

WASHINGTON STATE AUTONOMOUS VEHICLE WORK GROUP

Washington State Transportation Commission

AV Work Group Executive Committee Meeting

June 6, 2022



Agenda



TIME	DESCRIPTION	PRESENTER
9:00	Welcome, Introductions, & Virtual Meeting Operations	Jim Restucci, Chair, AV Work Group Executive Committee
9:10	University of Washington AV National Research Update	Bill Covington , Director, & Andrew Raitt , Student, <i>University of Washington Technology</i> Law & Public Policy Clinic
10:10	IIHS Ratings Program for Partial Driving Automation	Dr. Alexandra Mueller, Research Scientist, Insurance Institute for Highway Safety (IIHS)
10:55	AV Pilot Recommendation DRAFT	Scott Shogan, Vice President, WSP USA
11:25	LUNCH BREAK	30 MINUTES
11:55	Legislative Update and Next Steps	Reema Griffith, Executive Director, Washington State Transportation Commission Comments from Legislators
12:20	AV Roadmap to the Future – Key Component: Public Outreach	Scott Shogan, Vice President, WSP USA
12:55	AV Industry Presentation	Katie Stevens, Head of State and Local Policy, Nuro
1:40	Executive Committee Member Items	Open forum for members
1:55	Closing Remarks	Jim Restucci, Chair, AV Work Group Executive Committee

Overview of Virtual Meeting Operations



WASHINGTON STATE AUTONOMOUS VEHICLE WORK GROUP







Executive Committee Members & Presenters

- You can **mute/unmute yourself**, please stay muted unless speaking
- During discussion and when you are speaking, please turn on your video
- Use the "Chat" box to communicate with "panelists" meeting hosts, committee members, and presenters
 - » NOTE: You have the ability to send a chat to ALL ATTENDEES, please do not use this feature
 - The meeting controls bar may be on top, bottom, or sides of your screen





Executive Committee Members & Presenters

(continued)

During discussion and Q&A periods:

Raise your hand

OR

Pose a question in the "Chat" box

 You will be able to see questions in the Q&A box, but may not be able to pose a question





Other Attendees

- You will be muted with no video capabilities when you join
- The "Chat" feature is disabled
- Use the "Raise Hand" feature to request to be unmuted
- Use the "Q&A" box to pose written questions
 - » Organizers will read questions aloud during Q&A periods





Other Attendees

For those calling in:

- Mute/unmute by pressing *6
 - » When not speaking, please mute the phone line
- "Raise Hand" by pressing *9

University of Washington AV National Research Update

Bill Covington & Andrew Raitt, University of Washington Technology Law & Public Policy Clinic





WASHINGTON STATE AUTONOMOUS VEHICLE WORK GROUP



University of Washington Technology Law and Public Policy Clinic

Connected and Autonomous Vehicles Clinic Team

Tatiana Barraza, Erika Bykov, Ramita Kondepudi, Andrew Raitt, Carl Rustad, Ryan Tursi

Who We Are



Presentation Agenda

- DATABASE SHARING AND WALKTHROUGH

- Review our Fifty State Survey
- Visit the New Database Website
- Discuss State Rating System

- ASYNCHRONOUS PRESENTATION BY CAV TEAM

- Tatianna, Erika, Ramita, Carl, and Ryan will discuss our Whitepaper research
- Intern Shaun will discuss the summer research paper he is beginning
- SUMMARY STATEMENTS
- Q & A

Summary Statement

- CAV Database and Fifty State Survey
- State Rating System
- Whitepaper on ADA Policy Recommendations for AVs
- The Technology Law and Public Policy Clinic is in abeyance for the next academic year. The Connected and Autonomous Vehicle Research Team will return in 2023-2024
- Thank you for your time and attention!

Introduction - Overview

Individuals with Disabilities in the US



CDC: Disability Impacts All of US

Planning Concerns

1 2/1

Changes in Mode

of Transportation

11:25 AM from Landemolm Oir SE & 148th Ave SE \$2.75 #-9 mm every 15 mm 11:19 AM O UW Medicine COVID-19 Testing Site at Bellevue College Parking Lot 18, 3000 Landerholm Cir SE. Bellevue, WA 98007 Walk -4 w About Enroy 0.1 mil 11:25 AM Landerholm Cir SE & 148th Ave SE 0 221 University District Bellevue ✓ 43 min U/8 plans) - Stop 10/ 68583 15th Ave NE & NE 42nd St 12:08 PM 0 Walk ♥ Aboot 2 Imq.II.1.mi 12:10 PM
University of Washington School of Law

Planning Concerns



Jackson, Wyoming

Physical Concerns



Passenger Concerns

PERSONAL SPACE





The Disabled Life Tumblr



Technology Concerns



King County Metro



ADA in Public Transportation

- In the context of Connected and Autonomous Vehicles, it is important to understand the ways in which the ADA applies to public transportation today.
- Various requirements imposed by the ADA in public transportation



Example of Disability Access in Autonomous Vehicles

Waymo pilot program in Phoenix Metro

- Participants: people with disabilities and senior citizens 65 and older.
- Throughout the study, participants rode the vehicles with an operator on sight.
- Self-reported results of the study



Americans with Disabilities Act

- Signed in 1990, Amended in 2008
- Consists of five different titles
 - Employment
 - Public Entities
 - Public Accomodations
 - Telecommunications
 - Miscellaneous



What is a disability under the ADA?

- Physical or mental impairment that substantially limits one or more major life activities
- The 2008 amendments added examples of major life activities



Focus on Title II - Public Entities

- Enforced by multiple federal agencies
- Department of Transportation promulgates rules for public transportation provided by public entities
 - Example: bus requirements



ADA and Autonomous Vehicles

- ADA regulates almost all transportation providers, including future autonomous vehicle-based services
- Early lawsuits against private rideshare companies indicate little ADA applicability
- Public sector could therefore play an important role



Ramos v. Uber

- Allegations against Uber survived summary judgment
 - o 49 CFR 37.29
 - o 42 CFR 12184
- Uber strenuously objects to the applicability of these sections
- Could indicate scope of ADA applicability to private autonomous vehicle services



49 CFR 37.29

- Taxi services may not:
 - Refuse to provide services to those who can use them
 - Refuse to assist in stowing mobility devices
 - Charge higher fees for those with disabilities



42 CFR 12184

- Applies to servicers "primarily engaged in the business of transporting people" providing "specified public transportation services."
- Such providers may not:
 - Have eligibility requirements tending to screen out those with disabilities
 - Fail to remove barriers to use where readily achievable
 - Fail to, if it would not fundamentally alter the service, provide:
 - Modifications for accessibility
 - Auxiliary aids



Role of Public Sector

- Likely minimal duties to expand accessibility under ADA for private autonomous vehicle providers
- Service providers contracting with the government subject to more ADA provisions
- Government contracting with autonomous vehicle companies could increase accessibility



Case Study: Utah Autonomous Shuttle Pilot

- This pilot program and the resulting report dedicated resources to understanding what ADA compliance would look like
- Reached out to various stakeholders with disabilities to better understand their needs
- Relied on Level 4 automation EasyMile shuttles, which were customized to include ramps and Q'Straints



The Case for Operators

- The topic of AVs often raises concerns about job loss for drivers
- When it comes to public transportation, operators perform more tasks than just driving
 - Ranges from climate control to providing guidance and assistance to the elderly and/or disabled
- Relying on non-driving operators could help ease job loss associated with AVs and provide an extra layer of accessibility



Recommended Design Improvements



- Raised edges of 1.5 inches for ramps to comply with the ADA;
- External stop announcements;
- Two-strap wheelchair securement system, automatic if possible;
- Electric vehicle sound;
- Double-check Braille is accurate;
- A less steep ramp slope; and
- Stop-specific internal stop announcements.

Special Thanks



Shaun Olafson

2022 Lead Developer

CAV Online Database Development Team

Special Thanks



WSTC Director Reema Griffith Dean William Covington

Questions?

IIHS Ratings Program for Partial Driving Automation

Dr. Alexandra Mueller, Insurance Institute for Highway Safety (IIHS)



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IIHS ratings program on safeguards for partial driving automation

WA AV Work Group June 6, 2022 Meeting



Alexandra Mueller Research Scientist



New IIHS vehicle ratings program

Sets minimum expectations for automakers to design systems that deter misuse



- Program does not endorse partial driving automation
- It is technology neutral to encourage innovative solutions
- Safeguard categories are data-driven and will continue to evolve

Categories for the IIHS ratings program

- 1. Driver monitoring

- STOP

- **▲**+**●**)+**|●**| 2. Attention reminders
 - 3. Emergency escalation
 - 4. Automated lane changing
 - 5. ACC auto-resume
- 6. Cooperative steering assistance

Driver disengagement

Indicators that the driver is out of the loop



Glance behavior:

Correlated with visual attention

Crash risk increases with off-road glance time

Hand activity:

Hands off wheel related to off-road glances and distraction

Manual activities impair steering ability

IIHS category 1: Driver monitoring

Must monitor driver for signs of disengagement



Where is the driver looking?



What are the driver's hands doing?

Communicating to the driver

How can the driver be brought back into the loop?



For alerts to be effective:

Timing is crucial

Must be clear and intuitive

Visual information clarifies system's communication purpose and driver instructions

- Alert escalation implies urgency
- Multi-modal communication improves driver detection and response

IIHS category 2: Attention reminders

Rapid timing and utilization of multiple channels of communication

Attention reminders should rapidly escalate in urgency

- Escalation should add more modalities at each stage (which may include vehicle kinematic behavior, e.g., pulse braking)
- Must escalate to a minimum of three modalities



What if the driver does not respond?

Countermeasures



- Worst-case scenarios: unsupervised system support or simply switching off
- Better scenario: controlled stop or slow down
- Countermeasures help deter repetitive prolonged misuse

IIHS category 3: Emergency escalation

- System should never simply switch off
- Vehicle should slow down/stop and automatically make an SOS call
- Driver access to system becomes restricted for remainder of drive (lockout) If vehicle slowing/stopping procedure has been initiated After a threshold number of escalated attention reminders have occurred



Responsible application of automated functionality



- Added functionality can exacerbate driver misunderstanding about system limitations
- Risky situations can develop if the vehicle starts to move or performs a complex maneuver before the driver is ready
- Unexpected system behavior takes time for a driver to react to



IIHS category 4: Automated lane changing



- Feature not required to achieve good overall rating
- Systems that have it must require deliberate driver input to initiate or confirm the auto lane change maneuver before it can occur
- Feature only acceptable in systems that perform well on all other safeguard categories

System behavior without driver involvement

Driver distraction is prevalent while at stop and at slow speeds



IIHS category 5: ACC auto resume





- DMS must verify that driver is looking at the forward roadway before autoresuming
- If vehicle is stopped longer than that maximum duration, ACC should not auto resume at all (even if driver is looking ahead)

Keeping the driver involved

Proactive design strategies through shared control



- Information feedback helps coordinate anticipatory driver steering behavior
- Beneficial for conveying driver autonomy
- Promote driver participation
- Position cues through wheel can improve awareness of system's behavior and speed up detection of situations requiring intervention
- Non-cooperative designs can be perceived as punitive whenever driver steers

IIHS category 6: Cooperative steering assistance

> System must not switch off (i.e., require manual reactivation) whenever driver steers within lane



What features should be used with these systems?

Established vehicle technologies



- No clear safety benefit for partial driving automation
- Clear safety benefits for AEB and LDP

Address types of crashes that can result from distraction (e.g., rear-end and lane drift)

Clear safety benefits for seat belts

IIHS category 7: Safety features

- System cannot be switched on while automatic emergency braking (AEB) and lane departure prevention (LDP) are disabled or while driver is unbuckled
- > AEB and LDP cannot be switched off while system is on
- If driver unbuckles while system is on, attention reminders and emergency escalation process must begin





Insurance Institute for Highway Safety Highway Loss Data Institute

iihs.org







Alexandra Mueller

Research Scientist amueller@iihs.org



AV Pilot Recommendation DRAFT

Scott Shogan, WSP USA



WASHINGTON STATE AUTONOMOUS VEHICLE WORK GROUP



Transportation Commission 2021 Recommendation

Advance a state AV pilot program

WSTC and AV Work Group to establish scope & plan, and report back to Legislature by the 2023 session





Initial Pilot Recommendation Outline

- **Goals and Objectives**
- Structure of the Pilot
- **Pilot Administration**
- Role of Work Group



Equity

- Transit accessibility
- Disadvantaged communities
- Barriers to access

Public Awareness

- Understanding of capabilities
- Educate on safe use
- Measure public opinion

Organizational Knowledge

- Agency roles
- Partnerships
- Regulatory framework
- Preparedness



Are these still the right goals and objectives to drive pilot proposal development?

Multiple Choice, can only select one

0	0	0
YES	MAYBE but some others are missing	NO one or more needs to change/ be removed



If you answered "maybe" or "no" to the previous question, please expand here...







AV Pilot Use Case

Last-mile solutions to increase accessibility to transit in urban and small city/town settings



Approach - Intent

- Crawl, walk, run low risk threshold
- Test in both small city/town and urban settings
- Explore impacts to different communities
- Expand public awareness and exposure
- Identify equity considerations

Approach - Engage

- Gauge transit agency and industry interest
- Identify potential cost implications
- Discuss scope and innovative opportunities



Approach – Criteria, Execution, and Outcomes

- Proposal criteria
- Required documentation for pilot execution
- User survey(s)
- Pilot Summary and Findings Report
- Report to the Legislature

Approach – Anticipated Criteria

- Degree to which goals and objectives are addressed
- Qualifications and past experience of proposed team
- Plan to execute the pilot, including outreach to and inclusion of those impacted by the policy(ies) being explored (e.g., equity)
- Plan to address regulatory and stakeholder requirements and hurdles



Does your orgo Approach	anizatior	suppo	rt the pr	oposed
Multiple Choice,	can only se	elector		
-	0 Yes, it is on the right track	0 No, don't support	0 Not sure	



If you answered "No, don't support" or "Not sure" to the previous question, please expand here...





Administration

- Lead State Agency: Facilitate, coordination, oversight
- Transit Agency(ies): help develop pilot concept and integrate into their transit service
- Industry Partners: provide vehicles, technical and program support



Role of the Work Group

- Develop goals and objectives, pilot recommendation
- Receive updates during pilot development and solicitation process
- If Work Group is extended beyond 2023, could serve in an oversight role

Schedule

- Summer 2022 Develop pilot recommendation; outreach to Transit community and AV industry
- Fall 2022 Refine pilot recommendation, present to Transportation Commission & Work Group Executive Committee
- November 2022 Submit Annual Report to Legislature, includes pilot recommendation
- 2023 Legislative Session Legislature review and deliberate on pilot proposal and funding provision



Do you have any additional comments or questions about the AV Pilot Proposal?



Thank You!



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Be back at... 11:55 a.m. PT

Legislative Update and Next Steps

Reema Griffith, Washington State Transportation Commission

Comments from Legislators





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AV Roadmap to the Future – Key Component: Public Outreach

Scott Shogan, WSP USA



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Roadmap to the Future



The "**Roadmap to the Future**" will serve as the Work Group's Legacy Deliverable and be a resource for law makers to consider future actions

- » Deliver at the end of 2023 (when the Work Group sunsets)
- » A plan for the future, how Washington can continue to prepare for AVs



Roadmap to the Future



2022 and 2023 Executive Committee meetings will focus in on each of the key components, one at a time



Public Outreach Goals

- Communicate about AVs in a comprehensive, transparent, and equitable way
- Increase awareness among public and stakeholders
- Understand varying needs from different perspectives



Outreach Activities to Date

- Established Work Group structure with Executive Committee and seven subcommittees made up of stakeholders and interests within each topical area
- Stood up AV Work Group Website
- Quarterly "WAVE" Newsletters
- WTSC ADAS Survey (and developing Education Plan)

Agency Readiness	Testing / Pilots	Public Outreach	Safety	Path to Deployment
5 7				

Outreach Activities to Date

What other Public Outreach activities has the Work Group and/or its subcommittees conducted to date?

Open Ended Text



Looking Ahead: Outreach Audiences

- Policymakers & Implementers
- Those impacted by/may benefit from policies
- Policy Influencers



Audience: Policymakers & Implementers

Examples	Goal	How
 Elected officials Key agencies and departments 	 Continue to inform policy 	 Targeted one-on-one discussions Work Group-type forum Legislative briefings

Audience: Those impacted by/may benefit from policies

Examples		Goal	How	
•	Law Enforcement/ First Responders Local Government	 Educate and inform agency procedures to address AV Understand needs for state-level policy 	 State-level associations 	

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Audience: Those impacted by/may benefit from policies

Examples	Goal	How	
Transit Agencies	 Educate on potential for AV to support operations Understand needs for state-level policy 	 Statewide associations Experiential engagement 	

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Audience: Those impacted by/may benefit from policies

Examples	Goal	How	
General Public	 Educate on safe use of AV technology Inform policy from a wide range of perspectives 	 Broadcast media Focus groups Experiential engagement 	

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Looking Ahead: Outreach Audience: Policy Influencers

Examples		mples	Goal	How
	• 7	Technology companies	 Understand statewide policy 	Targeted one-on-one discussions
	• 7	TNCs	priorities and	Work Group-type
	• (Other private	concerns	forum
	C	companies		
		A 1		

Advocacy groups

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Looking Ahead: Outreach Audience: Policy Influencers

Examples	Goal	How	
• Academia	 Inform process through policy research 	 Targeted one-on-one discussions Work Group-type forum 	

Agency Readiness	Testing / Pilots	Public Outreach	Safety	Path to Deployment

Looking Ahead: Outreach
Diversity of Input



- Drivers
- Cyclists
- Pedestrians
- Transit riders

Focus on Equity

- Communities of color
- Immigrant communities
- Low-income
- People with disabilities
- Seniors

Looking Ahead: Outreach
Outreach and Engagement



What do you feel is the role of the State in engaging with the general public?



Informing public regarding safe use of AVs Informing public regarding state of the industry/what's next Seeking input to inform broad policy Seeking policy input specific to equity

Agency Readiness	Testing / Pilots

Looking Ahead: Outreach
Outreach and Engagement

What methods do you think should be the focus of public outreach and engagement?



16

Looking Ahead: Outreach
Outreach and Engagement

What other Public Outreach activities should Washington State explore in the future for AV readiness?



Agency Readiness	Testing / Pilots	Public Outreach	Safety	Path to Deployment

Thank You!



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AV Industry Presentation

Katie Stevens, Nuro





WASHINGTON STATE AUTONOMOUS VEHICLE WORK GROUP



Local Electric Autonomous Vehicle Delivery

6.6.22 | Washington State AV Working Group Executive Committee Meeting

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Katie Stevens Head of State and Local Policy, West Nuro <u>kstevens@nuro.ai</u>



Agenda

01 Nuro Overview
02 How Communities Benefit
03 Nuro's Technology
04 Nuro's Operations
05 Policy Discussion

01 Nuro Overview



Meet Nuro.

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nuro

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About Nuro



Company founded in 2016 1300+ employees: AZ, CA, TX, NV, DC



Fully autonomous, on-road vehicle Battery-electric motor vehicle designed specifically for goods delivery



Delivering groceries, medicine, and pizza with leading retailers





02 How Communities Benefit



Shopping and running errands take up time, one of our most valuable and fleeting resources

93B

total personal vehicle trips for shopping and running errands¹

140+

hours per year for the average end consumer¹

% of vehicle trips taken by Americans*			¹ Source: 2017 U.S. Department of Transportation Na	tional Household Travel Survey
Other	Recreation	Commuting	Other Errands	Shopping
11%	22%	24%	23%	20%
0				Nuro Proprietary and Confidential 8

Road fatalities at a 40-year high

42,915

People died on roads in 2021 - a 10.5% increase over 2020

13%

Increase in pedestrian fatalities since 2020

20%

Increase in alcohol and speeding fatalities since 2019 Our focus on moving goods instead of people allows us to address community challenges

SAFETY Zero occupants



ENVIRONMENT Zero emissions



EQUITY Serving food deserts & those w/ mobility challenges



Jовs Revitalizing local commerce





Serving America's food deserts



The Steer Report quantifies the positive impact of AV delivery services

Middle scenario forecast for 2025-35

3.4M



\$4.1T

U.S. economic activity generated



348K

fewer crash injuries



407M

tons of CO₂ avoided



8K tons of PM2.5

avoided

Source: Economic Impacts of Autonomous Delivery Services in the U.S. Steer (2020)



'Pioneering Moment'

"Bravo to Nuro...This program is an important step toward helping students in our region learn valuable skills for jobs in growing and innovative industries."

-US Congresswoman Anna Eshoo

"An exciting, pioneering moment in our economy...a win-win situation that should be emulated far and wide."

-US Congressman Eric Swalwell

"These efforts, where a business has the brains to understand how it intends to change the world, married with thoughtful intent to work with local communities, that is the magic."

-Cupertino Mayor Darcy Paul

03 Nuro's Technology



Optimized platform for goods delivery **1st Gen** Testing individual deliveries

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2nd Gen

Learning to build an unmanned fleet

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3rd Gen

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Scaling production of commercial vehicle

5 years of development 3 custom zero-occupant vehicles
Optimized platform for goods delivery

- → Custom external airbag
- → Narrow width design
- Energy absorbing design front face
- → Curbside delivery doors
- Simultaneous visibility in all directions
- → Sensor integration



04 Nuro's Operations



On the road

We have tested or deployed pilot programs in three major markets



Great delivery experience

- → Large interactive touchscreen
- → 2 large compartments
- → Modular, customizable compartment design
- → Payload mass of >500 lbs
- → Fully electric, up to 45 mph capable



Delivering for leading retailers, all day long

urrently a pilot program in select markets for 7-Eleven, Inc. Chipotle currently only an investor and not a commercial partner.



05 Policy Opportunities



Recommended AV Framework

Common regulations across states in which we operate:

- Have explicit authorization of AV operations
- Exception to state motor vehicle equipment laws that support conventional human driver
- Minimum insurance requirements for AV operation
- Requirement that AVs are capable of achieving a minimal risk condition
- Law enforcement interaction plan provided to a state agency in advance of operation, and when updated.
- Requirements are clear, achievable, and provided on a swift timeline



Addressing autonomous vehicle design



- Vehicle rules meant for traditional cars limit the introduction of novel vehicles like zero-occupant vehicles.
- States and federal government should modernize vehicle equipment rules



Executive Committee Member Items

Open Forum





Closing Remarks



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Closing Remarks

• Recap Today's Meeting:

- » Action Items
- » Agreements / Decisions

• Next Work Group Meeting:

» September 28, 2022

Thank You!



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