June 29, 2018

TO: Cybersecurity and Long-Term Issues Subcommittee of the Autonomous Vehicles Task Force
FROM: Becky Steckler, University of Oregon and Task Force Member
RE: AV Policy Furthering Oregon’s Transportation, Land Use, and Global Warming Pollution Reduction Goals and Economic Development Principles

BACKGROUND
At the May 30, 2018 meeting of the Cybersecurity and Long-Term Issues Subcommittee meeting I suggested that the autonomous vehicle (AV) policies that the state adopts should help to achieve the myriad statewide transportation, greenhouse gas emission reduction, land use, economic development and other related topic goals. I volunteered to put together this memorandum listing the pertinent goals. Note that all of these plans and documents contain additional information about each goal and accompanied objectives, strategies, and action items to implement them.

The rest of this memorandum provides a brief summary of the most relevant transportation, greenhouse gas reduction, land use, and economic development plans and goals that policy makers should consider to make sure that new policies, programs, or revenue systems related to AVs support these goals and do not create barriers to achieving them. The summary is followed by links to each plan and a list of the plan goals.

SUMMARY
Autonomous vehicles will dramatically impact Oregon’s transportation system. Any policy, program, or revenue structure adopted by the state should support the implementation of the Oregon Transportation Plan goals (see below). Because AVs will need to be integrated into a multi-modal system and will likely impact all modes, this memorandum includes the goals for Oregon’s Public Transportation System Plan and Oregon’s Bicycle and Pedestrian Plan. While Oregon has a Freight Plan, it does not address local delivery of goods and services (such as Uber Eats, Amazon deliveries, etc.), which occur primarily on city streets and roads. Automation of local goods delivery and the increase of e-commerce will also significantly impact the state’s transportation system.

This memorandum lists the goals for the following plans:

- Oregon Transportation Plan
- Transportation Safety Action Plan
- Oregon Public Transportation Plan (DRAFT)
- Oregon Bicycle and Pedestrian Plan
- 2017 ORS 468A.205 Policy: Greenhouse gas emissions reduction goals
- Oregon Statewide Transportation Strategy
- Oregon Land Use Planning Goals
- Business Oregon Strategic Plan Priorities

Of all the goals identified in the above plans, there are a few worth highlighting. Given the importance of mobility to Oregon’s economic, public health, and sustainability outcomes, policy makers should
ensure that AV policies support all of the goals of the Oregon Transportation Plan and the Oregon Safety Action Plan. AVs promise to deliver significant safety improvements but there is seemingly no reason to allow AVs if they do not. In addition, policy makers should ensure that AV policies, programs, and revenue structures support the Oregon Public Transportation Plan Goal 1 – Mobility: Public Transportation User Experience and Goal 4 – Equity. Government policy plays an important role in ensuring that people of all ages, abilities, and income levels can get from A to B. We should ensure that all Oregonians have affordable, safe, efficient, and equitable transportation to jobs, services, and key destinations.

The potential for AVs to significantly increase vehicle miles traveled and increase the pressure for sprawl may jeopardize Oregon’s ability to achieve its greenhouse gas (GHG) emission goals in ORS 468A.205. One of the best ways to reduce vehicle miles traveled is to improve the efficiency, comfort, and reduce the cost for walking, biking, and transit, as envisioned in the Oregon Statewide Transportation strategy. At the same time, the potential for AV electrification could help the state achieve its goal for fuel-efficient/alternative energy vehicles.

According to Nelson/Nygaard, a leading transportation consulting firm, the demand for parking may decrease by 80% in an autonomous future (“Autonomous Vehicles and the Future of Parking,” 2016). Given the potential reduction in demand for parking, the opportunity to increase density highlights the need to ensure that people can walk, bike, or take transit to their destinations. It will be increasingly difficult to move people by single occupancy vehicles or even shared occupancy vehicles in increasingly dense cities. Policy makers should ensure that AVs integrate and support increased density and pedestrian, bicycle, and transit systems.

Of the 19 statewide goals, Oregon Land Use Goal 12 Transportation is critical. Oregon’s land use program is based on planning transportation and land uses that are mutually supportive. Both the land use program and Business Oregon’s Strategic Priorities understand the importance of transportation for Oregon’s economy, especially worker access to jobs, customer access to businesses, access to materials, and the shipment of goods.

Finally, a well-functioning transportation system is critical to ensure that employees and customers can get to Oregon businesses as well as for shipping and receiving goods from across the country and around the world. The state should ensure that AV policies, programs, and revenue structures provide the infrastructure businesses need to succeed.

It should be no surprise that all of these plans have overlapping goals. Oregonians understand that the success of our communities is highly dependent on a transportation system that provides mobility and accessibility, manages congestion, supports the economy, supports sustainability, and is safe, healthy, and equitable. This will be much easier with coordinated land uses and a revenue structure that provides the resources needed for transportation investments, as well as partners from the local to the national level that are working together to achieve these goals. AV policies, programs, and revenue structures should help Oregonians achieve the very important goals identified in the above-named plans.
STATEWIDE GOALS IMPACTED BY AVS

This section lists the goals of statewide transportation, greenhouse gas emissions, land use and economic development plans that AVs may impact. Policy makers should ensure that any policies, programs, and taxes support these goals and do not make it more difficult for the state to achieve them.

TRANSPORTATION

AVs may be as transformative as the introduction of the car. The impacts and disruption to the transportation system should not be underestimated. All policies, programs, and revenue structures created by Oregon policy makers should help the state achieve the goals in the Oregon Transportation Plan.

In addition, one of the major arguments for deploying AVs is to improve the safety. According to the Oregon Department of Transportation, 445 people were killed and 41,754 were injured in 2015 (“2015 Oregon Motor Vehicle Traffic Crashes: Quick Facts,” 2017).

Oregon Transportation Plan (2006) implemented by the Oregon Department of Transportation and local governments:

- **Goal 1 – Mobility and Accessibility.** Provide a balanced, efficient and integrated transportation system that ensures interconnected access to all areas of the state, the nation and the world. Promote transportation choices that are reliable, accessible and cost-effective.
- **Goal 2 – Management of the System.** Improve the efficiency of the transportation system by optimizing operations and management. Manage transportation assets to extend their life and reduce maintenance costs.
- **Goal 3 – Economic Vitality.** Expand and diversify Oregon’s economy by transporting people, goods, services and information in safe, energy-efficient and environmentally sound ways. Provide Oregon with a competitive advantage by promoting an integrated freight system.
- **Goal 4 – Sustainability.** Meet present needs without compromising the ability of future generations to meet their needs from the joint perspective of the environment, economy, and communities. Encourage conservation and communities that integrate land use and transportation choices.
- **Goal 5 – Safety and Security.** Build, operate and maintain the transportation system so that is safe and secure. Take into account the needs of all users: operators, passengers, pedestrians and property owners.
- **Goal 6 – Funding the Transportation System.** Create sources of revenue that will support a viable transportation system today and in the future. Expand ways to fund the system that are fair and fiscally responsible.
- **Goal 7 – Coordination, Communication and Cooperation.** Foster coordination, communication and cooperation between transportation users and providers so various means of transportation function as an integrated system. Work to help all parties align interests, remove barriers and offer innovative, equitable solutions.
SAFETY
One of the primary reasons to have AVs is to save lives and reduce injuries. According to the National Safety Council (National Safety Council, Undated), more than 40,000 died in car crashes in the 2017 in the US, 4.57 million people were injured and societal costs were about $413.8 billion.

Transportation Safety Action Plan (2016) implemented by the Oregon Department of Transportation and local governments:

- **Safety Culture** – Transform public attitudes to recognize all transportation system users have responsibility for other people’s safety in addition to their own safety while using the transportation system. Transform organizational transportation safety culture among employees and agency partners (e.g., state agencies, MPOs, Tribes, counties, cities, Oregon Health Authority, stakeholders and public and private employers) to integrate safety considerations into all responsibilities.

- **Infrastructure** – Develop and improve infrastructure to eliminate fatalities and serious injuries for users of all modes.

- **Healthy, Livable Communities** – Plan, design, and implement safe systems. Support enforcement and emergency medical services to improve the safety and livability of communities, including improved health outcomes.

- **Technology** – Plan, prepare for, and implement technologies (existing and new) that can affect transportation safety for all users, including pilot testing innovative technologies as appropriate.

- **Collaborate and Communicate** – Create and support a collaborative environment for transportation system providers and public and private stakeholders to work together to eliminate fatalities and serious injury crashes.

- **Strategic Investments** – Target safety funding for effective engineering, emergency response, law enforcement, and education priorities.

The deployment of AVs will need to be carefully coordinated with pedestrian, bicycle, and transit systems to ensure that the introduction of AVs support these modes and do not make it more difficult or less convenient to walk, bike, or take transit. The University of Oregon is working on a literature review now on the impacts of new mobility technologies (the sharing economy and AVs). We anticipate that the transportation network company (TNC) model will likely be similar for the eventual roll out of AVs. The growth of TNCs in the last few years has impacted travel behavior and preliminary research suggests TNCs are reducing transit ridership. In a recent Boston-area study, researchers found weekly or monthly transit pass holders are substituting TNCs for transit more frequently, and that those “who ride transit more often are more likely to drop it for ride hailing, even while doing so at a huge cost differential, and even when they have already paid for the transit (Gehrke, Reardon, & Felix, 2018).” TNCs may also be replacing trips that otherwise would have been made by walking and biking. Using weighted data, researchers at UC Davis found that only 39% of trips made using Uber and Lyft would otherwise have been made by car, i.e. drive alone, carpool, or taxi (Clewlow & Mishra, 2017). The majority of trips would otherwise not have been made at all, or would have been made by walking, biking, or transit. If AVs follow the patterns we are beginning to see emerge with TNC usage, these trends could be worsened by AVs since a ride in a TNC-operated fully autonomous vehicle that does not include a driver will likely be cheaper than the cost of an average ride today. On the other hand,
new mobility services like TNCs, and eventually AVs, could theoretically boost ridership if they help solve the first-mile/last-mile problem and serve as a complement to transit.

2018 Oregon Public Transportation Plan Goals (DRAFT) implemented by the Oregon Department of Transportation and local governments

- **Goal 1 – Mobility - Public Transportation User Experience.** People of all ages, abilities, and income levels move reliably and conveniently between destinations using an affordable, well-coordinated public transportation system. People in Oregon routinely use public transportation to meet their daily needs.
- **Goal 2 – Accessibility and Connectivity - Getting from Here to There.** Riders experience user-friendly and convenient public transportation connections to and between services and travel modes in urban, suburban, rural, regional, and interstate areas.
- **Goal 3 – Community Livability and Economic Vitality.** Public transportation promotes community livability and economic vitality by efficiently and effectively moving people of all ages to and from homes, jobs, businesses, schools and colleges, and other destinations in urban, suburban, and rural areas.
- **Goal 4 – Equity.** Public transportation provides affordable, safe, efficient, and equitable transportation to jobs, services, and key destinations, improving quality of life for all Oregonians.
- **Goal 5 – Health.** Public transportation fosters improved health of Oregonians by promoting clean air, enhancing connections between people, enabling access to services such as health care and goods such as groceries, and by giving people opportunities to integrate physical activity into everyday life through walking and bicycling to and from public transportation.
- **Goal 6 – Safety and Security.** Public transportation trips are safe; riders feel safe and secure during their travel. Public transportation contributes to the resilience of Oregon communities.
- **Goal 7 – Environmental Sustainability.** Public transportation contributes to a healthy environment and climate by moving more people with efficient, low-emission vehicles, reducing greenhouse gases and other pollutants.
- **Goal 8 – Land Use.** Public transportation is a tool that supports Oregon’s state and local land use goals and policies. Agencies collaborate to ensure public transportation helps shape great Oregon communities providing efficient and effective travel options in urban, suburban, and rural areas.
- **Goal 9 – Funding and Strategic Investment.** Strategic investment in public transportation supports the overall transportation system, the economy, and Oregonians’ quality of life. Sustainable and reliable funding enables public transportation services and infrastructure to meet public needs.
- **Goal 10 – Communication, Collaboration, and Coordination.** Public and private transportation providers and all levels of government within the state and across state boundaries work collaboratively and foster partnerships that make public transportation seamless regardless of jurisdiction.

Preliminary modeling suggests that the demand for parking will decrease significantly – AVs will not need to park in the same places we want to park our cars today. That change provides an opportunity for redevelopment of parking lots and structures to other uses. With the potential increased density

comes an opportunity to improve and encourage more walking and biking. AV policies, programs, and revenue structure should be designed to support Oregon’s Bicycle and Pedestrian Plan.

**Oregon Bicycle and Pedestrian Plan** implemented by the Oregon Department of Transportation.

- **Goal 1 – Safety.** Eliminate pedestrian and bicyclist fatalities and serious injuries, and improve the overall sense of safety of those who bike or walk.
- **Goal 2 – Accessibility and Connectivity.** Provide a complete bicycling and pedestrian network that reliably and easily connects to destinations and other transportation modes.
- **Goal 3 – Mobility and Efficiency.** Improve the mobility and efficiency of the entire transportation system by providing high quality walking and biking options for trips of short and moderate distances. Support the ability of people who bike, walk, or use mobility devices to move easily on the system.
- **Goal 4 – Community and Economic Vitality.** Enhance community and economic vitality through walking and biking networks that improve people’s ability to access jobs, businesses, and other destinations, and to attract visitors, new residents, and new business to the state, opening new opportunities for Oregonians.
- **Goal 5 – Equity.** Provide opportunities and choices for people of all ages, abilities, race, ethnicities, and incomes in urban, suburban, and rural areas across the state to bike or walk to reach their destinations and access transportation options, assuring transportation disadvantaged communities are served and included in decision making.
- **Goal 6 – Health.** Provide Oregonians opportunities to become more active and healthy by walking and biking to meet their daily needs.
- **Goal 7 – Sustainability.** Help to meet federal, state, and local sustainability and environmental goals by providing zero emission transportation options like walking and biking.
- **Goal 8 – Strategic Investment.** Recognize Oregon’s strategic investments in walking and biking as crucial components of the transportation system that provide essential options for travel, and can help reduce system costs, and achieve other important benefits.
- **Goal 9 – Coordination, Cooperation, and Collaboration.** Work actively and collaboratively with federal, state, regional, local, and private partners to provide consistent and seamless walking and biking networks that are integral to the transportation system.

**GREENHOUSE GAS EMISSION REDUCTION**

Oregonians are concerned about climate change and have set environmental goals to reduce greenhouse gas (GHG) emissions. One of the most salient questions about AVs and other new mobility technologies is what impact they are likely to have on vehicle miles traveled (VMT) as VMT is directly related to both GHG emissions and congestion; preliminary modeling results from the consulting firm Fehr & Peers suggest that AVs could lead to a 14-31% increase in vehicle distance traveled\(^1\). Travel behavior outcomes, including the choices that people make regarding frequency of travel (trip generation), and mode of travel (mode share), have direct impacts on VMT. Research conducted by Greenblatt and Shaheen, Clewlow and Mishra, and others suggests that AVs could lead to an increase

in the total of number of trips taken for a variety of reasons (Clewlow & Mishra, 2017; Greenblatt & Shaheen, 2015). AVs could increase the number of trips taken by those who are currently unable to drive, such as elderly persons or persons with disabilities (Greenblatt & Shaheen, 2015). This could have the effect of adding more vehicles to the transportation network compared to current scenarios. It is worth noting that an increase in trips by populations who may currently be experiencing latent demand issues could help achieve another important outcome of increasing equitable access.² The policies, programs, and revenue structure adopted by the state of Oregon will be important to ensuring that Oregon achieves its greenhouse gas emissions reduction goals.

2017 ORS 468A.205 Policy: Greenhouse gas emissions reduction goals

(1) The Legislative Assembly declares that it is the policy of this state to reduce greenhouse gas emissions in Oregon pursuant to the following greenhouse gas emissions reduction goals:

(a) By 2010, arrest the growth of Oregon’s greenhouse gas emissions and begin to reduce greenhouse gas emissions.

(b) By 2020, achieve greenhouse gas levels that are 10 percent below 1990 levels.

(c) By 2050, achieve greenhouse gas levels that are at least 75 percent below 1990 levels.

(2) The Legislative Assembly declares that it is the policy of this state for state and local governments, businesses, nonprofit organizations and individual residents to prepare for the effects of global warming and by doing so, prevent and reduce the social, economic and environmental effects of global warming.

(3) This section does not create any additional regulatory authority for an agency of the executive department as defined in ORS 174.112 (“Executive department” defined). [2007 c.907 §2]

Note: See note under 468A.200 (Legislative findings).

Oregon Statewide Transportation Strategy (2013) implemented by the Oregon Department of Transportation

The Statewide Transportation Strategy Vision imagines a future Oregon that features:

- Improved public transportation service, bicycling and walking – Throughout the state, Oregonians have better access to a range of transportation options (e.g., transit, carpool, bicycling, walking). Communities feature well-lit walking paths, bicycle facilities, and more frequent transit service. Improvements in bicycling and walking facilities help encourage physical activity and foster reduced obesity rates and overall improvements in public health. Carsharing services provide households with a convenient way to forgo vehicle ownership entirely and save money.

² Latent demand refers to “the activities and travel that are desired but unrealized because of constraints.” (Clifton & Moura, 2017)
• **Fuel-efficient / alternative energy vehicles** – Great strides in technology allow for the widespread adoption of cleaner and more efficient vehicles by Oregon residents. Vehicles powered by electricity, compressed natural gas (CNG) and locally-produced biofuels are able to travel hundreds of miles without recharging or refueling, and are supported by an extensive network of fueling and charging stations. Heavy-duty freight vehicles have evolved from diesel fuel to liquefied natural gas (LNG), and commercial aircraft run largely on biofuels. These changes improve air quality dramatically while reducing dependency on foreign oil.

• **Enhanced information technology** – People can use technology to easily plan and update their travel routes using multiple modes as needed such as public transportation, bicycling and walking in addition to personal vehicles. Improved communication systems enable individuals and organizations to meet and collaborate virtually, while reducing the need for physical travel. In-vehicle communications technologies and collision avoidance systems in cars and trucks greatly reduce the number and severity of crashes, resulting in saved lives, reduced damage, improved travel time reliability, and elimination of hundreds of hours of roadway delay each year. New vehicle-to-vehicle communications advancements allow cars and trucks to drive closer together and use less space on the roadway, resulting in more efficient use of existing infrastructure.

• **More efficient movement of goods** – Fewer personal vehicles on Oregon roadways frees capacity for the transportation of goods that support a growing economy. When possible, goods are moved by more efficient modes such as rail and water. New technologies allow freight vehicles to emit lower emissions. Urban consolidation centers allow for more efficient distribution of freight deliveries to final destinations in urban areas.

• **Walkable mixed-use communities** – Within Oregon cities, a large share of residents live in walking distance of jobs, stores, services, entertainment, and transit stops. Because of this mix of uses in a geographically small area, commute times are shorter, limiting time spent in traffic. Residents of such communities are afforded increased opportunities to “buy local,” supporting local businesses. Communities across the state are recognized for vibrancy, livability, and safety.

**LAND USE**

AVs will change how we develop land, from reduced demands for parking and subsequent opportunities for infill, the changing nature of retail (rise of e-commerce and increasing demand of experiential retail), to the changing nature of employment (increased demand for warehousing uses for e-commerce goods delivery). AV policies, programs, and revenue structure should support Oregon’s statewide land use goals.

**Oregon Land Use Planning Goals** implemented by the Department of Land Conservation and Development and local governments.

• **Goal 1 – Citizen Involvement.** To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

• **Goal 2 – Land Use.** Planning – To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

• **Goal 3 – Agriculture.** To preserve and maintain agricultural lands.
• **Goal 4 – Forest Lands.** To conserve forest lands by maintaining the forest base and to protect the state’s forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

• **Goal 5 – Natural Resources, Scenic and Historic Areas, and Open Spaces.** To protect natural resources and conserve scenic and historic areas and open spaces.

• **Goal 6 – Air, Water and Land Resources Quality.** To maintain and improve the quality of the air, water and land resources of the state.

• **Goal 7 – Areas Subject to Natural Hazards.** To protect people and property from natural hazards.

• **Goal 8 – Recreational Needs.** To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

• **Goal 9 – Economic Development.** To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon’s citizens.

• **Goal 10 – Housing.** To provide for the housing needs of citizens of the state.

• **Goal 11 – Public Facilities and Services.** To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

• **Goal 12 – Transportation.** To provide and encourage a safe, convenient and economic transportation system.

• **Goal 13 – Energy Conservation.** To conserve energy. Land and uses developed on the land shall be managed and controlled so as to maximize the conservation of all forms of energy, based upon sound economic principles.

• **Goal 14 – Urbanization.** To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside of urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

• **Goal 15 – Willamette River Greenway.** To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

*Note: Goals 16 – 19 are coastal goals and not included in this list.*

**ECONOMIC DEVELOPMENT**

AVs will significantly change how Oregonians run and operate their businesses. While the state does not have a statewide economic plan, Business Oregon’s Strategic Plan Priorities are informative for the development of AV policies, programs, and revenue structure.

*Business Oregon Strategic Plan Priorities (2018 – 2022)*

• **Innovate Oregon’s Economy.** Expand Oregon’s research and development capacity and increase access to capital for high-growth startups.

• **Grow Small- and Middle-Market Companies.** Increase access to new sales markets, enhance competitiveness of small and middle-market manufacturing companies, attract businesses and
FDI to grow target industries, and prioritize infrastructure investments to directly promote business growth.

- **Cultivate Rural Economic Stability.** Enhance local economic development capacity in distressed rural communities, promote an environment that supports entrepreneurship and small business growth, expand business development to include non-traded sector companies and organizations, and connect rural communities to urban markets through targeted infrastructure investments.

- **Advance Economic Opportunity for Underrepresented People.** Connect people of color, immigrant populations, and native/tribal communities to jobs and foster wealth creation for underrepresented populations.

- **Ensure an Inclusive, Transparent, and Fiscally Healthy Agency.** Be transparent, accountable, and a good steward of public resources, be a sustainable, cohesive agency where all employees feel valued and understand how they contribute to the mission, and be a welcoming agency that empowers employees and is inclusive of Oregon’s cultural diversity.


