companies, especially those designing AV software, are very capable of processing vast amounts of data. Reporting the data is not a problem of not being able to or not knowing how to organize or transmit the data. Is it really a matter of not wanting regulation?	Good question. Short answer, no, it isn't that we do not want regulation. It is not a question of the volume of data, it is a question of the value of the data. If driving on I-5, an AV could be in multiple towns within just a few minutes. Not understanding the value of notifying all these towns' law enforcement 14 days in advance. A company's schedule may change, if they must report 14 days in advance, restricts testing. Are there ways to shape this to be far less burdensome? In current structure, the obligation is on the companies to identify and notify all law enforcement entities to report to. Rather, there is potential for the companies to provide data to a central entity, such as the DOT, through a portal that can be pushed to the appropriate entities.
AV Industry Panel on SSB5460	Jeremy Une	If there is an accident, such as an AV rear ended at a stop light, how does the public handle this? How is information exchanged?	Under current law in Washington, there must be an operator in the vehicle, and they would be the responsible party to handle the exchange.

MEETING SUMMARY

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AV Industry Panel on SSB5460	Jeremy Une	Specific to King County, there are jurisdictions that overlap – a county jurisdiction within a city limit. Who responds?	Law enforcement interaction plans developed for highly automated vehicles provides tools and information for a law enforcement officer to understand how best to interact with the vehicle. In terms of which jurisdiction's law enforcement responds, that is up to the jurisdictions rather than the AV industry, as it is handled now.
AV Industry Panel on SSB5460	Brenda Wiest	There are multiple reasons law enforcement may be interested in receiving data as these AVs pass through their jurisdictions. What stakeholder has the industry done with law enforcement on what they would like to receive and how it might be useful?	We have worked with law enforcement through the entire legislative process. We will take how we've interacted with other states in developing those interaction plans to inform plans in Washington. The objective is to provide adequate information to provide proper preparation.
AV Industry Panel on SSB5460	Reema Griffith	Panelists indicate interest in changes to the current law, can you send a write up of specifically the changes you are looking for, and suggestions for replacement language in the law? Could we setup a follow up so this group can work with the industry to support this moving forward?	We have suggestions for amendments. Still working on how we would recommend specific implementation.

MEETING SUMMARY

Presentation	Participant	Question / Comment	Presenter Response
AV Industry Panel on SSB5460	Annabel Chang	Regarding the NHTSA guidelines – what are the timelines looking like at the national level? Have any states responded? Where does the industry stand?	NHTSA order went into effect 10 days after issuance on June 29th. Each AV company named in the order had a single day to report a significant crash that occurs. AV companies or ADS manufacturers and developers are subject to an additional obligation, on the 15th of each month, must submit a report on all minor crashes that includes alleged crashes. Very broad data reporting requirement. Little clarity at this time on how that information with be released, what will be redacted, etc.
AV Industry Panel on SSB5460	Shelly Baldwin	Pathway to deployment – Does this specifically mean level 4 and level 5 driverless vehicles? And if so, how are other states dealing with liability and safety questions when there is no driver to contact or hold responsible?	A number of states allow for driverless testing and deployment of level 4 vehicles. Liability questions – existing torte laws well-equipped to handle liability in the event of a collision. Important for entities to be able to start to get deployment in place to commercialize the technology, in accordance with safety put forward by companies and safety self-assessments they take and the dialogue with state and federal authorities. If something that was on the car when it came off the mainline caused an incident, the manufacturer is liable, as it is today.

MEETING SUMMARY

Presentation	Participant	Question / Comment	Presenter Response
AV Industry Panel on SSB5460	Shelly Baldwin	Is it envisioned that people without a driver's license being carried in level 4 and level 5 vehicles? Do these other states say there does not need to be restrictions on who is operating these vehicles, in terms of safety requirements such as distracted driving, impaired driving, holding a license, being of a certain age?	Regarding how the system itself gets licensed – There is an operator and an owner. There are procedures and protocols for a vehicle to remain at the scene of an accident, providing information to law enforcement. Distinct roles for state, local, and federal entities. Traditional roles for licensure and registration is still a state level role.
AV Industry Panel on SSB5460	Representative Mary Dye	Do you think there will be dedicated roads for AV freight or are anticipating for AVs to operate on existing roadways with other passenger and freight vehicles that are non-AV?	It is up to the state, city, local jurisdictions to determine if there is a desire to have a dedicated / expedited lane for AV freight. The intent is to bring AV technology to the roads as they are today.

MEETING SUMMARY

Presentation	Participant	Question / Comment	Presenter Response
WSTC ADAS Survey and Education Plan Project	Zack Hudgins	On the slides on agreement vs. disagreement. Agree it is troubling if someone agrees with something that is not true. On some slides, people were disagreeing with what the system *does* do, which may indicate separation between the user and the technology. Is it problematic with folks disagreeing with true statements about the system?	There was less disagreement, more unsure. People had high confidence in what they knew. When asked specifics, they weren't as confident. Disagreement with true statements was limited. Many more were just unsure.
WSTC ADAS Survey and Education Plan Project	Markell Moffett	Can you provide some information on next steps in working with these survey results and developing the education plan?	Taking these results, brainstorming, developing an approach. Hoping to begin implementation next year, looking to address some misconceptions and begin to educate drivers.
WSTC ADAS Survey and Education Plan Project	Representative Sharon Shewmake	Do all vehicles 2017 and up have these technology features?	Went through automaker data, and saw that starting in 2017, a prevalence of ADAS technologies increased significantly. Asked that as a prequalification question, asked participants if they had the technologies to move forward in participating.

MEETING SUMMARY

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WSTC ADAS Survey and Education Plan Project	Chair Jim Restucci	Surprised that rental car companies had me the keys to a car equipped with ADAS technologies and do not provide any information on the technology. Are there plans to work with rental car companies, even to just provide something like a one-pager for renters?	That is a big gap in knowledge. That is an area that deserves to be looked out. When someone buys a new vehicle, they don't get the education, let alone when they rent a car.
Automated Technologies Safety Panel	(Moderator) Shelly Baldwin	What kinds of data will we need to collect to know if level 2 vehicles are reducing or increasing crashes, and do you think the crash reporting data (newly required by NHTSA) will be helpful here?	IIHS: To understand if these systems have safety benefits, we need to know the crash scenarios they are involved in. Are the systems on at the time of the crash, what the vehicle was doing, what the human driver was doing, what technology is equipped on the vehicles themselves. There is currently no universal VIN database of what is equipped on each vehicle. Need a VIN database to know what is equipped on the vehicle, police crash report data, access to the black box, naturalistic observation data to understand how driver interactions change over time.

Waymo: Consistency in collision reporting and its data has been a longtime challenge. In Arizona, we had access to public records, which may not be available in every state. NHTSA's general order moves us towards consistency. It wouldn't be the be all end all understanding how AVs compared to human drivers though, human driver data is difficult to obtain today. The closer we get to parity between the two, the better it will be to compare. |

MEETING SUMMARY

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Automated Technologies Safety Panel	(Moderator) Shelly Baldwin	Washington is interested in attracting AV testing. Would Waymo consider testing in Washington? How does Washington's environment (rain, snow, ice, fog, hills and mountains) compare and how our regulatory environment compares as you prioritize where to test?	Waymo: Washington was one of the first states we tested in, about 5 years ago, for rain. We test in different jurisdictions for different weather conditions – Arizona for extremely hot conditions, easy coast for black ice, etc.

It is important to ensure the 'driver' we are building can operate, one day, on a global scale, in any environment.

Policy environment in Washington is also favorable. The Executive Order and work done to date is helping build towards a favorable policy. The path is there, the technology still needs to catch up. We need to make sure we can commercially operate, and people are actually using this technology in scaled ways before we go to other jurisdictions and try to recreate and scale. |
| Automated Technologies Safety Panel | Curt Augustine | Dr. Mueller used the phrase "complex puzzle", want to layer another complexity on that. Need for more data, more cameras, more imaging. At the same time, automakers are wrestling with policymaker calls asking to not have those technologies, for privacy concerns – varying perspectives on that. | *No response required.* |

MEETING SUMMARY

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Automated Technologies Safety Panel	Representative Shelley Kloba	When we were working on HB 2676, we discovered with the testing pilot program, manufacturer/company that wants to test gets to decide by checking a box whether they have a human driver/attendant in the vehicle or not. There were no prequalifications required. Excited to hear companies like Waymo are giving that level of confidence to the public to know this is what they're going through, the benchmarks in their program before taking the risk. Have you [Waymo] felt like publishing that safety framework and details about the methodology and how you are deciding the technology is ready? Is there a concern around specialized knowledge or proprietary information?	Waymo: All of what we do is built on trust. Trust that our employees have, making the safe decision. Trust that our riders have, that we are keeping them safe. Trust in the public that we are being thoughtful and deliberate with scaled deployment. Before the safety framework, we began with dialogue with communities, states, federal officials responsible for jurisdictions we test/deploy. Varying, overlapping levels of authority – federal enforcement authority and defect investigation authority, state authority over motor vehicle operations or fleet types or ridehailing, or local operations and authority over things like parking spaces, congestion, or taxes. These various pathways allow us to share dialogue, and where we are. Both states and the federal government have expanded their knowledge capacities of autonomous vehicles and technologies. In previous years, releasing something like this would not have meant that much – today, many people are engaged and active in the conversation. The reason you may not be seeing much of that today in Washington state is that those deployment decisions haven't been made yet, companies have not reached the point to convince themselves let alone convince others the technology is safe enough to deploy in Washington.

MEETING SUMMARY

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Automated Technologies Safety Panel	(Moderator) Shelly Baldwin	Traffic deaths in Washington for walkers and rollers make up 20% of traffic deaths and is a big concern for the Washington Traffic Safety Commission. There is already a complex environment with lots of visual clues, non-verbal communication, how people interact. How do you anticipate near- and long-term AV technologies navigating these complex environments and being able to keep people inside and outside the vehicle safe?	IIHS: There is opportunity for vehicle-to-vehicle and vehicle-to-infrastructure communication. One technology that has promise is left turn assist with intersection navigation, and Infrastructure itself designed in a way that is focused to the safety and navigation patterns of vulnerable road users, there are left turn hardening infrastructure strategies and automated enforcement. Automated enforcement is a contentious issue, but has been demonstrated to have efficacy in reducing crashes with vulnerable road users. Waymo: When you get to the deployment decision and looking at the test data you have to proceed ahead. When looking at high density areas where there are serious injuries and fatalities – pedestrians, scooter riders, wheelchairs, etc. – you need a diversity of data to show how you could/would avoid or mitigate those kinds of collisions. That revolves around testing in the real world, testing virtually, testing on closed courses some situations that are too unsafe to test on real roads. Once the systems are ready, they have to have the data to backup those common kinds of scenarios can be avoided or mitigated. When looking at different locations, it is not just weather and geography, it is driving behaviors, number of pedestrians, the kinds of situations involved in the area. The system has to have these capabilities in the system itself to handle those situations. Waymo does not rely on infrastructure. In 2009, there was no smart infrastructure, no 5G. Building the system meant building the driver – if there is no connectivity, no infrastructure, the vehicle can still operate. The system needs to operate as the driver.

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Automated Technologies Safety Panel	Representative Shelley Kloba	It is interesting that most of the examples Waymo demonstrated running simulation based on real-life crash data, two of the three involved an inebriated driver and very high speeds. We assume and hope a level 5 automated vehicle cannot get inebriated, cannot fall asleep, will not have inattention like a human driver using level 2 or level 3 vehicles. What are some other simulations you are doing and other problems you are trying to overcome for us to better understand the thoroughness of your safety testing?	Waymo: In Waymo's 2017 safety report, the appendix included all the typical behaviors of a human driver that we test for in our AV, baseline categories with which we generate thousands of scenarios from. It also included categories of collision avoidance scenarios, stemming from the most frequent types of collisions in the US. Beyond those simulated in Arizona, there are many scenarios we see in every mile of driving we do. We see wrong way drivers, drivers that would have hit the side of the vehicle, frequent red-light runners, wrong way cyclists, etc. We take those into our simulation and increase it, to ensure under the most intense circumstances the system can safely stop, maneuver, and avoid the collision. It is key for Waymo to increase the complexity as much as possible so if it encounters a scenario in the real world it could not have predicted, it can safely stop and not proceed, which is the number one action it is trying to take. Another piece is to make sure the technology is advancing in a way that the vehicle can detect these situations. When we began in 2009, sensor technology such as lidar and radar were not good enough commercially to give us the fidelity we needed for fully autonomous operation. Off-the-shelf technology we bought back then had 150 meters of range, and that led us to develop systems in house for higher fidelity, with over 300 meters of range. They also overlap to compensate if one system doesn't see it. The system is also designed to safely pull over. You don't necessarily see that in level 2 or ADAS systems – low tire pressure, seatbelt unbuckled, situations that can be detected for a safe pullover event.

MEETING SUMMARY

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Automated Technologies Safety Panel	Steve Gordon	For regulation and testing, it seems to be a patchwork quilt of state by state efforts, fair degree of inconsistency in signage and signaling from state to state. How does Waymo handle that so the vehicles can travel between markets, states, weather, topographical situations, etc.? How do you see federal coordination and their role and how it is working so far?	This speaks to the federal vs. state roles and how companies like Waymo have to navigate and rise to the challenge.
			Part of it is having a baseline of what is safe enough. We appreciate the work of the federal government of looking to the future, how to develop safety cases going forward.
			For the state and local level, some of the geography discussion becomes extremely complex. How do you convert tens of thousands of rules of the road into driving behaviors for these vehicles? We don't think you can get around that. Conversations are being had around the world. The UN is working to harmonize on some level of baseline laws for cross-border travel of AVs. In the US, cross-state travel is already available. Expectations and requirements of human drivers today are being translated and must be complied with. We are building in those requirements and abilities to make sure we are complying with the rules of the road that apply to human drivers today.
			One example that is small but indicative of how human drivers can miss the changes in rules of the road, is a requirement in California of a 2-foot buffer gap between a moving vehicle and a cyclist – that rule was changed to 3 feet. Waymo had to build in that change. Whether human drivers were trained to do that when the law changed, don't think that occurred.
			We are not advocating for changes of the rules of the road for AVs, no dedicated lanes, we have to play by the same rules.

MEETING SUMMARY

Presentation	Participant	Question / Comment	Presenter Response
Automated Technologies Safety Panel	Representative Shelley Kloba	Human driving behavior can be quite perplexing. Complex-brained humans have a hard time predicting others' driving behavior. Are there things Waymo's system has trouble figuring out?	Waymo: A core challenge companies in this space have had is aggressive vs. defensive driving. In California, there are times you may need to violate the rules of the road to keep people safe, such as higher speed to merge into the highway lane then slowing back down. Waymo's driver can do that – could not with earlier systems but can now. It is designed to be a defensive driver. We have received complaints that it 'takes too long' waiting for an opening, for driving the speed limit. There is a balance of meshing expectations with reality. Another example of an improvement we made was not to hit the gas immediately when the light turns green. Human drivers usually take an eighth to a tenth of a second to accelerate. The vehicle can do it immediately, but found it was unsafe because within that first 1 to 2 seconds that we saw the most red-light runners. We added a delay in purpose to make it safer.