

Governor's Advisory Council on Connected and Automated Vehicles

Meeting Summary

December 8, 2022

1:00-3:30pm

Annual Report Review, Drive MN, goMARTI and Parting Thoughts

- **Welcome**

- Ben Lowndes called the meeting to begin in coordination with Commissioner Daubenberger and co-chair Phil Magney
- Commissioner and Chair Daubenberger and Co-Chair Magney provided welcoming comments and thanking the Council for their contributions to Minnesota's CAV work over the last four years.
- Council Members in attendance: Commissioner Daubenberger – MnDOT, Phil Magney – VSI Labs, Dan Chen – 3M, Ryan Daniel – St. Cloud Metropolitan Transit, Danielle Elkins – City of Minneapolis, Myrna Peterson – Mobility Mania, Damien Riehl – Fastcase Legal Research Platform, Kyle Shelton (Gina Baas in place) – University of Minnesota CTS, Bret Weiss – WSB, and Patrick Weldon – Polaris
- Thomas Johnson-Kaiser provided a review of the previous September GAC meeting which focused on the Council reviewing the 2022 Executive Report, discussing communities experiencing transportation barriers, and plans for SMART Grant applications.

- **Council 2022 Annual Report Review**

- Ginny Crowson provided background information on the Council's Annual Report including it being due in February and how it differs from the Executive Report that was sent to the Governor in October. In order to compile the report, CAV-X engaged with the Council in late October to include their input.
- Ginny provided a high-level review of the report and we will seek a formal review by the Council January 11-24th.
- The report includes the following sections:
 - Note from Our Chairs
 - Introduction
 - Council's 2022 Work
 - Includes an overview of meetings and summary of fulfilling the Executive Order duties
 - Interagency CAV Team
 - Innovation Alliance Committee Highlights
 - Labor and Workforce Development
 - Education and Outreach
 - Infrastructure Investment
 - Safety
 - Connectivity and Data

- How Minnesota is Preparing for CAV
 - Testing and Research – AV deployment projects, DriveMN
 - Planning – Local Road Research Board – How Local Agencies can prepare for CAV, and City of Burnsville CAV Planning efforts
 - Engagement – CAV Messaging and communication tools, engagement events like the STEAM event at the MOA, CAV Career Pathways Camp
 - Partnerships – CAV Challenge work, PAVEpublic sector advisory council, STEP Program
- CAV Plans for 2023
 - Identifying lessons learned from shuttle projects to shape policy
 - Sharing results of Drive MN for consideration in developing MN MUTCD
 - Exploring opportunities to test gathering and application of CAV data for transportation operations
- Appendices with members listed
- Comments from the Council
 - Ryan Daniel – The report is a good framework and summary of the work that has taken place and thank you for compiling all of the information
- **Drive MN Findings Summary**
 - Gina Baas introduced the project and project partners including VSI Labs, UofM CTS, Bolton and Menk, and MnDOT.
 - Project goal and focus areas – to understand infrastructure readiness for CAV application and how vehicle automation that is available today responds to each focus area of 1) traffic control devices, 2) construction zones, and 3) roadway signing and pavement markings
 - Project Approach – started with a 1000-mile drive across MN to gather data and engagement events along the drive to share current CAV info and preliminary info and observations from the drive. Following all data gathering, VSI Labs post-processed the data and analyzed it to then report findings in a final report expected to be published in early 2023. Data was gathered from a variety of roadways including 25% concrete and 75% asphalt paved roads, traffic control including 150 signals, roundabouts and other types of intersections, as well as, work zones and pavement markings.
 - Phil Magney shared how he appreciated the diversity in attendance at the engagement events held around the state. He noted that the effort was a study rather than a full asset management inventor. We were trying to understand how the vehicles interact with the current infrastructure and develop some key takeaways with the findings.
 - Process used: The project used two vehicles, one provided by VSI Labs and one by the U of M. The technology was running in the background to gather ample data. A significant amount of data was gathered (both volume and complexity), than data was post-processed by using the raw data, reviewing data against feature detectors and perception algorithms which were then compared against different roadways segments.
 - Lane Markings – are the rails for vision-based lane-keeping-assist. The MUTCD will be updated in 2023 and will be providing lane marking guidance to best address Avs.
 - Other options besides lane markings could include High-Definition Maps but could be challenging to keep up to date and be accurate (this is how

vehicles can function when lane markings aren't visible like with snow-cover).

- Ross Tillman of Bolton and Menk shared some highlights of the findings:
 - Freeway Ramps and Turn Lanes
 - There were some areas where lane lines were mid-detected or missed and other areas where they were detected accurately
 - Dashed lines for turn lanes and exit and entrance ramps help detection be more accurate
 - Poor lane marking condition and visibility
 - Worn center line caused the vehicle to misdetect lanes
 - Construction and Maintenance
 - Temporary and scarred striping makes it difficult to detect accurately including black (masked) striping
 - Proper detection can happen on poor quality pavement if markings are clear and contrasting
 - Poor Contrast
 - Lighter colored pavement and lighter pavement markings are difficult to detect accurately, similar to what the human eye may have difficulty seeing. This can be affected by time of day, amount of light, weather conditions, etc.
 - Tight curvature
 - Tighter turns did not detect lane lines accurately. A wider-angle lens and adjustments to the algorithms can help make improvements
 - Extreme Shadowing
 - Going in and out of light and dark spaces (due to shadows from vegetation perhaps) makes it difficult to detect.
 - Fog
 - Fog and other weather elements impact visual detection, similar to human drivers
 - MnROAD Testing Area
 - Unique facility with multiple lane marking options makes it unclear where the actual lane markings are and which to follow.
- Summary and next steps
 - Final report to come in January and hoping the findings can be used for key decisions at all levels of government and how to maintain lane markings
 - Consider specific corridor surveys to ensure suitability for ADAS to
- Council Comments:
 - Bret Weiss – most vehicles available today have lane-keeping assist so what is the recommendation coming out of this for the State DOT, County highways, and Cities.
 - Phil Magney – MUTCD is looking at updating and addressing CAV needs, including retro-reflectivity and things traditionally used for human drivers. Could help to develop a set of best practices to improve these features. No vehicles available today are able to function without the driver's interaction and oversight
 - Commissioner Daubenberger – Thank you to the team for their time and effort that went into this data gathering. Was any data gathered where 6" markings were already installed?

- Phil – yes, and where wider and higher contract markings were seen detection was clearer
 - Ginny – US 2 and I-94 both had wider and higher contrast markings on the route.
 - Group Discussion - “How does the Council see this project addressing their recommendations?”
 - Damien Rhiel – Commented on the Data and Connectivity committee and the value of having the committee to work through issues like those identified in Drive MN. He advocated for continued group meetings for that purpose. He noted that cars provide lots of data and asked how can we use it? Rep Elkins is looking how data from vehicle manufacturers can be used by the state.
 - Rep. Elkins – expressed appreciation for ability to learn significant amount of information through council and alliance committee meetings and helping to address data privacy concerns. He asked if MnDOT has as desired to introduce AV testing legislation?
 - There are no current plans to move forward any AV legislation at this time and that AV testing is not currently prohibited in our state but there is opportunity to improve clarity for safety.
 - Bret Weiss – Noted that we should advance MN businesses working with CAV and understand what kind of work they are doing here and how we can help them be successful and take them elsewhere too
 - Phil Magney – Do we need a CAV corridor to allow businesses to use, demonstrate, and learn from. We could create a safety highway that addresses human and automated driving.
 - Bret – Polaris and Winnebago are based here and how can we help them advance their work.
 - Gina Baas – the University has a lot of focus in this space and helping to develop the future workforce with CAV
 - Dan Chen – Minnesota has the opportunity to lead and people look to MnDOT to learn from us – just like this report by MnDOT on pavement markings (<http://www.dot.state.mn.us/research/reports/2020/202009.pdf>)
- **goMARTI Project Overview**
 - Thomas Johnson-Kaiser, Tammy Meehan Russell and Myrna Peterson shared information about the on-going pilot project goMARTI (Minnesota’s Autonomous Rural Transportation Initiative) which is a community driven CAV deployment
 - There are multiple partners are involved from government agencies, private sector partners, non-profit partners, academic and research partners
 - Project background and information
 - There are four main project goals – 1) advance and inform AV technology in rural and winter conditions, 2) engage with local community and build trust in self-driving shuttles, 3) create accessible mobility options, and 4) explore workforce and economic development opportunities.
 - Project is taking place in Grand Rapids, MN in Itasca County, with a city population of around 11,800, high older population and high lower income population

- 18-month of testing through March 2024 (two winters for testing), 5 shuttles in a 16.5 mile area, uses on-demand calls (through call center or cell phone app use), 70 programmed stop locations
 - Community Driven aspects –
 - Community listening sessions to identify locations and life points of interest as well as service hours to complement existing transit hours
 - Engagement events help six months prior to the kick-off of operations
 - Project Stats to date
 - Steady ridership – 350+ riders and 60+ wheel-chair accessible rides completed, 71% repeat riders
 - Driven over 16,000 miles with and without passengers collecting AV data
 - Lessons learned to date
 - Importance of training for operators to know how to handle respectfully and safely to ensure comfort for riders, especially those with mobility challenges
 - Communication, transparency, and listening to people’s concerns – taxi drivers have expressed concerns about business impacts but have not addressed existing mobility needs
 - Technology is in the research and testing phase – we still have a lot to learn
 - On-demand transit in a rural community is new, with or without automation – easier to lead with transportation and how they can use it, rather than the automation aspect of the project
- Group Discussion - “How does the Council see this project addressing their recommendations?”
 - Ryan Daniels – This project is helping to address Accessibility and Equity goals with transit and moving things in the right direction for a rural population
 - Myrna Peterson – There is a connection to economic development and workforce prep with student involvement and opportunities for people to stay and work in Grand Rapids with career opportunities.
 - Patrick Weldon – this project addresses all of the Council’s goals and it should be shared and replicated across the country
 - We should highlight it in the Annual Report as much as possible
 - Tammy – wants to showcase the technology in Grand Rapids and bring people to the community through Smart Rural Seminars
 - Commissioner Daubenberger and David Fenley asked about public perception and surveying and the team noted there is a pre and post-ride survey with similar and different questions as previous projects
 - Phil Magney – asked if there have been challenges to date with snow and winter weather with the technology?
 - There have been more challenges with snow and accessibility for riders and quality of roadway with snow accumulation and ice rather than technology themselves. It is easy to move to manual mode to continue operations if automated operations are not successful due to weather conditions.
- **SMART/ATTAIN Grants Update**
 - Ginny Crowson shared about several opportunities arose since last meeting – for both SMART and ATTAIN federal grants. ATTAIN is Advanced Transportation Technology and

Innovation – also known as Advanced Transportation Technologies & Innovative Mobility Deployment (ATTIMD)

- goMARTI proposed for ATTAIN to expand current project by time and geography
- Automated Truck Mounted Attenuator (ATMA) proposes expansion of work by CO, MN, WI and OK through pooled fund
- Metropolitan Airport Commissions (MAC) proposes replacement of tram and auto people movers with AV shuttle service
- Iron Range Resources and Rehabilitation (IRRR) also proposes demonstrating Polaris Ranger CV tech and data for on/off road utility vehicles
- MnDOT has provided letters of support for ATMA, goMARTI and MAC and applications were submitted 11/18
- In addition, the City of Minneapolis applied for a SMART grant, in coordination with several other cities, for digital curb work

- **Public Comment**
 - Joan Wilshire – Complimented the goMARTI team. Accessibility should not be separate but should be included in everything we do. Minnesota has one the best CAV programs and we need to spread the work nationally.
 - Tammy Meehan Russell – Minnesota’s CAV program is one of the best and thank you to the Council and the CAV-X team for making all this possible.

- **Closing**
 - With this meeting being the last planned Council meeting for this cohort, council members were asked to share parting thoughts
 - Dan Chen – 3M – been a privilege to work with this group, has learned a lot, and hope it continues
 - Ryan Daniel – St. Cloud Metropolitan Transit – great experience being on the council and have learned a lot
 - Danielle Elkins – City of Minneapolis – it’s been helpful to stay connected through the Council, how to be aware of Federal funding and keeping the city plugged in
 - Myrna Peterson – Mobility Mania- pleasure and honor to serve on the GAC, and the interplay with the Council on Disabilities and GAC has been rewarding personally
 - Bret Weiss – WSB – been a pleasure to work with everyone on the council. It is important to hear the different voices and can help the state prepare better. Hopes it continues on in some manner.
 - Patrick Weldon – Polaris – Council was a lot better than expected over the last 12 months. Appreciates the Commissioner’s leadership to the Council. Lots of people have been “hired” along the way and that is rewarding – like drivers/operators. And the projects we are doing are solving real problems.
 - Phil Magney – Thank you to everyone and it’s been a pleasure to be a part of this. Been a part of so many useful conversations and realize the talent and resources in the state. Early on it was a lot of talk and over the last 12 months there is a lot of tangible work and lots of ideas of where to go.
 - Commissioner Daubenberger – Thank you to Phil Magney for co-chairing and providing your leadership to the Council. We are excited about the efforts of Drive MN as well. Thank you to everyone for their contributions and thank you to the CAV-X staff for all of their work as well. Please be sure to review the Annual Report and please let us know if you see value in

continuing any of the CAV groups including the Council, Interagency CAV, and the Innovation Alliance Committees and how we can best continue work moving forward. It's been a pleasure working with everyone and getting to know everyone through this work.