Meeting to Explore City of SeaTac Becoming a Center of Excellence in Autonomous Vehicle Deployment

Presentation by John Niles,
CATES Executive Director
At the
Transportation & Public Works Special Committee
Meeting of June 29, 2017

CATES

Center for Advanced Transportation and Energy Solutions

Agenda for this Meeting

- Introduction to Project and to Vehicle Automation 5:15
- Buying Vehicles (ADAS) vs Buying Rides (MOD) 5:30
- Begin the SWOT for SeaTac Center of Excellence 5:45
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Presenter – John Niles

- **John Niles, President, Global Telematics, and Executive Director, CATES | telematics and automation expert, policy analyst**
- John is founder and president of the independent policy consultancy Global Telematics focused on research, design, planning and evaluation of policies and actions for transportation improvement with clients including federal, state, and local government agencies, universities, and corporations. John is a co-founder with Steve Marshall of the CATES nonprofit think-tank. He now leads the City of SeaTac project for CATES. Other recent research projects are on the productivity implications of transit rider acquisition at park & ride lots, and on strategies for accelerated deployment of transportation as a service (TaaS) using automated vehicles. John co-authored a chapter on automated vehicle deployment strategies in the book *Disrupting Mobility* (Springer, 2017) stemming from his presentation at an MIT Conference in 2015. John is a long-standing member of the Puget Sound Freight Mobility Roundtable. He served as an aviation quality assurance officer in the U.S. Navy, and is a graduate of MIT (math) and Carnegie Mellon University (business).


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The end of driving

The world waits in anticipation for the first self-driving cars. But after all the impossible pieces are sorted and the wonder dissipates, what will the world be like? And will there be some unintended consequences that belie optimistic predictions of today?

Words | Bean Crush and John Niles

The fully autonomous vehicle is increasingly an object of fascination, ridicule and hope. Opinions on market viability for this innovation range from 2017 to 2060 – or later. The autonomous vehicle promises so many benefits that some see it as an escape from the unintended tyranny of today's motorized vehicles. To greet this new utopia, there are calls for changes in how we plan transportation; demands for paradigm shifts.

There are also contrasting tendencies to see the self-driving car (SDC) as unlikely for a long time, a marketing ploy or an interesting idea with more flaws than benefits. Whichever way opinions go, they are usually viewed through a technological lens. The SDC will be safer because it will never be distracted. It will see more and respond more quickly. It will be cleaner because it can be smaller and lighter. It will reduce congestion because it will follow more closely and have fewer accidents.

Alternatively, naysayers argue that it is too complicated. It can't work in snow.

Click to download full article.

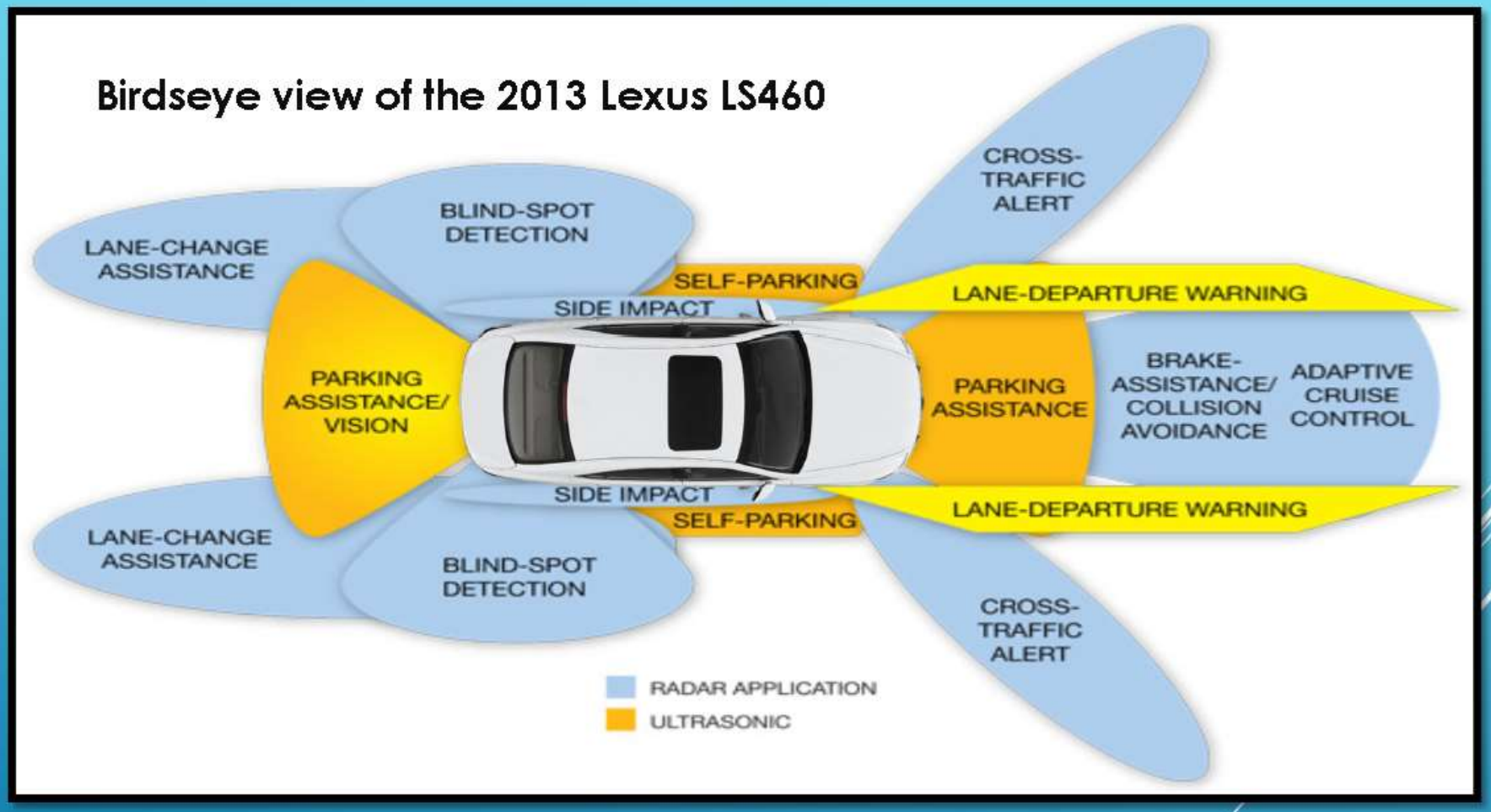
"To greet the new autonomous utopia there are calls for changes in how we plan transportation; demands for paradigm shifts"

Three Improvements in Personal Mobility Yielded by Higher Tech Vehicles

Connected, Automated, Tailored, Electric, Shared

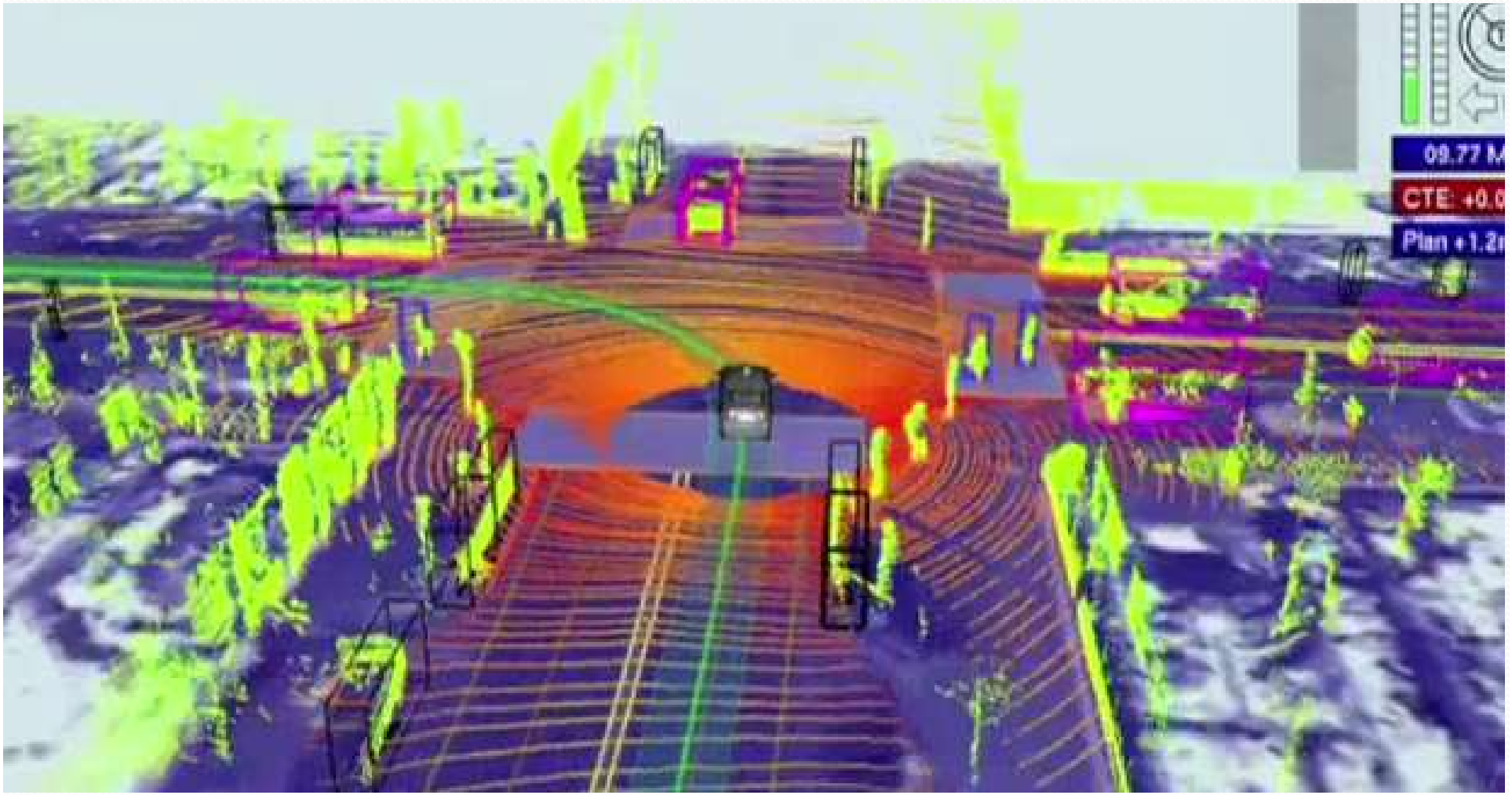
- Automated, so far fewer motor vehicle crashes
- Electric, so much lower vehicle emissions
- Automated, so smoother flows, closer vehicle spacing & more road capacity
- Shared, connected, tailored, so reduced traffic congestion from higher average passenger loading

Multiple Sensors Watching All Around

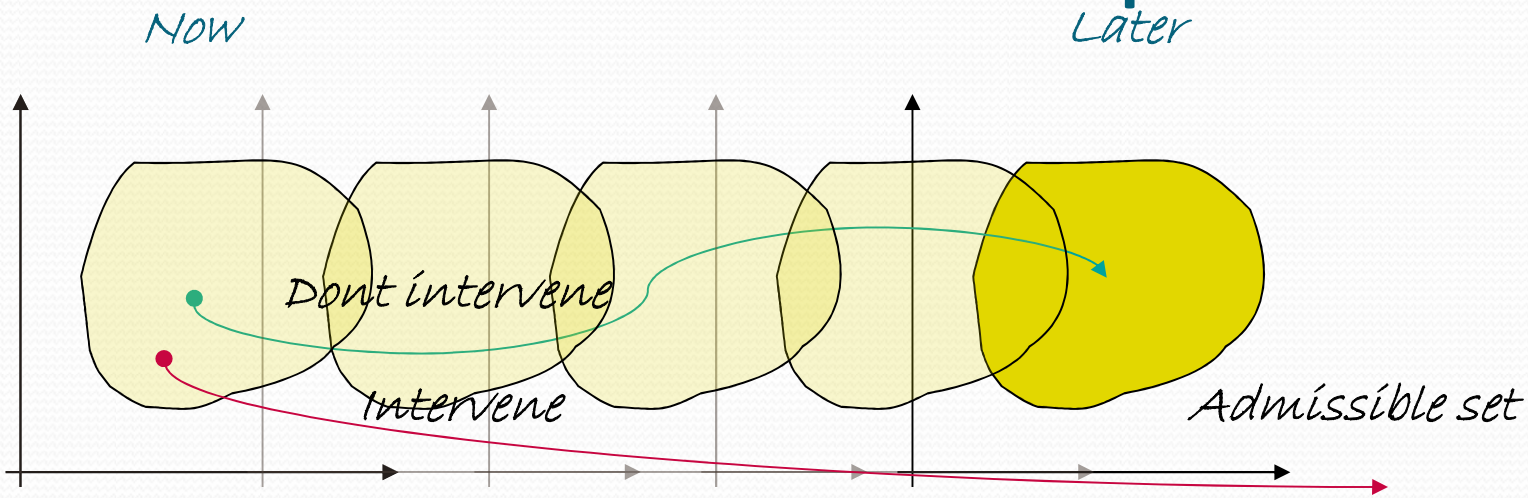


LEVEL 2 AUTONOMOUS TECHNOLOGIES IN USE TODAY

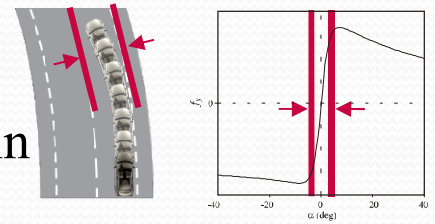
What a Google Car Sees with LIDAR



Volvo: Threat assessment problem



Given estimates of vehicle state and surrounding environment, can we find an admissible sequence of control signals such that the vehicle state evolves within the prescribed constraints?



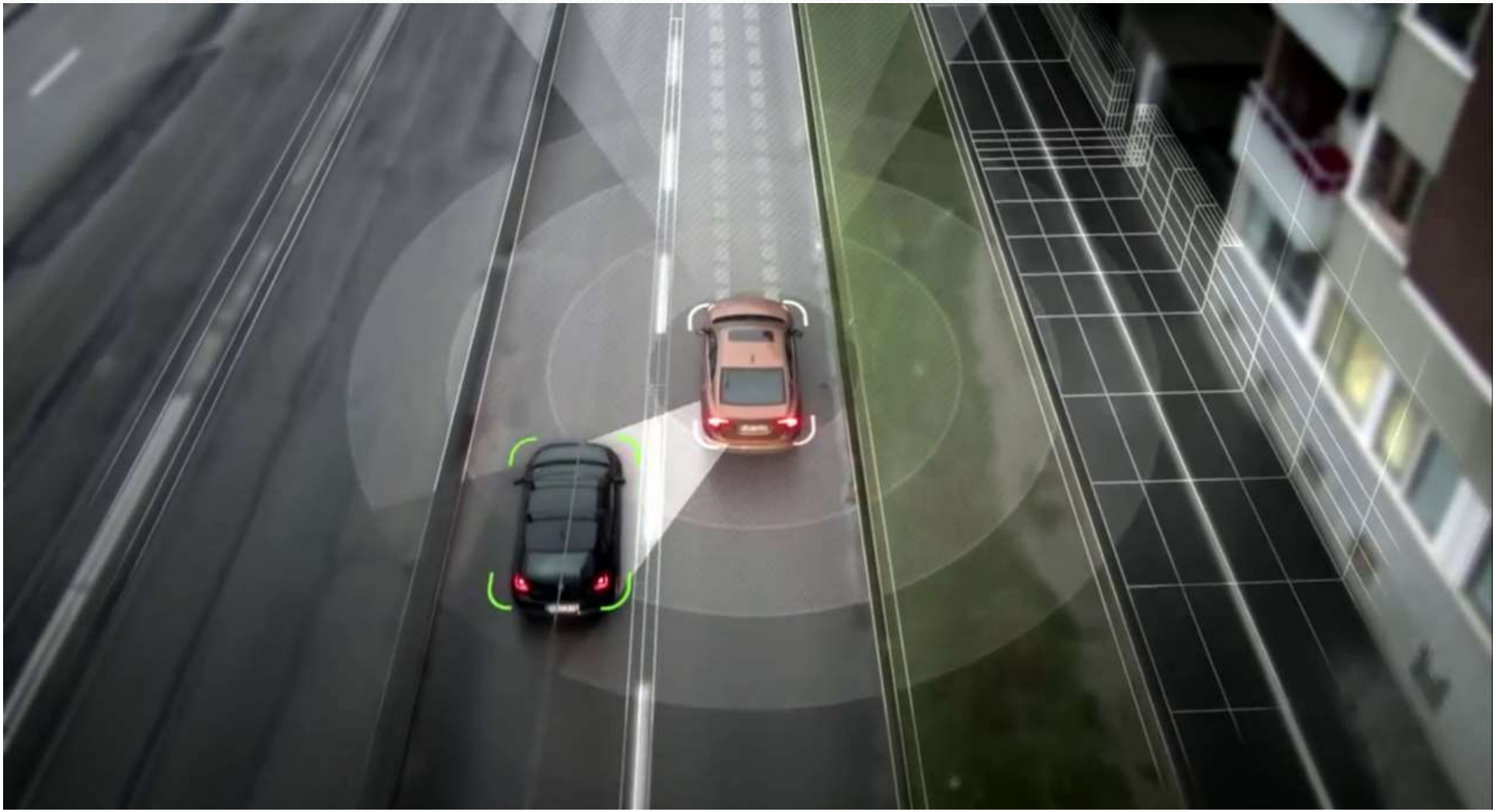
Video by Volvo on the Drive Me trial demonstration of 100 automated cars to be used by families in Gothenburg, Sweden on the ring road. Click here:

- https://www.media.volvocars.com/global/en-gb/media/videos/158339/drive-me-self-driving-cars-for-sustainable-mobility1
- Update: https://www.media.volvocars.com/global/en-gb/media/videos/202091/presenting-the-hain-family-a-roll

Forecast: Evolving Technology for Vehicles with Human Drivers

- Automated Driver Assistance Systems (ADAS)
  - Collision-preventing features already available:
    - Adaptive cruise control (ACC): smooth following, any speed
    - Lane keeping assistance (LKA) on highways
    - Blind spot monitoring for safer lane changes
    - Radar braking prevents hitting peds, bikes, cars
  - By 2040 or sooner, with further features:
    - 50% more capacity per freeway lane
    - 20% more capacity per arterial lane

Driver Assist Automation
On a Path to Evolve into Autonomous



Toughest Problem – Transition from Distraction to Driving

Google (Waymo) Version 1
Has steering wheel & pedals

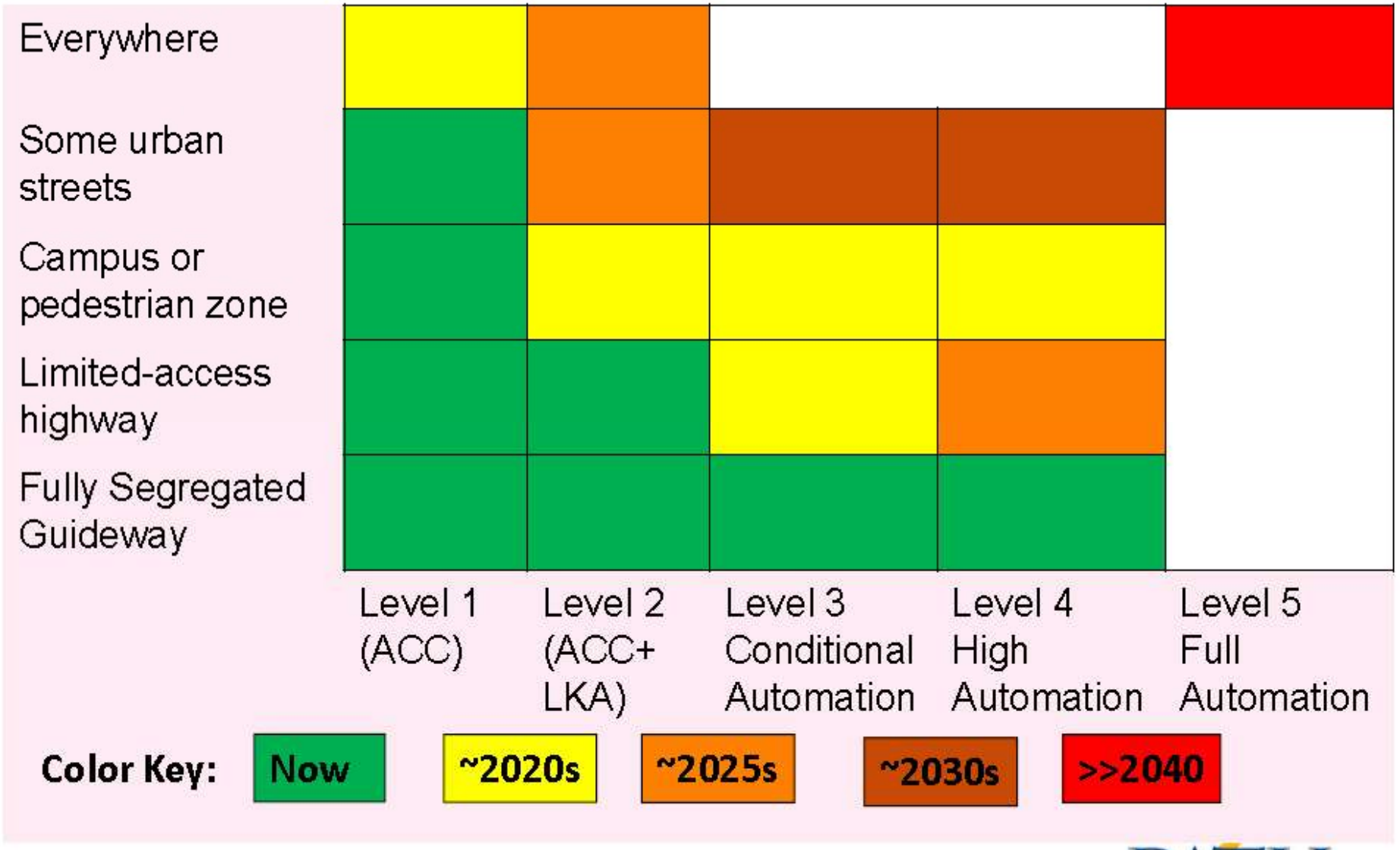
Google (Waymo) Car, Version Two
No steering wheel; no pedals

Driverless Horizontal Elevators: Transit Leap – Level 5 Automation

Olli Driverless Electric Shuttle Bus: Transit Leap – Level 5 Automation

Driverless trains in Vancouver, BC. Today

Expert Estimate of Market Introductions



Dr. Steve Shladover, 2015 presentation

Future Driverless Car Imagined

CATES

Center for Advanced Transportation and Energy Solutions

Consulting Project Underway to Help City of SeaTac Become a Municipal Center of Excellence in Vehicle Automation Deployment

- Five month engagement --- June until October, 2017
- Initial orientation workshop briefing for Council and public, June 29
- Seek input from officials, citizens, other govt. agencies, businesses
- Develop a portfolio of opportunities and SWOT assessment of pursuing them
- Action Plan report draft providing the rationale for City of SeaTac operating with identified Federal funding as a Municipal Center of Excellence
- Formal introduction of the Action Plan recommendations to Council and public

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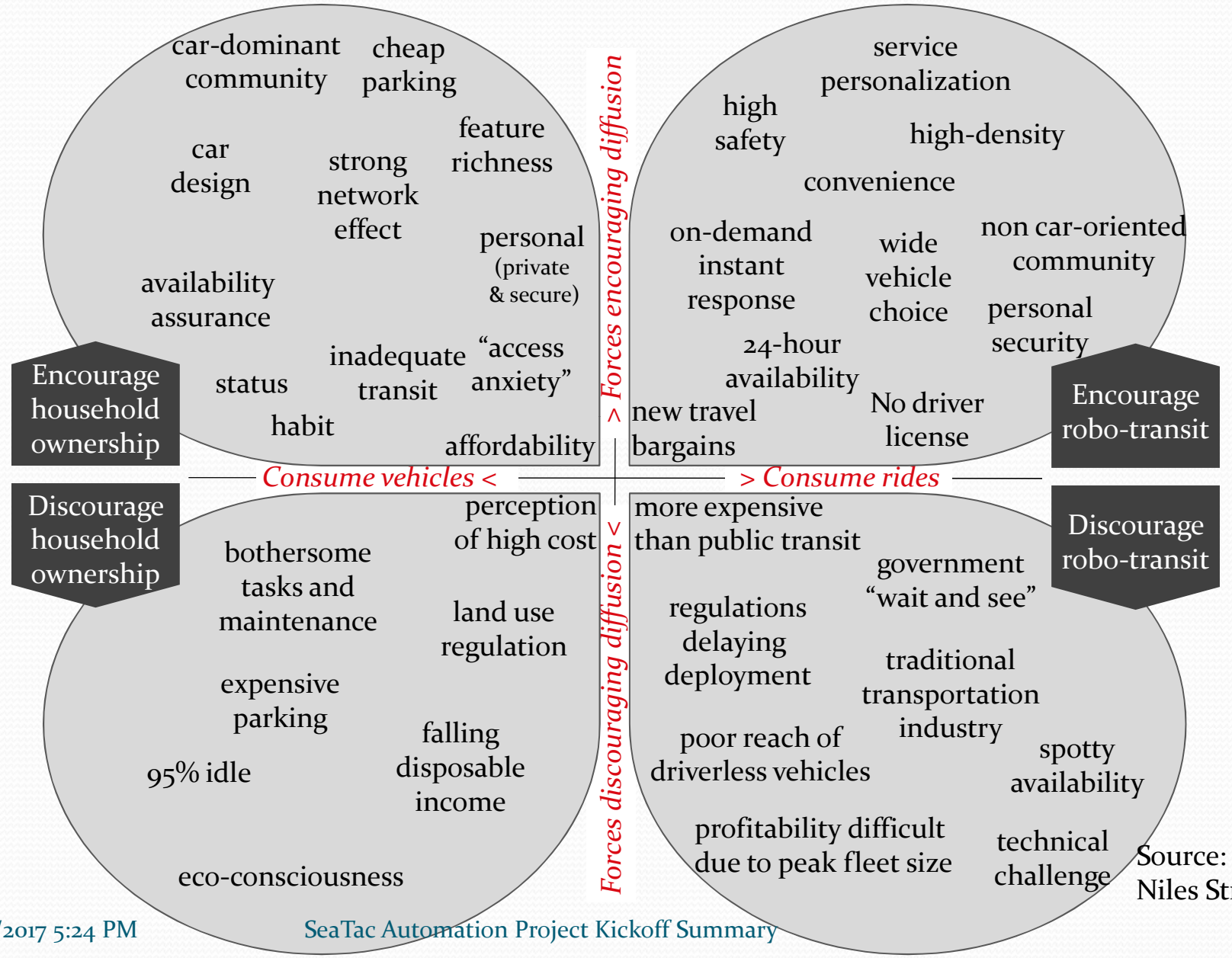
Better, Safer Vehicle Evolution (Automated Driver Assistance Systems – ADAS)
vs
Buying Automated Rides (Mobility on Demand – MOD)

Successive levels of vehicle automation define two markets for vehicle automation:
(A) Personal, owned
(B) Public, shared

We will have both markets!

Forces of Diffusion for Automated Vehicles



Source: Grush Niles Strategic

2040: Uncertain combination of privately owned vehicles and those providing MOD

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What "Center of Excellence" Implies

- Official commitment – seen in statements, documents, news stories
- Research-based planning underway
- Awareness of parallel developments worldwide
- Relevant partnerships created and maintained
- Economic development investments happen
- Plan(s) for action created
- Action plan(s) implemented
- Performance improvement results observable

SWOT for SeaTac Becoming a Center of Excellence for Vehicle Automation

- Strengths
- Weaknesses
- Opportunities
- Threats

Strengths

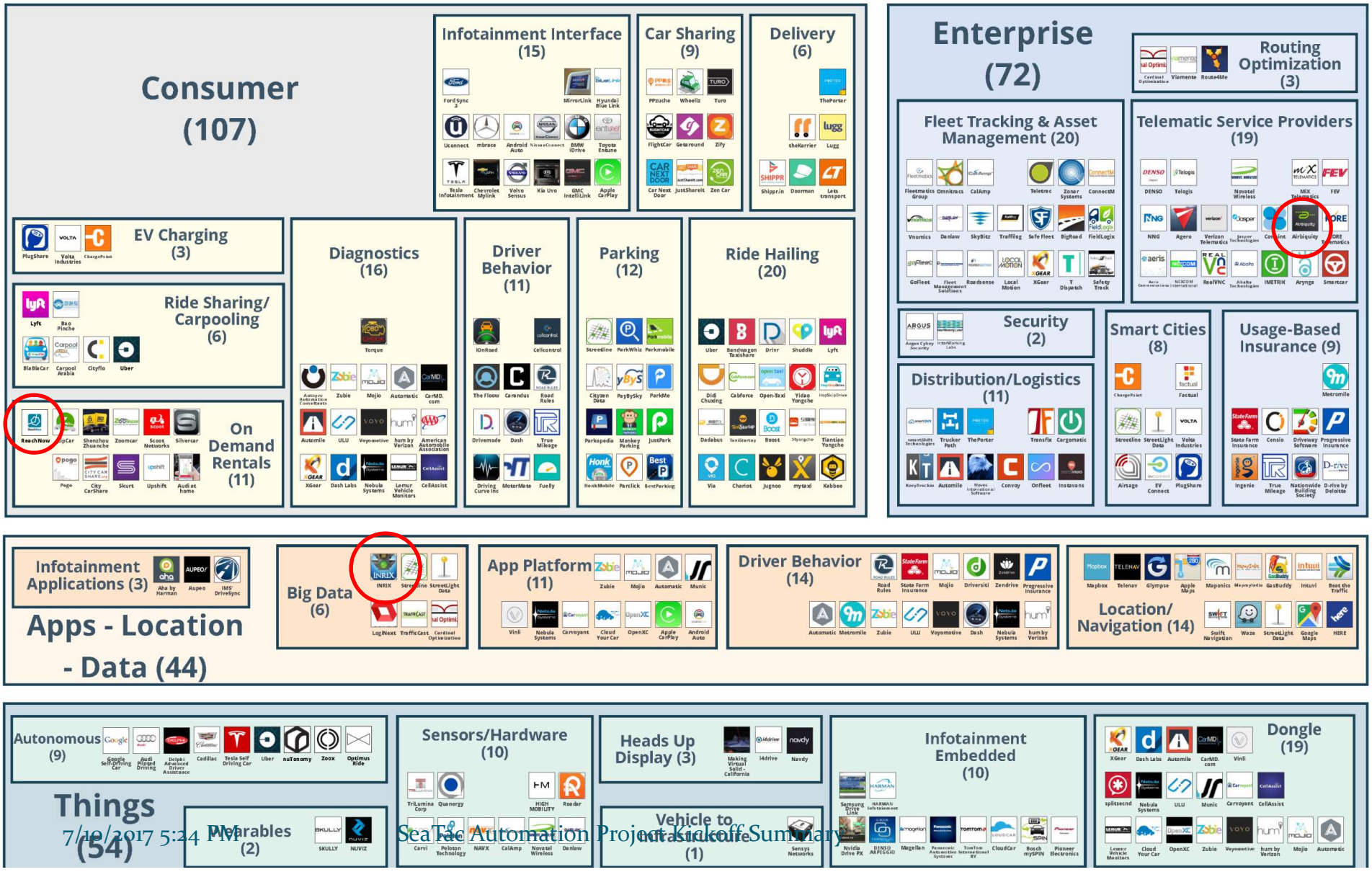
- Sea-Tac Airport at center of the community & is cooperative
- Three light rail stations in operation
- Rapid Ride BRT through SeaTac
- Manageable environment – focused on what's possible
- Ability to move more quickly than a larger jurisdiction
- Existing SeaTac ITS policy as a foundation for AV support
- Basic City of SeaTac transportation policies already established
- Orientation to high tech in the region – particular firms
- Deep municipal interest from several elected officials
- Interest from significant local hotel and parking interests

- Support from Governor Inslee in an Executive Order 17-02, early June
- Mobility Sandbox activity of Metro and ST
- Existence of CATES and ACES organizations
- Local venture capital available

DESIGNED BY
Liz Slocum Jensen

Connected Cars Landscape

POWERED BY
spoke Intelligence



Potential Weaknesses

- Not Detroit; not Silicon Valley
- Not a high density urban center
- Small city, limited resources
- Other, more pressing priorities constrain city management attention
- Entrenched interests in present ways and not wanting competition

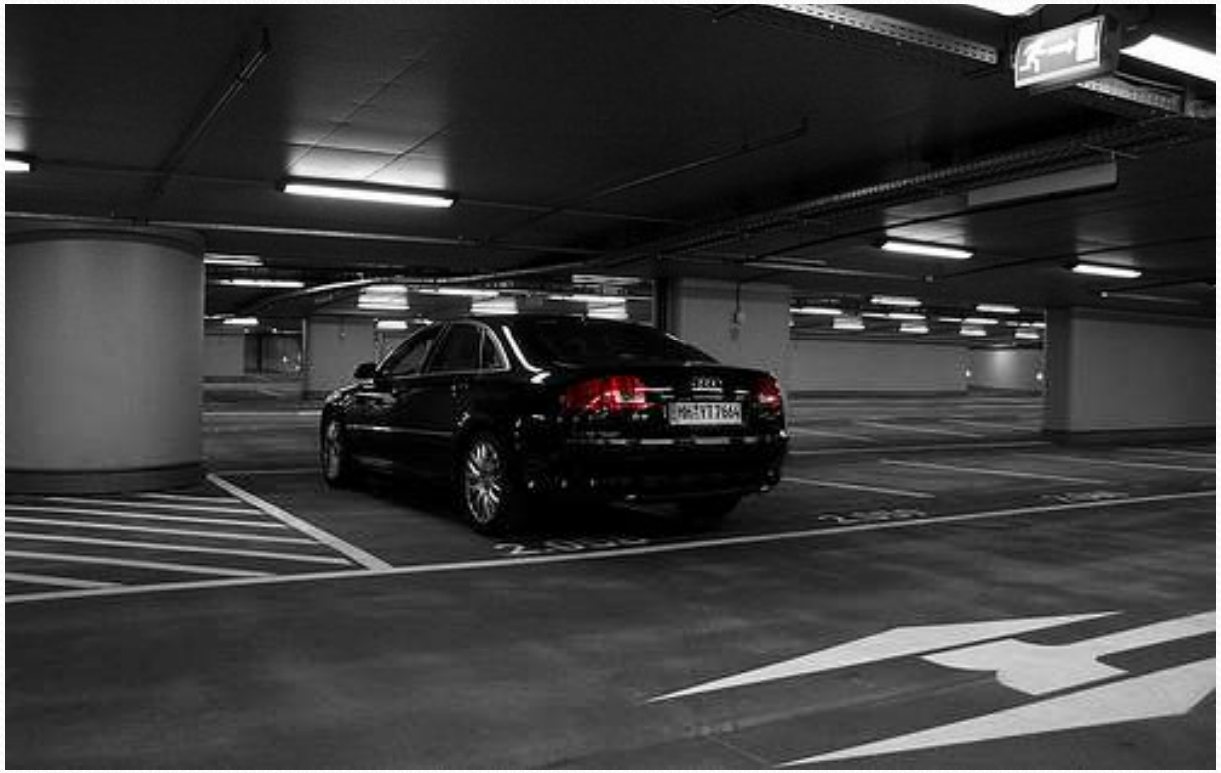
Opportunities

- Replace vehicle trips with trips in safer, higher capacity vehicles
- Many mobility issues that would yield to improvement
- Supporting fewer owned cars
- Parking automation potential
- Reducing parking requirements
- Attraction of new industry
- Implement systems that improve safety for peds and bikes
- Public safety monitoring via video on vehicles
- Federal govt funding available
- Seek private sector investment
- Work with a ride share provider
- Improve safety of city vehicles

Potential Partnership Opportunities for SeaTac

- Partnering with Sea-Tac Airport, PSRC, Sound Transit, King County Metro, and WSDOT to support technology applications
- Peer partnerships with other municipalities
- Partnerships with local business associations and other non governmental organizations
- Partnerships with private sector firms

Video of automated parking



https://www.youtube.com/watch?v=vt2oUnkmkLI

Potential Threats

- Diversion from existing City responsibilities
- Outside the standard realm of municipal responsibility
- Lack of realism from high ambition
- Citizen/business/taxpayer resistance
- Concerns for employment impacts
- Discouraging active lifestyle using bikes and walking

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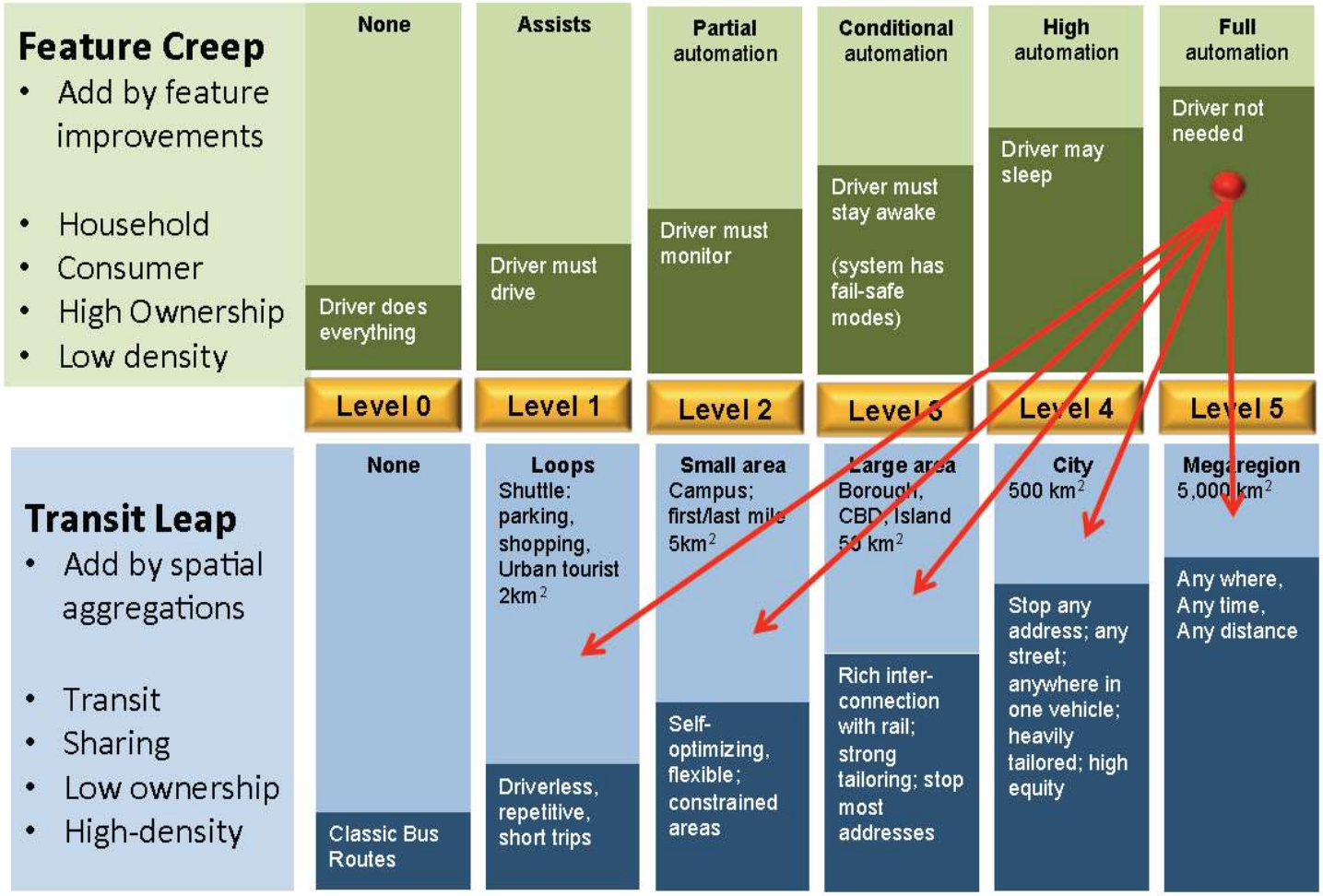
Transit Leap is a preferred alternative to automotive Feature Creep as a path to robotic mobility.



Source: http://endofdriving.org/wp-content/uploads/2016/02/How-cities-can-use-AVs.pdf

Tasks for initiating advanced on-demand ride services, that is, the path to shared use of fleet vehicles and MOD

- Think about and study the issues
- Simulate in a computer
- Simulate on the street --
  - Waymo in Arizona
  - Uber in Pittsburgh
- Transit Leap – Full automation, limited domain, ASAP

Rent by the minute – pick up and drop anywhere

Ford Chariot Vehicle Fleet, Seattle

Uber Testing with Passengers, Pittsburgh, Pennsylvania

Automated Small Buses -- Helsinki

https://www.youtube.com/watch?v=TXe8oPttvCg

Mobility on Demand Sandbox

- Funded project, Sound Transit and King County Metro
- "Our vision is to create a win-win that aligns the strengths of traditional transit (high capacity, accessible, affordable, equitable) with the strengths of on-demand options (dynamic routing, flexible, and convenient) to increase mobility, accessibility, and sustainability."
- Joint project with Los Angeles Metro
- In discussion with private vendors Lyft and Chariot
- Pierce Transit also has a Sandbox project
-
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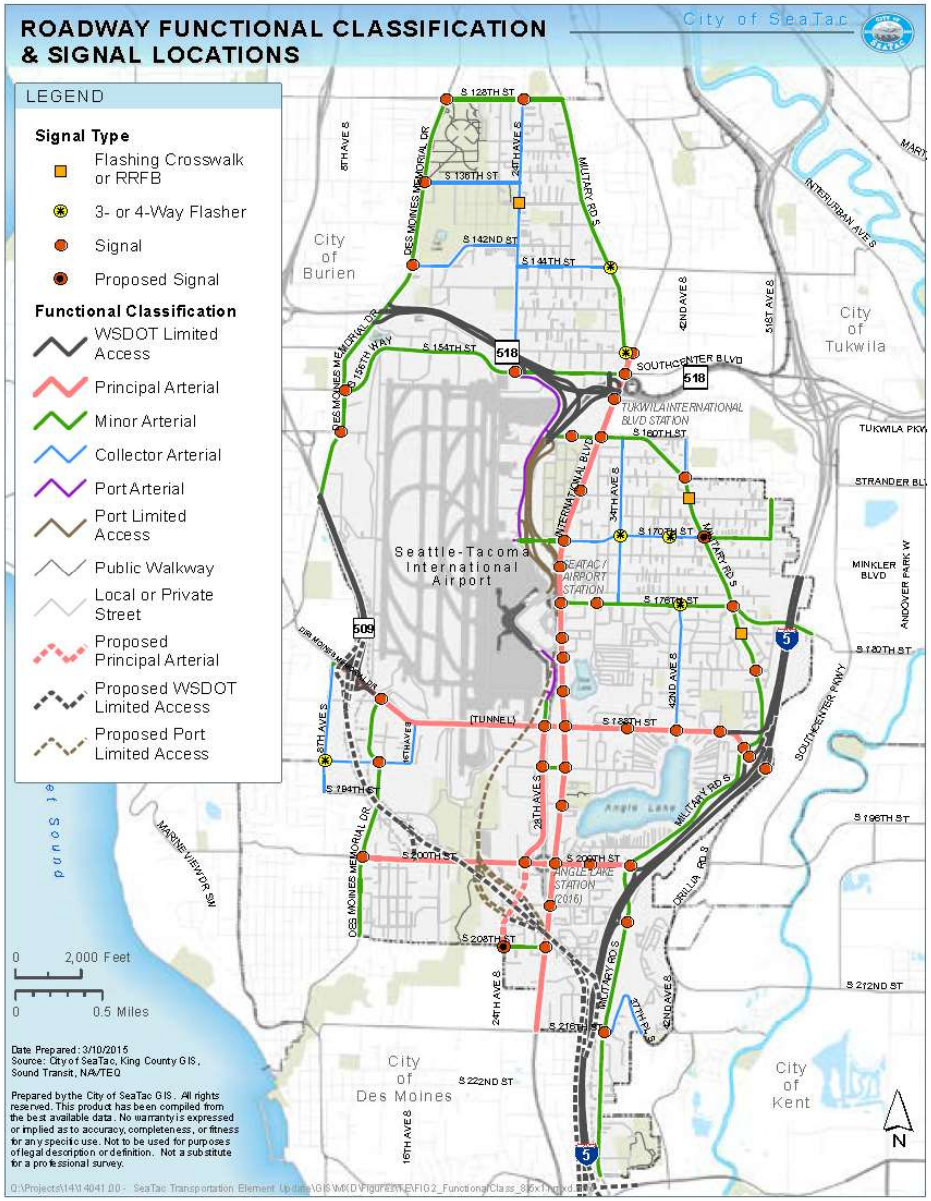
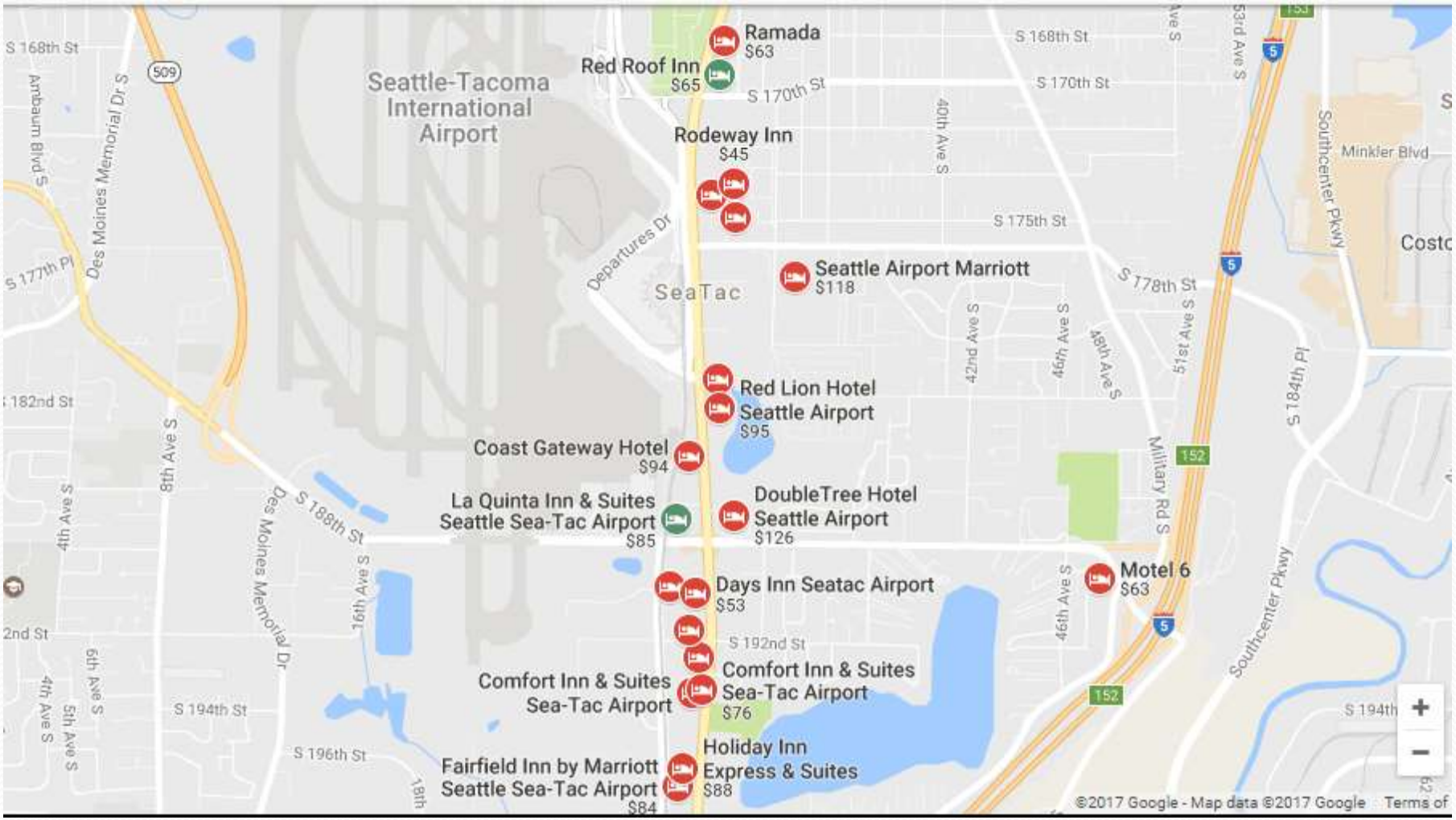
Potential Step One for a MOD future (Selling Rides) in City of SeaTac

- Become a demonstration site for early, available, practical, automated vehicle deployments
    - Shuttles to/from parking lots
    - Service to/from transit stations
    - Neighborhood circulation
- Show effectiveness and acceptance of automated, driverless mobility
- Embrace Target Zero – maintain strong safety emphasis

Brainstorming AV shuttle routes



Additional Mobility On International Boulevard?



Angle Lake Station: Mobility Hub

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Regulatory/Legal Factors

- Federal Government: Vehicle standards
- State Government: Operator licensing
- Local Government: Local infrastructure – streets and signals

Example of Regulations

Under Governor Inslee's executive order 17-02:

- Autonomous vehicles without human operators shall comply with the following requirements:
  - …must be capable of bringing the vehicle to a safe condition in the event of a system failure.
  - …capable of being operated in compliance with Washington State motor vehicle laws relevant to the vehicle's operational design limits.
  - Vehicle owners shall attest to proof of financial responsibility…
  - Developing entities shall self-certify to Dept of Licensing that they are compliant with the above requirements…

Key Action Opportunity

Design automated shuttle projects 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.

External Resource Potential ID'd So Far

- Advanced Transportation & Congestion Management Technologies Deployment Initiative, USDOT, FHWA
- Mobility on Demand, USDOT, FTA, Sound Transit
- PSRC – managed local competition for Fed funds
- Volkswagen Diesel Mitigation
- President Trump's Infrastructure Plan, TBD
-
-

U.S. Department of Transportation

Notice of Funding Opportunity Number DTFH6116RA00012

"*Advanced Transportation and Congestion Management Technologies*

Summary Information

Funding Opportunity Summary:		**$60 Million in Federal Funding to provide grants to eligible entities to develop model deployment sites for large scale installation and operation of advanced transportation technologies to improve safety, efficiency, system performance, and infrastructure return on investment.**
Federal Agency Name:		U.S. Department of Transportation (DOT) Federal Highway Administration (FHWA) Office of Operations 1200 New Jersey Avenue, SE Mail Drop: E86-205 Washington DC 20590 Attn: Robert Rupert
Funding Opportunity Title:		Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Initiative
Announcement Type:		This is the initial announcement of this funding opportunity. This is not a follow-on notice.

Wrap Up – What's Next

- Interviews with key stakeholders
- Prepare portfolio of options for development
- Documentation of external funding opportunities
- Document infrastructure and policy issues
- Finish the SWOT -- draw conclusions on next steps
- Recommend a few specific, non-expenditure SeaTac government actions for City positioning in the AV realm
- Action plan drafting and presentation

Questions, comments, discussion

Project Monitor	Lead Researcher
William Appleton, P.E., Public Works Director	John Niles, Executive Director
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