Connected and Automated Vehicles Stakeholder Engagement Report

December 2018

Special thanks to our skilled team of facilitators, Aimee Gourlay, Sunday Harholdt, Susan Mainzer, Ellen Velasco-Thompson, Charlene Eigen-Vasquez and Heron Diana.

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www.dot.state.mn.us/automated/index.html

Upon request, this material will be made available in an alternative format such as large print, Braille or audio recording. Printed on recycled paper.

Connected and Automated Vehicles Stakeholder Engagement
December 2018

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Advisory Council on Connected and Automated Vehicles

Stakeholder Engagement Report Overview

A. Background

One of the Advisory Council's duties was to "consult with governmental entities, communities experiencing transportation barriers, transportation stakeholders, the automotive industry, businesses, labor, technology companies, advocacy groups, and educational institutions."

The Minnesota Department of Transportation (MnDOT) established the Office of Connected and Automated Vehicles (CAV-X) to manage efforts related to the Executive Order. CAV-X worked with the Minnesota State Office of Collaboration and Dispute Resolution (OCDR) and MnDOT's Office of Public Engagement and Constituent Services to create a robust stakeholder engagement design that would allow the state to reach out to as many communities throughout Minnesota as possible by the December report deadline.

A stakeholder engagement plan was developed as a transparent process to allow broad stakeholder input within the limited timeframe of the Executive Order. Specifically, the purpose of the process intended to:

- Create an opportunity for experts, interested parties, and the general public to share their expertise, ideas, and feedback on Connected and Automated Vehicles (CAV) for the purpose of informing the work of the Advisory Council and I-CAV Team;
- Build relationships and create a foundation for stakeholder engagement CAV beyond the Executive Order;

The goals of the process included the need to:

- Solicit high-quality feedback;
- Build a stakeholder base that could be built upon as the recommendations are implemented; and
- Provide a variety of avenues for those interested (even if not originally identified) to participate.

The process was designed to be inclusive so that if Minnesotans could not attend any of the meetings open to the public, they could choose to submit an online survey developed by MnDOT Customer Relations expert survey staff.

Each subcommittee was tasked by the Council to address values critical to these conversations including: (1) safety; (2) equity; (3) risk management; and (4) environment. Generally, each subcommittee discussed:

- An introduction to understand what CAV is, how it works, and the potential benefits and risks
- Identification of major issues and areas for changes in state law, rules and policies
- Consensus recommendations for the Advisory Council, including
    - Recommendations to maximize the potential benefits of CAV and prepare for the widespread adoption of automated and connected vehicles. Note that the consensus

was expected to be a general rather than specific wording for state law, rules and policies.
  - Consensus areas of major concerns which may require further study and deliberation.
  - For areas divergence, a summary of the major policy considerations from all perspectives.
  - Other suggestions/inputs which arise through their discussions.

In the meetings, the participants were encouraged to come to recommendations by consensus. If ideas and feedback were shared but the group did not come to an agreement, they were recorded and kept as records for the Council and to be published on the CAV-X website.

B. Participants and Liaisons

CAV-X, I-CAV, and the Advisory Council reached out to various technical experts to identify liaisons whom could lead the subcommittee conversations by providing education on how CAV may impact the various policy areas. For most subcommittees, a public sector and governmental liaison partnered to co-host the conversations.[1]

After identifying liaisons, the state worked with a variety of organizations to identify individuals to participate in the conversations and gather feedback, including:

- Consulting with state agencies and I-CAV;
- MnDOT Offices of Equity and Diversity, Civil Rights, and Public Engagement and Constituent Services;
- OCDR;
- State Chief Diversity Officer;
- Press releases;
- Social media postings;
- State Fair public demonstration; and
- Presentation and conferences.

In addition to the above input, throughout the process, interested individuals were included in the meetings and invited to participate in the online survey to allow multiple, accessible opportunities to participate and provide feedback.

The subcommittee meetings were open to the public, allowing any individual to participate and opt-in to receive emails on upcoming CAV-related events and meetings. Public meeting information was shared via press releases, social media posting, reaching out to organizations to inform their members, individual phone calls and emails, and through personal invitations.

To ensure transparency, CAV-X placed all materials on its public website, including publishing meeting dates and locations, agendas, and meeting notes. For those unable to attend these meetings, MnDOT CAV-X conducted additional outreach activities including an online public survey, meetings requested by

[1] Traffic Regulations and Safety had one liaison and Vehicle Registration Driver Licensing and Training had two from the Minnesota Department of Public Safety (DPS). The Equity subcommittee has multiple liaisons for specific communities.

individual communities and organizations, public events such as the Minnesota State Fair demonstration, individual calls and emails, and presentations at various conferences and events. CAV-X also participated in intergovernmental consultation with Tribal Governments through the Advocacy Council on Tribal Transportation, the Minnesota Indian Affairs Council, and individual meetings with tribal leaders. The final recommendations from the Advisory Council considered input from all these outreach efforts.

Given the challenges of scheduling large groups of people over the summer, meeting times and dates were based on availability of the facilitators, liaisons, and CAV-X staff. Subcommittee members who could not participate in the meeting had the ability to participate remotely and were given the opportunity to submit individual feedback and comment on meeting notes. Evaluations were emailed after each meeting to foster continuous improvement of the process and solicit further feedback from the public.

Meeting Date	Policy Topic
July 12	Equity and Tribal Government-to-Government Relations
August 17	Cyber Security and Data Privacy
August 21	Economic Development, Business Opportunity and Workforce Preparation
August 27	Insurance and Liability
August 29	Vehicle Registration, Driver Training and Licensing
August 31	Cyber Security and Data Privacy
September 7	Equity
September 10	Transportation Infrastructure
September 12	Land Use and Planning
September 14	Equity and Tribal Government-to-Government Relations
September 14	Cyber Security and Data Privacy
September 18	Economic Development, Business Opportunity and Workforce Preparation
September 18	Equity and Aging Impacts
September 20	Traffic Regulations and Safety
September 24	Vehicle Registration, Driver Training and Licensing
September 24	Insurance and Liability
September 24	Land Use and Planning
September 25	Accessibility
September 29	Equity
October 1	Accessibility
October 3	Equity
October 8	Accessibility
October 9	Land Use and Planning with Metropolitan Planning Organizations
October 12	Transportation Infrastructure
October 18	Revenue

F. Evaluation Feedback

An evaluation was emailed after each subcommittee meeting to all subcommittee members, whether they attended or not. Those who did not attend were invited to provide additional comments they had (based on the agenda topics). Online comments were summarized at subsequent meetings. The response rates were low. Most participant responses were positive. The only exception was to the online participation option, which presented challenges at several meetings. The table below shows the number of responses for all meetings of each subcommittee, and the average response on a scale of 1 – 5 (with 1 being "not very" and 5 being "very much").

Subcommittee	# Responses (On a scale of 1 - 5, with 5 being "very much")	Was the information provided helpful?	If you attended the meeting, did you feel that is was a respectful process?
Accessibility	14	4.25	4.67
Transportation Infrastructure	31	3.93	4.63
Equity	5	4.40	5.00
Economic Development, Business Opportunity, and Workforce Preparation	19	3.83	4.39
Cyber Security and Data Privacy	19	4.23	4.38
Insurance and Liability	8	4.29	5.00
Land Use and Planning	25	4.00	4.42
Vehicle Registration, Driver Training, Licensing	10	4.10	4.78
Traffic Regulations and Safety	2	4.50	5.00

G. Recommendations and Observations

1. One-third of the meetings were held with the goal to gather feedback on accessibility and equity issues. The conversations were a good beginning. Ongoing conversations and outreach will be essential to develop trust and provide these communities a voice is CAV as it develops.

2. Many of the topics overlap between subcommittees. For example, cyber security and data is important for the insurance industry and for public safety professionals to assess insurance risk and respond to collisions. CAV-X staff helped to share intersectional, cross-cutting issues with all subcommittees by attending all the subcommittee meetings and providing information about considerations amongst subcommittees and their liaisons.
3. The concern mentioned most often in multiple subcommittees was that the development of CAV in Minnesota must benefit all Minnesotans equally.
4. Subcommittee members from the private sector were at times hesitant to publicly share their thoughts due to concerns about proprietary information or being taken out of context. These groups will likely continue to have access to comment on CAV issues through industry efforts as CAV develops.There is an ongoing need for public education on what CAV is, timelines for development and how it impacts the public. A comprehensive public engagement plan and communications plan will be necessary to continue to involve Minnesotans as CAV policy develops

Advisory Council on Connected and Automated Vehicles

Transportation Infrastructure Subcommittee Charter

Executive Order/Purpose

Governor Dayton issued an executive order on connected and automated vehicles. The executive order recognizes that technology is evolving rapidly, and that Minnesota must prepare. The executive order established an advisory council comprised of 15 members appointed by the Governor and ex-officio members from state agencies and the legislature. The council will submit a report to the Governor and Legislature by December 1, 2018. The report will recommend changes in statutes, rules, and policies in eight areas, including transportation infrastructure. The subcommittees are part of a larger effort to hear ideas about CAV from many Minnesotans. More information about the advisory council and this process is on MnDOT's CAV website.

Goal

"The goal of the CAV Transportation Infrastructure Subcommittee is to develop recommendations for changes to statutes, rules and policies in the areas of transportation infrastructure for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory council subcommittees as needed."

Roles

MnDOT CAV Office is implementing the Executive Order.

- Jay Hietpas, P.E.
  Connected and Automated Vehicles Executive Director
  Jay.Hietpas@state.mn.us
- Kristin White
  Connected and Automated Vehicles Innovation Director
  Kristin.White@state.mn.us

Co-liaisons will provide expertise to CAV X and the facilitation teams, review agendas and meeting notes prior to distribution, provide input on meeting logistics and process, and are engaged in the presentation of recommendations to the Advisory Council. (The subcommittee will decide how it wishes to present.)

- Jay Hietpas, P.E.
  Connected and Automated Vehicles Executive Director
  Jay.Hietpas@state.mn.us

- Mark Krebsbach
  Dakota County Transportation Director/County Engineer

Mark.krebsbach@co.dakota.mn.us

Facilitators will manage scheduling and meeting logistics, communication, draft agendas and notes, facilitate meetings and provide process guidance, and assist with compiling presentation materials.

- Susan Mainzer
  Facilitator
  CAVFacilitators@mediationcentermn.org

Anyone who wants to attend is welcome at meetings. Subcommittee members will provide their knowledge and expertise by participating in meetings in person, or electronically and/or by commenting on meeting notes and recommendations. Meeting participants will be asked to sign in at the meetings. Those commenting on meeting notes will be asked to provide their name and contact information for follow up clarification, however comments will be aggregated and not attributed to any individual.

Meetings & Meeting Materials

The following two meetings have been scheduled. Participants are encouraged to attend in person. If unable to attend, participants can attend via a remote Skype session. Remote attendees will be able to provide their input electronically only through the Skype session.

Monday, September 10
9:00-11:00 a.m.
MnDOT Shoreview Training Center, Room 1
1900 County Road I West, Shoreview, MN 55126

→ Join Skype Meeting

Friday, October 12
9:00-11:00 a.m.
MnDOT Shoreview Training Center, Room 1
1900 County Road I West, Shoreview, MN 55126

→ Join Skype Meeting

Members will be informed of meetings via email. Meetings will be announced and agendas will be available on the MnDOT website at least one week before the meeting. Meeting materials will be posted on the website after each meeting and will be emailed to subcommittee members prior to the meeting.

Meeting Notes

Facilitators will provide notes of meetings. The liaisons will approve the notes, and subcommittee will have the opportunity to review and comment on them. Subcommittee members who were unable to attend a meeting may provide additional comment. Additional comments may be summarized by the facilitator.

Meeting Evaluation

All subcommittee members and those who signed in that they attended the meeting will receive a post-meeting evaluation.

Communication

The facilitator will include CAV X staff and the co-liaisons on subcommittee communication regarding logistics and planning. If the facilitator chooses to open a dialogue via email, all subcommittee members will be included.

Meeting Process

FACILITATION. Meetings will be facilitated. Meetings are expected to be two to three hours. Meetings will end on time and with a clear understanding of assignments and next steps. Extension of time, which is not encouraged, will require the consent of a majority of members attending that meeting by a show of hands.

TIMLINESS. Participants understand that their work needs to be presented to the Advisory Council by October 30, 2018. They will do their best to meet the deadlines for giving feedback and other participation.

RESPECTFUL COMMUNICATION. Participants recognize that divergent ideas ensure robust recommendations and agree to listen respectfully to all opinions. The group may, if they choose, develop other meeting guidelines to facilitate communication.

NATURE OF RECOMMENDATONS. Recommendations will focus on maximizing the benefits and preparing MN for the adoption of automated and connected vehicles. Note that the recommendations are expected to be general rather than specific wording for state law, rules and policies.

DECISIONS/CONSENSUS. Recommendations from this group may be unanimous. If there is general consensus for a recommendation, meaning everyone is willing to support it, then it will be so noted for the Advisory Committee. If there is not a consensus, a summary of the rationales for different perspectives will be provided to the Advisory Council.

OPEN MEETINGS. Meetings will be open to all. The subcommittee meetings are public meetings, and people who are not on the subcommittee may attend. Depending on timing and number of participants, the facilitator may provide opportunity for members of the pubic to address the subcommittee in consultation with the co-liaisons.

PARKING LOT. Items raised for discussion which are not on the agenda may be listed for discussion or resolution at another time.

RECORD. The facilitator will keep a record of meeting attendees and meeting notes as outlined above. Comments from individual members will generally not be attributed and verbatim record of the meeting will not be prepared.

Outcomes

- Clear, consensus-based or rationales for divergences recommendations for the Advisory Council
- Subcommittee members participate in a meaningful way in developing recommendations
- Recommendations consider the for themes of safety, risk, equity and environment
- Recommendations consider immediate needs and longer term planning for CAV

Governor's Advisory Council on Connected & Automated Vehicles
Subcommittee on Transportation Infrastructure

Agenda

Monday, September 10, 2018 9:00 - 11:00 AM MnDOT Shoreview Training Center
(f.k.a. Arden Hills) Room 1
1900 County Road I, West Shoreview, MN 55126
Remote Access
→Join Skype Meeting

Subcommittee Goal: *To develop recommendations for changes to statutes, rules and policies in the areas of transportation infrastructure for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory council subcommittees as needed.*

1. Welcome & Introductions

- Review of Executive Order & Goals
- Review of Agenda & Meeting Process
- Introductions

2. Overview of Connected and Autonomous Vehicles ("CAV")

(Jay Hietpas, MnDOT CAV-X Office)

3. Key CAV Issues for Transportation Infrastructure

(Jay Hietpas, MnDOT CAV-X Office)

4. Discussion

- Draft Questions – Comments and Additions (see next page)
- Process for Discussion (5 minutes set up groupings; 25 minutes debrief)

5. Next Steps and Closing

Note: Discussion will continue at the next meeting on Friday, October 12, 2018 at the MnDOT Shoreview Training Center

DEPARTMENT OF TRANSPORTATION

Transportation Infrastructure Questions

- Infrastructure
    a. What infrastructure investments should Minnesota make today to support current AV and CV technology?
        i I to V/X tech/equipment at signals/roadside in corridors
        ii Establish standards for connected vehicle equipment for city, county, and state signals
        iii Cyber security

    b. What infrastructure investments should Minnesota consider making to support future AV and CV technology?
        i Keep flexibility as technology evolves
        ii Evaluate next gen signing and striping
        iii V to V or signs or other internet broadcast of work zones or lane closures
        iv Government invest in facilitating 5G; allow small cells in the R/W
        v Consider how paving lines impact how lanes are perceived

    c. What infrastructure considerations should Minnesota make to prepare for more Electric Vehicles?
        i Incentivize driving cars and installing more chargers.
        ii Facilitate those with fleets and other private to electrify and install chargers
        iii Incentivize gas stations to transition to having some chargers
        iv Install chargers at rest areas.

    d. What infrastructure considerations should Minnesota make to prepare for emerging trends in shared mobility?
        i Develop single occupant vehicle that is narrow and could facilitate more capacity by driving side by side
        ii How pedestrians will interact with autonomous cars, always yield to peds, creates operating issues

- Legislation & Policy
    a. What policy considerations should be considered to prepare MN infrastructure for CAV?

    b. What legislation is recommended to foster AV and CV testing and implementation?

c. What can Minnesota do to foster AV and CV testing and deployment?

d. How can we partner more effectively to prepare our infrastructure for CV, AV and EV?

e. What research should be considered to prepare our infrastructure for CAV?

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Infrastructure

DEPARTMENT OF TRANSPORTATION

September 10 ,2018

Welcome and Introductions

DEPARTMENT OF TRANSPORTATION

Subcommittee Goals

Subcommittee Goal

To formulate and recommend to the Advisory Council changes to Minnesota statutes, rules and policies related to transportation infrastructure.

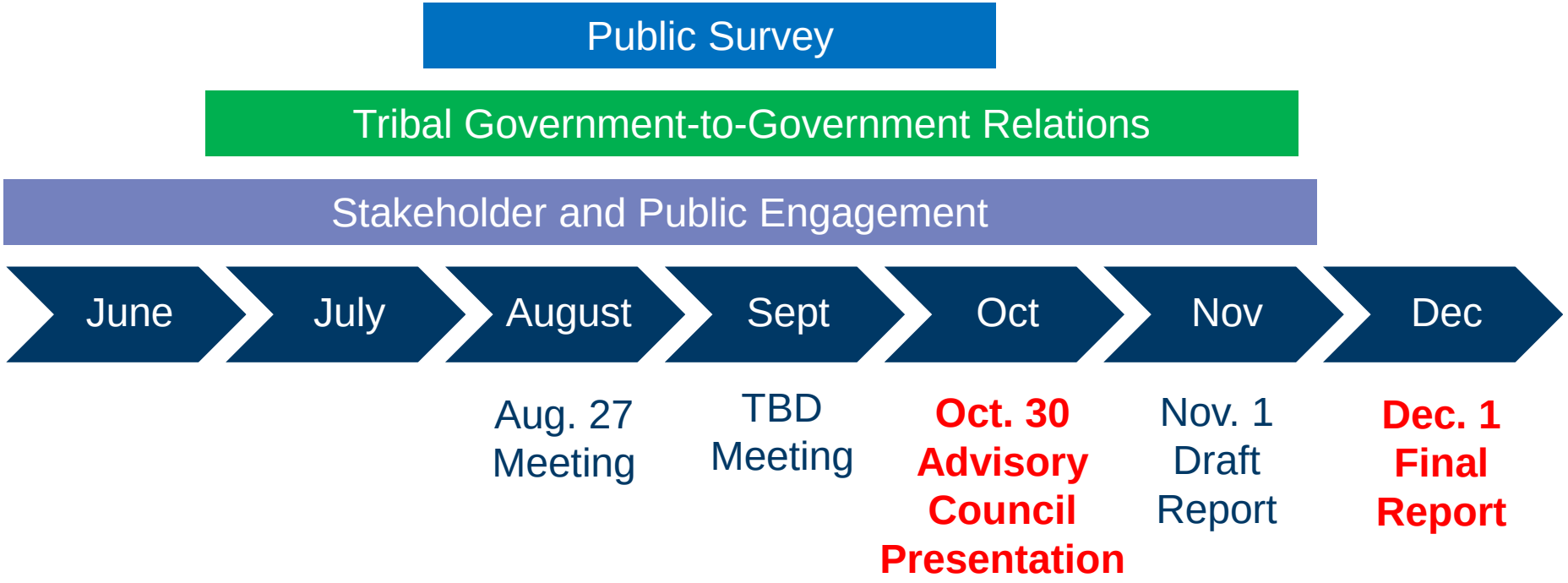
Subcommittee Process

- Participation
  - Meeting materials available on **MnDOT website**
  - Meeting updates at MnDOT's Connected and Automated Vehicles webpage.
  - Participate in a **meaningful way**
- Discussion
  - Consider the themes of **safety, risk, equity and environment**
  - Consider immediate, **short-term outcomes**
- Recommendation
  - Clear, **consensus-based** recommendations (or reasons for differences)
  - Present recommendations to Advisory Council **October 30th**

Subcommittee Charter

- Meetings **open to the public**
- **Respectful** discussion, opportunities to be heard and **listen**
- May submit written comments on **comment cards**
- Notes taken on **consensus** or **summary** of discussion
- Meeting **notes approved by liaisons** and sent to subcommittee members for additional comments
- Meeting evaluation emailed after meeting

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Aug. 27 Meeting
TBD Meeting
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV Goals

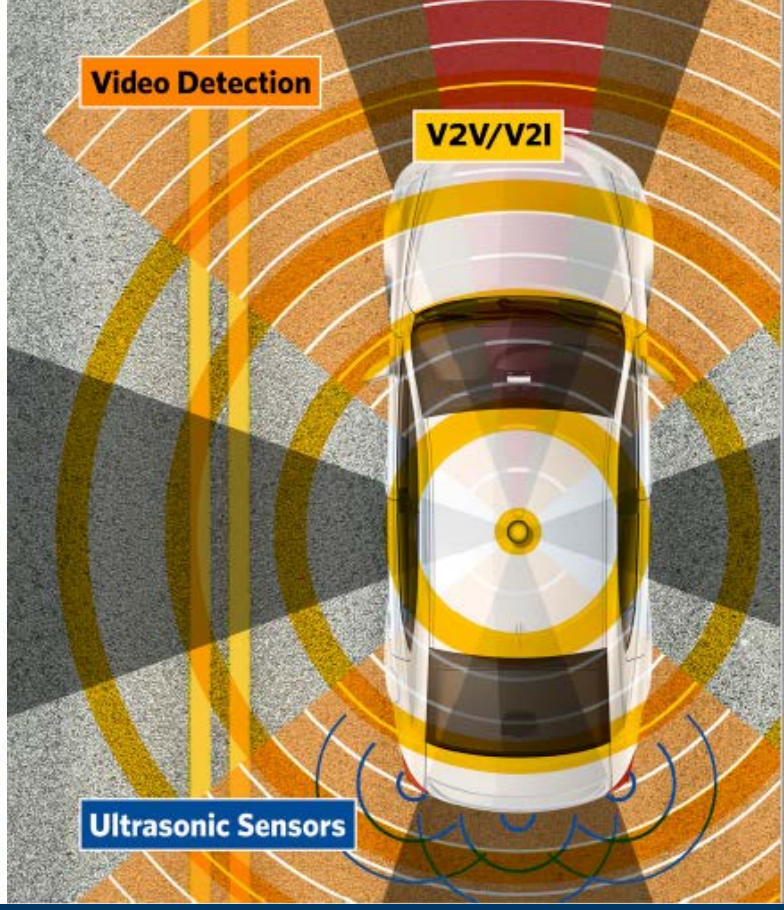
Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

Public Feedback Opportunities

Interagency Team

- Policy position papers
- Branding
- Testing & Deployment
- Partnerships



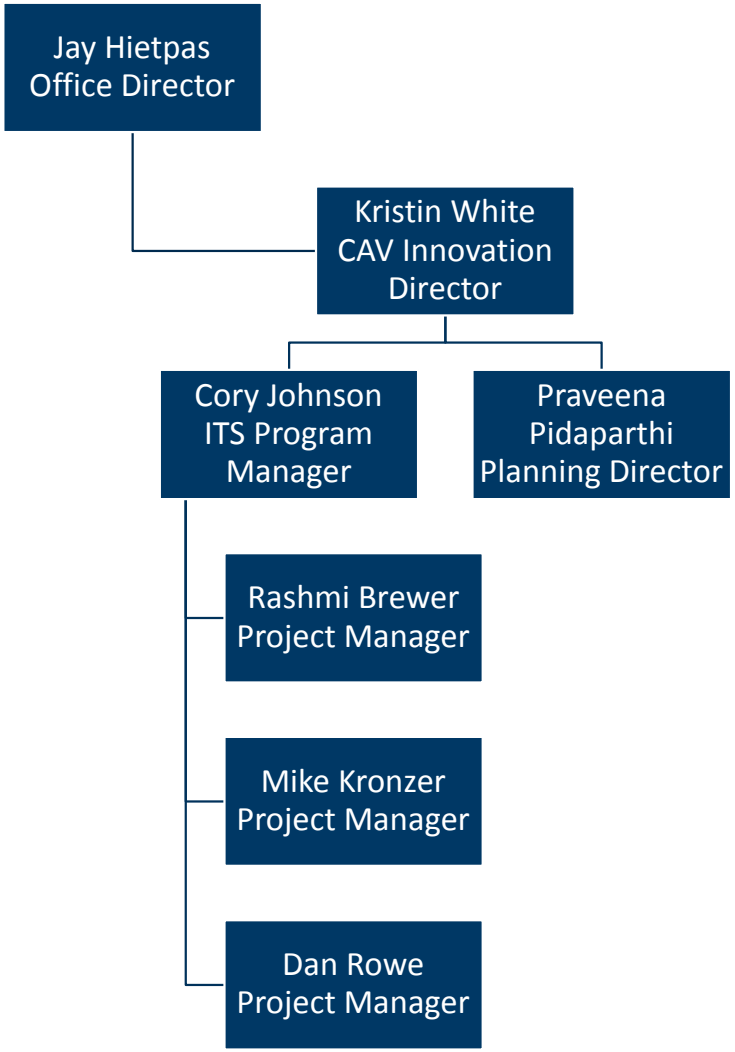
Overview of Connected & Automated Vehicles

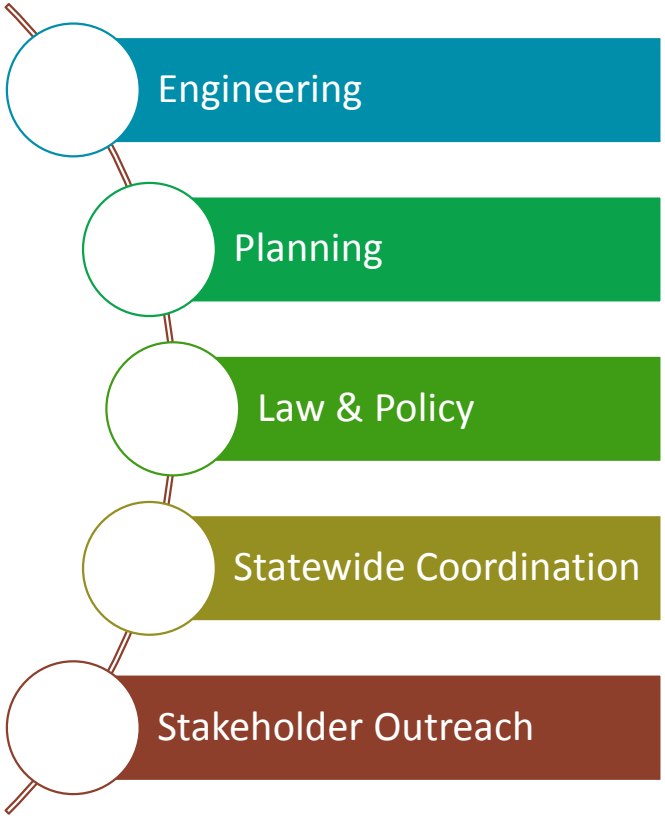
DEPARTMENT OF TRANSPORTATION

DEPARTMENT OF TRANSPORTATION

Who We Are

MnDOT CAV-X Office





DEPARTMENT OF TRANSPORTATION

Why We're Here

Automated Vehicles

Automated vehicles can **take control of** some or all aspects of **driving tasks**.

Uses for Automation

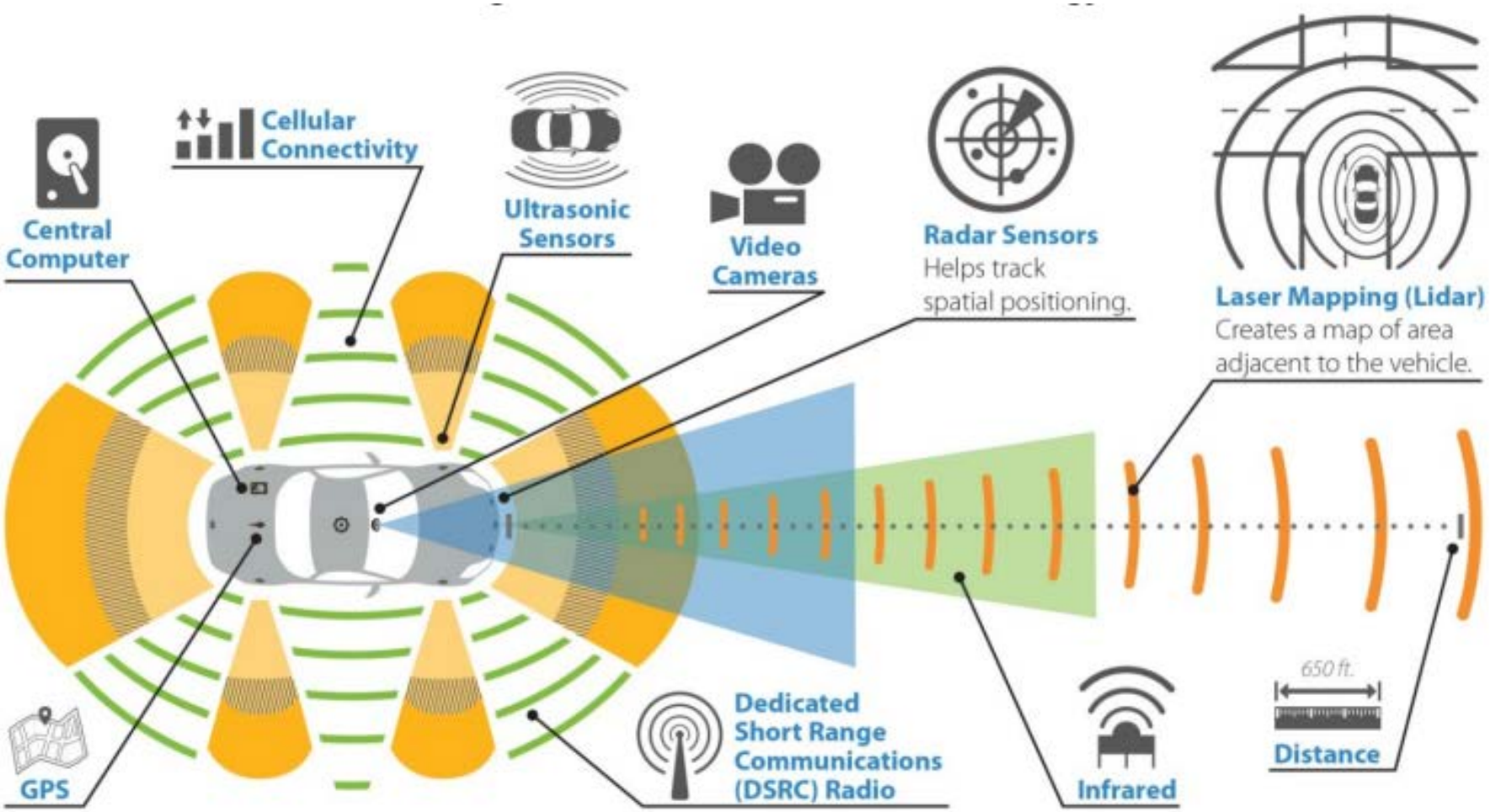
Types of **Automated Vehicles**

Passenger

Commercial

Transit

How does it work?



Full Automation

0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Society of Automotive Engineers (SAE) Levels of Automation

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

Connected Vehicles

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

Electric Vehicles

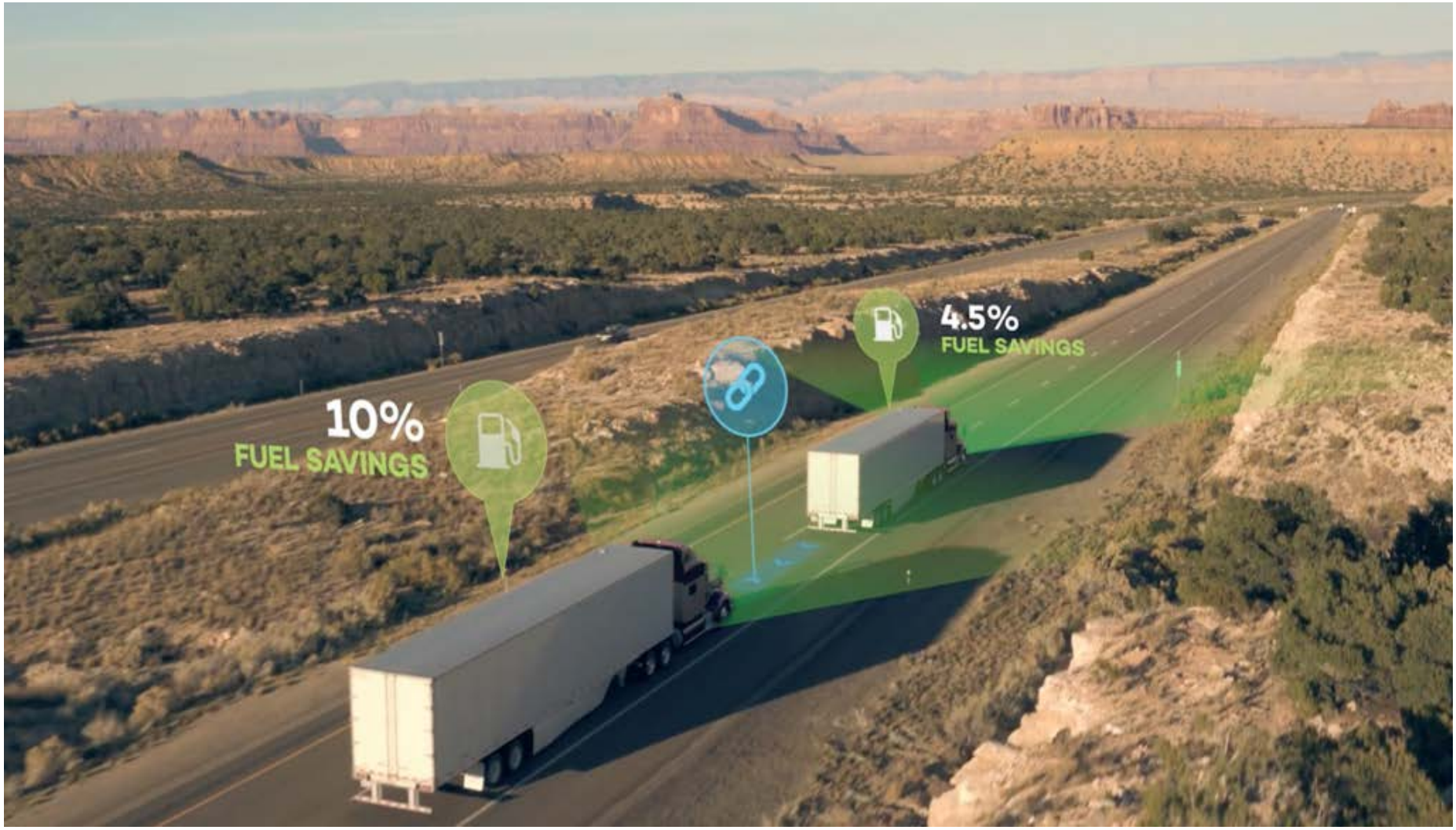
Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

Shared Mobility

Shared use of a vehicle, bicycle, or other transportation mode on an **as-needed basis**

1 account to access, plan, and pay for private and public transportation options

Truck Platooning



DEPARTMENT OF TRANSPORTATION

Infrastructure Impacts

Aging Infrastructure

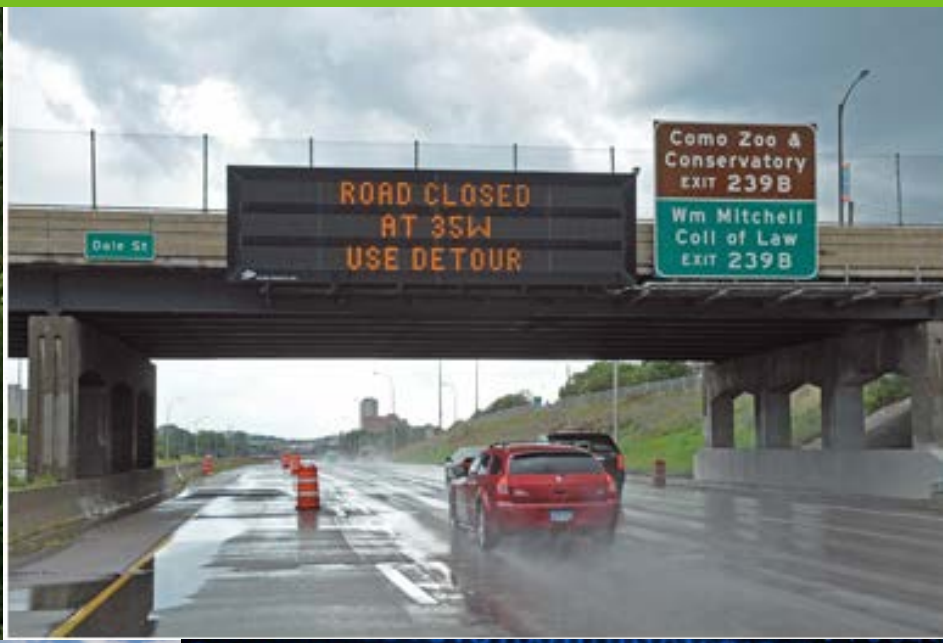
Local Infrastructure

Highway Infrastructure

Urban Environments

Other Items


SOUTH
52


ROAD CLOSED
AT 35W
USE DETOUR
Como Zoo &
Conservatory
EXIT 239B
Wm Mitchell
Coll of Law
EXIT 239B
Dale St

Discussion

Infrastructure

A. What infrastructure investments should Minnesota make today to support current AV and CV technology?

B. What infrastructure investments should Minnesota consider making to support future AV and CV technology?

C. What infrastructure considerations should Minnesota make to prepare for more Electric Vehicle?

D. What infrastructure considerations should Minnesota make to prepare for emerging trends in shared mobility?

Legislation and Policy

A. What policy considerations should be considered to prepare MN infrastructure for CAV?

B. What legislation is recommended to foster AV and CV testing and implementation?

C. What can Minnesota do to foster AV and CV testing and deployment?

D. How can we partner more effectively to prepare our infrastructure for CV, AV and EV?

E. What research should be considered to prepare our infrastructure for CAV?

Small Group Breakouts

Breakout Session Directions

- Designate 1 recorder
- Designate 1 person to report-out
- Engage with participants in your group & ask questions
- Write thoughts on large poster or individual comments on post-it notes & add to poster

Breakout Session Questions

- What themes and recommendations do you want the Council to share with the Governor & Legislature?

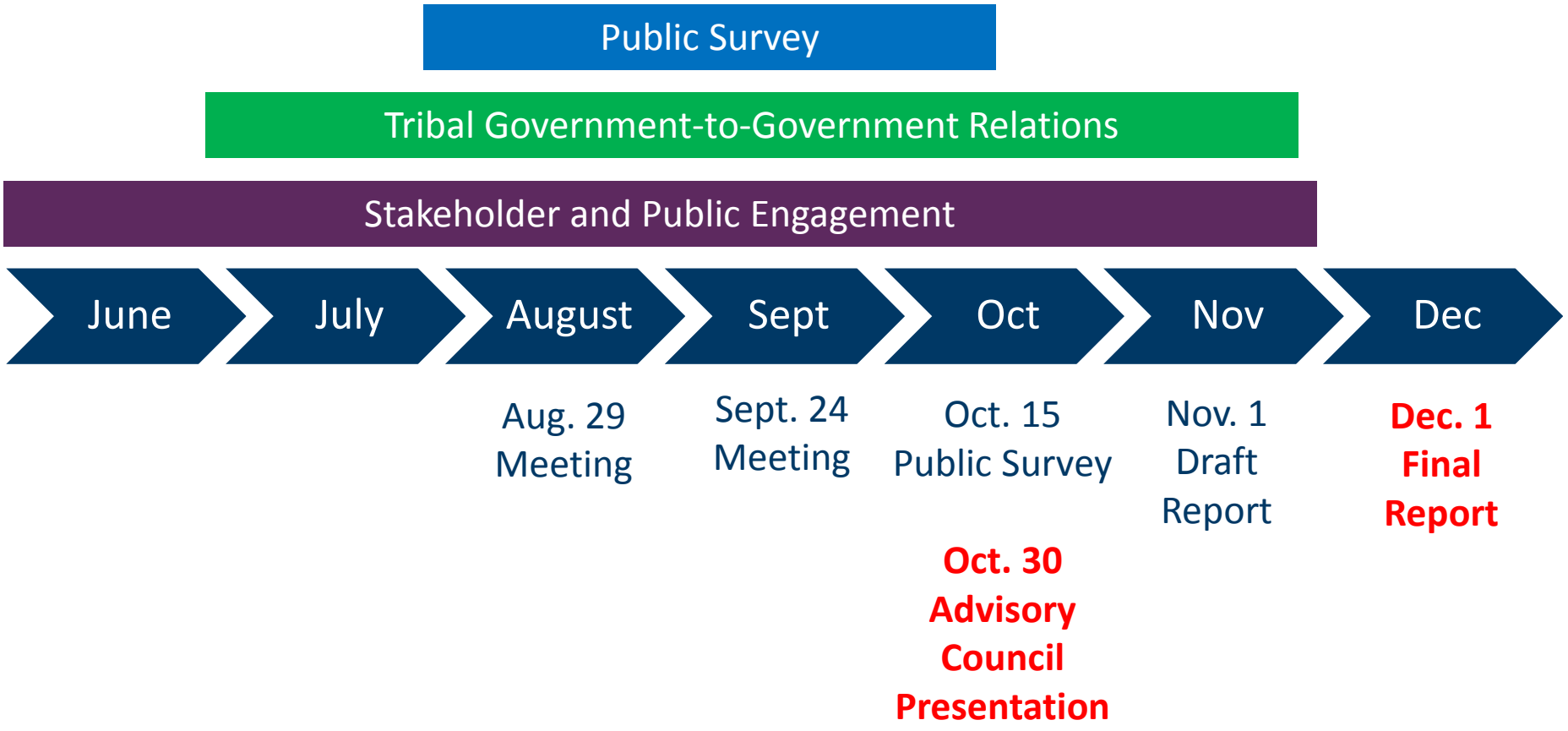
- What policy areas or themes do you want addressed in the 2019 Legislative session?

Next Steps & Closing

Next Steps

- Comments and feedback via comment cards or email.
- Participants review meeting minutes
- Post-meeting online survey
- Public CAV survey
- October 12th: Next meeting
- October 30th: Present to Advisory Council

Key Dates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Oct. 15 Public Survey
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

Thank you

Jay Hietpas, MnDOT

Mark Krebsbach, Dakota County

Governor's Advisory Council on Connected and Automated Vehicles
Transportation Infrastructure

Meeting Notes

Meeting Date: September 10, 2018

Jay Hietpas, Director of CAV-X, opened the meeting. Susan Mainzer and Charlene Eigen-Vasquez were present to facilitate the meeting. Participants introduced themselves and their affiliations. Mark Krebsbach from Dakota County was recognized as a co-chair.

Jay presented subcommittee goal: to formulate and recommend to the Advisory Council changes to Minnesota statutes, rules and policies related to transportation infrastructure.

Information from these meetings will be on the MnDOT website.

Timeline: October 30 is the date liaisons will present to the Advisory Council. Another meeting of this subcommittee is scheduled for Oct. 12, if necessary.

Executive Order says the Advisory Council will report to the legislature and governor, this subcommittee provides information to the Advisory Council.

There are seven other subcommittees. All are welcome to join any subcommittee. (More info available on website (MnnDOT CAV Public Meetings)

Other ways to participate: surveys, subcommittee meeting evaluation, comment cards, state fair, ask us to present to your group.

CAV Goals:

- Brand MN as a place to test and deploy CAV
- Public engagement
- Educate public
- Develop actionable recommendations
- Recommend mobility strategies

Jay presented “CAV 101”

- Automated vehicles take control of some or all aspects of driving
    - All modes of transportation (automobile, truck, shared)
    - We are focused only on surface transportation
    - Some rely on infrastructure, some don’t
    - Some rely on government resources, some don’t
- “Levels of vehicles” described (0 – 5). As numbers go higher, there is more automation. We are currently at partial/conditional automation, levels 2 and 3. There are no level 5 vehicles, full automation yet today. There are level four (high automation) today.
- Connected vehicles
    - Vehicles “talk” to infrastructure
    - Vehicle “talk” to each other
- Advisory council also wants us to talk about electric vehicles
- Shared mobility also has infrastructure impacts (e.g., shared curb space)
- Truck platooning (vehicle to vehicle communications)
    - If a lead truck accelerates, it signals truck(s) behind to
    - Some other states are allowing trucks to drive much closer together, testing platooning
- Infrastructure
    - Roads and bridges
    - Rural MN is an important piece for the governor and Advisory Council
    - Urban environments – what do we need to do to prepare for CAV?
    - Underground utilities
    - Work zones (road construction)
- Data is also infrastructure (some manufacturers want data from us, real time information on work zones)

Small Group Discussions

Susan Mainzer introduced small group input discussions. Cover the questions from liaisons and anything else. Keep notes, which will be transcribed below. Report out recommendations: What do you want the liaisons to recommend to the Advisory Council?

Group post-breakout report, describing top 3 priorities

Infrastructure, Group 1

- Short term
    - Collaboration with industry. At levels 1-3, make baseline supporting data/information available to manufactures about lane closures or construction, for example, so that the connected vehicles can respond. This should include information sharing with railway systems and traffic signal systems.
    - Inform public about what is available in the infrastructure … e.g., that a charging station is available, signage for special lanes
    - Collaborate with manufacturers – needs to be a detailed study to understand what will work and what will not work. The study should consider different weather environments (ice, snow …)
- Long term
    - Central database/ information sharing regarding traffic flow, traffic signals, and road conditions. An example was to start with sharing information on signals or road conditions.
    - Where does info live, how will it be retrieved? How can someone query this information?
    - There will be information going back and forth like air traffic control. Reliability, security will be important. For example: When a pilot is going to fly, he is able to get a bunch of information on weather, flight patterns, and is constantly getting updates while in flight. This model may occur in vehicles in the future, where data is more easily accessible to cars/drivers as compared to today.
    - How will CAV exist with current vehicles (non CAV)

Infrastructure, Group 2

- Establish standards for city/county/state to be future ready.
- What will entry-level readiness at each level be?
- Deploy equipment and standards for testing CAVs, partner with MN industry to get in the game and assure goals/standards are met.
- Work zones are a little future, however start working on it now. Support AV development b/c it is going to be a challenge. We have a short and intense work season. Work zones must be part of the plan.

- Do work on incentivizing electric vehicle chargers. Suggest creating charging zones at rest stops. Maybe start with I-94. Are there other incentives on a state level that would incentivize private industry to create charging zones?

Infrastructure, Group 3

- Partnership. Complexity of the right of way as a publicly owned space. Charging stations, curb space management, drop boxes for AV delivery vehicles, smart signs.
- Resources: very near-term need is the need for research funds for the public section to test technologies in the real world.
- How to charge the user in the end when some of the funding goes away?
- Pilots: near term need is to ID pilot projects in key areas of learning and need. E.g., testing autonomy in cold weather, rural areas and urban build out conditions.
- System and data: near term needs to build out fiber optics to enable this new world. Put conduits in roads. Who is responsible for mapping and data stewardship? (IA funded or is private industry) Decide MN approach.
- Other states have coalition models
- Multiple levels of government need to be involved … private/public is complex. Work through who is responsible for what.

Legislation and Policy, Group 1

- Need for standardization of protocols with this technology. Classic role for government (for example, the FCC). Needs to be a public/private partnership, ongoing coordination and stewardship, think this will be at the federal level.
- Who and how to pay for capital and operating? Allow MN to be innovative (research and education takes money)
- Beyond the gas tax, funding from other sources
- Focus on engagement and education, find funding for this
- Data Questions. Who owns it? Who has access to it? Liability questions? Data protocols and standards.

Legislation and Policy, Group 2

- What is MN trying to do in the realm of CAV? Get clear on goals before developing policy. Do we want to be the leader?

- Strike balance in funding stream … public and private mix
- Plug the policy gaps to allow testing and investment in MN while protecting the public interest, safety, and liability. Don't be so proscriptive that companies don't want to come here.

Legislation and Policy, Group 4

- Have a state funded area(s) to test, emphasize winter and rural driving challenges. Partner with industry.
- Funding – CAV will accelerate the trend toward electric vehicles. How to fill the gas tax gap? Partner at federal level to fix the funding problems.
- Partner with freight rail partners, e.g., crossing challenges.
- In the beginning, consider designated routes for AVs (like college campuses)

Infrastructure and Legislation and Policy, Skype Group

- From a policy perspective, some of the areas of interest include: Procurement / Partnerships; Policy related to Commercial Vehicle Operations (truck platoon following distance, vehicle safety and inspection; international border crossing documentation and clearance, etc.); Testing versus Deployment
- Infrastructure
    - From both investment and policy angles - and as a starting point - articulate the greatest outstanding transportation needs and determine how CAV could potentially address them.
    - When looking at transportation needs and subsequent investments, try to do so without jurisdictional boundaries so gaps in new infrastructure can be minimized as it is implemented. Met Council Transportation Advisory Board is a good example of a multi-jurisdictional body like this.
    - At a minimum, the Alliance would like the MN CAV policy to include Levels 3-5, Requirement of a $5M bond for insurance purposes, testing AND deployment, Prohibition on local/municipal action against automated vehicles, and definitions based on SAE (Society of Automotive Engineers). [SAE developed the 5 AV levels.]
    - To clarify, the "definitions based on SAE (not verbatim) is separate from the local/municipal prohibition suggestion.
    - Regarding infrastructure investment, clarify priorities among and within unique modal needs for general vehicle travel, commercial vehicles, transit, and non-motorized (e.g. biking, walking). We won't be able to build everything at once so having some structure around modal (and regional) priorities could help.

- From an infrastructure perspective: Development of Use Cases for CAV is critical for defining infrastructure needs to support automated driving systems; Definition of Operational Design Domains (don't forget about operations); Foundational Elements (markings and striping, communications infrastructure, data management platforms to support storage, aggregation, analytics, decision support); Infrastructure needs for MaaS (Mobility as a Service), including curb management, mobility hubs, common payment platforms, etc.; Electrification Opportunities including charging station infrastructure, grid modernization, wireless induction capabilities; Positive Train Control and Communications Based Train Control technology supporting automated train solutions; Barrier Control systems for mixed traffic environments (example: use of AV shuttles in shared lanes with peds, bikes, scooters, etc.); Managed Lanes for AVs and Platooning.
- Regarding infrastructure investment, clarify priorities among and within unique modal needs for general vehicle travel, commercial vehicles, transit, and non-motorized (e.g. biking, walking). We won't be able to build everything at once so having some structure around modal (and regional) priorities could help.
- There is support for thinking through the operational (and maintenance) implications of any new infrastructure. This includes the workforce expertise needed to operate and maintain.
- Consider if/how CAV policy and investments could continue to be managed separately - just in the beginning - from the traditional transportation planning and investment processes. Suggesting that this could establish a more cohesive foundation and support learning/information sharing that would guide an eventual shift back to the more traditional processes.
- Priorities from Skype Conversation
    - A recommendation to develop commercial vehicle operations policy for testing (such as platooning). This is different than deployment.
    - Understand needs and funding without jurisdictional boundaries, avoid gaps in new infrastructure.
    - For levels 3 - 5, require a bond for insurance purposes for testing and deployment.
    - For investment clarify unique modal and regional needs and develop funding priorities.
    - Standardized terms are important. Use SAE definitions.
    - Development of Use Cases for CAV is critical for defining infrastructure needs to support automated driving systems; Definition of Operational Design Domains (don't forget about operations); Foundational Elements (markings and striping, communications infrastructure, data management platforms to support storage, aggregation, analytics,

decision support); Infrastructure needs for MaaS (Mobility as a Service), including curb management, mobility hubs, common payment platforms, etc.; Electrification Opportunities including charging station infrastructure, grid modernization, wireless induction capabilities; Positive Train Control and Communications Based Train Control technology supporting automated train solutions; Barrier Control systems for mixed traffic environments; Managed Lanes for AVs and Platooning.

- Manage CAV policy and investment separately from traditional.
- Focus on low hanging fruit such as striping, signage, signal consistency and modernization. Investment in electrification to build-out charging infrastructure to ease range-anxiety; develop marketing to help further educate the public; and prioritize grid modernization.
- Look at how data analytics will support planning and operations. Ten: Partner with private sector to provide information - reduces risk.
- Partner with private sector to provide information - reduces risk.
- Public engagement

Facilitators' Note: A few participants mentioned their 3 top choices as priorities, but most people did not engage. A true agreement regarding the priority of these recommendations did not occur except that public engagement was essential.

Themes / Potential Recommendations

- We recommend that MN pursues partnering frameworks, public/private partnerships
  - For sharing data
    - Work zones, construction
    - Traffic signals
    - Rail road crossings
  - For right of way to publicly owned spaces (e.g., curb, smart signs)
  - Partnering for CAV testing
    - To test technology (needs funding)
    - For research into what works (e.g., weather, conditions)
  - To clarify who is responsible for what

- We recommend that MN plan for CAV funding needs
  - For how users pay beyond the gas tax
  - Avoid gaps in new infrastructure
  - Funding for public education and outreach
  - Clarify unique modal and regional needs and develop funding priorities

- We believe that public education and engagement are important policy considerations
    - Safety
    - Information about what is available (e.g., charging stations, special lanes)
    - "Marketing" CAV in MN
    - Develop workforce program for CAV technical skills

- We recommend MN support CAV testing – allow testing and investment while protecting the public, safety and liability
    - State funded pilot areas for testing
    - Establish standards
        - Entry level readiness
        - For testing and deployment of CAV
        - Pilot projects
        - Work zones
    - Allow for platooning testing
        - Commercial vehicle policy for platoons, truck automation, logistics, border crossings

- We recommend MN have an overall data management framework

- We recommend that MN address short term system needs
    - Incentivize electric vehicles
    - Fiber optics/conduits in roads
    - Mapping – decide who is responsible (public/private)

- We recommend that MN establish infrastructure foundation
    - Focus on "low hanging" fruit … signage, signal consistency, modernization, charging stations
    - Standardization protocols with this technology (consensus agreement from 9/10 meeting)

Additional meeting notes

Additional comments from the Skype Group

- Operations Perspective - Look at how data analytics will support planning and operations. Improved decision support for operations through integration of AI at TMCs (Traffic

Management Centers); staffing impacts from automation of current functions within the operations environment; ultimate impact on traffic signal control, traveler information infrastructure (DMS (Dynamic Message Signs) and 511, for example); Look at infrastructure and operational functions that can be reduced or for which responsibility (and risk) can be transferred to the private sector (traveler information services, payment processing, cloud services, edge computing capabilities, etc.)

- Policy and investment considerations also need to be made for the sharing economy/mobility on demand. CAV, electrification and sharing/on demand all seem to be converging at the same time. Need to find ways to both isolate and combine the impacts of each.
- For both policy and investment - keep engaging the public. Jay's comment about differences between the national AAA survey vs. State Fair survey results on acceptance shows how recent Minnesota engagement is likely helping the public understand - and eventually support - the direction Minnesota takes with CAV.
- Where Connected, Automated, and Shared mobility are concerned, de-emphasize traditional infrastructure – the road and existing traffic control – while keeping that all maintained is good, it's not sufficient; are investment increases even viable? or would make a meaningful difference? and when snow obscures it, it's instantly less relevant, AV industry isn't counting on it, and chasing legislations for infrastructure may not be fruitful; one consideration for hard infrastructure is designing/rebuilding more flexibly now so cross sections can be modified later (e.g., narrower or dedicated interstate lanes, or repurposed curb lanes for shared mobility)
- Prioritize, now and in the future, communications infrastructure (e.g., fiber), electric infrastructure (e.g., grid, especially since CAVs will increasingly be electric, too), and workforce "infrastructure" – getting the key positions created to keep MnDOT abreast of the wild developments
- Suggestion for priorities: 1) Establish partnering framework for CAV deployment and operations; 2) Establish data management framework for analytics and decision support; 3) Provide infrastructure foundation for CAV, including striping/markings, communications network infrastructure solutions, grid modernization; 4) Develop workforce program for CAV technical skills; and 5) Focus on Commercial Vehicle policy framework for platooning, truck automation, logistics and border crossings.

Group 1 – Notes regarding priorities

- Regarding work zones, must standardize, need better GPS locations
- Need to improve communication to create better awareness. This includes public information and hardware
- Need to collaborate with industry. This includes rail grade crossing and signals.

- Need to figure out how to intermix with other vehicles.
- Short term
- Need signage for CAV, to include:
    - EVs
    - Charging stations
    - Connected corridors
- Need to communicate electric corridor locations
- This is a technology change – need to communicate CAV options
- Consider dedicated lane(s) for AVs
- What are parking requirements

Notes that were emailed from small groups

Short Term focus areas

1. Information on reliability of autonomy supporting infrastructure

-We primarily discussed the need to share information in real-time with vehicles so as to enable/disable low level autonomy functions onboard. For example a vehicle with lane keeping feature will struggle to perform in a work zone where lane markings do not exist. Instead of the driver being frustrated by this fact, it may be better if MnDOT is able to make available a real-time query able database that provides information such as – "I94 between mile marker 182 and 186 no lane lines are present" – the vehicle can then use its GPS information and disable the land keeping ability between these mile segments. While this was only a possible solution – the main theme of the discussion "was what can be done to better support existing automation capabilities on today's vehicles. – Especially in work zones, snow covered roads etc".
-Some participants expressed that they would feel frustrated that a capability that they paid for did not function at all times.
-How can we ensure the quality / reporting of issues of lane markings and other signage in both rural and urban areas?
-How can autonomous vehicles be kept safe at railway crossings?

2. Promotion of MN initiatives in CAV areas

-MnDOT should promote awareness amongst the public about infrastructure that is already available in support of CAV vehicles. For example the fact that EVs can travel from Minneapolis to Duluth with recharge facilities available on the way is not well known to the public. Perhaps adding "EV charge" sign to existing gas station / exit info signage would be beneficial.
-Making people aware of available infrastructure – might incline them more to get an EV vehicle. Perhaps EV manufacturers will be willing to pay to promote this.

3. Collaboration to study future infrastructure needs

-Though we discussed a few possible infrastructure issues, a detailed study needs to be done with industry, MnDOT, university partnership that assesses the effect different infrastructure investments will have on enabling autonomous and connected vehicles. Perhaps we can start with established automation features available at present in the short term.

Long Term focus area

1. Two way information sharing – Infrastructure and hardware. Covering both information dissemination and information gathering

-Everyone agrees that information interchange between vehicles and a central/decentralized information and also between vehicles will be vital to reap all the promised benefits of CAVs. MnDOT should focus on the communication links to vehicles. Some of the key questions to be answered are

- What field of information will be made available (signal conditions, road condition, power outage, HD maps etc). Perhaps we can start with a small list of obvious services with future provisions to add more.
- What is the means of communication to and from vehicles (both hardware and software)
- If the service centralized / decentralized. How do we build redundancy and security into the system?
- What levels of latency is acceptable
- How to vet incoming information from vehicles (Eg : road conditions, delays) – before broadcasting to others
- Liability issues associated with the information shared
- Is this central database going to be available to anyone to query or is it going to be subscription based ? Perhaps it is made available for free to recognized entities. Does MnDOT want to / how can it monetize this service – because it is going to be expensive to maintain and run?

2. Collaborative study to identify bottlenecks in CAVs co-existing with present day vehicles and infrastructure

-Here again we need to conduct funded studies to identify corner cases and bottleneck scenarios on the interaction of CAVs with other older vehicles which may not have such capabilities.
-Would it be beneficial to allocate dedicated pathways for CAVs at first

-Independent studies to evaluate autonomy failure modes and security vulnerabilities that may exist in CAVs and how common are they

Group 2 Notes

a. What infrastructure investments should Minnesota make today to support current AV and CV technology?

i I to V/X tech/equipment at signals/roadside in corridors

ii Establish standards for connected vehicle equipment for city, county, and state signals

iii Cyber security

b. What infrastructure investments should Minnesota consider making to support future AV and CV technology?

i Keep flexibility as technology evolves

ii Evaluate next gen signing and striping

iii V to V or signs or other internet broadcast of work zones or lane closures

iv Government invest in facilitating 5G; allow small cells in the R/W

v Consider how paving lines impact how lanes are perceived

c. What infrastructure considerations should Minnesota make to prepare for more Electric Vehicles?

i Incentivize driving cars and installing more chargers.

ii Facilitate those with fleets and other private to electrify and install chargers

iii Incentivize gas stations to transition to having some chargers

iv Install chargers at rest areas.

d. What infrastructure considerations should Minnesota make to prepare for emerging trends in shared mobility?

i Develop single occupant vehicle that is narrow and could facilitate more capacity by driving side by side

ii How pedestrians will interact with autonomous cars, always yield to peds, creates operating issues

Group 3 – Notes

- Road infrastructure funding, where will funds come from?
    - Will there be public and private investment
    - We need to keep pace
- This is a changing environment for Traffic Engineering
- Transition period will be challenging

    - Driver v Driverless vehicle
    - Combination infrastructure (regular vehicles and CAVs)
    - Liability and risk
- Need for additional resources to address new multi-tier infrastructure as tech evolves
- Data: accessibility, privacy, standards, ownership
- Federal and state level legislation
- Differing highway systems, hierarchy of implementation
- Differing environments, urban v rural
- IMPORTANT – Need to maintain an on gong "multi-agency" committee(ies) to provide/coordinate recommendations to lead agency
- Monitor policy, legislature, state
- Lane lines v GIS or other location system
    - Need to have a standard protocol
    - Warmer weather v cold weather climate
- Work zones and other incidents will have significant impacts
    - Possible for research and testing
- Identify areas where legislation (statutes) are barriers to research and testing

Group 4 Notes

- Need to mitigate risks to trains
    - At grade intersections
    - Looking at specific routes, look for intersection overpasses or under passes
- How will infrastructure be paid for?
    - Electrical Vehicle (EV) fee v gas tax
    - $75 surcharge on EVs?
    - Are the utilities the responsible entity?
    - Should it be a surcharge on your bill?
    - Rural MN, how much more money will it cost?
    - Should there be a charge for congestion? Base fee in the Metro?
- Sharing of work zone mapping
    - Make an effort to provide that
    - Provide date regarding length, timing for trains locations
    - Push for train detection technology vehicles
- Regarding transit, fill gaps for people who have no transportation
    - Need more infrastructure advancement than just run on a track
        - Community vehicle sharing
        - For rural, very expensive, challenges for even having access to wireless service

        - May need federal policy v state policy due to large funding
- Regarding investments to support future AV and CV technology?
    - Map out clear conditions for regulation
    - We did not get a lot of input in this area

Infrastructure and research considerations to prepare for more EVs

- Begin pilot programs (and accelerate that) to support in systems/technologies such as sensors for snow
- Don't keep reinventing the wheel, but find avenues with private industry to keep progressing
- Need not to favor just one technology
- Look at Waymo, Ollie, EasyMile opportunities to keep advancing technologies
- Off track method of train detection
- Rural areas – sight lines technology

Regarding emerging trends in shared mobility

- Engage with businesses to weigh investing into public funds v private partnerships
- Trucking stations for platooning trucks work with private industry to make sure they are heard
- Where does data go?
- We are not comfortable with MnDOT being he keeper as then the data is public information. Need a separate entity.

Next Steps

Liaisons and facilitators will look for themes and gaps in these notes and bring tentative recommendations back to the group for discussion and refinement.

Governor's Advisory Council on Connected & Automated Vehicles

Subcommittee on Transportation Infrastructure

Agenda

Monday, October 12, 2018 9:00 - 11:00 AM at MnDOT Shoreview Training Center
(f.k.a. Arden Hills), Room 1
1900 County Road I, West Shoreview, MN 55126

Remote Participation Information:
Join Skype Meeting

Do not use Skype Audio – Join via Conference Call

1-888-742-5095
Code: 165 892 6687

Subcommittee Goal: *To develop recommendations for changes to statutes, rules and policies in the areas of transportation infrastructure for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory council subcommittees as needed.*

1. **Welcome and Introduction**

2. **Summary of Last Meeting's Discussion Topics and Tentative Recommendations**
   (Subcommittee Liaisons: Jay Hietpas and Mark Krebsbach)

3. **Discussion: Identify & Fill Gaps in Tentative Recommendations**

4. **Finalize Recommendations to the Advisory Council**
   - What do you want the liaisons to recommend to the Advisory Council?
   - Develop consensus on recommendations
   - Identify areas where consensus is not obtained

5. **Closing & Next Steps**
   - Is the subcommittee ready to present to the Advisory Council

DEPARTMENT OF TRANSPORTATION

Transportation Infrastructure Questions

Infrastructure

a. What infrastructure investments should Minnesota make today to support current AV and CV technology?
b. What infrastructure investments should Minnesota consider making to support
future AV and CV technology?
c. What infrastructure considerations should Minnesota make to prepare for more
Electric Vehicles?
d. What infrastructure considerations should Minnesota make to prepare for emerging trends in shared mobility?

• Legislation & Policy

a. What policy considerations should be considered to prepare MN infrastructure
for CAV?
b. What legislation is recommended to foster AV and CV testing and implementation?
c. What can Minnesota do to foster AV and CV testing and deployment?
d. How can we partner more effectively to prepare our infrastructure for CV, AV and EV?
e. What research should be considered to prepare our infrastructure for CAV?

Governor's Advisory Council on Connected and Automated Vehicles

Transportation Infrastructure Subcommittee
October 12, 2018
9:00 am – 11:00 pm

DEPARTMENT OF TRANSPORTATION

Welcome and Introductions

Meeting Content

- Advisory Council Overview & Schedule
- Subcommittee Goals
  - Questions we are trying to answer
- Quick CAV 101
- Recap of Meeting #1
  - Feedback
  - General Themes
  - Preliminary Recommendations
- Identify Gaps in Recommendations
- Finalize Recommendations

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

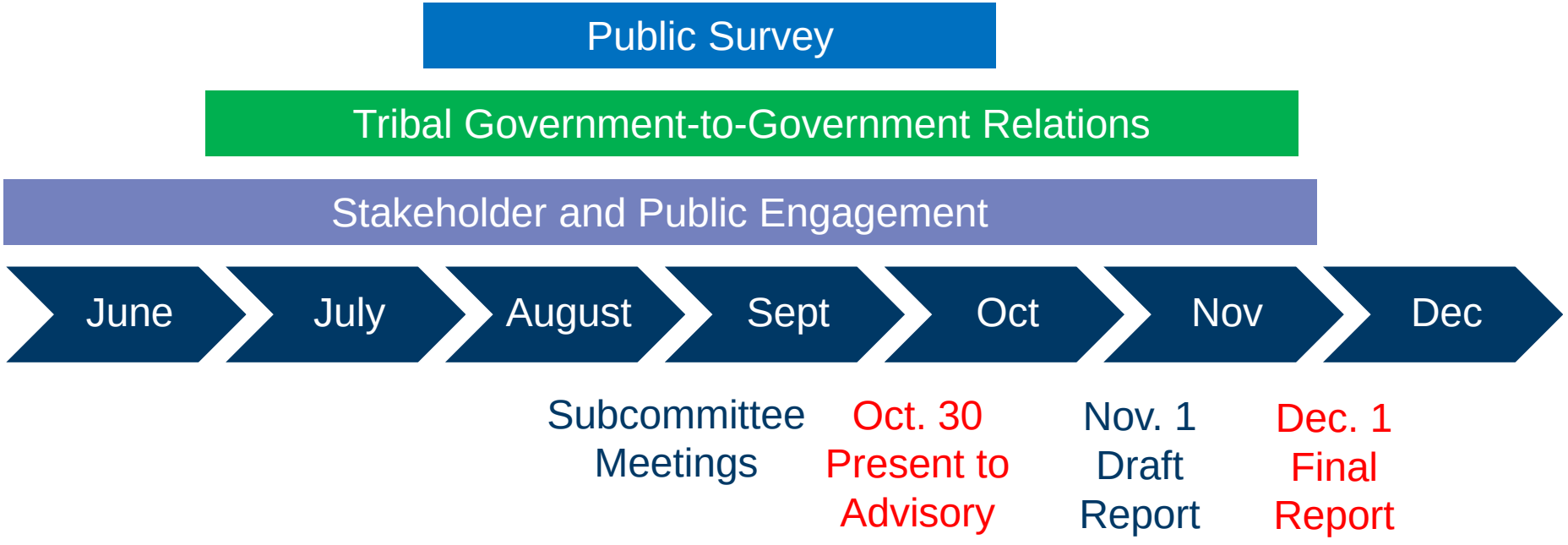
Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Subcommittee Meetings
Oct. 30 Present to Advisory Council
Nov. 1 Draft Report
Dec. 1 Final Report

Subcommittee Goal

To develop recommendations for changes to statutes, rules and policies in the area of transportation infrastructure for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory Council subcommittees as needed.

Infrastructure Questions

1. What infrastructure investments should Minnesota make today to support current AV and CV technology?
2. What infrastructure investments should Minnesota consider making to support future AV and CV technology?
3. What infrastructure considerations should Minnesota make to prepare for more electric vehicles?
4. What infrastructure considerations should Minnesota make to prepare for emerging trends in shared mobility?

Policy Questions

1. What policy changes are need to prepare MN infrastructure for CAV?
2. What legislation is recommended to foster AV and CV testing and implementation?
3. What can MN do to foster AV and CV testing and deployment?
4. How can we partner more effectively to prepare our infrastructure for CV, AV and EV?
5. What research should be considered to prepare our infrastructure for CAV?

Evaluation Feedback - September 10th Meeting

- Most who were interested in attending were able to attend in person or remotely
- Most found the information provided at the first meeting helpful
  - Additional information requested by subcommittee members:
    - Post-recommendations decision-making path
    - Status of federal guidance, information on the federal approach and actions
    - Whether AV developers have offered guidance on infrastructure
- Most felt that they had an opportunity to share their thoughts at the first meeting, and that the process was respectful
- Improve the meeting process with:
  - More direction and time for small group discussions
  - Better online software and engagement
- Additional feedback:
  - Separation of the discussion between CV and AV was useful
  - How to give more/continued feedback?

CAV 101 & Executive Order Review

4 Priorities: ACES

Connected

Electric

Automated

Shared Mobility

Uses for Automation

Types of **Automated Vehicles**

Passenger

Commercial

Transit

Summary of Last Meeting Themes

Review of First Meeting Themes

- Developing standardization protocols for CAV technology
- Public education and engagement
- Funding for research, studies, testing, and pilot projects
- Funding for development and implementation
- Assessing the modal and regional needs in MN
- Collaborate and partner with manufacturers, share information
- Determine how data/information will be shared and stored
- Develop policy without jurisdictional boundaries
- Focus on short term needs and “low hanging fruit”

Preliminary Recommendations

Prelim Recommendation #1

Infrastructure Standards

Engage in the development of infrastructure standards at the federal level, and develop state standards in collaboration with local units of government.

Data Standards

Develop data standards and centralized systems for sharing infrastructure data (e.g. work zone, traffic signal timing, road conditions) with 3rd parties.

Prelim Recommendation #3

Funding

Provide funding to support CAV infrastructure capital needs, operational needs, testing corridors, and public educational/outreach efforts.

Prelim Recommendation #4

Revenue

Identify additional revenue streams to support CAV infrastructure needs beyond current sources, in particular the potential loss in gas tax due to electrification.

Prelim Recommendation #5

Infrastructure Investments

Pursue infrastructure investments now in fiber optics, signal system modernization, improved pavement markings, and data collection to support emerging CAV technologies.

Prelim Recommendation #6

Partnerships

Support partnerships between government, academia, and private institutions to better understand the infrastructure needs for CAV testing and deploying, particular in winter weather conditions and other situations relative to Minnesota.

Prelim Recommendation #7

Partnerships

Identify roles, responsibilities, and liabilities for public and private partners involved with CAV deployment.

Testing & Priorities

Support safe testing of CAV on existing public infrastructure, including truck platooning deployment, based on Minnesota transportation needs and priorities.

Prelim Recommendation #9

Electric Vehicles

Support efforts for electric vehicle deployment and associated infrastructure.

Prelim Recommendation #9 (Contd.)

User Needs

Consider all road user needs (e.g. pedestrians, bicycles, person with disabilities) when making infrastructure investments for CAV.

Today's Discussion Topics

Discussion

Small Group Breakouts

Small Group Discussion

What themes and recommendations should the Governor and Legislature consider?

- Designate one recorder
- Designate one person to report back to large group
- Engage with participants in your group and ask questions
- Record all proposed recommendations on your note pads; designate “High” or “Low” priority
- Which recommendations have consensus?
  - Record the top 2-3 recs with consensus on flip chart
- Report back recommendations with group consensus

Next Steps & Closing

Next Steps

- Presentation of recommendations:

  October 30th : Present to Advisory Council

- Public survey on MnDOT CAV-X website

DEPARTMENT OF TRANSPORTATION

Thank you

Co-Liaisons

Mark Krebsbach, Dakota County
Jay Hietpas, MnDOT

Co-Facilitators

Charlene Eigen-Vasquez, Mediation Center

Sunday Harholdt, Mediation Center

Transportation Infrastructure

Subcommittee Meeting Notes

10/12/18

Participants

Jay Hietpas, presenter – MnDOT CAV-X Director
Mark Krebsbach – Dakota County, co-chair

Charlene Eigen-Vasquez, Facilitator – Mediation Center
Sunday Harholdt, Co-Facilitator – Mediation Center

Skype Participants:

Jody Martinson
Michael Kronzer
Maggie Green
David LaBelle
Cory J. Johnson

Jay Hietpas presented on CAV 101 and covered policy and infrastructure questions on the agenda and preliminary recommendations below.

PRELIMINARY RECOMMENDATIONS - Themes from the September 10th Meeting

- **Infrastructure Standards** (Highest Priority)- Engage in the development of infrastructure standards at the federal level, and develop state standards in collaboration with local units of government.
- **Data Standards** - Develop data standards and centralized systems for sharing infrastructure data (e.g. work zone, traffic signal timing, road conditions) with 3rd parties.
- **Funding** (Higher Priority) - Provide funding to support CAV infrastructure capital needs, operational needs, testing corridors, and public educational/outreach efforts.
- **Revenue** (Higher Priority) - Identify additional revenue streams to support CAV infrastructure needs beyond current sources, in particular the potential loss in gas tax due to electrification.
- **Infrastructure Investments** (Higher Priority) - Pursue infrastructure investments now in fiber optics, signal system modernization, improved pavement markings, and data collection to support emerging CAV technologies.
- **Partnerships (Infrastructure Collaboration)** (Highest Priority) - Support partnerships between government, academia, and private institutions to better understand the infrastructure needs for CAV testing and deploying, particular in winter weather conditions and other situations relative to Minnesota.

- **Partnerships (General Deployment)** - Identify roles, responsibilities, and liabilities for public and private partners involved with CAV deployment.
- **Testing & Priorities** (High Priority) - Support safe testing of CAV on existing public infrastructure, including truck platooning deployment, based on Minnesota transportation needs and priorities.
- **Electric Vehicles** - Support efforts for electric vehicle deployment and associated infrastructure.
- **User Needs** (High Priority)- Consider all road user needs (e.g. pedestrians, bicycles, person with disabilities) when making infrastructure investments for CAV.

Charlene: After looking over and talking through the preliminary recommendations, group the recommendations into high priority and low priority. Then determine 2-3 recs that you'd like to present to the group.

Mark: Add recommendations that might be missing, or combine/reword recommendations if the preliminary recommendations do not reflect small group consensus. Consider which recommendations are highest priority and who would implement those recommendations. If there is a divergence of opinion as to potential recommendations or the priority of potential recommendations in the small group session, please provide information about it – we'd like to know who thinks what.

Group 1

High Priority

1) Infrastructure Standards

Group 1 consensus is that the infrastructure standards need to be higher, but those with technical ability should develop the standards and not those who aren't in the industry or practitioners (e.g. politicians). Infrastructure and data standards should be developed by MnDOT, counties and cities, not mandated through statutes passed by legislators. Standards need to be developed on a national (or international) level; USDOT and FHWA need to assist in the development of national standards. Consideration could be given to funding national infrastructure standards. MN standards need to mesh with neighboring states' standards to avoid issues (e.g. the need to change modules when crossing state lines). While the group agrees that data standards should be developed on the national/federal level, the group notes that the data standards need to be developed quickly, and it may take time for the federal government to get it done.

2) Infrastructure Investments

Consider the "3 Ps", and take action now that can put us in a better position later on. Spend existing funds differently – if the funding is put towards something CAV related, then we can avoid separately spending the funds (e.g. consider funds for and spending on RR crossing signals and traffic signals – funds for development and implementation could potentially come from the same source: CAV funding). The group noted specifically that investment in developing the fiber optic network and updated signal controllers in needed. ROW could be used to install fiber optic lines through a PPP; the network could be used by both public and private entities (legislation needed to permit a private ROW). Revenue and funding are a mid-range priority, but an obvious necessity. The group concurred with the preliminary recommendation "Provide funding to support CAV infrastructure capital needs, operational needs, testing corridors, and public educational/outreach efforts."

3) Partnerships (Infrastructure collaborations)

Partnerships are necessary to encourage innovation. Partnerships could be incentivized through "CAV challenge innovation". The group notes that where other states are working on CAV policy and development, the state has worked closely and has strong ties with universities; this collaboration offers a good mix of those in academia and those with technical skills and implementation expertise (practitioners). University of Minnesota should have more involvement in CAV research; research grants should encourage research at the university level. Priorities include creating and enhancing partnerships with existing local (Minnesota) companies (3M, Polaris, Baudette, Winter Weather Auto Testing Facility). The state procurement process needs to be updated to allow more flexibility for partnerships with academia and private business. Allow third parties to install, update and maintain infrastructure through performance-based specifications.

4) Testing and Priorities

Testing CV and AV in Minnesota is an opportunity to capitalize on our unique weather (winter) conditions and existing vehicle testing sites; we should use Minnesota's unique conditions to "sell" our testing sites. Truck platooning is a good (and perhaps an "easy") starting point to move quickly on development and implementation because it does not require infrastructure improvements. Open-road and off-road testing is encouraged as well – getting out into the environment where CAV will be integrating and operating.

Low Priority (other subcommittees will consider these in-depth)

1) Data Standards

2) Partnerships Regarding General Deployment

3) Users Needs

Group divergence: revenue and the source of revenue. The group notes that we've struggled getting a gas tax increase, and the impact of EV. Concerns included keeping up the current infrastructure while somehow simultaneously developing CAV infrastructure.

One participant commented on the need for accurate digital maps, and the lack of accurate maps of greater Minnesota. Several different vendors are working on their own versions of map structures, yet there are no companies that are working in rural MN, no good digital maps. Lidar mapping offers problem-solving potential regarding mapping. Other participants stated that we shouldn't conclude that all users need high definition maps – we need real time high definition information, high accuracy GPS and GNNS. Companies like GM are pushing for national standards – mapping Minnesota alone isn't logical since travelers and those in transportation travel across state lines.

Group 2

High Priority

1) Infrastructure Standards

Group consensus is that a recommendation regarding standards should be treated as two separate issues. Engagement in the deployment of federal infrastructure and data standards for full deployment is the highest priority; it's important that we're part of the national conversation. At this stage, working on national standards is the priority for consistency in standards across state lines. National standards should allow for state discretion and disallow state laws that stifle innovation. To be a national leader in CAV development, state standards should be developed for prototype testing. Consider the risk associated with being a "leader".

2) Revenue

Focus additional revenue streams by increasing existing or finding new sources of user-based fees (gas tax, registration fees, user-based fees). It's critical to identify the needs and streams that are out there; the group agrees with the preliminary recommendation on revenue, with the following change "Identify additional revenue streams to support CAV infrastructure needs beyond current sources, ~~in particular the potential loss in gas tax due to electrification~~." The current gas tax grossly underfunds transportation infrastructure needs. Public and policy makers need a better understanding of future revenue needs and potential CAV related offsets.

3) User needs

Consider all users and modes and their intersections, crossings, interaction, connection, and frictions. The recommendations need more focus on crossing/connecting modes. Add traffic, transit, RR and truck platoons to recommendations if the recommendations call out modes.

Group 2 took a "lifecycle" view: 1) Baseline/foundation, 2) Testing, 3) Intermediate, 4) Execution.

Group divergence: the group found consensus on the above high priority recommendations; there was divergence on what could be considered low priority. User needs became more important as the discussion progressed.

Group 3

High Priority - Industry

1) Infrastructure Investments

2) Funding/Revenue

From the industry standpoint, standards and testing are most important; whether we have funding and revenue will help us get there. What will be the source of funding?

High Priority – Academia

1) User Needs

2) Testing

From the standpoint of those in academia, the development of long-lasting standards and policy is priority; we don't want to continually revise the standards based on the development stage.

High Priority – Industry and Academia

3) Partnerships (Infrastructure Collaboration)

The group looked at CAV development from a chronological standpoint and sought to determine a baseline for recommendations that will lead to testing. If we can get results from testing, then we can look at implementation and execution. To look at it chronologically, partnerships are critical; partnerships are necessary (and needed quickly) to start work on all aspects of transportation infrastructure and CAV development.

Low priority

1) Electric vehicles

Most in the group find that EVs are important going forward, but maybe not to infrastructure considerations. Pollution Control Agency representative states that EVs shouldn't necessarily be a low

priority due to the cross benefits, and that the group should consider that the Governor mandates that we address reducing pollution and create healthy environment in his Executive Order.

2) State standards

The group desires representation from the federal standpoint, we don't want to create state standards for prototypes and testing until we have federal standards (or guidance at a minimum).

Group divergence: the importance of infrastructure planning for EVs.

Group 4

High Priority

1) Standards (Safety and Infrastructure)

The development of standards is important because: a) user and industry acceptance, and b) consistency for users and industry. The USDOT is responsible for implementation of standards with input from government stakeholders (states, municipalities, public) and private sector stakeholders (users, manufacturers, suppliers, insurance industry, etc.).

2) Funding (and Revenue)

The group blended funding and revenue in their discussions. Funding and revenue are important because: a) current needs are not being met, and b) new needs will need to be met. Policymakers and public/private partnerships are responsible for implementation. Incentivize the public sector to invest.

3) Partnerships

See standards and funding. Safety considerations, public interest and the needs of the industry (OEMs) are top priority. Education should be included in partnerships – close the knowledge gap and educate policy makers.

Low Priority

None.

Regarding the recommendations, the group seeks:

- clarification on terminology and definitions of CAV, AV, EV, etc.,
- more federal engagement with the private sector,
- funding to become part of a broader legislative agenda, and
- clarification of data standards (security and privacy).

Offer demonstrations of CAV to develop public trust for municipalities, college campuses and medical campuses.

Next Steps

Jay and Mark refine the recommendations based on the subcommittee's input. Presentation of the recommendations to the Advisory Council on 10/30.

Transportation Infrastructure

Subcommittee Recommendations

Jay Hietpas, Department of Transportation
Mark Krebsbach, Dakota County

Subcommittee Goals

To develop recommendations for changes to statutes, rules and policies in the area of transportation infrastructure for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory Council subcommittees as needed.

Infrastructure Questions

1. What infrastructure investments should Minnesota make today to support current AV and CV technology?
2. What infrastructure investments should Minnesota consider making to support future AV and CV technology?
3. What infrastructure considerations should Minnesota make to prepare for more electric vehicles?
4. What infrastructure considerations should Minnesota make to prepare for emerging trends in shared mobility?

Policy Questions

1. What policy changes are need to prepare MN infrastructure for CAV?
2. What legislation is recommended to foster AV and CV testing and implementation?
3. What can MN do to foster AV and CV testing and deployment?
4. How can we partner more effectively to prepare our infrastructure for CV, AV and EV?
5. What research should be considered to prepare our infrastructure for CAV?

Attendees

- Transportation Consultants
- Railroads
- State Government
- County Government
- City Government
- Academia
- Technology Industry
- Auto Industry
- Tele Communications
- Coalitions / Alliances
- Freight
- Transit Providers
- Other Private Businesses

Recommendation 1

Infrastructure Standards

Engage in the development of infrastructure standards at the federal level, so national policy accounts for Minnesota needs.

Allow MnDOT to-develop state standards in collaboration with local units of government.

Recommendation 2

Partnerships

- Support partnerships between government, academia, and private institutions to better understand the infrastructure needs for CAV testing and deploying, particular in winter weather conditions and other situations relative to Minnesota.
- Update state procurement processes to allow more flexibility and encourage private investments in rapid developing infrastructure technologies.

Recommendation 3

Infrastructure Investments

Pursue public and private infrastructure investments now in fiber optics, signal system modernization, improved pavement markings, telecommunications (e.g. 5G), and data collection to support emerging CAV technologies

Recommendation 4

Funding

Provide funding to support CAV infrastructure capital needs, operational needs, testing corridors, and public educational/outreach efforts.

Recommendation 5

Revenue

Identify additional revenue streams to support CAV infrastructure needs beyond current sources, in particular the potential loss in gas tax due to electrification.

Recommendation 6

User Needs

Consider all road user needs (e.g. pedestrians, bicycles, person with disabilities, transit, railroads) when making infrastructure investments for CAV.

Recommendation 7

Data Standards

Develop data standards and centralized systems for sharing infrastructure data (e.g. work zone, traffic signal timing, road conditions) with 3rd parties.

Recommendation 8

Partnerships (General Deployment)

Identify roles, responsibilities, and liabilities for public and private partners involved with CAV deployment.

Recommendation 9

Testing & Priorities

Support safe testing of CAV on existing public infrastructure, including truck platooning deployment, based on Minnesota transportation needs and priorities.

Recommendation 10

Electric Vehicles

Support efforts for electric vehicle deployment and associated infrastructure.

Thank you

Co-Liaisons

Jay Hietpas, Department of Transportation
Mark Krebsbach, Dakota County

Vehicle Registration, Driver Training and Licensing Advisory Council Subcommittee Charter

Executive Order/Purpose

Governor Dayton issued an executive order on connected and automated vehicles. The executive order recognizes that technology is evolving rapidly, and that Minnesota must prepare. The executive order established an advisory council comprised of 15 members appointed by the Governor and ex-officio members from state agencies and the legislature. The council will submit a report to the Governor and Legislature by December 1, 2018. The report will recommend changes in statutes, rules, and policies in eight areas, including cyber security and data privacy standards. The subcommittees are part of a larger effort to hear ideas about CAV from many Minnesotans. More information about the advisory council and this process is on MnDOT's CAV website..

Goal

The goal for Vehicle Registration, Driver Training and Licensing Subcommittee is to formulate and recommend to the advisory committee key considerations for MN statutes, rules and policies related to registration, driver training and licensing for connected and autonomous vehicles.

Roles

Mn DOT CAV Office is implementing the Executive Order.

- Jay Hietpas, P.E.
  Connected and Automated Vehicles Executive Director
  Jay.Hietpas@state.mn.us
- Kristin White
  Connected and Automated Vehicles Innovation Director
  Kristin.White@state.mn.us

Co-liaisons will provide expertise to CAV X and the facilitation teams, review agendas and meeting notes prior to distribution, provide input on meeting logistics and process, and are engaged in the presentation of recommendations to the Advisory Council. (The subcommittee will decide how it wishes to present.)

- Dawn Olson, DPS dawn.m.olson@state.mn.us
- Tom Henderson, DPS thomas.henderson@state.mn.us

Facilitators will manage scheduling and meeting logistics, communication, draft agendas and notes, facilitate meetings and provide process guidance, and assist with compiling presentation materials.

- Aimee Gourlay CAVFacilitators@mediationcentermn.org

Anyone who wants to attend is welcome at meetings. Subcommittee members will provide their knowledge and expertise by participating in meetings in person, or electronically and/or by commenting on meeting notes and recommendations. Meeting participants will be asked to sign in at the meetings. Those commenting on meeting notes will be asked to provide their name and contact information for follow up clarification, however comments will be aggregated and not attributed to any individual.

Meetings & Meeting Materials

Meetings will be scheduled based on the availability of the co-liaisons, CAV X staff and the facilitator, and presenters if applicable. It is anticipated that there will be two or three meetings prior to making a recommendation to the Advisory Committee. Members will be informed of meetings via email. Meetings will be announced and agendas will be available on the MnDOT CAV website at least one week before the meeting. Meeting materials will be posted on the website after each meeting and will be emailed to subcommittee members prior to the meeting.

Meeting Notes

Facilitators will provide notes of meetings. The liaisons will approve the notes, and subcommittee will have the opportunity to review and comment on them. Subcommittee members who were unable to attend a meeting may provide additional comment. Additional comments may be summarized by the facilitator.

Meeting Evaluation

All subcommittee members and those who signed in that they attended the meeting will receive a post-meeting evaluation.

Communication

The facilitator will include CAV X staff and the co-liaisons on subcommittee communication regarding logistics and planning. If the facilitator chooses to open a dialogue via email, all subcommittee members will be included.

Meeting Process

FACILITATION. Meetings will be facilitated. Meetings are expected to be two to three hours. Meetings will end on time and with a clear understanding of assignments and next steps. Extension of time, which is not encouraged, will require the consent of a majority of members attending that meeting by a show of hands.

TIMLINESS. Participants understand that their work needs to be presented to the Advisory Council by their October 30, 2018 meeting. They will do their best to meet the deadlines for giving feedback and other participation.

RESPECTFUL COMMUNICATION. Participants recognize that divergent ideas ensure robust recommendations and agree to listen respectfully to all opinions. The group may, if they choose, develop other meeting guidelines to facilitate communication.

NATURE OF RECOMMENDATONS. Recommendations will focus on maximizing the benefits and preparing MN for the adoption of automated and connected vehicles. Note that the recommendations are expected to be general rather than specific wording for state law, rules and policies.

DECISIONS/CONSENSUS. Recommendations from this group may be unanimous. If there is general consensus for a recommendation, meaning everyone is willing to support it, then it will be so noted for the Advisory Committee. If there is not a consensus, a summary of the rationales for different perspectives will be provided to the Advisory Council.

OPEN MEETINGS. Meetings will be open to all. The subcommittee meetings are public meetings, and people who are not on the subcommittee may attend. Depending on timing and number of participants, the facilitator may provide opportunity for members of the pubic to address the subcommittee in consultation with the co-liaisons.

PARKING LOT. Items raised for discussion which are not on the agenda may be listed for discussion or resolution at another time.

RECORD. The facilitator will keep a record of meeting attendees and meeting notes as outlined above. Comments from individual members will generally not be attributed and verbatim record of the meeting will not be prepared.

Outcomes

- Clear, consensus-based or rationales for divergences recommendations for the Advisory Council
- Subcommittee members participate in a meaningful way in developing recommendations
- Recommendations consider the for themes of safety, risk, equity and environment
- Recommendations consider immediate needs and longer term planning for CAV

Governor's Advisory Council on Connected & Automated Vehicles
Subcommittee on Vehicle Registration, Driver Training & Licensing

Agenda

Wednesday, August 29, 2018 9:00 AM - Noon
MnDOT Shoreview Training Center, Room 10
1900 County Road I West, Shoreview, MN 55126

Join Skype meeting

Subcommittee Goal: T*o formulate and recommend to the Advisory Council changes to Minnesota statutes, rules and policies related to registration, driver training and licensing for connected and autonomous vehicles.*

1. Welcome & Introductions

- Review of Executive Order & Goals
- Review of Agenda & Meeting Process
- Introductions

2. Presentation: Overview of Connected and Autonomous Vehicles ("CAV")

Kristin White, MnDOT CAV-X

3. Presentation: Title

Dawn Olson & Tom Henderson, Minnesota Department of Public Safety

4. Subcommittee Member Discussion

5. Next Steps and Closing

To request this document in an alternative format, please contact the Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

DEPARTMENT OF TRANSPORTATION

Questions

- Driver Training (Short Term)
  - There are several levels of AV, and some technology is already on the roadway. What are your thoughts on driver training opportunities for users of this technology and others impacted (e.g., pedestrians and bicycles).

- Driver Training (Long Term)
  - What training do you recommend be required to use complex vehicle dashboard systems or vehicle automation?
  - Vehicles could be driven by technology or remote operators (no human driver in the vehicle, only passengers). How might to individuals who don't have a driver's license access these vehicles? What regulatory changes do you recommend?

- Licensing
  - How do you recommend the state plan for potentially more labor-intensive driver exams in automated vehicles?
  - What are your recommendations for incorporating automated vehicles into the State's general driver testing requirements?

- Vehicle Registrations
  - Should registrations require the level of automation to be identified?

- Testing
  - To allow the safe testing of highly automated vehicles in Minnesota, what vehicle regulation, driver training, and licensing process do you recommend?

- Other
  - If truck platooning were to become legal in Minnesota, what vehicle regulation, driver training, and licensing practices would need to be implemented?
  - As vehicles communicate with other vehicles, or communicate with infrastructure such as signal systems, does this present any challenges to vehicle registration, driver training, and licensing? If so, what are the challenges, and are there mitigation factors?
  - As use of shared vehicles increases, and the potential that these vehicles could be automated in the future, are there regulatory changes that we should be considering?

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Vehicle Registration, Driver Training and Licensing

DEPARTMENT OF TRANSPORTATION

August 29, 2018

Welcome and Introductions

Subcommittee Goals

Subcommittee Goal

To formulate and recommend to the Advisory Council changes to Minnesota statutes, rules and policies related to registration, driver training and licensing for connected and autonomous vehicles.

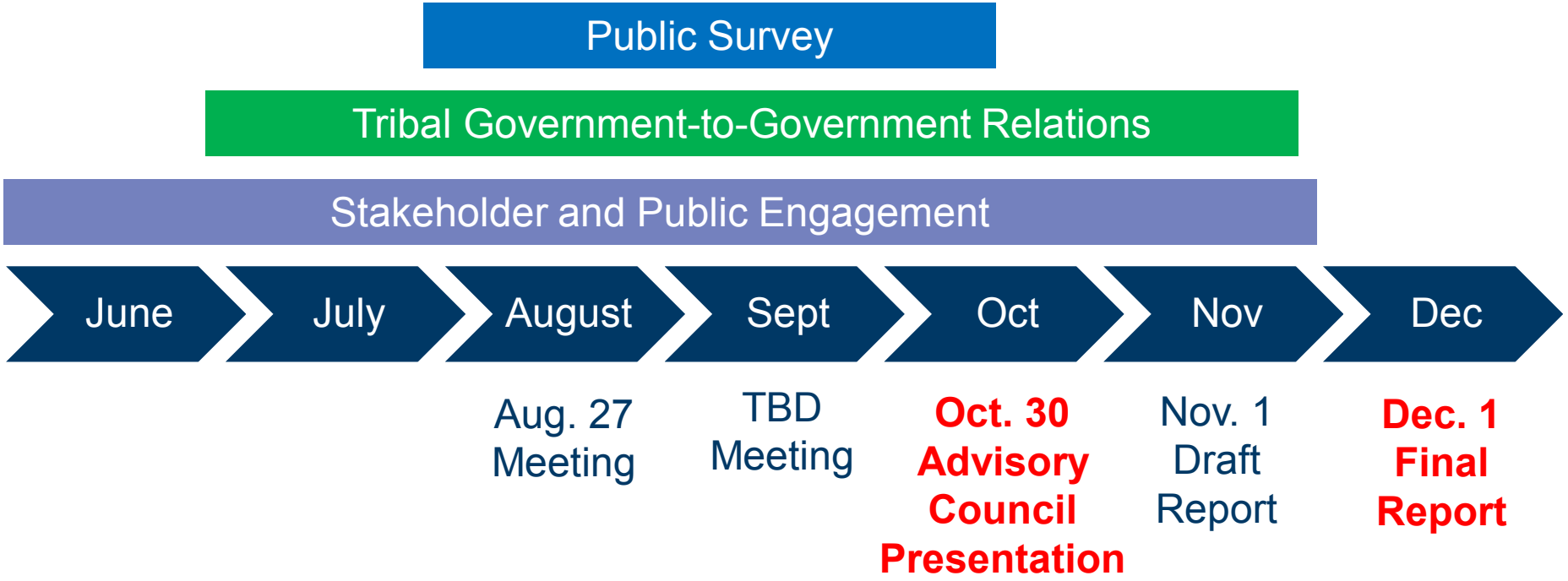
Subcommittee Process

- Participation
  - Meeting materials available on **MnDOT website**
  - Meeting updates at www.dot.state.mn.us/automated/publicmeetings.html
  - Participate in a **meaningful way**
- Discussion
  - Consider the themes of **safety, risk, equity and environment**
  - Consider immediate, **short-term outcomes**
- Recommendation
  - Clear, **consensus-based** recommendations (or reasons for differences)
  - Present recommendations to Advisory Council **October 30th**

Subcommittee Charter

- Meetings **open to the public**
- **Respectful** discussion, opportunities to be heard and **listen**
- May submit written comments on **comment cards**
- Notes taken on **consensus** or **summary** of discussion
- Meeting **notes approved by liaisons** and sent to subcommittee members for additional comments
- Meeting evaluation emailed after meeting

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Aug. 27 Meeting
TBD Meeting
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

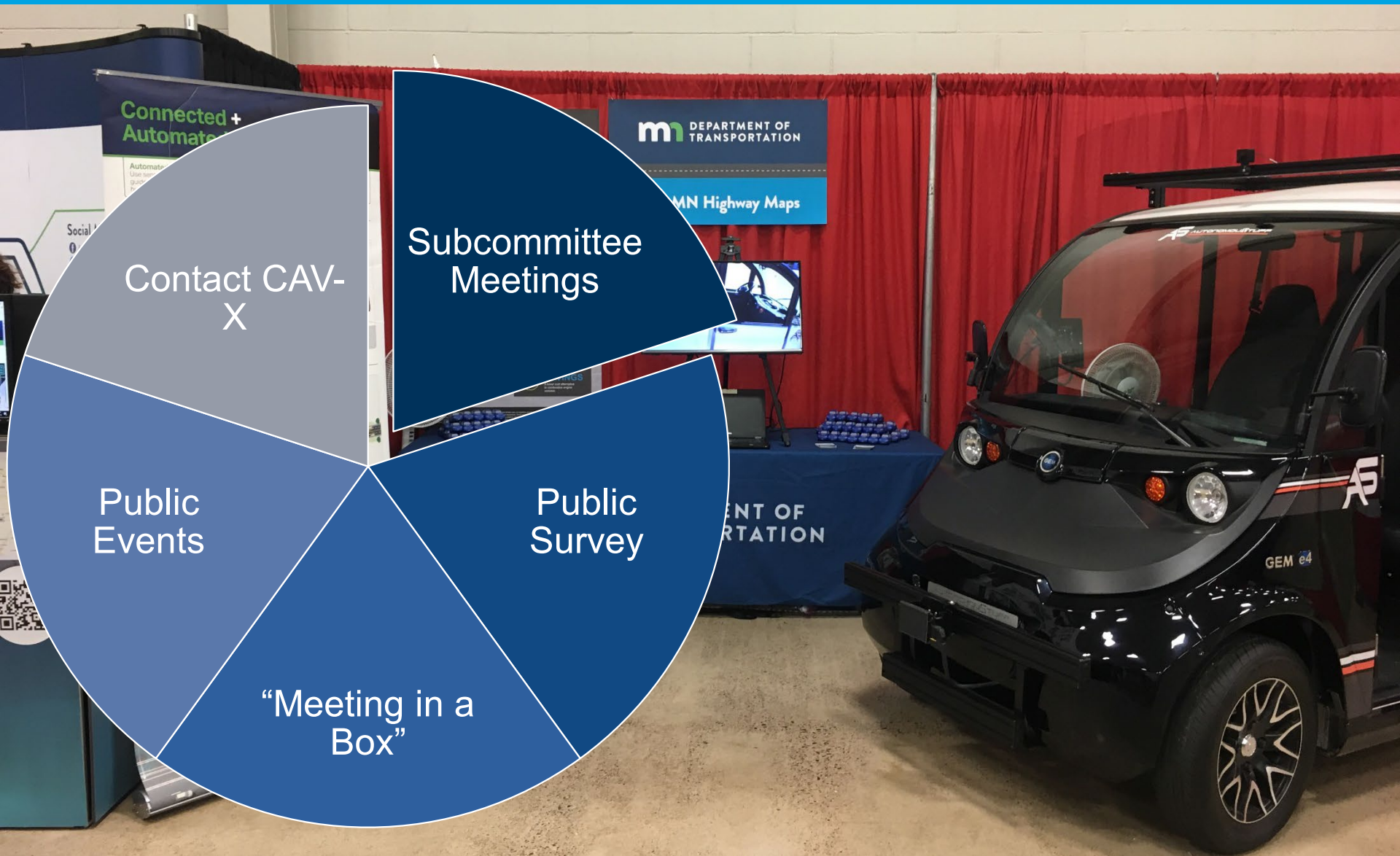
Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV

Advisory Council Goals

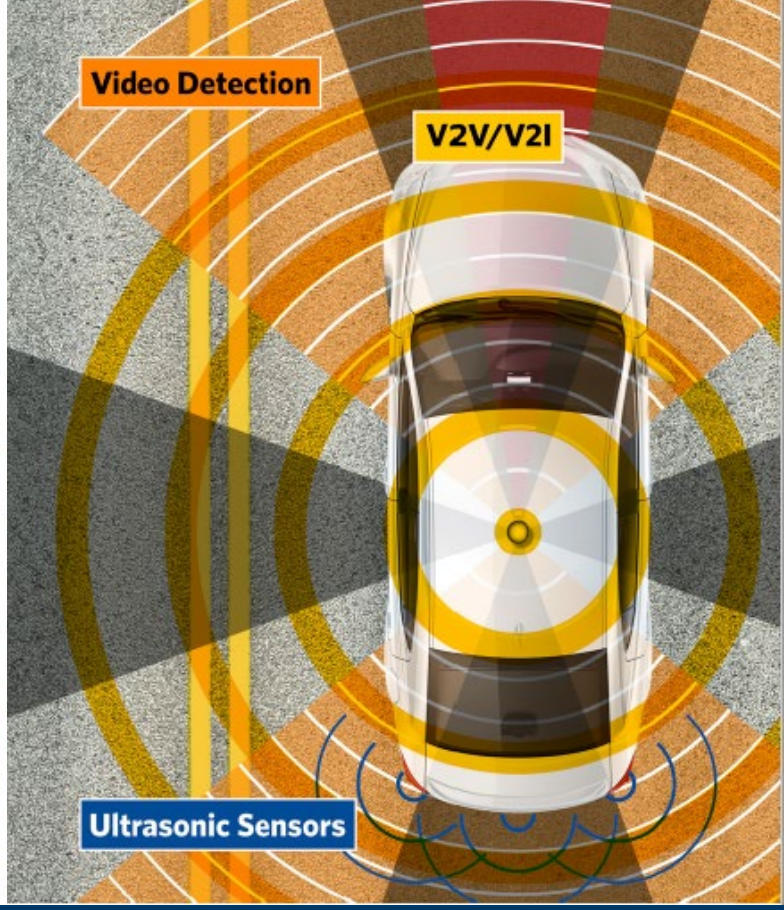
1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

Public Feedback Opportunities



Interagency Team

- Policy position papers
- Branding
- Testing & Deployment
- Partnerships



Overview of Connected & Automated Vehicles

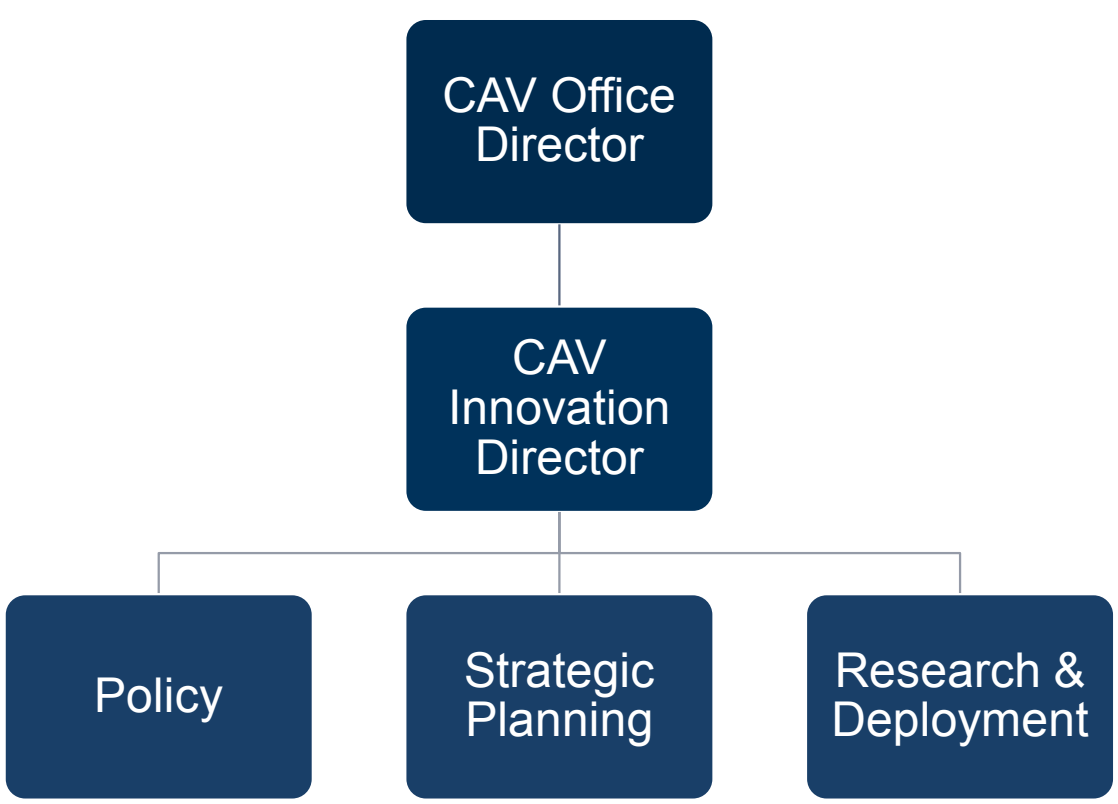
DEPARTMENT OF TRANSPORTATION

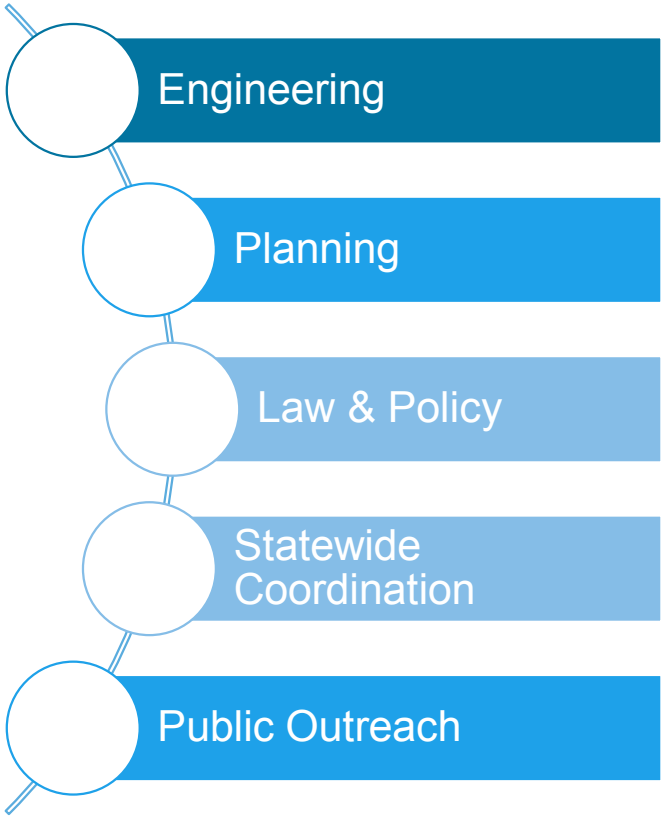
Kristin White, J.D.
CAV Innovation Director

DEPARTMENT OF TRANSPORTATION

Who We Are

MnDOT CAV-X Office





DEPARTMENT OF TRANSPORTATION

Why We're Here

Automated Vehicles

Automated vehicles can **take control of** some or all aspects of **driving tasks**.

Uses for Automation

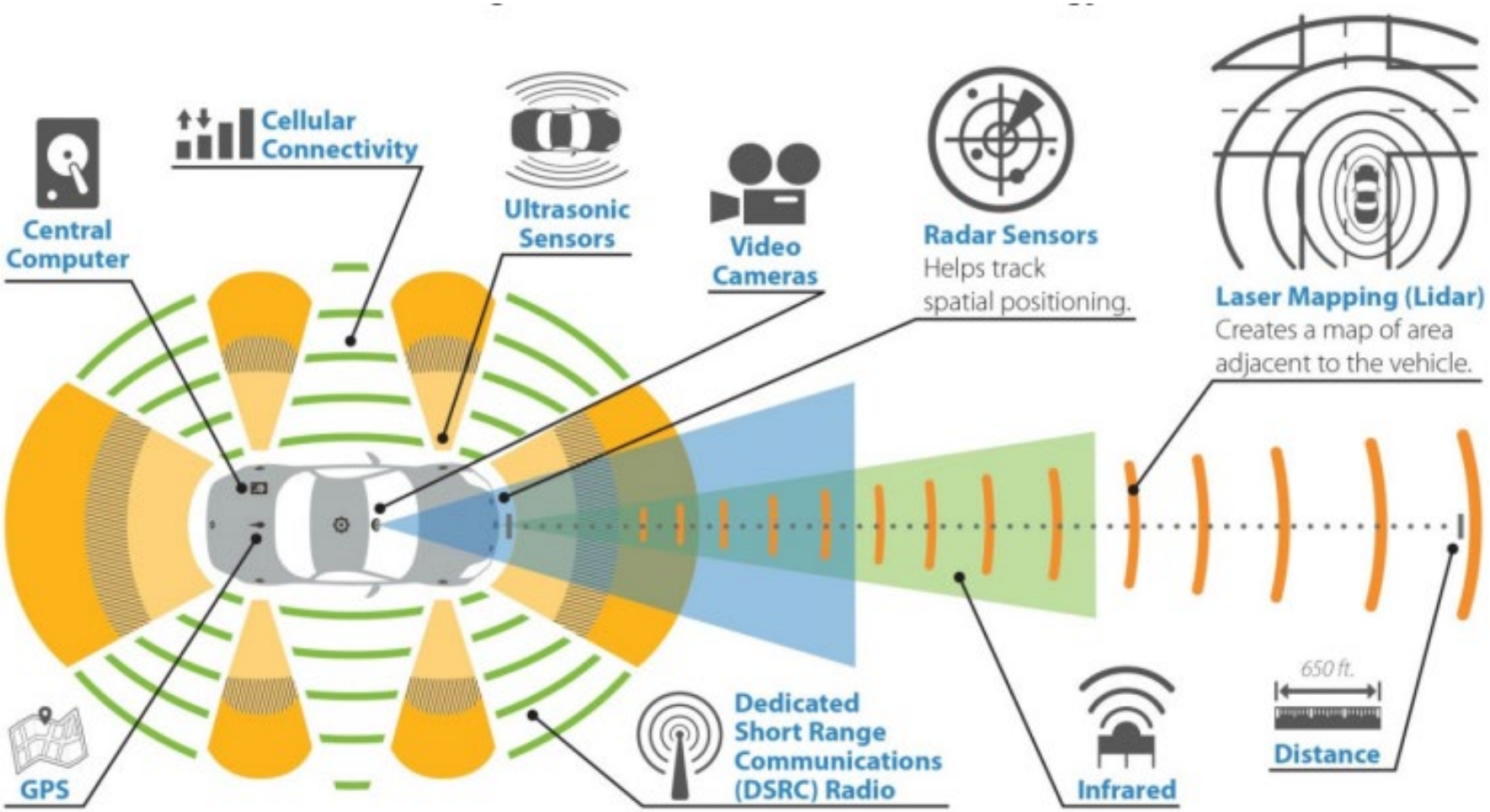
Types of **Automated Vehicles**

Passenger

Commercial

Transit

How does it work?



0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Society of Automotive Engineers (SAE) Levels of Automation

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

CAV Technology Already Available

Lane Assist & Departure Warnings

Self-Parking

Signal Countdowns

Connected Vehicles

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

Connected & Automated Vehicles

Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors

Connected Automated Vehicle

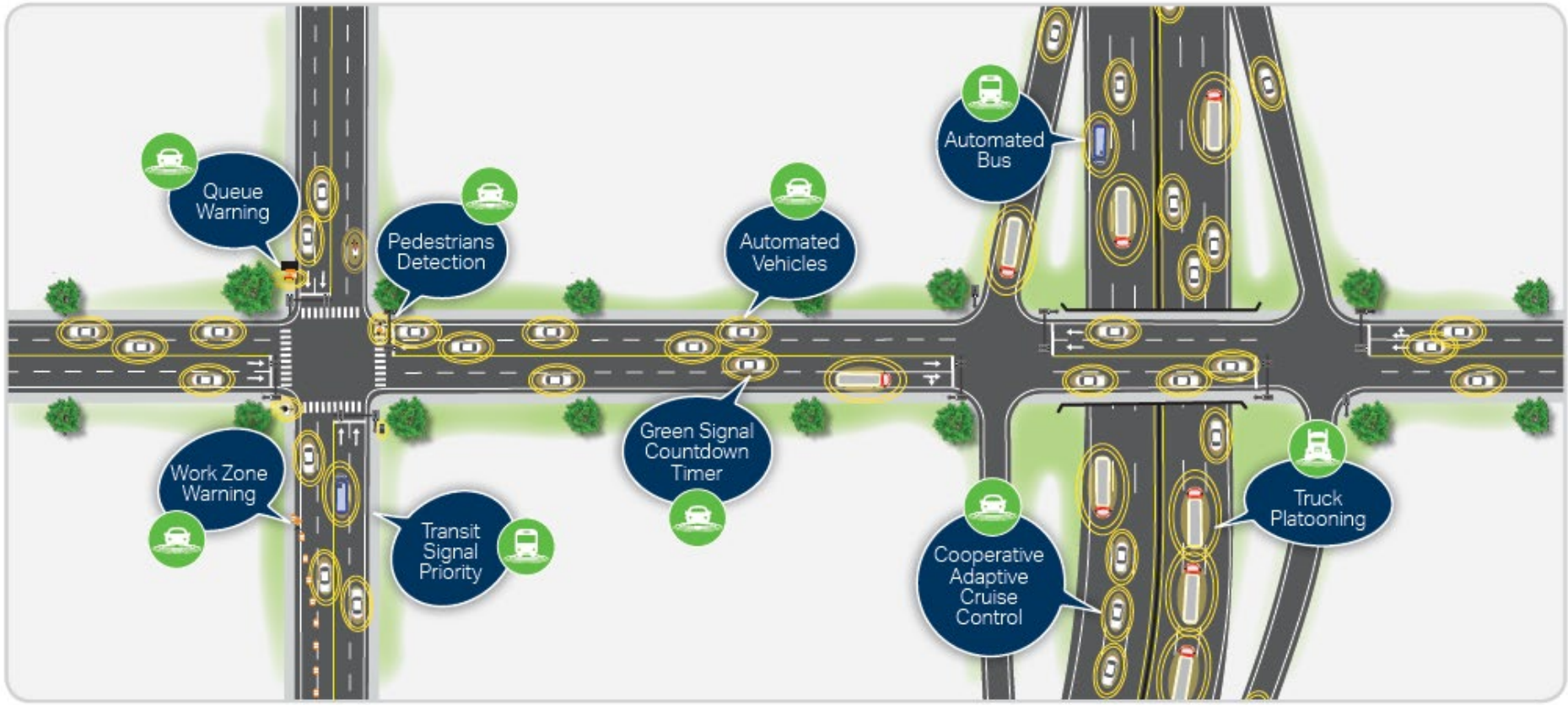
Leverages autonomous and connected vehicle capabilities

Connected Vehicle

Communicates with nearby vehicles and infrastructure

CAV Benefits

Types of Connected and Automated **Vehicle Applications**



Electric Vehicles

Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

Shared Mobility

Shared use of a vehicle, bicycle, or other transportation mode on an **as-needed basis**

1 account to access, plan, and pay for private and public transportation options

Vehicle: Think Broadly

Truck Platooning

Dockless scooters & bikes

Thank you

DEPARTMENT OF TRANSPORTATION

Kristin White, J.D.
CAV Innovation Director
kristin.white@state.mn.us

Highly Automated Vehicles

lessons from the AAMVA international conference

TOM HENDERSON, DRIVER AND VEHICLE SERVICES

AAMVA International Conference

Two sessions on HAV were presented.

AAMVA Jurisdictional Guidelines for Safe Testing and Deployment of Highly Automated Vehicles.

- The working group concluded the successful path to safe testing and development of HAV requires strong government and stakeholder engagement.
- Guidelines for driver licensing, motor vehicle administration, and law enforcement.
- The guide is available to download from the AAMVA website in the Autonomous Vehicle Information Library -- at www.aamva.org.

AAMVA International Conference

HAV discussion with states and industry:

- States don't know everything about HAV right now; learn more then regulate and change laws.
- Current laws probably cover most things HAV.
- People are going to be afraid of HAV - this is to be expected but cannot be a limiting factor.
  - Americans have been flying for 100+ years and commercially flying for 70+ years yet some people are afraid of flying.
- Test vehicle branding and some sort of special license plate would be a best practice.

AAMVA International Conference

- When testing, the test driver is critical.
- Some lessons learned following the Arizona HAV fatality.
  - States must demand a solid safety plan from manufacturers including driver training qualifications.
  - States should require some form of real time driver monitoring.
  - The collision avoidance system, if equipped, must be turned on.
  - Two safety drivers at speeds greater than 25 MPH might be desirable.
  - Manufacturers must explain the disengagement process from automated to manual driving; states must be comfortable with this process.
  - States should not incentivize testers to NOT disengage the AV with excessive reporting or that disengaging is seen as some sort of failure in testing.

AAMVA International Conference

- Minnesota is on the right track –
  - Governor's Executive Order
  - Advisory Group and Sub-Committees
  - Interagency Working Group

Discussion

Driver Training Questions

1. What are your thoughts on driver training opportunities for users of this technology and others impacted (e.g., pedestrians and bicycles)?

2. What training do you recommend be required to use complex vehicle dashboard systems or vehicle automation?

3. Vehicles could be driven by technology or remote operators (no human driver in the vehicle, only passengers). How might to individuals who don't have a driver's license access these vehicles? What regulatory changes do you recommend?

Licensing & Registration Questions

1. How do you recommend the state plan for potentially more labor-intensive driver exams in automated vehicles?

2. What are your recommendations for incorporating automated vehicles into the State's general driver testing requirements?

3. Should registrations require the level of automation to be identified?

AV Testing Questions

1. Should the state require AVs to be identified when testing? E.g. using a “green light” to show it’s in AV mode.

2. To allow the safe testing of highly automated vehicles in Minnesota, what vehicle regulation, driver training, and licensing process do you recommend?

Other Questions

1. If truck platooning becomes legal in Minnesota, what vehicle regulation, driver training, and licensing practices would need to be implemented?

2. As vehicles communicate with other vehicles, or communicate with infrastructure such as signal systems, does this present any challenges to vehicle registration, driver training, and licensing? If so, what are the challenges, and are there mitigation factors?

3. As use of shared vehicles increases, and the potential that these vehicles could be automated in the future, are there regulatory changes that we should be considering?

4. Did we address safety, risk, equity and environment?

5. Other questions or topics?

Next Steps & Closing

Next Steps

- Comments and feedback via comment cards or CAVfacilitators@mediationcentermn.org
- Participants review meeting minutes
- Post-meeting online survey
- Public CAV survey on www.state.mn.us/automated/
- September 24th: Next meeting
- October 30th: Present to Advisory Council

DEPARTMENT OF TRANSPORTATION

Thank you

Dawn Olson & Tom Henderson,
Minnesota Department of
Department of Public Safety

Governor's Advisory Council on Connected and Automated Vehicles

Vehicle Registration, Licensing and Training Subcommittee

Meeting Notes

Meeting Date: August 29, 2018 9:00 – 11:30 AM

General Meeting Notes (recorded ideas, lists generated by the group, and themes, not verbatim record)

Kristin White, MnDOT, Presentation on Connected and Automated Vehicles

- Governor issued Executive Order that requires a report to Governor, Legislature by Dec. 1st to discuss recommendations on changes to state law, rule, and policy
- Governor's Advisory Council on CAV has 4 main themes: safety, risk management, equity, and environment
- State of Minnesota has 4 main priorities focusing on CAV: connected, automated, electric and shared mobility
    - State uses SAE levels of automation, levels 3, 4, and 5 are highly automated vehicles (HAV)
    - State considering other uses like signal phasing and timing, truck platooning, automated shuttle services, mobility as a service (MaaS), and automated delivery

Tom Henderson, DPS, Presentation

- AAMVA (American Association of Motor Vehicle Administrators) Jurisdictional Guidelines for Safe Testing and Deployment of Highly Automated Vehicles is a good resource. It will be posted on the Subcommittee website (http://www.dot.state.mn.us/automated/publicmeetings.html) and sent to the subcommittee email list.
- Highlights from AAMVA Conference State and Industry forum
    - States don't know everything about HAV right now; learn more then regulate and change laws.
    - Current laws probably cover most things HAV. (Highly Automated Vehicles)
    - Test vehicle branding and some sort of special license plate would be a best practice.
    - When testing, the role of the test driver is critical.

- States must demand a solid safety plan from manufacturers, including driver training and qualifications.
- States should require some form of real time driver monitoring.
- The collision avoidance system, if equipped, must be turned on.
- Two safety drivers at speeds greater than 25 MPH might be desirable.
- Manufacturers must explain the disengagement process from automated to manual driving; states must be comfortable with this process.
- States should not penalize testing companies for reporting disengagements (when the AV shuts off and the human driver has to take over). Disengagements should not be seen as a point of failure
- Minnesota is on the right track with the –
  - Governor's Executive Order
  - Advisory Group and Sub-Committees
  - Interagency Working Group

Meeting Discussion

Clarifying Questions

- Is each state going to do their own road AV testing? States are making decisions based on their own state laws; AAMVA is trying to coordinate these efforts
- Commercial vehicles are in the scope of these discussions
- Uniformity for interstate travel is critical; commercial vehicles travel through different states in a single day/trip

Driver Training

- Need to work with OEMs (official equipment manufacturers) to provide training to technicians, training schools, and drivers. Currently auto manufacturers don't provide training for drivers, dealers, or third party purchasers
  - Concern around how you train for multiple/different manufacturers; how do you train for all the different AVs on the market?
  - Could we have 3rd party certified tester to train drivers?
  - Need to think about motorcycle endorsements
- Driver training and licensing requirements, may be different SAE levels of automation
- Test driver versus vehicle
  - Currently human drivers are tested, however automation is part of the vehicle. Currently vehicle automation systems are not tested for driving skills
  - Liaisons and CAV-X noted that NHTSA/FMCSA guidelines define the roles of the federal government and the roles of the states. The federal government will be

responsible for the vehicle while the states will be responsible for the driver. Given this, it is unlikely that Minnesota would have a role in testing the vehicle.
    - Would the human driving test have the AV turned on? How do we test driver's skills with and without automation in use?
- With new controls in CAV, discussion of what training would be required. Who would do the training? What if the AV systems go down?
    - What does it take to be a CAV "technician?"/human test driver? Is this regulated?
    - AV technology differs by manufacturer so may be difficult to standardize.
    - Who does the training? State or OEM?
    - There will need to be back-up systems, so human driver/technician needs to be able to meet current training and licensing requirements in case the automation does not work.
    - Does current state law require hands on the wheels? How do we monitor human driver?
    - Need a qualified AV driver (e.g. owner) and qualified human test driver
    - Should we use simulations to test AVs? Often not as good as on-the-road testing
- Liaisons and CAV-X noted that AAMVA recommendations state states should not establish endorsements at this time for SAE levels of automation. Currently, rules of the road apply whether using technology or not in a vehicle. Drivers are still required to be alert and aware.
- Accessibility
    - How do we think about minimum age to use CAV?
    - Benefits for accessibility for those younger than current driving age.
    - Benefits for disability, single parents, others.
    - AAMVA recommends not requiring a license for Level 4-5 AVs
- AV Driving Behavior Notifications/Signaling
    - How do we let other drivers know when the automation is being used? Or should we?
    - How do we let other road users know when the automation is being used? Or should we?
    - If we recommend using a light when AV is in use, this could have unintended negative impacts
- Testing Environment
    - How will examiners distinguish between different types of AVs? (e.g. different manufacturers)
    - Test will be longer. Could have 2 test: (1) current standards; (2) ability to use automation.
    - Would need to have a fleet of AVs which are expensive

- Need to train on the transition of Level 0 through 5 vehicles. It will be complex for trainers to be able to test all these levels of technology

Licensing

- Discussion of the benefits/drawbacks of signaling other drivers when the vehicle is in automated mode.
  - What behavior is incentivized if people around a vehicle know it is in automatic?
  - Do you want people to know? (It could attract attention or encourage interference OR it could create comfort through awareness.)
  - Plan for human interaction, positive and negative.
  - What about commercial platoons? Public awareness important. Otherwise, for example, a motorist might call 911 for tailgating/seemingly dangerous behavior.
- Plan for accessible use – Liaisons and CAV-X Office noted that per AAMVA guidance 5.6.4 states should not require licenses or training for SAE levels 4 and 5.
- Different driver requirements for different locations/roads? May not make practical sense. Policy is to have uniformity in the state. People drive from rural roads to city and vice versa. This is different discussion than standards for testing vehicles on roads.
- Discussion of driving track vs. street testing for AVs and commercial vehicles
  - Real-life has benefits – good to have combination of track and real life
  - Need infrastructure to test
  - Discussion of whether virtual road make sense for testing. It could be a virtual test before allowing on road testing. Simulators don't recreate the same as feeling the road and can't take the place of a road test.
  - Not good for end-use test (by manufacturers)
- Resources
  - If we have longer testing requirements, we need more resources and more locations for testing centers
  - Example of "imaginary lines" at Eagan testing facility. This would not be able to accommodate AVs. Would need to invest in infrastructure to support testing AV drivers and vehicles
- Commercial drivers' license (CDL) requirements should be uniform amongst states. E.g. Wisconsin's CDL testing may be easier than Minnesota's
- Commercial drivers' license (CDL) test protocol should be uniform between states
- Discussion of automatic reporting of collisions, 911 call. Agreed to refer this discussion to safety subcommittee. Outside the scope of this subcommittee.
- Licensing – how do examiners differentiate between cars? Skills to be an examiner?
  - What technology can be used during a test?
  - Exams will be longer.
  - It makes sense to have two tests. One for driver and one for use of technology.

- Transition period when there will be a mixed fleet of highly automated vehicles (HAV), which the CAV-X Office noted are SAE Levels 3-5 and non-HAV
    - Required retrofitting of was discussed, probably not practical
    - Who can service CAV? There is a link to the insurance and liability subcommittee, which is discussing this. Using an approved/manufacturer to service vehicle reduces risk.
- Discussion of the cost of vehicles. CAV will be expensive. Who will have access?

Vehicle Registrations

- Discussion of the importance of data about the level of car be required for registration. Liaisons noted this is per AAMVA Jurisdictional Guidelines 4.3.2 and 4.3.3. Need to know how many AVs are out there and which SAE level they are.
- In the short term for HAV testing, the current vehicle registration process could be used but in the future, the vehicle registration process might require revisions.
- Reciprocity with other states
    - Practical issue – how does the State of Minnesota stay ahead of change?
    - Reciprocity already exists in current state law. MN should recognize AV registrations of other states. Without this flexibility interstate commerce would be challenged.
    - Interstate reciprocity: MN doesn't recognize some states because their training doesn't meet our standards
    - Don't want to create barriers to interstate travel
- Vehicle Maintenance
    - State should not mandate retrofitting as this would be controversial and expensive
    - Who can service these AVs?
    - Could address maintenance on annual registration renewal; if AV hasn't been maintained, it can't be registered
    - How is ongoing maintenance of AV technology enforced? Maybe like the annual emissions testing used to be. Challenge is proprietary information from manufacturers. Perhaps require proof of vehicle inspection by manufacturer/approved service.

AV Testing/Permitting

- Things will change, can't monitor daily (like vehicle insurance requirement for license … checked when renewed, not more frequently)
    - Public will expect oversight
    - Is manufacturers' safety self-certification acceptable to meet state standards? Liaisons note that the federal government is responsible for vehicle safety standards through a self-certification process by manufacturers

    - What can DPS do?
    - Testing AVs requires connectivity and infrastructure (for example currently law enforcement can access information about a car/driver on the road)
    - What resources are needed?
- To test a platoon there would be at least two trucks
- Safety drivers for testing
    - Driver qualifications high
    - Higher skill jobs
- Will commercial trucking competitors work together? Liaisons noted that Minnesota may wish to address requiring uniform/inter-changeable technology in AVs for platoon testing so the technology tested can be used in multiple trucks and carriers.
- Each automated vehicle is different, but for testing purposes the State may be able to test on more uniform/similar AV applications.
- Cyber security an issue. It might be possible to steal freight, detour truck, or use the truck for terrorism.
- What information is required to test a vehicle on the road today?
    - Disclosure
    - Self-certification
    - Testing – on designated highways or is anywhere in the state okay?
- Does Minnesota need to issue a permit to test AVs?
    - Currently there is no permit to test AVs. Liaisons note that AAMVA recommendations in Chapter 4 discuss AV test permitting.
    - Current AAMVA recommendations discuss requiring an AV testing permit
    - What happens if no additional permit required?
    - Would need authorizing language in state law
- Railroads are testing AV. Some locations use biometric security measures. Some railroads conducting research on how to identify owner/operator of AV if it's a level 4-5 with no human driver or passenger; testing location recognition programs to eliminate driver wait times. Homeland security driver ID – currently allows access to certain areas only by driver security clearance. How is there a positive security ID if there is no person in the vehicle?
- How do we get the right information at the right time?
- Driver easy/safety/time involved should all be considered

Tentative Recommendations –

- There is general consensus of this subcommittee that commercial licensing should be uniform for interstate travel; need reciprocity. Liaisons note that there is already reciprocity amongst states for commercial driver licensing and registration. Uniformity must be allowed for efficient interstate commerce.

- There is agreement that there is a need for further research into endorsements/driver training for commercial CDL (appropriate testing for vehicle being tested – might be similar to current motorcycle endorsement)
- There is general consensus that there may be standards for test driver quality
- There is general consensus that CAV disengagement should not be discouraged in order to encourage safety to the public. Some other states have learned that reports of disengagement could create a disincentive.
- There is consensus that at some point in technology development there may need to be two licensing tests: one for drivers and one for technology.
- Need guidance on how to train testing technicians – will the schools initiate training or the manufacturers? There was a lack of consensus regarding whether the manufacturers will need to train or whether the state or driving schools. Liaisons recommend proposing that Minnesota requires information to understand how an AV human test driver is trained.
- Need endorsements for each level of automation; title of vehicle could be branded by the SAE level of automation. Liaisons note that this is contrary to AAMVA's recommendations.
- Need to distinguish training and endorsements of an owner of an AV passenger vehicle and that of an AV human test driver. Liaisons note that this is contrary to the role of current federal and state responsibilities. Liaisons note that the training and testing of a Minnesotan who owns an AV in the future will be different than the training and testing requirements of a current AV human test driver.

Next Steps – any follow up and who is responsible, by what date

- CAV-X will provide sample CAV reports from other states to the subcommittee.
- CAV-X will forward AAMVA report (America Association of Motor Vehicle Administrators). Recommended subcommittee members review this report before the next meeting.
- Facilitator's notes will be reviewed by the liaisons and CAV-X, then posted on the subcommittee website (http://www.dot.state.mn.us/automated/publicmeetings.html), and emailed to subcommittee members. Comments on the meeting notes are welcome.
- A meeting evaluation will be sent to the subcommittee
- Next meeting date is September 24, 2018 from 9:00 AM – noon at MNDOT Shoreview Training Center 1900 County Rd I, Shoreview, MN 55126
- Refer discussion of automatic collision reporting/911 call to the safety subcommittee. This subcommittee thinks it makes sense, however outside its scope.

Parking Lot - items for follow up at subsequent meetings

- Review Tom Henderson's learnings from AAMVA conference (summarized in General Meeting Notes above). Are any of these points potential recommendations?

Governor's Advisory Council on Connected & Automated Vehicles

Vehicle Registration, Driver Training and Licensing Subcommittee

Agenda

Monday, September 24, 2018 9:00 AM - Noon
MnDOT Shoreview Training Center, Room 10
1900 County Road I West, Shoreview, MN 55126

Join Skype Meeting for PowerPoint Presentation
Call-in number for audio is: 1-888-742-5095
Conference code: 1658 926 687

Subcommittee Goal: *The goal for Vehicle Registration, Driver Training and Licensing Subcommittee is to formulate and recommend to the advisory committee key considerations for Minnesota statutes, rules and policies related to registration, driver training and licensing for connected and autonomous vehicles*

1. **Welcome and Introduction**

2. **Summary of Last Meeting's Discussion Topics and Tentative Recommendations**
   (Subcommittee Liaisons: Dawn Olson and Tom Henderson)

3. **Discussion: Other Topics the Subcommittee Would Like to Address?**

4. **Develop Recommendations to the Advisory Council**
   - What do you want the liaisons to recommend to the Advisory Council?
   - Refine tentative recommendations
   - Discuss and develop any additional recommendations

5. **Closing & Next Steps**
   - Is the subcommittee ready to present to the Advisory Council

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Tentative Recommendations from 8/29/18 Meeting

- There is general consensus of this subcommittee that commercial licensing should be uniform for interstate travel
- There is agreement that there is a need for further research into endorsements/driver training for commercial CDL (appropriate testing for vehicle being tested – might be similar to current motorcycle endorsement)
- There is general consensus that there be standards for test driver quality
- There is general consensus that CAV disengagement should not be discouraged in order to encourage safety to the public. Some other states have learned that reports of disengagement could create a disincentive.
- There is consensus that at some point in technology development there will need to be two licensing tests: one for drivers and one for technology. (Note from liaisons: driver testing is the state government responsibility and vehicles are federal.)

Areas for Possible Recommendations

- Driver Training (Short Term)
  - There are several levels of AV, and some technology is already on the roadway. What recommendations on driver training for users would you make for this technology and others impacted (e.g., pedestrians and bicycles).

- Driver Training (Long Term)
  - What driver training would you recommend be required to use complex vehicle dashboard systems or vehicle automation?
  - Vehicles could be driven by technology or remote operators (no human driver in the vehicle, only passengers). How might to individuals who don't have a driver's license access these vehicles? What regulatory changes do you recommend?

- Licensing
  - What are your recommendations for incorporating automated vehicles into the State's general driver testing requirements?

- Vehicle Registrations
  - What are your recommendations for registering vehicles with automation?

- Testing
  - To allow the safe testing of highly automated vehicles in Minnesota driver training and licensing process do you recommend?

- Other
  - If truck platooning were authorized in Minnesota, what driver training and licensing practices would you recommend be implemented?
  - As vehicles communicate with other vehicles, or communicate with infrastructure such as signal systems, does this present any challenges to vehicle registration, driver training, and licensing? If so, what recommendations do you have to mitigate these?
  - As increase use of shared vehicles increases, and the potential that these vehicles could be automated in the future, what regulatory recommendations would you make?

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Vehicle Registration, Licensing, and Training

DEPARTMENT OF TRANSPORTATION

September 24, 2018

Welcome and Introductions

Summary of Last Meeting

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure & Investment	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV

Review of First Meeting- Themes

- Driver Training
  - How to train/test for all of the different Avs on the market
  - Role of MN in testing (federal/state and OEM/state distinctions)
- Licensing
  - Accessible use
  - Commercial drivers' licenses
- Vehicle Registrations
  - Importance of data collection
  - Reciprocity with other states
- AV Testing/Permitting

Evaluation Feedback

- Generally satisfied
- Comment: Accessibility was brought up for a bit in regards to level 4 CAVs for those who cannot otherwise drive a car because of licensing and training requirements. Hoping for more discussion on how those with disabilities will be impacted by licensing and training requirements. I would imagine training will be required to ensure that they can otherwise operate the vehicle, maintain it, utilize other car features, etc.

Process for Potential Considerations & Recommendations

- CAV-X, liaisons and facilitator reviewed notes
- Identified potential recommendations from the first meeting
- Identified references to AAMVA
- Summarized below for the subcommittee's consideration
- The purpose is to give the group additional information in formulating recommendations

Potential Policy Consideration - Uniformity

- *There is general consensus of this subcommittee that commercial licensing should be uniform for interstate travel; need reciprocity. Uniformity must be allowed for efficient interstate commerce.*
- Liaisons note that there is already reciprocity amongst states for commercial driver licensing and registration.
- AAMVA 4.2.1 Establish uniform language that will benefit law enforcement, the MVA, and other stakeholders for testing HAVs. Such language should use common terminology such as “HAV” for “highly automated vehicle” and Levels 3, 4, and 5.
- AAMVA 4.2.3 Recognize the registration, title, and plate issued by another titling jurisdiction for purposes of testing.
- AAMVA 5.1.1 Recommends adopting SAE International definitions for HAV technology (Chapter 2, levels 1 – 5) definitions.

Potential Policy Consideration - Disengagement

- *There is general consensus that CAV disengagement should not be discouraged in order to encourage safety to the public. Some other states have learned that reports of disengagement could create a disincentive.*

Potential Recommendation - Licensing

- *There is agreement that there is a need for further research into endorsements/driver training for commercial drivers' license.*
- AAMVA 5.6.1. Jurisdictions should not establish endorsements or restrictions on driver licenses at this time.
- *Plan for accessible use.*
- AAMVA 5.6.4. Jurisdictions should not impose any other requirements, such as licensure, sobriety, clean driving history, and so on, for nondrivers to use Level 4 and 5 vehicles.
- AAMVA 5.6.6. Review jurisdictional laws and regulations related to unsupervised children in motor vehicles and adopt appropriate laws and regulations to ensure safety

Potential Recommendation - Registration

- *Need endorsements for each level of automation; title of vehicle could be branded by the SAE level of automation. Liaisons note that this is contrary to AAMVA's recommendations.*
- AAMVA 4.3.2. Titles for vehicles with added aftermarket components enabling HAV functionality should be branded. The brand should indicate "highly automated vehicle."
- AAMVA 4.3.3. Make a notation on a vehicle's record using "HAV" when the altered vehicle is capable of functioning at a Level 3, 4 or 5 as automated technologies continue to develop.
- AAMVA 4.3.4 Title all highly automated deployed vehicles, including those altered by aftermarket part manufacturers, pursuant to the jurisdiction's laws or policies; each title should be branded "HAV" and further designated by Level 3, 4, or 5

Potential Recommendations - Testing

- *There is general consensus that there may be standards for test driver quality.*
- AAMVA 4.1.1. Require all manufacturers and other entities testing Level 3, 4, or 5 HAVs to apply for and be issued vehicle specific permits before testing on public roadways
- AAMVA 5.2.1. Review and develop or adapt existing rules, if applicable, regarding vehicle operation to ensure HAV testing is permitted.
- AAMVA 5.2.2. Require test HAVs be operated solely by employees, contractors, or other persons designated by the manufacturer of the HAV or any such entity involved in the testing of the HAV.
- AAMVA 5.2.3. Require test drivers to receive training and instruction related to, but not limited to, the capabilities and limitations of the vehicle and be subject to a background check as described in Section 6.2 Criminal Activity.

Potential Recommendations – Testing (continued)

- AAMVA 5.2.4. Require training provided to the employees, contractors, or other persons designated by the manufacturer or entity be documented and submitted to the jurisdiction's HAV lead agency along with other required information.
- AAMVA 5.2.5. Support the safe testing without a human driver inside of the vehicle by requiring a user designated by the manufacturer of the ADS technology or any such entity involved in the driverless testing of the HAV to be capable of assuming control of the vehicle's operations or have the ability to achieve a minimal risk condition.
- AAMVA 5.2.6. Take steps to ensure motor vehicle laws allow for the manufacturer to safely test Level 4 and 5 vehicles without a licensed driver, provided a user designated by the manufacturer or any such entity involved in the driverless testing of the HAV is capable of assuming control of the vehicle's operations or has the ability to achieve a minimal risk condition

Discussion – Topics for Recommendations?

Small Group Breakouts

Small Group Discussion

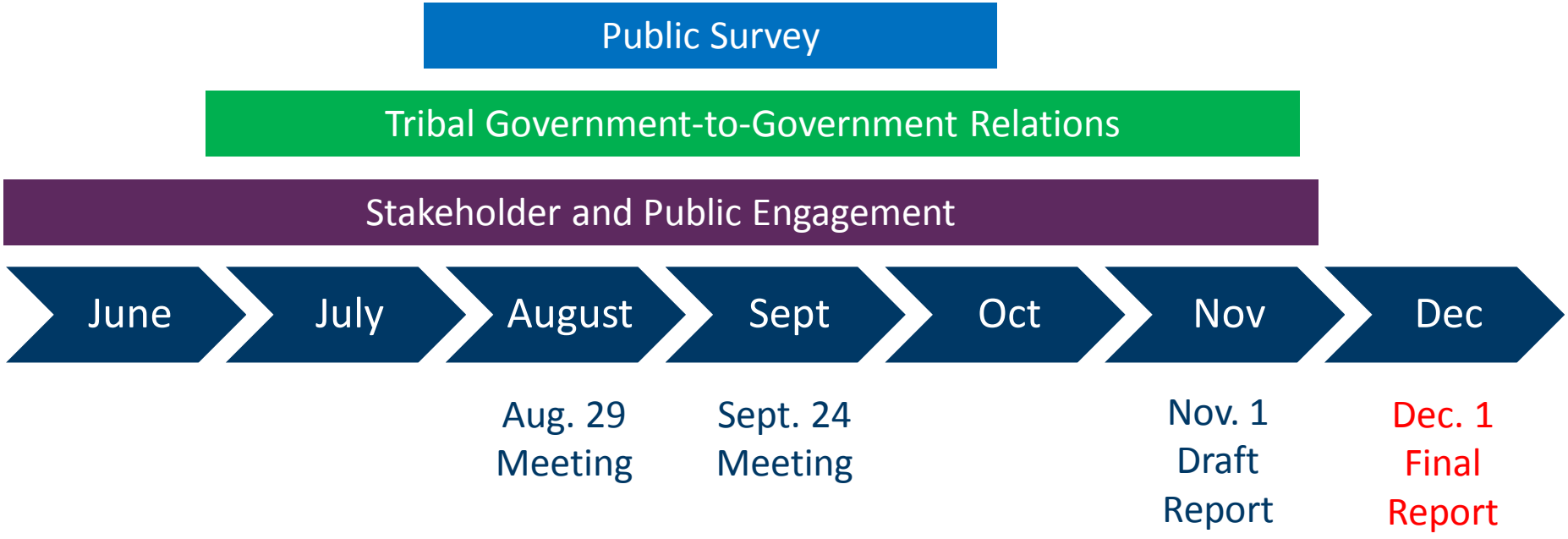
- Select themes for discussion.
- Decide which theme you want to work on and meet together in small groups.
- Select a recorder and reporter for your group.
- Discuss the topic and record *all* proposed recommendations on a post-it or put them on flip chart paper.
- Decide which recommendations have consensus in your group.
- Come back together and the reporter shares consensus recommendations, discuss as a large group.

Next Steps & Closing

Next Steps

- Do you need to meet again? Review recommendations?
- Feedback on meeting process & structure?
- Finalize written recommendations
- September 25th: Present to Advisory Council
- Public survey

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Aug. 29 Meeting
Sept. 24 Meeting
Sept. 25 Present to Advisory Council
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Thank you

Vehicle Registration and Training Meeting

September 24th, 2018

1. In person attendees

a. Skip Hanson
b. Mike Hansen
c. Matt Hacker, MN Truck Driving School
d. Elite Driving School
e. Amber Bachus

2. Online attendees

a. Bruce Jindra, Hennepin County
b. Maggie Green, Messerli Kramer
c. John W. Palmer, St. Cloud
d. Joan Wilshire, MCOD

3. Summary of Previous Meetings

a. CAV-X gave broad overview of EO and other subcommittees
b. Tom Henderson gave summary of last meeting
    i. General consensus on endorsements
    ii. Consensus on driver training for HAVs
    iii. Conversation, possible general consensus on 2 tests, e.g. L0-4 and 1 for Level 5
    iv. Need endorsements on registration and titling
    v. Distinguish training and endorsements for driver as levels of automation increase
c. Mediation Center gave overview of evaluation feedback from last meeting
d. Mediation Center discussed process for potential recommendations
    i. Discussed AAMVA recommendations
    ii. Liaison noted these are not set in stone, and MN doesn't have to adopt those wholesale
    iii. AAMA recommendations 4.1-4.3
    iv. Do not monitor disengagement
    v. Need further research/there wasn't consensus for endorsements/training for CDL
    vi. AAMVA 5.6.1: Don't establish restrictions on driver licenses
    vii. AAMVA 5.6.4 Don't impose any other requirements (e.g. licensure/sobriety/driving history) for L4-5
    viii. 5.6.6 Review jurisdictional laws related to unlicensed children
    ix. 4.3.2 Titles for CAVs could label as "HAV"

x. 4.3.3 Make a notation on vehicles record using “HAV” when vehicle is capable of functioning
xi. 4.1.1
xii. 5.2.1
xiii. 5.2.2 HAVs operated by employees of contractors of manufacturers
xiv. 5.2.3 Require test driver training
xv. 5.2.4
xvi. 5.2.5
xvii. 5.2.6

4. Anything missing?

a. **Licensing for the broader population**. What about conversations on driver’s licenses for those that currently have them? (E.g. those with disabilities/elderly).
b. **Rental car industry and users.** Rental car industry will be impacted by this. Would you be able to rent a vehicle in an easy manner if you’re qualified to rent a CAV?

5. Discussion

a. Licensing for people in the broader population. People who may not qualify for driver’s license.
b. Is there a general scope? Are we talking about passengers for industrial use? Railroads are moving quickly into AV. State doesn’t title or register vehicles on industrial/private roads. What if the vehicle doesn’t go on state roads? It depends on who owns and operates the road.
c. **Uniformity** (intrastate, and within the United States) is going to be one of the most important considerations.
d. **Designate 1 lead motor vehicle state agency for testing**
e. **Coordination amongst state agencies and locals**. Least restrictive bias, e.g. error on the side of being as unrestrictive as possible. Think about end user/owner. Don’t over-regulate.
    i. AAMVA recommends a lead agency for testing so there aren’t multiple agencies for testing. DPS and MnDOT agree that it should be one lead agency.
f. **Data-driven regulations.** Don’t take action until we have data. Data about how user interacts with choice. Think about unintended consequences.
    i. Human factors discussion: An uninformed or under-informed user may unknowingly override a vehicle safety system. What would that study look like?
    ii. Need research on human impacts, human acceptance and human use of this technology
g. **Education** is key. Educate users now so they are prepared when the technology is deployed in 20 years.
    i. How do we discuss Level 3/hands-free curriculum with students?
    ii. A module needs to be developed for driver’s training for this technology. Traffic Regulations and Safety subcommittee discussed technician trainers for this technology.
    iii. State has the ability to do this training with the facilities and staff the state already has.

h. **Driver training and testing**. Currently are not testing on this CAV technology. Can we have an endorsement on the license for the level of automation? Current driver training and testing assumes human driver is in total control of the vehicle. DPS concerned with requiring different testing for CAV because there isn't enough data. **Need to look at how we train and test drivers** with all levels of automation.
i. **Need research funding from the state**
j. CAV technology will be different amongst industry manufacturers; L3-5 is different between manufacturers
k. You need different licensing based on whether human can take control of the vehicle
l. Point was shared about accessibility and people and veterans with disabilities, and ensuring regulations don't prohibit people with disabilities from using CAV.
m. Need to identify level of automated vehicle to law enforcement thru registration
n. What is the type of testing we should be thinking about for snow and winter conditions?
o. Unique challenges of Greater Minnesota, notably with regard to research, how this technology can safely be utilized in a rural environment.
    i. Transportation Infrastructure group addressing winter weather conditions
    ii. State doesn't require winter testing because state can't control the weather
p. Commercial vehicles and uniformity: Currently can use one state's commercial license in other states if there's reciprocity.
q. Disengagements: Important for states to know when technology is on or off. Need to know when technology is used and when it is not.
    i. Who owns the data? Currently owner of vehicle.
    ii. CAV-X noted that Cyber Security & Data Privacy Standards subcommittee looking into opt-in language
r. **Recommendations for test drivers**: What are the qualifications for test drivers? Should the state be making recommendations to the Council on number of miles required?
    i. For commercial drivers,
        1. Mileage may only be 1 metric
        2. Can look at safety scores, moving violations on a driver's record
    ii. For standard driver need to know how to use features, need to be validly licensed
        1. Numbers of years of experience? E.g. 5 years citation-accident free driving, e.g. minimum age of 18
        2. Need training on specific equipment
s. When auto manufactures test CAVs, they need to collaborate with communities with disabilities and have testing for people with disabilities so they can use the technology
t. Permitting/testing: How does lead agency enforce? Is this going to be a permit process or welcome to come and test? Don't want statutes or rules for testing.
    i. Some think we should have statutes to address testing
    ii. To balance public safety/greater good and private industry: need to error on the side of public safety.
    iii. Needs to be a balanced approach
    iv. Need a further study of the permitting process or other process to allow testing of Minnesota

Recommendations

1. There should be 1 lead agency responsible for approving testing in MN
2. Don't know about L4-5. Don't create a regulation yet. It will be important to incorporate users who may not currently have driver's licenses (children, elderly, people with disabilities).
3. This subcommittee recognized the need for research to how users will use this technology and the need for research and funding
4. Develop consistent, state-wide curriculum
5. Should be a specific registration/title branding for a highly automated vehicle
6. Disengagements
7. Human test drivers: Need to have standards for commercial and passenger test drivers. Citation and accident free. Minnesota requires vehicles be tested with people with disabilities, aging, and veterans with disabilities. As technology develops, MN should reconsider human driver testing.
8. Need a further study of the permitting process, other application process, or statute to allow testing of Minnesota

Considerations

1. As tech evolves, need to be able to adapt education, training and licensing
2. Uniformity, federal government will continue to evaluate vehicle safety. States will accept that

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Vehicle Registration, Training and Licensing

Draft Recommendations

1. This subcommittee recommends that there be one "lead agency" responsible for approving testing in MN. The process for testing needs to include considerations of public safety and support testing in MN. We recommend the I-CAV work group to consider how to strike this balance (permitting, statute, regulations, etc.). We urge restraint in regulation in testing, and prefer flexibility for pilot testing.
2. We don't know enough about what level 4 – 5 cars will be like. This subcommittee recommends not creating regulation yet. It will be important to plan to incorporate users who may not currently have driver's licenses (children, elderly, people with disabilities).
3. This subcommittee recognized the need for research to how users will understand and use this technology and the need for research funding.
4. Develop a network for driver and user technology training (partners: private drivers' education/vehicle manufacturers/state of MN). Develop a statewide curriculum as to what is being discussed in the training.
5. We recommend that there be a specific registration component and branding on the license for HAV.
6. Disengagement needs to be tracked in incident report for testing. To avoid the unintended consequence of testers being reluctant to disengage, disengagement should not be assumed to be a negative.
7. There is a general consensus that there be standards for test driver quality: a higher standard than commercial drivers' license for trucking, and a higher standard than a drivers' license for passenger vehicle test drivers. As technology develops, MN should reconsider test driver requirements and require that testing of vehicles include people with disabilities, aging, veterans, and others who may not have drivers' licenses.

Considerations

1. As technology evolves, we need to be able to adapt education, training and licensing. This subcommittee recommends considering data and human behavior factors before making decisions.
2. The federal government is responsible for regulating the vehicle and MN the driver.
3. Work with other states for uniformity, interstate travel.
4. This subcommittee recommends that MN laws be revised to allow for use of fully automated vehicles. No drivers' license will be required when there is no possibility for human control of the vehicle. Remote drivers licensing and training will need to be considered.

Vehicle Registration, Driver Training and Licensing

Subcommittee Recommendations

Tom Henderson, Department of Public Safety

Considerations

- As technology evolves, we need to be able to adapt education, training and licensing. This subcommittee recommends considering data and human behavior factors before making decisions.
- The federal government is responsible for regulating the vehicle and states are responsible for regulating the driver.
- Work with other states for uniformity, especially with interstate trucks and drivers.
- Minnesota laws should be revised to allow for the safe use of fully automated vehicles. No drivers' license should be required when there is no human control of the vehicle. Remote drivers licensing and training will need to be considered.

Recommendation 1: Driver's Education Partnerships

- Partner with industry to collaboratively develop driver education, training and testing materials for a statewide curriculum designed for buyers and end-users.

Recommendation 2: Driver's Licensing

- Only require driver's license to operate highly automated vehicle *if* automated vehicle is capable of being driven by a human operator.
- Do not require a driver's license for a level 4 or 5 *if* a human operator cannot operate the vehicle.

Recommendation 3: Licensing and Registration

- At this time, do not require special license plates or branded vehicle titles.

Recommendation 4: Testing Permits

- There should be one lead agency responsible for approving testing in Minnesota. DPS and MnDOT should partner together (similar to overweight vehicles and limousine permits) to safely test and deploy CAVs.
- Authority to test should be granted thru a central permitting process, for a designated time period, with qualified human drivers.

Recommendation 5: Accessibility & Equity

- CAV testing in Minnesota should include the perspectives of people with disabilities, aging populations, and other Minnesotans who may not qualify for a driver's license.
- Manufacturers should reach out to these communities when testing CAVs.

Recommendation 6: Research & Funding

- Need to research how users, driver training programs, vehicle examiners will understand and use this technology.
- Need funding for this research.

DEPARTMENT OF TRANSPORTATION

Questions & Discussion

Tom Henderson

Program Director, Vehicle Services

Department of Public Safety

Governor's Advisory Council on Connected & Automated Vehicles Accessibility Subcommittee

Agenda

September 25, 2018 from 3:30-5:30 pm
Roseville Public County Library
2180 North Hamline Avenue, Roseville, MN 55113

Online or Phone Participation:
Join from PC, Mac, Linux, iOS or Android: https://zoom.us/j/272659813

Or iPhone one-tap:
US: +1 (669) 900-6833; 272659813# or +1 (408) 638-0968; 272659813#
Or Telephone:
Dial (for higher quality, dial a number based on your current location):
US: +1 (669) 900-6833 or +1 (408) 638-0968 or +1 (646) 876-9923
Meeting ID: 272 659 813

Subcommittee Goal: *To formulate and recommend to the Advisory Council recommended changes to statutes, rules and policies related to accessibility, affordability, and greater access to transportation and independence for all.*

1. Welcome & Introductions

- Review of Executive Order & Goals
- Review of Agenda & Meeting Process

- Introductions

2. Overview of Connected and Autonomous Vehicles ("CAV")

MnDOT CAV X Office

3. Key CAV Issues for Accessibility & Equity

CAV-X and Subcommittee Liaisons

4. Key Dates:

- **October 1st**: Public Meeting in Rochester; Public online CAV survey closes
- **October 8th**: Public Meeting in Grand Rapids, Minnesota
- **October 30th**: Present Recommendations to Advisory Council

5. Discussion

6. Next Steps and Closing:

Next Accessibility Subcommittee Meetings will be at:

- Monday, **October 1st,** 2018 from 1-4 pm at the Southeastern Minnesota Independent Living Center (SEMCIL) in Rochester, MN
- Monday, **October 8th,** 2018 from 2-4:30 PM **at the** Blandin Foundation in Grand Rapids, MN

Questions to Consider

1. How does the State of Minnesota ensure automated vehicles are accessible & affordable to all Minnesotans?

2. What do we have now? (Presentation by the Liaisons)

3. What are the current barriers to the transportation system that CAV could resolve?

4. Where do we want to be during the testing phases and in the final product development?

Accessibility and Equity Themes

- Registration, Licensing & Training
  - Highly automated vehicles should not require a licensed driver

- Vehicle Design & Industry Feedback
  - Address language barriers
  - Automobile manufacturers input from disability community
  - Difference between ADA compliance and accessibility
  - Design of automated vehicles with mobility challenges in mind
  - Benefits of Level 4 vehicles
  - Different needs require different accommodations – including mobility, vision, hearing, and cognition

- Equity
  - Access in urban, suburban and Greater Minnesota
  - Affordability

- Policy and Planning
  - Policy incentives to ensure greater mobility
  - Promoting public education and engagement
  - Need a multi-modal system
  - Door-to-door and curb-to-curb access

- Testing and Deployment
  - Automated vehicle pilot programs
  - Testing and deployment of Level 4 AVs

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Accessibility

DEPARTMENT OF TRANSPORTATION

Welcome and Introductions

DEPARTMENT OF TRANSPORTATION

Subcommittee Goals

Subcommittee Goal

To formulate and recommend to the Advisory Council recommended changes to statutes, rules and policies related to accessibility, affordability, and greater access to transportation and independence for all.

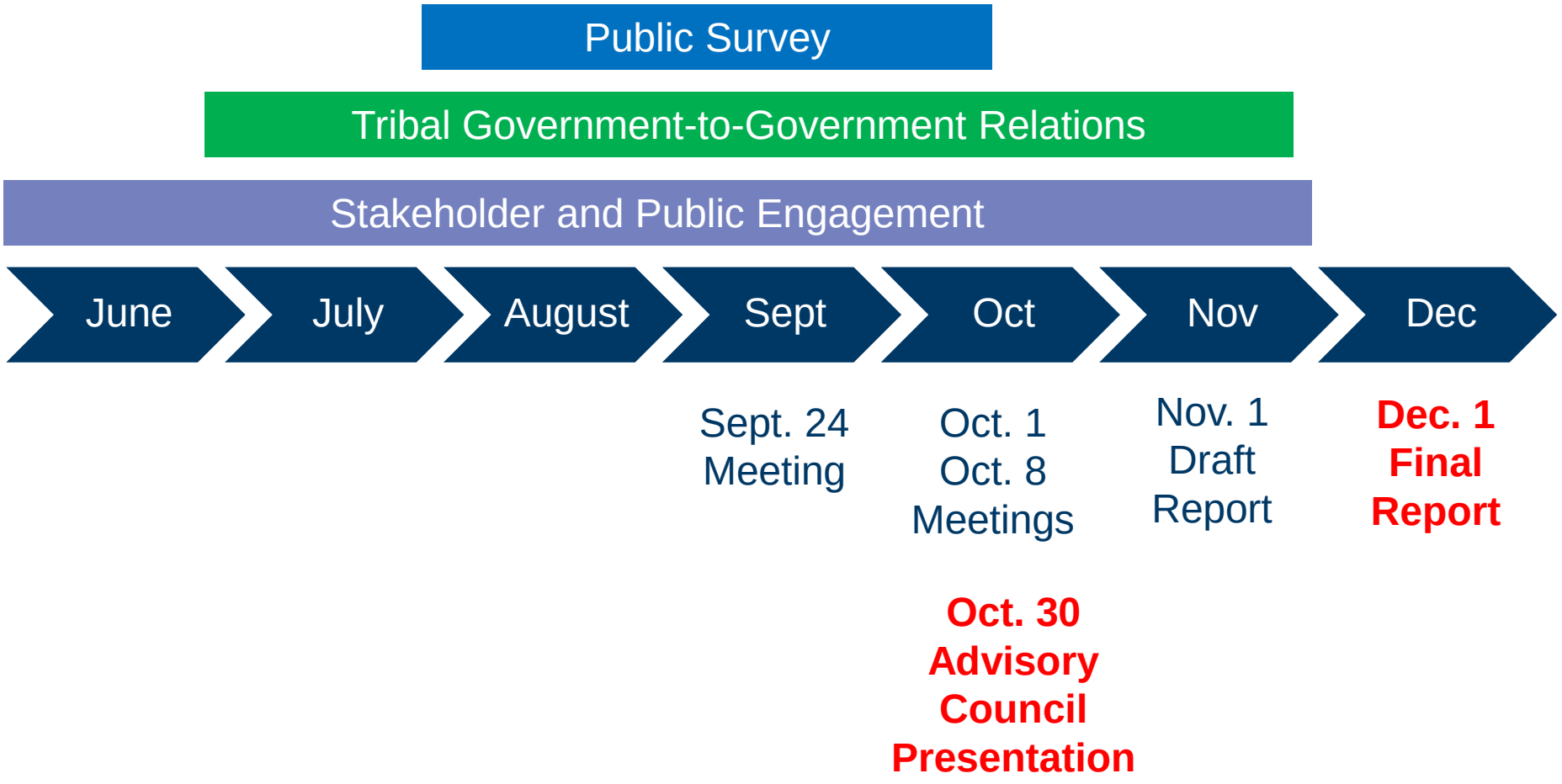
Subcommittee Process

- Participation
  - Meeting materials available on MnDOT website
  - Meeting updates at MnDOT CAV-X website
  - Participate in a meaningful way
- Discussion
  - Consider the themes of safety, risk, equity and environment
  - Consider immediate, short-term outcomes
- Recommendation
  - Clear, consensus-based recommendations (or reasons for differences)
  - Present recommendations to Advisory Council October 30th

Subcommittee Charter

- Meetings open to the public
- Respectful discussion, opportunities to be heard and listen
- May submit written comments on comment cards
- Notes taken on consensus or summary of discussion
- Meeting notes approved by liaisons and sent to subcommittee members for additional comments
- Meeting evaluation emailed after meeting

Key Dates


Public Survey
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Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Sept. 24 Meeting
Oct. 1 Oct. 8 Meetings
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

Governor's Advisory Council on CAV

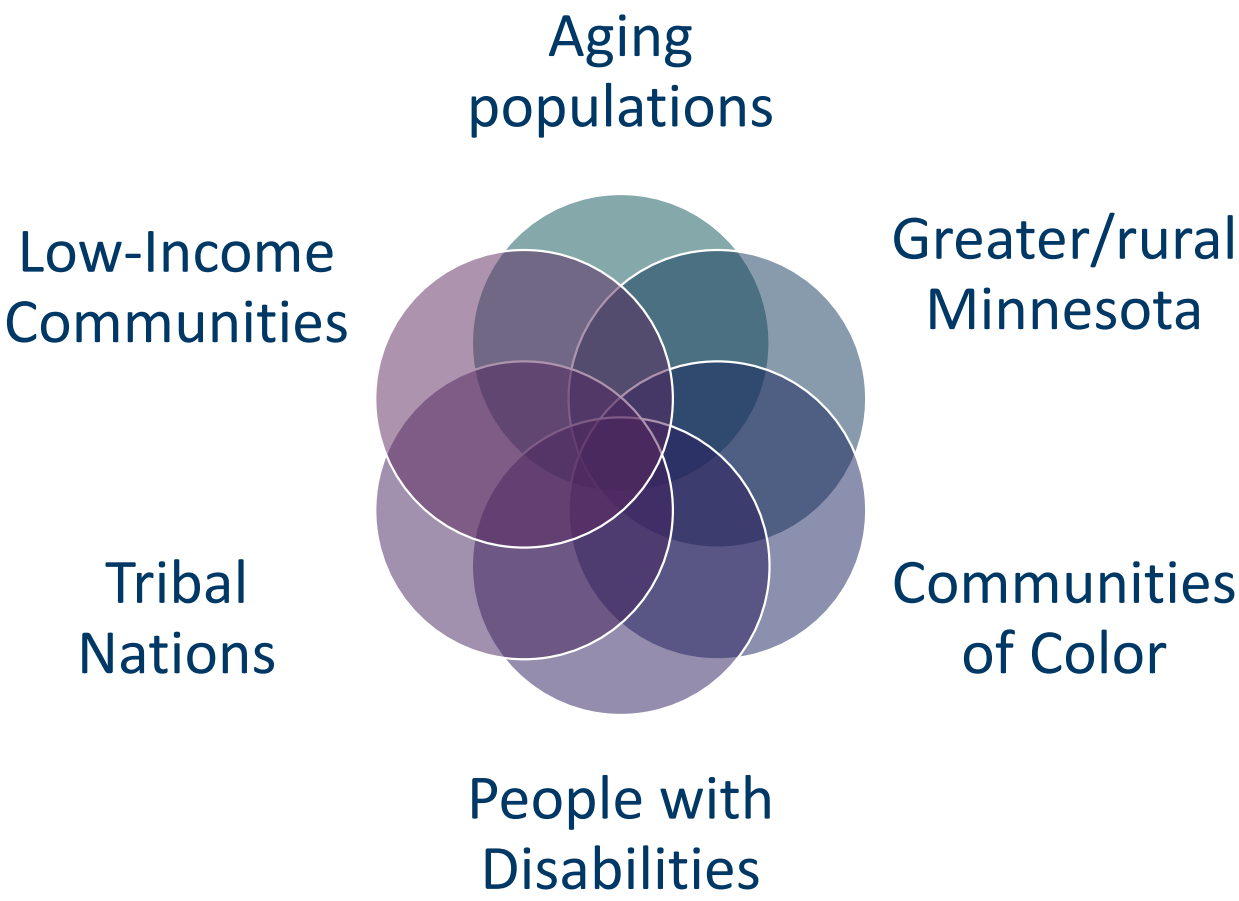
Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV Goals

"Communities experiencing transportation barriers"

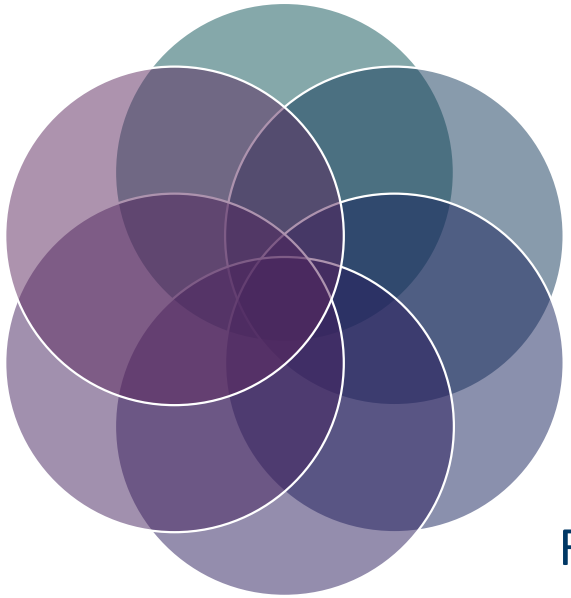


"Accessibility and equity for all Minnesotans"

DHS

Minnesota
Council on Aging

Low-Income
communities



Rochester
Grand Rapids
St. Cloud

Indian Affairs
Council

Council on Tribal
Transportation

Somali,
Hmong &
Rondo Communities

Minnesota Council on
Disability

Independent Living Centers

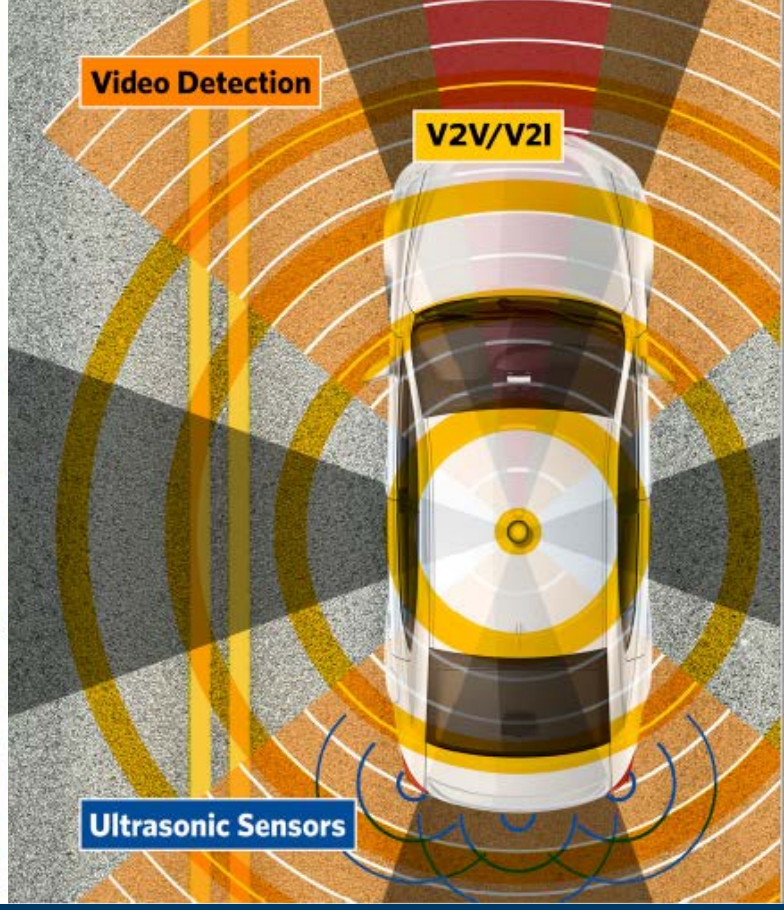
Advisory Council Goals

1. Brand Minnesota as a place to test and deploy CAV
2. Engage the public
3. Educate the general public
4. Develop actionable recommendations to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. Recommend mobility strategies

Public Engagement Opportunities

Public Events – State Fair

Interagency CAV Team



Overview of Connected & Automated Vehicles

DEPARTMENT OF TRANSPORTATION

Automated Vehicles

Uses for Automation

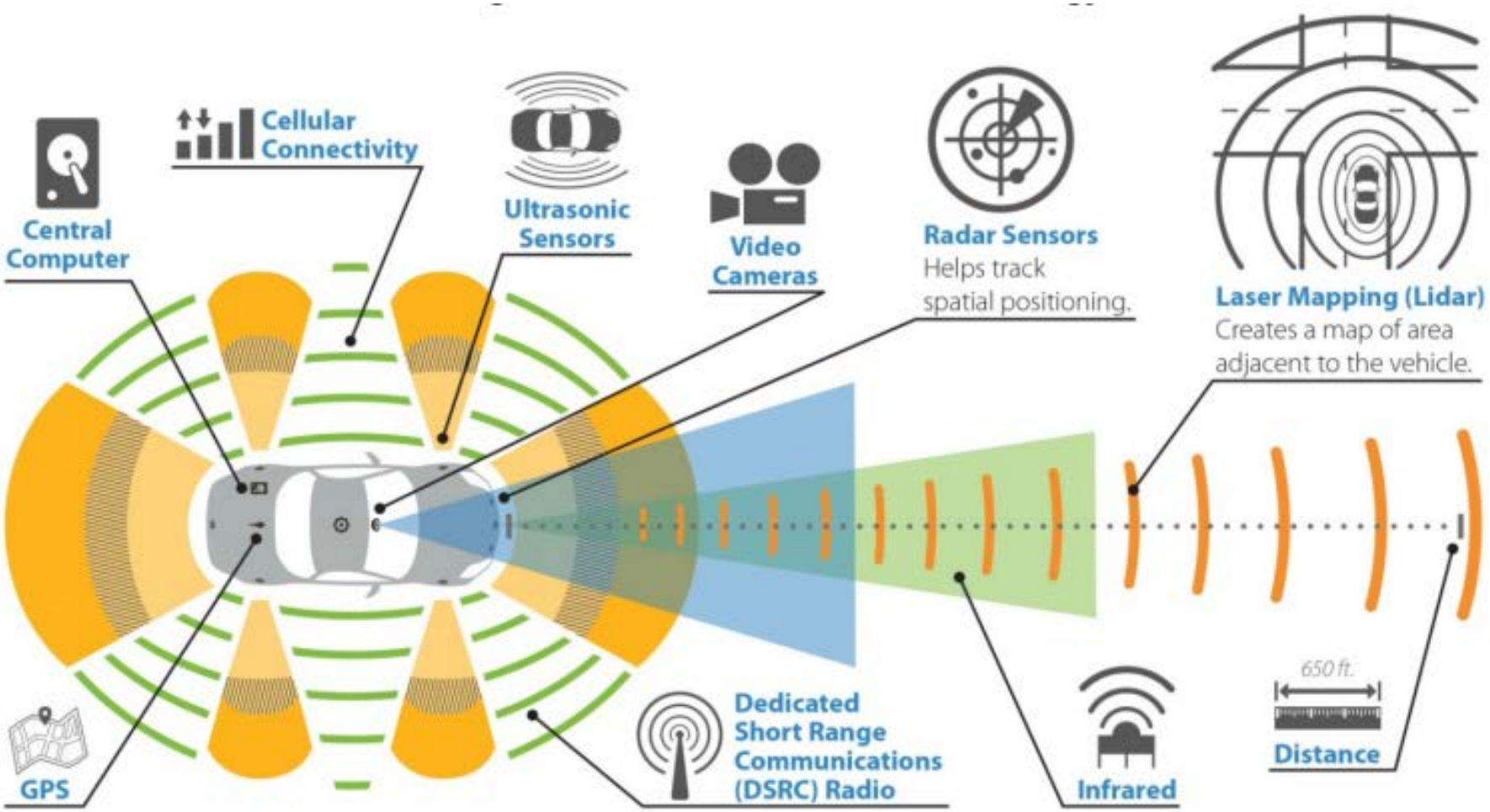
Types of **Automated Vehicles**

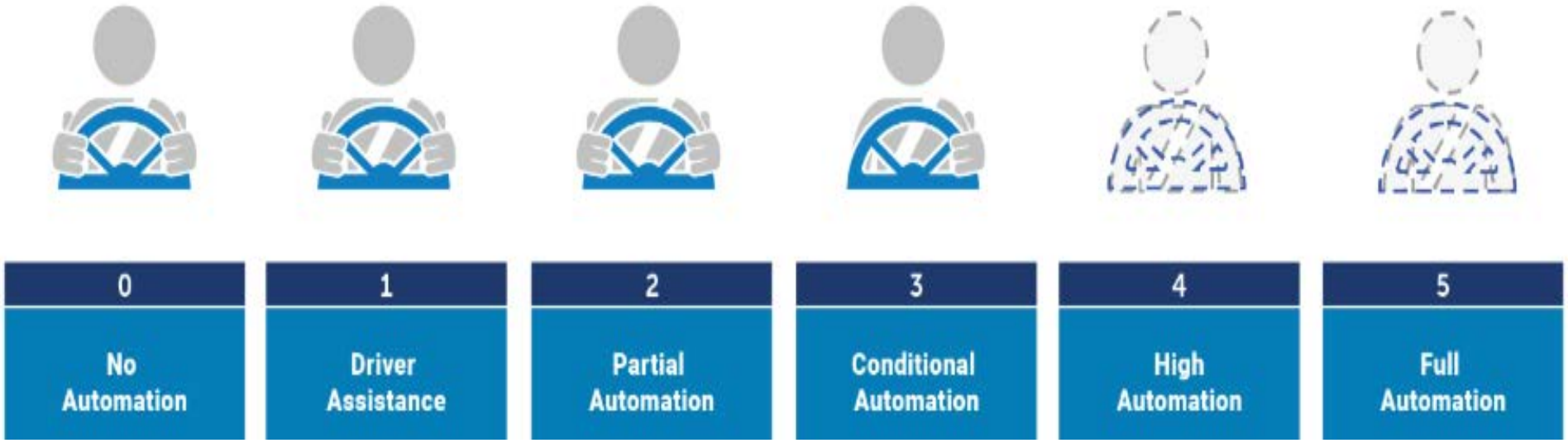
Passenger

Commercial

Transit

How does it work?





Society of Automotive Engineers (SAE) Levels of Automation

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

Connected Vehicles

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

Electric Vehicles

Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

Shared Mobility

Shared use of a vehicle, bicycle, or other transportation mode on an **as-needed basis**

1 account to access, plan, and pay for private and public transportation options

CAV Impacts

1. Increased **safety**
2. **Infrastructure** changes
3. **Law** and regulatory changes
4. Different **titling and registration** requirements
5. Changes to **insurance** premiums & liability
6. Greater **mobility** and **equal access**
7. Personal **data** and cyber **security**
8. **Business and workforce** opportunities
9. **Public health** impacts

DEPARTMENT OF TRANSPORTATION

Liaisons - Accessibility Impacts

Accessibility Considerations

- Present status of
  - Urban
  - Rural
  - Rural Townships (populations of less than 1,000)
- Medical vs. Social Rides (school, work, church & friends)

Accessibility Barriers

- Driver availability, especially on weekends and after-hours
- Affordability
- Accessibility: different needs for differently-abled (emotionally, physically, visually, etc.)
- No Lyft-like services for single trips
- Ride-share options
- Lack of cell phones or credit cards

Accessibility Barriers (continued)

- GPS to find locations in remote areas
- Weather extremes, temperature, power access, precipitation
- User design of CAV
- Insurance coverage & liability issues
- Lack of legislative funding to support quality of life issues like transportation

Minnesota's Transit System

- Minnesota has the 5th largest system of roads in the nation.
  - 143,318 miles to be exact!
- A variety of public transit options are available in the Twin Cities.
- Current public transit options in the Twin Cities include:
  - Regular and express bus routes, light rail transit, commuter rail, and bus rapid transit.
  - Dial a ride service is also available throughout the region.
- All 187 cities and townships in the seven county metro area have access to some form of public transit service.
- Ride services such as Uber, Lyft, or Transportation Network companies (TNCs).

Learning Lessons

- Why is accessibility so important for CAVs?
- According to the CDC, approximately 1 in 4 people in the U.S. has a disability (or 81 million Americans).
- Transportation is key support that allows individuals to be able to live, work, and play in the community of their choice.
- We need to do it right with CAV, and learn lessons from the past. When the internet was invented it was not required to be accessible, which is the reason many websites are not accessible.

Accessibility

- We need to make sure that these vehicles are accessible to all people with disabilities, aging, and veterans with disabilities.
- In passing the Americans with Disabilities Act, Congress sought to provide a clear and comprehensive national mandate for the elimination of discrimination against individuals with disabilities.
- There is a need for consistent federal and state guidelines to ensure that people with disabilities, aging, and veterans with disabilities are not prevented from operating these vehicles.

Steering Without a Steering Wheel

- Level 4 and 5 vehicles do not have steering wheels
- There is a need to ensure that Level 4 autonomous vehicles may be operated by people with disabilities, particularly people with disabilities who are currently unable to obtain a driver's license.

Potential Recommendations

1. No driver license or driver test required to operate CAVs.
2. Create disability coalition to ensure that these issues are addressed upfront in the planning stages and implementation stages as well.
3. Develop CAV pilot programs that includes people with disabilities, aging, and veterans with disabilities, with a focus on fostering independence.

Self Driving Car

Discussion

Discussion Topics

- What are important topics for your liaisons to present to the Advisory Council?
- What themes and recommendations do you want the Council to share with the Governor & Legislature?
- These topics will form the basis of today's discussion and draft recommendations to the Advisory Council.

Small Group Breakouts

Breakout Session Directions

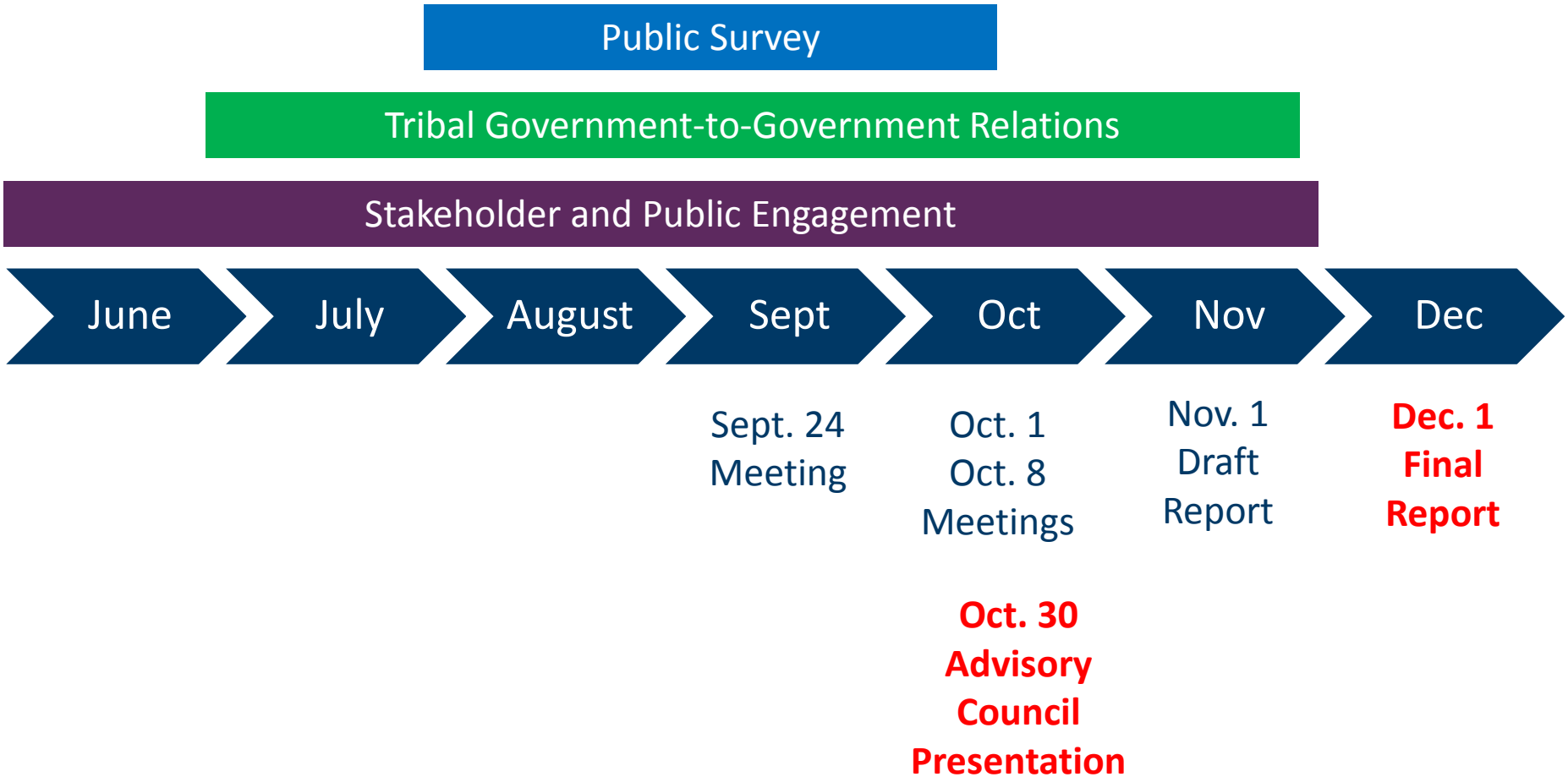
- Designate 1 recorder
- Designate 1 person to report-out
- Engage with participants in your group & ask questions
- Write thoughts on large poster or individual comments on post-it notes & add to poster

Breakout Session Questions

- What are important topics for your liaisons to present to the Advisory Council?
- What themes and recommendations do you want the Council to share with the Governor & Legislature?

Next Steps & Closing

Key Dates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Next Steps

- Comments and feedback via comment cards or CAVfacilitators@mediationcentermn.org
- Participants review meeting minutes
- Post-meeting online survey
- Public CAV survey on MnDOT CAV-X website
- Next meeting if necessary
- October 30th: Present to Advisory Council

DEPARTMENT OF TRANSPORTATION

Thank you

Liaisons:

Joan Willshire, MN Council on Disabilities

Myrna Peterson, Consumer

ACCESSIBILITY SUBCOMMITTEE NOTES

Recommendations from the Roseville Meeting on 9-25-18

1. No legal requirement for a driver license for Level 4/5 vehicles.

2. No legal requirements for steering wheels and pedals in Level 4/5 vehicles.

3. Insurance requirements need to be defined for the development of CAV.

4. Some adults have never learned to drive; ridesharing is the most accessible alternative. Require that all vehicles have Universal Design to be fully accessible. This includes physical and software access by the consumer. MN needs to pass this legislatively and push for its adaptation on the federal level.

5. This system should have no barriers; in financial restrictions, age limitations, hours available (evenings and weekends). Create a voucher system for easier access to these vehicles funded through legislation via grants/creative methods.

6. The pilot for public funding needs to directly address accessibility issues in outstate MN.

7. Pilot projects are needed in rural MN. For example in Grand Rapids, the investment into broadband requirements have been made, CAV availability needs to be like the hospital and Walmart which are open 24/7.

8. Vehicles must be designed to allow full physical access of personal equipment (scooters, wheelchairs, walkers) so consumers can enter independently and secure safety mechanisms (tie-downs) within a vehicle. All designed for full functionality for riders to use independently.

9. Level 4/5 CAV vehicles must be fully accessible for all disabilities including visually or hearing impaired to interface with vehicle requirements for on and off boarding. For example, how does a visually impaired person know which CAV vehicle they have reserved? Presently, a sighted person guides them to the right vehicle. Interface accessibility designs allow for touch screens to talk.

10. Preamble is needed as to why this is so important to an under-served population on the benefits of CAV. This will allow employment opportunities by providing dependable affordable transportation alternatives and improve the quality of life issues (live, work & play) by providing more mobility options in the community of their choice, urban/rural. This is a large untapped workforce.

Meeting Notes from the CAV Accessibility Subcommittee #2
October 1, 2018 at the Rochester SEMCIL location

Note: A change in protocol, for this meeting, we are going to memorialize only the Recommendations to CAV-X.

9 people in the room 2 people on line (inclusive of sign language interpreters and Mediation Center staff. Liaison Myrna Peterson was present. David Fenley was presenting for Joan Willshire who is the 2nd Liaison. Keith Mensha was presenting for MnDOT. On-line participants are Frank Douma from the Humphrey School, and Guthrie Byard with ARC Minnesota.

With so few attendees, due to the rain storm and the poor WiFi connections, the meeting was informally ended early, with discussion about the next meeting. An online attendee, requested to give his feedback at a later conference call.

Recommendations:

1. Ensuring full accessibility for all disabilities (blind, hearing impaired, developmental, cognitive), that they are all able to prototype test vehicles that they can use and give feedback on the design developments no matter where they live in the state.
2. Create a variety of financing arrangements to be available for low income populations for public and personal use.
3. Create systems for shared mobility like a Lyft or Uber, especially in outstate MN. We need a use on demand.
4. These concepts are so futuristic, we will need a robust education system for users and non-users to increase better interactions.
5. We support the no license need, but a new iteration of changing present assumptions on transportation for the many instead of the individual, supported by incentives on ride sharing, alternative fuel use, and group ownership of a vehicle. Match insurance incentives to be based on group ownership than individual.
6. For licensing and training the subcommittee needs to recommend that all people are trained for use, funding from the State to fund many Associations to educate, how to interact, how to operate, what to do in an emergency or personal danger, health risk, as well as immediate connection with 911, police, fire, or just being stuck.
7. Define safety options to protect the fragile, and how they would communicate for needed assistance.
8. For rural needs; we need access to WiFi/or an alternative where it is non-existent.
9. Support universal design; for the deaf or blind, special equipment like wheelchairs, or sensory issues, designs that work for many users and communicate on several levels.
10. Define the options for people under guardianship, liability issues, safety for all occupants, or the ability to have a 1+ traveler (to assist the fragile), who covers insurance, who decides safety, spell it out if an escort will be responsible.
11. Association peers can work together to suggest equity rules for their population's health, safety, and access to clinics, grocers, employers, and churches with a wider public participation.

10-8-18 Grand Rapids Notes for the Accessibility Subcommittee

Recommendations for Rural CAVs:

1. The cost for transportation to be the SAME for able bodied and differently abled consumers
2. Universal transportation costs decreases with the density of population (due to the economy of scale). Implementation from a downtown site to outer rings for a CAV system need to be patterned after the electrification grid in a coop system in rural areas
3. The concept of owning vehicles should be move to a Lease/Shared concept as a goal
4. Auto dealerships now sell vehicles, we should evolve to selling lease shares
5. Public transportation has to have density of use to support rural service, fixed routes are no longer needed, no infrastructure needed, only increase trips
6. Shared (change present mindset/barrier) park and ride as the dominant use, with less single driver/rider vehicles
7. Availability of service broadened: to go beyond city limits, time of service shutdown be expanded to allow evenings and weekends
8. With an aging population, we need to accept public transportation options; so this acceptance needs to be expanded to everyone
9. Financially incentivize alternative CAVs to offset present day public barriers
10. We need the ability to call for help from within the CAV
11. We need the ability for CAV occupants to Stop a vehicle from within, as well as Public Safety authorities (police, fire, 911) to override CAV instructions
12. Code 3, needs CAV to get out of the Way, in other words, CAVs needs to implement priority decision trees before moving/stopping or on/off-boarding consumers
13. We need the ability to call and order through CAV: shop on-line/delivery of meds, grocery, etc. like an Amazon/Walmart. This creates Accessibility #1 for all
14. If municipalities are considered charities, philanthropy can be part of the solution in supporting the effort to education populations on CAV
15. Research, development, and regulation by the government has originated processes in the past; then it is turned over to the private sector to expand
16. Presently rural systems exist through volunteers/or elder drivers, mostly in their 80's. Remote expectations are different in rural areas than urban, they have had to be more resourceful.
17. Cognitively able-elderly can use CAV, not all disabilities can be addressed this way. Systems will need to be created to certify (sometimes through guardians) those who are able to travel alone vs. 1+
18. Work hours access to a 3-11 shift (local manufacturer of plastic tubs for the post office is lacking workers, needs grants to pool and get workers home at the end of the shift)

19. CAV needs to have seat sensors to allow for a variety of safety engagements
20. Allow for companion animals, deal with allergies through notifications
21. We need the education of developers on adaptive behaviors
22. Ride share safety incentives need to be granted by insurers to decrease financial insurance rates
23. Increase public education and availability of shared drives for better economy
24. In Grand Rapids, where $450/vehicle/mo to transport this population is the present insurance rate, we need a decrease in the CAV ride share vehicle rates
25. Rural MN needs a uniform broadband to ALL areas to access CAV effectively
26. Must TEST in Grand Rapids where there are 24 hrs companies that are open and can test with employers, emergency clinics & shopping venues
27. No use limits must be defined for safety/sensory impaired consumers, during inclement weather with limited visibility, floods, low temps, or blizzards. Must have 2-way communication methods onboard and in scheduling modules

ACCESSIBILITY SUBCOMMITTEE NOTES

Recommendations from the 9-25-18, 10-1-18, & 10-8-18 Public Meetings

Regulation

1. No legal requirement for a driver license, wheel, or pedals for Level 4 or 5 vehicles.

2. Insurance requirements need to be defined for the development of CAV. Ride share safety incentives need to be granted by insurers to decrease financial insurance rates.

3. Require that all vehicles have Universal Design to be fully accessible. This includes physical and software access by the consumer. MN needs to pass this legislatively and push for its adaptation on the federal level. Universal design must include physical space for personal equipment (scooters, wheelchairs, walkers, companion animals) so consumers can enter independently and secure safety mechanisms (tie-downs) within a vehicle. Universal design must also include interfaces for the visual or hearing impaired.

4. Define the options for people under guardianship, liability issues, safety for all occupants, or the ability to have a 1+ traveler (to assist the fragile), who covers insurance, who decides safety, spell it out if an escort will be responsible.
5. CAV systems will have to be designed to address individuals who have the ability to travel alone (e.g. cognitively disabled, children) versus those who can ride independently/alone.
6. Funding and Incentivizing Equity
7. Create a voucher system for easier access to these vehicles funded through legislation via grants/innovative methods.
8. Create a variety of financing arrangements to be available for low income populations for public and personal use.
9. The cost for transportation be the SAME for able bodied and differently abled consumers.
10. Should use public utility/electricity's coop system to ensure that transportation costs do not increase in Greater Minnesota.

Testing

11. Pilot projects must include both urban and rural/Greater Minnesota, such as Grand Rapids.
12. Ensure full accessibility for all disabilities (blind, hearing impaired, developmental, cognitive), that they are all able to prototype test vehicles that they can use and give feedback on the design developments no matter where they live in the state.

Principles

13. A Preamble is needed as to why this is so important to an under-served population on the benefits of CAV. This will allow employment opportunities by providing dependable affordable transportation alternatives and improve the quality of life issues (live, work & play) providing more mobility options in the community of their choice, urban/rural. This is a large untapped workforce.

Shared Mobility

14. Create systems for shared mobility equal to a Lyft/Uber, especially in outstate MN. We need a use on demand model.
15. Promote ride sharing, alternative fuel use, and group ownership of a vehicle. Match insurance incentives to be based on group ownership than individual use.
16. Instead of promoting individual ownership, the State should promote that auto dealerships sell lease shares.
17. Increase the number of transit trips. Public transportation has to have density of use to support rural service; fixed routes are no longer needed; less infrastructure is needed, should increase the number of trips. Expand trips beyond city limits and include evenings and weekends.

Public Education

18. These concepts are so futuristic, we will need a robust education system for users and non-users to increase better interactions.
19. Need funding for training and education on how to interact with and operate CAV and direction on what to do in emergencies

Connectivity

20. Greater Minnesota needs access to WiFi/or an alternative where WiFi is non-existent.

Engagement

21. Association peers can work together to suggest equity rules for their population's health, safety, and access to clinics, grocers, employers, and churches with a wider public participation.

Public Safety & Emergencies

22. We need the ability to call for help by users within the CAV.
23. We need the ability for CAV occupants to STOP a vehicle from within, as well as Public Safety authorities (police, fire, 911) to override CAV instructions.
24. Code 3, needs CAV to get out of the Way, in other words, CAVs needs to implement priority decision trees before moving/stopping or on/off-boarding consumers.

Commerce

25. Should promote the ability to call and order online with CAV (e.g. shop on-line, delivery of medication, grocery, etc. like an Amazon/Walmart). This creates accessibility for all.

Governor's Advisory Council on Connected and Automated Vehicles

October 30, 2018

DEPARTMENT OF TRANSPORTATION

Accessibility

Subcommittee Recommendations

Myrna Peterson, Mobility Mania
Joan Wilshire, Minnesota Council on Disability

Principle

- A Preamble is needed as to why CAV is so important to under-served populations.
- CAV will allow employment opportunities by providing dependable affordable transportation alternatives and improve the quality of life issues (live, work & play) providing more mobility options in the community of their choice, including urban *and* rural areas.
- These communities are a large, untapped workforce.

Recommendation 1: Regulatory

- No legal requirement for a driver license, wheel, or pedals for Level 4 or 5 vehicles.
- Insurance requirements need to be defined for the development of CAV. Ride share safety incentives need to be granted by insurers to decrease financial insurance rates.
- Require that all vehicles have Universal Design to be fully accessible. This includes physical and software access by the consumer. MN needs to pass this legislatively and push for its adaptation on the federal level. Universal design must include physical space for personal equipment (scooters, wheelchairs, walkers, companion animals) so consumers can enter independently and secure safety mechanisms (tie-downs) within a vehicle. Universal design must also include interfaces for the visual or hearing impaired.
- Define the options for people under guardianship, liability issues, safety for all occupants, or the ability to have a 1+ traveler (to assist the fragile), who covers insurance, who decides safety, spell it out if an escort will be responsible.
- CAV systems will have to be designed to address individuals who have the ability to travel alone (e.g. cognitively disabled, children) versus those who can ride independently/alone.

Recommendation 2: Funding & Incentivizing Equity

- Create a voucher system for easier access to these vehicles funded through legislation via grants/innovative methods.
- Create a variety of financing arrangements to be available for low income populations for public and personal use.
- The cost for transportation be the SAME for able bodied and differently abled consumers.
- Should use public utility/electricity's coop system to ensure that transportation costs do not increase in Greater Minnesota.

Recommendation 3: Testing

- Pilot projects must include both urban and rural/Greater Minnesota, such as Grand Rapids.

- Ensure full accessibility for all disabilities (blind, hearing impaired, developmental, cognitive), that they are all able to prototype test vehicles that they can use and give feedback on the design developments no matter where they live in the state.

Recommendation 4: Public Education & Engagement

- These concepts are so futuristic, we will need a robust education system for users and non-users to increase better interactions.
- Need funding for training and education on how to interact with and operate CAV and direction on what to do in emergencies
- Association peers can work together to suggest equity rules for their population's health, safety, and access to clinics, grocers, employers, and churches with a wider public participation.

Recommendation 5: Shared Mobility

- Create systems for shared mobility equal to a Lyft/Uber, especially in outstate MN. We need a use on demand model.
- Promote ride sharing, alternative fuel use, and group ownership of a vehicle. Match insurance incentives to be based on group ownership than individual use.
- Instead of promoting individual ownership, the State should promote that auto dealerships sell lease shares.
- Increase the number of transit trips. Public transportation has to have density of use to support rural service; fixed routes are no longer needed; less infrastructure is needed, should increase the number of trips. Expand trips beyond city limits and include evenings and weekends.

Recommendation 6: Misc.

- **Connectivity**
  - Greater Minnesota needs access to Wi-Fi/or an alternative where Wi-Fi is non-existent.
- **Public Safety & Emergencies**
  - We need the ability to call for help by users within the CAV.
  - We need the ability for CAV occupants to STOP a vehicle from within, as well as Public Safety authorities (police, fire, 911) to override CAV instructions.
  - Code 3, needs CAV to get out of the Way, in other words, CAVs needs to implement priority decision trees before moving/stopping or on/off-boarding consumers.
- **Commerce**
- Should promote the ability to call and order online with CAV (e.g. shop on-line, delivery of medication, grocery, etc. like an Amazon/Walmart). This creates accessibility for all.

DEPARTMENT OF TRANSPORTATION

Thank you

Myrna Peterson, Mobility Mania
Joan Wilshire, Minnesota Council on Disability

MnDOT Connected and Automated Vehicles
Governor's Advisory Council
Equity Charter

Executive Order/Purpose

Governor Dayton issued an executive order on connected and automated vehicles. The executive order recognizes that technology is evolving rapidly, and that Minnesota must prepare. The executive order established an advisory council comprised of 15 members appointed by the Governor and ex-officio members from state agencies and the legislature. The council will submit a report to the Governor and Legislature by December 1, 2018. The report will recommend changes in statutes, rules, and policies in eight areas, including equity standards. The subcommittees are part of a larger effort to hear ideas about CAV from many Minnesotans. More information about the advisory council and this process is on MnDOT's CAV website.

Goal

The goal for the subcommittee is to provide feedback to the Governor's Advisory Council on Connected and Automated Vehicles on recommended changes to statutes, rules, and policies and to ensure accessibility and equity for all Minnesotans, with a particular focus on rural communities, elderly Minnesotans, Minnesotans with disabilities, low-income communities, communities of color, and American Indians.

Roles

MnDOT CAV-X Office is implementing the Executive Order.

- Jay Hietpas, P.E.
  Connected and Automated Vehicles Executive Director
  Jay.Hietpas@state.mn.us
- Kristin White
  Connected and Automated Vehicles Innovation Director
  Kristin.White@state.mn.us
- Praveena Pidaparthi
  CAV Policy and Planning Director
  Praveena.Pidaparthi@state.mn.us
- Cory Johnson
  ITS Program Manager
  Coryj.Johnson@state.mn.us

Facilitators will manage scheduling and meeting logistics, communication, draft agendas and notes, facilitate meetings and provide process guidance, and assist with compiling presentation materials.

- Aimee Gourlay, Aimee.Gourlay@mediationcentermn.org

Anyone who wants to attend is welcome at meetings. Subcommittee members will provide their knowledge and expertise by participating in meetings in person, or electronically and/or by commenting on meeting notes and recommendations. Meeting participants will be asked to sign in at the meetings.

Those commenting on meeting notes will be asked to provide their name and contact information for follow up clarification, however comments will be aggregated and not attributed to any individual.

Meetings & Meeting Materials

Meetings will be scheduled based on the availability of the CAV X staff and the facilitator, and presenters if applicable. It is anticipated that there will be two or three meetings prior to making a recommendation to the Advisory Committee. Members will be informed of meetings via email. Meetings will be announced and agendas will be available on the MnDOT website (http://www.dot.state.mn.us/automated/index.html) at least one week before the meeting. Meeting materials will be posted on the website after each meeting and will be emailed to subcommittee members prior to the meeting. To request documents in an alternative format, individuals may contact the MnDOT Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). Individuals may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

Meeting Notes

Facilitators will provide notes of meetings. The subcommittee attendees will have the opportunity to review and comment on them. Subcommittee attendees who were unable to attend a meeting may provide additional comment. Additional comments may be summarized by the facilitator.

Meeting Evaluation

All subcommittee attendees and those who signed in that they attended the meeting will receive a post-meeting evaluation.

Communication

The facilitator will include CAV-X staff on subcommittee communication regarding logistics and planning. If the facilitator chooses to open a dialogue via email, all subcommittee members will be included.

Meeting Process

FACILITATION. Meetings will be facilitated. Meetings are expected to be two to three hours. Meetings will end on time and with a clear understanding of assignments and next steps. Extension of time, which is not encouraged, will require the consent of a majority of members attending that meeting by a show of hands.

TIMELINES. Participants understand that their work needs to be presented to the Advisory Council by October 30, 2018. They will do their best to meet the deadlines for giving feedback and other participation.

RESPECTFUL COMMUNICATION. Participants recognize that divergent ideas ensure robust recommendations and agree to listen respectfully to all opinions. The group may, if they choose, develop other meeting guidelines to facilitate communication.

NATURE OF RECOMMENDATONS. Recommendations will focus on maximizing the benefits and preparing MN for the adoption of automated and connected vehicles. Note that the recommendations are expected to be general rather than specific wording for state law, rules and policies.

DECISIONS/CONSENSUS. Recommendations from this group may be unanimous. If there is general consensus for a recommendation, meaning everyone is willing to support it, then it will be so noted for the Advisory Committee. If there is not a consensus, a summary of the rationales for different perspectives will be provided to the Advisory Council.

OPEN MEETINGS. Meetings will be open to all. The subcommittee meetings are public meetings, and people who are not on the subcommittee may attend. Depending on timing and number of participants, the facilitator may provide opportunity for members of the pubic to address the subcommittee in consultation with the co-liaisons.

PARKING LOT. Items raised for discussion which are not on the agenda may be listed for discussion or resolution at another time.

RECORD. The facilitator will keep a record of meeting attendees and meeting notes as outlined above. Comments from individual members will generally not be attributed and verbatim record of the meeting will not be prepared.

Outcomes

- Clear, consensus-based or rationales for divergences recommendations for the Advisory Council
- Subcommittee members participate in a meaningful way in developing recommendations
- Recommendations consider the for themes of safety, risk, equity and environment
- Recommendations consider immediate needs and longer-term planning for CAV

September 7 Community Meeting

General Meeting Notes

Kristin provided a general overview of the Executive Order.

- Review of Item 6 under the Order.
- Explanation of connected vehicles.
- Explanation of automated vehicles.
- Explanation of shared mobility and the integration of existing modes of transportation.

Review of Item 6 in the handout – current thoughts around CAV.

REQUEST FOR GENERAL FEEDBACK

- Interested in equity issues. Anyone impacted by tech are low income because tech creates a gap between those with access and those without. Why? Usually, only wealthy people will have access.
- Transportation will really impact low income (LI)
- The issue is that LI jobs are moving out of the community, so transportation to jobs is a big stress.
- He already spoke to Amazon to let them know that if transportation is addressed, more employees would be able to work for them.
- LI people will need access to money for new vehicles.
- Education – How will students be prepared for this new technology?
- It is hard to engage people we don't understand what's going on and you don't ask us what we know.
- How do you create equity when it comes to the type of education LI people are receiving? Will students be prepared for new jobs?
- Right now you call a cab. Will automated vehicles (AVs) take away jobs? Cab drivers are people with few skills, where will they work? What will the new jobs be? Will there be rules to address this?
- We have seen accidents by large corporations, concerned?
- Speaking of roads and bridges, do we have the infrastructure to support the future of transportation?
- Currently the drivers in their community are considering creating their own Union because there are so many people employed as drivers.
- How will CAV impact the trucking business? They have a huge population of truck drivers. More than 50% of SWIFT [driving students] are from their community.
- Imagining the coming of CAV, many members have transitioned from cab driving to truck driving. They work hard and can afford trucks. Will they be able to afford the next vehicle?
- Will the state have the resources for workforce development, road/bridge infrastructure, the purchase of vehicles?

- Right now the community is disconnected from downtown. They can see downtown, but they can not easily get to downtown. Maybe you can walk or bike across a bridge, but that will not work for everyone. Will CAV be a solution for this disconnection?
- When it comes to the issues like how things will impact them economically, or impact matters of accessibility, they are left out of discussions.
- New drivers struggle with rules and regulations. Minnesota has a less flexible policy, than other states. We're concerned with how the new rules and regs will effect truck drivers.
- CAV may reduce accessibility challenges.
- For those who cannot afford the next vehicle, they will be disadvantaged by those who can afford CAVs.
- Regarding data privacy, he was concerned about lack of consent in terms of tracking and the disruption of daily life. Who will control data privacy in regards to tracking movement? *How does one opt out? Who controls content/consent?*
- Elderly – Who will train elders, will it create an additional barrier. Today apps are a big problem. The current mode is for elders to find someone who can perform a function (i.e. secure an Uber ride).
- Companies need to be forced to invest in the infrastructure, education and unforeseen skill gap.
- He understands public and private data. The question is, who will own the data attached to CAV? Will safety nets be proactively created?
- Will people be dislocated out of jobs?
- What safety nets will be in place from the environmental or technological perspective?
- What about disabled people? Even voice activation does not always work in their community.
- Metro is dealing with a big shortage, they have been recruiting like crazy, but drivers want to drive trucks where they can make more money.
- [Somalians] are a visual community, community folks need to see it.
- Ownership of cars is an issue, will they be affordable?
- If English is not your first language, voice apps do not work. Google voice never works. It is a very frustrating process. Google maps, voice activation, can reroute people because of miscommunication between systems.

QUESTION FROM KRISTEN – What do you want to see more of from the state regarding conversations?

- I would like to see more inclusion.
- Charlene mentioned that there will be a general meeting in October where more community members will be able to participate.

COMMENTS REGARDING SAFETY

- Tech brings safety
- Tech will results in less accidents every day
- Concern about CAV during the winter

Per Kristin – shuttles are being tested, maybe public demonstrations would help

Entire group – yes to public demonstrations

ENVIRONMENT – Kristen defined the category

Reducing greenhouse effect

Increased public health effects

COMMENTS REGARDING ENVIRONMENT

- Will CAV negatively impact environments – they tend to impact people of color
- Will recycling components increase health risks – emissions?
- Will we now be relying upon something we are trying to get rid of?
- What happens if technology is modified? Will it impact risk? What are the restrictions? Will the software be an open or closed system?
- Benefits of software modification
    - If you can modify voice activation so it recognizes your accent, that would help
    - Connecting to your own pda is good
    - Pre-programming some apps to assist elders/disabled
- How will vehicles be recycled, resold, disposed? Will they be shipped to out of the country? Can they be refurbished and sold to low income people.
- There is concern about the crash in Arizona as it relates to safety. It was related to a self-driving Uber. His biggest issue is safety.
- He is also concerned about current drivers losing jobs
- Concern that even with new policy or laws, people will not obey safety rules
- Concern about young people using vehicles and safety or liability
- Concern that CAV will add yet another distraction, will people use even more apps when driving? For example, Facebook.

COMMENTS REGARDING BENEFITS OF CAV

- Availability – quicker to get to your destination
- Quick access
- Technology brings greater safety. Less accidents every day.

KRISTIN QUESTION – If Level 5 were avail, would you use it?

1 person Yes

To explore

To have fun with it

To be the first person

But I do not want to be in the front seat

I am looking forward to level 5

1 person - No, Maybe

Worried about accidents

WHAT WOULD A NEXT MEETING BE, what do you want?

Who should come?

- School bus drivers
- Truck drivers – especially important!
- Youth
- Elders
- Working class
- Professionals

A challenge is that no group from their community would come to a general meeting. They would feel more comfortable if meetings were in their own community.

Suggestion, use Somali media, communicate in their language to attract the larger group that will be impacted

Kristin suggested that she work with them to identify the right person who can help educate the community on CAV

PRIORITIES – LAST 20 minutes

Accessibility

- Income, wealth
- Those w disabilities, who really need access
- Limited English users

Engaging those who do not speak English well

Infrastructure – already in bad shape, how will we prepare for the future?

- Pool transit system
- Economy is key and tied to the infrastructure

If trust is not built, the immediate relationship will be at risk

- Must acknowledge cultural and linguistic differences
- Elders see the change before their eyes and need to be involved so they can support the transition. Elders are not consulted, they have lots of information, where we came from, where we're going.
- Employers need to hire people from our community to be involved in the development and use of CAV

They still want the state in meetings regarding CAV, to create credibility. If community members hear of CAV from one another, community members may not believe what is happening.

There is concern about whether kids are going to be prepared for the new jobs? Will there be computer science classes in HS to prepare them for jobs in LI schools? Kids need to have entry-level skills in order to compete.

RED DOT EXERCISE - THE MOST IMPORTANT THINGS.

The most important thing is EQUITY

Policy should be built to ensure equity.

Safety

Data Privacy

Regulations that might be so rigid that people actually relocate in order to

Early education re CAV – They appreciate subject matter experts teaching directly to their community. Word of mouth within their community does not carry the same credibility.

Educate us, we will become involved.

Want the State to reach out (and build trust)

Tentative & Final Recommendations

Will someone come to the advisory meeting (Kristin)

Mohomud. Maybe someone will go if they see that it applies directly to them.

Governor's Advisory Council on Connected & Automated Vehicles
Subcommittee on Equity
Agenda

Saturday, September 29, 2018, 1:00 - 3:00 PM
16797 Elmcrest Avenue North
Hugo, MN 55038

Subcommittee Goal: To develop recommended changes to Minnesota statutes, rules, and policies to the Governor's Advisory Council on Connected and Autonomous Vehicles ("CAV") to ensure accessibility and equity for all Minnesotans, with a particular focus on rural communities, elderly Minnesotans, Minnesotans with disabilities, low-income communities, communities of color, and American Indians.

1. **Welcome and Introduction**
2. **CAV 101**
3. **Discussion Topics and Questions** (see page 2)
4. **Other Topics You Would Like to Address?**
5. **Develop Recommendations to the Advisory Council**
    - What do you want to be sure the Advisory Council understands?
    - What themes and considerations do you want the Advisory Council to know?
    - Any additional thoughts?
6. **Closing & Next Steps**

To request this document in an alternative format, please contact the Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

Questions

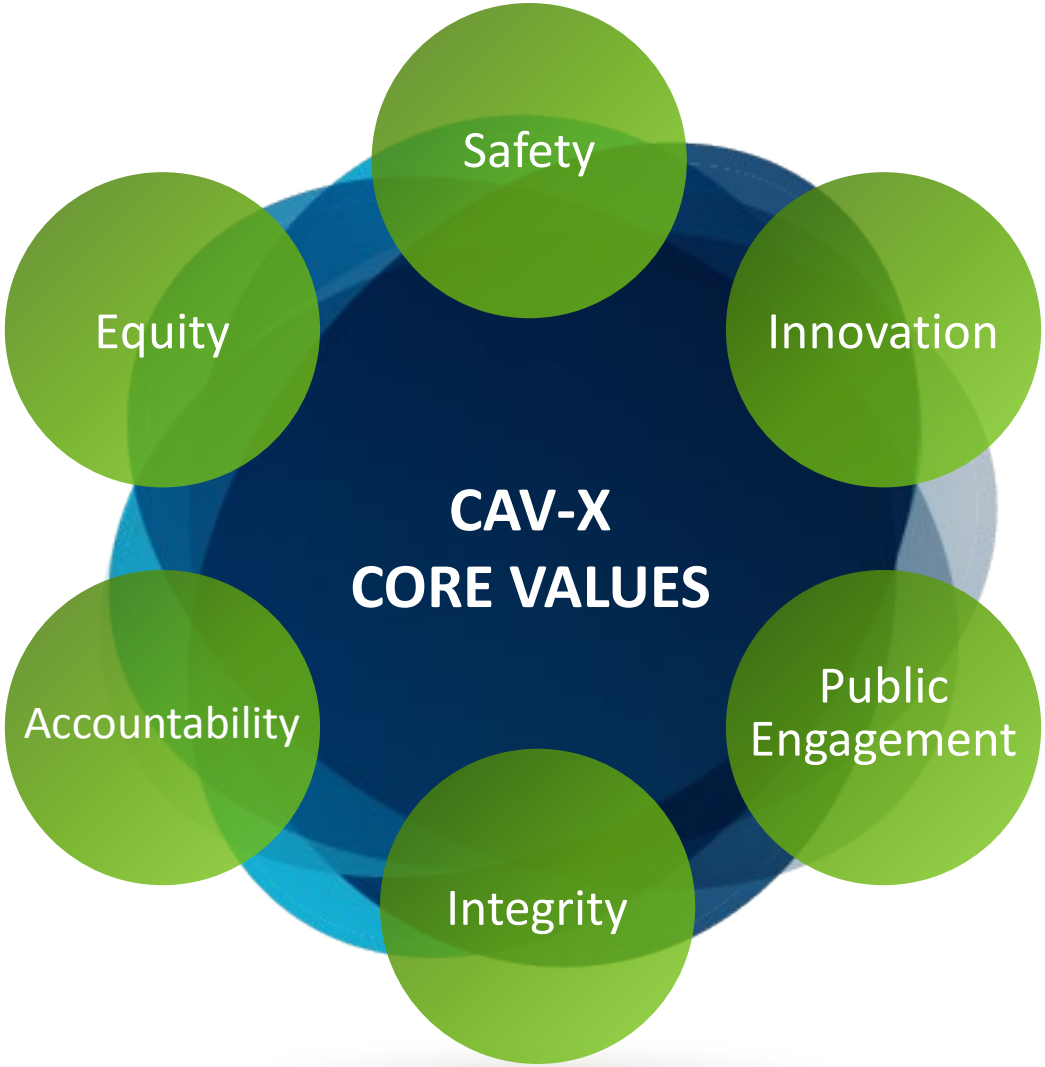
- What do you see are the biggest opportunities for CAV and your life? Your community?
- What do you see are the biggest risks for CAV?
- What are your safety concerns?
- What is needed to make CAV equitable to all Minnesotans?
- When CAV transportation becomes more available, do you think you will have the technology needed to use it (smartphone, computer, newer car)?
- What are your concerns about using and accessing CAV?
- What are your concerns about learning how to implement CAV? Would you like to participate in a community learning class or a meeting place to learn more about the technology?
- How would CAV transportation directly affect you? Would better transportation help you find/keep a job?
- How can CAV change transportation problems in your community?
- Considering the time you spend on transportation, do you think CAV would change the time you now spend on your transportation needs? For example:
  - Getting you or family places?
  - Looking for or getting to work?
  - Getting to appointments?

Connected and Automated Vehicles in Minnesota
The Future of Mobility

DEPARTMENT OF TRANSPORTATION

Kristin White, JD
CAV Innovation Director

CAV-X Core Values



Executive Order 18-04

ADVISORY COUNCIL

Report to Governor and Legislature by December 1, 2018

TESTING AND DEPLOYMENT

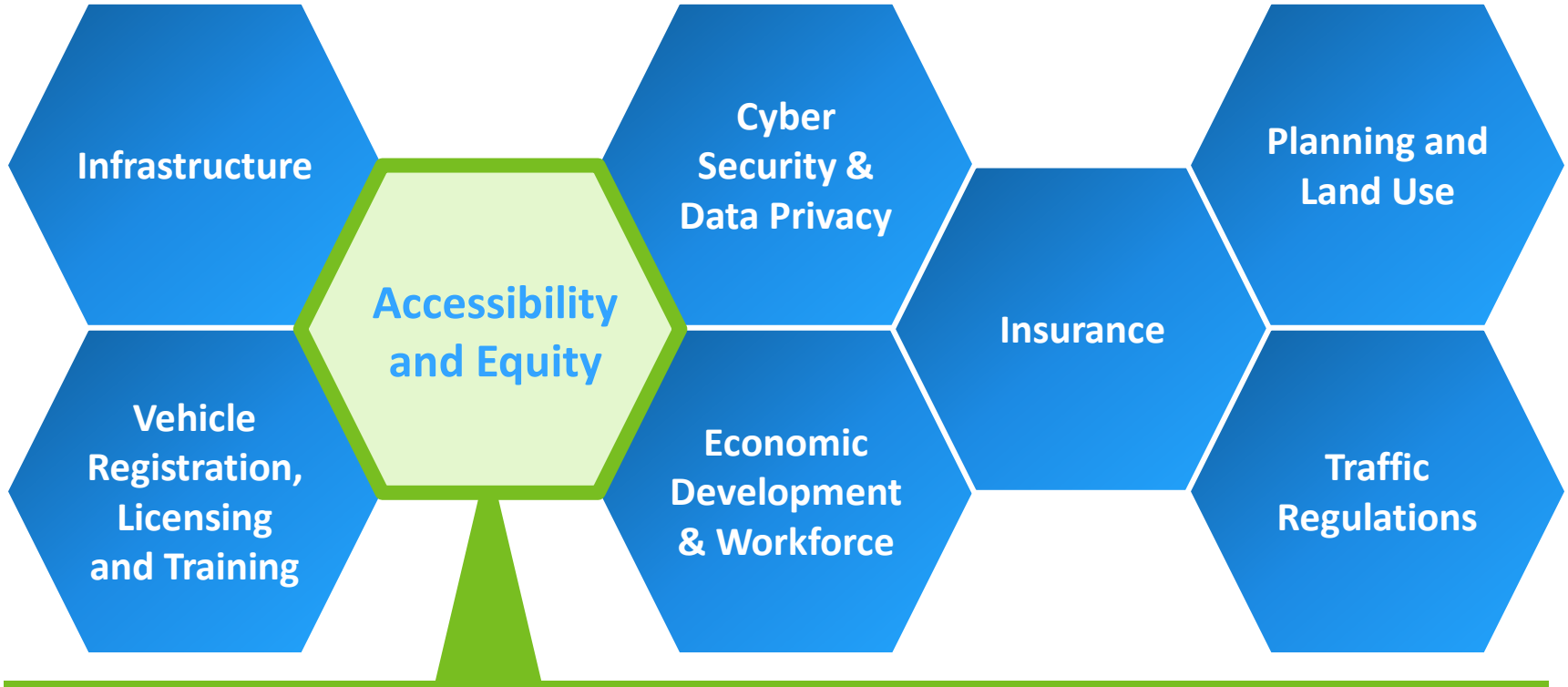
Requires MnDOT and DPS to establish testing and deployment programs

COORDINATION

Establishes Interagency CAV team (I-CAV)

Advisory Council

Report to Governor and Legislature by December 1, 2018



Emphasis Areas

- ✓ Rural Minnesota
- ✓ Disabled
- ✓ Low Income
- ✓ Tribal Nations
- ✓ Elderly
- ✓ Communities of Color

Governor's Advisory Council Themes

Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public** with testing and demonstrations
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

CAV: 4 Primary Elements

Automated

Electric

Connected

Shared

Automated Vehicles

Automated vehicles can take control of some or all aspects of driving tasks.

Society of Automotive Engineers (SAE) Levels of Automation

Full Automation






0	1	2	3	4	5
No Automation	Driver Assist	Partial Automation	Conditional Automation	High Automation	Full Automation

Types of Automated Vehicles

Available and Future **Automation**

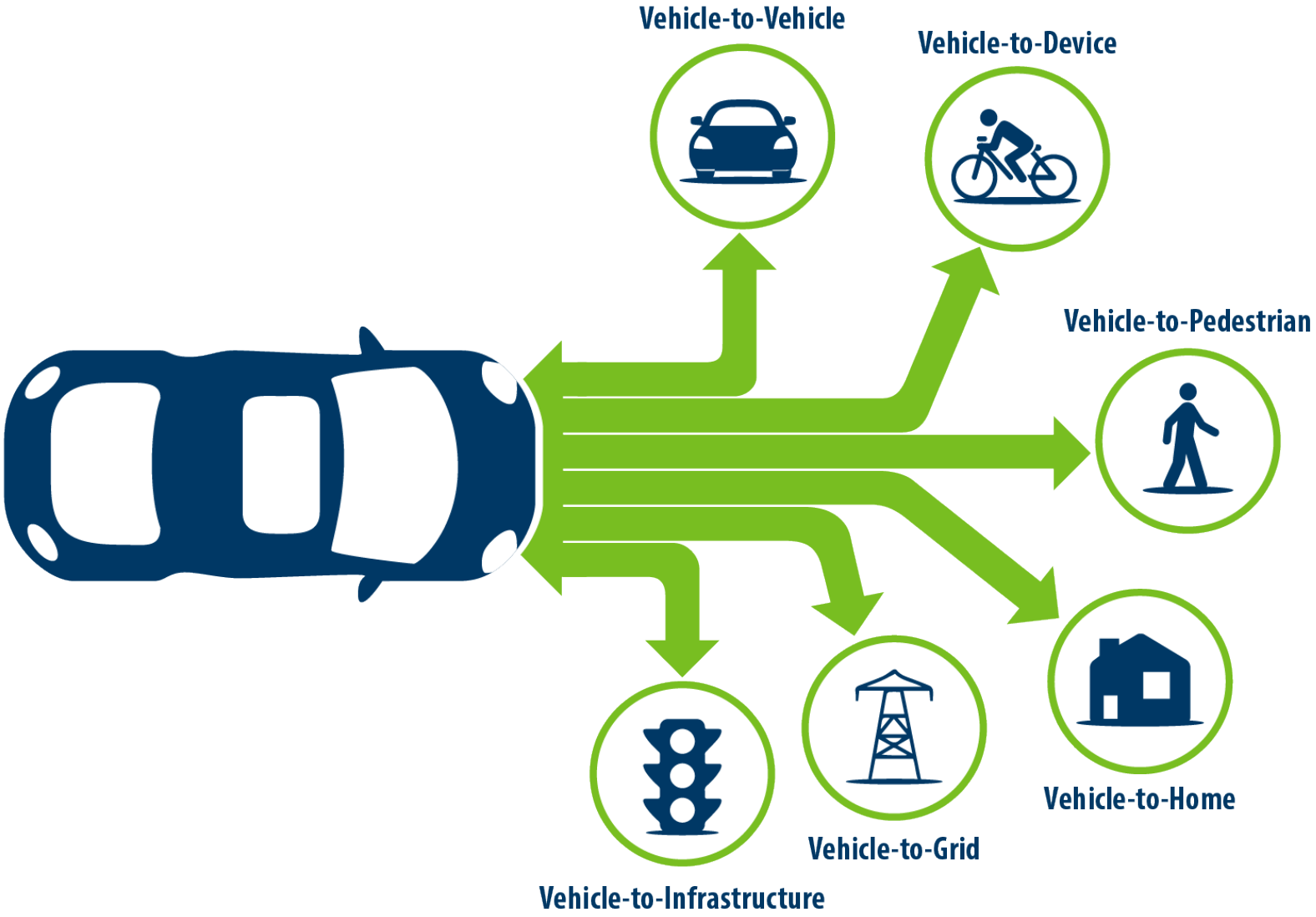
Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

Connected Vehicles

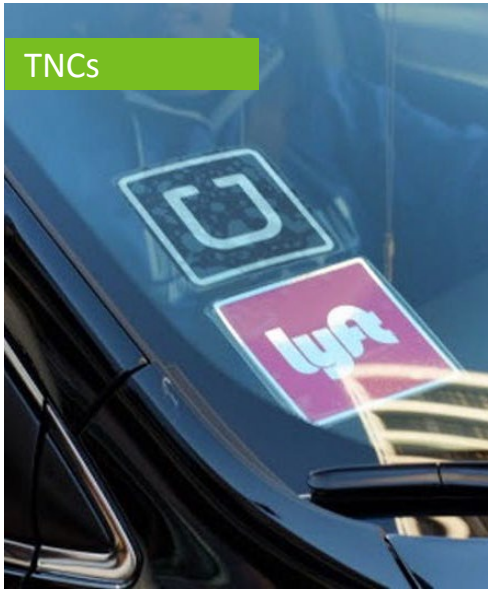


Electric Vehicles

Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

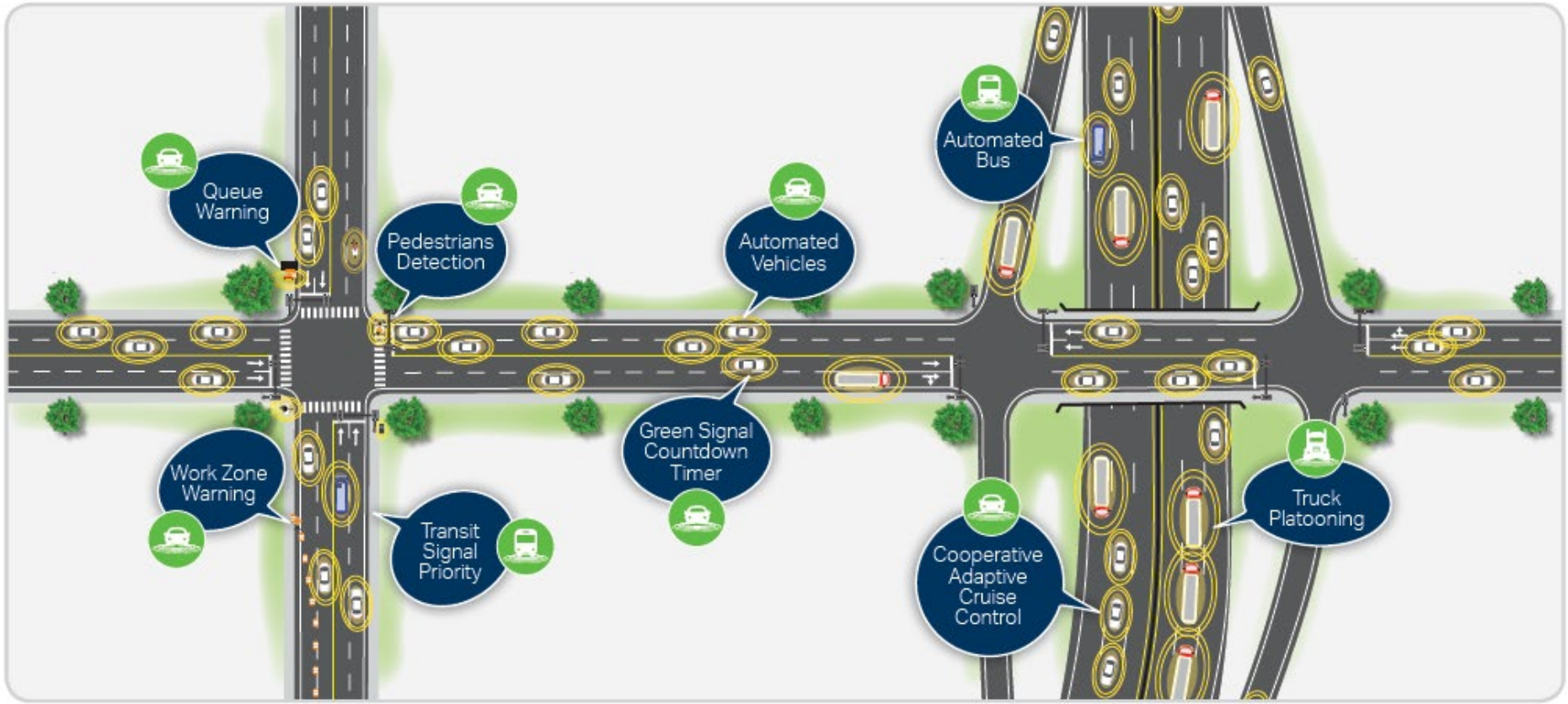
Shared Mobility

CAV allows more accessible transportation

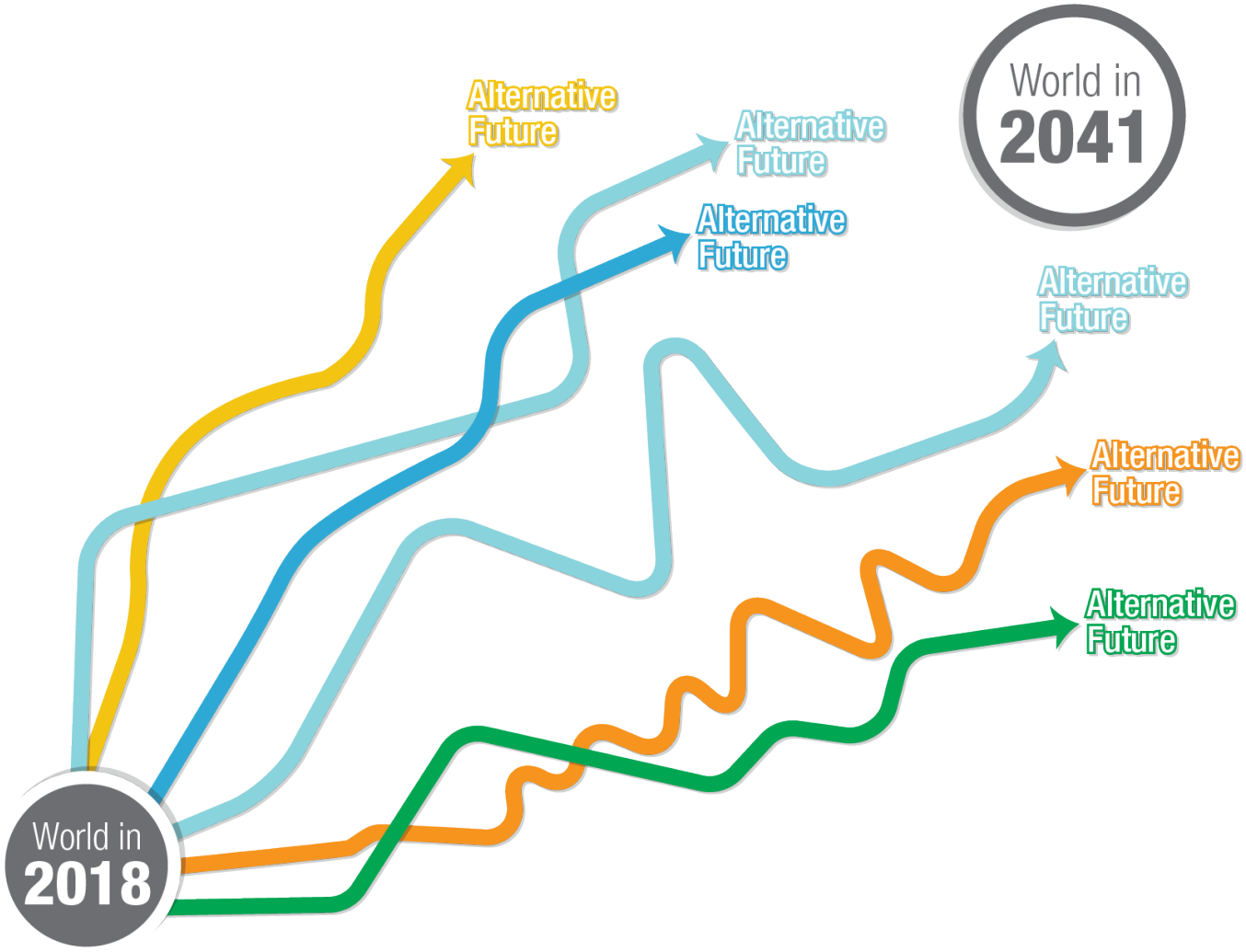


CAV Benefits

Types of Connected and Automated **Vehicle Applications**



CAV - When Will It Come?



Collaboration and Next Steps

CAV Impacts

1. Increased safety
2. Infrastructure changes
3. Law and regulatory changes
4. Different titling and registration requirements
5. Changes to insurance premiums & liability
6. Greater mobility and equal access
7. Personal data and cyber security
8. Business and workforce opportunities
9. Public health impacts

What are we trying to do

- ✓ Advance CAV technology in **winter weather** conditions
- ✓ **Develop corridors and test tracks** for industry to test and validate technology
- ✓ Utilize CAV technology to **improve mobility for those with transportation challenges** (e.g. person with disabilities, low income, elderly, rural Minnesota)
- ✓ Utilize CAV technology to improve the safety and operations of **work zones**
- ✓ **Build public trust** in CAV
- ✓ **Share data** between government and third parties who can advance CAV applications that improve safety and mobility
- ✓ **Utilize data** to help manage infrastructure and operations to support CAV
- ✓ Utilize CAV technology to **grow Minnesota businesses and attract new business** and talent
- ✓ Strategically plan for **policy**, infrastructure and operational risk

How you can be involved?

- Reach out to your communities so they understand technology and the state's policy efforts.
- Help us identify partners.
- Partner with our office to schedule conversations to understand your community's needs and priorities.
- Help us educate the public, legislators, and key stakeholders on how CAV impacts your communities.
- Participate in future conversations.

Hmong Community Meeting

Notes

September 29, 2018

Overview of Connected and Automated Vehicles

Kristin White of CAV-X Office presented background on connected and automated vehicles

Discussion

- Have we just started meeting with community members?
    - They are concerned that many people do not understand English and recommend translated materials.
- What is the timeline for implementation?
    - [Kristin] Step one is to submit a report of recommendations in December. After that we do not know. Driverless cars may not be on the road until 2050, but it could be sooner.
- From a participant that works in personal injury.
    - MN is a no-fault state; would it continue to be a no-fault state? Would that go away? Who is liable?
    - [Kristin] There is an insurance sub-committee working on this issue. At this time things would stay the same. In 5 years, the rules might change.
- With so many parts/components needed to make up a vehicle, the state must make an easier way for individuals to sue. Individuals should not need to go to every company that contributed to the creation of a vehicle.
- Someone saw a Tesla "type" vehicle pulled over. Why?
    - [Kristin] In one case a person was taking notes while the car was driving. In another case the driver was doing something with their cell phone and an accident occurred.
- There is a concern about a glitch causing an automated vehicle (AV) to come to close to another vehicle causing an accident.
- There is concern about whether an AV will react to a deer that jumps in front of an AV. If the AV is in an accident, who will be liable?
- What will be legal/not legal re: drivers/driving?
- Participants shared their experiences with vehicles that provide some automated features. Each person was excited about what they could do in today's CAV and what they might be able to do in the future.
- There was a discussion as to what the age limits should be for those using a CAV vehicle. There was discussion about whether young children could abuse adult authority by using a vehicle without permission if a driver's license was not required.

- There was confusion around the comment that CAV could mean less congestion. The idea of everyone wanting and eventually using a CAV would seem to mean more congestion.
- There was concern about CAV in different weather conditions.
    - Kristin explained the degree of testing currently taking place.
- One person owns a 2016 RAV 4 and mentioned how the advanced automated features periodically malfunctioned. There was a discussion regarding how a CAV might malfunction and the results.
- Question - Will speed would be monitored? Will CAVs would have their own lane?
    - There was a discussion around what would happen if there was an emergency requiring the operator to drive faster than the programmed speed.
    - Kristen explained that emergency vehicles would have priority over other vehicles. Maybe buses would have their own lane. It was agreed that other operators would likely need to adjust their lives, maybe plan better.
- Still more questions regarding whether public transportation would have a dedicated lane.
- Question – Will park and ride options change?
- CAV will open/increase access for travel. People will be able to go more places.
    - Revisit of concern regarding children using CAV.
    - Maybe culture time norm will change, slow down, become more relaxed. Different cultures look at time differently.

Equity Concerns

- Important things include:
    - Cost of individual vehicles. Ex: cost of Tesla way too high
    - Cost of constantly updating to new technology and having the devices necessary to use technology.
    - Whether there will be pressure for kids to have a CAV since they already feel pressure to have the latest technology
    - What if kids or their families can't afford a CAV? Can an average family really afford this?
        - Will this create an increase in crime to gain access?
            - Group discusses how kids have been known to do illegal things to acquire things they cannot afford
    - Questions regarding current and future price range.
- Group believes CAV could "really divide the social status of the country." They see this for Minnesota. Already a divide between by those who can afford new technology and those who can't.
    - Will there be opportunities available for those without individual access to CAV?
    - What about people who won't/don't want to use CAV, separate lanes/roads for them?
- Different lanes for public transport? Private?

- In rural areas, concern about electric vehicles and availability to charging stations, especially in a state such as Wyoming.
- Rural people could be at a disadvantage, esp rural elderly/disabled. There was concern that charging stations might be too far apart, or vehicles may not hold a long enough charge and operators need to make frequent stops for charging.
- The group was very interested in seeing a vehicle.
    - Kids should really see vehicles since it is their future
    - Educate at an early age! Show parents/elders the importance of this education
    - Take into account the different styles of learning; how do you reach/teach everyone
    - Every generation, including elders, should see vehicles in operation.
    - Comment that it especially important for elders to have the ability to see, touch, and try makes the idea real. Once they buy into an idea, others will follow
    - Recommendation that presenters bring a video of a CAV in operation or bring a CAV to demo.
    - Important in Hmong community to do this in person; learning style in Hmong community is hands on learning. We learn by seeing, touching; esp. important to see it for ourselves.
- Recommendations:
    - Take a vehicle to the Hmong village for a demonstration. There are people there from different business (i.e. business people, farmers, elders)
    - Hmong New Year would be a good place to have a table about CAV
    - Make CAV environmentally based and sound
- Excited about hands free
- Concerned about personal experience & safety & affordability
- What if I cannot afford something I need
- Concerned about weather issues
    - Black ice
    - If one CAV car skids, do the others get out of the way

Top Concerns and Recommendations

- Pricing/affordability
- What will be the laws/regulations
- Accessibility is important
- Will public transportation be convenient?
- Will roads change? How much will new infrastructure cost?
- Will CAV be safe for the environment?
    - Will they be any safer than today's vehicles?
- Concern about child proofing vehicles – small children can figure out how to make tech work

- If elderly will have access, will it be affordable?
    - Will they have problems getting in and out of a CAV if they are not escorted?
- How will recalls be handled?
    - Will companies stay in touch with owners? Will companies follow-up to make sure CAVs are in continuous working order?
- What will the future of tractors be like?
    - How can a small farm afford access to CAV as a tool?
    - Will there be a loan program for small farms?
- Will there be cameras in every car?
    - Maybe monitoring such cameras is a new job of the future?
- There is concern about cameras and privacy
- Who will be in charge of updating CAV software?
- Concern about the cost of new infrastructure and taxes
- Concern that automation will take away jobs
- Will renewable energy help?
- Even after CAV is on the road, will anyone from the state come back to see how communities are doing?
    - They requested periodic updates (every other year). They are willing to seek out the information if it is on social media.
        - Communication recommendations: Facebook page, use of Hmong radio, contact Hmong organizations, use of Hmong television station (they offered a contact for Hmong TV), use of churches
- Will cars operate in different languages? Intonation and accent concerns with voice recognition

Priority Recommendations to Share with Advisory Council

- Affordability
- Accessibility including: public transportation, cost, location of CAVs
- Need a clear understanding for:
    - Laws and regulations
    - Speed limits
    - Age
    - Licensing
- Will it be better for the environment?
- Need continued education and updates
    - What is the world doing regarding CAV? How does it compare to Minnesota?
    - How will you keep diverse communities in the loop? Keep us in the mainstream
    - Please update us even on the “small” things” Keep us plugged in to what is going on
- Infrastructure cost
    - Who will pay?

    - What is the tax payer cost?
- Demonstrations in Hmong community

MINNESOTA
INDIAN AFFAIRS COUNCIL

QUARTERLY BOARD MEETING
Friday, September 14th, 2018
1:00pm to 4:00pm

Grand Portage Resort & Casino
70 Casino Drive
Grand Portage, MN 55605
KiGiTong Room

AGENDA

Meeting Called To Order
Invocation
Roll Call & Introductions
Review & approval of notes from June 14, 2018

1. **MIAC Updates:**
   - Executive Director – Dennis Olson Jr
   - Cultural Resources Department – Melissa Cerda
   - Legislative & Grants Director – Shannon Geshick
2. **Reports:**
   - Urban Indian Advisory Board – Karen Bedeau
   - Tribal Nations Education Committee – Maria Burnett (Education Director for Grand Portage)
   - Ombudsperson for American Indian Families – *written report included*
   - Joint Council Advisory Committee – Joni Cabrera
   - Commissioners
   - State Tribal Liaisons
3. **Presentations:**
   - ***Department Of Corrections American Indian Disparities Workplan;*** John Poupart
   - ***Results First Initiative – Children's MH Report;*** Weston Merrick (MMB); Angela Hirsch (DHS); Laura Kramer (MMB); Vern LaPlante (DHS)
   - ***DHS American Indian Workforce Initiative;*** Vern LaPlante (DHS); Alicia Smith (DHS): *RESOLUTION REQUEST*
   - ***Tribal-State Relations Training Proposed Sustainability Action Plan;*** Linda Aitken (MnDOT); Cindy Bellefeuille (MnDOT)
   - ***University of Minnesota Regent's Policy;*** Tadd Johnson
   - ***DOL/Veterans Employment and Training Service;*** David Seay – State Director
   - ***Connected and Automated Vehicles*;** Kristin White (MnDOT); Jay Hietpas (MnDOT)
   - ***SAMHSA Policy Academy & FDL Opioid Summit recommendations;*** Sam Moose – FDL Human Services Director
   - ***Center of American Indian and Minority Health update & Native college student research study;*** Mary Owen

Announcements
Adjourn

Connected and Automated Vehicles and Impacts within Indian Country

DEPARTMENT OF TRANSPORTATION

September 14, 2018

DEPARTMENT OF TRANSPORTATION

Governor's Executive Order

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV

Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

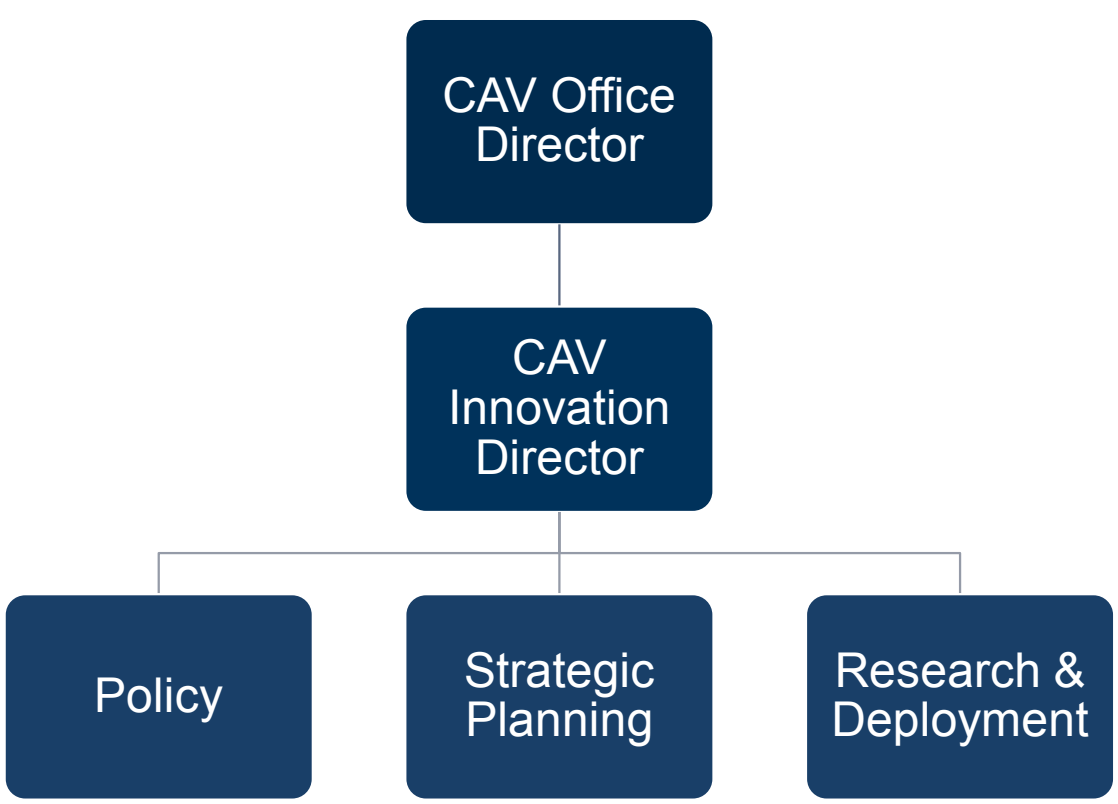
Interagency CAV Team

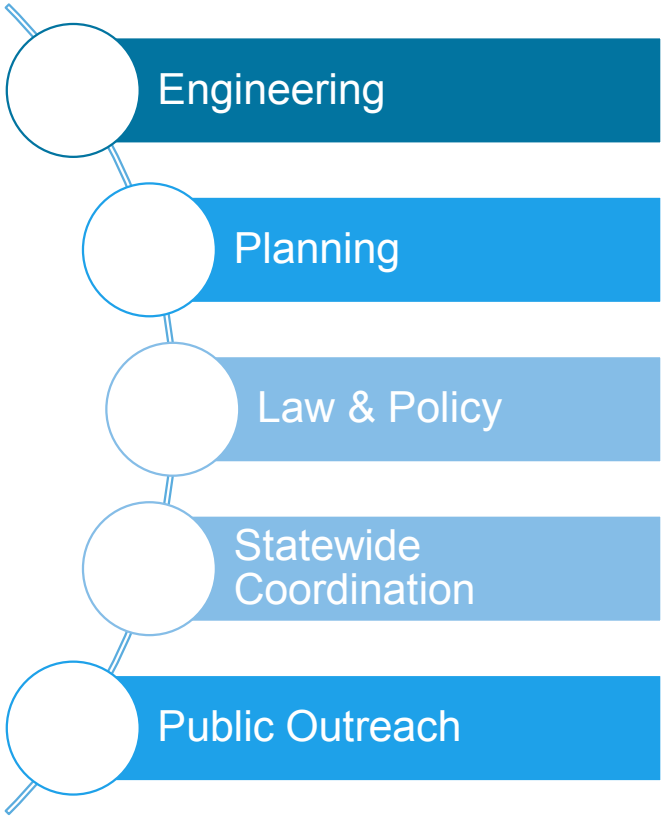
- Policy position papers
- Branding
- Testing & Deployment
- Partnerships

DEPARTMENT OF TRANSPORTATION

Who we are

MnDOT CAV-X Office





DEPARTMENT OF TRANSPORTATION

What is CAV?

Automated Vehicles

Automated vehicles can **take control of** some or all aspects of **driving tasks**.

Uses for Automation

Types of **Automated Vehicles**

Passenger

Commercial

Transit

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Society of Automotive Engineers (SAE) Levels of Automation

Connected Vehicles

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

Connected & Automated Vehicles

Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors

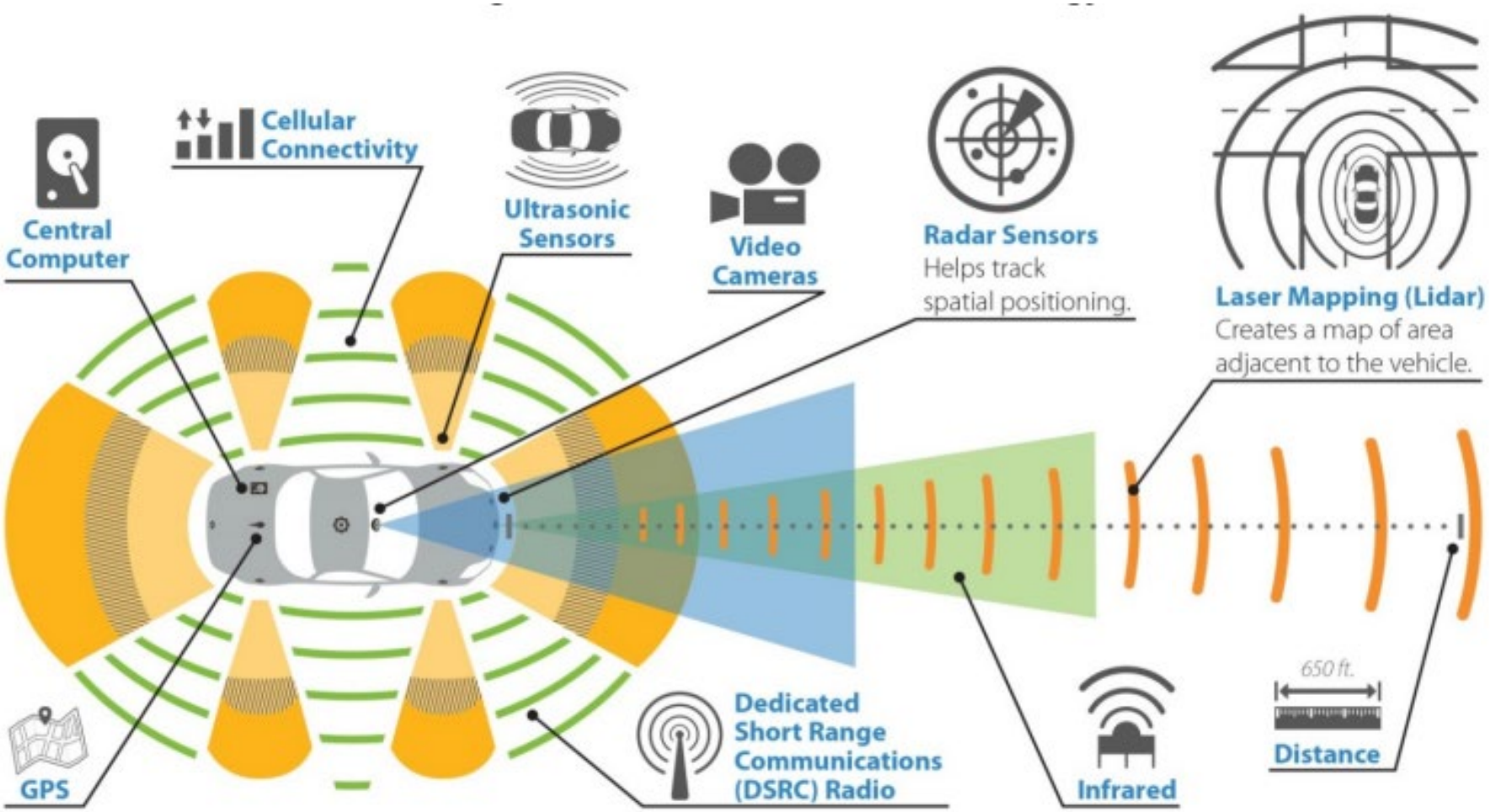
Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities

Connected Vehicle

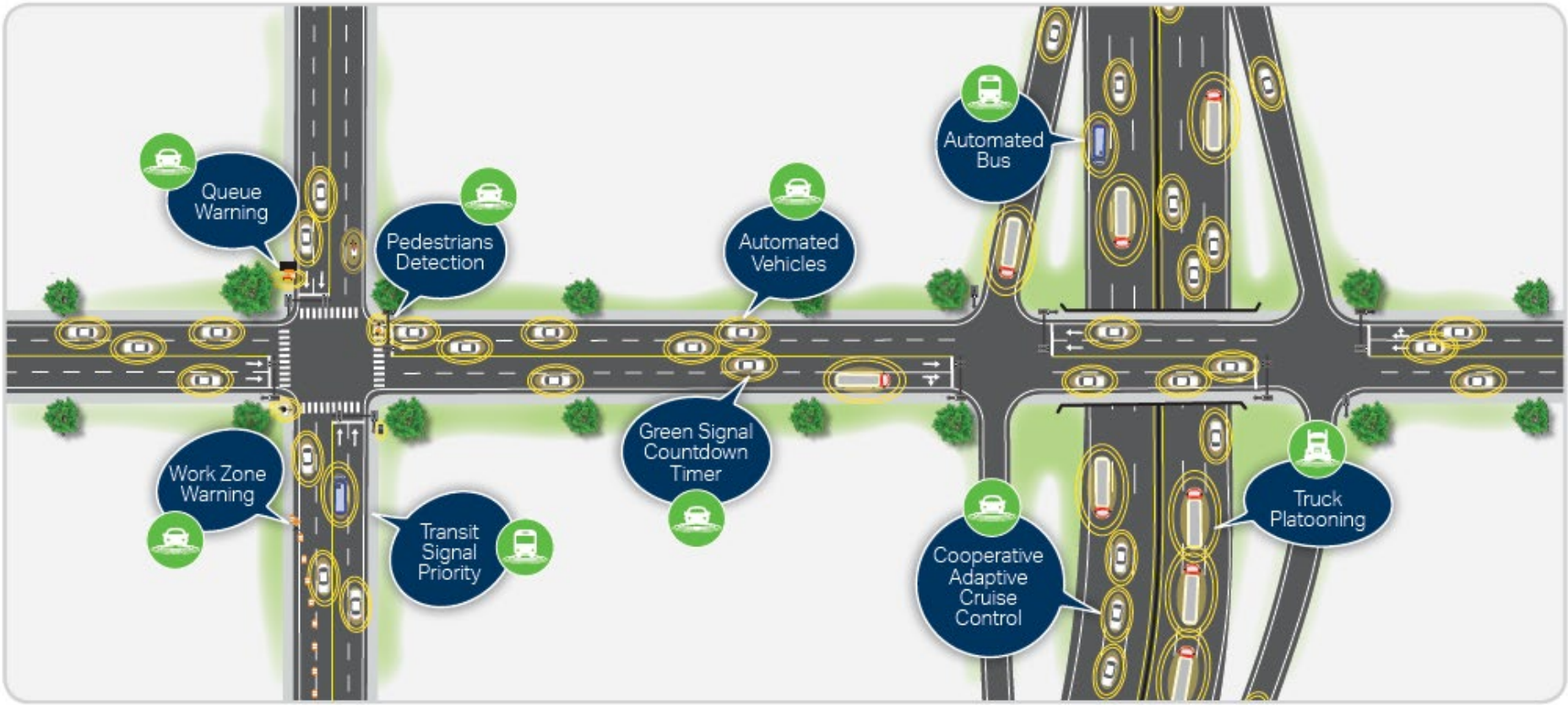
Communicates with nearby vehicles and infrastructure

How does it work?



CAV Benefits

Types of Connected and Automated **Vehicle Applications**



Electric Vehicles

Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

Shared Mobility

Shared use of a vehicle, bicycle, or other transportation mode on an **as-needed basis**

1 account to access, plan, and pay for private and public transportation options

Alternative Automation

Truck Platooning

Dockless scooters & bikes

Automated product delivery

CAV Technology Already Available

Lane Assist & Departure Warnings

Self-Parking

Signal Countdowns

DEPARTMENT OF TRANSPORTATION

CAV and Indian Country

CAV Impacts

1. Increased **safety**
2. **Infrastructure** changes
3. **Law** and regulatory changes
4. Different **titling and registration** requirements
5. Changes to **insurance** premiums & liability
6. Greater **mobility** and **equal access**
7. Personal **data** and cyber **security**
8. **Business and workforce** opportunities
9. **Public health** impacts

Minnesota CAV Priorities

- Advance CAV technology in **winter weather** conditions
- **Develop corridors and test tracks** for industry to test and validate technology
- Utilize CAV technology to **improve mobility for those with transportation challenges** (e.g. person with disabilities, low income, elderly, rural Minnesota)
- Utilize CAV technology to improve the safety and operations of **work zones**
- **Build public trust** in CAV
- **Share data** between government and third parties who can advance CAV applications that improve safety and mobility
- **Utilize data** to help manage infrastructure and operations to support CAV
- Utilize CAV technology to **grow Minnesota businesses and attract new business** and talent
- Strategically plan for **policy**, infrastructure and operational risk

Discussion

Next Steps

What the future looks like

Thank you

DEPARTMENT OF TRANSPORTATION

Jay Hietpas & Kristin White
MnDOT CAV-X Office

Minnesota Indian Affairs Council Meeting

September 14, 2018

Meeting Notes

Connected and Automated Vehicles, Kristin White

Kristin White from CAV-X Office provided a background on connected and automated vehicles, the new MnDOT CAV-X Office, the Governor's Executive Order, and policy areas the state is reviewing to safely harness this technology to improve the lives of Minnesotans and Tribal Nations.

Discussion

- Civil regulatory aspects of these policy changes will require close coordination with the tribes
- Could add MIAC, tribes to the Interagency Connected and Automated Vehicles Team (I-CAV)
- Creation of the new offices represents how the state needs to proactively plan for emerging technologies to harness their benefits, ensure safety, and ensure the benefits are shared equally
- CAVs require a significant amount of technology to detect obstacles like pedestrians or deer detection, plan for national emergencies, work zones, and adapt to weather/national emergencies
- Coordinate with tribal technical experts and public works staff at Advocacy Council on Tribal Transportation (ACTT)
- Assess rural versus suburban impacts, especially with lack of transit and broadband in parts of the state and tribal lands
- Need to meet with each tribe, starting with Upper Sioux since they aren't a part of MIAC

Questions

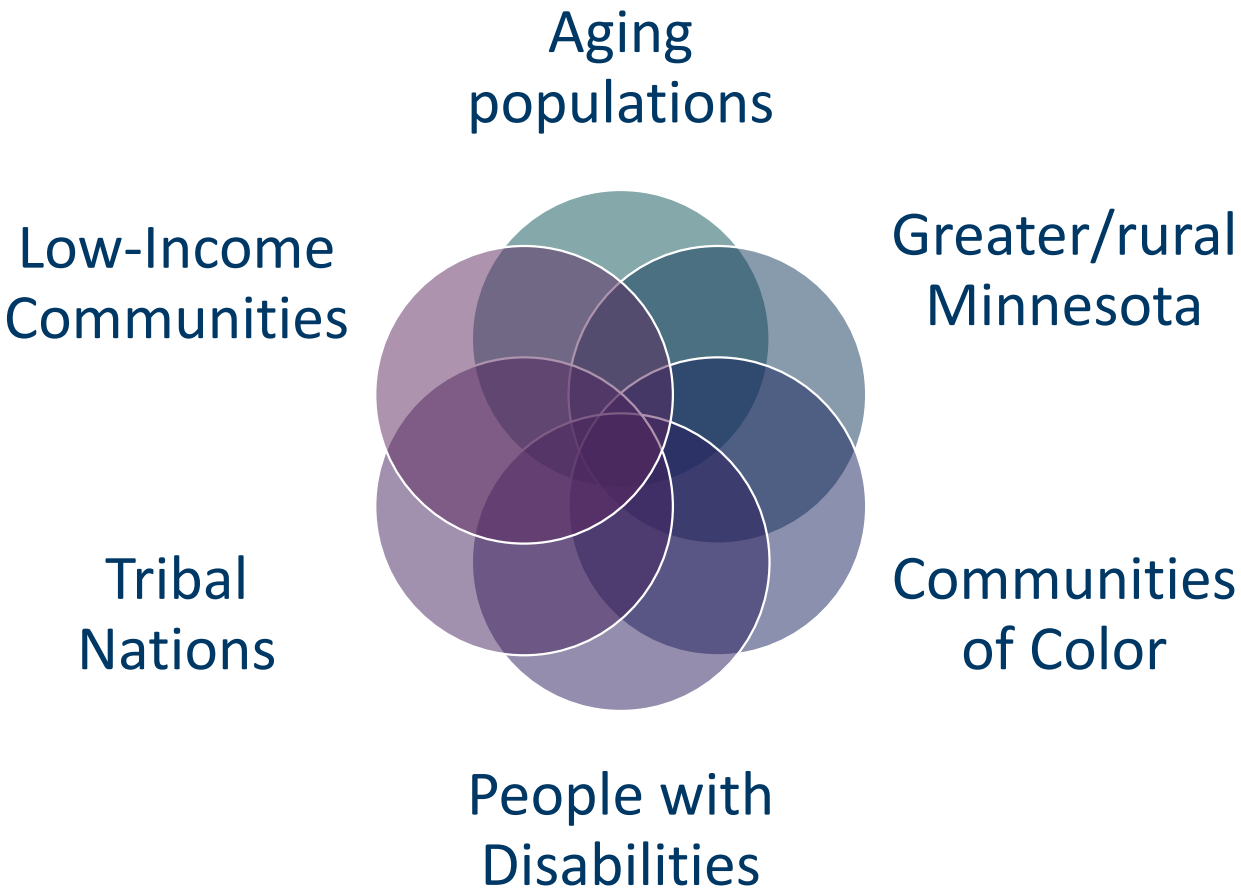
- Since Red Lake Nation independently negotiations with the state a constitution that has oversight with Bureau of Indian Affairs do they have to renegotiate their constitution? This seems unlikely but CAV-X Office will look into it.
- What is the goal for renewable energies? Are we pursuing other technologies other than electric vehicles? We are trying to plan for the future and electrification is part of the planning process.
- Will the state test CAVs in Indian Country? The state plans to host testing, demonstrations and pilots throughout the state, including partnerships with tribes in Indian Country
- Are there emergency management plans for public emergencies? This will be a critical part of this program and law enforcement and emergency officials are beginning to address how CAV can help support safety during emergencies.

Tribal, Equity, and Accessibility Updates

Kristin White - MnDOT

Governor's Advisory Council on CAV

"Communities experiencing transportation barriers"



"Accessibility and equity for all Minnesotans"

DHS

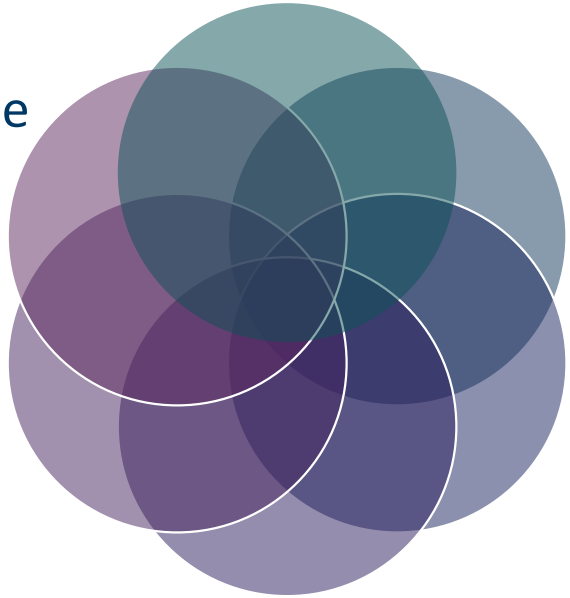
Minnesota Council on Aging

Section 8

Environmental Justice

YWCA; Homeless

Rochester
Grand Rapids
St. Cloud



Indian Affairs Council

Council on Tribal Transportation

Somali,
Hmong &
Rondo Communities

Minnesota Council on Disability

Independent Living Centers

Public Engagement Opportunities

Tribal Governments

- Tribal regulations and state uniformity
- Testing and demonstrations
- Infrastructure & Connectivity
- Training and workforce development
- Continued consultation and coordination

Somali Community

- Trust and equity
- Demonstrations and testing
- Language and accessibility
- Workforce & job training
- Data privacy
- Balance innovation and safety
- Continued conversations and engagement with elders

Aging Populations

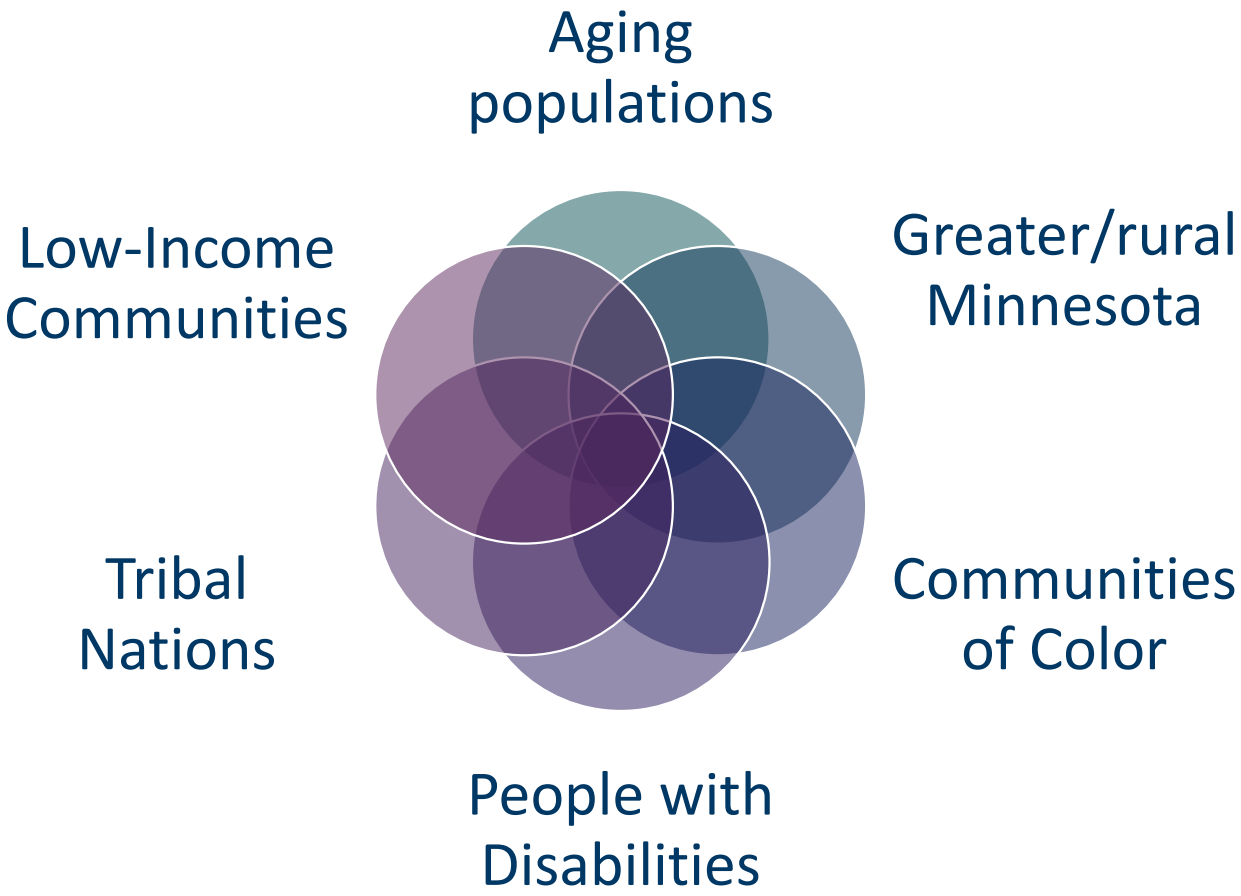
- Education and public engagement
- Connectivity
- Urban/rural divide
- Access to technology/shared mobility
- Accessibility by design and coordination with auto industry
- Continued conversations with older adults & caregivers

Equity

Subcommittee Report and Recommendations

Aimee Gourlay, Minnesota Mediation Center

"Communities experiencing transportation barriers"



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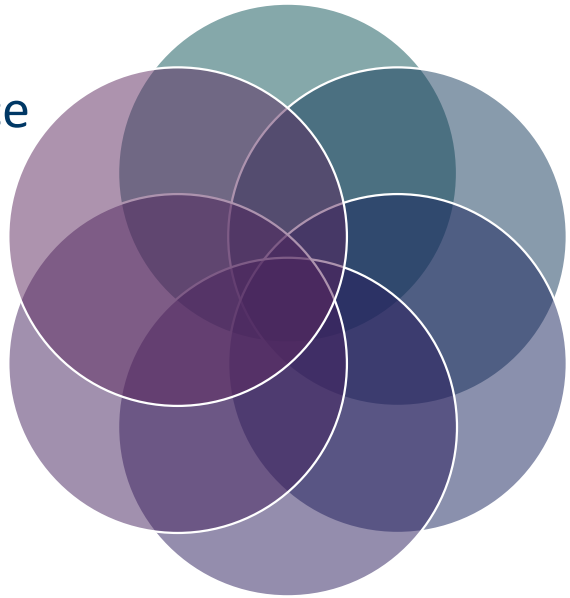

Rochester
Grand Rapids
St. Cloud

Indian Affairs Council

Council on Tribal Transportation

Somali,
Hmong &
Rondo Communities

Minnesota Council on Disability

Independent Living Centers

Equity & Accessibility Conversations

- Enhanced process
  - To encourage participation and amplify the voices of people who may not attend “traditional” subcommittee process
  - Accessibility – recommendations developed at three meetings in Roseville, Rochester and Grand Rapids
  - Equity – phone contacts and focused meetings
    - Facilitators made approximately 50 contacts with people from groups “experiencing transportation barriers”
      - "Do you know how many times we've tried to talk with them? They just don't listen.“ (Rondo community member)
    - Meetings between CAV-X staff and Hmong and Somali communities, tribal governments and aging populations

Hmong Community

- Enact policies for equitable pricing of CAV and TNCs; if pricing is not accessible to low-income populations it could lead to theft, incarceration, and social injustice
- Do not enact policies that create a social/class divide; enact policies that promote equal access
- Recognize that elderly and aging populations have limited income, so must incentivize the use of CAV/shared mobility in these communities to ensure equal access
- Electric charging stations must be installed in rural areas to avoid equity gaps or urban/rural divide
- Need testing and demonstrations in Hmong community and online classes, recognizing that our community needs to see, feel, and touch the technology to learn and understand its importance
- Continue conversations with elders in the community to build public trust and understand what other states are doing

Tribal Governments

- Tribal regulations and state uniformity
- Testing and demonstrations
- Infrastructure & Connectivity
- Training and workforce development
- Continued consultation and coordination

Somali Community

- Trust and equity
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Aging Populations

- Education and public engagement
- Connectivity
- Urban/rural divide
- Access to technology/shared mobility
- Accessibility by design and coordination with auto industry
- Continued conversations with older adults & caregivers

Facilitators' Recommendations

- Doors which were previously shut have been opened and each community that participated now expects to be included going forward.
- Follow-up is essential in order to build and maintain long-term relationships between participating communities and the State as CAV develops.
- There is willingness and opportunity for real inclusion, and this would definitely require a commitment of resources.
- Listening and integrating these community's wisdom will enable inclusion, participation, and buy-in to happen.
- All communities stressed the importance of including Elders to obtain buy-in of CAV.

DEPARTMENT OF TRANSPORTATION

Questions & Discussion

Aimee Gourlay, Minnesota Mediation Center

CAV and Revenue Meeting Notes

October 18, 2018

1. Attendees
    a. Mark Nelson, MnDOT Planning
    b. Emily Smoak, Department of Health
    c. Chris Berens, MnDOT Office of Transportation System Management
    d. Kristin White, MnDOT CAV-X
    e. Randy Sanford, Asst. Director of Tax Research, Department of Revenue
    f. Frank Douma, University of Minnesota Humphrey School
    g. Commissioner Bauerly, Department of Revenue
    h. Kathy Schill, House Policy
2. Overview of Land Use and Planning Discussion of Revenue
    a. CAV will be predominantly electric
    b. Discussed user-fees; MBUF
    c. In long-term gas tax will become obsolete
    d. Vehicle licensing and registration could be impacted with decreased ownership models
    e. Participants arose these concerns; not state agency staff
3. Review of Land Use and Planning Subcommittee's recommendations (Mark Nelson, Emily Smoak & Frank Douma)
    a. Clarification that some of subcommittee recommendations are not specific to revenue
    b. Need to be clearly split up recommendations to differentiate land use recommendations from revenue recommendations
    c. Be clear what "incentivize" means; don't use term unless we have a clear goal
    d. Recommendation: Create public and private sector work group to get a baseline understanding of current funding model"
        i. Do research what other states are doing
        ii. State do a comprehensive review of current tax structure and funding structure
4. General Discussion & Items a Working Group Needs to Address
    a. EV are paying more because they're value-based and EVs cost more
    b. Need to use John Wilson's (MnDOT Finance) "Electrification Sensitivity Analysis"; Chris will share
    c. **What is the time frame** for these policy changes/adoption of CAV considering we're already underfunding our infrastructure needs?
    d. **How do we understand CV infrastructure needs**, as those assets will be more costly?
    e. We can enforce ½ cent transit tax; **should we enforce this transit tax at a state level** since locals have difficulty don't do this? 2/3 counties already do this
    f. **Auto part funding** is already dedicated from general fund
    g. **Accessibility**/last mile needs to be thought about because these communities are often impacted when other changes are made to distribution of other general fund
5. Additional Considerations the Working Group Should Focus On

a. Recommendation to look at a list of things, including **transit**, **MBUF**, **auto part funding**, **EV**, **options for funding**
b. Additional considerations (Kathy Schill)
    i. **User fees** and how that interfaces with what we currently have
    ii. **What the MN Constitution tells us we must do with motor fuel taxes**; need to redirect that funding and that can be a comfortable conversation
    iii. Need to reach out to **Greater Minnesota** to understand the benefits these communities could receive (e.g. shuttles) and how much that would cost
    iv. Driver's licenses
    v. License tabs
c. MnDOT is conducting scenario planning workshops; timelines will be difficult to estimate
d. Additional considerations (Frank Douma)
    i. **Administrative efficiency**: Motor fuel tax administratively is a very efficient tax to collect; this kind of efficiency will be difficult to replicate
    ii. There is **no data** on many of these questions
    iii. Jerry Schaufeld is looking at items such as total cost and number of revenue streams that could be impacted
e. **Administrative efficiency is a consideration we need to consider** (e.g. 400 distributors versus all Minnesotans via income tax)
f. How do Minnesotans respond to these ideas?
    i. E.g. California had 5,000 willing MBUF users who shared their data. In Minnesota this would be more challenging
    ii. Could **work with fleets** to provide distance-based fees more efficiently than each individual driver
    iii. Could **put the onus on the company to collect this data** (just as they do with sales tax)
    iv. This isn't replacement of gas tax; it's supplementing
    v. Shared mobility companies want to operate on our roadways
g. Fairness/equity across MN
    i. How do we ensure consistency/fairness across the State? If we take an Uber from one location to another, are we paying the same amount for that infrastructure. We need more information on what fleets can look like.
    ii. Retailers want to keep an administrative fee for getting the information to the department of revenue. Other states allow locales to keep ½ of 1 cent for this work
h. Changes in revenue could change behaviors. Need data on price sensitivity, e.g. John Wilson's paper
    i. Typically in MN revenue law, we are reinforcing/reimbursing existing behavior, instead of changing behavior
    ii. Studies haven't shown many changes in behavior
i. Recommendation should read: **diversify and supplement transportation funding models**; not replacing them.
j. Electrification

i. **Does PUC need to consider how to regulate utility bills for EVs**?
ii. E.g. saves to charge at public-owned facilities than at home
iii. California is testing "pay at the electric pump"
iv. Norway policies eliminated tolls and fee to charge to promote EV
v. Important to not inadvertently disincentivize use
vi. EVs aren't catching on in MN; with worldwide numbers we should have 15,000; currently we only have 1,000

k. Federal policy

i. MN tends to extend credits for 2 years; **business needs long-term certainty** for business

l. State uniformity

i. There are federal and state gas taxes
ii. Not sure there's a federal model
iii. We've been approached by other states for a pooled pilot

m. MBUF Pilot

i. Working with car-sharing fleets because they own their vehicles
ii. Implementing tent. 2019-2020 with Hour Car

6. Next Steps
    a. Report will separate out Revenue from LU&P recommendations
    b. Will share early draft report with this team
    c. Recognize the mixed fleet period with blending of use of revenues

Action Items

1. Chris will share Wilson's EV analysis
2. CAV-X will update recommendations per this conversation and send out early next week
3. Share these recommendations separately at Council meeting
4. Advisory Council meeting October 30th at Hiway Federal Credit Union; this conversation will be held at 11:00 am on the agenda

Revenue

Subcommittee Recommendations

Commissioner Cynthia Bauerly, Department of Revenue
Randy Sanford, Department of Revenue

Recommendation 1: Revenue Working Group

Create public-private working group to conduct a comprehensive review of current and future revenue structures for transportation and make recommendation about how to diversify and supplement transportation funding for Minnesota.

Recommendation 1: Revenue Working Group (Contd.)

The CAV Revenue Working Group should consider:

1. **CAV infrastructure needs and assets** including timelines for CAV adoption and deployment
2. Current revenue available to the state and local systems including: **constitutional considerations** for dedicating "motor fuel"; general fund dedication of **auto part sales** tax; **gas tax**; **MVST**; **registration fees**; widely adopted **½ cent tax available to counties**; among others
3. **Options for diversifying and supplementing the existing revenue structures** with attention to **administrative efficiency** including **mileage based user fees** and options being deployed in other states
4. Opportunities for future revenue structures to create **accessibility and equity** across MN
5. **Greater Minnesota** opportunities for CAV around transit and **cost impacts for local government**
6. **Data** to understand transition from current revenue structures to new structures; **pilots with fleets** to collect data on distance-based fees

Governor's Advisory Council on Connected and Automated Vehicles
Traffic Regulation and Safety Subcommittee Charter

Executive Order/Purpose

Governor Dayton issued an executive order on connected and automated vehicles. The executive order recognizes that technology is evolving rapidly, and that Minnesota must prepare. The executive order established an advisory council comprised of 15 members appointed by the Governor and ex-officio members from state agencies and the legislature. The council will submit a report to the Governor and Legislature by December 1, 2018. The report will recommend changes in statutes, rules, and policies in eight areas, including traffic regulation, law enforcement and safety. The subcommittees are part of a larger effort to hear ideas about CAV from many Minnesotans. More information about the advisory council and this process is on Mn DOT's CAV website at: http://www.dot.state.mn.us/automated/index.html.

Goal

To develop recommendations for changes to statutes, rules and policies in the areas of traffic regulation, law enforcement and safety for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory Council subcommittees as needed.

Roles

Mn DOT CAV Office is implementing the Executive Order.

- Jay Hietpas, P.E.
  Connected and Automated Vehicles Executive Director
  Jay.Hietpas@state.mn.us
- Kristin White
  Connected and Automated Vehicles Innovation Director
  Kristin.White@state.mn.us
- Praveena Pidaparthi
  CAV Policy and Planning Director
  Praveena.Pidaparthi@state.mn.us
- Cory Johnson
  ITS Program Manager
  Coryj.Johnson@state.mn.us

The liaison will provide expertise to CAV X and the facilitation teams, review agendas and meeting notes prior to distribution, provide input on meeting logistics and process, and are engaged in the presentation of recommendations to the Advisory Council. (The subcommittee will decide how it wishes to present.)

- Colonel Langer, DPS 651-201-7114 matthew.langer@state.mn.us

Facilitators will manage scheduling and meeting logistics, communication, draft agendas and notes, facilitate meetings and provide process guidance, and assist with compiling presentation materials.

- Aimee Gourlay 612-237-6505 CAVFacilitators@mediationcentermn.org

Anyone who wants to attend is welcome at meetings. Subcommittee members will provide their knowledge and expertise by participating in meetings in person, or electronically and/or by commenting on meeting notes and recommendations. Meeting participants will be asked to sign in at the meetings. Those commenting on meeting notes will be asked to provide their name and contact information if they wish to be on the subcommittee email list, however comments will be aggregated and not attributed to any individual.

Meetings & Meeting Materials

Meetings will be scheduled based on the availability of the liaison, CAV X staff and the facilitator, and presenters if applicable. It is anticipated that there will be one to three meetings prior to making a recommendation to the Advisory Committee. Members will be informed of meetings via email. Meetings will be announced and agendas will be available on the MnDOT website (http://www.dot.state.mn.us/automated/index.html) at least one week before the meeting. Meeting materials will be posted on the website after each meeting and will be emailed to subcommittee members prior to the meeting.

Meeting Notes

Facilitators will provide notes of meetings. The liaison will approve the notes, and subcommittee will have the opportunity to review and comment on them. Subcommittee members who were unable to attend a meeting may provide additional comment. Additional comments may be summarized by the facilitator.

Meeting Evaluation

All subcommittee members and those who provide an email address at the meeting will receive a post-meeting evaluation.

Communication

The facilitator will include CAV X staff and the co-liaisons on subcommittee communication regarding logistics and planning. If the facilitator chooses to open a dialogue via email, all subcommittee members will be included.

Meeting Process

FACILITATION. Meetings will be facilitated. Meetings are expected to be two to three hours. Meetings will end on time and with a clear understanding of assignments and next steps. Extension of time, which is not encouraged, will require the consent of a majority of members attending that meeting by a show of hands.

TIMELINES. Participants understand that their work needs to be presented to the Advisory Council by October 30, 2018. They will do their best to meet the deadlines for giving feedback and other participation.

RESPECTFUL COMMUNICATION. Participants recognize that divergent ideas ensure robust recommendations and agree to listen respectfully to all opinions. The group may, if they choose, develop other meeting guidelines to facilitate communication.

NATURE OF RECOMMENDATONS. Recommendations will focus on maximizing the benefits and preparing MN for the adoption of automated and connected vehicles. Note that the recommendations are expected to be general rather than specific wording for state law, rules and policies.

DECISIONS/CONSENSUS. Recommendations from this group may be unanimous. If there is general consensus for a recommendation, meaning everyone is willing to support it, then it will be so noted for the Advisory Committee. If there is not a consensus, a summary of the rationales for different perspectives will be provided to the Advisory Council.

OPEN MEETINGS. Meetings will be open to all. The subcommittee meetings are public meetings, and people who are not on the subcommittee may attend. Depending on timing and number of participants, the facilitator may provide opportunity for members of the pubic to address the subcommittee in consultation with the co-liaisons.

PARKING LOT. Items raised for discussion which are not on the agenda may be listed for discussion or resolution at another time.

RECORD. The facilitator will keep a record of meeting attendees and meeting notes as outlined above. Comments from individual members will generally not be attributed and verbatim record of the meeting will not be prepared.

Outcomes

- Clear, consensus-based or rationales for divergences recommendations for the Advisory Council
- Subcommittee members participate in a meaningful way in developing recommendations
- Recommendations consider the for themes of safety, risk, equity and environment
- Recommendations consider immediate needs and longer term planning for CAV

Governor's Advisory Council on Connected and Autonomous Vehicles
Traffic Regulations and Safety Subcommittee

Agenda

September 20, 2018 2:00 – 4:00 PM

MN Safety Council, 474 Concordia Ave., St. Paul

Remote Participation Information:

Please email CAVFacilitators@mediationcentermn.org for remote participation access.

Subcommittee Goal: *To develop recommendations for changes to statutes, rules and policies in the areas of traffic regulation, law enforcement and safety for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory Council subcommittees as needed.*

1. Welcome & Introductions

- Review of Executive Order & Goals
- Review of Agenda & Meeting Process
- Introductions

2. Overview of Connected and Autonomous Vehicles

Kristin White, MnDOT CAV X Office

3. Key CAV Issues for Law Enforcement, Traffic Regulation and Safety

Colonel Matthew Langer, Minnesota State Patrol

4. Discussion

- Review & comments on draft questions (see next page)
- Recommendations for Advisory Council related to each question

5. Next Steps and Closing

DEPARTMENT OF TRANSPORTATION

Traffic Regulations and Safety Questions

- Impact of connected and automated vehicles impact current state statutes?
    - What changes, if any, do you recommend changes in regulations, policy, or practice to account for connected and automated vehicles? (Current needs.)

- What changes in regulations, policy, and practice do you recommend to safely foster the testing that is already occurring on public roads? (Current needs.)

- If truck platooning were to become legal in Minnesota, what regulations, training and permitting practices do you recommend to aid law enforcement?

- What are the traffic regulations, policy, and practice areas which may need to change to assist law enforcement if an automated vehicle is driven by technology or remote operators (no human driver in the vehicle, only passengers)? (Future needs.)

- Do you have recommended policy changes related to CAV for crash reporting and crash investigation processes?

- As vehicles communicate with other vehicles, or communicate with infrastructure such as signal systems, does this present any challenges to law enforcement? If so, what are the challenges, and are there mitigate factors?

- As increase use of shared vehicles increases, and the potential that these vehicles could be automated in the future, are there regulatory changes that we should be considering?

- Records and Retention Policy Recommendations:

    - State collection of data after collisions for reporting
    - What the state does with collision data or other data from automated vehicles
    - Storage of automated vehicle data and access for law enforcement

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Traffic Regulations and Safety

DEPARTMENT OF TRANSPORTATION

September 20 ,2018

Welcome and Introductions

DEPARTMENT OF TRANSPORTATION

Subcommittee Goals

Subcommittee Goal

To develop recommendations for changes to statutes, rules and policies in the areas of traffic regulation, law enforcement and safety for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory Council subcommittees as needed.

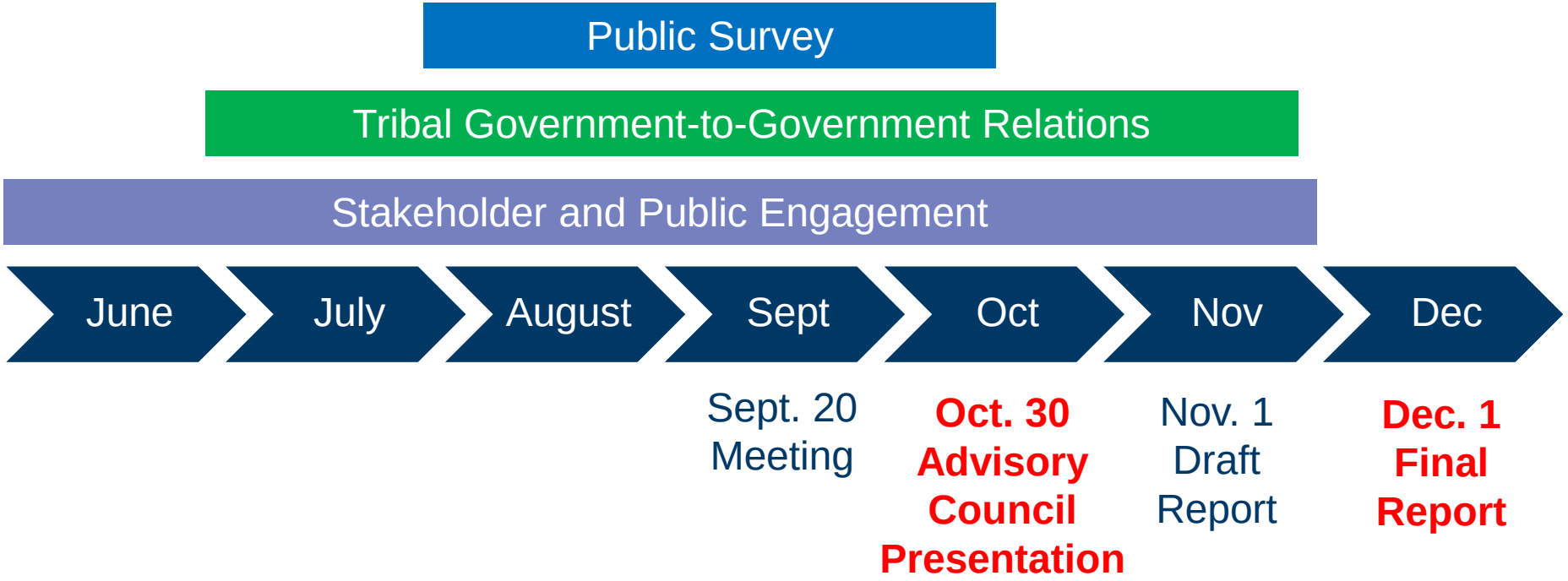
Subcommittee Process

- Participation
  - Meeting materials available on **MnDOT website**
  - Meeting updates at MnDOT CAV-X website
  - Participate in a **meaningful way**
- Discussion
  - Consider the themes of **safety, risk, equity and environment**
  - Consider immediate, **short-term outcomes**
- Recommendation
  - Clear, **consensus-based** recommendations (or reasons for differences)
  - Present recommendations to Advisory Council **October 30th**

Subcommittee Charter

- Meetings **open to the public**
- **Respectful** discussion, opportunities to be heard and **listen**
- May submit written comments on **comment cards**
- Notes taken on **consensus** or **summary** of discussion
- Meeting **notes approved by liaisons** and sent to subcommittee members for additional comments
- Meeting evaluation emailed after meeting

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Sept. 20 Meeting
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV Goals

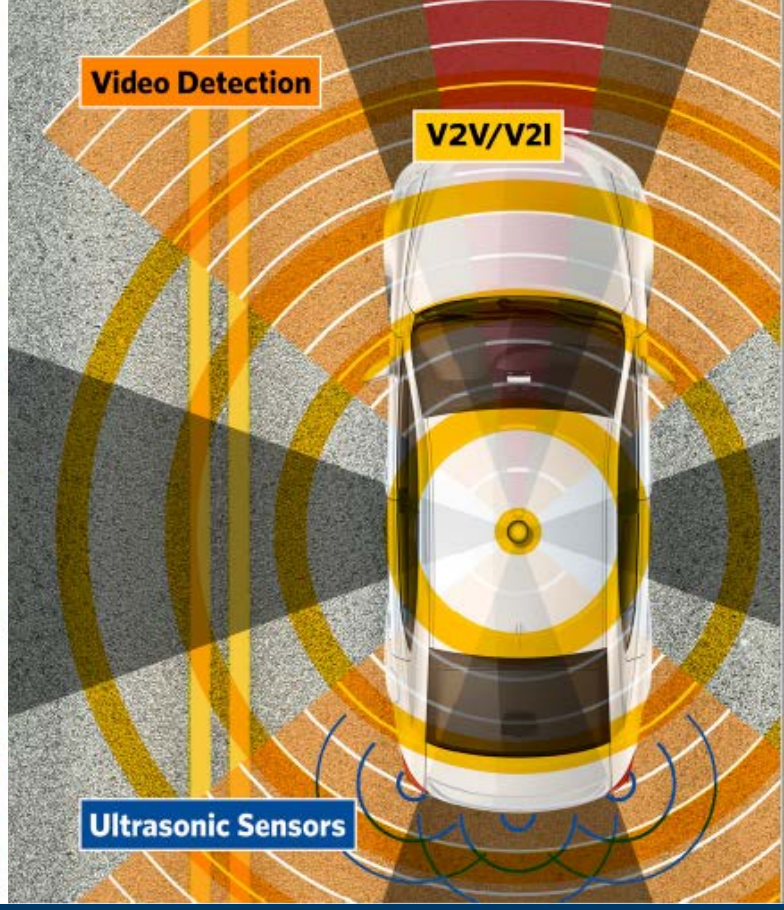
Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

Public Feedback Opportunities

Interagency Team

- Policy position papers
- Branding
- Testing & Deployment
- Partnerships



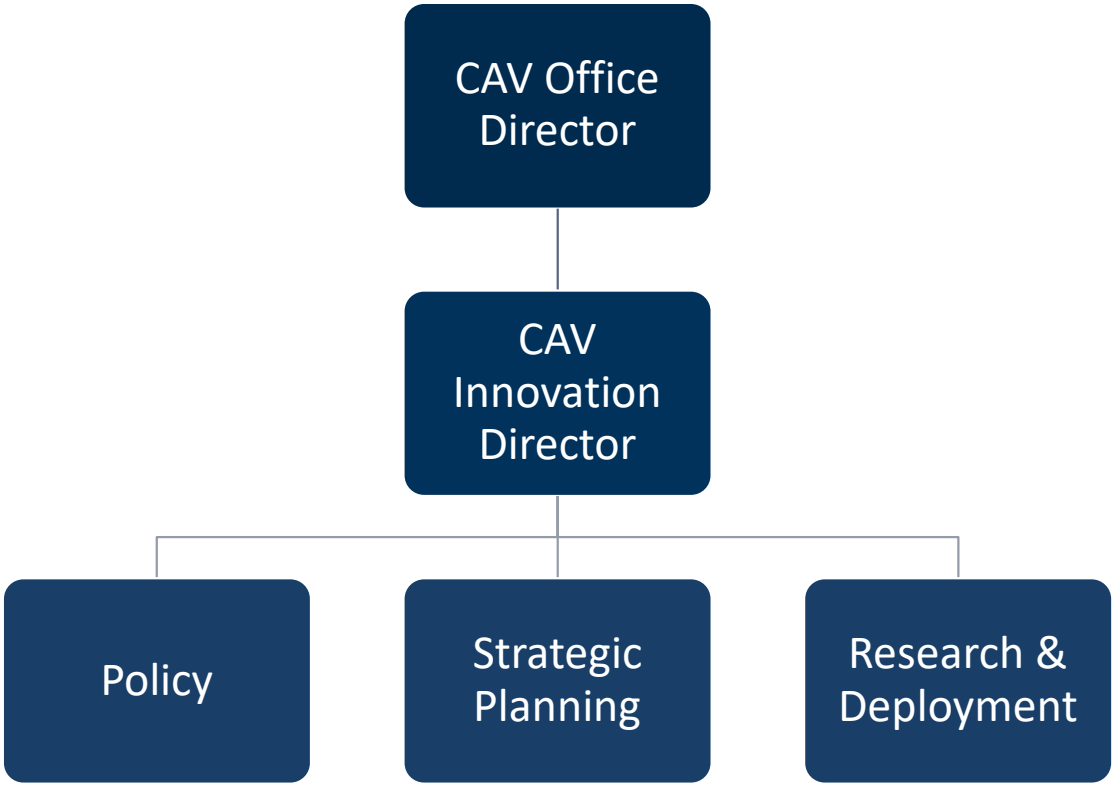
Overview of Connected & Automated Vehicles

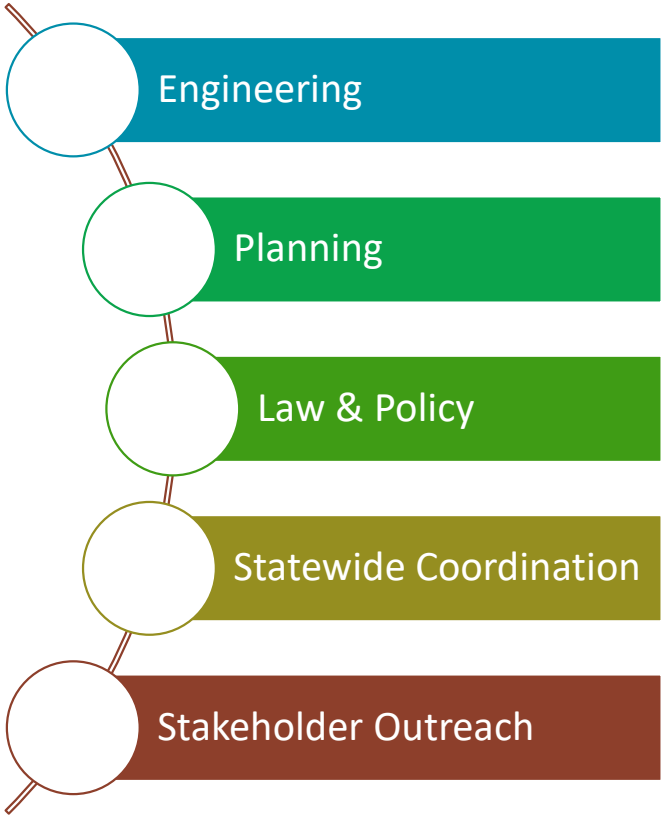
DEPARTMENT OF TRANSPORTATION

DEPARTMENT OF TRANSPORTATION

Who We Are

MnDOT CAV-X Office





DEPARTMENT OF TRANSPORTATION

Why We're Here

Automated Vehicles

Uses for Automation

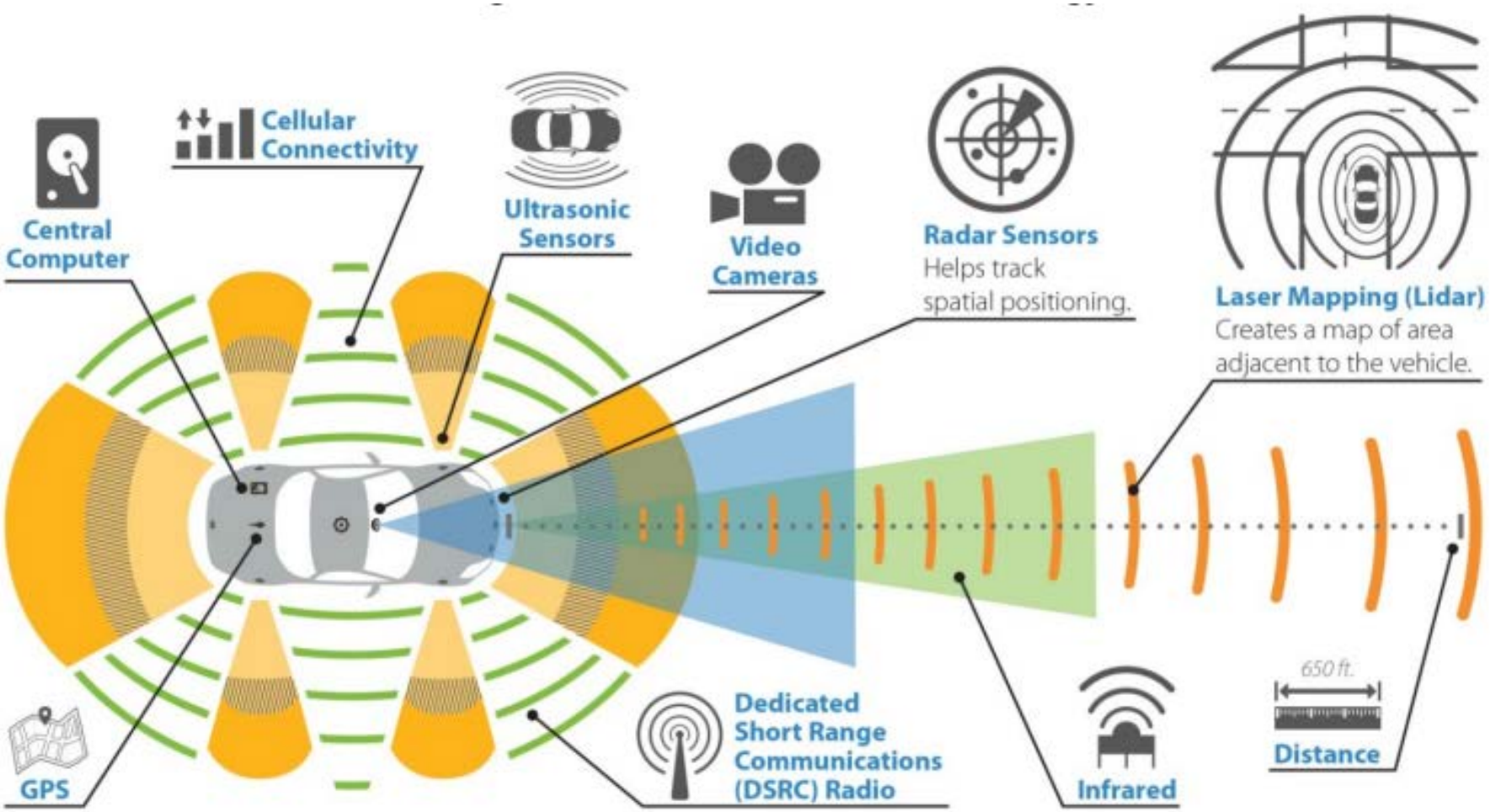
Types of **Automated Vehicles**

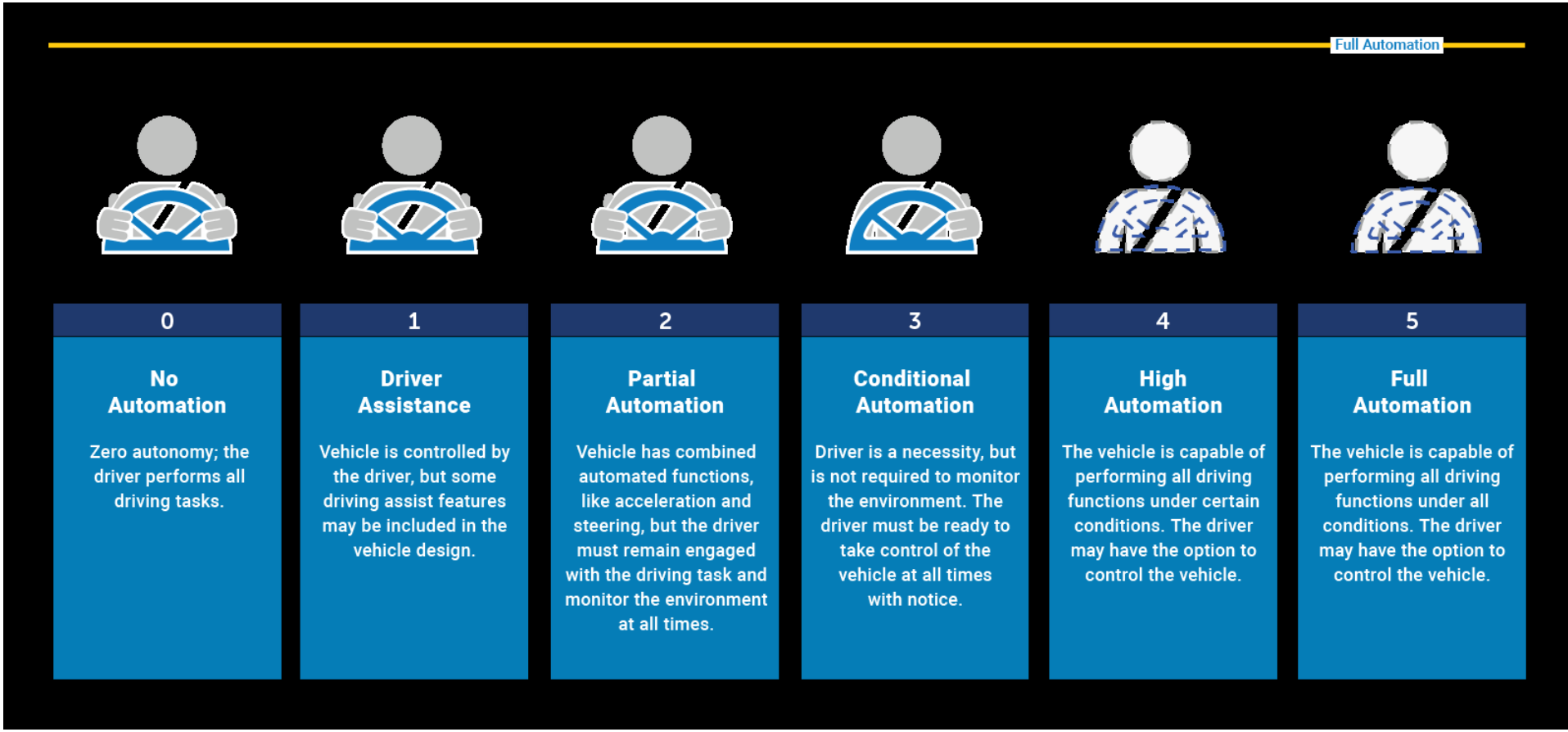
Passenger

Commercial

Transit

How does it work?





Society of Automotive Engineers (SAE) Levels of Automation

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

Connected Vehicles

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

Electric Vehicles

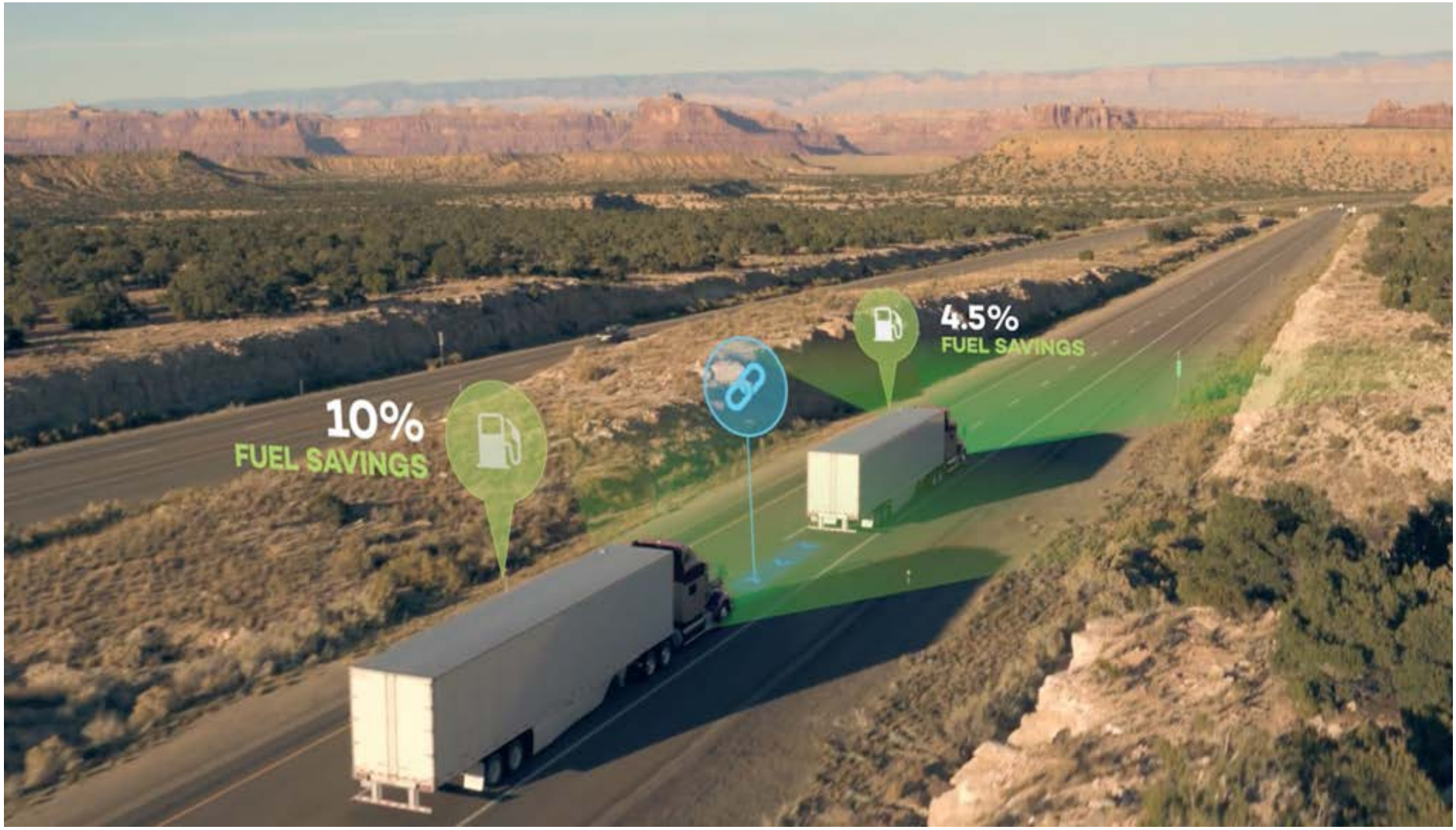
Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

Shared Mobility

Shared use of a vehicle, bicycle, or other transportation mode on an **as-needed basis**

1 account to access, plan, and pay for private and public transportation options

Truck Platooning



Traffic Regulation and Safety Impacts

Discussion

High Priority Topics

- Topics for recommendations.
  - What are important topics for your liaison to present to the Advisory Council?
  - These topics will form the basis of today's discussion and draft recommendations.

Small Group Breakouts

Breakout Session Directions

- Designate 1 recorder
- Designate 1 person to report-out
- Engage with participants in your group & ask questions
- Write thoughts on large poster or individual comments on post-it notes & add to poster

Breakout Session Questions

- What themes and recommendations do you want the Council to share with the Governor & Legislature?

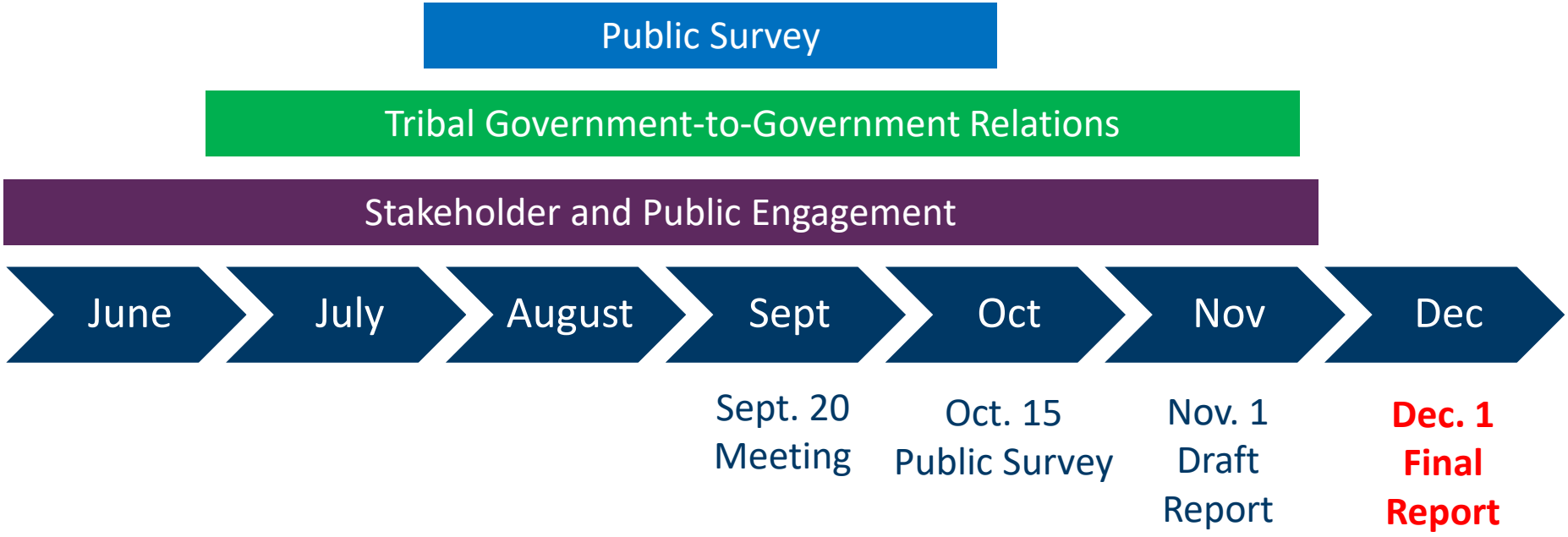
- What policy areas or themes do you want addressed in the 2019 Legislative session?

Next Steps & Closing

Next Steps

- Comments and feedback via comment cards or CAVfacilitators@mediationcentermn.org
- Participants review meeting minutes
- Post-meeting online survey
- Public CAV survey on MnDOT CAV-X website
- Next meeting if necessary
- October 30th: Present to Advisory Council

Key Dates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DEPARTMENT OF TRANSPORTATION

Thank you

Colonel Matthew Langer

Mn Department of Pubic Safety

Subcommittee Liaison

Governor's Advisory Council on Connected and Automated Vehicles
Traffic Regulation and Safety Subcommittee

Meeting Notes

Meeting Date: September 20, 2018 2 P.M.

Kristin White welcomed the group and provided information about CAV and CAV-X.

Department of Public Safety Comments

- We wrestle with vendor requests as they come up. Let's be more proactive.
- Nobody knows about crashes in MN because the data isn't reported
- If we are ever going to get to zero deaths, this will be a big part of it

Initial Comments (Full Group Discussion)

- Good group to get together to address coming issues. Need to pose good questions, as it is coming
- Not one topic, a couple of different buckets depending on automation level (low level already exits – and does not require any different license endorsements as an example
- Living document is what could come out of this process – change with advancement of automation level
- Need another conversation – 'our generation' focused on ownership. Include younger – well – bird scooters, non-drivers.
- Who is responsible for training on technology?
- Regulate but do not kill industry interest in serving our citizens (Embrace w/o letting it run wild)
- Uniformity and enforceability across various jurisdictions
- Recognize other state's existing or proposed rules / licensed
- Who owns the vehicle (vary by urban rural differences)

Recommendations approved by all participating:

1. MN needs to define what, if any, safety data about CAV should be captured, for example crash data or vehicle miles traveled.
2. Recommendation to focus efforts on training users of technology and public education, communicate and educate about CAV.

3. The subcommittee supports the idea of allowing testing, appropriate definitions
4. CAV technology can help the public: encourage development which supports drivers to stay mobile safely (e.g., elderly) and assist drivers in areas where driving is difficult (e.g., work zones, road conditions)
5. MN should develop a work group to evaluate MN statutes and rules (e.g., platooning and following distance
6. Something about the importance of uniformity and clear definitions
7. CAV on board systems should be routed for safety – for example, to a regulated RR crossing

Details from Small Group Meetings

Small Group Meetings Broke into 4 Groups, 3 in person and one online.

Group Report Detail

- Crash data capture data, CAV information
    - Some institutions no longer documenting property only crashes – so how to encourage collection
    - MnCrash could be programmed to show automation of a vehicle
    - And how to train peace officers to populate data set
    - Also – VMT Vehicle miles travelled – need to begin to capture. How do we get odometer readings?
- General how to train users know how to use the technology (car set training as an example)
- Also, risk – level of trust going down – how to use our knowledge to help people process information
    - Engage with, survey the public to gauge understanding of CAV
- What systems were operating in the vehicle before crash (one step further?) Is that info collectable by peace officers – currently no national leadership on automatic data collection
    - Peace officers having a plug into car to capture data on site of crash (ask car in addition to asking person on sight – human recollection (human) fresh at the time – that is what we do
    - General – different ideas about collecting crash data – but idea of collecting data on crash is key
    - Issue of police having to get new cables for new model cars every year
    - What if any data does the state want to collect?
- Training and education, need for outreach, technology clinics.
- Disadvantage drivers - elderly (increasing older drivers) truckers reduced stopping times, work zones traffic signs (mass transit, bicyclists and pedestrians)

    - How can machine vision assist human vision
    - Disadvantaged means something different in this situation (truckers and aging is an amazingly overlapping group)
    - Further implications
    - What we meant is to support drivers to stay mobile safely and assist drivers in areas where difficult driving.
- This group also discussed licensing and training, similar to group one.
- Recommended a work group to evaluate MN statutes and rules (e.g., platooning and following distances)
- Testing in closed systems. Promote seasonal testing.
- Platooning testing. Need education. Need definitions, e.g., following distance
    - Testing side closed systems – seasonal testing midcontinent weather testing – closed area
    - Platooning issues – must understand systems, seasonality, manufacturing, insurance laibility – how can one figure platooning behavior vs people just following too close – means of communication
    - Specific recommendations – following distance needs to be defined also defined testing

Notes from online discussions

- From a railroad perspective we are most concerned about how CAVs will operate at rail crossings.
- It's exciting the thing about the progression and how technology can be used to improve safety on the roads but at the same point it hard to understand how that will integrate with general traffic and unpredictable situations
- From League of Cities: On local streets, we will want to make sure pedestrians are safe. We also should consider what kind of information/training law enforcement needs to adequately enforce traffic laws.
- One thing that needs to be focused on is outreach. I'm sure a lot of people will be concerned with the thought of driverless cars driving around at freeway speeds right from the get go. Myself included I'm didn't fully understand (and probably still don't) the fully automated system. I attended the webinar a week or two ago which stated the projects are focusing on vehicles traveling less than 20 mph
- Energy delivery from the electrical grid to the CAV/EV batteries must be widely available and accessible by mobile devices. For MnDOT that means laws and regulation for our right of way may have to be modified to provide the flexibility to be used for batter power delivery.

- A question I have is how does this work for licensing/testing. As we discussed there is already technology out there like parking assist. DL testing still requires a person to parallel park. Can the technology be used for that?
- I think a good start would be to create some definitions that will not inhibit opportunities and technological advances, but that will serve as a baseline to work with. Such as CA S 369, "'Autonomous technology' means technology that has the capability to drive a vehicle without the active physical control or monitoring by a human operator.
- Redundant systems to back-up the continuous flow of data.
- For policy recommendations BNSF would recommend that CAV on-board systems route vehicles to grade separated crossings within larger cities where available, and in rural areas that crossings be consolidated and CAVS be routed to designated and controlled crossings. The technology will certainly require a robust digital mapping system for multitudes of reasons
- Cyber security and the data exchange between separate systems. Will there be a standard language, is there restrictions of on types of data that can be shared?
- Information about CAV/AV testing timelines and testing objectives.
- Law enforcement to have clear direction on how to handle CAVs, so in the case of an emergency/malfunction, they know how to handle the situation safely. That might be something that requires manufacturers to provide training sessions on how to do a manual override, etc. In theory these vehicles should be able to operate better than human drivers who are prone to errors, but being somewhat of a skeptic of relying too much on technology, I always believe in a backup plan! Educating consumers would be along the same lines, too: how to handle the CAV in the event of a malfunction, etc.
- As we move to driverless vehicle or truly automated do we need to consider having a Monitor at least for a public transit provider?
- On the adaptability side of things, all vehicles used by a transportation provider to transport wheelchair occupants need to be equipped with wheelchair securement systems and occupant restraints
- I would echo some of the comment made in the room that rules should be tailored to the difference levels of automation. One size doesn't fit all when you think about a Level 1 driver-assistive system versus a Level 4+ autonomous vehicle
- not all occupants can apply the restraints themselves
- when I mentioned monitors it was more along the lines of passenger safety
- Defining platooning is another great start. I have seen legislation from other states that define a platoon, that adjust safe following distances with exemptions for platoons.

- I agree outreach is key. I am getting a lot of questions from city officials about what they should be doing to plan for CAV. Unless they are very determined, it is difficult to find useful information.

Governor's Advisory Council on Connected and Automated Vehicles

Traffic Regulations & Subcommittee

Col. Matt Langer, Liaison

DEPARTMENT OF TRANSPORTATION

Subcommittee Goal

To develop recommendations for changes to statutes, rules and policies in the areas of traffic regulation, law enforcement and safety for the Governor's Advisory Council on Connected and Automated Vehicles, and assist other Advisory Council subcommittees as needed.

General Themes

- Safety
- Crash reporting
- Education
- Insurance
- Data
- Testing
- Public education and demonstrations
- Mobility
- Vulnerable road users/situations
- Licensing/driver training
- Platooning
- Continue work groups & conversations

Considerations

- **Distinguish between Levels 3-5**. Regulations will depend on level of vehicle. Need to distinguish between Level 3, 4, and 5.
- **Technology advancements**. These recommendations will change with advancement of automation.
- **Generational differences**. Need future conversations on how differently generations understand ownership and how they may – or may not – adopt CAV.
- **Training**. Who is responsible for training on technology?
- **Balance regulation with innovation**. The State should regulate and embrace CAV without impeding industry interest in serving our citizens.
- **Uniformity**. Support uniformity and enforceability across various jurisdictions.
- **Reciprocity**. Recognize other state's existing or proposed rules, licenses.
- **Ownership** questions. Who "owns" a CAV? Will this vary by urban or rural differences?

Recommendation 1

Data: Minnesota needs to determine what, if any, data should be collected specific to CAV.

Recommendation 2

Training and Education: Minnesota should study, review, and revise whether any training for CAV is required.

Recommendation 3

Minnesota needs public education to build public trust on CAV.

Recommendation 4

CAV technology is going to be helpful for all drivers, and especially vulnerable road users.

Recommendation 5

Establish a workgroup to research all laws and regulations related to these issues to determine what, if anything, needs to change.

DEPARTMENT OF TRANSPORTATION

Thank you

Colonel Matt Langer

Minnesota State Patrol

Governor's Advisory Council on Connected & Automated Vehicles
Subcommittee on Economic Development and Employment

Agenda

Tuesday, August 21, 2018 10:00 AM - Noon at MnDOT TEC Center
MnDOT Central Office Building, 395 John Ireland Boulevard, St. Paul, MN 55155.

Remote Participation Information: Click the following link to join online for free from any device:
https://meet.lync.com/mn365/kristin.white/2H9VN3Z5

Subcommittee Goal: *To formulate and recommend to the Advisory Council recommended changes to statutes, rules and policies related to economic development, labor and business interests and to address opportunities, impacts and challenges of CAV technology.*

1. Welcome & Introductions

- Review of Executive Order & Goals
- Review of Agenda & Meeting Process
- Introductions

2. Overview of Connected and Autonomous Vehicles ("CAV")

(Kristin White, MnDOT CAV X Office)

3. Key CAV Issues for Economic Development and Employment

(Kevin McKinnon, DEED and Edward Reynoso, Teamsters)

4. Discussion

- Draft Questions – Comments and Additions (see next page)
- Process for Discussion

5. Next Steps and Closing

Note: Discussion will continue at the next meeting on September 18, 2018 from 10:00 AM – noon at MnDOT Central Office.

DEPARTMENT OF TRANSPORTATION

Economic Development and Employment Questions

- What are potential economic development and innovation opportunities from CAV?
    - How might CAV impact supply chain and network footprints of industry?
    - How might CAV impact current industry, or create new industries?
    - What are your thoughts on Minnesota being an innovation center for CAV?

- What changes, if any, do you recommend Minnesota change or adopt in regulations, policy, or practice to achieve the potential benefits of CAV?

- What employment considerations or concerns do you have about CAV?
    - What are your views about how CAV impacts long haul trucking, taxi services, bus driving, and other driver-related careers?
    - What important employment considerations do you recommend the Advisory Committee consider?
    - What changes, if any, do you recommend Minnesota change or adopt in regulations, policy, or practice to decrease the potential economic and employment challenges of connected and automated vehicles?

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Economic Development, Business Opportunity & Workforce Preparation

DEPARTMENT OF TRANSPORTATION

August 21, 2018

Welcome and Introductions

DEPARTMENT OF TRANSPORTATION

Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV

Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

Interagency Team

- Policy position papers
- Branding
- Testing & Deployment
- Partnerships

Subcommittee Goal

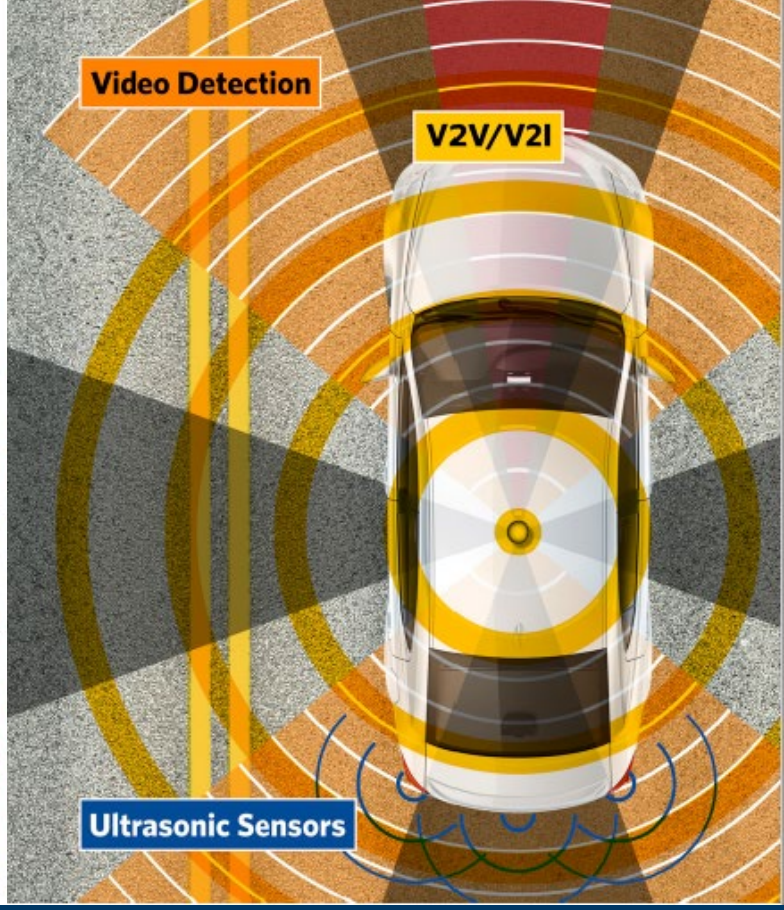
To formulate and recommend to the advisory committee recommended changes to statutes, rules and policies related to economic development, labor and business interests and to address opportunities, impacts and challenges of CAV technology.

Subcommittee Process

- Review agenda
- Agendas, charter and meeting notes on MnDOT website
  - http://www.dot.state.mn.us/automated/publicmeetings.html
- Outcomes
  - Clear, consensus-based or rationales for divergences recommendations for the Advisory Council
  - Subcommittee members participate in a meaningful way in developing recommendations
  - Recommendations consider the for themes of safety, risk, equity and environment
  - Recommendations consider immediate needs and longer term planning for CAV
- Next meeting: Sept. 18 from 8:00 – 10:00 AM at MnDOT Central Office
- Presentation to the Advisory Council on September 25, 2018

Charter Highlights

- Meetings are open to the public
- Join the subcommittee by providing your email address
- Meeting notes will be approved by liaisons and provided to subcommittee for additional comments
- Respectful discussion, opportunities to be heard and to listen
- Consensus or summary
- Comment cards available during the meeting
- Meeting evaluation emailed after meeting



Overview of Connected & Automated Vehicles
MnDOT CAV-X Office

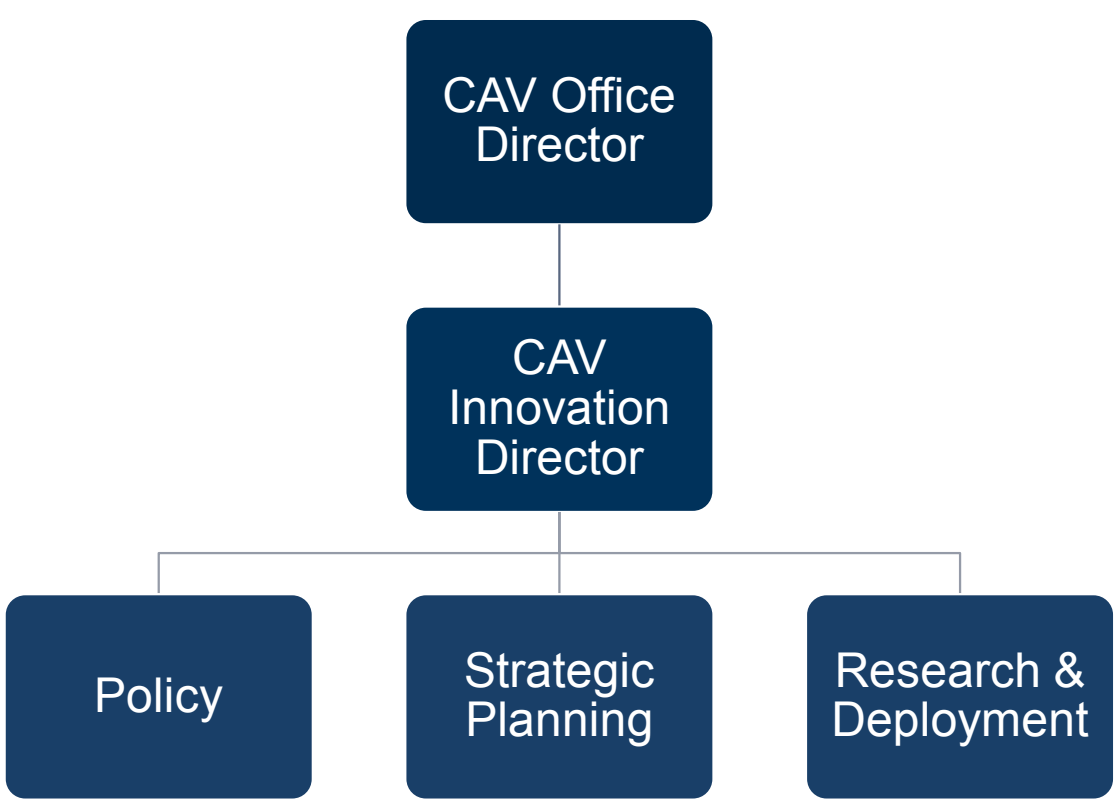
DEPARTMENT OF TRANSPORTATION

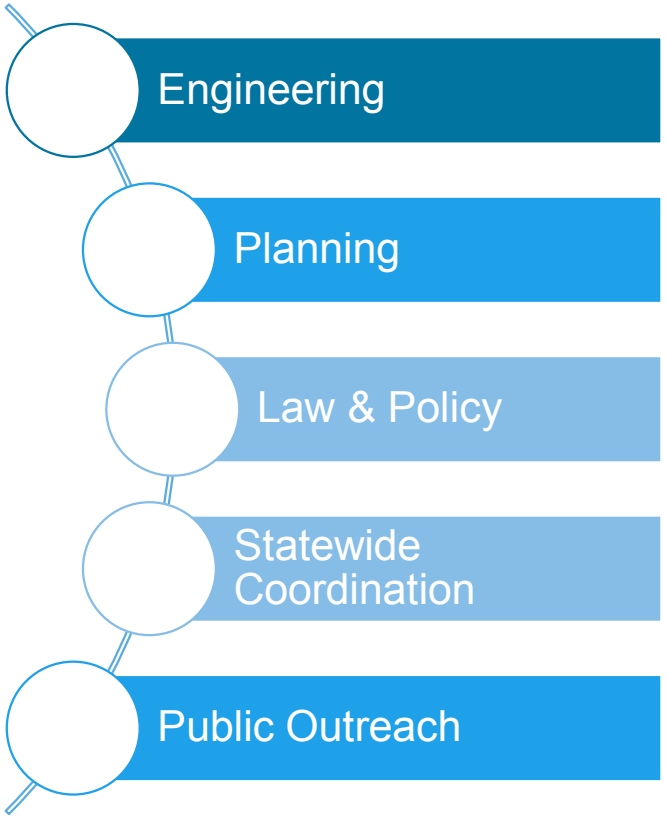
Jay Hietpas, PE, Director
Connected and Automated Vehicles Office

DEPARTMENT OF TRANSPORTATION

Who we are

MnDOT CAV-X Office





DEPARTMENT OF TRANSPORTATION

What we're talking about

Automated Vehicles

Automated vehicles can **take control of** some or all aspects of **driving tasks**.

Uses for Automation

Types of **Automated Vehicles**

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

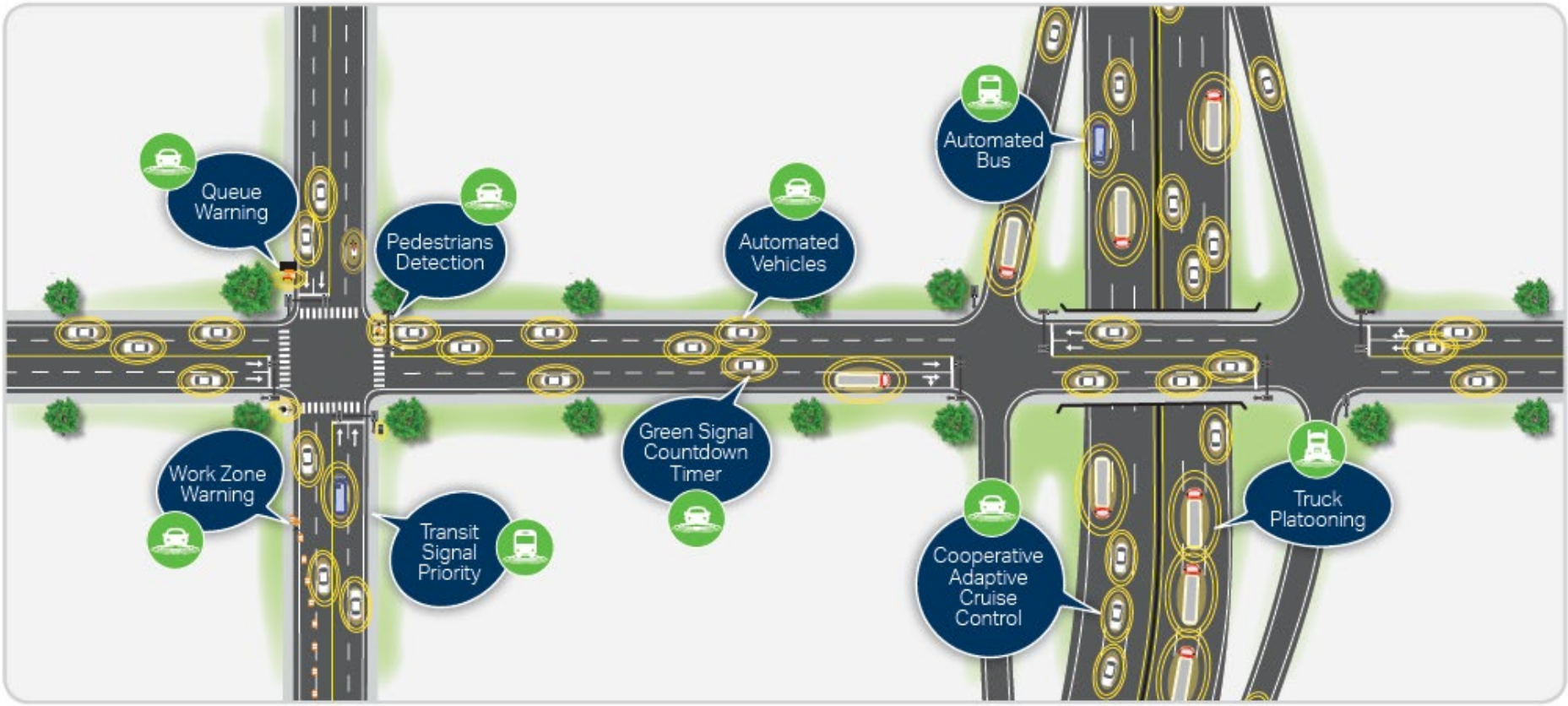
Society of Automotive Engineers (SAE) Levels of Automation

Connected Vehicles

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

Connected Vehicle Benefits

Types of Connected and Automated **Vehicle Applications**



Connected & Automated Vehicles

Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors

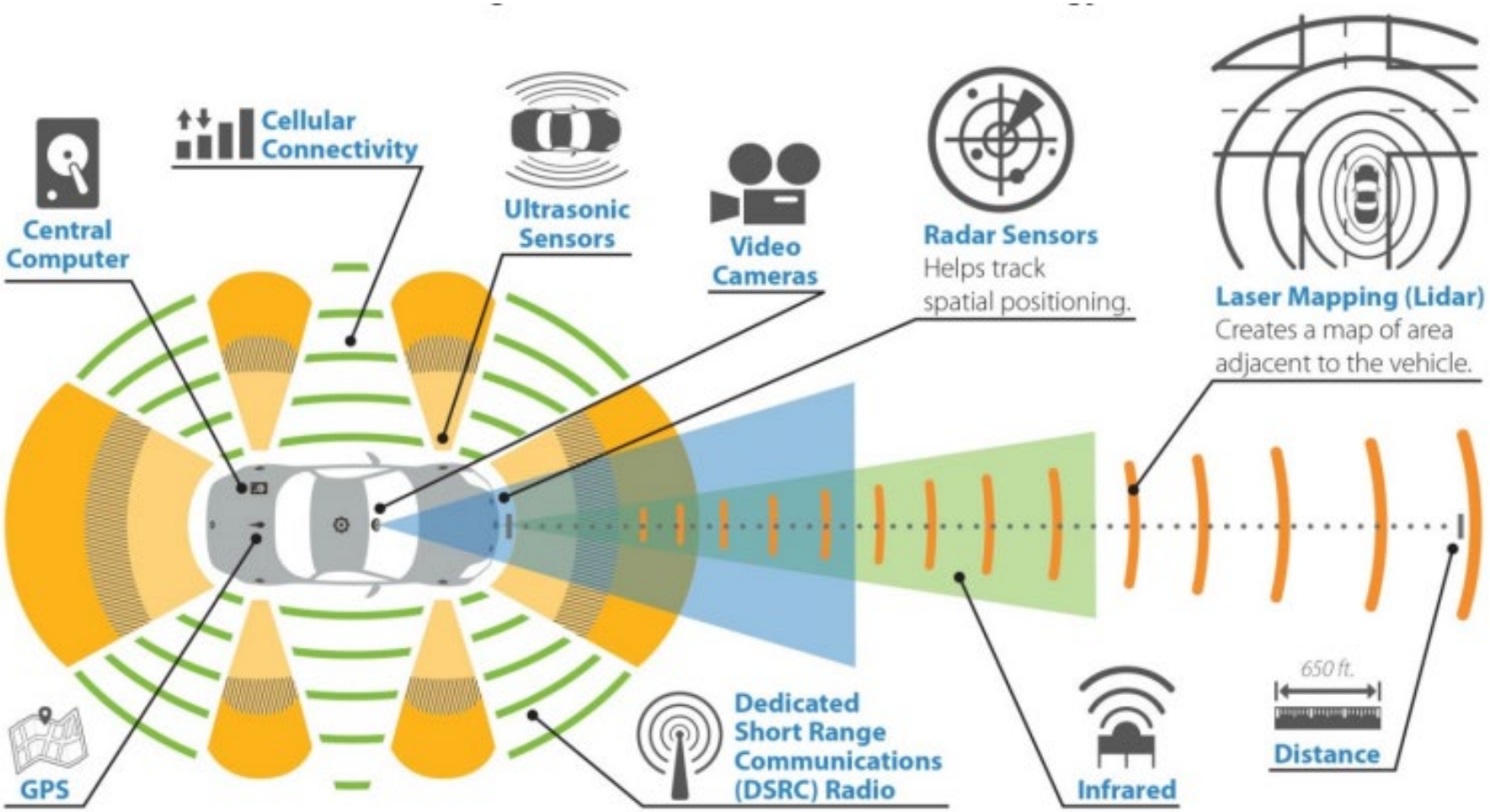
Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities

Connected Vehicle

Communicates with nearby vehicles and infrastructure

How does it work?



Electric Vehicles

Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

Shared Mobility

Shared use of a vehicle, bicycle, or other transportation mode on an **as-needed basis**

1 account to access, plan, and pay for private and public transportation options

Alternative Automation

Truck Platooning

Automated Delivery

CAV Technology Already Available

Lane Assist & Departure Warnings

Self-Parking

Signal Countdowns

Thank you

DEPARTMENT OF TRANSPORTATION

Kristin White, J.D.
CAV Innovation Director
kristin.white@state.mn.us

Key CAV Issues for Economic Development, Business Opportunity & Workforce Preparation

Discussion

Key Questions

- What are potential economic development and innovation opportunities from CAV?
  - How might CAV impact supply chain and network footprints of industry?
  - How might CAV impact current industry, or create new industries?
  - What are your thoughts on Minnesota being an innovation center for CAV?
- What changes, if any, do you recommend Minnesota change or adopt in regulations, policy, or practice to achieve the potential benefits of CAV?
- What employment considerations or concerns do you have about CAV?
  - What are your views about how CAV impacts long haul trucking, taxi services, bus driving, and other driver-related careers?
  - What important employment considerations do you recommend the Advisory Committee consider?
  - What changes, if any, do you recommend Minnesota change or adopt in regulations, policy, or practice to decrease the potential economic and employment challenges of connected and automated vehicles?

Other Questions

- Did we address safety, risk, equity and environment?
- Other questions and topics?

Next Steps & Closing

DEPARTMENT OF TRANSPORTATION

Thank you

Kevin McKinnon, DEED

Co-Liaison

Edward Reynoso, Teamsters

Co-Liaison

Governor's Advisory Council on Connected and Automated Vehicles Economic Development, Business Opportunities and Workforce Preparation Subcommittee

Meeting Notes

Meeting Date: August 21, 2018 10:00 AM-12:00 PM

General Meeting Notes

Summary of Comments from Liaisons

Economic Development

- Freight and product delivery
- Technology changes
- How do we compete in this space with what other states are doing? This is a crowded area. (Purdue Discover Park; Smart Cities; MI American Center for Mobility)
- Ideas: Moving people, moving freight, production of vehicles, product and supply chain, new businesses, workforce impacts and training, becoming and information center, testing and deployment. What could be MN's "specialization area?

Workforce

- Public engagement is the most critical component. What are the long-term impacts to industry?
- Impact of labor and workers. The other states' CAV legislation doesn't include labor input
- Need to retrain and rebrand trucking industry
- Will have drivers for quite a while
- Long haul trucking, taxi service and other careers

Discussion of Key Questions (CAV-X Notes)

- Need to consider both federal and state legislation
- Need research and development
- Cost: building a supply chain or investment, where does the cost component come into this discussion? Return on investment of autonomous vehicles is an unknown, we will have to make some assumptions.

- CAV will mean dramatic changes from our current transportation needs, how do we develop revenue system which adapts to these changes, adequately funds our transportation needs and allows for emerging industry to grow?
- Impact to small businesses; “ma and pop” truckers
- Employment: interstate freight and what is authorized to haul interstate; different if driving a passenger car. Federal question … what role does the Advisory Council have?
- Distinctions between private/commercial and public use
- Job training for younger people
- Training: technical for AV; could attract younger people into commercial driving
- Driver training standards, no commercial driver license training requirement
- MN is not creating MN specific standards that are barriers. Consider reciprocity/standards.
- Focus on automated and driver-assist, not driverless. The words we use are important
- Watch for emerging tech jobs, developing engineering and technical talent in MN?

Themes

- Policy considerations
- Impacted industries and workers
- Education and training considerations for the workforce
- Informing and educating the public and legislators
- Financial considerations: raising capital, investment opportunities and use of tax-payor dollars
- Interstate travel and movement
- Opportunities and areas strengths
- Cross-disciplinary expertise
- Equity, fairness, and impartiality regarding involvement, opportunities and gains

Economic Development

Policy

- Utilizing expertise and strengths in MN
- Developing new industries and strengths in MN
- Gap analysis regarding expertise
- Cross-disciplinary communication and involvement
- Technology: moving quickly
- “Unlock” intellectual property
- Public versus private – is there a current focus?
- Interstate travel: potential barriers
- Federal regulations/recommendations versus state regulations/recommendations

Impacted Industry Considerations

- Technology
- Hardware/software
- Automation
- Intellectual property
- Engineering
- Transportation: public and private
- Delivery services
- Tow trucks
- Small business (mom & pop shops, contractors), economic impact on
- Farming equipment
- Railroad

Education and Training

- Developing engineering and technical talent for IT and science industries
- Workforce shortages
- Apprenticeship programs for different sectors
- Bringing the training curriculum to MN for manufacturing and sales
- Training technicians for new technology

Financial considerations

- Investors
- Raising capital
- Startup companies
- Return on investment (ROI)
- Cost of development and implementation
- Including small business in the development and implementation of CAV

Employment

Policy

- Possibilities and probabilities for which workers need to prepare
- Accounting for workers' input during the policy consideration and implementation phases
- Engaging public and private sectors
- Leverage across platforms: research & development, cross-pollenization
- Connectivity: considering MN as a whole, including Greater MN
- Involving contractors and small businesses
- Helping existing companies
- Liability

Impacted Industries

- Drivers
- Transportation
- Uber, Lyft (not present)
- Deliveries
- Tow trucks
- Utility companies
- Oil

Education and Training Considerations

- Training for emerging industries
- Helping existing companies

Financial & Capital Considerations

- Raising capital and investors
- Cost of development and implementation
- Use of tax payer dollars
- Cost of training development

Facilitators' Notes

Economic Development

Scope of CAV development is a big question: public vs. private use, state vs. federal regulations and recommendations. Potential for technology industries, especially in manufacturing, computer software/hardware, automation, and training. Broad policy concerns regarding the need to move quickly with technology and developing the communication lines to create truly cross-disciplinary gains. Focus on areas of expertise in MN, especially IT, science and large businesses and institutions (Xcel, Great Rivers, University of Minnesota, 3M); concern over the possibility for intellectual property and new technologies to become "locked up" by certain businesses and institutions, and the fear of slowing down development due to IP ownership.

Gap analysis needed to understand MN strengths and weaknesses regarding expertise and workforce. Partnerships between large corporations, small companies, start-ups, investors, "mom & pop" shops and independent contractors are necessary – connectivity and communication necessary. Big questions regarding the impact on workers, especially in the transportation industry (goods and people) – what will the training requirements be? Who will develop the training requirements? What will be the requirements for drivers? What about licensing requirements? How will travelers be affected? How will this effect interstate travel for commerce and travel?

Investment and raising capital are also unclear as to whether there will be investment opportunities, the use of tax payer dollars, the way in which capital will be raised. What are the overall costs for development and implementation? What will be the scope of development and implementation in the near future and over time?

The group would like to discuss the way in which CAV will affect infrastructure and be thoughtful in the planning stages. Thoughtful investment is also important, especially regarding access and equity. Training will be a serious consideration for all sectors: scientists, designers, engineers, manufacturers, developers, drivers, and so on. Bringing a training curriculum to MN for CAV could offer economic development opportunities as CAV become more widely known and used.

Employment

Other states looking into development of CAV haven't considered workers and laborers input. Importance of the engagement of the public, expert opinions and the subcommittee highlighted. Subcommittee experts, interests? What are the responsibilities and liabilities of driver? Overlap between employment and economic development, including financial considerations, training considerations, cross-disciplinary considerations need for innovation and innovative thinking, and need for those with certain areas of expertise, need to develop certain areas of expertise. Reciprocity for drivers and technology is a concern if MN is to be at the forefront of CAV development; avoid creating barriers. CAV's impact on the workforce and potential workforce shortages were discussed. Partnerships, especially between the public (utility companies) and private sectors will be necessary. Shortages: training, workers and emerging industries. Leverage across platforms: more effectively engaging more parties in this process; connectivity; equity; diversification. Use of tax payer dollars referenced at least 3 times regarding the way in which tax dollars will be used. Information that goes out to the public regarding CAV development should be thoughtful, carefully crafted: "words are very impactful."

Tentative & Final Recommendations

Next Steps

The next subcommittee meeting is:

Tuesday, September 18
10:00 a.m. - 12:00 p.m.
MnDOT Central Office TEC Center
395 John Ireland Boulevard, St. Paul, MN 55155

Governor's Advisory Council on Connected & Automated Vehicles Subcommittee on Economic Development, Business Opportunities and Workforce Preparation

Agenda

Tuesday, September 18, 2018 10:00 AM - Noon at MnDOT TEC Center
MnDOT Central Office Building, 395 John Ireland Boulevard, St Paul, MN 55155

Remote Participation Information: Click the following link to join online for free from any device:
https://meet.lync.com/mn365/kristin.white/2H9VN3Z5

Subcommittee Goal: *To formulate and recommend to the Advisory Council recommended changes to statutes, rules and policies related to economic development, labor and business interests and to address opportunities, impacts and challenges of CAV technology.*

1. Welcome & Introduction

2. Summary of Last Meeting's Discussion Topics

(Subcommittee Liaisons: Kevin McKinnon and Edward Reynoso)

- Economic Development
  - Economic development policy: utilizing expertise and strengths in Minnesota
  - Informing and educating businesses, the public and legislators
  - Financial considerations: raising capital, investment opportunities and use of tax payor dollars
- Employment Opportunities
  - Impacted industries and workers
  - Education and training considerations for the workforce
  - Gap analysis regarding what areas and cross-disciplinary expertise provide opportunities or present challenges to business, higher education, R & D and the workforce.

3. Discussion: Other Topics the Subcommittee Would Like to Address

4. Recommendations to the Advisory Council

- Is the subcommittee ready to present to the Governor's Advisory Council on September 25?
- Summarize recommendations or schedule another meeting, other next steps

5. Next Steps and Closing

To request this document in an alternative format, please contact the Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

Economic Development, Business Opportunities and Workforce Preparation Subcommittee Questions

- What does Minnesota need to do to be a competitive center for CAV?
- How do we create and support ecosystem to foster interest and involvement in the industry in Minnesota?
- What changes are recommended to provide opportunities for existing and new businesses to develop technology and products in Minnesota related to CAV?
- What policy and legislation will be needed to help impacted workforce?
- What education and talent are needed to support development of the CAV industry and how can Minnesota meet those needs?

Governor's Advisory Council on Connected and Automated Vehicles

Economic Development, Business Opportunities and Workforce Preparation Subcommittee
September 18, 2018
10:00 am – 12:00 pm

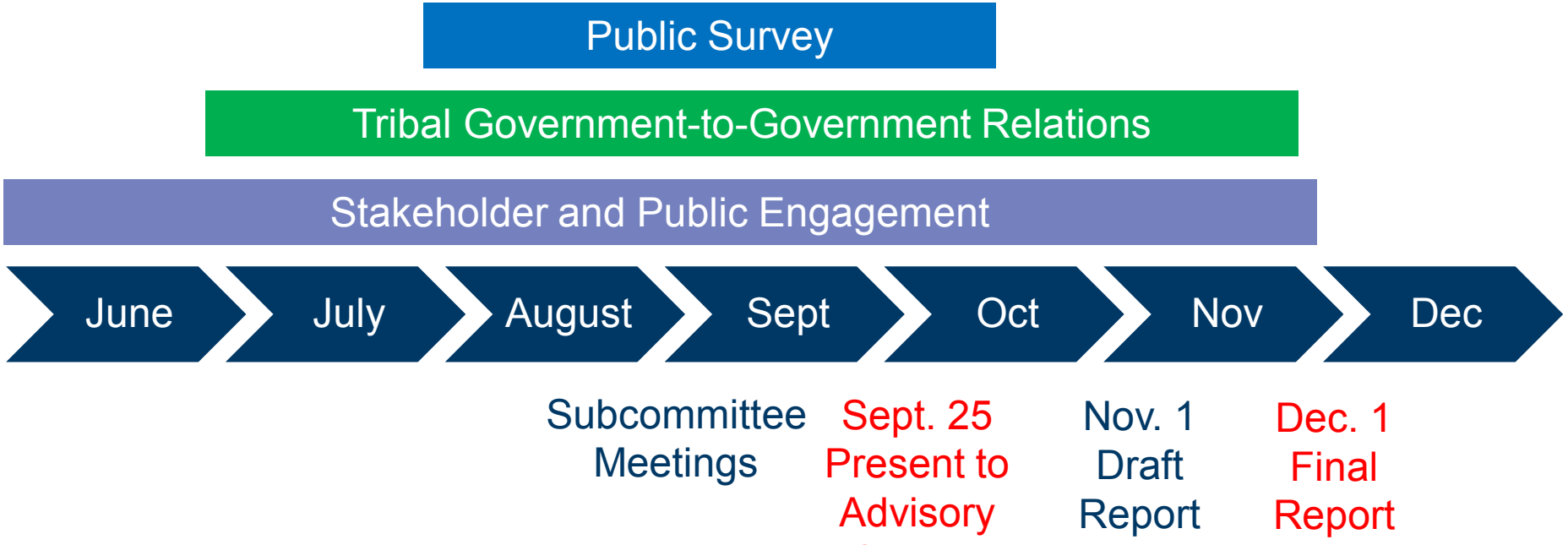
DEPARTMENT OF TRANSPORTATION

Welcome and Introductions

Subcommittee Goal

To formulate and recommend to the advisory committee recommended changes to statutes, rules and policies related to economic development, labor and business interests and to address opportunities, impacts and challenges of CAV technology.

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Subcommittee Meetings
Sept. 25 Present to Advisory Council
Nov. 1 Draft Report
Dec. 1 Final Report

Evaluation Feedback from August 21st

- Most who wanted to were able to attend the meeting (91.7%)
- Most found the information provided at the first meeting helpful
- Additional information requested by participants:
  - Policies from other states
  - Share meeting notes from 8/21/18
- Comments from participants:
  - More time needed to work on recommendation proposals
  - More opportunity to share thoughts with the group

Summary of Last Meeting

Response to Meeting Notes

- Cover as driver assisted rather than driverless – words are impactful

Comments from the Liaisons

Kevin McKinnon, DEED

Edward Reynoso, Teamsters

Review of Meeting Notes
Economic Development

- Develop new industries that utilize the strengths of MN businesses and technology expertise, especially IT, AI, hardware/software and science; conduct gap analysis
- Foster public and private collaborations with institutions, organizations and small business and avoid slowing development by “locking up” IP
- Quickly develop communication lines to create truly cross-disciplinary gains
- Raise capital, and consider investment opportunities and start-up possibilities
- Consider equity, fairness, and impartiality regarding involvement, opportunities and gains – include Greater MN in policy and development decisions
- Consider the cost of CAV development to the tax payer

Areas of Focus

Areas of specialization (public and private)

- Research and development expertise (sensors, AI, etc.)
- Testing/development/deployment (physical location for this activity)
- Education and training of the talent needed to support the industry (existing expertise and future considerations of what will be needed)

Areas of Focus

Facilitating connections for business opportunities/needs

- Business opportunities for existing OEM's in MN in the industry
- Business opportunities for existing providers in the supply chain
- Providing areas of connectivity between OEM's and technology providers

Areas of Focus

Supporting the ecosystem to foster interest and involvement in the industry

- Early stage businesses developing products or services for the industry
- Accessing capital to remain and grow in MN
- Physical (incubators, co-working, accelerators) or virtual support networks

Review of Meeting Notes
Workforce Planning

- Inclusion of, and input from impacted industries and workers is vital
- Involve and collaborate with existing companies, employ MN workers
- Develop recommendations that:
  - don't create barriers for interstate travel/movement,
  - consider state versus federal policy, and
  - consider reciprocity
- Consider reciprocity and standards in recommendations

Review of Meeting Notes
Workforce Planning

- Focus on probabilities for which workers need to prepare
- Develop policy around training, driver requirements and licensing
- Bring the training curriculum for development of new technologies, manufacturing and sales to MN to promote innovation and opportunity
- Train and rebrand the workforce, develop apprenticeship opportunities
- Develop engineering and technology talent in MN for IT, AI and other science and technology industries

Today's Discussion Topics

Review of First Meeting
Themes

- Policy considerations
- Business opportunities, areas of strength and cross-disciplinary expertise – leverage across platforms
- Informing and educating the public and legislators
- Impacted industries and workers
- Education and training considerations for the workforce
- Financial considerations
- Interstate travel and movement
- Equity, fairness, and impartiality regarding involvement, opportunities and gains

Discussion

Small Group Breakouts

Small Group Discussion

- Designate one recorder
- Designate one person to report out
- Engage with participants in your group and ask questions
- Record *all* proposed recommendations on your note pads

Small Group Discussion

- What themes and recommendations do you want the council to share with the Governor and Legislature?
- What policy recommendations do want addressed in the 2019 legislative session?
- Decide which recommendations have consensus in your group and record top 2-3 on flip chart

Next Steps & Closing

Next Steps

- Presentation of recommendations
- September 25th : Present to Advisory Council
- Public survey on www.state.mn.us/automated/

DEPARTMENT OF TRANSPORTATION

Thank you

Co-Liaisons

Edward Reynoso, Teamsters
Kevin McKinnon, DEED

Co-Facilitators

Susan Mainzer, Mediation Center

Sunday Harholdt, Mediation Center

Governor's Advisory Council on Connected and Automated Vehicles Economic Development, Business Opportunities and Workforce Preparation Subcommittee

DRAFT Meeting Notes

MnDOT TEC Center

September 18, 2018

10:00 am – 12:00 pm

General Meeting Notes

Presentation at the State Capitol 9/25

Room 316 EO Presents 11:15 am (begins at 10 am with Cyber Security)

In-Person Participants

Rae Anna Bucholz, MN Chamber

Bentley Graves, MN Chamber

Gary Thaden, MMCA/NEEA

Skip Foster

Amber Backes, Great River Energy

Bill Gardner, MnDOT

Sean Ducas

Jason Whitman

Darielle Dannen, DEED

Nick Nassar, Land O' Lakes

Remote Participants

Rich Scott, BNSF

Maggie Green, Messerli Kramer

John

Dave Montebello, SRF

MN Regional RR Assoc.

Liaisons

Kevin McKinnon, DEED

Edward Reynoso, Teamsters

Facilitator

Susan Mainzer

CAV-X Office, MnDOT

Kristin White

Introduction - Kristin White

- Brief overview of feedback from the first meeting
- Hear from the liaisons regarding impacts and considerations for Economic Development, Business Opportunities and Workforce Preparation
- Goal is to formulate recommendations by 12/1, with a focus on short term impacts to the subcommittee's areas of focus
- In the future, MnDOT will reconvene the subcommittee to think about medium- and long-term impacts
- Discussion of key dates for the subcommittee, including presenting to the advisory council at capital on 9/25

Susan Mainzer – Notes

- feedback from the first meeting; subcommittee participants want:
  - to know policy from other states,
  - notes from 8/21 meeting
- response to last meeting: language and wordsmithing is very important,
- today's meeting goals:
  - brainstorm to work out the recommendations,
  - liaisons presentation includes summarizing notes from 8/21 meeting and proposals for potential recommendations for the advisory council
  - subcommittee participants to give feedback on liaisons proposed recommendation and work in small groups to develop additional recommendations

Comment from participant regarding meeting notes from 8/21: page 1 under Workforce heading – include short- and long-haul trucking

Kevin McKinnon

- Robust conversation in the last meeting on a variety of topics
- Focus in a few different areas:
    - impact on MN businesses in existence
    - determining the strengths of those businesses
    - collaboration for testing, basic research and development
    - concern over locking up the IP (work with large educational institutions on this topic)
- CAV development will impact a variety of disciplines, from automation to manufacturing
- Begin determining which start-up businesses could engage, and whether they could raise the capital to participate in CAVE development
- Concerns about equity and fairness, especially about Greater MN,
- Cost of CAV to tax payer for testing facilities and cost of infrastructure
- Importance of understanding what MN can contribute to CAV development: what is our competitive advantage, what could it be
- Currently a number of states developing CAV – what can MN bring to the table
- Use of hardware/software and automation goes beyond CAV
- CAV technologies have a wide variety of application, like farm, lawn, and cleaning equipment
- Understanding the broader application of automation
- Understanding the broader application of necessary talent for development
- Determining the skills ultimately needed for development of automation
- Presentation of the three potential recommendations:
    - Areas of specialization (public and private) that MN can currently contribute:
        - Research and development expertise (such as AI, sensors, automation)
        - Physical location for testing, development and deployment
        - Education and training of the talent needed to support the industry (existing and needed expertise)
- Considerations: who is here and how are they already contributing, or what do they need in order to contribute to CAV development? Are there emerging technologies that could be better understood, and how they can they be applied to CAV? What businesses do we need to draw to MN?
    - Identify MN's competitive advantage and business opportunities; facilitate connections for the existing businesses from an opportunity and needs perspective:
        - Existing OEMs in MN industry
        - Existing providers in the supply chain
        - OEMs and technology providers

        - Considerations: how do we connect these businesses to start dialogues (applies for original equipment manufacturers)? How do we develop the R&D network to draw others to come and participate, to become an attraction?
    - Foster interest and involvement in the industry and supporting the ecosystem by:
        - Early stage businesses develop products and services for the industry
        - Remain and grow in MN by accessing capital
        - Creating support networks, both physical (incubators, co-working, accelerators) and virtual
            - Considerations: ecosystem of start-ups and how it's all connected, small companies may have interesting connections to big data, ancillary connections. How do we corral automation software? What are the resources they'll need to help them grow? Where the physical location for testing that is brings together all the people who are interested in CAV to share knowledge and expertise? How do we support the ecosystem to foster interest, involvement and innovation in the industry? If we build it here, we're creating a lot of jobs for a variety of industries – depending on the industry, businesses will need to compete.

Participant comments:

- Exploiting industry advantages and testing mechanisms to explore industry expertise is important.
- It's easier to provide feedback if it's a three-legged stool - we need the PowerPoint presentation in order to understand.
- If the vehicle is connected in or near the roadway, those things need to be installed, right? Should we discuss developing the infrastructure? (Kevin: supply chain/installation question)
- This work group will be making recommendations that the state of MN focus its efforts with regard to RND, business connections and ecosystem?

Susan Mainzer

Check in with subcommittee participants to see if we're on the right track (participant suggestion: "the right road") in terms of MN strengths. Is this something that you would give the green light to and support? **Could Kevin's suggestions provide the advisory council with an area of focus for recommendation proposals?**

***Subcommittee participants nod in agreement.**

Edward Reynoso

- Focus on workforce planning, and represents the teamsters – particularly the drivers
- Drivers are not looking to stymie or stop innovation
- Drivers want to make sure their workforce is prepared
- Involving existing business in MN was the key consideration from first meeting
- Path to respecting workers and development
- Looking for laws that are going to work
- Considering probabilities for which workers need to prepare
- Focus is on the training:
    - How are the drivers going to adapt and be trained?
    - Currently workers go into a training system
    - Workers are encouraged to do an apprenticeship
    - Need to ensure the drivers are meeting the standards
    - Need to rebrand the workforce – we've done it before and we'll do it again
    - Need to be a part of the conversation, and make sure we develop the workforce HERE (critical)

Participant comments:

- Workers will need to adapt to changes that may be out of date shortly.
- All will be impacted differently (drivers, mechanics, etc.), does it need to be more focused to ensure these are the specific industries that will be impacted first instead of the scattershot approach?

Susan: Consider a recommendation that "these are the 15 industries that will be impacted first."

Edward Reynoso

- No question that it will impact the trucking industry, but also Uber, Lyft – I wish they were represented here, but they're not
- Our union includes mechanics, for the record
- Being cognizant of the technology that's available now and where we are at this phase/stage
- Consider how to attract mechanics to the development process

Participant comments:

- If it's all going to be fleets and subscription services, you're taking the jobs from the dealerships, what is the advisory council going to do to address jobs are going away in other industries? Will state policy pick winners and losers?
- There's a chance that jobs will be lost, but also an opportunity that jobs will be created.
- The state needs to stay ahead of the market opportunity.
- The state shouldn't support economic development at the risk of workforce impacts.

Kristin White: To be clear, that's one potential, but we're not focusing on or assuming any outcomes.

Susan: Constant change will impact the workforce, it will create some jobs, but it will have positive and some negative impacts on the workforce, so it's important for the state to address the needs of the workforce and to meet the needs of the workforce. The state needs to get ahead of the impacts and challenges, and to give assistance as needed.

Edward Reynoso

That why we have someone here from DEED – we need to talk about training, but we also need to talk about funding for training. Traded deals can negatively affect and impact jobs – is there some way that we can generate additional money because there is no way that the workforce can be trained with the investment we have today.

Kevin McKinnon

- How do we efficiently and effectively develop CAV while remaining cognizant of the sources of funding - particularly tax payer dollars

Participant comments:

- Seems to me there is no way gov't could have enough money - MnDOT should help private industry.
- For reference, there's an NCHRP TSMO Workforce project underway that really gets at this workforce question. Agencies have changing needs in light of this 4th Industrial Revolution (CAV/CAT included). There's a need to create (or convert to) unconventional positions that can bring sufficient in-house awareness of things like AI, cybersecurity, privacy and liability policy, etc. The background on the project is here: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4326

Susan: Summarize some of the themes from last time: policy, business opportunities, informing and educating, impacted industries and workers, education and training considerations for the workforce, financial considerations, interstate travel and movement – no barriers – restrictions on commercial licenses, equity fairness and impartiality – CAV development approaches need to look and play out differently depending on where they live.

***Consensus for Workforce (in-person participants)**

1. **State policies should not select winners and losers (example: manufacturers vs. dealerships), the government should assist all MN workers, the state shouldn't be deciding market share.**
2. **Attract start-ups and businesses with expertise to MN who are not represented in MN.**
3. **Utilize MN workforce, talent and expertise.**

Small Group Work

The two areas (econ. dev. and workforce planning) overlap each other. Participants split into three groups to work on econ. dev., business opportunity, and workforce considerations. Report out:

Economic Development

1. **MN legislature to establish framework to encourage the collaborative development of the CAV industry (examples: policies related to research, testing, infrastructure)**
    a. Economic & development opportunities, making sure others know that MN is open to the opportunities CAV presents ("open for business")
    b. Testing: how this can be done, who will do it (who will monitor it)? Can we test in MN?
    c. Basics:
        i. Ecosystem - We're a hospitable environment and we can show this through policy, recommendations and legislation.
        ii. Investment - We want the state to encourage investment – is policy framework in place to encourage development?
        iii. Public Safety - Government, citizens and consumers need to fully buy-in that this is a safer solution, safer way to operate, and if its fully matured, needs to be fully proven that this is a safer way, publicly prove that this is a safer way through public demonstrations.
    d. Policy - Framework Only! – policy should stay out of the way to allow for testing, where and how, not create details that complicate testing and make it difficult
    e. Need for policies that encourage rather than setup barriers that assist CAV development
    f. Should be the legislature and not just the governor agreeing to policy framework – governor changing office soon
2. **Identify and capitalize on competitive advantages**
    a. (examples: agriculture, retail and logistics industries, software, cyber security technology, weather (we can facilitate safety feature testing that can't happen elsewhere))
    b. What is unique to MN that encourages people to test here: consider who we want to attract and why
3. **Fund initiatives to support the CAV industry** – funding is needed to support the policy recommendations
4. Transportation equality, if we focus on certain modes, will others suffer

a. Online participant comment: With regard to the level playing field, I think it's important for the legislature to look at modal equity for infrastructure investments. For accommodating fully CAV and platooning trucks in particular would require an overhaul and reimagining of our transportation system. The legislature will have to balance how much public funding they put toward improvements for the purpose of accommodating truck platoons, which may disadvantage other modes of transportation.

Business Opportunity

1. **Incentive of use** – what is the incentive to buy a semi-autonomous vehicle
   - **a. State-wide uniformity standards**
   - **b. Incentives for:**
     - **i. users,**
     - **ii. developers for tech and safety features,**
     - **iii. installers,**
     - **iv. entrepreneurs,**
     - **v. users of DA**
     - vi. private industry/ businesses that transport product
2. **Regulation for Level 3 DA (driver assisted)**
   - a. Uncertainty as to what can be operated regarding what can be autonomously driven in the current structure – clarify without impeding
   - b. **Statewide coordination with local jurisdictions** – standards that don't create barriers for development
3. Online participant comment: I think one of the challenges to the advisory committee and legislature is to figure out how to structure policy to ensure a fair playing field that is attractive to CAV investment, while addressing key impacts of CAVs....cost of infrastructure (e.g., loss of gas tax revenue) and work force training needs are two examples. Can movement to gain efficiencies through fleets or other automation changes fund key elements of the transition? We want to guide the direction to end up with an outcome that is consistent with MN values/goals. Obviously these policies need to be competitive with other states to attract investment and support current businesses in the state but also can't necessarily be a race to the bottom - give away all to get maximum investment but have significant impacts. To help guide this we will need lots of good policy analysis and guidance from both public and private sectors (partnership).

Workforce Planning

1. **Require drivers (or operators) in all vehicles until the technology is fully developed to protect public safety (will "fully" create a barrier to moving forward?)**
    a. Differentiate between developed and in development, technology moves very quickly
    b. What is fully developed? We don't know what that technology looks like
    c. Make sure there is somewhere for testing, blanket prohibition will lead developers to go elsewhere, tech is always evolving, liken to airplane industry (pilot, back-up systems)
        i. Framework that won't bar the testing and deployment, while those still in vehicle (operator and driver) are safe
        ii. Needs to be a statewide policy that allows for safety and testing
2. **Collaborate with federal, state and educational institutions for curriculum and funding at appropriate levels**
    a. Public and private public institutions
    b. Higher education - MNSCU
    c. Federal partnerships to develop a TAA – drivers and mechanics, not just for drivers
    d. Real gap for people in the system to be able to access the technologies
    e. Online participant comment: CAV is an element to the general trend of automation; the broader automation issue impacts a broader set of skills and workforce including - highly technical and skilled jobs. As an example, our engineers and designers may be impacted due to efficiencies and advancement of AI and automation of design programs. These are highly professional and skilled jobs. Just wanted to make the point that some of the advancement of this technology has broader impacts.

Tentative & Final Recommendations

*Please see "report out" section, directly above. Consensus recommendation proposals are in bold throughout the document. "Friendly amendments" are included throughout.

Next Steps

Closing and next steps:

Your recommendations will be presented to the advisory council by Kevin and Ed on 9/25. There is a public survey online, which presents another opportunity to give feedback.

Parking Lot - items for follow up at subsequent meetings

Governor's Advisory Council on Connected and Automated Vehicles

Economic Development, Business Opportunities and Workforce Preparation Subcommittee
September 18, 2018
10:00 am – 12:00 pm

DEPARTMENT OF TRANSPORTATION

Subcommittee Goal

To formulate and recommend to the advisory committee recommended changes to statutes, rules and policies related to economic development, labor and business interests and to address opportunities, impacts and challenges of CAV technology.

General Themes

- Economic Development
- Business Opportunity
- Workforce Impacts

Themes

- **Words matter**. Use “automated” not “driverless” or autonomous
- **Inclusion**. Including voices of, and input from, impacted industries and workers is vital
- **Support Minnesota businesses**. Involve and collaborate with *existing* companies
- **Support Minnesota talent**. Employ Minnesota workers
- **Support interstate commerce**. Don’t create barriers for interstate travel & movement
- **Uniformity & reciprocity**. Federal and state uniformity and reciprocity

Themes

- **Collaboration**. Leverage business opportunities, strengths and cross-disciplinary expertise amongst businesses and industries
- **Education**. Inform and educate the public and legislators
- **Understand CAV impacts**. Understand CAV impacted industries and workers
- **Workforce training**. Educate and train the workforce
- **Financial considerations**. Invest in Minnesota.
- **Interstate travel and movement**
- **Equity, fairness, and impartiality** regarding involvement, opportunities and gains

DEPARTMENT OF TRANSPORTATION

Recommendation 1: Economic Development

Recommendation 1 – Economic Development

- **New CAV industry**. The State should develop new industries that use the strengths of Minnesota businesses and technology expertise, especially IT, AI, hardware/software and science.
- **Gap analysis**. The State should conduct a gap analysis on which CAV industries are not in Minnesota.
- **Public private partnerships**. The State should foster public-private collaborations with institutions, organizations, and small business and avoid slowing development of CAV.
- **Collaboration**. The State should quickly develop communication lines to create cross-disciplinary knowledge sharing.

Recommendation 1 – Economic Development

- **State funding.** The Legislature should fund initiatives to support the CAV industry. Raise capital, and consider investment opportunities and start-up possibilities.
- **Taxpayer impacts**. The State should consider the cost of CAV development to the tax payer.
- **Equity and fairness**. Consider equity, fairness, and impartiality regarding involvement, opportunities and gains – include Greater MN in policy and development decisions.
- **Leverage Minnesota strengths**. The State should identify and capitalize on competitive advantages, including weather, agriculture, retail, logistics, software, cyber security, and technology industries.

Recommendation 1 – Economic Development

- **CAV testing and deployment.** The Governor & Legislature should establish a framework to encourage collaborative development of the CAV industry, including research, testing and infrastructure.
- **Branding**. Make sure industry knows that Minnesota is open for businesses, understands where testing can be done, and who is responsible for monitoring testing.
- **CAV testing policy**. The State should make it clear whether industry can test CAVs in Minnesota. Don't want state to discourage investment. Need a policy framework to know how industry can test, where it can, etc.
- **Testing and demos**. The State should conduct public testing and demonstrations. Government, citizens, and consumers need to understand CAV is a safety solution.

DEPARTMENT OF TRANSPORTATION

Recommendation 2: Business Opportunity

Recommendation 2 – Business Opportunity

- **Capitalize on Minnesota's competitive advantages.** E.g. agriculture, retail and logistics industries, software, cyber security technology, weather). We can facilitate safety testing that can't happen elsewhere.
- **Leverage our expertise.** Use Minnesota's research and development expertise (e.g. sensors, AI, etc.)
- **Testing locations**. The State should create testing and development locations.
- **Talent pipeline**. Education and training of the talent needed to support the industry (existing expertise and future considerations of what will be needed).

Recommendation 2: Business Opportunity

- **OEM partnerships**. Facilitating conversations for business opportunities and needs, including:
  - Auto industry/OEM's in Minnesota working in the CAV industry;
  - Existing supply chain providers; and
  - Connecting auto manufacturers/OEMs and technology companies.

Recommendation 2: Business Opportunity

- **The State should develop an ecosystem to foster interest and involvement in the industry by:**
- Supporting start-ups developing products or services for the industry;
- Fund initiatives to encourage businesses to remain and grow in Minnesota; and
- Creating physical incubators, co-working, accelerators, and/or virtual support networks.

Recommendation 2: Business Opportunity

- **Leveraging the technology**. The State should create spaces where industry can share best practices and allow access to developing CAV technology.
- **Uniformity**. The Legislature should encourage uniformity. There should be a statewide standard that prohibits local jurisdictions creating policies inhibiting this technology.
- **Financial incentives**. The Legislature should provide business incentives for users, developers for tech and safety features, installers, entrepreneurs, private industry and businesses that transport product.

DEPARTMENT OF TRANSPORTATION

Recommendation 3: Workforce Impacts

Recommendation 3: Workforce Impacts

- **No Tradeoffs**. The State shouldn't support economic development at the risk of workforce impacts.
- **Use local talent.** The State should use Minnesota's workforce, talent, and expertise.
- **Human operators**. The Legislature should require drivers (or operators) in all vehicles until the technology is fully developed to protect public safety. Need driver, operator back-up systems
- **Driver training and licensing**. The State should develop policy around training, driver requirements, and licensing.

Recommendation 3: Workforce Impacts

- **Minnesota-based training**. The State should bring the training curriculum for development of new technologies, manufacturing, and sales to Minnesota to promote innovation and opportunity.
- **Workforce training**. The State should train and rebrand the workforce, and develop apprenticeship opportunities.
- **Develop STEM talent**. The State should develop engineering and technology talent in Minnesota for IT, AI and other science and technology industries.

Recommendation 3: Workforce Impacts

- **Federal-state coordination.** Collaborate with federal and state educational institutions (e.g. universities, MnSCU, vocational schools).
- **State training fund**. The State needs to appropriate funding for training. There are some existing programs but need to evaluate how to adapt current programs or create new.
  - Training should include drivers and mechanics;
  - Need to include both public and private educational institutions, e.g. if Teamsters create education, they should be able to take advantage of state training programs.

DEPARTMENT OF TRANSPORTATION

Thank you

Co-Liaisons

Edward Reynoso, Teamsters
Kevin McKinnon, DEED

Governor's Advisory Council on Connected & Automated Vehicles
Subcommittee on Insurance & Liability

Agenda

Monday, August 27, 2018 2:00-4:30 PM at the Minnesota Department of Revenue
Stassen Building, Conference Room 200, 600 N. Robert Street, St. Paul, MN 55146

Call-in number: (888) 742-5095
Conference Code: 740 089-9265

Subcommittee Goal: *To ensure Minnesota insurance laws and regulations are responsive to connected and autonomous vehicle (CAV) technology to allow for innovation in the development of products and services while providing adequate protection for Minnesota families and businesses.*

1. Welcome & Introductions

- Review of Executive Order & Goals
- Review of Agenda & Meeting Process
- Introductions

2. Presentation: Overview of Connected and Autonomous Vehicles ("CAV")

Kristin White, MnDOT CAV-X Office

3. Presentation: Key CAV Issues for Insurance and Liability

Vicky Rizzolo, American Family Insurance & Alison Groebner, Department of Commerce

4. Discussion

- Review & comments on draft questions (see next page)
- Discussion

5. Next Steps & Closing

6. Key Questions for CAV Insurance and Liability

- What insurance or liability statutory changes, if any, should be considered or recommended in Minnesota's auto insurance laws to address the new mobility eco-system and automated vehicles?

- Assuming Minnesota allows testing of automated vehicles on public roadways, should the state require specific insurance and liability protections during testing phases? If so, what standards should be adopted? How should insurance differ between automated vehicle on-road public testing and full-scale deployment?

- What is the role of insurance companies in the new mobility ecosystem? What are the responsibilities of insurance companies, government and others to educate consumers on changes in vehicle technology (its potential and limitations) and also on safety issues posed by technological advances?

- What are some of the challenges insurers face in the evolution of insurance products to cover risks in the new mobility ecosystem?

- Do you have specific recommendations relating to potential new insurance products and services that may develop in response to advancing technology changes?

- What accident data will insurers need to provide necessary coverage and properly rate new insurance new products? How does this differ from the accident data insurers have access to today?

- Should we treat people injured in accidents involving automated vehicles differently than those injured in accidents involving non-automated automobiles (or partially automated vehicles)? What factors should we consider?

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Insurance & Liability

DEPARTMENT OF TRANSPORTATION

August 27, 2018

Welcome and Introductions

DEPARTMENT OF TRANSPORTATION

Insurance & Liability Subcommittee

Subcommittee Goal

To ensure Minnesota insurance laws and regulations are **responsive** to connected and autonomous vehicle (CAV) technology to allow for innovation in the **development of products and services** while providing adequate **protection for Minnesota families and businesses**

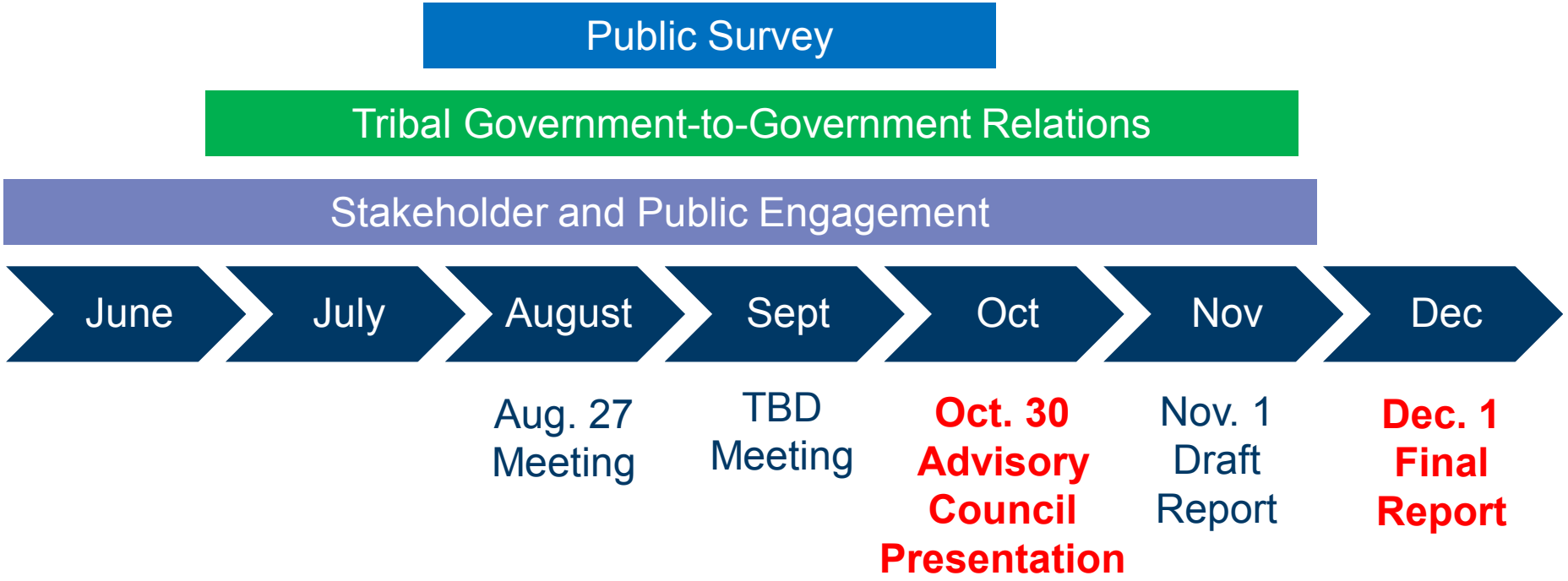
Subcommittee Process

- Participation
  - Meeting materials available on **MnDOT website**
  - Meeting updates at www.dot.state.mn.us/automated/publicmeetings.html
  - Participate in a **meaningful way**
- Discussion
  - Consider the themes of **safety, risk, equity and environment**
  - Consider immediate, **short-term outcomes**
- Recommendation
  - Clear, **consensus-based** recommendations (or reasons for differences)
  - Present recommendations to Advisory Council **October 30th**

Subcommittee Charter

- Meetings **open to the public**
- **Respectful** discussion, opportunities to be heard and **listen**
- May submit written comments on **comment cards**
- Notes taken on **consensus** or **summary** of discussion
- Meeting **notes approved by liaisons** and sent to subcommittee members for additional comments
- Meeting evaluation emailed after meeting

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Aug. 27 Meeting
TBD Meeting
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV

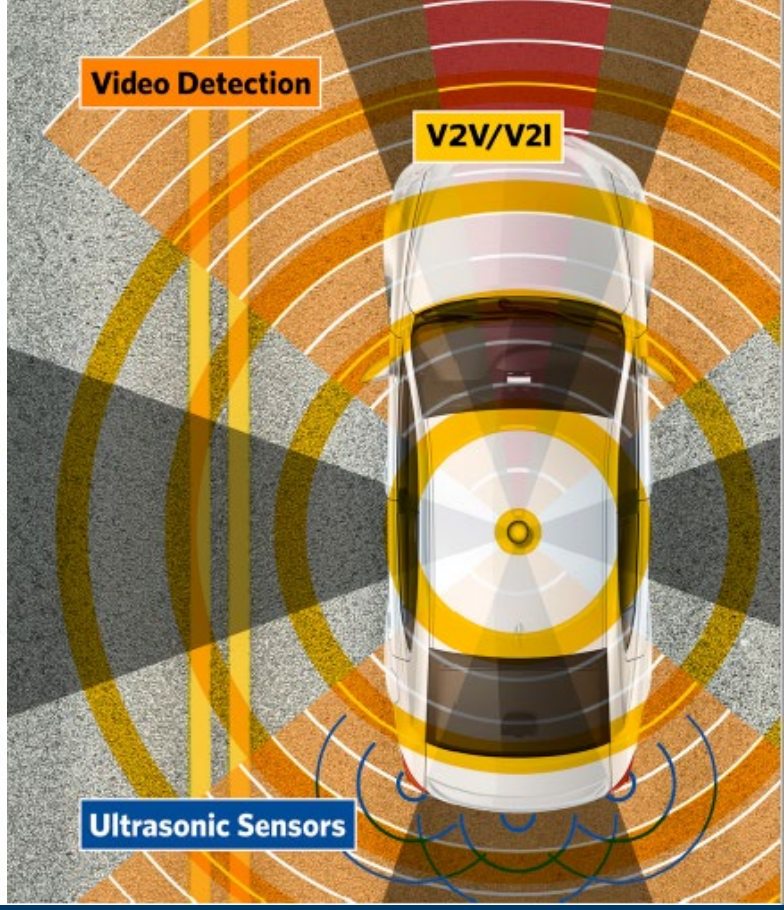
Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

Public Feedback Opportunities

Interagency Team

- Policy position papers
- Branding
- Testing & Deployment
- Partnerships



Overview of Connected & Automated Vehicles

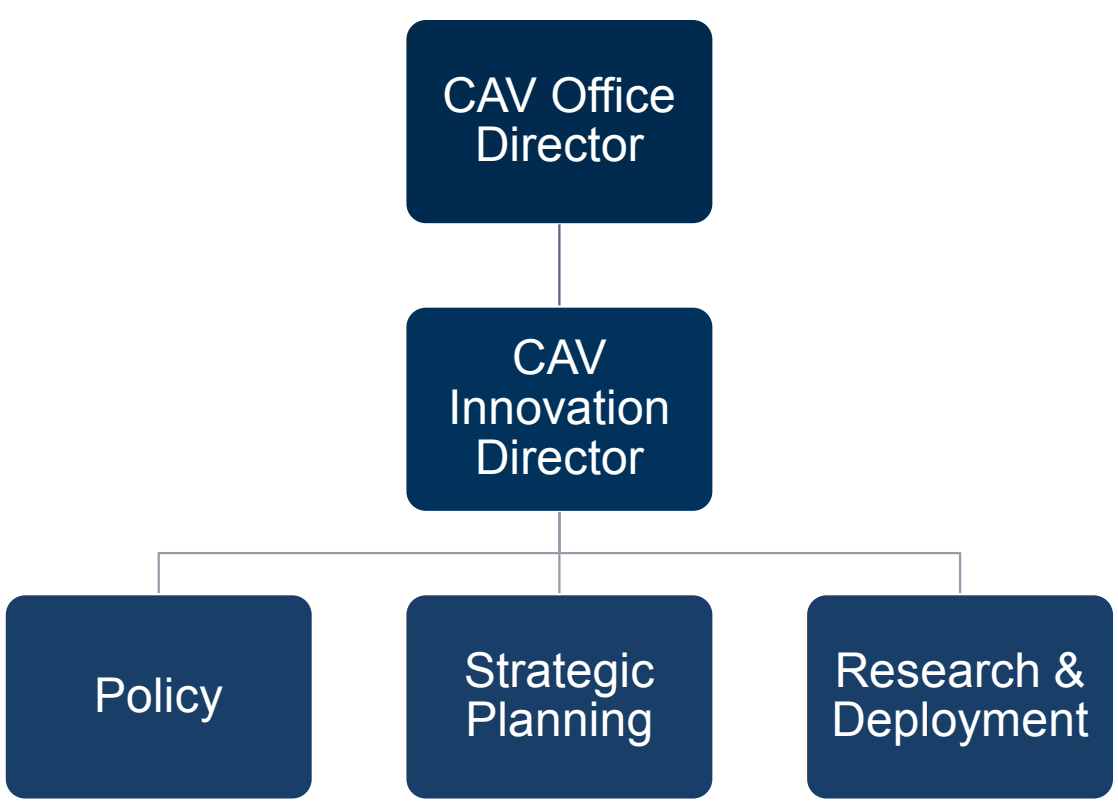
DEPARTMENT OF TRANSPORTATION

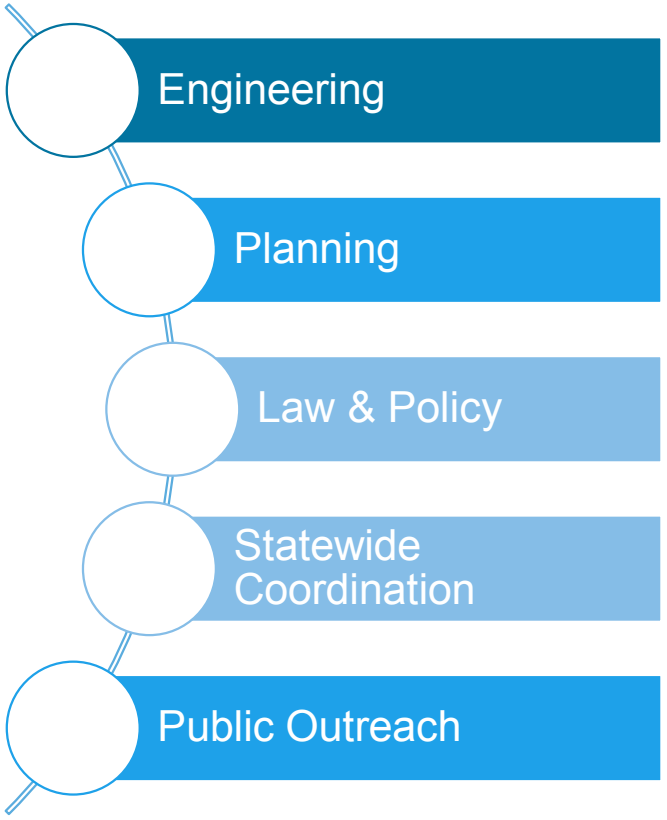
Kristin White, J.D.
CAV Innovation Director

DEPARTMENT OF TRANSPORTATION

Who We Are

MnDOT CAV-X Office





DEPARTMENT OF TRANSPORTATION

Why We're Here

Automated Vehicles

Automated vehicles can **take control of** some or all aspects of **driving tasks**.

Uses for Automation

Types of **Automated Vehicles**

Passenger

Commercial

Transit

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

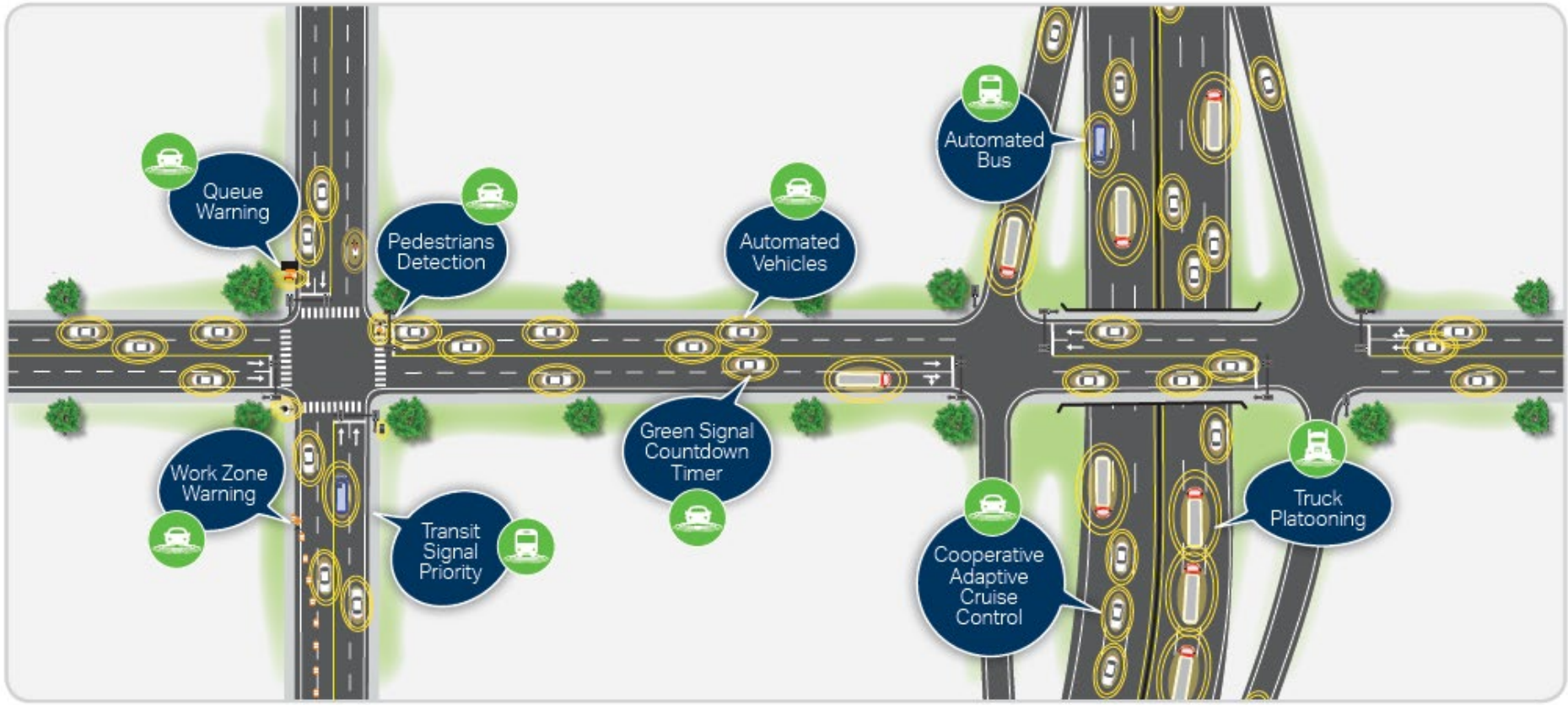
Society of Automotive Engineers (SAE) Levels of Automation

Connected Vehicles

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

CAV Benefits

Types of Connected and Automated **Vehicle Applications**



Connected & Automated Vehicles

Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors

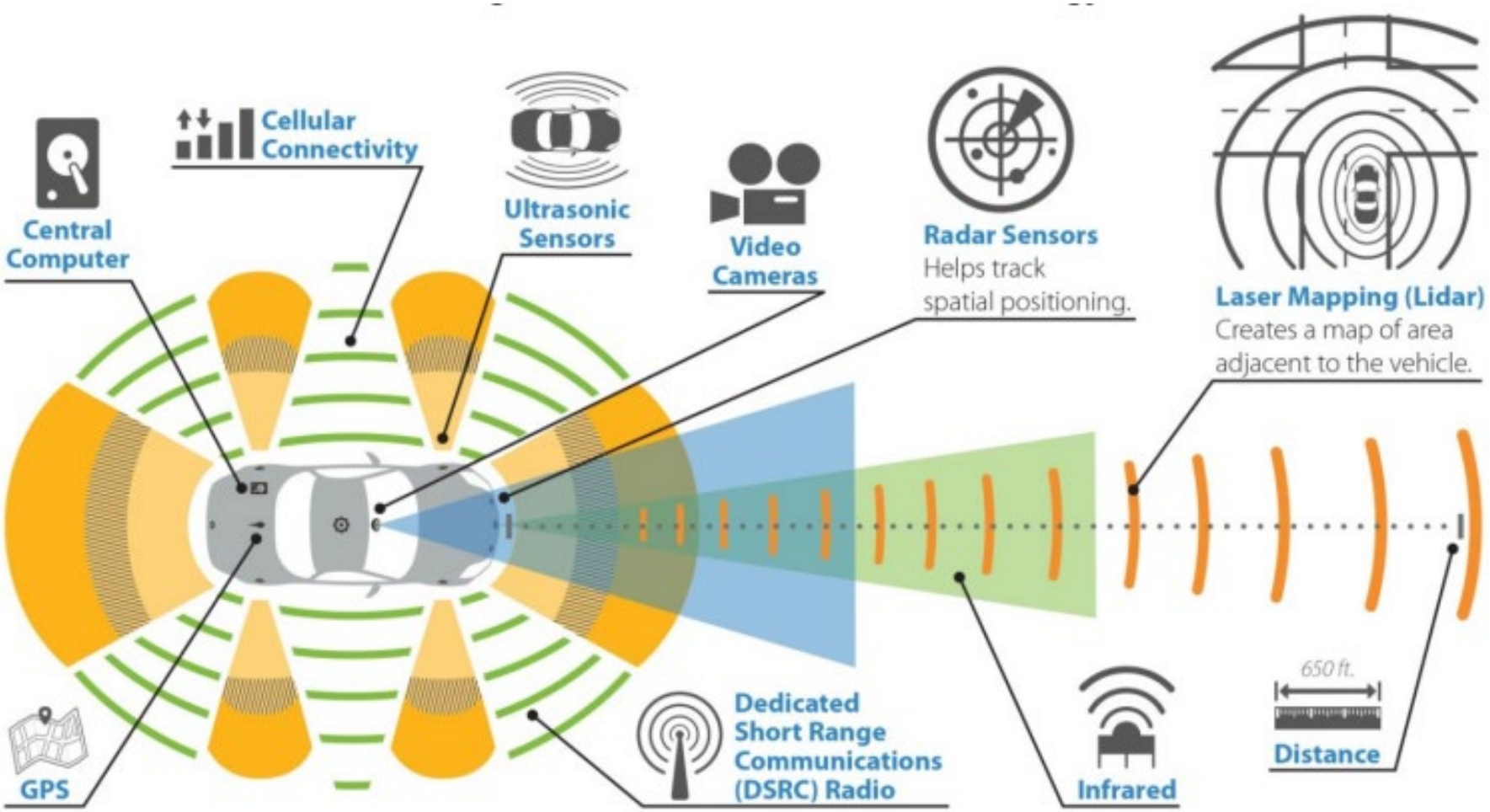
Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities

Connected Vehicle

Communicates with nearby vehicles and infrastructure

How does it work?



Electric Vehicles

Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

Shared Mobility

Shared use of a vehicle, bicycle, or other transportation mode on an **as-needed basis**

1 account to access, plan, and pay for private and public transportation options

Alternative Automation

Truck Platooning

Dockless scooters & bikes

CAV Technology Already Available

Lane Assist & Departure Warnings

Self-Parking

Signal Countdowns

Thank you

DEPARTMENT OF TRANSPORTATION

Kristin White, J.D.
CAV Innovation Director
kristin.white@state.mn.us

Key CAV Issues for Insurance & Liability

Alison Groebner,
Department of Commerce

Survey of U.S. States

- 29 States: Enacted autonomous vehicle legislation
- 10 States: Enacted executive orders
- National State Conference of State Legislators
  - www.ncsl.org/research/transportation/autonomous-vehicles

Insurance and Liability

- Texas
  - Bill: SB2205
  - Enacted in 2017
- Tennessee
  - Bill : SB0151
  - Enacted in 2017
- Nebraska
  - Bill : LB989
  - Enacted in 2018

Insurance and Liability

- Michigan
  - Bill: SB998
  - Enacted in 2016
  - Bill: SB663
  - Enacted in 2013
- Oregon
  - Task Force Recommendations

Insurance Requirements in Other States

States with AV Testing Permitting Programs

	AAMVA	California	Nevada	New York	Massachusetts	Connecticut
Evidence of manufacturer's ability to respond to judgements for damages for personal injury, death, or property damage caused by a vehicle during testing. Evidence may be in the form of an instrument of insurance, a surety bond, or proof of self-insurance.	✔	$5,000,000 Minimum	$5,000,000 Minimum[1] ($1,500,000 minimum for TNCs)	$5,000,000 Minimum	$5,000,000 Minimum	$5,000,000 Minimum

1. Nevada requires certification of understanding that each autonomous testing vehicle listed is covered by an insurance company licensed to do business in the state and certification of understanding that a testing entity must maintain coverage that meets or exceeds Nevada's minimum liability requirements.

Source: https://www.oregon.gov/ODOT/Get-Involved/Documents/AVTF-ODOT-research-insurance-sub-0620.pdf.

Insurance Requirements in Other States

Self-Certification/Notification Required States

	Arizona	Michigan	Tennessee	Washington	Nebraska
Evidence of manufacturer's ability to respond to judgements for damages for personal injury, death, or property damage caused by a vehicle during testing. Evidence may be in the form of an instrument of insurance, a surety bond, or proof of self-insurance.	Nothing mentioned	$10,000,000 Minimum	$5,000,000 Minimum (for a vehicle without a human driver physically present)	Does not differ from a conventional vehicle	Does not differ from a conventional vehicle

2. Arizona requires notification for testing AVs without a driver present. It does not for testing with a driver. Insurance requirements are not specified for either case.

3. Michigan requires a minimum of $10 million in coverage for an entity to be considered a "motor vehicle manufacturer." Michigan's AV laws mandate that only motor vehicle manufacturers can operate autonomous vehicles.

Source: https://www.oregon.gov/ODOT/Get-Involved/Documents/AVTF-ODOT-research-insurance-sub-0620.pdf.

Insurance Requirements in Other States

States with No AV Testing Permit Program or Notification Requirement

	Colorado	Texas	Florida	Georgia	North Carolina
Evidence of manufacturer's ability to respond to judgements for damages for personal injury, death, or property damage caused by a vehicle during testing. Evidence may be in the form of an instrument of insurance, a surety bond, or proof of self-insurance.	$ 5,000,000 minimum[4]	Does not differ from a conventional vehicle	Nothing specifically mentioned	250 percent what is required for limousines or self-insurance until 2020. Starting in 2020, equivalent to what is required for limousines or self-insurance.[5]	Does not differ from a conventional vehicle

4. No less than $5 million umbrella insurance, commercial general liability insurance of no less than $1 million, and vehicle insurance of no less than $1 million. And / or a surety bond of no less than $5 million if they have no umbrella insurance or their limits are less than what was outlined above.

5. Only applies to vehicles without human drivers.

Source: https://www.oregon.gov/ODOT/Get-Involved/Documents/AVTF-ODOT-research-insurance-sub-0620.pdf.

CAV Data & Safety Issues for Insurance & Liability

Vicky Rizzolo,
American Family Insurance

Discussion

Key Questions

1. What insurance or liability statutory changes, if any, should be considered or recommended in Minnesota's auto insurance laws to address the new mobility eco-system and automated vehicles?

2. Assuming Minnesota allows testing of automated vehicles on public roadways, should the state require specific insurance and liability protections during testing phases? If so, what standards should be adopted? How should insurance differ between automated vehicle on-road public testing and full-scale deployment?

3. What is the role of insurance companies in the new mobility ecosystem? What are the responsibilities of insurance companies, government and others to educate consumers on changes in vehicle technology (its potential and limitations) and also on safety issues posed by technological advances?

Key Questions

4. What are some of the challenges insurers face in the evolution of insurance products to cover risks in the new mobility ecosystem?

5. Do you have specific recommendations relating to potential new insurance products and services that may develop in response to advancing technology changes?

6. What accident data will insurers need to provide necessary coverage and properly rate new insurance new products? How does this differ from the accident data insurers have access to today?

7. Should we treat people injured in accidents involving automated vehicles differently than those injured in accidents involving non-automated automobiles (or partially automated vehicles)? What factors should we consider?

Key Questions

8. Did we address safety, risk, equity and environment?

9. Other questions and topics?

Small Group Breakouts

Breakout Session Directions

- Designate 1 recorder
- Designate 1 person to report-out
- Engage with participants in your group & ask questions
- Write thoughts on large poster or individual comments on post-it notes & add to poster

Breakout Session Questions

- What themes and recommendations do you want the Council to share with the Governor & Legislature?

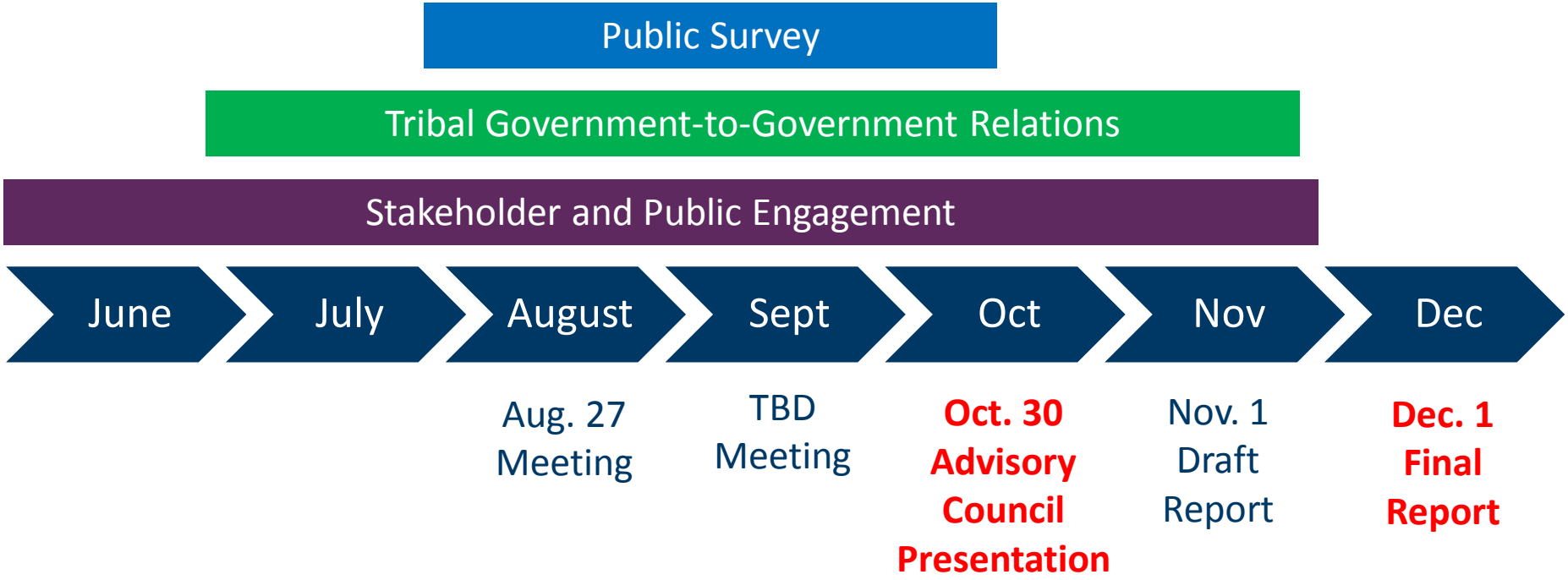
- What policy areas or themes do you want addressed in the 2019 Legislative session?

Next Steps & Closing

Next Steps

- Comment Cards & Suggestions for next meeting
- All participants may review meeting minutes
- Additional comments can be made at CAVfacilitators@mediationcentermn.org
- Post-meeting online survey
- Public survey on www.state.mn.us/automated/
- October 30th: Present to Advisory Council

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Aug. 27 Meeting
TBD Meeting
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Thank you

Vicky Rizzolo,
American Family Insurance

Subcommittee Liaison

Alison Groebner, Department of Commerce

Subcommittee Liaisons

Governor's Advisory Council on Connected and Automated Vehicles
Insurance & Liability Subcommittee

Meeting Date: August 24, 2018, 1:30-3:30PM

MEETING NOTES

Summary

The Insurance & Liability Subcommittee met on August 24, 2018 to receive public feedback on insurance and liability issues related to developing CAV technology. Kristin White, CAV Innovation Director, Minnesota Department of Transportation, provided an overview of the Governor Dayton's CAV Executive Order and goals and encouraged public input both through the subcommittee process and online input prior to the October 15 deadline. Co-liaison Alison Groebner, Department of Commerce, provided a review of CAV legislative and regulatory activity in other states and Vicky Rizzolo, American Family Insurance and CAV Advisory Council member, provided an overview of insurance industry perspective on key data accessibility and vehicle safety issues. The meeting included a broad spectrum of stakeholders within the insurance industry and the public at large. Discussion centered around specific questions published by the Subcommittee in advance of the meeting.

Key Subjects Discussed/Comments

1. **Accessibility of AV Data**

Insurers will need access to AV data to appropriately underwrite/rate insurance products and services and investigate claims despite proprietary concerns.

Minnesota should look to other state laws, i.e. Tennessee and Oregon, to establish standards for access to vehicle data.

"Data" needs to be defined and a process established to share data with appropriate stakeholders, including consumers, insurers, and regulators.

Responsibility for data storage costs should be addressed.

2. **Minimum Liability Limits**

Most states have adopted a minimum liability limit of $5,000,000 for companies involved in testing AV's (Liaisons will research public policy considerations leading to the prevalent $5 million requirement).

Higher liability limits may be considered but increased costs associated with higher limits of liability must also be considered.

Any new liability requirements applicable to AV testing phases should not apply to personal use of autonomous vehicles.

3. **Consumer Education (Relating to data privacy)**

The roles of vehicle manufacturers, insurers, government, and others in protecting the privacy of AV data must be specified.

Liaisons will provide information regarding current disclosures utilized with telematics (black box) technology.

Potential redundancies between black box technology and new AV technology should be explored.

4. **Changes to Current Minnesota Auto Insurance and Liability Laws/Regulations**

In promulgating new AV laws and regulations, Minnesota public policy makers should consider the need for consumer protection but not stifle innovation and creativity in the automobile insurance marketplace (i.e. collaboration of TNC companies, insurers, and regulators).

Current Minnesota laws and regulations are likely adequate to protect consumers in the current mobility ecosystem (except for testing phase) but will need to be re-evaluated as we move to fully autonomous (driverless) vehicles.

New laws and regulations will need to account for varying levels of automation and connectivity in vehicles that will share the roadways in the transition to fully autonomous vehicles.

Most states have a pure liability system for auto liability but Minnesota has a hybrid No-Fault/Liability law that may need to be addressed as AV technology progresses.

Traditional product liability models may not be appropriate to access liability and adequately compensate victims of crashes involving autonomous vehicles considering the multitude of potential product liability claims (OEM's software developers, other AV technology components) and jurisdictional uncertainties.

5. AV Safety Laws

NHTSA has established safety standards for Level 3, 4 and 5 automated vehicles that cannot be modified by states.

Accident data (before and after crash) should be made available to consumers and appropriate stakeholders, including insurers and regulators.

Specific data sets will need to be defined and mandatory data production standards established.

Safety monitoring data should also be addressed, especially in Level 3 and 4 vehicles, i.e. impact of driver's behavior unrelated to the crash.

6. New Insurance Products/Services

Auto insurance products and services are likely to change drastically in coming years due to developing AV technology, but specifics are as yet unknown.

New laws and regulations should respond to developing technologies and new insurance products and services and not stifle innovation (i.e. TNC experience).

Challenges will present in the transition period when analog and (semi) autonomous vehicles will share the roadways.

Transitional insurance products in the form of endorsements for owners of autonomous vehicles are already in the marketplace.

Policies that provide coverage for consumers throughout the day as they utilize all manner of transportation may be developed.

7. Miscellaneous Issues

Minnesota needs a consistent statutory definition of "driver" throughout Minnesota laws and regulations.

At what point, if ever, might driver licensing become unnecessary.

Governor's Advisory Council on Connected & Automated Vehicles
Subcommittee on Insurance and Liability

Agenda

Monday, September 24, 2018 1-3:30 pm
MnDOT District 6 Rochester Headquarters Building
Conference Rooms Mississippi River East & West
2900 48th Street NW, Rochester, MN 55901

Join Skype to View PowerPoint Presentation
Call-in number for audio: 1-888-742-5095
Conference code: 1658 926 687

Subcommittee Goal: To ensure Minnesota insurance laws and regulations are responsive to connected and autonomous vehicle (CAV) technology to allow for innovation in the development of products and services while providing adequate protection for Minnesota families and businesses.

1. Welcome and Introduction

2. Summary of Last Meeting's Discussion Topics and Common Themes

(Subcommittee Liaisons: Alison Groebner, Department of Commerce & Vicky Rizzolo, American Family Insurance)

3. Discussion: Other Topics the Subcommittee Would Like to Address?

4. Develop Recommendations to the Advisory Council

- What do you want to be sure the liaisons recommend to the Advisory Council?
- Refine tentative recommendations
- Discuss and develop any additional recommendations

5. Closing & Next Steps

- Is the subcommittee ready to present to the Advisory Council?

To request this document in an alternative format, please contact the Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

DEPARTMENT OF TRANSPORTATION

Key Questions for CAV Insurance and Liability

- What insurance or liability statutory changes, if any, should be considered or recommended in Minnesota's auto insurance laws to address the new mobility eco-system and automated vehicles?

- Assuming Minnesota allows testing of automated vehicles on public roadways, should the state require specific insurance and liability protections during testing phases? If so, what standards should be adopted? How should insurance differ between automated vehicle on-road public testing and full-scale deployment?

- What is the role of insurance companies in the new mobility ecosystem? What are the responsibilities of insurance companies, government and others to educate consumers on changes in vehicle technology (its potential and limitations) and also on safety issues posed by technological advances?

- What are some of the challenges insurers face in the evolution of insurance products to cover risks in the new mobility ecosystem?

- Do you have specific recommendations relating to potential new insurance products and services that may develop in response to advancing technology changes?

- What accident data will insurers need to provide necessary coverage and properly rate new insurance new products? How does this differ from the accident data insurers have access to today?

- Should we treat people injured in accidents involving automated vehicles differently than those injured in accidents involving non-automated automobiles (or partially automated vehicles)? What factors should we consider?

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Insurance and Liability

DEPARTMENT OF TRANSPORTATION

September 24, 2018

Welcome and Introductions

Summary of Last Meeting

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure & Investment	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV

Subcommittee Goal

To ensure Minnesota insurance laws and regulations are responsive to connected and autonomous vehicle (CAV) technology to allow for innovation in the development of products and services while providing adequate protection for Minnesota families and businesses.

Evaluation Feedback

- Subcommittees should read reports and articles from other subcommittees to broaden their background
- A roster of those invited would be helpful
- Post more data on the website prior to the actual meeting
- Hold the meeting in a room that has built in microphones so participants don't have to pass a microphone around.

Evaluation Comments

- The speakers were very easy to hear over the phone
- Appreciate not having to split into small groups; didn't feel it would be helpful unless group needed creative brainstorming
- CAV-X: The X we were told is for the unknown. Insurance necessity in the future will be X. This process will be very fluid and we need policy to be flexible.
- It feels as if we are not really going to solve the insurance problem very soon.

Review of First Meeting - Themes

- Data Access and Privacy
- Liability Minimums/Maximums
- Statutory Definition of Operator and Driver
- Existing Safety Standards and Modifications
- Accident & Collision Reporting (referred to Traffic Regulations & Safety)
- Education and Training for Consumers
- New Insurance Products
- No-Fault
- Transition with HAVs and non-AVs
- Monitoring Human Driver in AVs

Meeting Notes

Discussion

Small Group Breakouts

Small Group Discussion

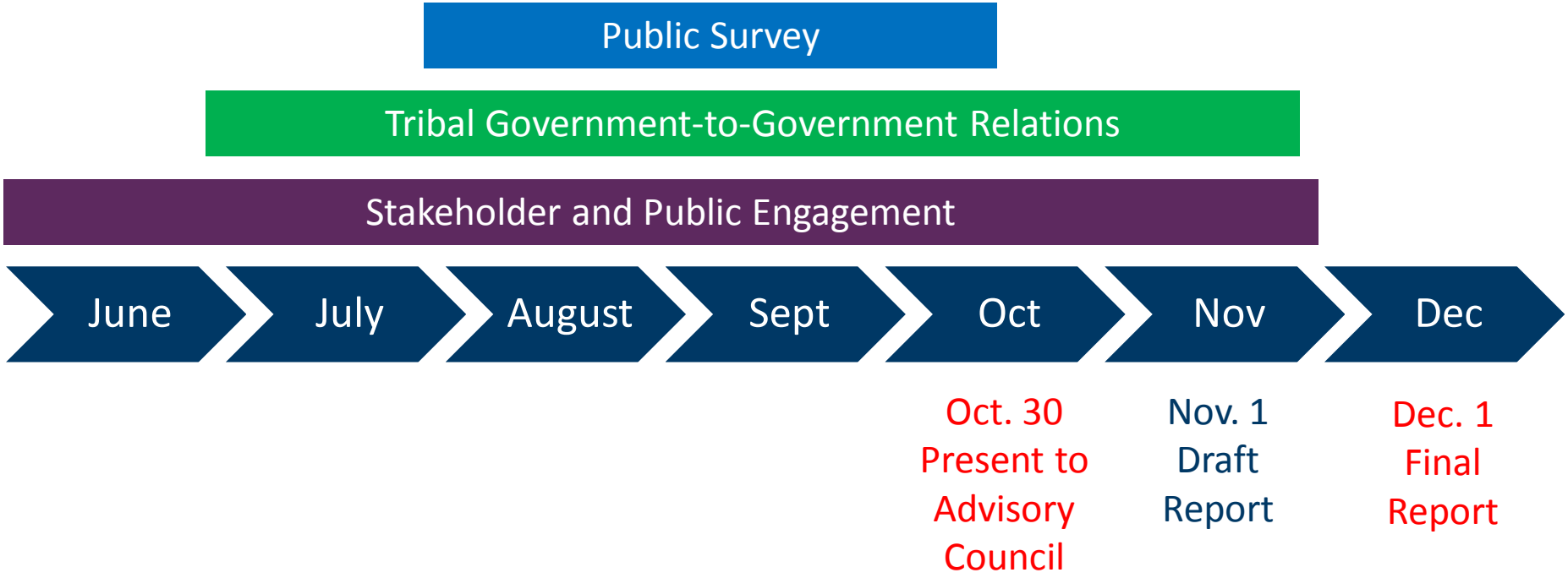
- Select themes for discussion.
- Decide which theme you want to work on and meet together in small groups.
- Select a recorder and reporter for your group.
- Discuss the topic and record *all* proposed recommendations on a post-it or put them on flip chart paper.
- Decide which recommendations have consensus in your group.
- Come back together and the reporter shares consensus recommendations, discuss as a large group.

Next Steps & Closing

Next Steps

- Further comments? Email by 10-1-18 CAVFacilitators@mediationcentermn.org
- Feedback on meeting process & structure? CAVFacilitators@mediationcentermn.org
- Liaisons finalize written recommendations
- October 30th: Liaisons present to Advisory Council
- Public survey on www.state.mn.us/automated/

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Oct. 30
Present to
Advisory
Council
Nov. 1
Draft
Report
Dec. 1
Final
Report

DEPARTMENT OF TRANSPORTATION

Thank you

Alison Groebner,

MN Dept. of Commerce
Co-Liaison

Vicky Rizzolo,

American Family Insurance Co.

Co-Liaison

Governor's Advisory Council on Connected and Automated Vehicles
Insurance and Liability Subcommittee Meeting

Draft Meeting Notes

Monday, September 24,2018 1:00 – 3:30pm
MnDOT District 6 Rochester Headquarters Building
2900 48th Street NW, Rochester, MN 55901

1. Kristin White, Mn DOT CAV-X Director of Innovation reviewed the Advisory Council goals, subcommittee process, and goals of the subcommittee.
2. Facilitator Ellen Velasco Thompson reviewed the process and agenda.
3. The liaisons summarized themes from the first meeting of the Insurance and Liability subcommittee on August 27, 2018:
    a. Accessibility of AV Data
    b. Minimum Liability Limits
    c. Consumer Education (Relating to data privacy)
    d. Changes to Current Minnesota Auto Insurance and Liability Laws/Regulations
    e. AV Safety Laws
    f. New Insurance Products/Services
    g. Miscellaneous Issues
4. The group discussed the themes, including:

    1. Definitions Needed
        a. Of 'driver' 'operator' 'owner' and 'automated vehicle'
        b. Adopt SAE level of automation?
        c. Uniform Law Commission is formalizing a model code of driver, and manufacturers are also working on this
        d. There was general agreement in the room that MN adopt uniform definitions and that uniformity and reciprocity between states is important

    2. Testing of CAV
        a. Not so restrictive so that it doesn't allow testing
        b. Insurance different for testing versus mass deployment
        c. Should specify whether a mandatory minimum needed for testing of automated vehicles, and – if so - what that amount is.
        d. Need to identify who the financial responsibility falls on
            i. Can we draw parallels from mass transit or rental car market? How do those business models apply to CAV insurance models?
        e. Self-insured?

    3. Data from CAV
        a. Insurers will need access to certain amounts of data/datasets

b. Need a definition of what data insurance market needs
c. From a consumer/regulatory perspective, need to understand who is responsible
d. Disclosure/transparency about the data created by individuals using CAVs & consent
e. Data insurers use to rate individuals & disclosure
f. It's rare when law enforcement download black box data at a collision site (it's typically legal representatives, investigators, accident reconstructionists).
g. Legally mandated for commercial vehicle collision.
h. Should there be a mandated inspection for L3-5? Or data download?
i. There will also be vehicle to infrastructure (V2I) data that public infrastructure owners/operators may have
j. Insurers do telematics which comes with disclosures, similar to an opt-in program
k. From a recommendation standpoint, there will be data questions for years

4. Education

a. Educational partnerships for state to help manufacturers and insurance industry
b. Encourage consumer education among the major stakeholders to educate consumers on all these issues
c. Education for etiquette "on the road" – e.g., bikes, bike lanes

5. **No Fault/Liability Assessment**

a. No 'No Fault' recommendations at this time
b. MN still a fault-based liability market even though we're a no-fault state. Shouldn't change no-fault principles for CAV, e.g. should include Levels 1-5 under no-fault claims
c. Current law requires joint and several responsibility of owner and operator of vehicle; some feel this should continue
d. The big question is how you prove liability? Is it a product liability case?
e. This issue is complicated by multiple defendants when a consumer is attempting to represent themselves on a contingent-fee bases
f. Insurers would like to see technology develop further until specific recommendations are made on this topic
g. Indemnification/contribution liability for OEMs and technology companies. Conversation about fairness of requiring consumer to go after manufacturer and technology vendor
h. Should 'owner' of AV be jointly and severally responsible for testing?

6. New Products & Services

a. State of Minnesota is open to new products/services
b. State ought to encourage creativity and innovation, e.g. National Association of Insurance Commissioners (NAIC) recognizes that there ought to be a way

for companies to work with regulators to bring new products and services forward.

c. Partnerships

7. The group developed recommendations to the Advisory Council, including:

1. **Definitions** of 'driver' 'operator' 'owner' and 'automated vehicle'. Should not create a new statutory definition; should utilize NHTSA's definitions.
2. **Testing**: Should specify whether a mandatory minimum needed for testing of automated vehicles, and – if so - what that amount is. Need to identify who the financial responsibility falls on: is the owner, original equipment manufacturer (OEM), tech company, etc.? Entity conducting testing would be legally and financially responsible.
3. **Data**: Need a definition of what data insurance market needs. Statute needs to make it clear what the data is, who has access, when it's preserved, and – when it's given to the government –if it falls under the Minnesota Government Data Practices Act.
    a. Disclosure: Need to address disclosure, transparency, and consent requirements; e.g. opt-in.
4. **Consumer Education Partnerships**: Encourage partnerships among principal stakeholders to educate consumers on all these issues. Manufacturers will need to educate drivers on what AVs can do, and insurance companies can educate on what AV insurance policy covers, and government can also help educate. E.g. Seat-belt campaigns
5. **New Products & Services**
    a. State of Minnesota is open to new products/services
    b. State ought to encourage creativity and innovation, e.g. National Association of Insurance Commissioners (NAIC) recognizes that there ought to be a way for companies to work with regulators to bring new products and services forward.
    c. Partnership

8. The facilitator asked whether there were any other points the group would like to make, and there were note. The meeting adjourned.

9. Next steps: These notes will be shared with the subcommittee for comments. The liaisons present the recommendations to the Advisory Council on October 30. The agenda, including the time for this subcommittee liaisons to present, will be posted at http://www.dot.state.mn.us/automated/advisory.html. All are welcome to attend.

Insurance & Liability

Subcommittee Recommendation

Alison Groebner, Department of Commerce
Vicky Rizzolo, American Family Insurance

Subcommittee Goal

To formulate and recommend to the advisory committee recommended changes to statutes, rules and policies related to *economic development, labor and business interests* and to address opportunities, impacts and challenges of CAV technology.

Themes

- Definitions needed (driver, owner, AV, level of automation)
- CAV testing and innovation
- Data for rates, underwriters, accident reconstructionists, inspections
- Consumer education
- No Fault, liability, and indemnification
- New products and services

Recommendation 1 – Definitions

- **Definitions.** Need a definition of ‘driver’ ‘operator’ ‘owner’ and ‘automated vehicle’. Should not create a new statutory definition; should utilize NHTSA’s definitions.

Recommendation 2 – Testing

- Should specify whether a mandatory insurance minimum needed for testing of automated vehicles, and – if so - what that amount is.
- Need to identify who the financial responsibility falls on: is the owner, original equipment manufacturer (OEM), tech company, etc.? I.e. the entity conducting testing would be legally and financially responsible.

Recommendation 3 – Data

- Need a definition of what data insurance market needs. Statute needs to make it clear what the data is, who has access, when it's preserved, and – when it's given to the government – if it falls under the Minnesota Government Data Practices Act.
- Disclosure: Need to address disclosure, transparency, and consent requirements; e.g. opt-in.

Recommendation 4 – Consumer Education

- **Consumer Education Partnerships**: Encourage partnerships among principal stakeholders to educate consumers on all these issues. Manufacturers will need to educate drivers on what AVs can do, and insurance companies can educate on what AV insurance policy covers, and government can also help educate. E.g. Seat-belt campaigns.

Recommendation 5 – New Products & Services

- **New Products & Services**
  - State of Minnesota is open to new products/services
  - State ought to encourage creativity and innovation, e.g. National Association of Insurance Commissioners (NAIC) recognizes that there ought to be a way for companies to work with regulators to bring new products and services forward.
  - Partnerships will be key

DEPARTMENT OF TRANSPORTATION

Thank you

Co-Liaisons

Alison Groebner, Commerce

Vicky Rizzolo, American Family Insurance

Governor's Advisory Council on Connected & Automated Vehicles
Subcommittee on Cyber Security & Data Privacy

Agenda

Friday, August 17, 2018 8:00 – 10:00 AM at MnDOT TECC Center
MnDOT Central Office, 395 John Ireland Boulevard, St. Paul, MN 55155

Call-in number: 1-888-742-5095
Conference Code: 1658 926 687

Subcommittee Goal: *The goal for the Cyber Security and Data Privacy Subcommittees is to formulate and recommend to the advisory committee key considerations for Minnesota statutes, rules, and policies related connected and autonomous vehicles' date storage, security, use and privacy.*

1. Welcome & Introductions

- Review of Executive Order & Goals
- Review of Agenda & Meeting Process
- Introductions

2. Presentation: Overview of Connected and Autonomous Vehicles ("CAV")

(Kristin White, MnDOT CAV-X Office)

3. Presentation: Key CAV Issues for Cyber Security and Data Privacy

(Damien Riehl, Stroz Friedberg)

4. Discussion

- Review & comments on draft questions (see next page)
- Discussion

Note: Discussion will continue at the next meeting on August 31, 2018 from 8:00 – 10:00 AM at MnDOT Central Office.

5. Next Steps & Closing

DEPARTMENT OF TRANSPORTATION

Cyber Security & Data Privacy Questions

- What is the optimal balance between business innovation and protection of proprietary information?

- What is the balance of user privacy and CAV technology benefits?
    - What policies or rules will help strike these balances?

- What happens to the large amounts of data created using this technology?
    - Recommended policy for storage of data
    - Recommended policy to ensure private user data remains private
    - Appropriate use of data (non-commercial)
    - Other

- Does blockchain offer ways to protect data and ensure accuracy?

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Cyber Security & Data Privacy

DEPARTMENT OF TRANSPORTATION

August 17, 2018

Welcome and Introductions

DEPARTMENT OF TRANSPORTATION

Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Consult with government, stakeholders, auto & tech industry, business, labor, advocacy groups, universities, communities experiencing transportation barriers

Prepare and submit a report to the Governor and Legislature by **December 1, 2018**

Advise and support government to support **testing and deployment** of CAV

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure & Investment	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV

Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

Interagency Team

- Policy position papers
- Branding
- Testing & Deployment
- Partnerships

Subcommittee Goal

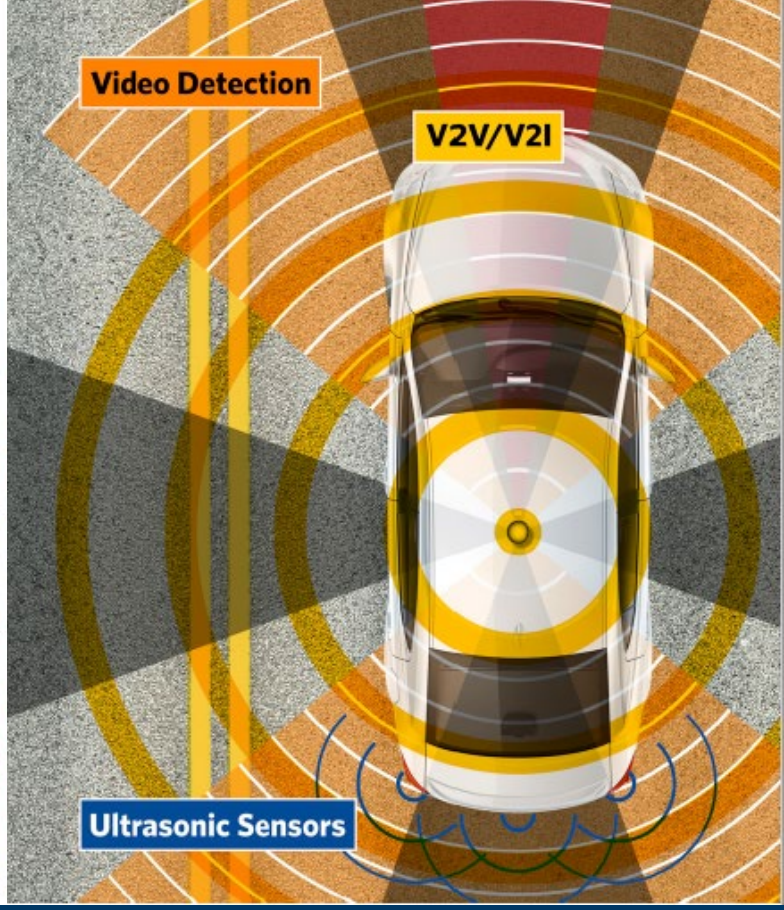
The goal for the Cyber Security and Data Privacy Subcommittee is to formulate and recommend to the Advisory Committee key considerations for MN statutes, rules and policies related connected and autonomous vehicles' date storage, security, use and privacy.

Subcommittee Process

- Review agenda
- Agendas, charter and meeting notes on MnDOT website
  - http://www.dot.state.mn.us/automated/publicmeetings.html
- Outcomes
  - Clear, consensus-based or rationales for divergences recommendations for the Advisory Council
  - Subcommittee members participate in a meaningful way in developing recommendations
  - Recommendations consider the for themes of safety, risk, equity and environment
  - Recommendations consider immediate needs and longer term planning for CAV
- Next meeting: August 31 from 8:00 – 10:00 AM at MnDOT Central Office
- Presentation to the Advisory Council on September 25, 2018

Charter Highlights

- Meetings are open to the public
- Join the subcommittee by providing your email address
- Meeting notes will be approved by liaisons and provided to subcommittee for additional comments
- Respectful discussion, opportunities to be heard and to listen
- Consensus or summary
- Meeting evaluation emailed after meeting



Overview of Connected & Automated Vehicles
MnDOT CAV-X Office

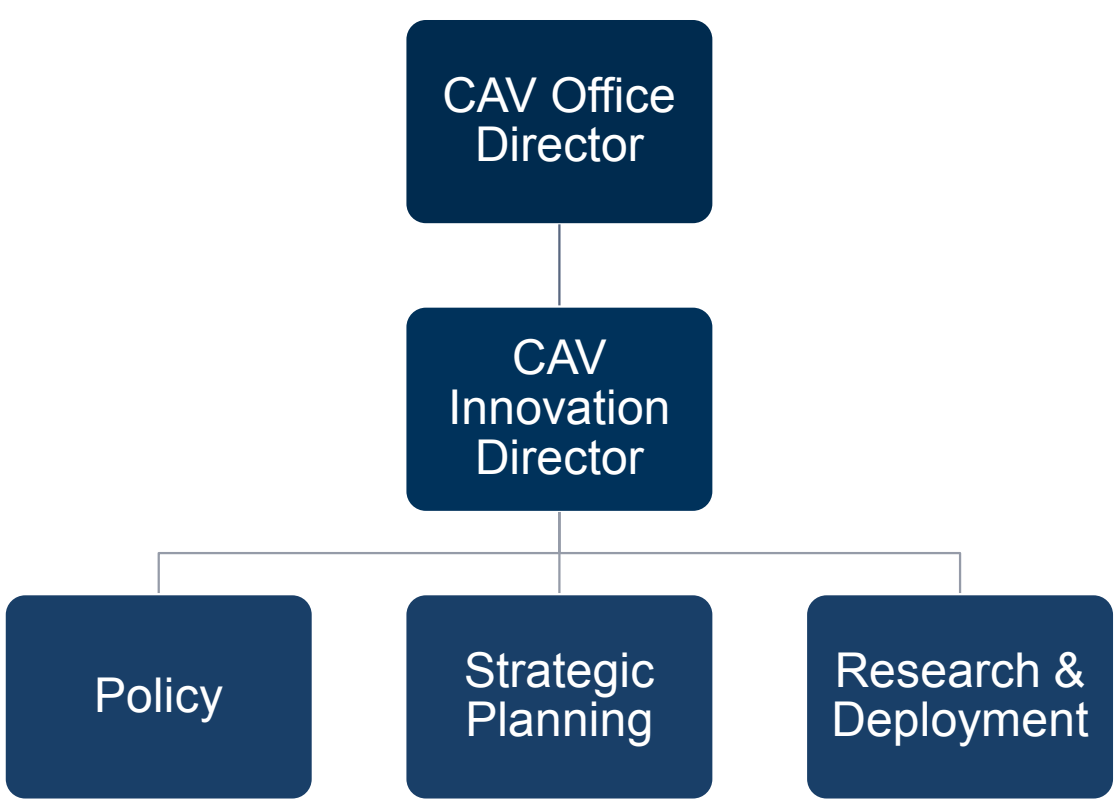
DEPARTMENT OF TRANSPORTATION

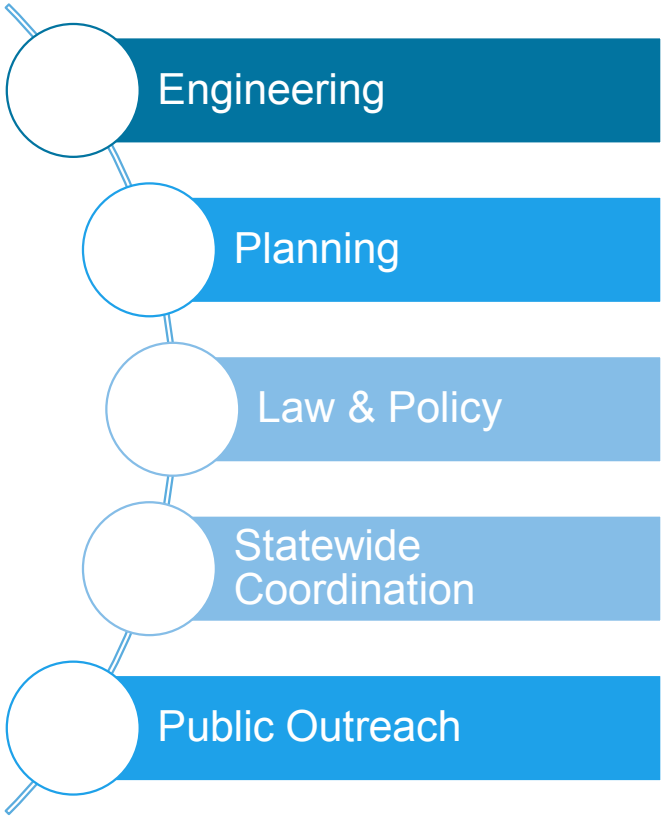
Kristin White, J.D.
Connected and Automated Innovation Director

DEPARTMENT OF TRANSPORTATION

Who we are

MnDOT CAV-X Office





DEPARTMENT OF TRANSPORTATION

What we're talking about

Connected Vehicles

Connected vehicles **“talk” to infrastructure**, including roads, traffic signals, and other vehicles electronically.

Automated Vehicles

Automated vehicles can **take control of** some or all aspects of **driving tasks**.

0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Society of Automotive Engineers (SAE) Levels of Automation

Connected & Automated Vehicles

Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors

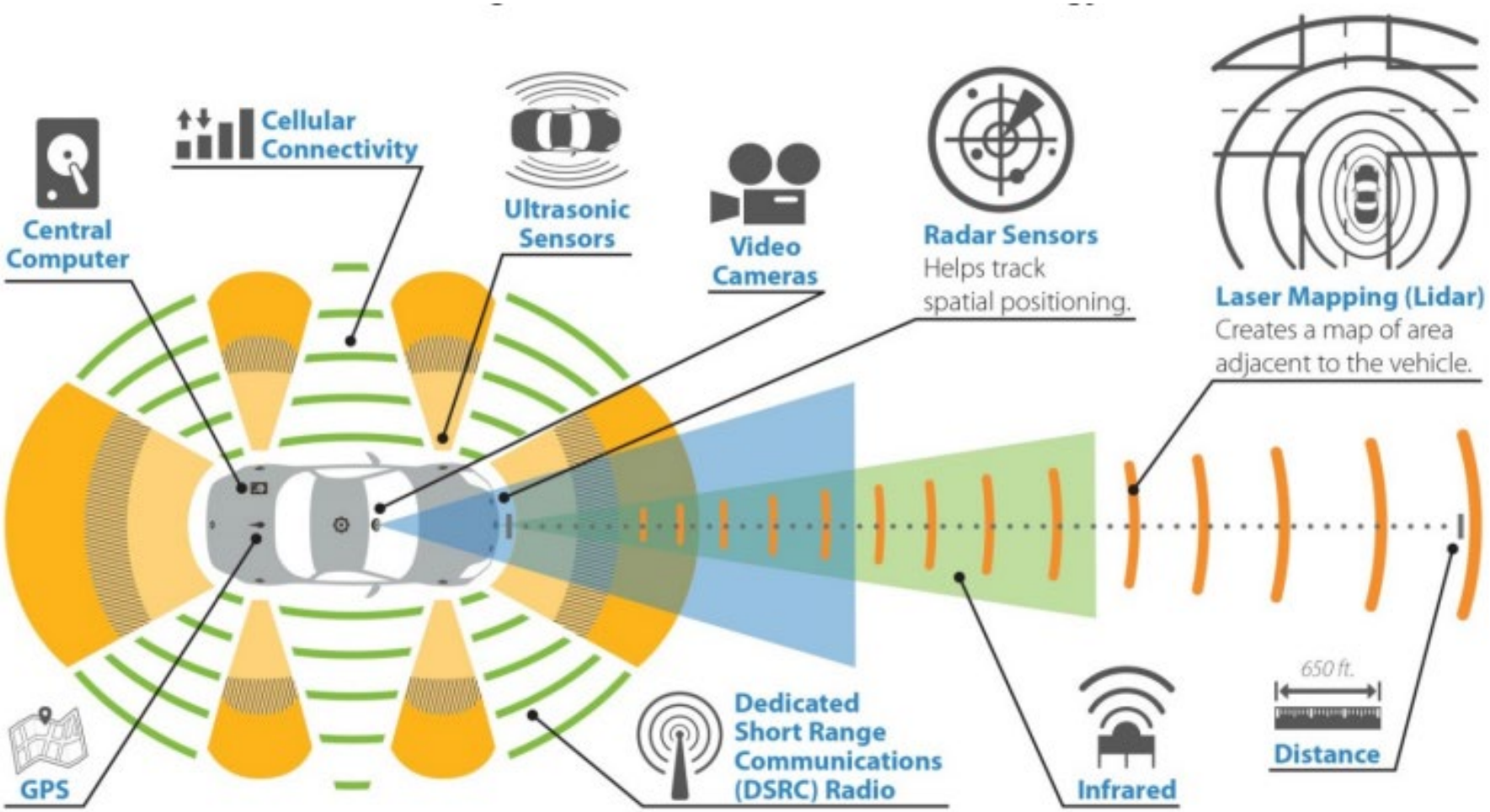
Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities

Connected Vehicle

Communicates with nearby vehicles and infrastructure

How does it work?



Electric Vehicles

Majority of CAV being developed on **battery, solar, or electric**-generator platforms.

Shared Mobility

Shared use of a vehicle, bicycle, or other transportation mode on an **as-needed basis**

1 account to access, plan, and pay for private and public transportation options

Alternative Automation

Truck Platooning

Automated Delivery

Pieces of Automation Already Available

Lane Assist & Departure Warnings

Self-Parking

Signal Countdowns

Thank you

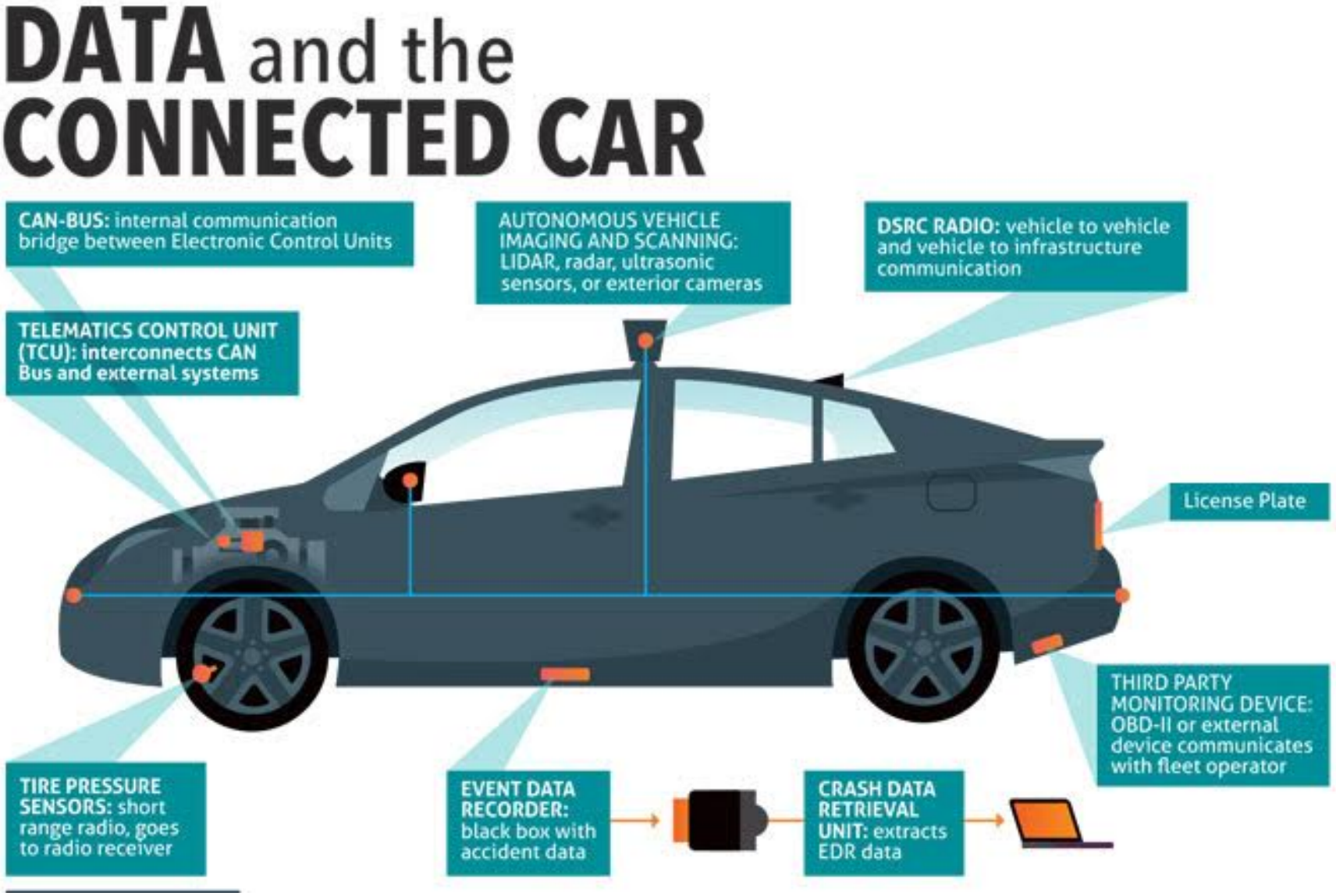
DEPARTMENT OF TRANSPORTATION

Kristin White, J.D.
CAV Innovation Director
kristin.white@state.mn.us

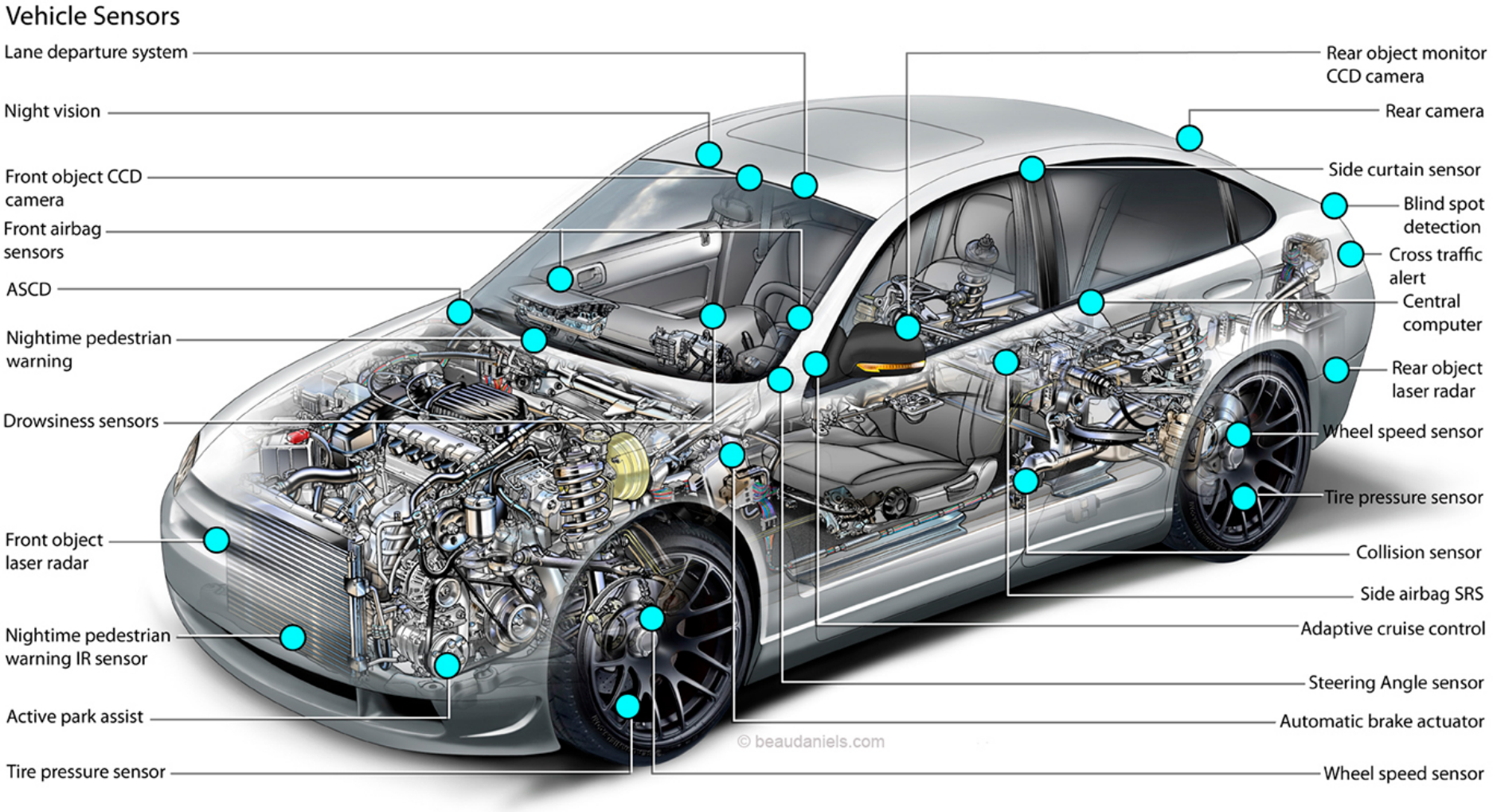
Key CAV Issues for Cyber Security and Data Privacy

Damien Riehl

Stroz Friedberg


DATA and the
CONNECTED CAR
CAN-BUS: internal communication bridge between Electronic Control Units
AUTONOMOUS VEHICLE IMAGING AND SCANNING: LIDAR, radar, ultrasonic sensors, or exterior cameras
DSRC RADIO: vehicle to vehicle and vehicle to infrastructure communication
TELEMATICS CONTROL UNIT (TCU): interconnects CAN Bus and external systems
License Plate
THIRD PARTY MONITORING DEVICE: OBD-II or external device communicates with fleet operator
TIRE PRESSURE SENSORS: short range radio, goes to radio receiver
EVENT DATA RECORDER: black box with accident data
CRASH DATA RETRIEVAL UNIT: extracts EDR data

Regulate me?


Vehicle Sensors
Lane departure system
Night vision
Front object CCD camera
Front airbag sensors
ASCD
Nightime pedestrian warning
Drowsiness sensors
Front object laser radar
Nightime pedestrian warning IR sensor
Active park assist
Tire pressure sensor
Rear object monitor CCD camera
Rear camera
Side curtain sensor
Blind spot detection
Cross traffic alert
Central computer
Rear object laser radar
Wheel speed sensor
Tire pressure sensor
Collision sensor
Side airbag SRS
Adaptive cruise control
Steering Angle sensor
Automatic brake actuator
Wheel speed sensor
© beaudaniels.com

Regulate me?

CYBERSECURITY

Cybersecurity:

- Government role in connected-car cyber preparedness?

Cybersecurity:

- For connected infrastructure, Governmental role in ensuring that vendors' sensors and devices are secure?

Cybersecurity:

- Require government inspection of auto and infrastructure security?
- Permit private citizens?
- Permit companies?

Cybersecurity:

- Reporting requirements for connected autos' security vulnerabilities or attacks?

Cybersecurity

- Require “security by design”?

Cybersecurity

- Require encryption standards?
- Back doors?

Cybersecurity

- Blockchain?


privacy

Privacy

- Government role in connected cars' privacy implications?

Privacy

- **Optimal balance:**
- Business innovation vs. proprietary info?
- Business innovation vs. privacy?

Privacy

- Guidelines/requirements on connected-vehicle data collection, storage?

Privacy

- GPS locations?
- Driver behavior (e.g., jackrabbit starts)
- Ride-share history (across vehicles)?
- In-car cameras?

Privacy

- Different than privacy implications of smartphones?

Privacy

- Statutory protections?
- Regulatory protections?

Privacy

- Require “privacy by design”

Privacy

- **Commercial** access to citizens' data?
- In aggregate?
- "Anonymized"?

Privacy

- **Academic** access to citizens' data?
- In aggregate?
- "Anonymized"?

Privacy

- Restrict or prohibit commercialization of connected auto PII?

Privacy

- Insurers’ access?

Privacy

- Government disclosure of:
- Vehicle-related PII collected, retained?
- Explanation how used, disclosed, handled?
- Minimization of such collection/retention?
- Retention period? Destruction period?
- Protection against unauthorized disclosure? Encryption?
- OEMs' privacy policies?
- Citizens' ability to stop PII collection?
  - Use?
  - Distribution?
  - Sale?

Other thoughts

Key Questions

- What is the optimal balance between business innovation and protection of proprietary information?
- What is the balance of user privacy and CAV technology benefits?
  - What policies or rules will help strike these balances?
- What happens to the large amounts of data created using this technology?
  - Recommended policy for storage of data
  - Recommended policy to ensure private user data remains private
  - Appropriate use of data (non-commercial)
  - Other
- Does blockchain offer ways to protect data and ensure accuracy?

Review of Questions

- Are any questions missing?
- Have the themes of safety, risk, equity and environment been considered?

Discussion

Next Steps & Closing

DEPARTMENT OF TRANSPORTATION

Thank you

Aaron Call, MnIT

Co-Liaison

Damien Riehl, Stroz Friedberg

Co-Liaison

Governor's Advisory Council on Connected and Automated Vehicles
Cyber Security & Data Privacy Subcommittee

Meeting Notes

Meeting Date: August 17, 2018 8:00 – 10:00 AM

General Meeting Notes

CAV Principles (K. White presentation):

1. Connected vehicles
2. Automation to take over human tasks
3. Electrified vehicles
4. Shared mobility

Issues (D. Riehl presentation):

What is the government's role in:

- Preparedness
- Ensuring vendors' sensors and devices are secure
- Required inspections of security
- Permit private citizens/companies
- Insurance
- Reporting requirements for vulnerabilities or attacks
- Encryption standards/backdoors
- Security by design/privacy by design
- Blockchain
- Privacy implications
- Innovation/trade secrets/PII
- GPS/driver behavior/travel history/in-car cameras
- Smartphones
- Statutory/regulatory/policy
- Commercialization
- Coordinate with Federal regulations
- What is disclosed …

Top issues from the subcommittee's small group discussions:

Data Privacy

- Goal: Prevent anyone from de-anonymizing the data
- Data must be anonymized at the collection point

To what extent does the driver need to be identified (PII)?

- How do drivers fit?
    - In the future it may not be a "driver" (e.g., primary user, owner, operator)
    - The person who has contracted the vehicle
    - Connected vs autonomous cars (connected has a driver)
    - Legally/statutorily the term driver is problematic – operator more accurate/easier for court – make the distinction
    - Enabling system to determine whether driver or system is at fault

Driver/Infrastructure – Advancement of Research

- To what extent should Minnesota be a curator of data (clearinghouse?) and for what uses
- Swiping card on dashboard (rental car, driver's license)
- How much data should be kept?
    - Internal vs external storage

Innovation

- What role does the government have to work with private industry to standardize?
- What testing standards are used for testing? Airplane?

Data and Records

- What should be identifiable and accessible? For example: Capability to determine fault.

Should this be private?

- Government should provide a foundation of standard requirements for records.
    - "Black box" info
- State liability for connection with state infrastructure
- Car manufacturer liability
- (Note, link to Insurance and Liability Subcommittee)
- Who curates map data: road, lane, intra-lane
- Where does state's responsibility begin?

What is the Role of Block Chain?

- There is precedent regarding responsibly to secure state's IT systems and buy mechanisms to protect, but cannot take responsibility for what we don't manage
    - Secure what you control
    - Transport layer security versioning issue
- 1609.2 IEEE Standard Wireless Access Vehicular Environments
- Testability

Public/Private Data

- Protection of data (Equifax concerns)
- Current -1 is the standard without a choice
- Coalition with other states
- Best practices with respect to cyber security – risk assessment
- Change profile – safe harbor with respect to liability issues for
- Pool of $ for manufacturers to cover liability
- Service Organization Controls reports dependent on auditor – audit firm takes on liability of report
    - Will insurers report what they are doing to mitigate risk? SOC report?
- Demonstrating rigor and compliance
- SOC, ISO, NIST

Communication

- Consider how to communicate this to laypersons and the general public
- Build trust
- Legislators/others will not understand but instead ask if it is true and believable
    - Concerns about false reports and misinformation leading to catastrophic results/malicious information
    - Reliability and integrity concerns

Other

- DMV-type assessments – determine efficacy based on sensors and assign a score
    - DOT gives certificate to drive based on score or flips to manual and can't drive until 'trust' of system is approved
- Privacy by design – IPV6 (Internet Protocol version 6) privacy mode must be enabled
- Up front security because infrastructure changes are expensive

Tentative & Final Recommendations

Recommend making a distinction between operator and driver in statutes/rules/policies going forward.

General sense that it is in MN's best interests to pursue public/private partnerships to learn from and protect data. No specific recommendation yet.

Next Steps

Renee will send her presentation
Liaisons and CAV-X will provide resources on website

Parking Lot - items for follow up at subsequent meetings

None

Governor's Advisory Council on Connected & Automated Vehicles
Subcommittee on Cyber Security and Data Privacy

Agenda

Friday, August 31, 2018 8:00 – 10:00 AM at MnDOT TECC Center
MnDOT Central Office, 395 John Ireland Boulevard, St. Paul, MN 55155

Join Skype Meeting

Subcommittee Goal: *The goal for the Cyber Security and Data Privacy Subcommittees is to formulate and recommend to the advisory committee key considerations for Minnesota statutes, rules, and policies related to connected and autonomous vehicles' date storage, security, use and privacy.*

1. Welcome and Introduction

2. Summary of Last Meeting's Discussion Topics and Tentative Recommendations

(Subcommittee Liaisons: Aaron Call, Damien Riehl, Josh Root)

- Data Privacy
- Driver/Infrastructure – Advancement of Research
- Innovation
- Data and Records
- What is the Role of Block Chain
- Public/Private Data
- Communication
- Other

3. Discussion: Other Topics the Subcommittee Would Like to Address

4. Recommendations to the Advisory Council

- Is the subcommittee ready to present to the Advisory Council on September 18?
- Summarize recommendations or schedule another meeting, other next steps

5. Closing

To request this document in an alternative format, please contact the Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

DEPARTMENT OF TRANSPORTATION

Tentative Recommendations from August 17, 2018 Meeting

- Definitions
  - Recommend making a distinction between "operator" and "driver" in state statutes
- Security & Validating AV Data
  - Need a way to identify if/when the automated system is in use (e.g. using a light or basic safety messages)
  - Need to use SOC/ISO/NIST 853 framework to demonstrate compliance with cyber security laws
  - Need to create levels of trust validations; E.g. State of MN data is highly-trusted but anonymous user who submits for the first time has lower level of trust that requires higher validation/authentication
  - Need to design security at beginning of programming (security by design) to reduce costs and schedule
  - Need security certificates for basic safety messages (BSMs)
- Collecting Data
  - Need to establish ways to collect new data to advance data and create data sets while protecting PII
- Sharing Data & Standardization
  - Need to standardize infrastructure and automation technology
  - Need to anonymize metadata in a manner that still allows data to be useful
- Collision & Incident Reporting & Liability
  - Need to address liability for state-owned infrastructure communications
  - Need to establish liability for automated vehicle manufacturer when vehicle does not communicate with infrastructure correctly
  - Need to establish when state's responsibility for protecting data begins (e.g. when it comes into agency systems
  - Need to establish safe harbor for liability concerns when sharing data
  - Need to establish how long accident/collision data must be maintained (whether on board or externally), e.g. "black box" information
- Partnerships, Education & Engagement
  - Need to find plain language to explain to public and legislators whether data is accurate and true
  - Minnesota needs to pursue public/private partnerships to learn from and protect data.

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Questions

- What is the optimal balance between business innovation and protection of proprietary information?

- What is the balance of user privacy and CAV technology benefits?
  - What policies or rules will help strike these balances?

- What happens to the large amounts of data created using this technology?
  - Recommended policy for storage of data
  - Recommended policy to ensure private user data remains private
  - Appropriate use of data (non-commercial)
  - Other

- Does block chain offer ways to protect data and ensure accuracy?

- What is the state's role in providing data (e.g. GPS RTK data) to private companies?

- Could the state test AV sensors in real-time to determine efficacy and evaluate with a numerical score? Should AVs have to go to the DOT to ask permission to drive after validation?

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Cyber Security & Data Privacy

DEPARTMENT OF TRANSPORTATION

August 31, 2018

Welcome and Introductions

Summary of Last Meeting

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure & Investment	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Governor's Advisory Council on CAV

Subcommittee Goal

The goal for the Cyber Security and Data Privacy Subcommittee is to formulate and recommend to the Advisory Committee key considerations for MN statutes, rules and policies related connected and autonomous vehicles' date storage, security, use and privacy.

Evaluation Feedback

- Generally satisfied
- Request to keep the discussion high level

Evaluation Comments

- How do we handle extra judicial regulatory requirements? GDPR Implications or CCPA, etc.
- Equity should be considered
- What data is public and what is subject to search and seizure laws?
- What information is available to manufacturers or to dealers for improvements on the product vs protected consumer information. (Targeted Ads, notification of lease overage, "risky behavior" sent to insurers, etc.)
- Being a commercial user, we must have uniform standards in line with all other states.

Responses to Meeting Notes

- Don’t over promise on CAV. A lot is unknown
- Cyber security is about more than data protection (hacking, misuse of data)
- Timing – CAV is not one thing, one time
- Use inclusive language – people need to understand it to support it, be involved

Review of First Meeting- Themes

- Data Privacy
- Driver/Infrastructure – Advancement of Research
- Innovation
- Data and Records
- What is the Role of Block Chain
- Public/Private Data
- Communication
- Other ?

Review of Tentative Recommendations

See page 2 of agenda

Discussion

Small Group Breakouts

Small Group Discussion

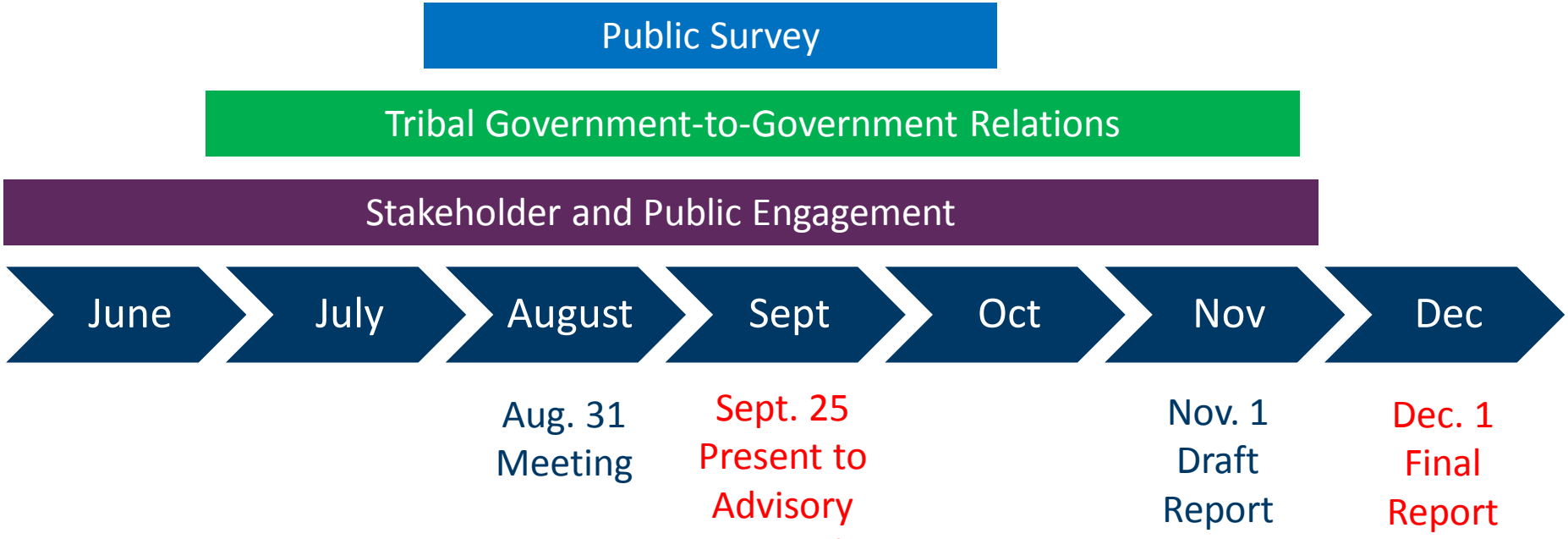
- Select themes for discussion.
- Decide which theme you want to work on and meet together in small groups.
- Select a recorder and reporter for your group.
- Discuss the topic and record *all* proposed recommendations on a post-it or put them on flip chart paper.
- Decide which recommendations have consensus in your group.
- Come back together and the reporter shares consensus recommendations, discuss as a large group.

Next Steps & Closing

Next Steps

- Meet again?
- Feedback on meeting process & structure?
- Finalize written recommendations
- September 25th: Present to Advisory Council
- Public survey on www.state.mn.us/automated/

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Aug. 31 Meeting
Sept. 25 Present to Advisory Council
Nov. 1 Draft Report
Dec. 1 Final Report

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Thank you

Aaron Call, MnIT
Co-Liaison

Damien Riehl, Stroz Friedberg
Co-Liaison

Cyber Security & Data Privacy Skype Meeting Notes

September 14, 2018

Consensus revisions to slides are found in red text and yellow highlighter.

1. Attendees
    a. Maggie Green
    b. Heidi Fessler
    c. Josh Root
    d. Kelsey Schwarzrock
    e. Damien Riehl
    f. Skip Foster
    g. Tom Wanamaker
    h. Bill Lefheit
    i. Maggie Green
    j. Russ Reilly
    k. Chris Geisler
    l. Kristin White
    m. Steve McGregor
    n. Fakurudin Mohamed
    o. Craig Gustafson
    p. Eran Kahala
    q. Russ Reilly
2. Considerations
    a. Recommendations: Need definition of driver, operator
    b. Classification of data that is generated
    c. Security: In communications channels, vehicles, data
    d. Partnerships
    e. Regulatory: Opt-in option; protecting data
    f. Inevitable consequences: Data generation, storage and distribution. CAVs can generate massive amounts of data. What are we storing? Where? How?
3. Recommendation 1: Definition of driver
    a. No longer requires a human being driving the vehicle
    b. The term driver is defined in Minnesota statute is defined as “driving or in control of the vehicle.”
    c. Damien: On the levels of autonomy, with L5 you would be a passenger. With a level 4, you would have someone controlling or operating a vehicle.
    d. Tom: Leaning towards driver
    e. Chris Geisler: Don’t need to change the term “driver” in every statute. Need to think about the driver
    f. Heidi: Driver in criminal context will be different with respect to remote controlling of vehicle. How does this interact with criminal context?

g. Damien: With L5 autonomy you could have a blind driver operating the vehicle.
h. Josh: Need to offer privacy protection to person owning vehicle, driving vehicle, and passenger

4. Recommendation 1: Definition of private data
    a. Includes personal identifiable information (PII)
    b. Broad definition of PII that is explained in plain language
    c. Look to federal GDPR outcomes
5. Recommendation 2: Classification
    a. Do what we can to ensure data is aggregated and anonymized as much as is practical
        i. Summary data versus specific data
    b. Rudy: When we say "anonymized" are we discussing the data and how it can't be tied back to an individual?
    c. Damien: A: Yes. We discussed if you anonymize something with an arbitrary ID not tied back to an individual, it could be de-anonymized by connecting other data points like geo-location. Legislature/regulators need to be careful. Need to obfuscate to a point where de-anonymization is less likely.
6. Recommendation 2: Classification
    a. There is commercial value and opportunity for public-private partnerships to advance public good. That benefit of P3s should be balanced with potential privacy challenges (or appearance thereof)
    b. 2nd paragraph should be focused on sharing of data
    c. Should make this language clear so the slidedeck stands on its own without verbal presentation
    d. Q: Is there a difference ; if we hire a private company to store gov't data (versus the state agency), e.g. a third party or research company. A: Generally third party contractors are subject to same state data privacy standards.
7. Recommendation 3: Uniformity
    a. Need uniformity with federal gov't and states
8. Recommendation 4: Security
    a. Goal is not to resolve all security issues or standards, but that there are best practices
    b. Early and often; "baked in" approach is best
    c. Identify a standard security rubric, as opposed to a specifically security protocol (e.g. IEEE). Doesn't make sense to use European approach if other states are not
    d. Need authentication
    e. Edit SOC to SAE
    f. Discussed scoring of these security communications; higher trust means a higher rating
    g. Immutability and integrity is critical
    h. NY Dept. Financial Services financial security approach: Trend to aggregate standards to build something from existing frameworks. Not building something new. Can borrow from other standards which show common ideas. Don't need to reinvent the rules.
    i. Without people walking through the 4-points it will be difficult to standards; get away from the acronyms.
    j. Acronyms can be difficult; Be aware that OEMs have their own proprietary systems. Whether you're Tesla or Ford, you should be able to understand the security standards

k. Don't need 4 examples. Could use ISO and NIST (since some folks have heard of these). Instead revise to "Industry security examples"
l. "Trust and authenticate: Confirming who you are"
m. "Immutability and integrity: Avoiding unwanted changes"
n. "Scoring the functionality of the vehicle" – Could delete this since it's not related to privacy
o. Remove SOC: It's a reporting mechanism. It's a trust/authenticate issue.
p. Change items 1-4 to:
    i. 1. Use Industry standards for security and electronics
    ii. 2. Ensure we can trust creators of the data – confirm who you are
    iii. 3. Are all data reports equal? E.g. LEO's vs. anonymous reporters.
    iv. 4. Ensure the data is kept safe and is unchanged

9. Recommendation 5: Partnerships
    a. There is a role for industry and gov't to play
    b. Increase availability of CAV benefits "to both citizens and businesses" Need to tighten up the language. This also addresses the equity requirements the EO had
    c. Add:
        i. 2 themes when need regulations that are extensible and flexible, e.g. Cadillac may have some special data it wants to send to other Cadillacs. If this doesn't interfere with basic safety messages (BSM), then Cadillac could do so.
        ii. E.g. Standards are going to be minimum requirements, but partnerships could exceed those requirements
10. Recommendation 5: Partnerships
    a. Mapping
    b. CAVs will need clearer roadmap and lane map. There may be an additional burden placed on traditional entities that do this. E.g. Hennepin County may be able to do something that Aitkin County cannot.
11. Recommendation 6: Regulatory
    a. Minnesota's Breach standards are good, however we need to look at California, New York, GDPR and what Canada's GDPR has done for them.
    b. We should provide expectations and certainty for what happens in a breach situation. E.g. Target and Home Depot. There is a public perception with these breaches.
    c. There are some lessons learned, e.g. carrot-and-stick approach by removing private right of action but having a regulatory enforcement action.
    d. Comment: Concerned about discussing breach within existing breach notification requirements. These are connected with PII (e.g. card holder information). Not convinced CAV has the same intimate connection to PII that we see in other settings
    e. Comment: EU has clarified that geo-location connected to a name is considered PII.
    f. Comment: Agree that we need to prepare for geo-location and ability to trace it back to an individual.
    g. Comment: Propose a roll-out type of approach. Issues with CAVs are infrastructure non PII. There will be potential for PII to be involved. Non-public personal information (NPPI). In the future we will need to be concerned.

h. Online comment A CAV may authenticate an individual – and pas that authentication/identity to MN gov't systems.
i. Online comment: Agree. Authentication does provide user attribution which will be matched to geo-location.
j. Online comment: Also, one degree of separation. An app (e.g. Facebook) tracks geolocation. CAV tracks geolocation. App correlates geolocation to confirm identity.
k. Action: Reframe this language to address the above and gain approval from the subcommittee.

12. Recommendation 6: Regulatory
    a. Need opt-in language
    b. Revision: If individual opts-out, it should not impact the service. This is included in California language.
13. Recommendation 7: Inevitable Consequences; Change to "Collection, Storage and Distribution of Data"
    a. Collection, storage, and distribution of data
    b. Will be significantly expensive to manage
    c. Make Council aware that this will be a long-term problem. If we don't do this right at the beginning, it will be complex and expensive
    d. If we don't collect un-needed data at the beginning, we protect ourselves from managing it later.
    e. Ensure we understand what gov't needs versus what it wants
14. Next Steps
    a. Make revisions to the slides and send out by Wednesday, September 19th
    b. Group will review and make any final changes by Friday, September 21st
    c.

Subcommittee on Cyber Security and Data Privacy

Damien Riehl| Joshua Root

DEPARTMENT OF TRANSPORTATION

Considerations

1. **DEFINITIONS** – The terms currently used in industry, statute, or rule may not align with how people or the law will interpret CAVs' newly revised "driving" experience.
   A. Driver vs. Operator
   B. Private Data

2. **CLASSIFICATION** – The Minnesota Data Practices Act's data-classification scheme will impact which CAV data is shared, how it could be shared, and with whom.
   A. Aggregate data vs. Specific data
   B. Commercial value vs. Obligation

3. **UNIFORMITY** – Will specific industry, federal, or early adopting states use a shared framework?
   A. Minnesota vs. the World (or at least North America)

Considerations

4. **SECURITY** – The sooner security protocols are determined, the cheaper they will be.
   A. Standards (SOC vs. ISO vs. NIST vs. IEEE)
   B. Trust / Authenticate
   C. Score
   D. Immutability / Integrity

5. **PARTNERSHIPS** – This is an exciting area with a few early players. There is great knowledge, but be careful not to isolate new ideas. There can be more than one buggy whip.
   A. Winners vs. Losers

Considerations

6. **REGULATORY** – In CAV, the government's role can help foster new development, while protecting the public from bad actors.
   - *A. Breach*
   - *B. MN vs. CA vs. NY vs. EU vs. CAN*
   - *C. Regulatory response vs. Private right of action*
   - *D. Opt In (Collection / Use / Sale)*
   - *E. Consumer Information*
   - *F. Disclose what data is being collected*
   - *G. Opt In (Collection / Use / Sale)*

7. **INEVITABLE CONSEQUENCE** – Start the process now: determine what data to collect, where it will be retained, and how it will be disseminated.
   - *A. Storage*
   - *B. Distribution*

Recommendation 1: DEFINITIONS

The terms currently used in industry, statute, or rule may not align with how people or the law will interpret CAVs' newly revised "driving" experience.

A. *"Driver" vs. "Operator"*

B. *Private Data*

Our group thinks that with the advent of CAVs, the legislature should clarify two terms: "Driver" and "Private" data.

Driver. Currently, the term "driver" is a sliding-scale element that routinely means the person controlling the steering wheel. If the role of control is changing — from human to machine — then that term might be ripe for re-definition. Be aware of this potential shift as you develop policy and use the words "driver" and "operatator" consistently and intentionally.

Recommendation 1: DEFINITIONS

The terms currently used in industry, statute, or rule may not align with how people or the law will interpret CAVs' newly revised "driving" experience.

A. *"Driver" vs. "Operator"*

B. *Private Data*

Private Data 1. Control relates to another key term: "private." Our group had considerable conversations about how that term exists in statute, business, and common perception. We noted that the federal government is also looking at PII definitions and it will be important to track what is being done nationally.

Regarding PII (personally identifiable information), we concluding that connected "talking" vehicles could share more personal information than the public is likely going to be comfortable with. Specifically, the group considered two privacy aspects:

(1) what information about a human is being shared and

(2) with whom.

Recommendation 1: DEFINITIONS

The terms currently used in industry, statute, or rule may not align with how people or the law will interpret CAVs' newly revised "driving" experience.

A. *"Driver" vs. "Operator"*

B. *Private Data*

Private Data 2. People frequently share their PII with private companies, in exchange for services (e.g., Google), but that dynamic changes when that PII is shared with governmental entities.

As a first step, the legislature might consider expanding the definition of Private Data as it relates to data the government collects about humans who travel in vehicles. The public might not be comfortable with governmental sharing of sensitive data (e.g., pinpoint geolocation, driving habits) that CAVs may collect and communicate.

Recommendation 2: CLASSIFICATION

The Minnesota Data Practices Act's data-classification scheme will impact which CAV data is shared, how it could be shared, and with whom.

1. *Aggregate data vs. Specific data*
2. *Commercial value vs. Obligation*

Collection. Carrying forward the theme of "What is private data?" — we also evaluated what data types governmental authorities will likely collect, create, store, or maintain. We also considered how both governmental entities and industry might use that data. We noted that aggregated data can be de-aggregated. We came to two general consensus elements:

(1) This data should be **anonymized** and **aggregated**, reducing attributability to a particular person, and

(2) The data likely has **value**.

Recommendation 2: CLASSIFICATION

The Minnesota Data Practices Act's data-classification scheme will impact which CAV data is shared, how it could be shared, and with whom.

1. *Aggregate data vs. Specific data*
2. *Commercial value vs. Obligation*

Government may have a partnership opportunity with specific industry sectors regarding government-collected CAV data. But the data's potential commercial value could also complicate the governmental role.

Clarifying or setting policies around the data would help create both a uniform roadway user experience and data simplification.

Recommendation 3: UNIFORMITY

Will specific industry, federal, or early adopting states use a shared framework?

1. *Minnesota vs. the World (or at least North America)*

Many states — Arizona, California, Michigan, and Minnesota (among others) — are currently considering how to integrate these new technologies into:

(1) the driver's experience,

(2) regulatory framework, and

(3) future planning.

We strongly urge Minnesota to not "go it alone." Rather, we should collaborate to help frame the future vision. As the ground solidifies about how machines, infrastructure, and humans are integrating this technology, Minnesota should adopt as much of that practice as practicable (considering our state-specific needs).

Rather than re-creating the wheel, we should identify where "the way it is" could work for us.

Recommendation 4: SECURITY

The sooner security protocols are determined, the cheaper they will be.

1. *Industry Security Standards (ISO, NIST) – Common use in industry*
2. *Trust / Authenticate – Confirming who you are*
3. *Immutability / Integrity – Avoiding unwanted changes*

Insert Bill's online comments here

The single most important element of CAV vehicles is their security protocols. If the security is implemented poorly, no other element will have its anticipated effect.

Security is best "baked in" which means developers and policymakers need to emphasize "security by design."

Much like the previous aspect (Uniformity), security standard-making provides an opportunity for Minnesota to pair with early adopters to pick a technology. We need to avoid the Betamax vs. VHS wars; rather than market fragmentation, we should help the industry consolidate around common security standards

Recommendation 4: SECURITY

The sooner security protocols are determined, the cheaper they will be.

1. *Industry Security Standards (ISO, NIST) – Common use in industry*
2. *Trust / Authenticate – Confirming who you are*
3. *Immutability / Integrity – Avoiding unwanted changes*

We suggest that beyond the basic security backbone, Minnesota should also invest in systems that permit building relationships with changing technology.

Like human relationships, identifying/building relationships with technology can increase its credibility — and infrastructure's ability to rely on that relationship.

Recommendation 5: PARTNERSHIPS

This is an exciting area with a few early players. There is great knowledge, but be careful not to isolate new ideas. There can be more than one buggy whip.

1. *Public-private partnerships*
2. *Maps / Mapping*

Partnerships. In the CAV space, private industry is seeing great competition and investment — at a level that government is unlikely to match. Large-scale investment leads to increased innovation.

As such, Minnesota may want to consider partnering with private industry to both:

(1) increase the availability of CAVs' benefits to citizens and businesses, as well as

(2) further and enforce Minnesota's obligations to maintain safety standards.

The state's policies should incentivize public/private cooperation through partnerships. The standards are minimum requirements. Industry should be able to do more as long as they adhere to the minimum.

Recommendation 5: PARTNERSHIPS

This is an exciting area with a few early players. There is great knowledge, but be careful not to isolate new ideas. There can be more than one buggy whip.

1. *Public-private partnerships*
2. *Maps / Mapping*

Maps. The group also discussed private-industry partnerships for maps/mapping.

The State has a role in reporting what is being done on roads (e.g., construction, detours), which could impact CAVs' performance.

Certain roads may have higher or lower "trust" levels and CAV-capability.

Similarly, map attributes (e.g., streets, lanes, potholes) might have a variety of sources (e.g., government, industry, individuals).

The state should consider staffing and funding a system that assesses the reliability of map data and its sources. And additional research and partnering is required to define the state's role.

Recommendation 6: REGULATORY

With CAV, the government's role can help foster new development, while protecting the public from bad actors.

1. *Breach*
2. *MN vs. CA vs. NY vs. EU vs. CAN*
3. *Regulatory response vs. Private right of action*

"Liaisons will rewrite this language to propose to the group."

Breach. Where there is data (information), there will be a breach.

Multi-jurisdiction. Minnesota has one of several successful data classification and breach systems that have developed, in addition to California, New York, the EU, and Canada. We believe that Minnesota's requirements are fair, even with changing technology. But some enhancements may provide increased certainty for business sectors.

Regulatory response vs. Private right of action. We believe that given the known issues, legislators and regulators should consider explicit guidance, rather than requiring people and industry to rely upon policy being made through costly and uncertain litigation.

Recommendation 6: REGULATORY

With CAV, the government's role can help foster new development, while protecting the public from bad actors.

1. *Breach*
2. *MN vs. CA vs. NY vs. EU vs. CAN*
3. *Regulatory response vs. Private right of action*

Consumer information. We see great room for improvement on consumer notice and protection.

Disclosure. Data collectors (governmental and private) must disclose what data the CAV is collecting about people. And the data-collection purpose should be clear (e.g., traffic flow, road conditions, safety, emissions).

Opt-in language can help consumers chose what data they are willing to share, and with whom. Specifically, we discussed three areas where opt-in is preferred:

(1) collection (likely by OEMs),

(2) use (likely both OEMs and trusted suppliers), and

(3) sale (controlling who may buy data about people).

A consumer who does not opt in should not experience degraded service by making this choice.

Recommendation 7: STORAGE, MANAGEMENT AND COLLECTION OF DATA

Start the process now: determine what data to collect, where it will be retained, and how it will be disseminated.

1. *Collection*
2. *Storage*
3. *Distribution*

Collection. Because CAVs are able to generate enormous amounts of sensitive data, government should first identify:

1. what data government needs (be specific and don't collect anything else)
2. for how long, and
3. what triggers destruction.

Storage, format, and necessity. After that, government should identify:

1. how to store it,
2. where to store it, and
3. whether to collect/store it at all.

Distribution. Who has access?

The best way to prevent data from being improperly being accessed: don't have the data at all.

Questions?

Thank you again!

–

Subcommittee on Cyber Security and Data Privacy Advisory Council Recommendations

Damien Riehl| Joshua Root

DEPARTMENT OF TRANSPORTATION

Considerations

1. **DEFINITIONS** – The terms currently used in industry, statute, or rule may not align with how people or the law will interpret automated vehicles being driven without human operators.

2. **CLASSIFICATION** – The Minnesota Data Practices Act's data-classification scheme will impact which CAV data is shared, how it could be shared, and with whom. The state will have to make private data anonymous and understand that this data has significant financial value.

3. **UNIFORMITY** – Need uniform data storage, collection, and usage amongst industry, states, and world.

Considerations

4. **SECURITY** – The sooner security protocols are determined, the cheaper they will be.
   A. Use security industry standards
   B. Trust and authenticate: Confirm who is providing the data sources and how trustworthy their data is
   C. Immutability and integrity: Avoiding unwanted challenges

5. **PARTNERSHIPS** – Public-private partnerships will be key to leverage industry knowledge to benefit citizens and benefits without minimizing safety

Considerations

6. **REGULATORY** – In CAV, the government's role can help foster new development, while protecting the public from risk.
   A. Address data breaches
   B. Look to existing standards
   C. Address how the government would respond in a breach and whether the public has a private right of action
   D. Public should have to "opt in" to allow the collection, use, or sale of their data
   E. Consumers must be informed
   F. Entities must disclose what data is being collected

7. **COLLECTION, STORAGE & DISTRIBUTION OF DATA** – Start the process now to determine what data to collect, where it will be retained, and how it will be shared.

Recommendation 1: Definitions

Recommendation 1A: Definition for ‘Driver’ & ‘Operator’

- **Define Driver & Operator.** Legislature should define ‘driver’ and ‘operator’ so as address situations where human is not operating the automated vehicle.

- **Consistent Definitions.** Legislature should ensure ‘driver’ and ‘operator’ are used consistently among statutes, rules, and policies.

Recommendation 1B: ‘Personally Identifiable Information’

- **Align with Federal Definition.** The State needs to revise the definition of “personally identifiable information” (PII) to align with federal standards.

- **Need PII Definition.** The State’s definition of PII needs to address *what* private information about a human is being shared and with *whom* the data is being shared.

Recommendation 1C: Definition for ‘Private Data’

- **Expand ‘Private Data’ Definition.** Legislature should expand definition of “private data” as it relates to data the government collects about humans who travel in vehicles.

- Understand that the public might not be comfortable with governmental sharing of sensitive data (e.g., pinpoint geolocation, driving habits) that CAVs may collect and communicate.

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Recommendation 2: Classification

Recommendation 2A: Data Anonymity, Summary & Value

- **Anonymization, aggregation & value**. The Minnesota Data Practices Act should be updated to:
  - make private data anonymous;
  - Summarize (or “aggregate”) data so that personal information is not identifiable; and
  - Understand that this data has significant financial value.

Recommendation 2B: Public-Private Partnerships & Uniformity

- **Partnerships to Collect Data.** The State should look into public-private partnership (P3) opportunities with industry regarding government-collected CAV data. These P3s should balance potential privacy challenges (or the appearance of privacy challenges).

- **Uniformity & Simplicity**. The Legislature should clarify or set policies around data that would help create both a uniform roadway user experience and simplify data.

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Recommendation 3: Uniformity

Recommendation 3: Uniformity with Other States

- **Uniformity.** Minnesota should adopt other state, federal, and international best practices, while also considering our state-specific needs, for uniform data storage, collection, and use.

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Recommendation 4: Security

Recommendation 4A: Security by Design

- **Security Protocols are Critical**. The Legislature must understand that the single most important element of CAV are their security protocols.

- **Security by Design**. The Legislature and developers must emphasize "security by design." Security is best thought about and integrated early in design, not afterwards.

- **Partnering for Standardization.** The State should avoid choosing a specific technology (e.g. Betamax vs. VHS). Instead the State should partner with industry around common security standards.

Recommendation 4B: Security Standards, Trust & Integrity

- **Early Integration Saves Costs.** The State should integrate security in design earlier in order to save costs. The sooner security protocols are determined, the cheaper they will be.

- **Allow for Changing Technology.** The State should invest in security systems that allow for changes in technology.

- **Use industry standards for trust and integrity.** In designing security systems, the State should:
  - Use industry standards for security and electronics
  - Ensure we can trust creators of the data (e.g. confirm who you are)
  - Ensure the data is kept safe and is unchanged.

DEPARTMENT OF TRANSPORTATION

Recommendation 5: Partnerships

Recommendation 5A: Partnerships to Engage Public & Increase Safety

- **Partnerships to Advance Safety Benefits.** The State should partner with private industry to:
  - increase the availability of CAV benefits to citizens and businesses, which also addresses equity work; and
  - further enforce Minnesota's obligations to maintain safety standards.
- **Partnership Incentives**. The State's policies should incentivize public-private partnerships. Understand that while State standards are minimum requirements, industry should be able to do more as long as they adhere to these minimum requirements.

Recommendation 5B: Public Data & Mapping

- **Construction & Operations**. Understand that the State has a role in reporting what is being done on roads (e.g., construction, detours), which could impact CAV performance.
- **Infrastructure Capacity.** Understand that certain roads may have higher or lower CAV-capability, e.g. gravel roads vs. paved roads with connected signals.
- **Mapping Data.** The State must recognize that mapping data (e.g., streets, lanes, potholes) may have a variety of sources from government, industry, and private individuals.
- **Staffing & Funding**. The State should staff and fund a system that assesses the reliability of map data and its sources.
- **Research.** Additional research and partnering is required to define the State's role.

DEPARTMENT OF TRANSPORTATION

Recommendation 6: Regulatory

Recommendation 6A: Data Breaches & Existing Standards

- **Look to existing standards.** Minnesota should look to existing state and international standards to clarify its data breach standards to provide more certainty for business sectors.

- **Government breach response.** The Legislature should make it more clear how the government would respond in a breach situation.

- **Private Right of Action**. The Legislature should make it more clear whether consumers have a public right of action in breach situations instead of allowing this issue to be litigated in courts.

Recommendation 6B: Consumer Protection

- **Consumer information.** The State should update the Minnesota Consumer Protection Act (MCPA) to enhance requirements for consumer notice and protection.
- **Disclosure.** The Legislature should require government and private data collectors to disclose *what* data the CAV is collecting about people, and why the data is being collected (e.g., traffic flow, road conditions, safety, emissions).
- **Opt-in.** The Legislature should require consumers to opt-in if they want their data shared to help consumers chose what data they are willing to share, and with whom. Opt-in should be required for:
    - collection (likely by OEMs),
    - use (likely both OEMs and trusted suppliers), and
    - sale (controlling who may buy data about people).
- **Fairness**. The Legislature should prohibit service from being degraded if consumers choose not to share their data.

Recommendation 7: Storing, Managing & Collecting Data

Recommendation 7: Storing, Managing & Collecting Data

- **Collection.** The Legislature should first identify:
  1. what data government needs
  2. for how long, and
  3. what triggers destroying records/data.

- **Storage, format, and necessity.** The Legislature should identify
  1. how to store data,
  2. where to store it, and
  3. whether to collect/store it at all.

- **Distribution.** The Legislature should clarify who has access to data.

Questions & Discussion

Thank you!

Damien Riehl

Josh Root

Aaron Call

Bill Leifheit

Craig Gustafson

MnDOT Connected and Automated Vehicles
Governor's Advisory Council
Land Use and Planning Charter

Executive Order/Purpose

Governor Dayton issued an executive order on connected and automated vehicles. The executive order recognizes that technology is evolving rapidly, and that Minnesota must prepare. The executive order established an advisory council comprised of 15 members appointed by the Governor and ex-officio members from state agencies and the legislature. The council will submit a report to the Governor and Legislature by December 1, 2018. The report will recommend changes in statutes, rules, and policies in eight areas, including cyber security and data privacy standards. The subcommittees are part of a larger effort to hear ideas about CAV from many Minnesotans. More information about the advisory council and this process is on MnDOT's CAV website..

Goal

The goal for the subcommittee is to develop recommended changes to land use and planning state statutes, rules and/or policies to the Governor's Advisory Council on Connected and Autonomous Vehicles ("CAV"). The subcommittee will discuss recommended CAV principles related to transportation, revenue and its interaction with land use and the role of planning.

Roles

MnDOT CAV-X Office is implementing the Executive Order.

- Jay Hietpas, P.E.
  Connected and Automated Vehicles Executive Director
  Jay.Hietpas@state.mn.us
- Kristin White
  Connected and Automated Vehicles Innovation Director
  Kristin.White@state.mn.us
- Praveena Pidaparthi
  CAV Policy and Planning Director
  Praveena.Pidaparthi@state.mn.us
- Cory Johnson
  ITS Program Manager
  Coryj.Johnson@state.mn.us

Co-liaisons will provide expertise to CAV X and the facilitation teams, review agendas and meeting notes prior to distribution, provide input on meeting logistics and process, and are engaged in the presentation of recommendations to the Advisory Council. (The subcommittee will decide how it wishes to present.)

- Emily Smoak, Minnesota Department of Health, emily.smoak@state.mn.us
- Frank Douma, University of Minnesota, douma002@umn.edu
- Mark Nelson, MnDOT, mark.b.nelson@state.mn.us

Facilitators will manage scheduling and meeting logistics, communication, draft agendas and notes, facilitate meetings and provide process guidance, and assist with compiling presentation materials.

- Aimee Gourlay, Aimee.Gourlay@mediationcentermn.org

Anyone who wants to attend is welcome at meetings. Subcommittee members will provide their knowledge and expertise by participating in meetings in person, or electronically and/or by commenting on meeting notes and recommendations. Meeting participants will be asked to sign in at the meetings. Those commenting on meeting notes will be asked to provide their name and contact information for follow up clarification, however comments will be aggregated and not attributed to any individual.

Meetings & Meeting Materials

Meetings will be scheduled based on the availability of the co-liaisons, CAV X staff and the facilitator, and presenters if applicable. It is anticipated that there will be two or three meetings prior to making a recommendation to the Advisory Committee. Members will be informed of meetings via email. Meetings will be announced and agendas will be available on the MnDOT CAV-X website at least one week before the meeting. Meeting materials will be posted on the website after each meeting and will be emailed to subcommittee members prior to the meeting. To request documents in an alternative format, individuals may contact the MnDOT Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). Individuals may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

Meeting Notes

Facilitators will provide notes of meetings. The liaisons will approve the notes, and subcommittee will have the opportunity to review and comment on them. Subcommittee members who were unable to attend a meeting may provide additional comment. Additional comments may be summarized by the facilitator.

Meeting Evaluation

All subcommittee members and those who signed in that they attended the meeting will receive a post-meeting evaluation.

Communication

The facilitator will include CAV-X staff and co-liaisons on subcommittee communication regarding logistics and planning. If the facilitator chooses to open a dialogue via email, all subcommittee members will be included.

Meeting Process

FACILITATION. Meetings will be facilitated. Meetings are expected to be two to three hours. Meetings will end on time and with a clear understanding of assignments and next steps. Extension of time, which is not encouraged, will require the consent of a majority of members attending that meeting by a show of hands.

TIMELINES. Participants understand that their work needs to be presented to the Advisory Council by October 30, 2018. They will do their best to meet the deadlines for giving feedback and other participation.

RESPECTFUL COMMUNICATION. Participants recognize that divergent ideas ensure robust recommendations and agree to listen respectfully to all opinions. The group may, if they choose, develop other meeting guidelines to facilitate communication.

NATURE OF RECOMMENDATONS. Recommendations will focus on maximizing the benefits and preparing MN for the adoption of automated and connected vehicles. Note that the recommendations are expected to be general rather than specific wording for state law, rules and policies.

DECISIONS/CONSENSUS. Recommendations from this group may be unanimous. If there is general consensus for a recommendation, meaning everyone is willing to support it, then it will be so noted for the Advisory Committee. If there is not a consensus, a summary of the rationales for different perspectives will be provided to the Advisory Council.

OPEN MEETINGS. Meetings will be open to all. The subcommittee meetings are public meetings, and people who are not on the subcommittee may attend. Depending on timing and number of participants, the facilitator may provide opportunity for members of the pubic to address the subcommittee in consultation with the co-liaisons.

PARKING LOT. Items raised for discussion which are not on the agenda may be listed for discussion or resolution at another time.

RECORD. The facilitator will keep a record of meeting attendees and meeting notes as outlined above. Comments from individual members will generally not be attributed and verbatim record of the meeting will not be prepared.

Outcomes

- Clear, consensus-based or rationales for divergences recommendations for the Advisory Council
- Subcommittee members participate in a meaningful way in developing recommendations
- Recommendations consider the for themes of safety, risk, equity and environment
- Recommendations consider immediate needs and longer term planning for CAV

Governor's Advisory Council on Connected & Automated Vehicles

Subcommittee on Land Use and Planning

Agenda

September 12, 2018 6:00 – 8:00 PM
MnDOT St. Cloud Training Center
3725 12th St. N.
St. Cloud, MN 56303
http://www.dot.state.mn.us/d3/stctrainingcenter/index.html
Please email CAVFacilitators@mediationcentermn.org for remote participation access.

Subcommittee Goal: *The goal for the subcommittee is to develop recommended changes to land use and planning state statutes, rules and/or policies to the Governor's Advisory Council on Connected and Autonomous Vehicles ("CAV"). The subcommittee will discuss recommended CAV principles related to transportation, revenue and its interaction with land use and the role of planning.*

1. Welcome & Introductions

- Review of Executive Order & Goals
- Review of Agenda & Meeting Process
- Introductions

2. Presentation: Overview of Connected and Autonomous Vehicles ("CAV")

Kristin White, Mn DOT CAV-X Office

3. Presentation: Key CAV Issues for Land Use and Planning

Liaisons: Frank Douma, University of Minnesota, Mark Nelson, MN Department of Transportation, and Emily Smoak, MN Department of Health

4. Discussion

- Review & comments on draft questions (see next page)
- What do you see as the biggest opportunities for land use and planning as CAV develops?

5. Next Steps and Closing

To request this document in an alternative format, please contact the Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

DEPARTMENT OF TRANSPORTATION

Land Use and Planning Questions

Vision (September 12 Meeting)

- What are the biggest opportunities for land use and planning as CAV develops?
- What are the biggest risks for land use and planning as CAV develops?
- Are these opportunities and risks different for large cities, small cities and/or rural areas? If so, how?

Policy Items to Consider (September 24 Meeting)

- How might state policy allow for more shared mobility, while balancing other motorized and non-motorized needs?
- What are ways to fund/address changes in investment and funding levels?
- Should laws be developed to incentivize shared mobility options in rural and underserved communities?
- What steps do you recommend the state take to plan for land use and planning needs that might be associated with CAV?
    - Speed management
    - Land use and sprawl
    - Parking, infrastructure and management
    - Siting for new uses (zoning)
    - Curb space access
    - Transportation Network Companies
    - Transit planning and access
    - Bicycling and walking infrastructure, policies, etc.
    - Transportation demand management policies
    - Other …

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Land Use & Planning

DEPARTMENT OF TRANSPORTATION

September 12, 2018

Welcome and Introductions

DEPARTMENT OF TRANSPORTATION

Land Use & Planning Subcommittee

Subcommittee Goal

To develop recommended changes to land use and planning state statutes, rules and/or policies to the Governor's Advisory Council on Connected and Autonomous Vehicles ("CAV").

The subcommittee will discuss recommended CAV principles related to transportation, revenue and its interaction with land use and the role of planning.

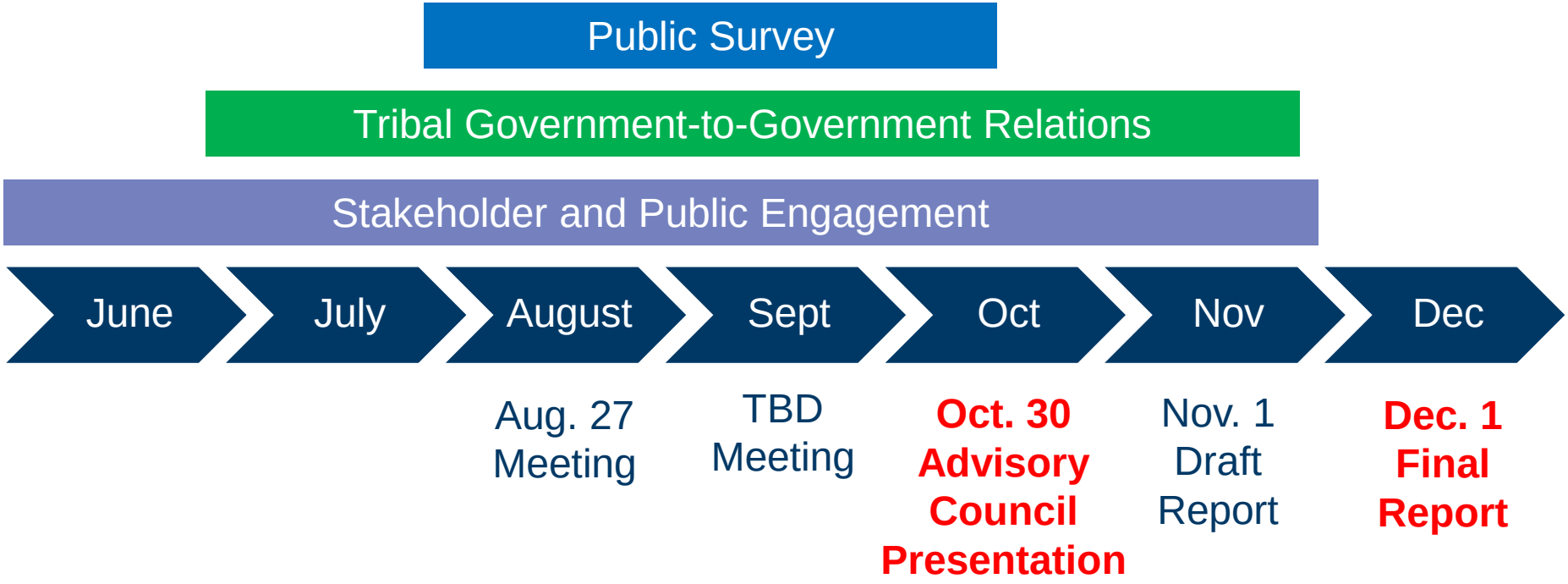
Subcommittee Process

- Participation
  - Meeting materials available on **MnDOT website**
  - Meeting updates at MnDOT CAV-X website
  - Participate in a **meaningful way**
- Discussion
  - Consider the themes of **safety, risk, equity and environment**
  - Consider immediate, **short-term outcomes**
- Recommendation
  - Clear, **consensus-based** recommendations (or reasons for differences)
  - Present recommendations to Advisory Council **October 30th**

Subcommittee Charter

- Meetings **open to the public**
- **Respectful** discussion, opportunities to be heard and **listen**
- May submit written comments on **comment cards**
- Notes taken on **consensus** or **summary** of discussion
- Meeting **notes approved by liaisons** and sent to subcommittee members for additional comments
- Meeting evaluation emailed after meeting

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
August
Sept
Oct
Nov
Dec
Aug. 27 Meeting
TBD Meeting
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Forms an Advisory Council

Consults with Stakeholders

Prepares a Report on Statute, Rules and Policy Changes

Establishes Testing and Development Programs

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

Public Engagement Opportunities

Public Feedback Opportunities

Interagency Team

- Policy position papers
- Branding
- Testing & Deployment
- Partnerships

DEPARTMENT OF TRANSPORTATION

Why We're Here

Automated Vehicles

Why Automated Vehicles?

SAFETY

United States

40,100 in USA in 2016

Worldwide

1.25 Million Deaths in 2013

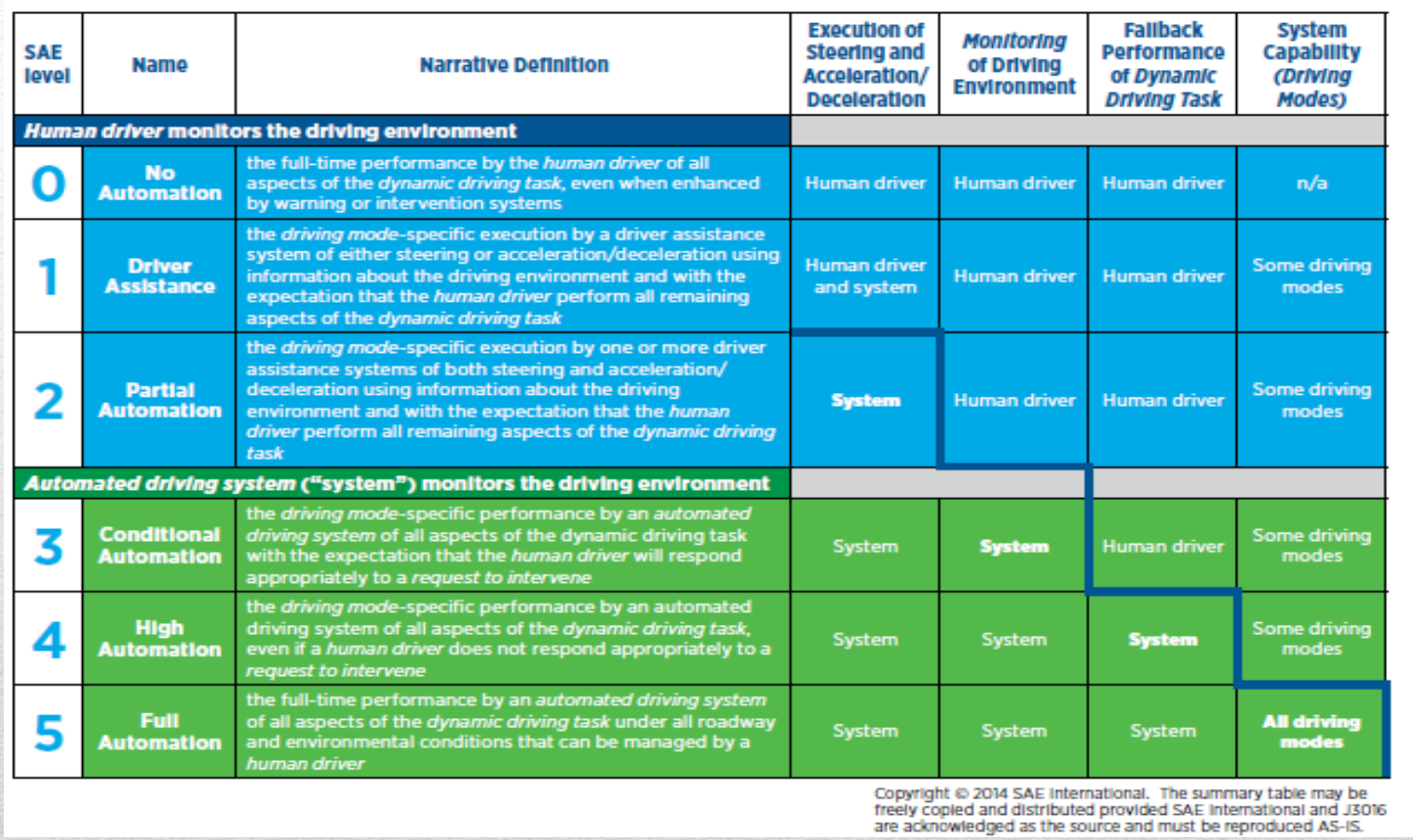
50+ million Injuries

65+ Million Deaths in 20th Century

Approximately WW II causalities

Economic Cost > $500 Billion/year

90% percent of accidents caused by driver's error



SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	*Monitoring* of Driving Environment	Fallback Performance of *Dynamic Driving Task*	System Capability *(Driving Modes)*
***Human driver* monitors the driving environment**						
0	**No Automation**	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	**Driver Assistance**	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	**Partial Automation**	the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
***Automated driving system* ("system") monitors the driving environment**						
3	**Conditional Automation**	the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	**High Automation**	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	**Full Automation**	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

SAE International (Society of Automotive Engineers) Definition Used in 2016 Federal Policy

What Automated Vehicles Could Look Like

What Automated Vehicles Could Look Like

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

Led by Waymo (Google)

- Clear leader with more than 600 vehicles in demonstration
- SDV has driven more than 6 million miles in 25 cities in California, Washington, Texas, Arizona etc.
- Lowest rate of disengagement
- Taxi demonstration in Phoenix suburb with plan to launch fully driverless commercial taxi service in Arizona later this year
- Ordered 20,000 Jaguar SUV's
- Ordered 62,000 Chrysler Minivans

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

Connected Vehicles

Connected Vehicles (CV)

CV's / AV's

Autonomous Vehicles (AV)

Electric Vehicles

3 Trends in Motor Vehicle Development

Land Use / Infrastructure

- Congestion Reduction
  - Gap reduction- low elasticity
    - Reduced Lane width
    - Smooth merging
- Reduced Right Of Way Allocated For Vehicles?
- End of Minimum Parking Requirements?

Improved Transit

- Seniors, Poor, Children?
- First and Last Mile Solution for Transit
- Complement to existing service
- Increase the impact of transit stations on adjoining properties
- Greater efficiency in low density
- From few blocks to maybe a mile?

Cost/Ownership

Depending on vehicle cost, new ownership models may be adopted

Does It make sense to own a vehicle which is used only 2 out of 24 hours?

Fewer cars/Family

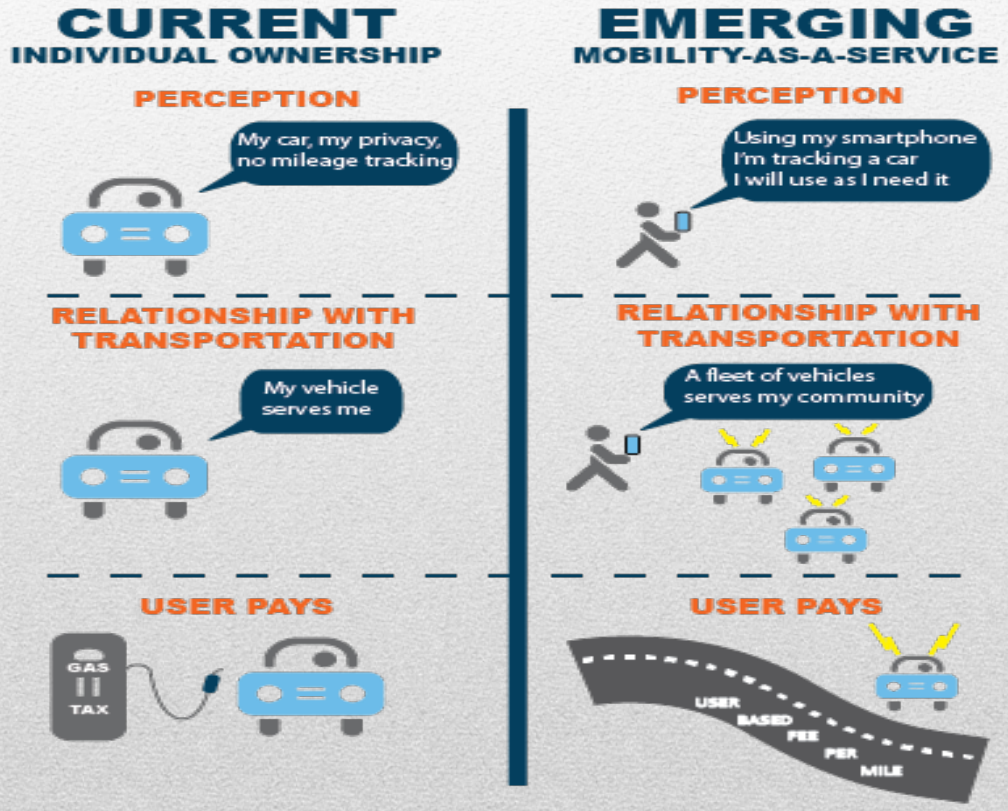
Private/Public Owned Fleet

Shared Vehicles

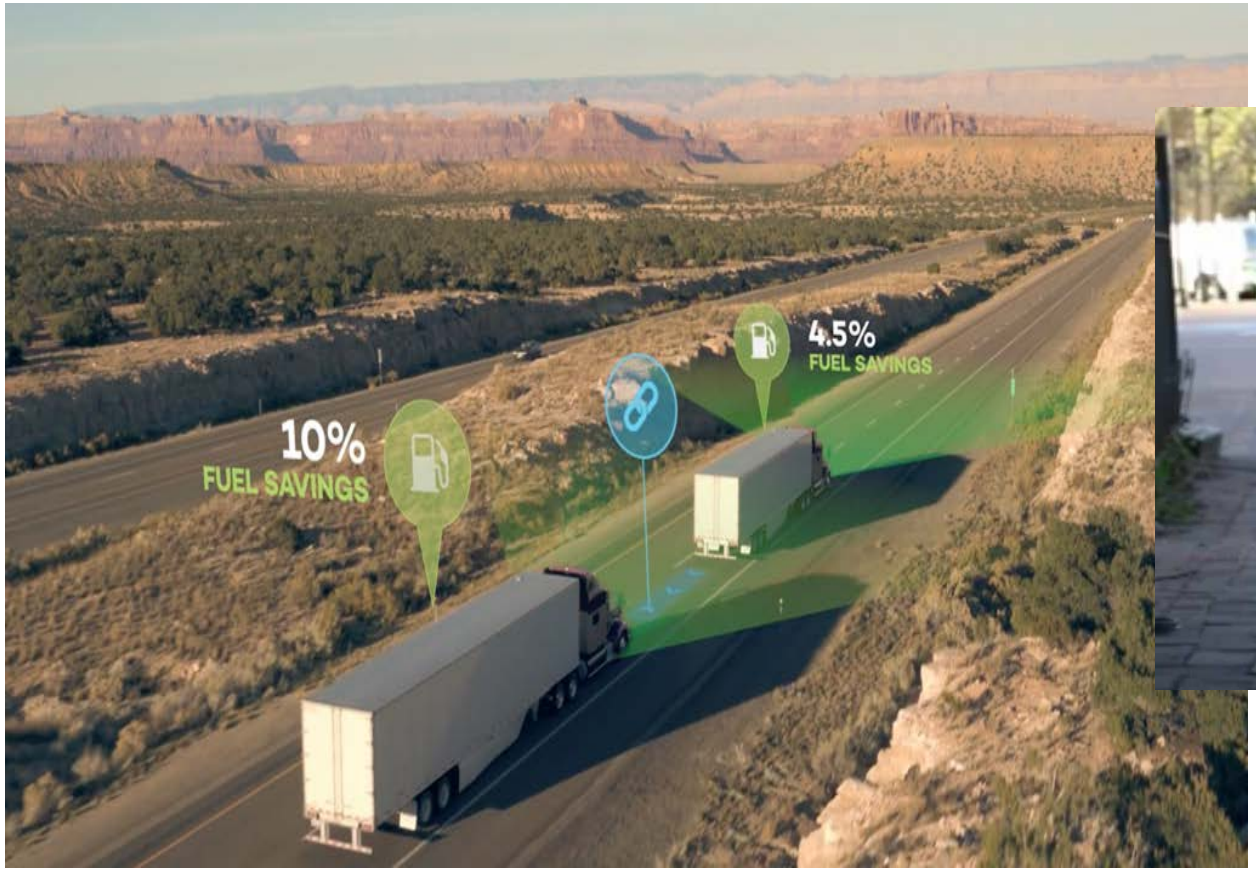
- Remember Waymo?
- Ordered 20,000 Jaguar SUV's
- Ordered 62,000 Chrysler Minivans

What was that about ownership???

Mobility as a Service



Alternative Automation



Truck Platooning

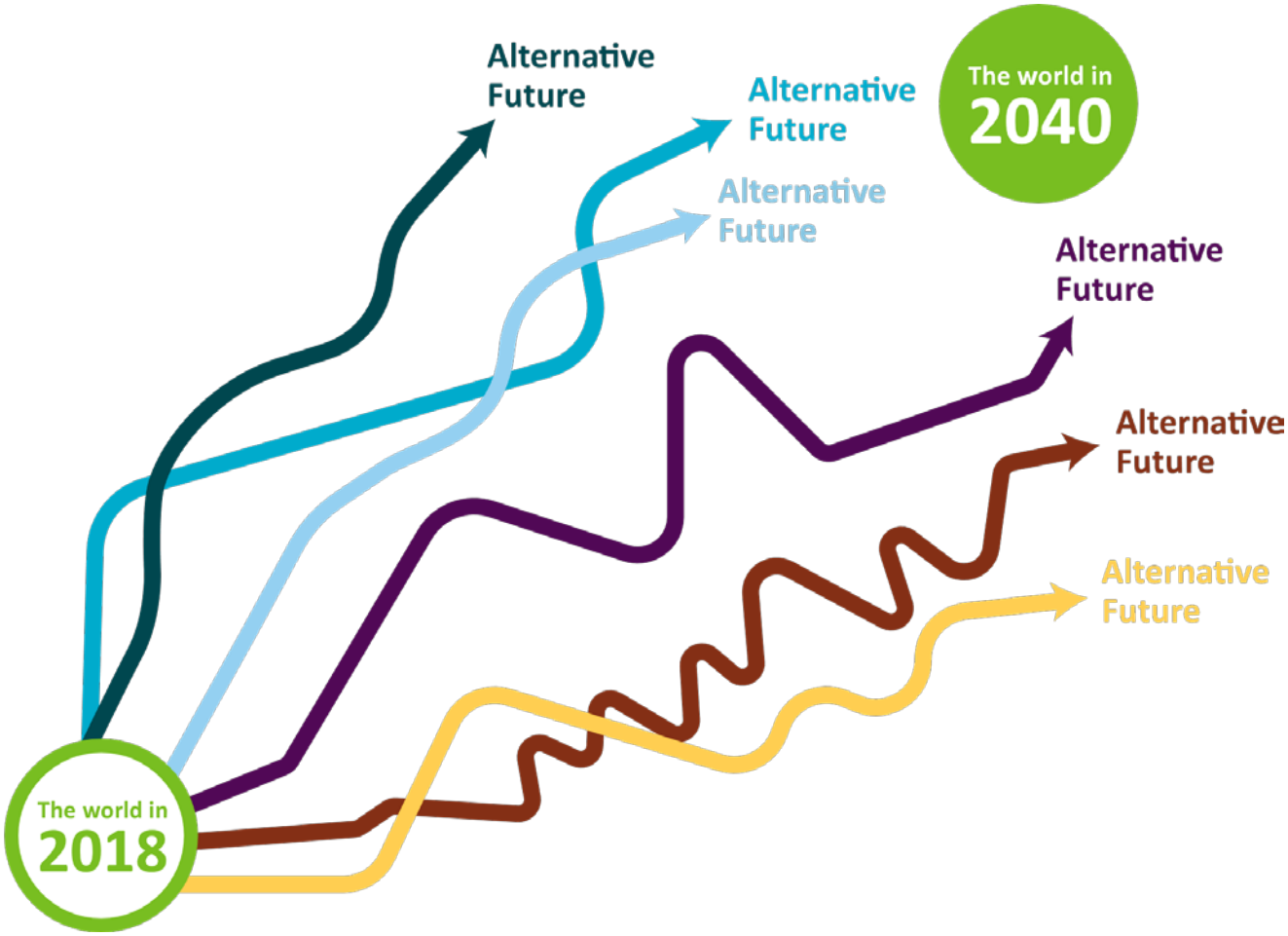
Automated Delivery

DEPARTMENT OF TRANSPORTATION

Potential Development Scenarios for Connected and Automated Vehicles

Mark Nelson
Program Manager for Statewide Planning
September 12, 2018

Planning in the Face of Uncertainty



What's Changing?

- **Connectivity**: Degree to which vehicles can communicate with other vehicles, infrastructure, other devices
- **Automation** : Degree to which vehicle is automated and driver is in control or needed (Level 0 to Level 5)
- **Cooperation**: Degree of data sharing and integration of services to achieve public and user benefit.
- **Electrification** : Concurrent trend with impact on finance, infrastructure, etc. Not necessary for automation.

Levels of Automation

Full Automation

0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Scenario: Gradual Change

Summary

Minimal change beyond currently available technology and investments already in motion.

Key Assumptions

- Continued progress and innovation in CAV
- No major changes in tech trends since 2018

Scenario: Automated Zones

Summary

Innovation proliferates, but only in certain locations (retirement communities, office parks, urban neighborhoods, campuses, etc.).

Key Assumptions

- Level 4 AV technology is available but can't operate in most contexts
- Pilot programs of Level 4 AVs are successful and some transition to commercial use

Scenario: Connected Infrastructure

Summary

The public sector makes significant investment in connected infrastructure to encourage CAV adoption.

Key Assumptions

- Level 2 and 3 AV technology is common but requires supportive infrastructure to achieve benefits
- Public agencies invest in connected technologies to make AVs more functional

Scenario: Competing Fleets

Summary

AVs proliferate - but because of low cooperation, benefits accrue more to drivers and vehicles than other modes.

Key Assumptions

- Level 4 AV technology available at commercially affordable prices
- Outdated pricing, policy and lack of cooperation results in most trips being single occupant vehicle

Scenario: Integrated Mobility

Summary

On-demand shared services proliferate and integrate with other modes via cooperative data sharing, policies, infrastructure.

Key Assumptions

- Level 4 AV technology available at commercially affordable prices
- Integrated, coordinated mobility-as-a-service is common, shows large benefits
- Car ownership rates drop, especially in cities

DEPARTMENT OF HEALTH

Autonomous Vehicles and Public Health

Emily Smoak | Principal Planner

September 2018

What is health

"The state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity."

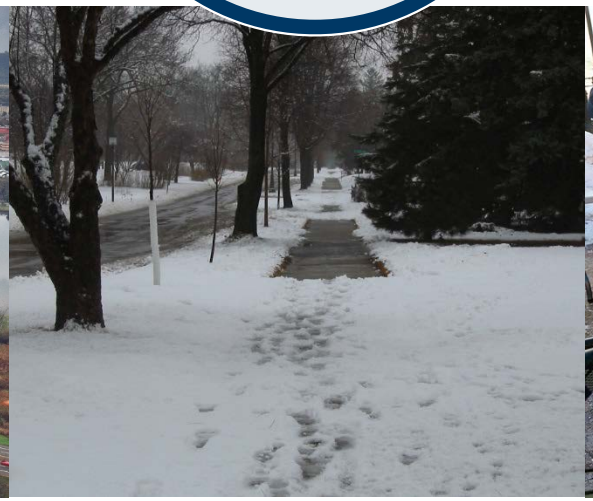
What is Public Health

Public health and the environment

Physical environment

Social environment

Lifestyle & behavior



Age of Infectious Disease

- Industrial Revolution
- Rapid industrial development. Hundreds of thousands of people moved into crowded, unsanitary, industrial cities.
- Results: increased infectious disease, epidemics, unhealthy housing and workplaces, etc.
- Response: sewer systems, zoning, building guidelines, etc.

The Age of Infectious Disease

Urban Sprawl

Age of Chronic Disease

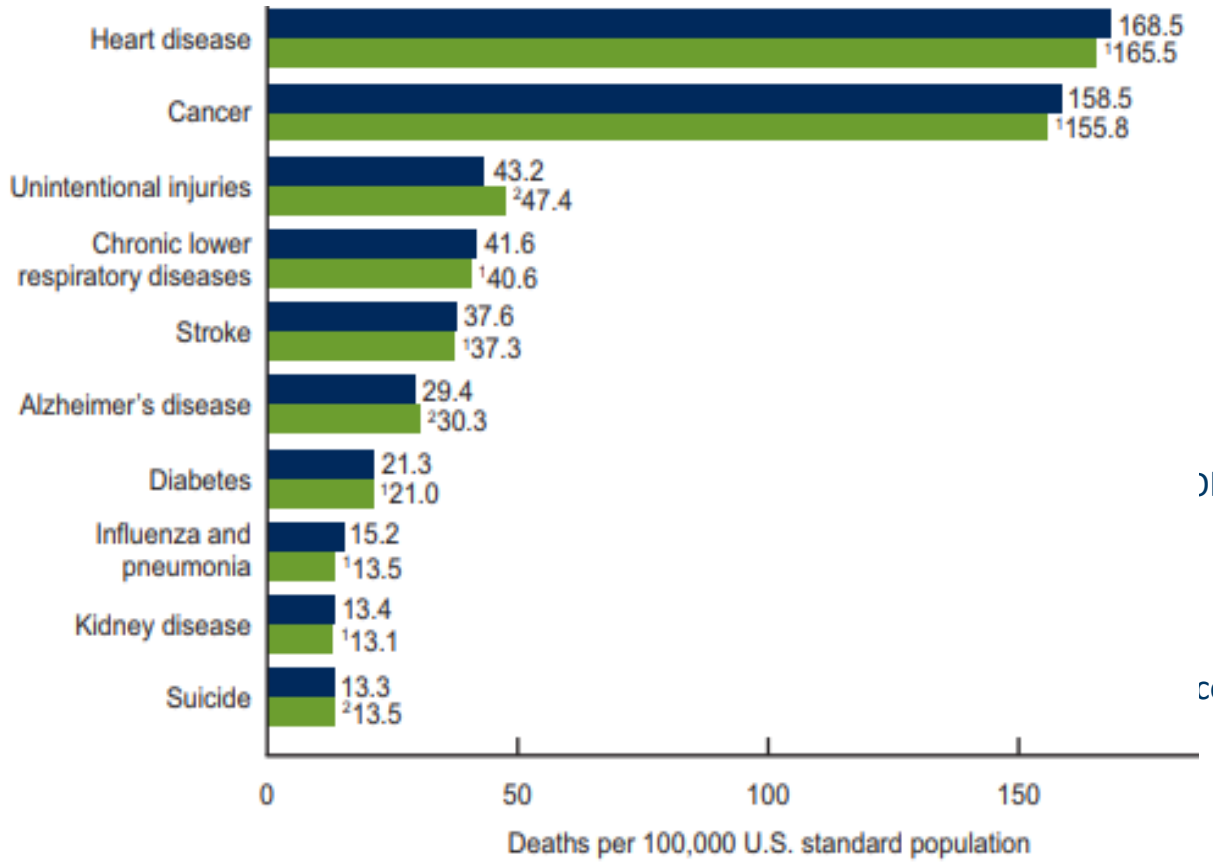
- Suburbanization/Sprawl
- The Interstate Highway System is built out and automobiles make it easier for people to live far away from where they work.
- Results: obesity epidemic, motor vehicle fatalities/injuries, health care costs, GHG emissions, long and stressful commutes, etc.
- Response: Density zoning laws and building guidelines, individual behavior change, Complete Streets policies, Safe Routes to School, gyms

The Age of Chronic Disease

Public Health and Transportation

Healthy Communities
= Healthier Minnesota

Not just crash fatalities



Largely caused by lack of physical activity + poor diet

Certain types of cancer linked to obesity

1/3 motor vehicle crashes

Poor air quality is a contributing cause

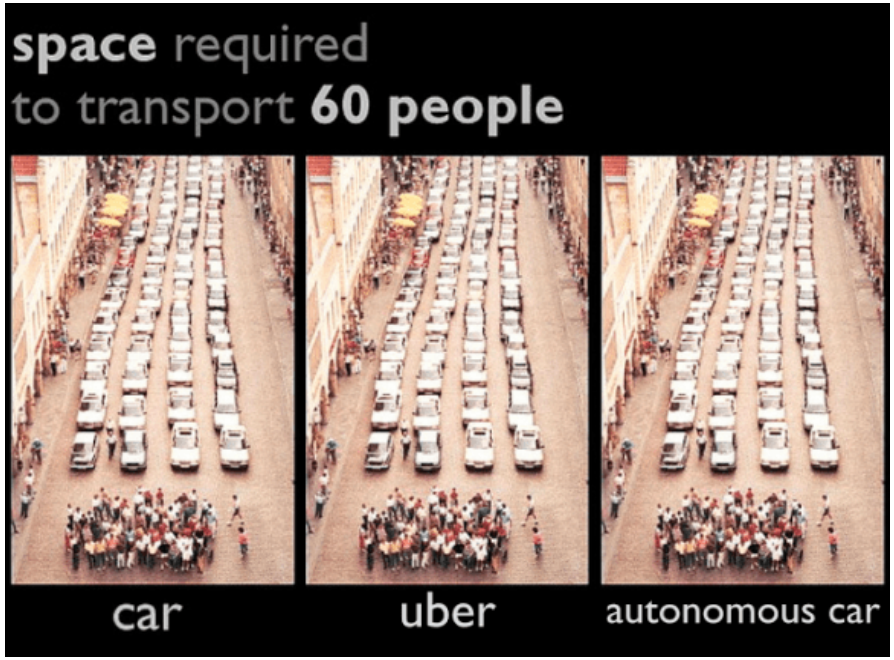
Obesity is a primary risk factor

)besity is a primary risk factor

cohesion linked to lower rates of depression

How does this relate to AV's?

Possible Risks



Possible Opportunities

Discussion

Vision

- What are the biggest opportunities for land use and planning as CAV develops?
- What are the biggest risks for land use and planning as CAV develops?
- Are these opportunities and risks different for large cities, small cities and/or rural areas? If so, how?

Policy Items to Consider

1. How might state policy allow for more shared mobility, while balancing other motorized and non-motorized needs?
2. What are ways to fund/address changes in investment and funding levels?
3. Should laws be developed to incentivize shared mobility options in rural and underserved communities?

Policy Items to Consider (Contd.)

- What steps do you recommend the state take to plan for land use and planning needs that might be associated with CAV?
  - o Speed management
  - o Land use and sprawl
  - o Parking, infrastructure and management
  - o Siting for new uses (zoning)
  - o Curb space access
  - o Transportation Network Companies
  - o Transit planning and access
  - o Bicycling and walking infrastructure, policies, etc.
  - o Transportation demand management policies
- o Other themes?
- Did we address safety, risk, equity and environment?

Small Group Breakouts

Breakout Session Directions

- Designate 1 recorder
- Designate 1 person to report-out
- Engage with participants in your group & ask questions
- Write thoughts on large poster or individual comments on post-it notes & add to poster

Breakout Session Questions

- What themes and recommendations do you want the Council to share with the Governor & Legislature?

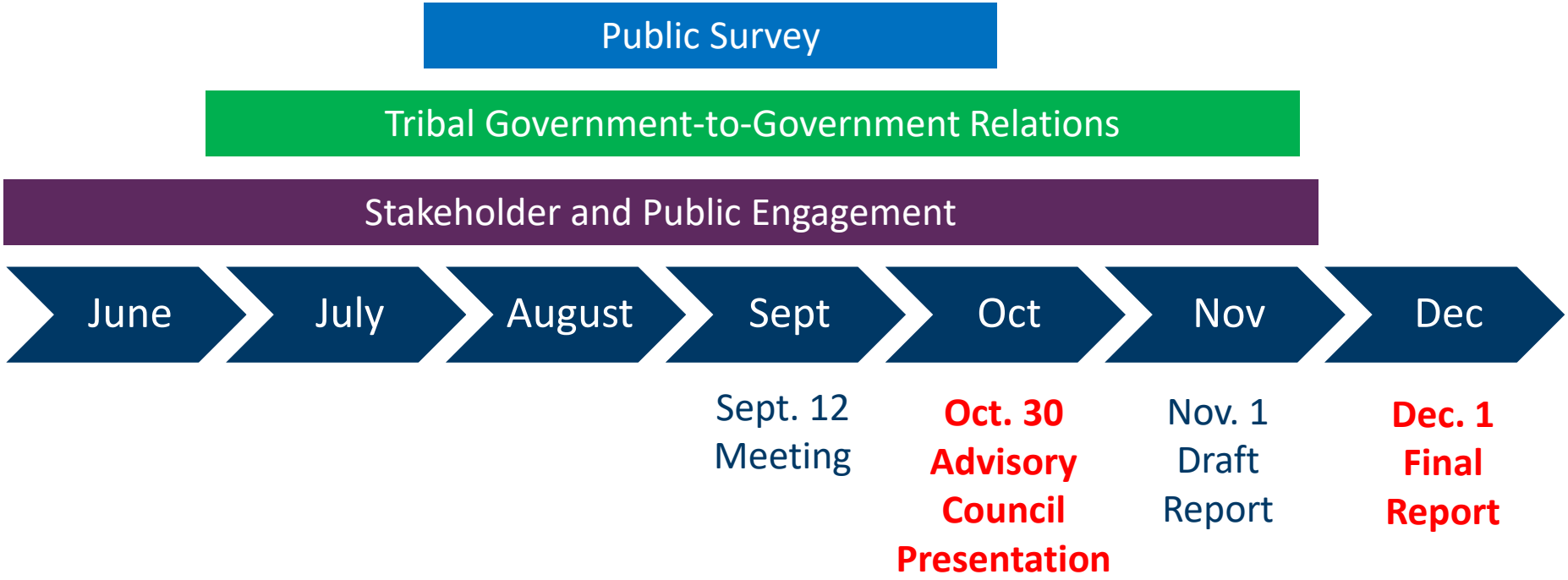
- What policy areas or themes do you want addressed in the 2019 Legislative session?

Next Steps & Closing

Next Steps

- Comment Cards & Suggestions for next meeting
- All participants may review meeting minutes
- Additional comments can be made at CAVfacilitators@mediationcentermn.org
- Post-meeting online survey
- Public survey on MnDOT CAV-X website
- October 30th: Present to Advisory Council

Key Dates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June
July
August
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Nov
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Sept. 12 Meeting
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

DEPARTMENT OF TRANSPORTATION

Thank you

Frank Douma, University of Minnesota
Subcommittee Liaison

Mark Nelson, MnDOT
Subcommittee Liaison

Emily Smoak, Department of Health

Subcommittee Liaison

Governor's Advisory Council on Connected and Automated Vehicles

Land Use and Planning Subcommittee

Meeting Notes

MnDOT St. Cloud Training Center
Meeting Date: September 12, 2018
6:00 pm – 8:00 pm

CAV-X Office Presentation

Jay Hietpas, CAV Director

- Seeking an open and transparent process
- Moving towards recommendations for land use and planning considerations, keeping in mind the four themes: safety, risk, equity and environment
- Goal for the subcommittee: reaching a consensus on recommendations, determining areas where agreement on recommendations has not been reached, and presenting the recommendations at the October 30th Advisory Committee meeting

Liasons:

Frank Douma, University of Minnesota

Frank presented the last portion of the CAV 101 presentation and discussed the potential benefits of CAV, including:

- being more intentional regarding land use,
- less roadway and road infrastructure needed,
- people can much more easily locate their vehicle,
- parking structures can be redeveloped for new uses,
- parking structures won't need the capacity that is currently needed,
- gaining the opportunity to develop better design for roadway and parking structures,
- the opportunity to address the "first mile, last mile" (FMLM) issue for those who use transit.

Currently vehicle owners drive about 2-4 hours per day, leaving the vehicle parked for the remainder of the day; CAVs could potentially address this problem with ride share options, especially via the private sector. Currently, manufacturing vehicles leads to profit, but there is a real potential that selling rides, or, for the consumer, buying rides from a fleet, will lead to

profit and cost savings respectively in the future, examples are Lyft and Uber, Waymo and LimeBike. High vehicle turnover, as opposed to single-owner vehicles may lead to profits and cost savings. Regarding transportation, CAV development could lead to changes such as truck platooning, changes in the fuel taxation (fleet owner taxation or motor fuel tax) and small vehicle delivery of goods. Changing the way we live and the way in which we relate to the areas where we live.

Mark Nelson, MN Department of Transportation

Land use planners are currently working on long range policy development. The language is changing as quickly as the technology. In 2017, planners were thinking and planning long range, but in 2018 planners now realize that they need to accept uncertainty in planning regarding the development of CAV.

The Scenario-based approach:

The scenario-based approach is useful when trying to predict something such as CAV development, where there is uncertainty. Planners need to determine how to address upcoming changes without the benefit of certainty. Taking the scenario-based approach is a way to consider how CAV development could play out in a variety of ways. In thinking about risks and opportunities, we can influence the outcome, but cannot completely control it – right now, we're in reactive mode. Consider these context scenarios to help think about planning, given that:

1) looking forward to 2040, change may be gradual, but there is a potential for the planning landscape to change quite a bit, and
2) there is likely no high-level of automation or electrification for vehicles anytime soon.

Scenarios:

- Geography may limit automated zones; innovation proliferates, but only in certain locations, while other locations remain geographically limited
- Working towards connected infrastructure, from the public policy perspective, there is a high level of investment from the government in connecting vehicles that assist drivers
- Tech allows the fleet model to move forward, then fleets (Lyft, Uber, etc.) compete for curb space at destinations
- We hope for integrated mobility, data sharing, policies and infrastructure if the tech comes to fruition, imagining mobility as a service industry

Potential scenarios could play out, but we don't know where we'll be in 2040. Planners need to be very resilient and consider the risks and the opportunity in the path of CAV development.

What is the time frame for CAV?

- No established time horizon. However, when we think of building new infrastructure, we think about is lasting 50-100 years.

- The planning and recommendations don't necessarily need to be focused on short, medium or long term – we can be thinking about all three. It's OK to consider the gamut and include the recommendations for each time frame, as we see fit. The long term is unpredictable, which is why we're using scenarios to consider long term.
- Another issue, what is the ownership model going to be like in 2050? If we each own an autonomous vehicle, it'll look far different than fleet sharing.
- We're making assumptions that CAVs would not be individually owned. The ownership structure will determine a lot.
- Add owned versus shared as another scenario.

Emily Smoak, MN Department of Health

- Why is the MN Dept. of Health involved?
    - Health is more than not feeling sick, health is a state of well-being and happiness, and feeling security in life.
    - Public health professionals develop policies that help people avoid getting sick in the first place and make it easy to live healthy lives.
    - MDH ensures the environment, specifically our transportation system, makes it easier for people to live healthy lives.
- Environment
    - **physical environment** is made up of natural and built space that create our community design
    - **Natural**: geography, etc. and 2) Built: schools, workplaces, parks, sewer and transportation systems, etc.
    - **social environment** is made up of things that affect the access of resources
        - includes: availability of education, food and jobs. Public safety, social support, the economy, discrimination, etc.
        - determined by policies, planning and culture
    - Those two environments influence our lifestyle & behaviors including:
        - What we eat
        - Physical activity
        - Cleanliness of the air we breathe
- Connection between public health and the environment became obvious when infectious disease (pneumonia, smallpox) was the primary public health threat.
    - Industrial revolution brought unsanitary conditions and overcrowded urban areas facilitating the spread of infection.
        - Cities made dramatic improvements to the environment to address public health.
            - Building guidelines – air & sun

        - garbage collection, sewer systems,
        - beginnings of modern-day zoning laws separating neighborhoods, businesses and industry.
    - Shortly after this time we saw the automobile industry take off and the interstate highway system built out, creating even more separation between where people lived and where they needed to go.
- By mid-20th century, connection between public health and the environment seemed to diminish.
    - Infectious disease had been brought under control, and the planning of cities was a matter of esthetics and economics, not health.
    - However, in recent years, we've started to see the connection between public health and the environment rise to the top again.
    - Now living in a time when the leading causes of death are now chronic disease (heart disease, type 2 diabetes, asthma).
- When most people think of transportation and public health, they primarily think of traffic fatalities.
    - Motor vehicle crashes - leading cause of death for people under 30.
    - Last year, roughly 40,000 people in the US - 1.3 million people worldwide. In addition, millions more experience life altering injuries as a result of these crashes
- It's not just crashes that affect public health. In the US, chronic disease is responsible for 7/10 deaths.
    - Strong evidence indicates the burden of chronic disease in the US can be reduced by living an active life, eating health foods, and reducing exposure to toxic conditions like air pollution.
    - The way many of our communities have been designed leads to long distances between work, school and home, more space taken up by roads, and an increased reliance on driving alone.
    - Traffic increases air pollution, decreases the time spend being physically active, makes it hard for some people to access healthy food and lessens opportunities for positive social interactions.

How does all this relate to CAVs?

- Connected and automated vehicles have the potential to dramatically change our environment and affect our behaviors. We saw this once before with the invention of the automobile.
    - Physical environment changed
    - Social environment changed
    - Behaviors changed

- How will this transportation revolution change our environment and how will that influence future public health outcomes?
    - Safety: Vehicles become smarter, but still need operators. People begin to pay less attention levels
    - How will CAVs interact with people?
    - Ownership and usage models
        - If AV's bring down the overall cost of driving, more people will drive causing longer commutes, increased congestion, further urban sprawl and increased VMT.
        - Cheapest land will be used for car charging and parking which leads huge suburban and rural surface lots (empty car drives to you).
        - Shared use model
    - Equity: We must ensure that CAVs do not reinforce existing disparities in access. Certain populations being left out of a shared use model because where they live/work isn't considered a highly profitable area.
    - Surge pricing for people with off-peak hours. Streets just for CAVs and not for other modes – risk creating a hostile environment for people walking and bicycling
    - Environmental: Electrification of these vehicles is not guaranteed. If they're not electric, air quality could worsen. If CAV's lead to more shared use/rideshare: could see increase in spread of infectious disease. Similar to what we see on transit, airplanes, and on elevators among other places.
- Opportunities
    - Safety: Opportunity to improve safety on our streets by taking out human error (accounts for almost all crashes). Rethink how we set speed limits, opportunity to lower them in priority areas (residential, pedestrian oriented, etc.). Rethink enforcement for dangerous behaviors like speeding, running lights, not stopping for pedestrians, etc. Environmental: Electrification of AVs would lead to improved air quality which could improve respiratory disease.
    - **Revenue models**
        - Incentivize environmentally friendly & healthy transportation choices: transit, walking, bicycling, + ridesharing using:
            - Congestion pricing
            - VMT tax
            - Occupancy fee for empty seats
        - All of this could possibly be scaled to household income and could also be used to manage demand and relieve pressure from the transportation network. Land use: Since AVs likely need less street space (lane width +

parking). We have a huge opportunity to rethink the way we use our streets and design our public right-of-way
    - Space can be reallocated to bus rapid transit, people walking and bicycling, storm water infrastructure, park space, art, etc.
    - If we do shift to more ridesharing: we can rethink parking minimums = new uses for parking lots, garages and curb space
- **All of these opportunities have the ability to help address the leading causes of death by addressing:**
    - Unintended injuries by: creating a safer transportation system
    - Obesity epidemic by: increasing physical activity by supporting active transportation options
    - Suicide prevention by: Improving social cohesion through improved public space and spending less time alone in cars
    - Respiratory disease prevention by: Improving air quality with electrification and reduced VMT
    - Improving access to food, jobs, education, parks – all things we know contribute to health.

Meeting Participants Small Group Work - Feedback on Risks and Opportunities

Keeping in mind the four themes of safety, risk, equity and environment:

Opportunities:

Transit and ride sharing opportunities

- Ride and cost sharing: ride sharing is more affordable, but we must consider the urban and rural context
- Create an incentive for ride sharing
- Improving the transit system without increasing costs
- Repurpose transit system
- Solve the FMLM (first mile last mile) issue

Parking space

- Eliminating or substantially reducing parking – not a certainty, but a possible opportunity
- More remote parking in rural areas, less in urban areas creates re-development opportunities

Infrastructure and Right of Way

- Re-purpose right of way
- Decrease investment in large/multiple car lane
- Create bike and pedestrian opportunities
- Avoid un-traversable by pedestrian areas

- Infrastructure costs less, no need for mass interchanges and expensive infrastructure
- Right of way allocation: moving curbs and tearing up asphalt

Cargo/freight

- Cargo oriented development (COD), more room for people and houses in cities
- Avoid semi-trucks in the cities with micro-delivery vehicles
- Shift cargo from rail to truck if the efficiency of trucks is better
- Getting in the right mode
- Rely more heavily on inter-mobile

Society, Health, Environment

- Reduce isolation for people in rural areas and increase accessibility
- Travel time reliability
- Getting time back in your day
- Decrease urban sprawl
- Protect farmland from suburban encroachment
- Decreasing use of cars is good for health: ability for pedestrians to get around safely and less disease due to industrialization
- Decrease pollution
- Self-patrol and self-report, less need for policing of vehicles – reduce the need for police?

Taxes and funding

- Shift from gas tax to vehicle miles traveled (VMT)
- Create a new pricing structure

Equity

- Decrease urban sprawl and protect farmland from suburban encroachment
- If shared ownership model, improve access in areas where single vehicle ownership is not a possibility

Other Opportunities

- Reduction in congestion
    - Increase in travel time reliability wasn't addressed, ability to plan a trip
- An opportunity to decrease urban sprawl and loss of farm land by reusing parking lots for residential use, protecting farm land from urban sprawl
    - Has the potential to increase urban sprawl even more with people being able to do a lot more on CAVs
    - Is it going to be profitable to be living two hours away like St. Cloud? How would the transit model look like in these areas?
- For Minneapolis, this is a great equity piece. CAV can improve transit
- A road diet, repurposing of the right-of-way to build other modes like transit, bike/ped
- Public revenue for infrastructure
    - Taxation discussion

    - We built a huge transportation system that we can't maintain anymore
- Better access for people who can't drive a car
    - CAV will really help Metro Mobility which moves people around
- It is possible to get lesser vehicle miles driven
- How do we regulate the vehicle itself? And regulate the use of the vehicle
- One thing that wasn't discussed much is transportation goods
- Shortage of spaces that move goods and services
- Improving transit operations without increasing costs
- Providing incentives for shared vehicles
- Parking in urban areas
- Increasing accessibility, reducing isolation of rural areas
- Opportunity of shifting the revenue model from gas tax to VMT or
- Can CAV police themselves to lead to reduction in police staff
- ROW allocation – tear up asphalt or move curbs

Risks:

- Additional empty miles traveled when sending the vehicle on an additional trip (to park, congestion related to this, etc.) Increase in VMT
    - VMT regarding gas tax
    - Drive further due to the reduced time and cost of travel – increased emissions?
- Ownership scenario: no equal access to the technology, only those with means having access to the tech.
- Funding issues for rural areas, concern about not having the money to develop the road and infrastructure
- Transit services are currently underutilized; what if CAVs are developed, and they're not utilized; what if the tech. or ownership model is not accepted?
- Inability to overcome past practices and social barriers (ride sharing)
- CAV development is not the "silver bullet" – is CAV distracting from bigger issues/concerns?
- Integration of people driven vehicles and CAVs – how does that play out in the intermediary?
- Pre-emption of cities
- Private industry as the driving force – what if cities are forced to react (LimeBike example: not properly distributed)
- Impacting infrastructure that influences behavior, but there are no rewards as of yet (especially parking)
- More roadway lanes -esp. in downtown areas - due to "zombie vehicles"
- Income inequality creates divide between owners and sharers
- Expense for people to own their own car
- Insurance costs – equity in this? Positives and negatives of this

- Can behaviors of drivers successfully shift?
- Policing, will CAV increase/decrease need of (more) police
- Will rural areas be the last place that development reaches?
- How to haul farm equipment? Boat? RV?
- People in rural areas need to drive longer distances, will this cost more?
- People in rural areas keep their vehicles for a longer time
- Drive people to move to urban areas
- Will CAV increase urban sprawl?
- How to address the conditions of the road
- Retiring old car parts, especially batteries – we need time to think about upcycling/ recycling non-CAV vehicles
- Large dumping grounds for old cars
- Must all cars be electric?
- Increased cost of insurance
- Priced out of mobility
- Equity and affordability
- Assumption that efficiency is the "name of the game"
- Private sector may not share their algorithms or technology
- How/who gathers information, privacy concerns
- Dramatic reduction in transit ridership, especially with "choice riders", Uber and Lyft on steroids; will this reduce infrastructure spending
- Transit may be under-cut and the benefits never come to fruition
- Transit must become automated
- C.O.D. limitations; industrial space, pollution, access to amenities, use of land
- Will CAV be seen as an alternate to the transit system? Putting 90 people on a light rail will always be more affordable…
- CAV is part of the solution, but not the solution itself
- Can increase vehicle miles VMT, congestion and pollution due to cars that are not electrified
- Concerned about the transition time where human drivers and automated cars are operating together
- Provide a variety of lane mix where
- The reason people are buying bigger vehicles is because gas tac hasn't gone up very much
- Biggest risk – we can't drive the change ahead of time far enough that when this happens we are ready for it
- Decrease in revenue due to electrification of fleet
- Dramatically reduces in ridership on transit

- Shared mobility scenario, when the cost of CAV goes down will we be seeing CAVs piled up everywhere?!
- Equity issue: Amazon or Google
- Are we in a place in providing franchises
- Preemption in cities, state doesn't get in the way of cities so that they are allowed to experiment
- Should be tested in cities like Minneapolis
- Vehicle preemption at signals
- Profitability, ownership model in the rural areas
- Scalable transit
- Risk of increased empty vehicle miles
- Risk of traveling further because of lower cost of travel time
- Risk of non-equitable access to the technology
- Funding issue for rural areas to build infrastructure for this technology
- Concerns about acceptability of this technology
- If behavior doesn't change what is the risk
- Might end up needing more roadway width because of more cars
- Income equality created by owned vs shared
- Will AVs be too expensive for people to own their cars
- If rural areas take time to adopt this technology then will people move to urban areas and how
- How do I haul my boat?
- If we are using the shared cars for longer, then concerned about how do we recycle the batteries
- Private sector seem to be driving the situation
- If we do this right, it could improve transit
- Negatives happen without action and the positives will happen when we take work on the actions

Next Steps – any follow up and who is responsible, by what date

Next meeting date: September 24, 2018
6-8 pm
Cornelia Day Walker and Victor Watkins Auditoriums
451 Lexington Parkway N.
St. Paul, MN 55104

Governor's Advisory Council on Connected & Automated Vehicles

Land Use and Planning Subcommittee

Agenda

Monday, September 24, 2018 6:00 - 8:00

Wilder Center, Cornelia Day Wilder and Victor Watkins auditoriums (C&D)
451 Lexington Parkway, North, Saint Paul, MN 55104

Join Skype Meeting for PowerPoint Presentation
Call-in number for audio is: 1-888-742-5095
Conference code: 1658 926 687

Subcommittee Goal: *The goal for the subcommittee is to develop recommended changes to land use and planning state statutes, rules and/or policies to the Governor's Advisory Council on Connected and Autonomous Vehicles ("CAV"). The subcommittee will discuss recommended CAV principles related to transportation, revenue and its interaction with land use and the role of planning.*

1. Welcome and Introductions

2. Summary of Last Meeting's Discussion Topics and Tentative Recommendations

Subcommittee Liaisons Frank Douma, Emily Smoak, and Mark Nelson

3. Discussion: Other Topics the Subcommittee Would Like to Address?

4. Develop Recommendations to the Advisory Council

- What do you want to be sure the liaisons recommend to the Advisory Council?
- Refine tentative recommendations
- Discuss and develop any additional recommendations

5. Closing & Next Steps

To request this document in an alternative format, please contact the Office of Equity and Diversity at 651-366-4720 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an email to ADArequest.dot@state.mn.us. (Please request at least one week in advance).

Land Use and Planning Subcommittee

Policy Questions for September 24, 2018 meeting

How might state policy allow for more shared mobility, while balancing other motorized and non-motorized needs?

What are ways to fund/address changes in investment and funding levels?

Should laws be developed to incentivize shared mobility options in rural and underserved communities?

What steps do you recommend the state take to plan for land use and planning needs that might be associated with CAV?

- Speed management
- Land use and sprawl
- Parking, infrastructure and management
- Siting for new uses (zoning)
- Curb space access
- Transportation Network Companies
- Transit planning and access
- Bicycling and walking infrastructure, policies, etc.
- Transportation demand management policies
- Other

Governor's Advisory Council on Connected and Automated Vehicles

Land Use and Planning Subcommittee

Meeting Notes

Amherst Wilder Center
September 24, 2018
6:00 PM – 8:00 PM

MnDOT CAV-X Office Presentation

Jay Hietpas, Director of MnDOT CAV-X Office

Subcommittee Liaisons:

Mark Nelson, MN Department of Transportation
Frank Douma, University of MN
Emily Smoak, MN Department of Health

Facilitator:

Heron Diana, Mediation Center

Heron Diana, Facilitator

Process and goals for the meeting:

- Evaluation for the 9-12-18 meeting; participants seeking more information on:
    - The current state of regulation and CAV development in other states,
    - Whether Minnesota will collaborate with other states on planning and development,
        - Note: MN is the only state to hold stakeholder subcommittee process
    - Who will write the final report,
    - Realistic next steps, given the timing,
    - Environmental impact of CAV, and
    - Whether the public sector will act quickly and avoid being too prescriptive.
    - Some participants prefer note-takers for small groups and workday meeting times.
- Briefly cover CAV 101 for those new to the process
- Liaison summary

- Summary of opportunities and risks developed at the 9-12-18 meeting and additional input
- Seek consensus on potential recommendations for the subcommittee
- Small group work on themes and potential recommendations
- Large group discussion
- Next steps

Jay Hietpas

- CAV 101
- Seek consensus on 5-7 recommendations for the report to the Advisory Council from the Land Use and Planning Subcommittee
- Themes and focus of last meeting: mobility strategies and accessibility for all

Frank Douma

Summary of key points from presentation at meeting on 9-12-18

- CAV offers potential benefits by addressing the:
    - Large amounts of land dedicated to current model, and offer the opportunity to redevelop land,
    - Single ownership vehicle model,
    - First mile, last mile (FMLM) problem; more efficient ways to reach transit, and
    - Possibility of vehicle fleets with high vehicle turnover.
- The role of policy is to define the vision.
- Changes will not occur on their own; we need to give signals to the market for change to occur.
- Land use will change significantly if we give the right signals.
- Funding considerations – revenue, shared model and increased fleet – does the state collect excise tax on each vehicle, or if elec. How that will effect the motor tax issue?
- Shared-rides: easy for high density areas, practical in rural areas?
- Planning: speed management, parking, new uses and zoning, plan for transit, access to curb space, pedestrian infrastructure, how to accommodate CAV

Mark Nelson

From a planning perspective, there's a great deal of uncertainty.

- Planning must continue, but we don't know how planning will play out over the next 20 years.
- If there is a high level of investment by government, CAV can address current safety issues.
- Consider policy regarding information and data sharing between infrastructure and vehicle – what to do with all that data?

- If the fleet model scenario occurs, costs could be cut, but competition could lead to more vehicles; competition for curb and lane space, and data and algorithms.
- An integrated system which requires data sharing would offer more equity and benefits.
- Policies regarding data usage and infrastructure may gain the support of the subcommittee.

Emily Smoak

The Department of Health is uniquely related to and involved with CAV development.

- The history of public health planning indicates that health, happiness and well-being considerations should play an important role as policy is developed around CAV.
- Infectious disease is no longer the leading cause of death
    - chronic disease is now a leading cause
    - research shows that chronic disease can be prevented with physical activity, access to healthy foods and pollution prevention
- Our current reliance on driving means less opportunities for social activities, more pollution
- MN AAA data says that the cost of owning and operating a sedan-type vehicle (not including the cost of the vehicle purchase) is $8500 per year to own and operate; minimum wage earners make $17k-20k per year – cost prohibitive.
- Current transportation system is contributing to negative public health outcomes
- Opportunities with CAV:
    - Transit and ride-sharing
    - Decrease single occupancy trips
    - Provide transit options in rural areas
    - Rethink public right of way, reconsider mode hierarchy
    - Cargo/freight shipping efficiency
    - Cleaner air
    - More access to things that increase health (healthy food, exercise, medical care)
    - An affordable transportation system
    - Rethink the design of our cities
- Consideration and reinforcement for how we manage behaviors that are killing and injuring people
-
- More opportunities in addition to the list on the presentation slide?
- Risk of more cars on the street – is there an opportunity in urban areas to gain more right of way if we eliminate parking meters (better use of existing right of way via elimination of parking)

- Framing: how quickly is this going to happen, what is the critical mass, what day can we start eliminating the parking meters – this information is important because it gives us the tipping point for making change… tomorrow? in 20 years?
- Rural areas: roadway is not paved – can CAV travel on dirt road, do we need to pave rural roads?
    - Need for conduits, need for infrastructure
    - Oppty to improve the entire rural environment, infrastructure
- Travel time reliability, increase speed of transit, require CAV to pull over for transit vehicle (similar to emergency vehicles)
- Cost of maintaining transportation system – current system falls apart during rush hour (inefficiency)
- Opportunity to help people experience electric vehicles, and shared and autonomous vehicles in the way we want them to experience it
    - Provide experiences today that shape the culture of CAV
- In order to gain acceptance, the public need a better understanding of
    - what's going on today,
    - how the infrastructure is built,
    - how we design CAV friendly roadway,
    - why there is a rush hour,
    - why people die in collisions,
    - the costs, risks and benefits.

More risks in addition to the list on the presentation slide?

- Increase empty miles
- Infrastructure that doesn't align with the goals – especially if CAV technology continues to be developed by the private sector and not the public – inaction could lead to tension between the public and private sector
- More sprawl, less efficient land use
- Everything scattered all over the place
- Privacy implications: all trips and correlating data will be tracked and recorded
- Economic trap: What happens if insurance rates sky-rocket for non-CAV vehicle drivers? What if drivers cannot afford a CAV and the ownership model remains the same?

Large Group Report Out

Group 1 – the sooner the public sees the benefits of CAV, the more buy-in

1. Offer incentives for state employees to lead by example
    a. Get people out of vehicles and begin re-developing parking lots (Sears)
2. Provide funds for demonstration projects (like Columbus OH)

    a. Provide the public with demonstration projects (similar to the Columbus, OH model) in order to ensure public buy-in
    b. Secure funding to start implementing the infrastructure
3. Fund local CAV infrastructure
    a. Upgrade current infrastructure in preparation for CAV with:
        i. transponders,
        ii. roadside units (RSUs),
        iii. fiber optics
        iv. and more
    b. Begin integrating the infrastructure (especially infrastructure that can be useful today)

Group 2 – high level goals in the interest of the public are necessary

1. The state and MNDot should develop high level goals (remaining cognizant of public and private interests) for the public sector, to address concerns such as:
    a. Reducing VMT (vehicle miles traveled)
    b. Reducing pollution
    c. Utilizing franchise agreements (for private service providers)
    d. Increase safety for the general public, riders, bicyclists, pedestrians
    e. Use of both carrots (eg. funding) and sticks (eg. required reports on fleet algorithms).
2. Incentivize ridesharing in conjunction with transit use
    a. Continue to invest in and encourage transit
        i. Tackle FMLM (first mile, last mile) problem
    b. Require a surcharge to discourage transit duplicative trips
    c. Incentivize passengers who ride share
3. Switch the user fee system to a mileage and/or impact-based system
    a. VMT-based funding system, or congestion-based pricing
4. Ensure equity by outlawing transportation redlining
    a. Ensure a standard of quality for all areas of MN (urban, suburban and rural)
    b. Models based on serving all income levels
5. Reduce pollution by requiring electric
6. Prohibit state preemption of experimentation by local government (city, county)
    a. Require private parties to develop franchise agreements with local governments
    b. Preempt local governments from adopting conflicting regulations
    c. If the state does not provide the policy, allow local government to develop interim policy
    d. CAV development needs the benefit of experimentation
    e. Encourage a healthy level of experimentation

f. Do not allow private interests to supersede public interests (5G cell phone tower example)

Group 3 – standardization, equity and testing conditions unique to MN

1. Public education of risks, costs and benefits
    a. Discuss the benefits and risks of changing the status quo
    b. Carefully craft information for the public about CAV
2. Ensure that early demonstrations of the technology are successful
3. VMT-based funding system
4. Develop standards of service as requirement to operate in MN
    a. Serve rural MN
    b. provide a certain percentage of ADA (Americans with Disabilities Act) compliant vehicles
    c. Provide regional service
5. Preempt local governments from adopting regulations that conflict with state regulations and policy
6.
7. Aggressively encourage cold weather testing
    a. Safety features for weather conditions unique to MN
    b. Keep ahead of the curve for testing cold weather safety features

Tentative & Final Recommendations

Draft Recommendations for Land Use and Planning Subcommittee:

I. Encourage greater buy-in by providing the public with information of the benefits and risks regarding CAV, beginning the installation of CAV infrastructure that can offer current benefits for connected vehicles (SAE level 3 vehicles), and successful public demonstrations of CAV.

II. Incentivize the use of ride-sharing, transit opportunities, and ultimately CAV by addressing the FMLM problem, continuing to invest in and improve transit and rethinking the current taxation structure (look to other funding models, such as vehicle miles traveled (VMT).

III. Ensure equity by standardizing quality of service, requiring a certain percentage of ADA compliant vehicles, and providing infrastructure and service in all areas of MN.

IV. Make MN the center for testing cold weather safety features.

V. Preempt regulations that disallow local governments (cities, towns, municipalities, counties) from CAV development and experimentation, and require private businesses to contract with public entities (do not allow private interests to supersede public interests).

VI. Increase public well-being and health by redeveloping and repurposing parking lots and un-traversable infrastructure with transit lanes, bikeways and pedestrian paths.

Next Steps

Closing and next steps:

Your recommendations will be presented to the advisory council by the liaisons on Oct. 30. There is a public survey online, which presents another opportunity to give feedback.

Parking Lot

Governor's Advisory Council on Connected & Automated Vehicles

Subcommittee on Land Use and Planning

Agenda

October 9, 2018 10:00 AM – 12:00 PM
Dept. of Administration, Room 116C
200 Administration Building
50 Sherburne Avenue, St. Paul, MN 55155

Remote participation access: Click the following link to join online for free from any device:
https://meet.lync.com/mn365/kristin.white/9Y841N0B

Subcommittee Goal: *The goal for the subcommittee is to develop recommended changes to land use and planning state statutes, rules and/or policies to the Governor's Advisory Council on Connected and Autonomous Vehicles ("CAV"). The subcommittee will discuss recommended CAV principles related to transportation, revenue and its interaction with land use and the role of planning.*

1. Welcome & Introductions

- Review of Agenda & Meeting Process
- Introductions

2. Presentation: Review of Executive Order and Goals

Praveena Pidaparthi, MnDOT CAV-X Office

3. Overview of Connected and Automated Vehicles (CAV) & Key CAV Issues for Land Use and Planning

Liaisons: Frank Douma, University of Minnesota, Mark Nelson, MN Department of Transportation, and Emily Smoak, MN Department of Health

4. Discussion

- Review & comments on draft questions (see next page)
- What do you see as the biggest opportunities for land use and planning as CAV develops?

5. Next Steps and Closing

Land Use and Planning Questions

Vision

- What are the biggest opportunities for land use and planning as CAV develops?
- What are the biggest risks for land use and planning as CAV develops?
- Are these opportunities and risks different for large cities, small cities and/or rural areas? If so, how?

Policy Items to Consider

- How might state policy allow for more shared mobility, while balancing other motorized and non-motorized needs?
- What are ways to fund/address changes in investment and funding levels?
- Should laws be developed to incentivize shared mobility options in rural and underserved communities?
- What steps do you recommend the state take to plan for land use and planning needs that might be associated with CAV?
    - Speed management
    - Land use and sprawl
    - Parking, infrastructure and management
    - Siting for new uses (zoning)
    - Curb space access
    - Transportation Network Companies
    - Transit planning and access
    - Bicycling and walking infrastructure, policies, etc.
    - Transportation demand management policies
    - Other …

Governor's Advisory Council on Connected and Automated Vehicles

Subcommittee on Land Use & Planning

DEPARTMENT OF TRANSPORTATION

October 9, 2018

Welcome and Introductions

DEPARTMENT OF TRANSPORTATION

Land Use & Planning Subcommittee

Praveena Pidaparthi, Planning Director
Office of Connected and Automated Vehicles (CAV-X)
MnDOT

Subcommittee Goal

To develop recommended changes to land use and planning state statutes, rules and/or policies to the Governor's Advisory Council on Connected and Autonomous Vehicles ("CAV").

The subcommittee will discuss recommended CAV principles related to transportation, revenue and its interaction with land use and the role of planning.

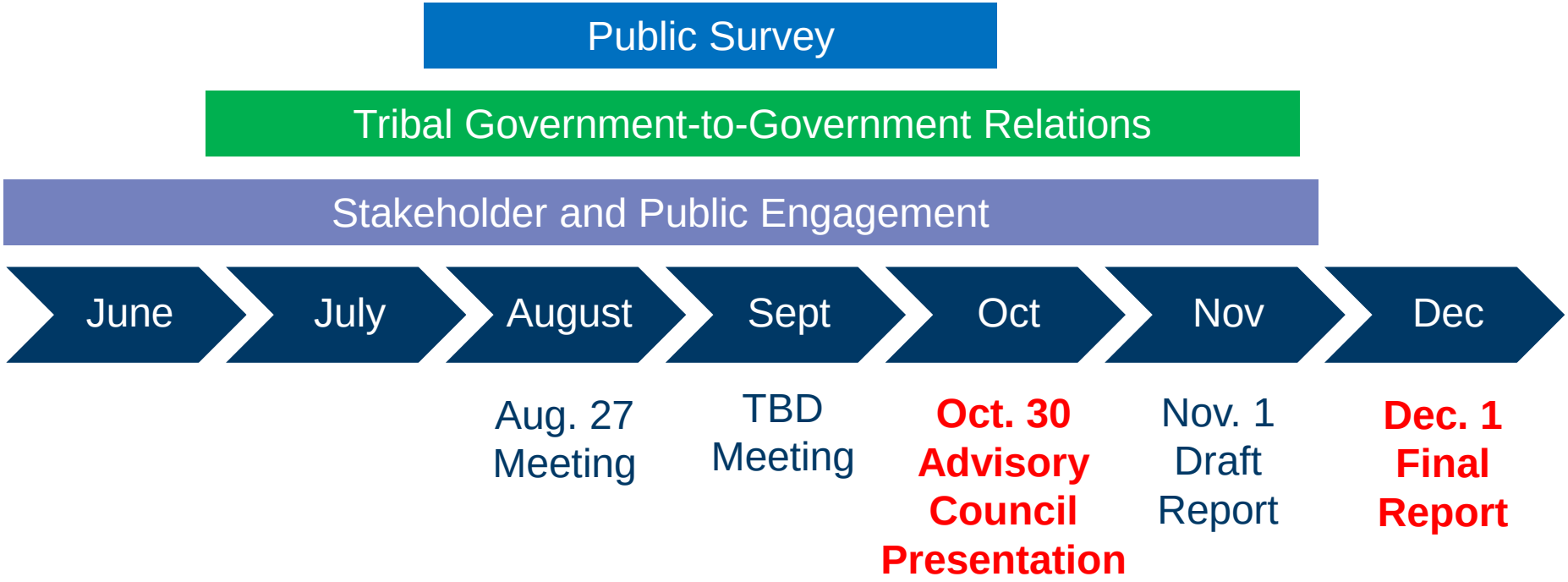
Subcommittee Process

- Participation
  - Meeting materials available on **MnDOT website**
  - Meeting updates at MnDOT CAV-X website
  - Participate in a **meaningful way**
- Discussion
  - Consider the themes of **safety, risk, equity and environment**
  - Consider immediate, **short-term outcomes**
- Recommendation
  - Clear, **consensus-based** recommendations (or reasons for differences)
  - Present recommendations to Advisory Council **October 30th**

Subcommittee Charter

- Meetings **open to the public**
- **Respectful** discussion, opportunities to be heard and **listen**
- May submit written comments on **comment cards**
- Notes taken on **consensus** or **summary** of discussion
- Meeting **notes approved by liaisons** and sent to subcommittee members for additional comments
- Meeting evaluation emailed after meeting

Key Dates


Public Survey
Tribal Government-to-Government Relations
Stakeholder and Public Engagement
June
July
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Dec
Aug. 27 Meeting
TBD Meeting
Oct. 30 Advisory Council Presentation
Nov. 1 Draft Report
Dec. 1 Final Report

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Review of Executive Order & Goals

Governor's Executive Order Establishing the Advisory Council

Forms an Advisory Council

Consults with Stakeholders

Prepares a Report on Statute, Rules and Policy Changes

Establishes Testing and Development Programs

Governor's Advisory Council on CAV

Advisory Council

Interagency CAV Team

Transportation Infrastructure	Cyber Security & Data Privacy	Vehicle Registration, Driving Training, Licensing	Insurance and Liability	Traffic Regulations & Safety	Economic & Workforce Development, Business Opportunities	Accessibility and Equity	Land Use & Planning
Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback	Public Feedback

Advisory Council Goals

1. **Brand** Minnesota as a place to test and deploy CAV
2. **Engage the public**
3. **Educate** the general public
4. **Develop actionable recommendations** to facilitate the adoption of CAV in a manner that enhances our quality of life, while providing flexibility to account for evolving technology
5. **Recommend mobility strategies**

Public Engagement Opportunities

Public Feedback Opportunities

Interagency Team

- Policy position papers
- Branding
- Testing & Deployment
- Partnerships

DEPARTMENT OF TRANSPORTATION

Why We're Here

Frank Douma
Director, State and Local Policy Program
Hubert H. Humphrey School of Public Affairs

Automated Vehicles

Automated vehicles can **take control of** some or all aspects of **driving tasks**.

Why Automated Vehicles?

SAFETY

United States

40,100 in USA in 2016

Worldwide

1.25 Million Deaths in 2013

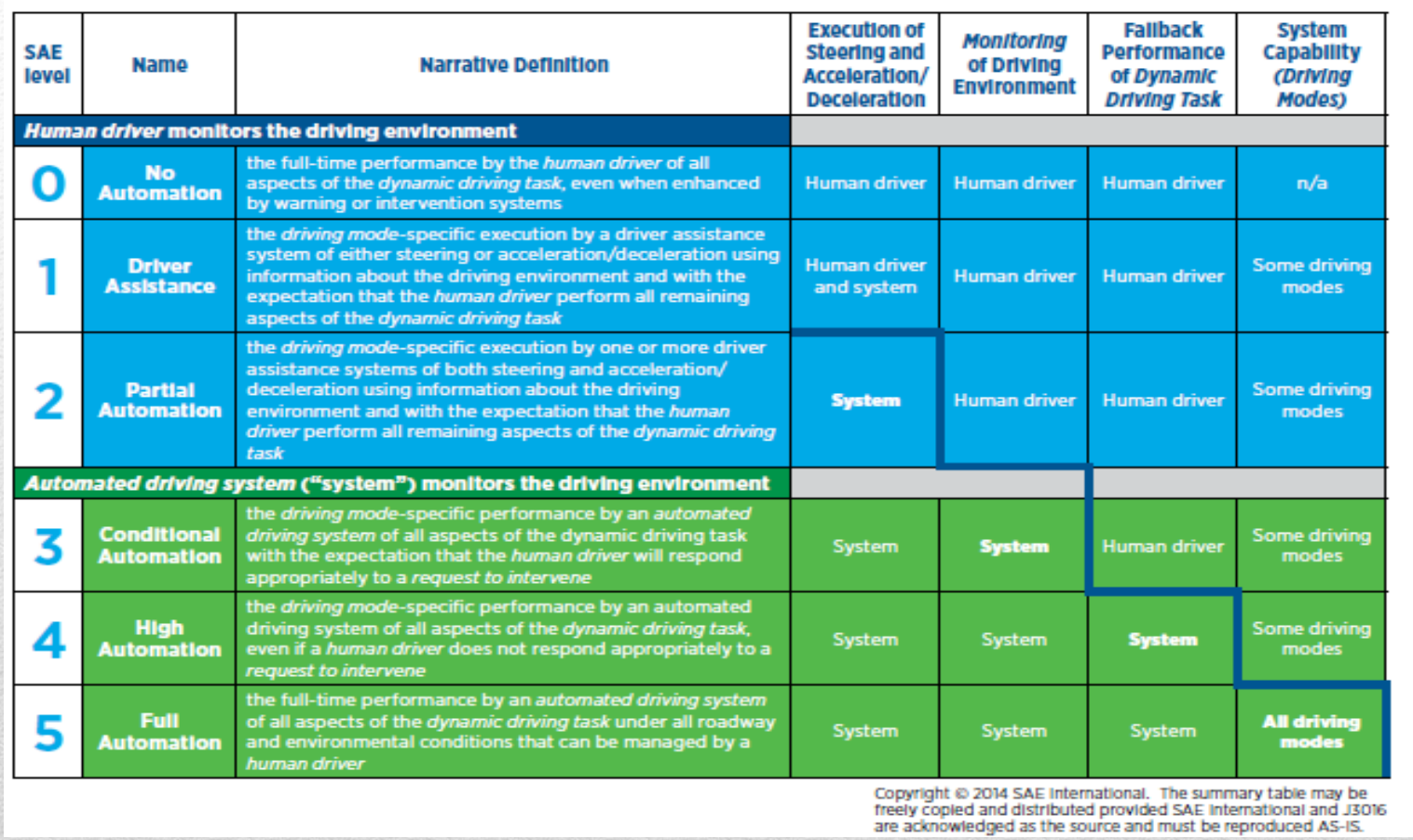
50+ million Injuries

65+ Million Deaths in 20th Century

Approximately WW II causalities

Economic Cost > $500 Billion/year

90% percent of accidents caused by driver's error



SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	*Monitoring* of Driving Environment	Fallback Performance of *Dynamic Driving Task*	System Capability *(Driving Modes)*
***Human driver* monitors the driving environment**						
0	**No Automation**	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	**Driver Assistance**	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	**Partial Automation**	the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
***Automated driving system* ("system") monitors the driving environment**						
3	**Conditional Automation**	the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	**High Automation**	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	**Full Automation**	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

SAE International (Society of Automotive Engineers) Definition Used in 2016 Federal Policy

What Automated Vehicles Could Look Like

What Automated Vehicles Could Look Like

Types of Automated Vehicles

Available and Future **Automation**

Today

Levels of Automation:
Adaptive Cruise Control, Auto Emergency Braking, Automatic Lane Keeping, Partial "hands off"

Future

Levels of Automation:
Possibly no steering wheel, hands off technology

Led by Waymo (Google)

- Clear leader with more than 600 vehicles in demonstration
- SDV has driven more than 6 million miles in 25 cities in California, Washington, Texas, Arizona etc.
- Lowest rate of disengagement
- Taxi demonstration in Phoenix suburb with plan to launch fully driverless commercial taxi service in Arizona later this year
- Ordered 20,000 Jaguar SUV's
- Ordered 62,000 Chrysler Minivans

Connected vehicles **“talk” to infrastructure**, other vehicles, and potentially other modes (bikes, peds, transit)

Connected Vehicles

Connected Vehicles (CV)

Autonomous Vehicles (AV)

Electric Vehicles

3 Trends in Motor Vehicle Development

Land Use / Infrastructure

- Congestion Reduction
  - Gap reduction- low elasticity
    - Reduced Lane width
    - Smooth merging
- Reduced Right Of Way Allocated For Vehicles?
- End of Minimum Parking Requirements?

Improved Transit

- Seniors, Poor, Children?
- First and Last Mile Solution for Transit
- Complement to existing service
- Increase the impact of transit stations on adjoining properties
- Greater efficiency in low density
- From few blocks to maybe a mile?

Cost/Ownership

Depending on vehicle cost, new ownership models may be adopted

Does It make sense to own a vehicle which is used only 2 out of 24 hours?

Fewer cars/Family

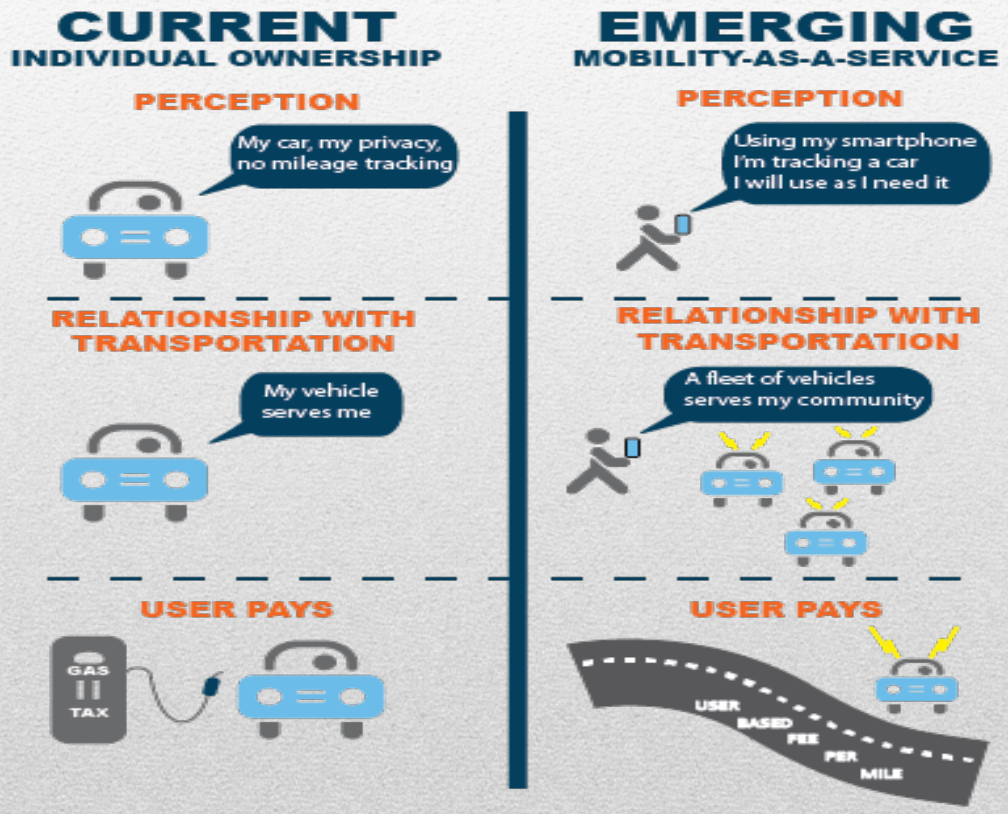
Private/Public Owned Fleet

Shared Vehicles

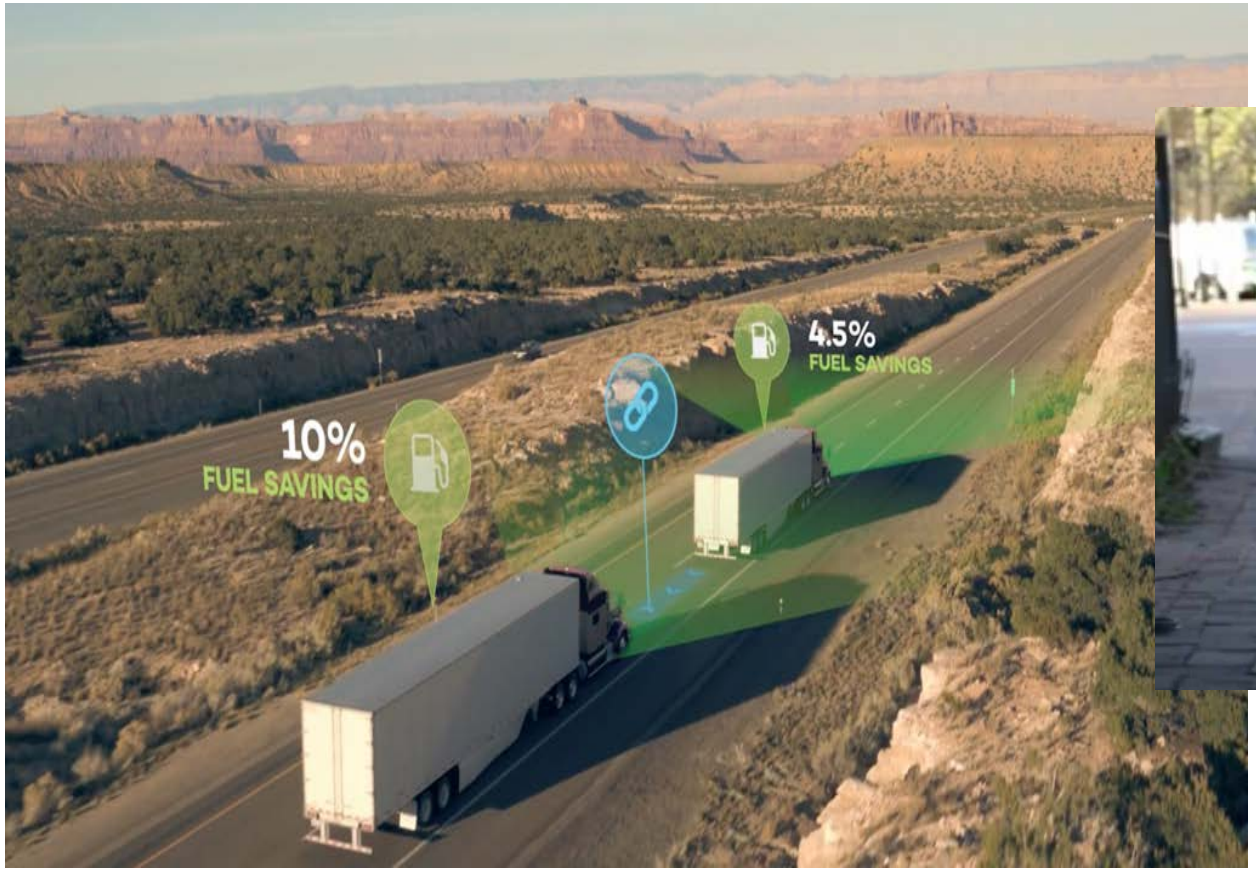
- Remember Waymo?
  - Ordered 20,000 Jaguar SUV's
  - Ordered 62,000 Chrysler Minivans

What was that about ownership???

Mobility as a Service



Alternative Automation



Truck Platooning

Automated Delivery

DEPARTMENT OF TRANSPORTATION

Potential Development Scenarios for Connected and Automated Vehicles

Mark Nelson
Program Manager for Statewide Planning
MnDOT

Technology Causes Big Change

All of these…

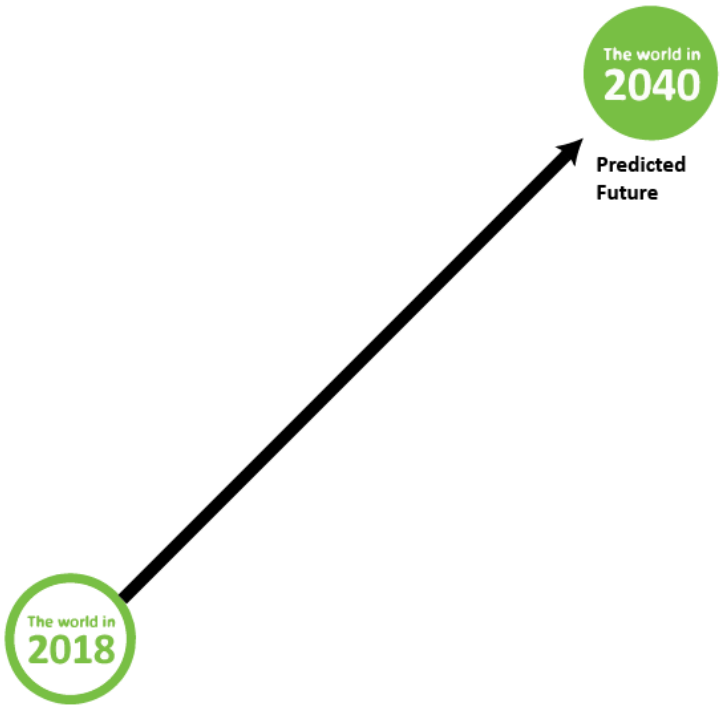
…are now part of this!
(and more)

Change Happens Fast

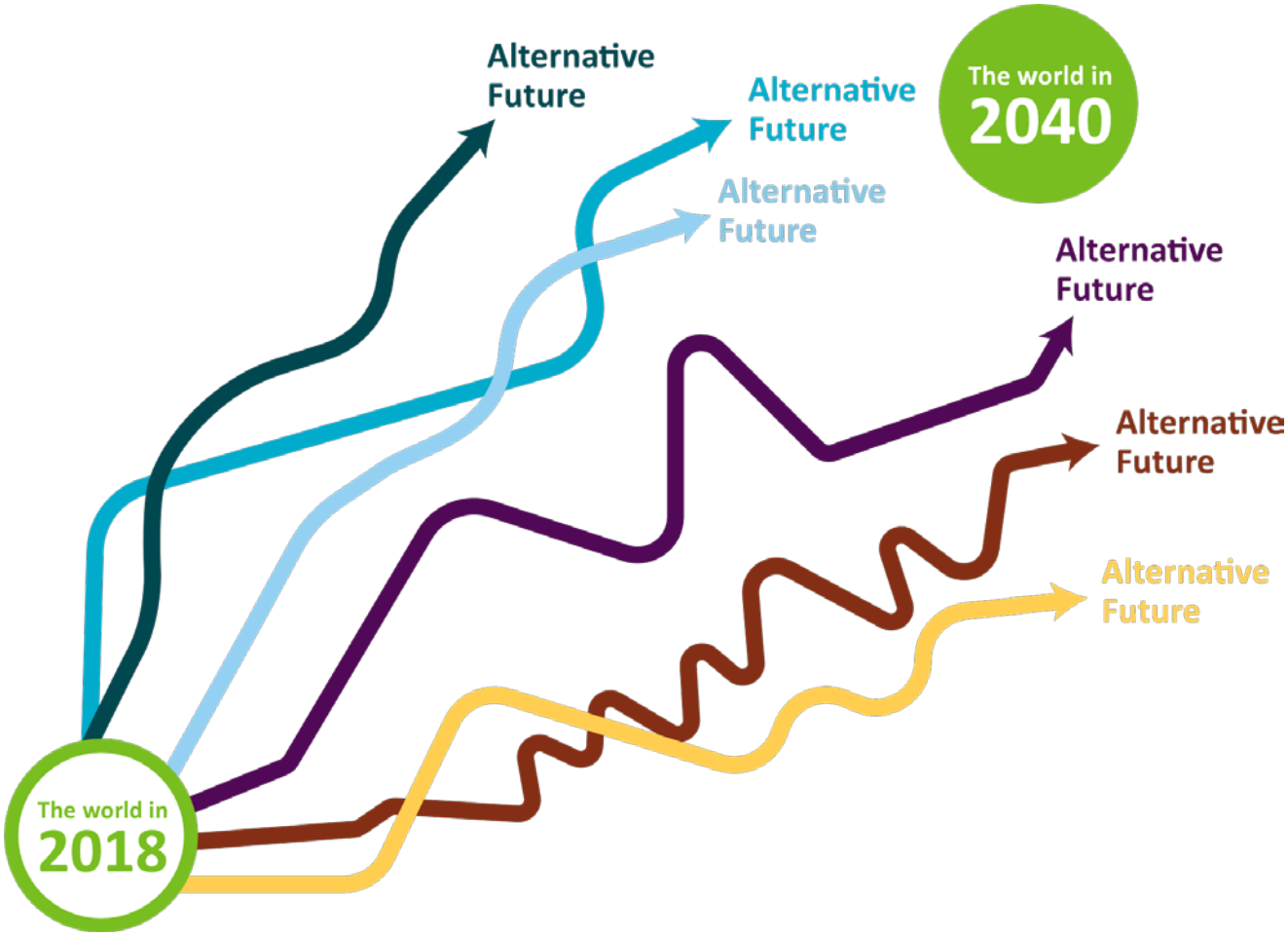
First Model T – 1908
Cars dominate in U.S. cities – 1920 **(+12 years)**
Cars dominate in U.S. rural areas – 1939 **(+31 years)**

First commercially available cell phone – 1984
Majority of Americans have cell phones – 1995 **(+11 years)**
First iPhone – 2007 **(+23 years)**

Traditional Planning & Forecasting



Planning in the Face of Uncertainty



What's Changing?

- **Connectivity**: Degree to which vehicles can communicate with other vehicles, infrastructure, other devices
- **Automation** : Degree to which vehicle is automated and driver is in control or needed (Level 0 to Level 5)
- **Cooperation**: Degree of data sharing and integration of services to achieve public and user benefit.
- **Electrification** : Concurrent trend with impact on finance, infrastructure, etc. Not necessary for automation.

4 Scenarios

These are *possible* futures.
Any of these *could* happen. Or none.

Automated Zones

Connected Infrastructure

Competing Fleets

Integrated Mobility

What Could Change?

People Movement

- Drive, transit, walk, bike, wheelchair, low-power electrics

Goods Movement

- Local, regional, interstate

Land & Environment

- Land (for transportation, other uses, community form)
- Environment (air quality, water quality, etc.)

Social/Political/Economic

- Employment, development, finances, equity, etc.

What Could Change? (Contd.)

Trip Type

- Work, shopping, recreation, freight,

Trip Location

- Urban, suburban, small town, rural

Vulnerable Users

- Children, youth, elderly, people with disabilities
- Low resource (low-income, no car, language barrier, etc.)

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Autonomous Vehicles and Public Health

Emily Smoak | Principal Planner

What is health

"The state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity."

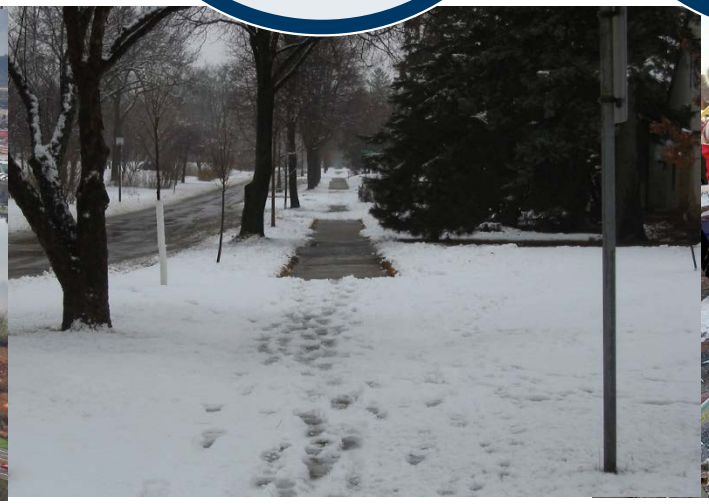
What is Public Health

Public health and the environment

Physical environment

Social environment

Lifestyle & behavior



Age of Infectious Disease

- Industrial Revolution
- Rapid industrial development. Hundreds of thousands of people moved into crowded, unsanitary, industrial cities.
- Results: increased infectious disease, epidemics, unhealthy housing and workplaces, etc.
- Response: sewer systems, zoning, building guidelines, etc.

The Age of Infectious Disease

Urban Sprawl

Age of Chronic Disease

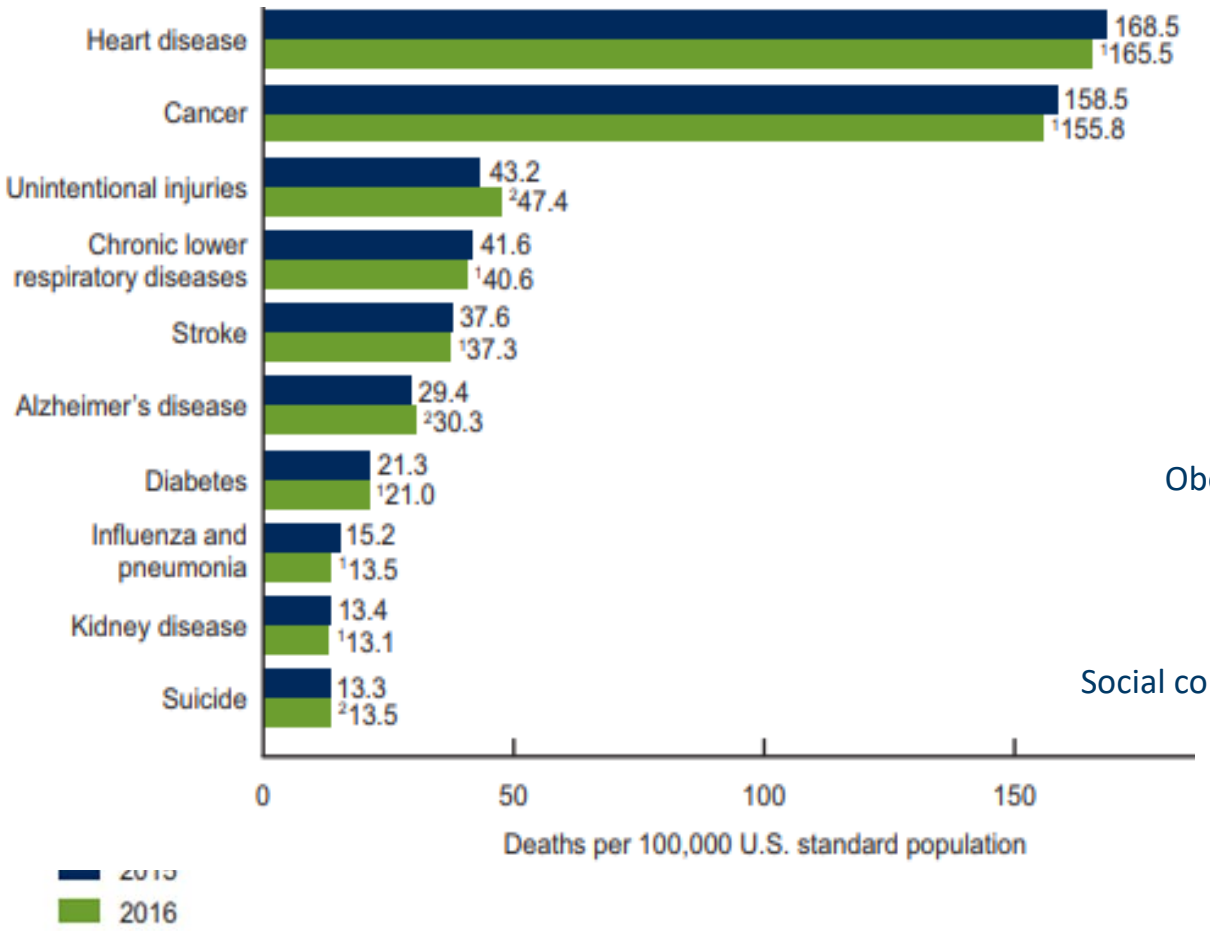
- Suburbanization/Sprawl
- The Interstate Highway System is built out and automobiles make it easier for people to live far away from where they work.
- Results: obesity epidemic, motor vehicle fatalities/injuries, health care costs, GHG emissions, long and stressful commutes, etc.
- Response: Density zoning laws and building guidelines, individual behavior change, Complete Streets policies, Safe Routes to School, gyms

The Age of Chronic Disease

Public Health and Transportation

Healthy Communities
= Healthier Minnesota

Not just crash fatalities



Largely caused by lack of physical activity + poor diet

Certain types of cancer linked to obesity

1/3 motor vehicle crashes

Poor air quality is a contributing cause

Obesity is a primary risk factor

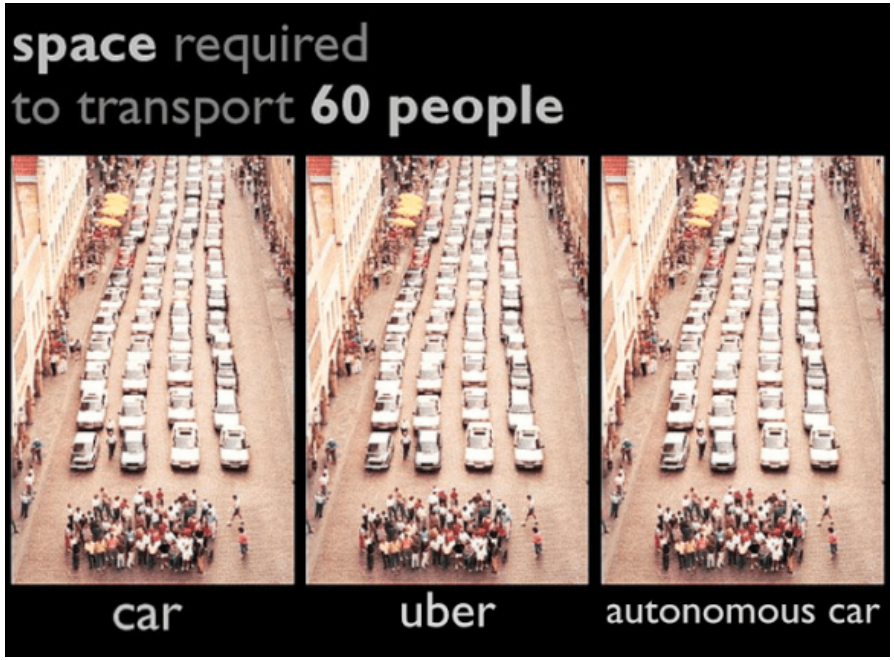
Obesity is a primary risk factor

Social cohesion linked to lower rates of depression

https://www.cdc.gov/nchs/data/databriefs/db293.pdf

How does this relate to AV's?

Possible Risks



Possible Opportunities

Discussion

Vision

- What are the biggest opportunities for land use and planning as CAV develops?
- What are the biggest risks for land use and planning as CAV develops?
- Are these opportunities and risks different for large cities, small cities and/or rural areas? If so, how?

Policy Items to Consider

1. How might state policy allow for more shared mobility, while balancing other motorized and non-motorized needs?
2. What are ways to fund/address changes in investment and funding levels?
3. Should laws be developed to incentivize shared mobility options in rural and underserved communities?

Policy Items to Consider (Contd.)

- What steps do you recommend the state take to plan for land use and planning needs that might be associated with CAV?
  - o Speed management
  - o Land use and sprawl
  - o Parking, infrastructure and management
  - o Siting for new uses (zoning)
  - o Curb space access
  - o Transportation Network Companies
  - o Transit planning and access
  - o Bicycling and walking infrastructure, policies, etc.
  - o Transportation demand management policies
- o Other themes?
- Did we address safety, risk, equity and environment?

Small Group Breakouts

Breakout Session Directions

- Designate 1 recorder
- Designate 1 person to report-out
- Engage with participants in your group & ask questions
- Write thoughts on large poster or individual comments on post-it notes & add to poster

Breakout Session Questions

- What themes and recommendations do you want the Council to share with the Governor & Legislature?

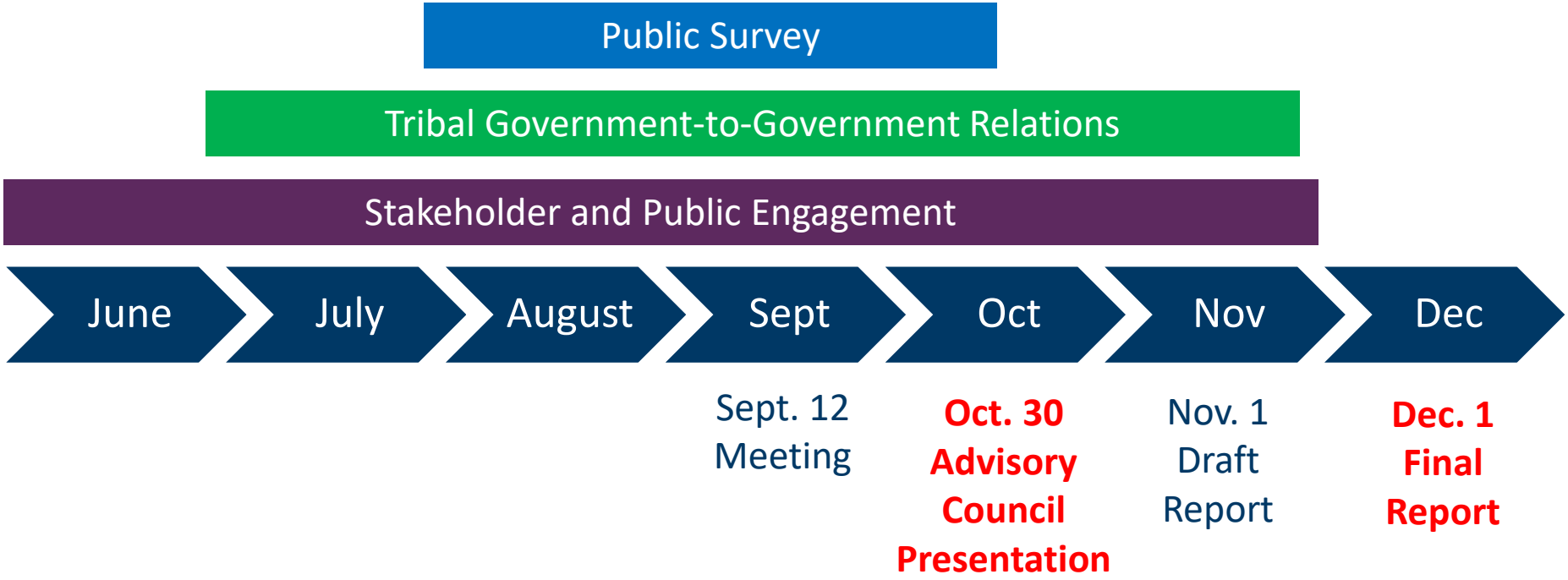
- What policy areas or themes do you want addressed in the 2019 Legislative session?

Next Steps & Closing

Next Steps

- Comment Cards & Suggestions for next meeting
- All participants may review meeting minutes
- Additional comments can be made at CAVfacilitators@mediationcentermn.org
- Post-meeting online survey
- Public survey on MnDOT CAV-X website
- October 30th: Present to Advisory Council

Key Dates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DEPARTMENT OF TRANSPORTATION

Thank you

Frank Douma, University of Minnesota
Subcommittee Liaison

Mark Nelson, MnDOT
Subcommittee Liaison

Emily Smoak, Department of Health

Subcommittee Liaison

Governor's Advisory Council on Connected and Automated Vehicles

Land Use and Planning Subcommittee – MPO Meeting

Meeting Notes

Department of Administration, Conf Rm 116C
200 Administration Building
50 Sherburne Avenue, St. Paul, MN 55155

Participants

Metro Transit
MnDOT Metro
Bike MN
MPCA
Department of Revenue
Apparatus
MnDOT Transit and Active Transportation
St. Cloud APO
Mankota APO
Fargo-Moorhead MPO
Grand Forks MPO
University of Minnesota

Overview of connected and automated vehicles, policy, planning and public health

Themes and recommendations to share with the CAV Advisory Council, Governor and Legislature

- Planning for aging populations
- Safety in school zones
    - What do CAVs do around school system? How old do you need to be to ride/operate a CAV? Liability issues with kids operating CAVs.
    - Micro transit and school access.
    - How do we design our streets?
- Congestion
    - Taking people from walk/bike/transit to SOV, HOV = congestion

- MnDOT rights-of-way
    - How do we create separate spaces for each mode of transportation?
    - Do we place more emphasis on separating people in different modes?
- Funding and Revenue
    - State to set framework for new pricing and revenue (similar to how property taxes are structured by state)
    - Use MnDOT transportation dollars to incentivize more efficient/equitable siting (zoning/land use) choices
    - scenario planning takes resources. Shouldn't some discussion be had to allocate more funding to allow these scenarios to be better or more fully vetted?
    - Seems like the requirements that are in a plan should be expanded to include CAV and with this new requirement state funding could be tied to complete the updates.
- Equity
    - State role in equity – service area, pricing, phase/credit card, type of vehicles
    - CAV initially more expensive (will reinforce existing disparities)
    - Funding toward public transportation opportunities
    - Fair pricing structure and geographic coverage requirements- permitting process
- Liability
    - Who holds it? The owner, user? Manufacturer?
- Land Use
    - CAV could lead to fewer parking needs; opportunities for development
    - As far as urban design and urban sprawl go, municipalities have long had the tools to address these issues, (zoning, subdivision ordinances, building codes, etc.) but have chosen not to use them to limit urban sprawl or to foster building for health. With CAV development driven by the private sector, it seems that profit will continue to take precedence over planning. This is an opportunity for the Council and Governor to review and modify land use and planning policies in light of the introduction of CAVs.
    - site planning issues associated with drop-offs and pick-ups and many other matters associated with CAV.
    - Transition from surface parking to more productive uses could be potential source of revenue for continued investment in smart transportation practices. E.g. tax proceeds from development on former surface lots could be used to subsidize community-wide CAV fleets to keep individual ridership costs down and allow folks to live car-free
- Environment

    - Focus on environmental benefits of technology, policies incentivizing electrification
    - Emission standards for all vehicles and maybe CAV specifically
    - Get rid of gas subsidies
    - Get rid of parking subsidies and promote true cost of parking
- Safety
    - Zone restrictions focused on safety. Example: Downtown with multiple pedestrians (stopping distance, predictive braking, lane departure)
    - Enforcement regulations regarding responsibility where there is no driver
    - Restrict CAV testing to certain area until established to operate safely
- Public Education
    - Get public used to idea of sharing rides in CAV by making demonstration projects a shared shuttle and electrified model (access to electric vehicles)
- Commuting
    - CAV could potentially decrease the "pain" of driving long commutes by freeing drivers to perform other activities while riding between home and work. This may incentivize further and further exurban sprawl, which has numerous negatives including chronic disease, breakdown of community fabric, and higher carbon/pollutant output. How can this be mitigated?
- Shared mobility
    - promoting shared use can make sure that the full cost of travel is part of the individual trip/distance decision instead of the way we own cars as a large sunk cost and only pay a small marginal cost for each trip
    - A shared mobility model (shared fleet serving an entire community) is preferable for many reasons. Not sure what levers can be pulled at the legislative level to steer private development toward a mobility vs. ownership model.
    -
- Infrastructure
    - Assuming the transition to fully automated CAV will take time, what stages of infrastructure will need to be in place?
- Local Government
    - MPOs will need technical assistance, information sharing and best practices.
    - Land use planning and implementation happens at the city/local level but most small cities will not have the capacity and expertise to keep up with the rapidly changing technology and its impacts on land use.
    - MPOs and the state agencies need to be well coordinated and have a structure in-place to provide technical assistance and share best practices.
- Misc.

- How about CAV use Air Space above the road ROW?

Policy priorities for the 2019 Legislative session?

- Public demonstrations
  - Create a demonstration program/ research at state level where communities can apply to do demonstration projects. Allows flexibility with communities but state keeps track of what works and what doesn't
  - Need public education at municipal and county level
- Funding and Research
  - Funding is the most important piece right now - for pilot projects or grants to communities and public transit providers to implement innovative programs related to shared mobility and CAV development.
  - Local governments and the public needs a better understanding of CA of CAV, so they are motivated to consider it in their regulations and planning. This will require the legislature to fund some education and outreach.
  - State, federal government need to fund demonstrations and programs at local level; a top-down approach is best at first, as opposed to a grass-roots or bottom-up approach.
  - Incentivize demonstrations through local grants
  - Study funding mechanisms – look into VMT model by vehicle not my person. How do you charge/surcharge for SOV
  - Study how shared mobility options can be expanded in rural areas where it won't be as profitable.
  - Roadway funding needs to include costs for building in the technology needed, to streamline investment
- Clear policy
  - Create a set of values that the State wants to see for CAV
  - Need a legal framework
  - The Legislature should proceed slowly with passing any new laws governing CAV development.
  - Craft policy statements about CAV and CAV infrastructure and associated land use considerations that can be incorporated into local long-range planning documents (LRTP, bike and ped, ITS, TDP).
  - Strengthening vulnerable user law
  - Need speed management with appropriate speeds with mixed modes of transportation
- Technology
  - Need to standardize technology

- Coordination and Collaboration
    - Bi-state MPO's need to know that coordination is taking place with the neighboring state DOTs (e.g. ND, Wisconsin).
    - West Fargo, ND recently adopted a new comp plan that provides a good example for shared/pooled parking, e.g. building surrounding a parking / loading / deliver area. It looks to me like a great example of how infill development could occur if less parking is needed, with the ability to incorporate pick-up/drop-off areas.

Land Use & Planning

Subcommittee Recommendations

Frank Douma, University of Minnesota
Mark Nelson, Department of Transportation
Emily Smoak, Department of Health

Subcommittee Considerations

Recognizing that while transportation infrastructure planning occurs at all levels of government, the authority for land use planning largely resides with local and regional government.

Consequently, these recommendations are offered as overall values and principles to guide local land use and planning discussions.

General Themes

- Transit and ridesharing
- Parking
- Bikes and pedestrians
- Freight
- Social/environmental impacts
- Taxes and funding
- Equity
- Mobility for all
- Great Minnesota/urban cores
- Mixed fleet
- Insurance
- Pricing
- Weather conditions
- Privacy
- Human impacts

Recommendation 1

- **Education:** Encourage greater buy-in by providing the public with information of the benefits and risks regarding CAV, beginning the installation of CAV infrastructure that can offer current benefits for connected vehicles and successful public demonstrations of CAV.

Recommendation 2

- **Equity:** Standardize quality of service for all users. Require a certain percentage of ADA compliant vehicles. Provide infrastructure and service in all areas of Minnesota

Recommendation 3

- **Role of the State and Local Government:** Maintain current delegation of powers between the state and local governments regarding land-use and other local planning powers.
- Local innovation should be allowed and encouraged, so long as traditional public interests (health, safety, welfare, choice) are protected.

Recommendation 4

- **Infrastructure Planning:** Increase public well-being through “people-focused” system design and investment that supports all users and all modes.

Recommendation 5

- **Values:** The State should establish a clear set of values and objectives to guide CAV policy development and investment priorities.

Funding & Revenue Recommendations

- The State should plan for new transportation funding models prioritizing usage-based fee/tax structure. These models, to the extent possible, should incentivize the use of ride-sharing, and give priority to the integration of CAV and transit, including the use of CAV to serve the first-mile/last-mile of a transit trip. Continue to invest in and improve transit.

MPO Recommendations

- The Legislature should proceed slowly with passing any new laws governing CAV development.
- Funding is the most important piece right now - for pilot projects or grants to communities and public transit providers to implement innovative programs related to shared mobility and CAV development.
- Bi-state MPO's will require coordination at the statewide level with neighboring state governments (Duluth/Superior, Grand Forks/East Grand Fork, Fargo/Moorhead, La Crosse/La Crescent).
- State and MPOs should collaborate on technical assistance, information sharing and best practices. Land use planning and implementation happens at the city/local level but most small cities will not have capacity and expertise to keep up with CAV and land use impacts. MPOs and State need to be well-coordinated and have a structure in-place to provide technical assistance and share best practices.

Thank you

Frank Douma, University of Minnesota
Mark Nelson, Department of Transportation
Emily Smoak, Department of Health