DEPARTMENT OF TRANSPORTATION

Governor's Advisory Council on Connected and Automated Vehicles
Land Use and Planning Subcommittee

DRAFT Meeting Notes

Mn DOT St. Cloud Training Center

Meeting Date: September 12, 2018

6:00 pm – 8:00 pm

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

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.

Meeting participant questions from Steve Morris:

- What is the time frame for CAV?

Mark: No established time horizon. However, when we think of building new infrastructure, we think about is lasting 50-100 years.
Jay: 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.

Mark: We're making assumptions that CAVs would not be individually owned. The ownership structure will determine a lot.
Bill Dermody: I'd add owned versus shared as another scenario.

Emily Smoak, MN Department of Health

Why is the MN Dept. of Health involved?

- In framing and answering that question, we need to think about the definition of health from the Dept. of Health POV, that 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.
- What I do is ensure the environment, specifically our transportation system, makes it easier for people to live healthy lives**.**

When I refer to the "environment":

Physical environment: natural and built space that create our community design

1) Natural: geography, etc. and 2) Built: schools, workplaces, parks, sewer and transportation systems, etc.

Social environment: things that affect the access of resources

1) availability of education, food and jobs. 2) Safety, social support, 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

The connection between public health and the environment

- Started when infectious disease was the primary public health threat.
- Industrial revolution = crowded cities and unsanitary conditions
- Cities made improvements to the environment to address public health.
    - Building guidelines, garbage collection, sewer systems,
    - Modern-day zoning separating neighborhoods, businesses and industry.
- Automobile industry and interstate highway system = even more separation

Mid-20th century = connection between public health and the environment lessened.

- Infectious disease was under control
- Planning of cities for esthetics and economics, not health.

Today, we've started to see the connection between public health and the environment rise to the top again.

- Leading causes of death are now chronic disease

Transportation and public health - primarily traffic fatalities.

- Motor vehicle crashes - leading cause of death for people under 30.
- 40,000 people in the US, 1.3 million people worldwide.
- Millions more experience life altering injuries

In the US, chronic disease is responsible for 7/10 deaths.

- Evidence indicating that the burden of chronic disease in the US can be reduced by living an active life, eating health foods, and reducing exposure to air pollution.
- Communities design leads to long distances between work, school and home, more roads, and an increased reliance on driving alone.
- Increases air pollution, decreases physical activity, hard for some people to access healthy food, less opportunities for positive social interactions.

How does all this relate to CAVs?

CAV has the potential to dramatically change our environment and affect our behaviors.

- Happened before with the automobile.

P**hysical environment changed** - S**ocial environment changed** – **our behaviors changed**

- How will this transportation revolution change our environment?
- How will that influence future public health outcomes?

Safety:

- Vehicles become smarter, but still need operators. People begin to pay less attention
- How will CAVs interact with people?

Ownership and usage models:

- If AV's bring down the cost of driving = more people will drive = longer commutes, increased congestion, further urban sprawl and increased VMT.
- Cheapest land = Car charging and parking = huge suburban and rural surface lots

Shared use model:

- CAV should 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.

Environmental:

- Streets just for CAVs and not for other modes – risk creating a hostile environment for people walking and bicycling
- Electrification of these vehicles is not guaranteed = air quality could worsen.
- If CAV's lead to more shared use/rideshare: possible increase in spread of infectious disease. Similar to what we see on transit, airplanes, and on elevators among other places.

Opportunities:

Safety:

- 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 = Improved air quality = 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
  - possibly be scaled to household income
  - could be used to manage demand/relieve pressure from the transportation network.

Land use:

- Since AVs likely need less street space = 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.

<u>Meeting Participants Small Group Work - Feedback on Risks and Opportunities</u>

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

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

Risk and Opportunity
Public and private sectors must work together

<u>CAV-X Office Notes:</u>
Praveena Pidaparthi
Discussion on 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 can't drive a car
- CAV will really help Metro Mobility which moves people around
- It is possible to get lesser vehicle miles driven but
- 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
- COD – Cargo Oriented Development
- CAN CAV police themselves to lead to reduction in police staff
- ROW allocation – tear up asphalt or move curbs

Risks

- 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

Skype Notes

Opportunity:
Risk: continued or resurgence of sprawling development patterns - more potential impacts to rural areas

What are the biggest opportunities for land use and planning as connected and automated vehicles CAV?

- Less land utilized for parking. Same for large and small cities
- Start using existing parking in different ways. Currently in dense urban areas where people pay to park they choose either a parking contract or a transit pass. Commuters are interested in flexibility. If we start letting people take transit some days and drive on others we start breaking the habit of owning your own car, and start moving the culture to transit. This leads to shared AV.
- Creating a transportation infrastructure financing system from the ground up, without the massive transition costs of shifting our current system, since the transition could come right with CAVs (no additional transition). HUGE potential impact on sprawl, equity, fiscal sustainability, etc.
- Start demonstrating shared AV by having one corridor dedicated to providing shared AV Rides so people start imagining and experiencing AVs and shared. They are doing this in Columbus.
- Start providing more access to shared EVs. The audience could be transit users who need a car occasionally during the day for meetings or errands. If they can easily rent a shared EV people will learn to experience EV and learn to trust EV and how to drive them.
- In the suburban office park of today, everyone drives their own car to the office and parks in the adjacent ramp. What happens when they're all dropped off at the front door to the office within 1/2 hour span?
- Opportunity to better use parking space goes beyond the mere space's opportunity cost - the conversion of that to placemaking-supportive uses has a cumulative impact on the overall place - it's more than just a transaction.
- If done with bike/ped safety in mind, our development patterns could make for better places for people to walk and bike, especially if vehicle as service becomes prominent and people no longer own their own vehicles.
- In the urban environment most people drive their car downtown and park it in a similar ramp near their office. When they're driven to their front door in a shared autonomous vehicle where does the vehicle go after that worker has been dropped off?

- If parking garages now are turned into Mobility Hubs with other services such as car share and access to other modes, and retail on ground floor - and other placemaking it will start transitioning away from parking.
- ROW reallocation. (This is long-term, though - that costs a lot of money to move curbs and tear up asphalt.)
- In rural areas and small towns, an opportunity would be that as people age, they'll more likely be able to age in place. Right now rural transit systems are very limited in their ability to effectively serve people in rural areas and very small towns. CAVs could provide better mobility to people who get to a point where they can't or don't drive anymore.
- A short-term opportunity would exist when we no longer need parking lanes and 12-foot travel lanes (since CAVs will be able to stay in the lines) - we can reallocate more of the existing pavement to bikes/peds.
- Can CAVs be made to "self-report" or "self-patrol" for traffic violations, so as to lessen police staff needs for that?

What are the biggest opportunities risks of land use and planning as connected and automated vehicles CAV?

- Risk is the flip side of that with sprawl, etc., locking us into a scenario where we have to "drive" everywhere / reliance on CAVs to get around.
- In today's Twin Cities, each car contains an average of 1.1 passengers per vehicle at rush hour. What happens when that drops to 0.7 passengers per vehicle because so many vehicles are driving around empty waiting for the next ride.
- There is a danger that our urban downtowns will be choked with zombie vehicles during the day because far more vehicles will accumulate in the downtowns that are needed. How do we incentivize the fleet owners to park their excess vehicles and lots of the periphery of the downtown rather than just driving them around downtown empty?
- We could end up needing more roadway lanes in downtown areas, rather than less, because there are so many zombie vehicles on the road
- We may need somewhat less parking space but a lot more free curb space that will have to be managed for organized pickups and drop offs
- I agree with the zombie vehicle risk. Moving toward VMT tax from gas tax could help discourage that.
- We will be compelled to use congestion pricing to manage the zombie vehicle problem and are congested downtown areas
- Fleet owners must he be compelled to balance the cost of driving zombie vehicles versus parking them at lots on the periphery.
- Lack of curb space could discourage density and encourage more dispersed activities... ergo more driving. I wonder what the key density/intensity tipping points will be for that?
- When is the Xcel center event too large for people to attend with CAVs because they can't be dropped close enough?
- When is the office building too large to accommodate pickup/dropoffs well enough?
- The vehicles will have to be connected to manage the flow to the office building
- A risk is we are not flexible enough with our planning. there could be lots of small AVs giving individual rides. Or there could be fewer larger vehicles that pickup several people. The latter will be less congestion.
- Jitney style ad hoc carpooling will definitely be part of the mix
- As we're discussing the pickup/dropoff at events, (Xcel, etc) I'm envisioning the problems with the same situation today at schools. I think keeping a focus on other modes (walking and

biking) will be key. A balanced system will function better than one tilted too hard to accommodate CAVs.
- Income inequality creates divide between owners and sharers.
- Planning, zoning and policy need to get in front of how we think this should work best. We should plan for how we reduce congestion. A risk is don't get out front of it and we let the changes happen to us.

Are there opportunities and risks different for lare cities, small cities and/or rural areas? if so, how?

- Our suburban park and rides in the Twin Cities will become hubs for the smaller autonomous vehicles are charged overnight and then range out into the surrounding suburbs to bring people back to the transit hubs where they will take a larger vehicle to their ultimate destination
- There will be an incentive for people to live in denser areas because that is where the convenience of shared autonomous vehicles will be the greatest
- It is in the least dense areas in the countryside and ex-urban areas where people will be most likely to want to own their own vehicles because the wait to summon a shared vehicle will be so long
- Congestion from zombie cars is definitely more of a large city risk
- Rural areas will be the last place for AVs. Especially if it is shared ownership. People will own and drive cars in rural areas for much longer than in the dense urban areas.
- I can't imagine taking an AV to the cabin. or for it to leave me there.
- Which means all the opportunities are smaller in rural areas
- In suburban areas, families may go from two or more vehicles to one, using a shared vehicle for most trips in the owned vehicle for longer trips and to schlep stuff
- I think the safety features of connected vehicles are there for rural
- What happens to the three-car garage in this scenario? Granny flats?
- The scenario on 2+ cars to 1 car in suburbs is plausible, but I wouldn't guarantee it. We might actually see same # of owned cars in suburbs
- If the benefits are smaller in rural areas, that has political implications
- Will AVs be too expensive for people to own their own? Or at least to own many?
- At one meeting where we were discussing CAVs in our region, I had someone ask me "how do I haul my boat?" in a CAV environment.
- Will the lower insurance cost offset the purchase cost? Will the convenience be worth extra cost?
- Could change how rural areas develop - if they get "left behind" with CAV tech, could encourage/force/etc migration to larger urban areas and regional centers???
- It will heighten the advantage of living in an urban area
- Or, for some people to own -widening the equity divide
- I envision 10 CAVs lined up outside every rural bar at closing time, though
- If people can telework more, and only go to the city when they need to, rural might have an advantage
- Telework has grown... slowly. There seems to be an enduring advantage to face-to-face work for most people most of the time.
- Yes it has the potential to significantly reduce drunk driving.
- Interesting vehicle load-balancing problem. Can the demand forecasting algorithm predict the need to have 10 CAV's at the bar at closing time
- Why transfer at the park and ride for an exurban to urban trip? A: because the cost of repositionioning the AV back to the exurbs from the city will make the ride cost prohibitive

Other comments

- Everyone seems to think that AV rides will be practcally free.
- The cost of positioning the zombie vehicle for the next ride will sometimes be substantial
- That is an excellent point - what if you can't afford a CAV and your insurance is pricing you out of using your conventional vehicle? Agree that this is an equity issue.
- Shared vehicles would help
- If CAVs are an alternative to funding transit, then there must be significant advantages for HOVs so CAVs can act more like transit

Tentative & Final Recommendations – Start tracking tentative recommendations and agreed upon recommendations (bold agreed recommendations).

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

Parking Lot - items for follow up at subsequent meetings