

Status Report: Automated & Connected Vehicles

CATES

Center for Advanced Transportation and Energy Solutions

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December 4, 2014

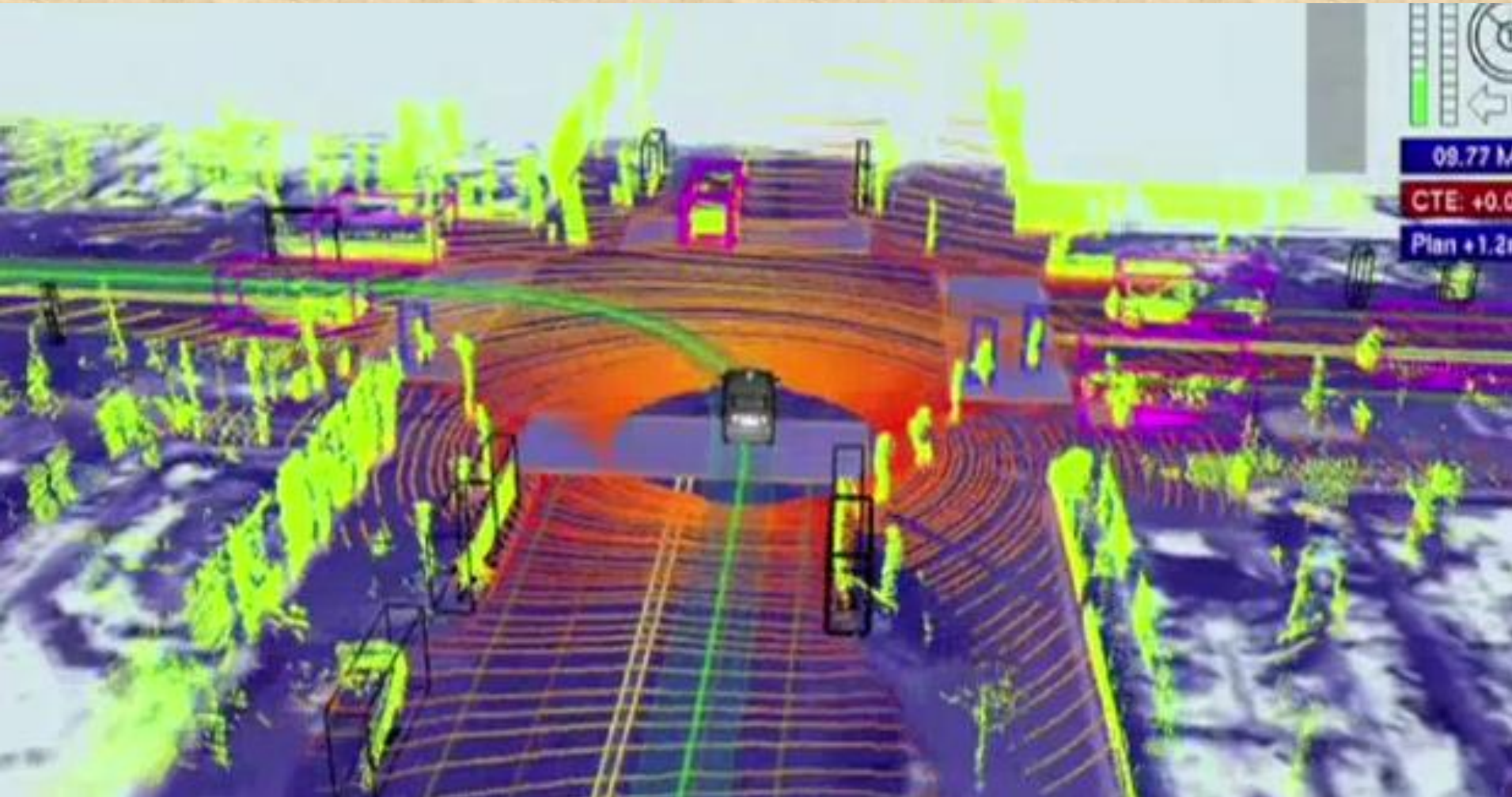
Future Driverless Car Interior Imagined



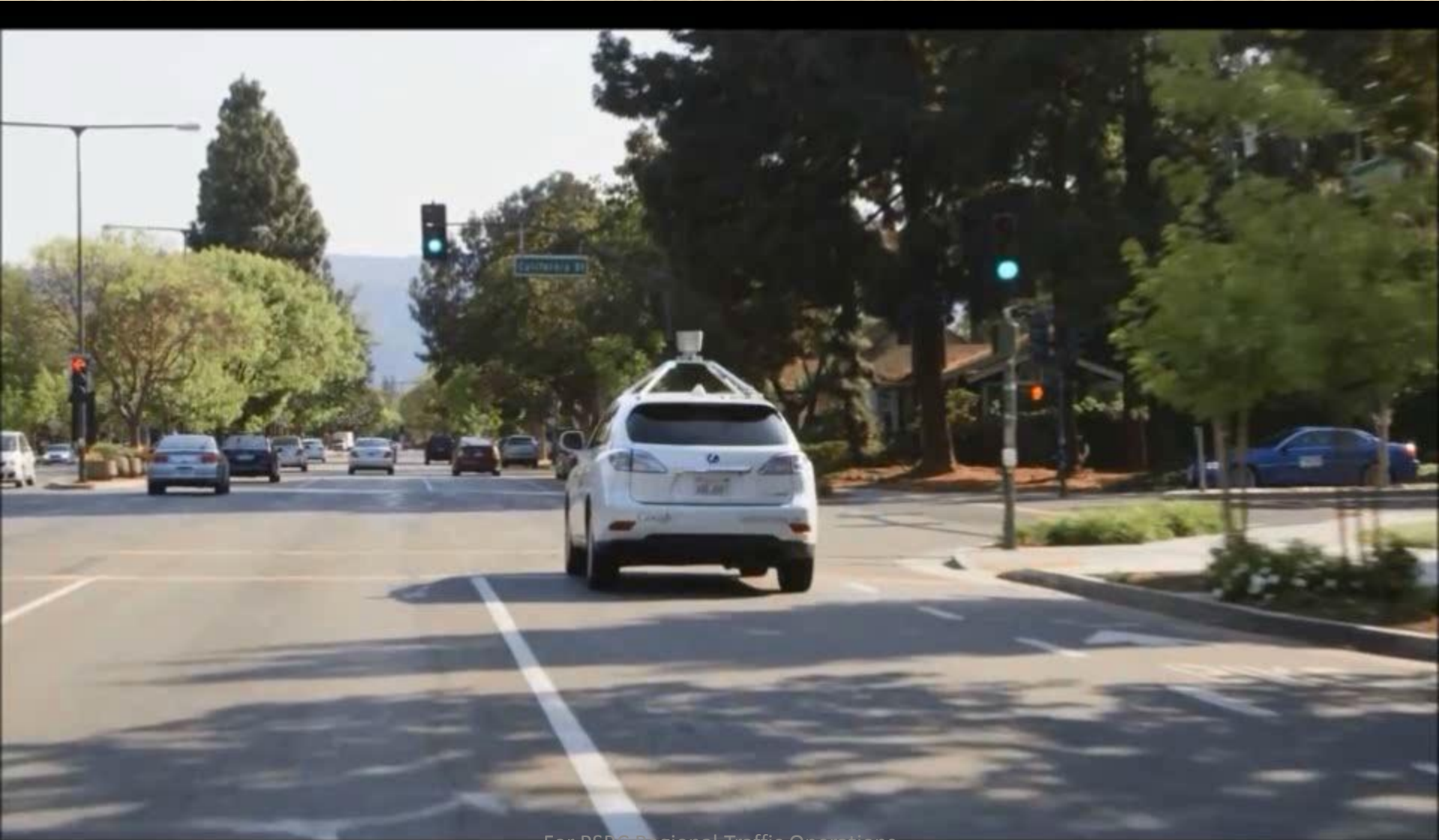
Google Car Version One - 700,000 Miles



What a Google Car Sees with LIDAR



Google Car Avoiding Collisions



All of the Global Auto Industry Working on Automation



Tier 1

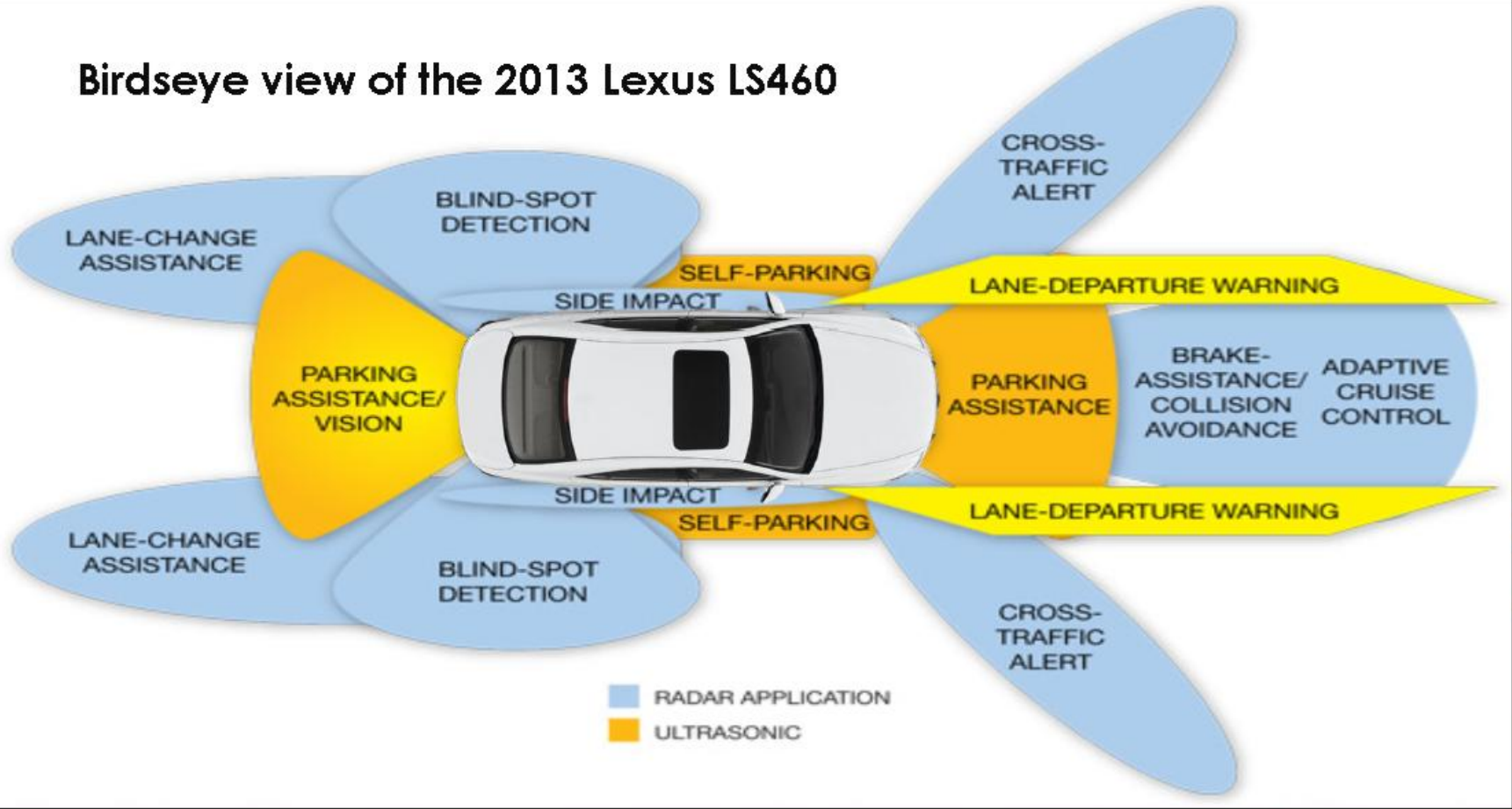


How Volvo Promotes its 100 Car Trial



Multiple Sensors Watching All Around

Birdseye view of the 2013 Lexus LS460



LEVEL 2 AUTONOMOUS TECHNOLOGIES IN USE TODAY

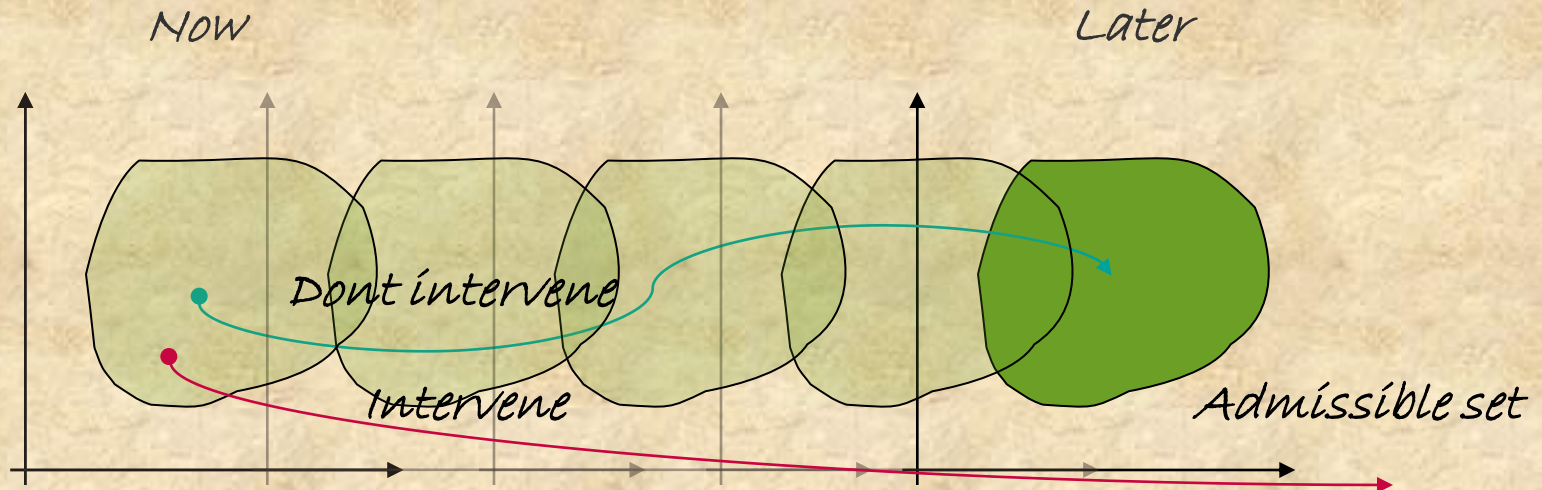
Automated Driver Assistance



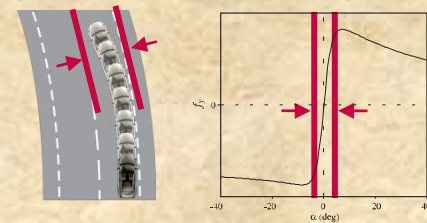
Massive Computer Processing in Small Space



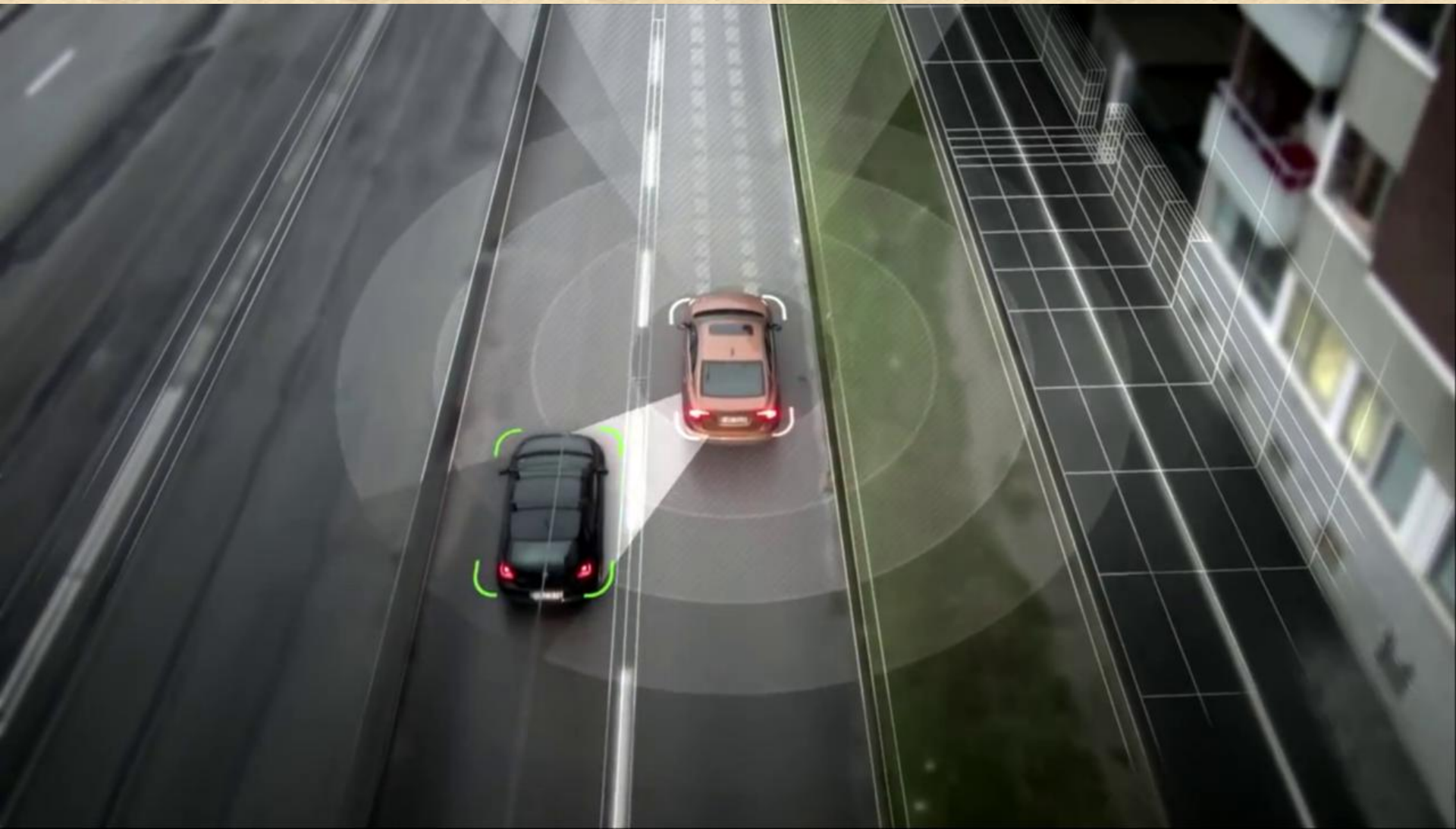
Volvo: Threat assessment problem



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



Driver Assist Automation On a Path to Evolve into Autopilot



Automation Can Be Turned Off



Sometimes the Driver Still Drives



Toughest Problem – Transition from Distraction to Driving



Google Car, Version Two



Horizontal Elevator

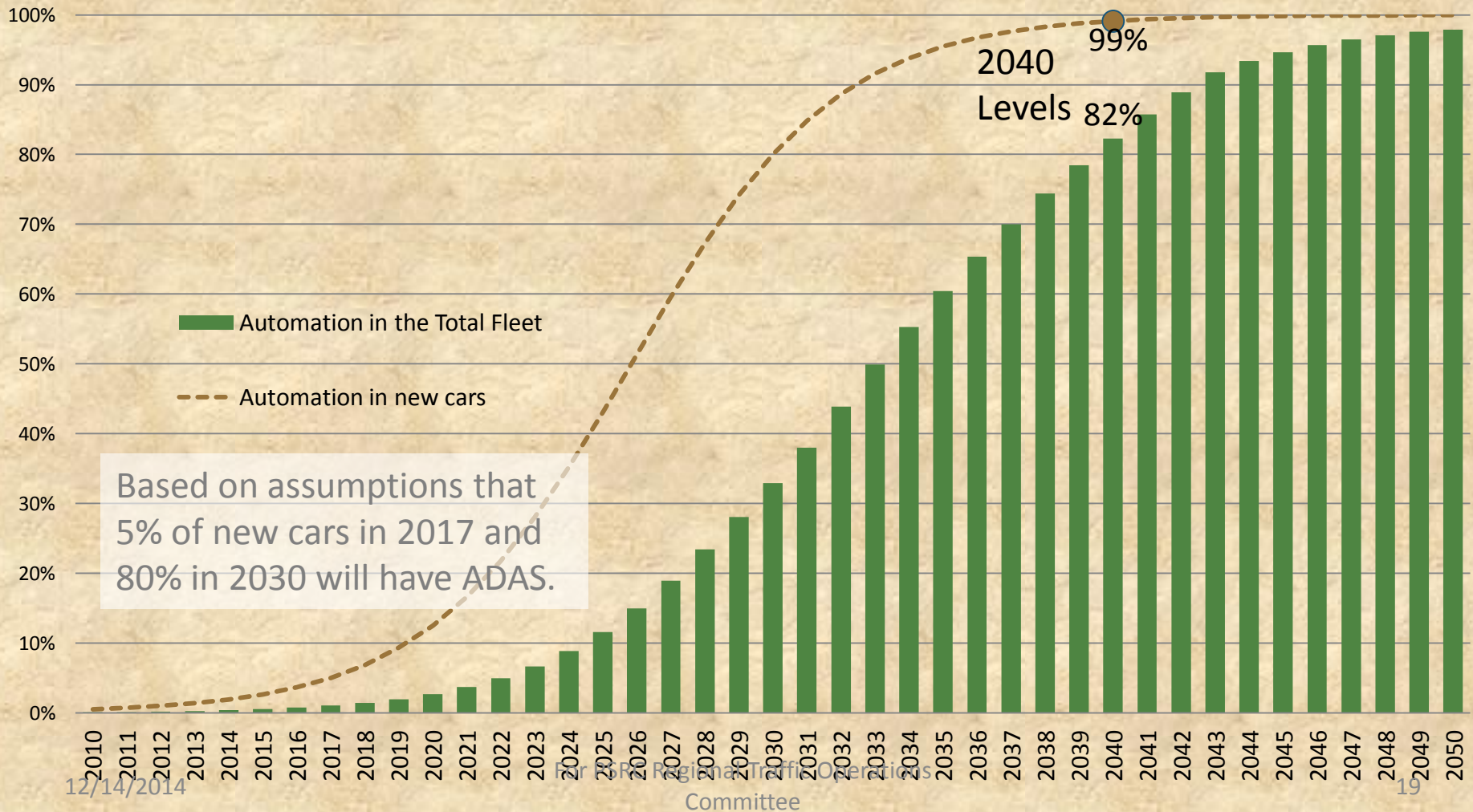


Easier No Driver Environment: Slow and Nobody in the Vehicle



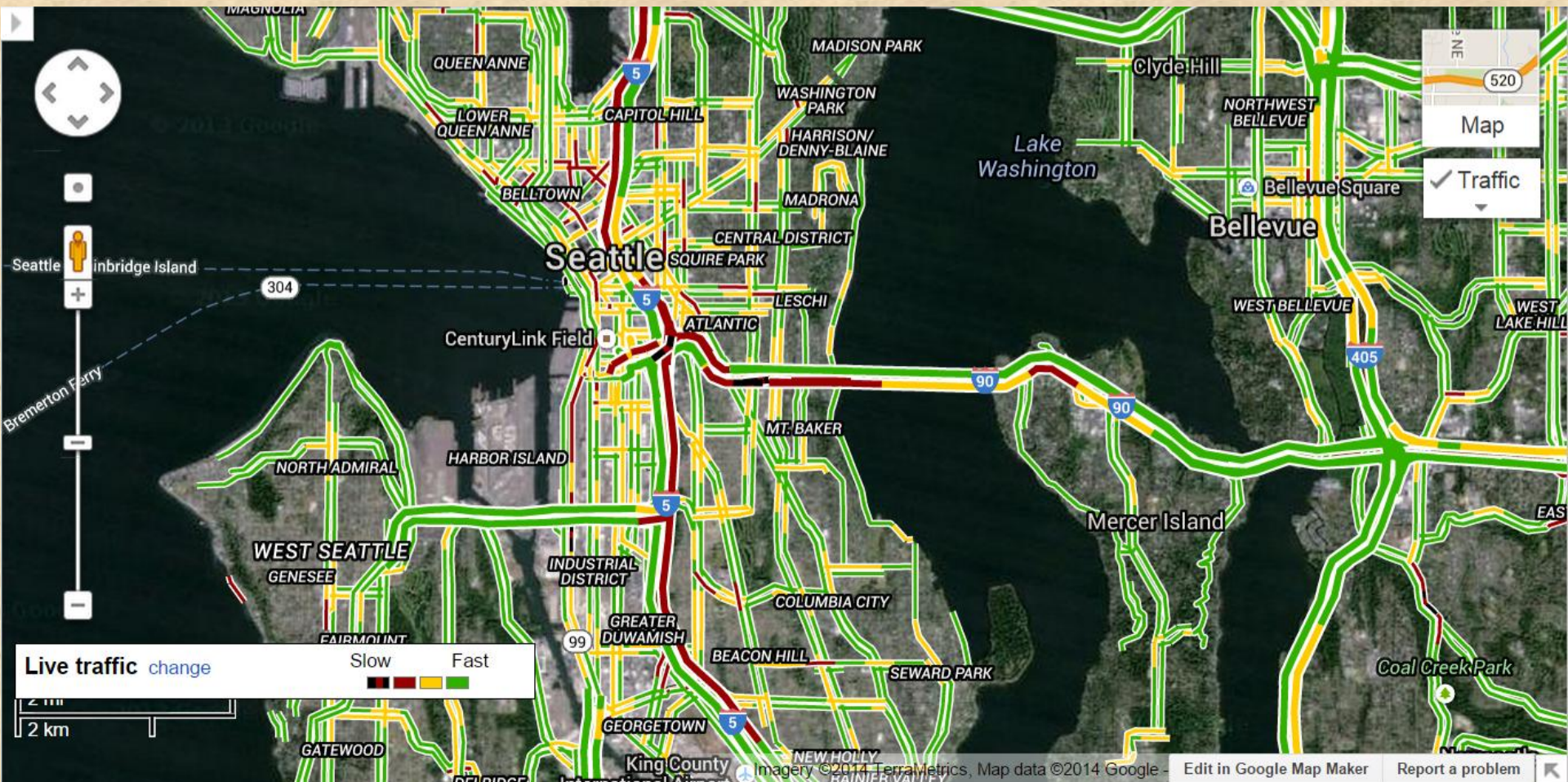
Automated Driver Assistance Systems Forecast of Deployment Timeline

Estimated Growth of Automation in U.S. Light Vehicles



Benefit: Traffic Congestion Mitigation

Smoother Flow, Fewer Accidents



Benefit: Reduce a Leading Cause of Crashes

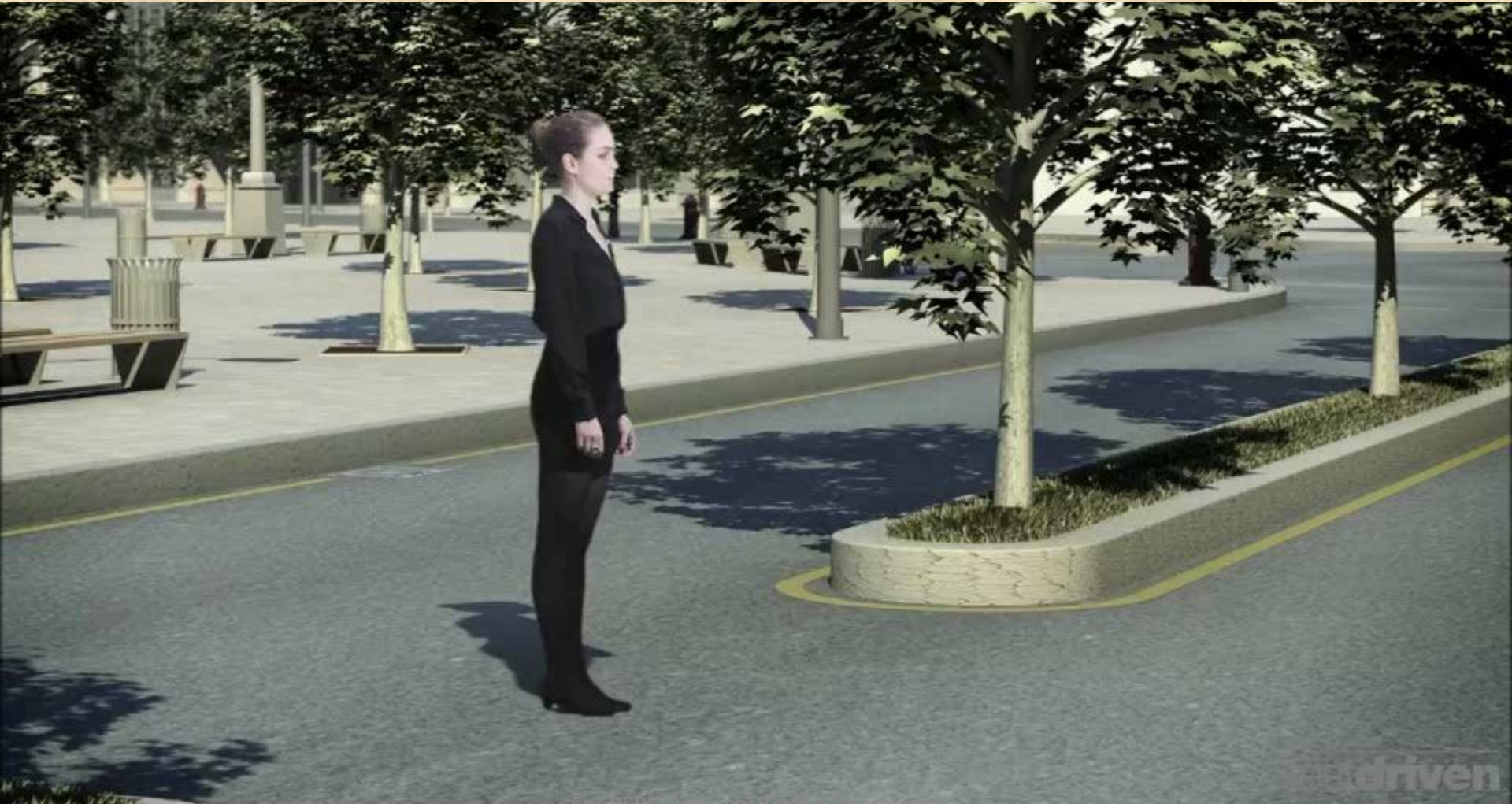


Benefit: Do Non-Driving Activities While Moving in a Car

An aerial photograph of a large suspension bridge spanning a wide river at sunset. The sun is low on the horizon, creating a strong lens flare and casting a warm, golden glow over the scene. Several vehicles, including a large white semi-truck, are visible on the bridge's roadway. A large cargo ship is docked or moving slowly in the water below the bridge. The text "OUR NEXT FEATURE. SPARE TIME." is overlaid in large, bold, white capital letters across the center of the image.

OUR NEXT FEATURE. SPARE TIME.

Benefit: Fewer Collisions



Vehicle Technology Enhances Sustainability by Pushing Back on Two Main Killers



“Nearly 3,400 people die on the world's roads every day. Tens of millions of people are injured or disabled every year. Children, pedestrians, cyclists and older people are among the most vulnerable of road users.”

The Telegraph

“Exhaust fumes are twice as deadly as roads, study claims



According to the Massachusetts Institute of Technology, more than 5,000 people die prematurely from conditions like lung cancer and heart disease because of emissions Photo: ALAMY



By Nick Collins, Science Correspondent

7:30AM BST 18 Apr 2012



Photos from WSDOT Report



12/14/2014

For PSRC Regional Traffic Operations
Committee

Nissan Leaf Electric Autonomous Drive



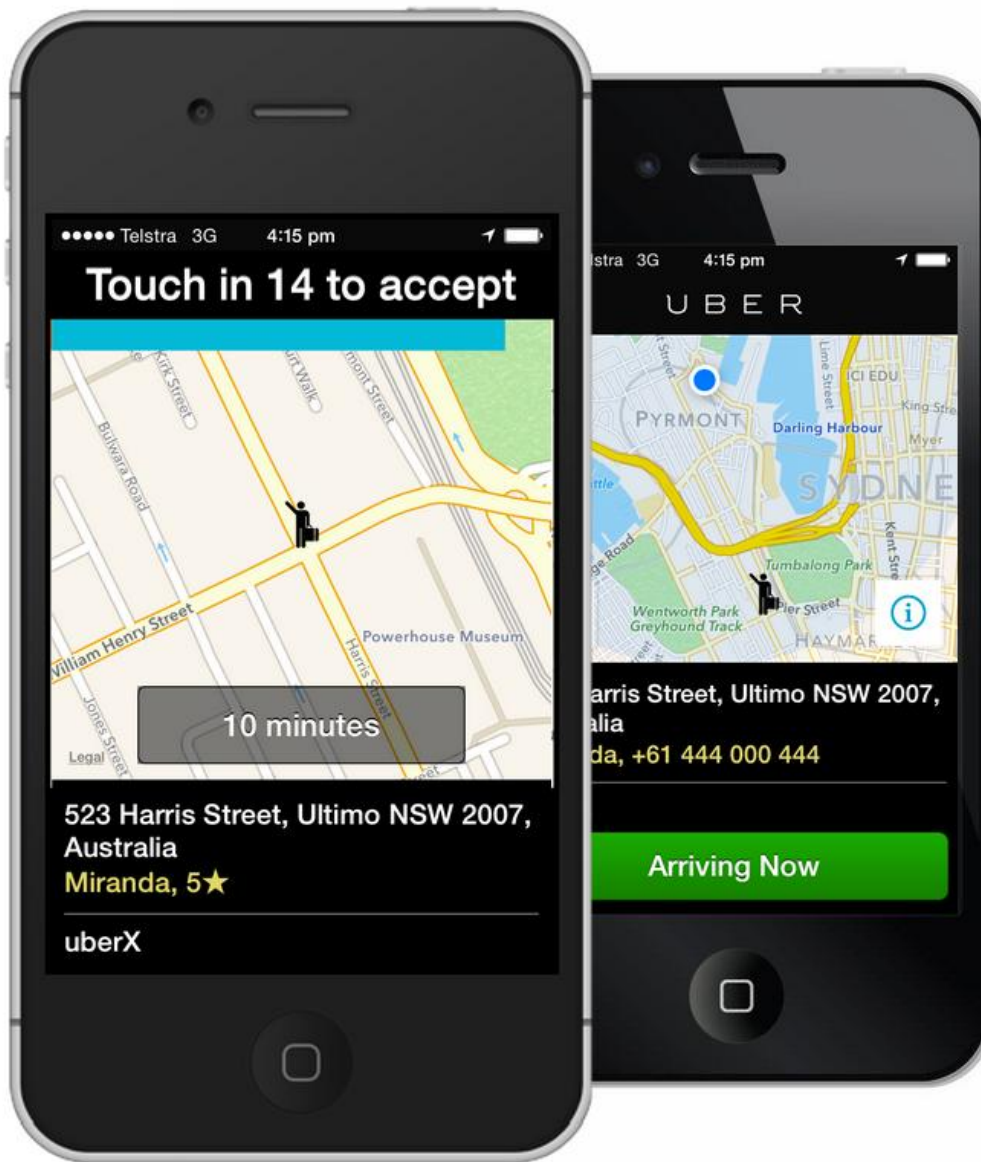
Policy Recommendations

- Acknowledge & monitor coming changes
- Flexibility in regional plans & investments
- Keep roads maintained; lanes well marked
- Highway shoulders for fail-safe refuge
- Uniform traffic devices along the road
- Minimize legislative/regulatory intervention
- Remove barriers to Mobility as a Service

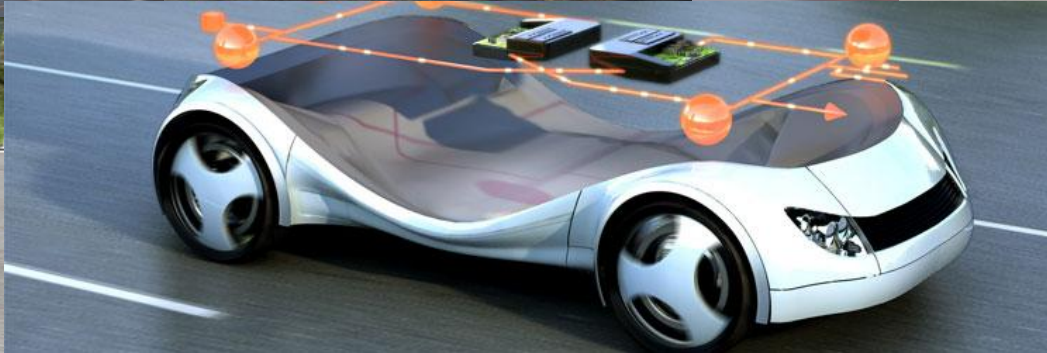
MaaS = Mobility as a Service







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



The end of driving

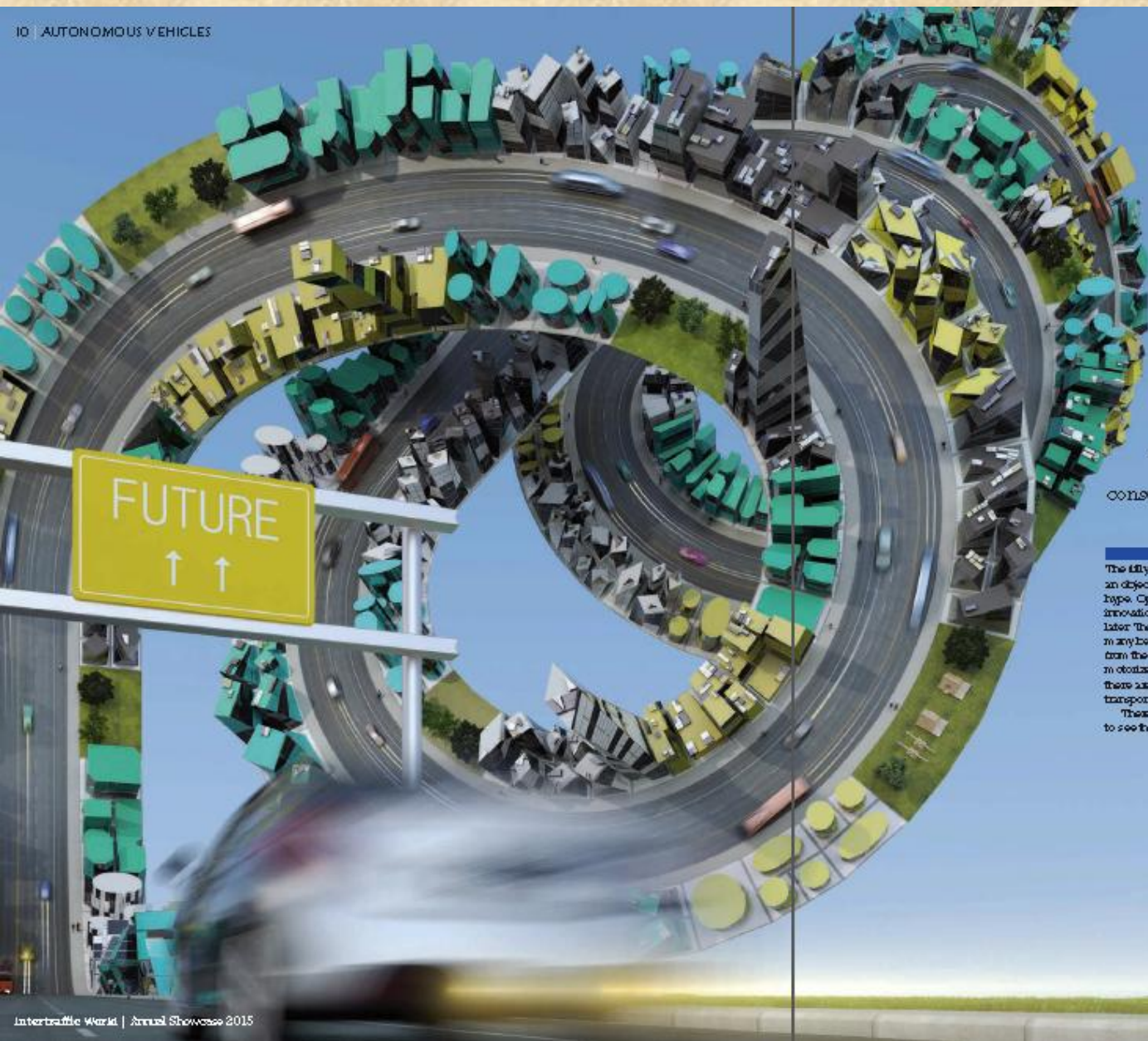
The world waits in anticipation for the first self-driving cars. But after all the impossible pieces are sorted and the wonder dissipates, what will the world be like? And will there be some unintended consequences that belie optimistic predictions of today?

Words | Brian C. Smith 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 2050 – 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

utopian 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 denser 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,

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



Solution for Sustainable Cities: Merge New Technologies into Cars

- Automated driving - A
- Electrically powered - E
- Wireless connections - C
- Tailored size & configuration -T
- Shared use of vehicles – S
- C-A-T-E-S

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Thank You Very Much!

For further information
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