

CATES

Center for Advanced Transportation and Energy Solutions

April 6, 2018

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To: City of SeaTac

Subject: Draft Final Action Plan for Development of Autonomous Vehicles

This document is an Action Plan providing guidance for the City of SeaTac to justify deploying advanced transportation technologies, specifically autonomous vehicles.

Executive Summary

The prospect of automation of road vehicle driving on public roads rose to widespread public prominence in October 2010 when the high-tech firm Google, famous for search technology, surprisingly announced that over the preceding year it had equipped several Prius sedans with sensors and electronic equipment for robotic driving. Google staff had then supervised the cars' unannounced movements over 140,000 accident-free miles on California roads and highways.

This effort has subsequently advanced in years since then until in 2018 Google formed a new company called Waymo, now seemingly demonstrating the ability to provide on-demand taxi-like rides in custom-built driverless Chrysler Pacifica hybrid vans in suburbs of the Phoenix metropolitan area. In San Francisco, General Motors in alliance with Cruise Automation is a competitor on the path to providing on-demand rides in an urban environment. There are other competitors emerging as well, including providers of automated, slow-speed microtransit vehicles, such as Easy Mile and Navya, focused on first/last mile service to transit hubs.

In reaction to automation developments at Google and in vehicle electrification, the Center for Advanced Transportation and Energy Solutions (CATES) was founded in 2012 in Seattle as a non-profit think tank to advance automated, electric-powered vehicles as a sustainable solution to transportation and energy problems in the central Puget Sound Region. First funding of CATES was from the University of Michigan's Graham Environmental Sustainability Institute, with later funding from the three King County subarea Transportation Boards.

In May 2017, after a period when Waymo, General Motors, Volvo and other private companies continued with further development of robotic driving, the City of SeaTac engaged CATES as a consultant to conduct research that explores and points to municipal action on the opportunity of using the City's public road network and economic development capacity to establish the viability of the City credibly labeling itself as a Municipal Center of Excellence in Automated

Vehicles. The consulting contract cost was set at \$20,000 fixed price, with payment for deliverables. Deliverables to date have been posted on the SeaTac City website at <http://www.ci.seatac.wa.us/government/city-departments/public-works/autonomous-vehicles>

During the course of the CATES consulting engagement, the State of Washington has taken two significant actions supporting how the City of SeaTac and its consultant CATES have been proceeding. Governor Inslee in June 2017 issued executive order 17-02 on autonomous vehicle testing and technology, setting parameters for the development of driverless vehicles that CATES has incorporated into its work for SeaTac. In February 2018, the Legislature approved and the Governor concurred on the establishment of an autonomous vehicle working group of executive and legislative branch representatives to develop policy recommendations that address the operation of autonomous vehicles on public roadways.

Note: CATES new recommendation to the State of Washington autonomous vehicle working group in response to the change in national perception of safety in autonomous vehicle development activities resulting from the Uber testing fatality in Arizona on March 18, 2018 is provided at <http://cates.solutions/wp-content/uploads/2018/03/Statement-by-CATES-on-the-March-18-Uber-fatality-in-Arizona-March-302018.pdf>

After exploring strengths and weaknesses, as well as opportunities and threats, CATES has found SeaTac positioning for “excellence” in vehicle automation as viable. “Excellence” requires doing something excellent, the details of which CATES have now developed for City consideration in this Action Plan. The work has been carried out by the CATES Executive Research Director John Niles, a public policy analyst focused on transportation technology over three decades, and now with a university-level textbook he co-authored, *The End of Driving: Transportation Systems and Public Policy Planning for Autonomous Vehicles* set to be published by Elsevier in summer 2018.

This Action Plan sets out this path of Excellence for City of SeaTac: As a way of attracting the attention of Waymo, or a competitor of Waymo, to deploy a driverless ride service in City of SeaTac, a good option is for the City to proceed to design a deployment of an automated electric on-demand shuttle micro-transit franchise operation delivered by a qualified public or private organization meeting a provable City of SeaTac residents’ mobility demand and working within a framework of sustainable long-run economics. The City should specify a pilot deployment qualified for external Federal, private, and non-government organization funding with due regard for regulatory issues and in cooperation with agencies working on similar projects. This path is described further and justified below.

One basic choice for City response to this Action Plan is Go or No-Go on proceeding to reach the potentials available. Choosing No-GO supports focusing City leadership and staff attention on other priorities. However, the benefits of proceeding with the action on automated vehicles recommended are several:

- More community engagement in a high-tech future with benefits for residents and visitors
- Demonstrated City pursuit of enhanced mobility for all citizens, voters, and taxpayers
- Demonstrated official interest in mobility support for non-driver citizens both young and old
- New positive engagement with the new Autonomous Vehicle Working Group, King County Metro, Sound Transit, Puget Sound Regional Council, and other transportation main actors in the central Puget Sound region
- Demonstrated regional and national transportation improvement leadership
- Further engagement by the City with recognized national organizations like National League of Cities and Aspen/Bloomberg Charities. The latter has already recognized the project described here in its City of SeaTac in its Global Atlas of Autonomous Vehicles and Cities published on the web at <https://avsincities.bloomberg.org/global-atlas/>
- Some new local employment opportunities if the pilot project proceeds
- Enhanced civic pride from pursuing public service technology applications
- Positions the City for attracting other private sector initiatives related to vehicle automation

CATES has developed a menu of possibilities for going forward, ranging from further study of possibilities, to seeking outside funding and planning toward achieving near-term driverless, electric vehicle deployment for cost-effective public benefit.

All of the options to proceed include a strong recommendation from CATES that the City Council vote a Resolution of Action Plan endorsement and statement of Autonomous Vehicle Intentions with regard to implementation, in order to energize regional attention on a formal municipal decision to pursue excellence at one of three levels.

Level One: Work actively to move the findings and recommendations of the Action Plan into the deliberations of the State AV Working Group.

Recommended City of SeaTac Resolution for Level One:

- A. WHEREAS, many motor vehicle collisions with other automobiles, bicycles, pedestrians, and fixed objects are caused by driver errors or impairment leading to deaths and injuries;

- B. WHEREAS, technological advancement and business innovation has now resulted in the commercial availability of vehicles capable of moving on some public roads safely without constant, direct control by a human operator in the vehicle, and with full-time human monitoring via telecommunication to a fixed base site;
- C. WHEREAS the State of Washington Governor has issued Executive Order 17-02 on autonomous vehicle technology development which serves to encourage the state's private sector and all levels of government to support safe deployment of automated vehicles for citizen benefit;
- D. WHEREAS the State of Washington Legislature has passed, and the Governor has signed Substitute House Bill 2970 establishing an Autonomous Vehicle Working Group to develop policy recommendation to address the operation of autonomous vehicles (AVs) on public roadways in the state;
- E. WHEREAS, the City Council has funded and embraced the development of an Action Plan document with specific steps to advance automated vehicle deployment in the City of SeaTac, and hereby offers it to its citizens and all others for discussion and supportive activities;

NOW THEREFORE, the City Council of SeaTac, Washington hereby declares itself a Center of Municipal Excellence in Automated Vehicle Policy Development because of taking the initiative in 2017 to begin planning for automated vehicle deployment in the City. The City will appoint a staff member as liaison between the City Government and the State's Autonomous Vehicle Working Group, and hereby will forward all materials developed by its consultant in the Action Plan to the Working Group for consideration in its deliberations on how the State of Washington and its county and municipal governments should proceed further on AVs.

Level Two: Study further a pilot deployment of AV service

All of the WHEREAS clauses above, plus some additional WHEREAS clauses and a different, alternative NOW THEREFORE action clause

- F. WHEREAS, City of SeaTac has an interest in developing and maintaining a municipal leadership role in supporting the deployment of vehicles with automated driving capabilities on the City's public roadways in order to nurture, cultivate, and advance the beneficial impact of this technology application;
- G. WHEREAS, the deployment of automated vehicles in the City will promote economic growth, bring new employment opportunity, provide research opportunities for the

State's academic institutions, and allow the State of Washington's leading airport City to serve as an easily accessible statewide and national demonstration site for innovative mobility services based on emerging new technologies;

- H. WHEREAS, the safe deployment and operation of automated, electric or hybrid vehicles is likely to produce societal benefits cost-effectively, minimizing injuries and saving lives that would otherwise be lost to vehicle collisions, reclaiming time spent waiting for rides; maximizing the ability to move people and goods quickly and safely throughout the City, improving mobility for youth, elderly, disabled and other non-drivers, and serving to reduce atmospheric emissions;

NOW THEREFORE, the City Council of SeaTac, Washington hereby declares itself a Center of Municipal Excellence in Automated Vehicle Deployment to be evidenced henceforward by City staff pursuing available opportunities to propose changes in local and state laws impeding technology deployment and making technology deployment safer, to conduct further follow-on study activities recommended in the Action Plan in cooperation with the State Autonomous Vehicle Working Group, and to pursue opportunities in cooperation with other jurisdictions to conduct pilot projects demonstrating innovative excellence funded by the Federal Government and other external sources.

Level Three: Aggressively pursue implementation of an automated vehicle ride service pilot deployment within the City

All of the resolution language above, with the following additional language in the concluding action section:

NOW FURTHERMORE, the City Council of SeaTac, Washington directs the City Manager and City Staff to pursue deployment aggressively -- in cooperation with King County Metro Transit, Sound Transit, and the City of Bellevue Transportation Partnership program -- of automated ride services operating within City boundaries as described in the Action Plan, and coordinated with the provision of similar service access to and from other geographic locations in cooperating neighboring municipal jurisdictions and in the Sea-Tac Airport. Any such vehicles deployed in the City of SeaTac must be delivered for deployment pre-certified by competent authority to have highly reliable ability to detect pedestrians, cyclists, and motor vehicles in its path and then take action to prevent collisions with them.

Additional recommendation for all Levels

- Submit the Action Plan to the State AV Working Group for their review, and participate in future deliberations and activity of this group.

- Appoint a City representative and alternate assigned to liaison with the State AV Working Group who advocates for City of SeaTac as an early deployment site for mobility-as-a-service applications of autonomous vehicles.

Additional recommendations for Levels Two and Three

- Put the Action Plan resolution and other documents in public circulation to help ramp up public attention and interest, to encourage active engagement and collaboration with the City by citizen and business interests, neighboring jurisdictions, Port of Seattle, King County Metro, Sound Transit, non-governmental technology or mobility providers, and others – such as members of the ACES Northwest Network -- who step forward with an interest in this topic.
- City leaders embrace and actively describe a long-run vision of multi-vendor robotic mobility services that provide fleets of electric driverless vehicles – RoboCabs -- that will come on short notice to any location in the Puget Sound region to take a customer to any other location. General Motors, Ford, Volvo, Uber, Lyft, and Waymo all embrace a future for urban mobility consistent with this vision.
 - Such a service would be a strong competitor of private vehicle ownership, partially but not completely replacing consumer ownership of road vehicles. This would be consistent with proposed technology applications seen worldwide in visioning and simulation exercises and the subject of existing research, development, and testing activities.
 - A different, popular vision -- evolutionary embrace of increasingly automated vehicles owned and operated by private citizen-consumers who are SeaTac residents or visitors -- is well underway and does not require any special City action beyond keeping its roads and traffic signals in good repair.
 - The RoboCab vision contemplates motivating many citizens in the long run to drive their private vehicles less frequently. The future mobility service would carry SeaTac resident travelers across the last mile to rail and express bus services that remain in operation even after RoboCabs deploy ubiquitously, as well as to other local destinations, such as employee entrances to large employers, and the Senior Center.
- SeaTac's role in the deployment is to authorize, encourage, and regulate use of its street and signaling infrastructure, NOT to own and operate Robocabs. The fleet of Robocabs would be owned and operated by King County Metro, or by another government or non-profit organization, or by a private for-profit organization such as Waymo. The owner operator could potentially be a new organization founded for the purpose of operating an automated RoboCab service.

- As a way to support the vision, this Action Plan recommends that the City find a way to deploy an early, limited range pilot version of the long-run vision to provide enhanced mobility in the City's residential neighborhoods in cooperation with King County Metro, Sound Transit, the Hyde Shuttle, and the City of Bellevue Transportation Partnership Office. City of Bellevue is also planning for a pilot deployment of electric shuttles within its jurisdiction.
- The pilot deployment explored in this Action Plan is a small fleet of driver-less shuttle mini-buses or vans on City roads providing convenient, affordable, quiet, accessible mobility for passengers in residential neighborhoods traveling to light rail stations, community centers, shopping areas, and employment locations.
 - Although not RoboCabs, electric shuttle buses are precursors. These small, boxy passenger carriers are ready to be deployed in driverless motion now. Details are provided in the Appendix. Vehicles such as these have the potential to provide mobility that is safer, less expensive, and non-polluting compared to today's available alternatives. Such vehicles from several manufacturers are already being tested and deployed in cities around the world. CATES has conducted some preliminary analysis to verify economic feasibility and sufficient paid ridership to justify investment of management attention by the SeaTac municipality.
 - The cost of the pilot would in effect be a first round of development for all of South King County and beyond, and thus appropriately covered not by taxation of the 28,000 SeaTac residents, but by external funding and in-kind support within existing SeaTac responsibilities. Several specific Federal funding opportunities are described in this Action Plan.
 - Cooperation, coordination, and co-sponsorship with other municipal jurisdictions is recommended as a way to achieve an attractive scale for investors and economies of scale in operations. City of Tukwila, in particular, has given indications of interest in participating, as well as City of Bellevue, the latter now doing parallel development and being a potential partner in obtaining regional financial support from U.S. Department of Transportation.
 - First/last mile service to the Link light rail and Rapid Ride combined transit stations would be a key element of the pilot to engage and maintain support of Sound Transit and King County Metro Transit.
 - This should be a service deployment, not a technology experiment.
- The pilot should be designed to be consistent with a plan for the long-run financial sustainability of mobility as a service as the geographic coverage area expands. CATES has provided sample calculations as part of its work for the City.

- This Action Plan proposes a step by step series of staged deployments beginning in 2019 with microtransit first to the Tukwila light rail and BRT station and other destinations in the Riverton Heights neighborhood, including the Sea-Tac Airport employee access point and the Boeing Parts Distribution Center. Again, the pilot would be supported with developmental funding from the U.S. Government and quite possibly, private entrepreneurial risk capital that recognizes the advantages of working with a willing municipal customer in a highly visible, easily accessible geographic location.

Additional detail is provided in the 95% submission document for the 68 page Action Plan submitted January 17, 2018.