

SPUR

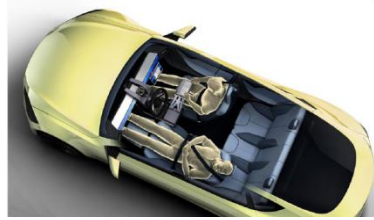
Ideas + Action for a Better City

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Our Mobility Future

Autonomous Vehicle Policy & Practice

April 11, 2016



PARSONS
BRINCKERHOFF



CONTRA COSTA
transportation
authority

Contra Costa Transportation Authority



CONTRA COSTA
transportation
authority

- The Contra Costa Transportation Authority (CCTA) is a public agency formed by Contra Costa voters in 1988 to manage the county's transportation sales tax program and to lead the county's transportation planning efforts.
- CCTA is responsible for maintaining and improving the county's transportation system by planning, funding, and delivering critical transportation infrastructure projects and programs that connect our communities, foster a strong economy, increase sustainability, and safely and efficiently get people where they need to go.



MEASURE C



- Passed by voters in 1988, Measure C provided for a half-cent on the dollar sales tax for twenty years (through March 2009) to pay for an ambitious list of transportation projects and programs.
- Measure C was estimated to generate \$1 billion over 20 years for a BART extension, freeway improvements, better bus service, enhanced bicycle facilities and more transportation options for senior citizens and people with disabilities.



MEASURE J



- In November 2004, 71% of Contra Costa voters approved Measure J. The measure provided for the continuation of our county's half-cent transportation sales tax until 2034, and will provide approximately \$2.7 billion for countywide and local transportation projects and programs for the life of the measure.



What We Do

- **BUSES** Invest in a reliable, comfortable and convenient bus network



- **LOCAL STREETS** Smooth traffic flow on major roads and invest in neighborhood improvements such as repairing potholes and road surfaces



- **PEDESTRIAN** Make improvements to sidewalks, crosswalks, trails, and paths



- **SAFE ROUTES TO SCHOOLS** Focus on programs and projects aimed at bicycle and pedestrian safety for K-12 students



- **FERRIES** Expand the Bay Area ferry system by looking to ferries as an alternate commute method between West County and San Francisco



- **BICYCLE** Invest in safe routes and infrastructure improvements for bicyclists



- **BART** Make improvements to BART service and stations, such as extensions to new routes and parking at stations



- **HIGHWAYS** Complete Contra Costa's highway system, and improve air quality and noise protection along these corridors



- **CARPOOL/RIDESHARE** Implement programs aimed at reducing traffic congestion by encouraging carpooling and ridesharing

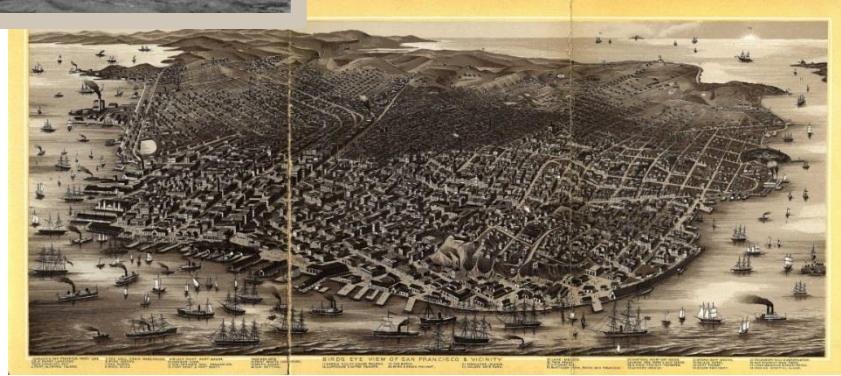


- **PROGRAMS FOR SENIORS AND PEOPLE WITH DISABILITIES** Enhance transit options to improve mobility for seniors and people with disabilities



Our Cities' Evolution...

City 1.0



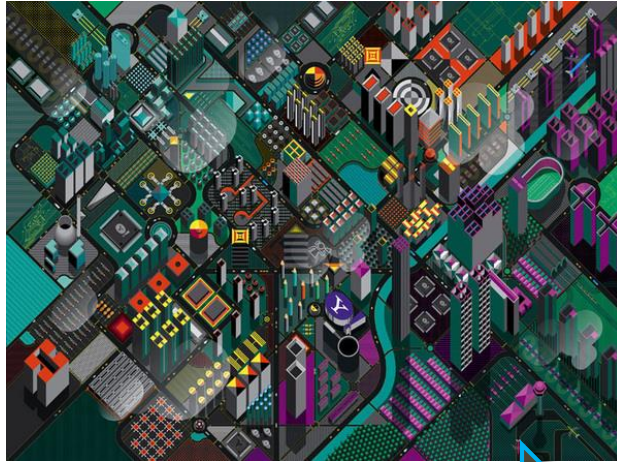
City 2.0 Interstate Highways



City 3.0



City 5.0



Data Driven Mobility

Sensible & Digital City

Intermodal Innovations

Discussion Topics

- Autonomous Vehicles (AV) 101
- Historic Perspective on Mobility
- Our AV Future
- Current Status of Government with AV
- Introduction to GoMentum Station
- Proposed Actions for State and Local Governments Regarding AV

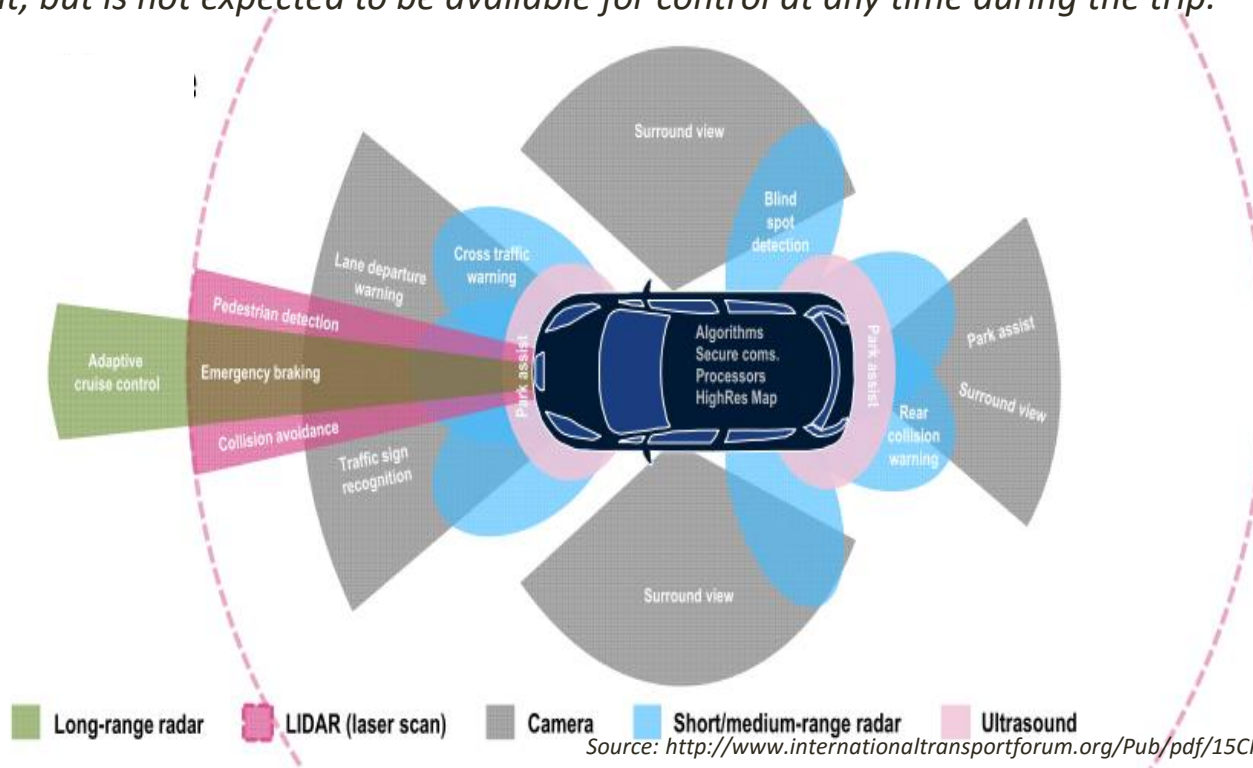


Autonomous Vehicles (AV) 101

AV Definition

- NHTSA defines “Full Self-Driving Automation” as:

“designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip. Such a design anticipates that the driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip.”



Source: http://www.internationaltransportforum.org/Pub/pdf/15CPB_AutonomousDriving.pdf

NHTSA's Definition of Vehicle Automation

Level 0 (Non-Automation)

The driver is in complete and sole control of the primary vehicle controls – brake, steering, throttle, and motive power – at all times.

Level 1 (Function-Specific Automation)

Automation at this level involves one or more specific control functions.

Level 2 (Combined Function Automation)

Automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions.

Level 3 (Limited Self-Driving Automation)

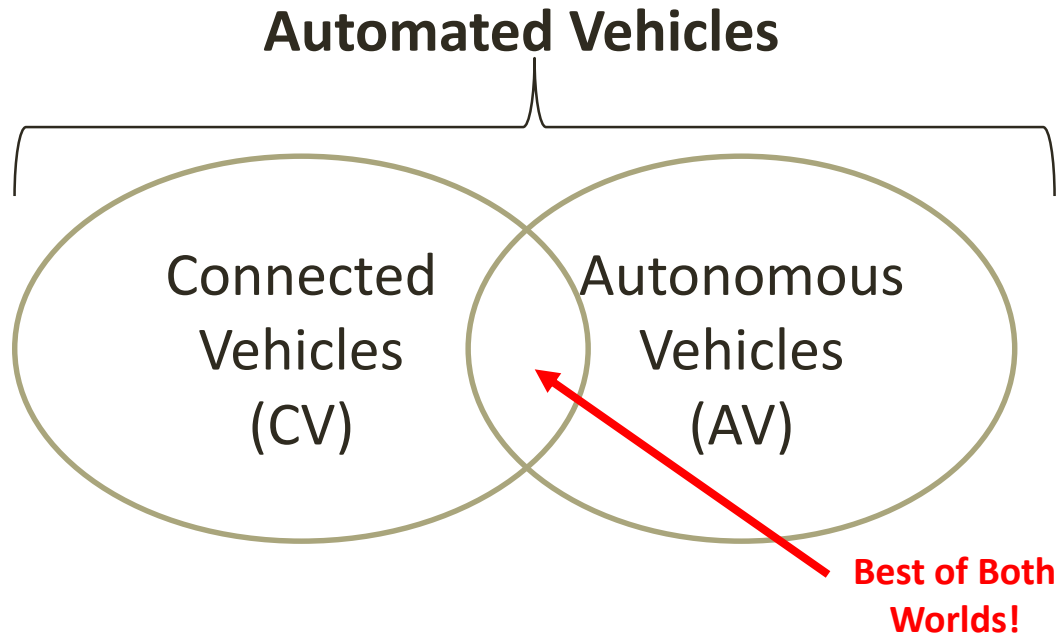
Automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions. The driver is expected to be available for occasional control, but with sufficiently comfortable transition time.

Level 4 (Full Self-Driving Automation)

The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip. Such a design anticipates that the driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip.



AV vs CV



Potential Impact of AVs on Society

- Positives

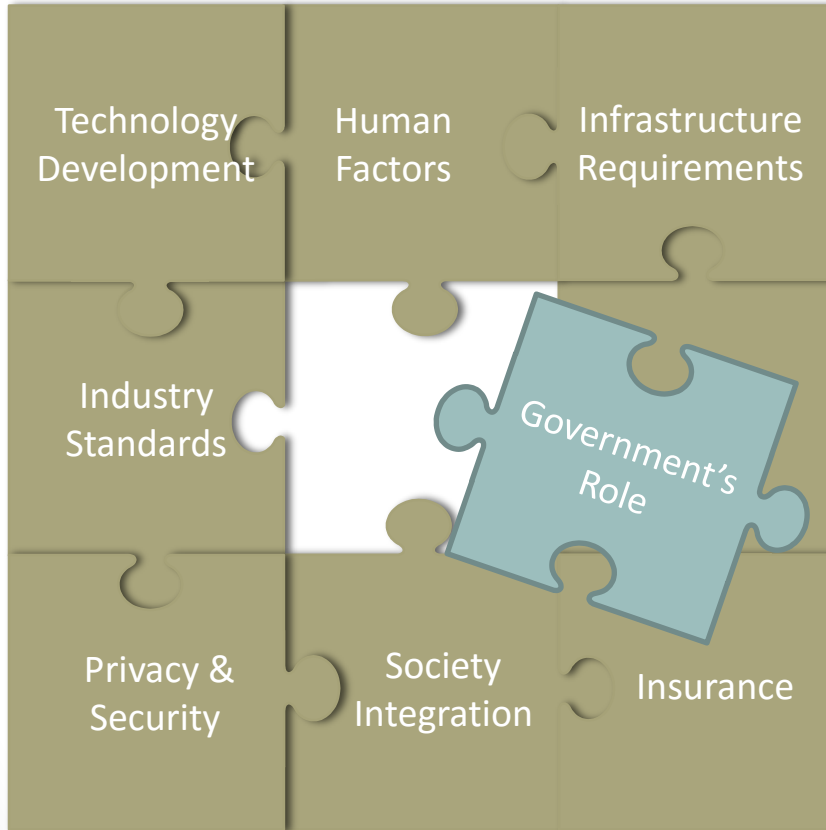
- Safety improvements
- Improved mobility for youth, elderly, and disabled
- Improved traffic circulation
- Reduced need for parking
- Improved travel time reliability
- Reduced GHG emissions
- Reduced need for private car ownership and private auto insurance

- Negatives

- Increased “VMT”
- Insurance policy disruption
- Increased urban sprawl
- Job loss

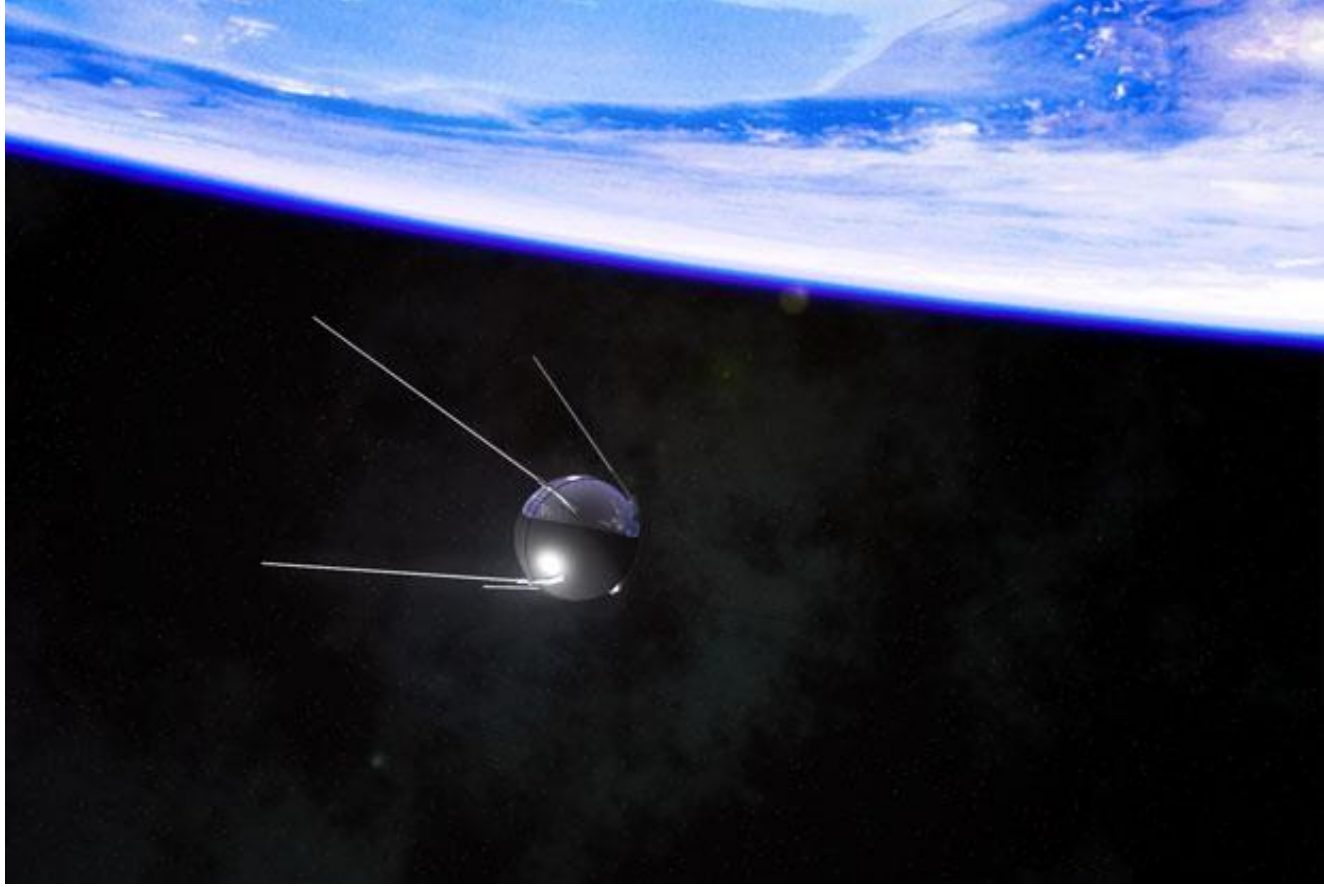


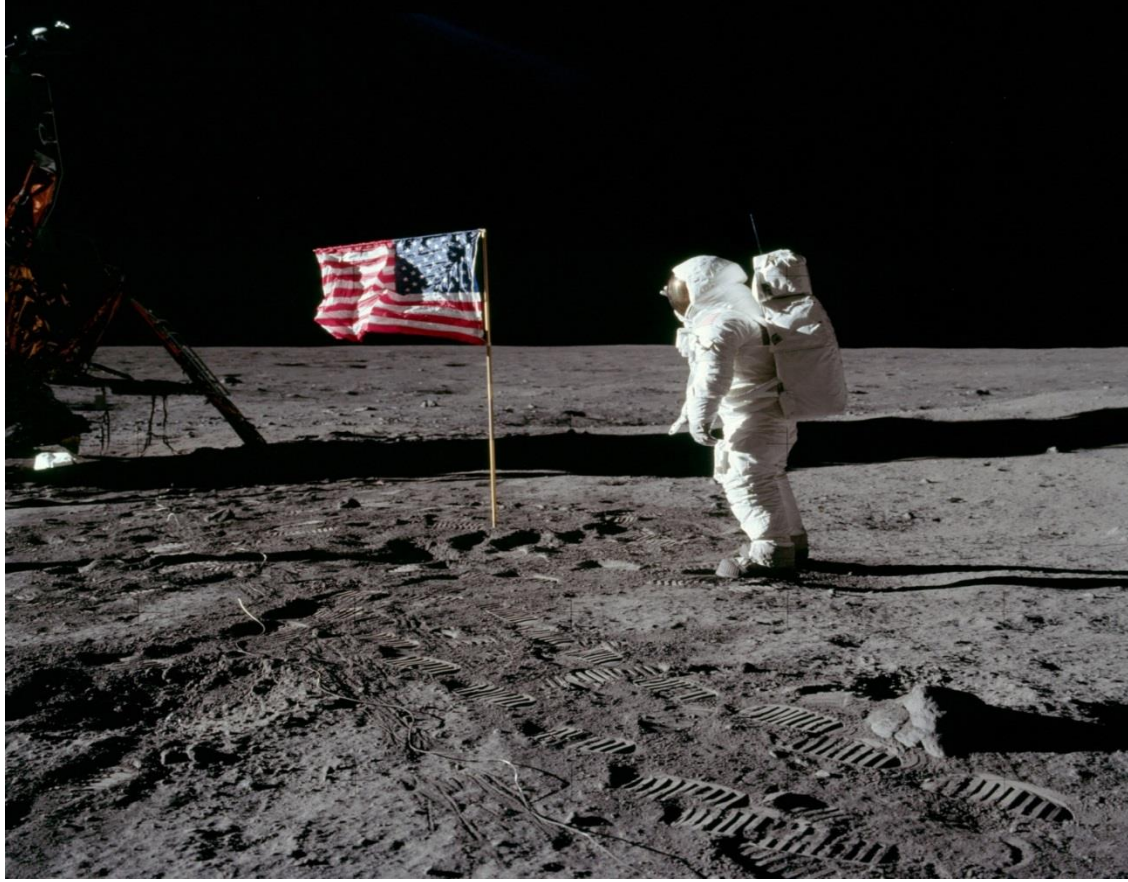
AV Today



- Technology development continues to be the main focus; however, other considerations are being researched as well
- Governments around the world are developing partnerships and conducting research to determine how they should regulate the industry in order to ensure public safety

A Little Bit of History...







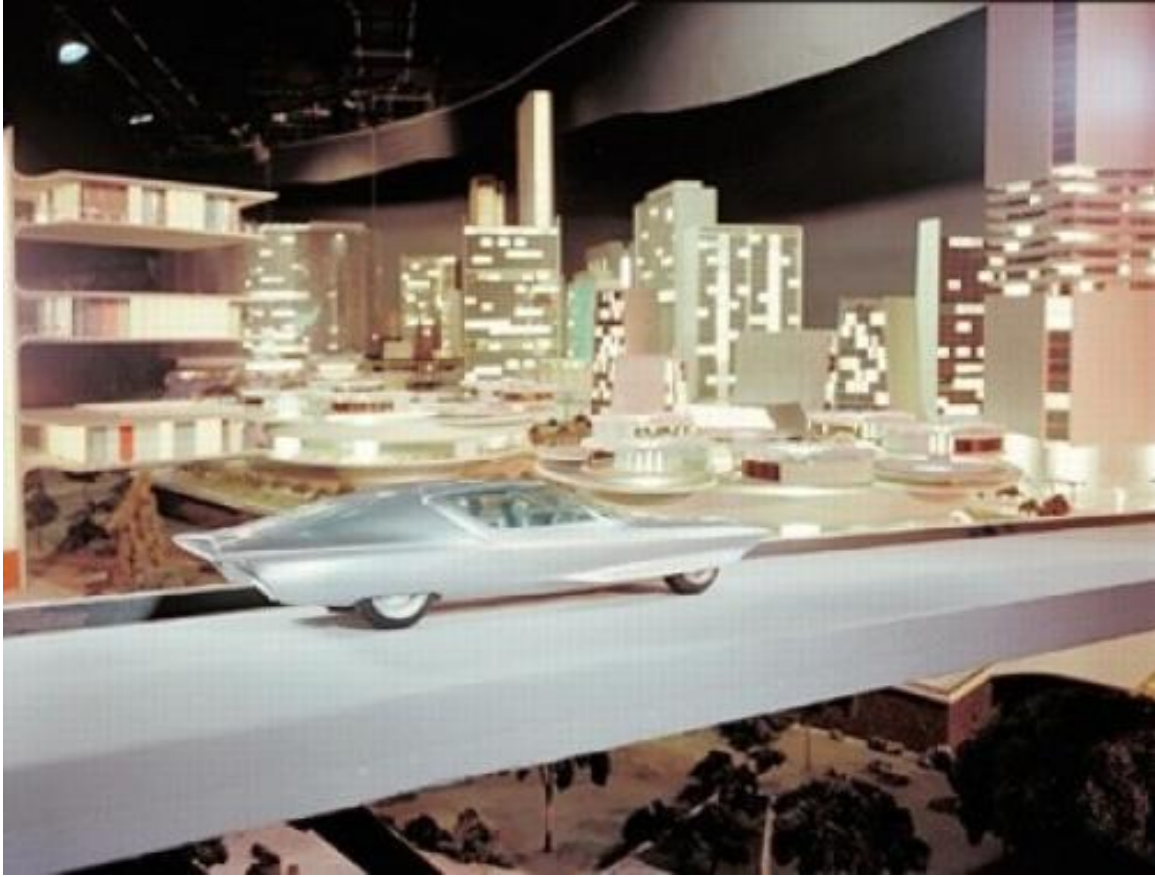
1964 World's Fair Futurama

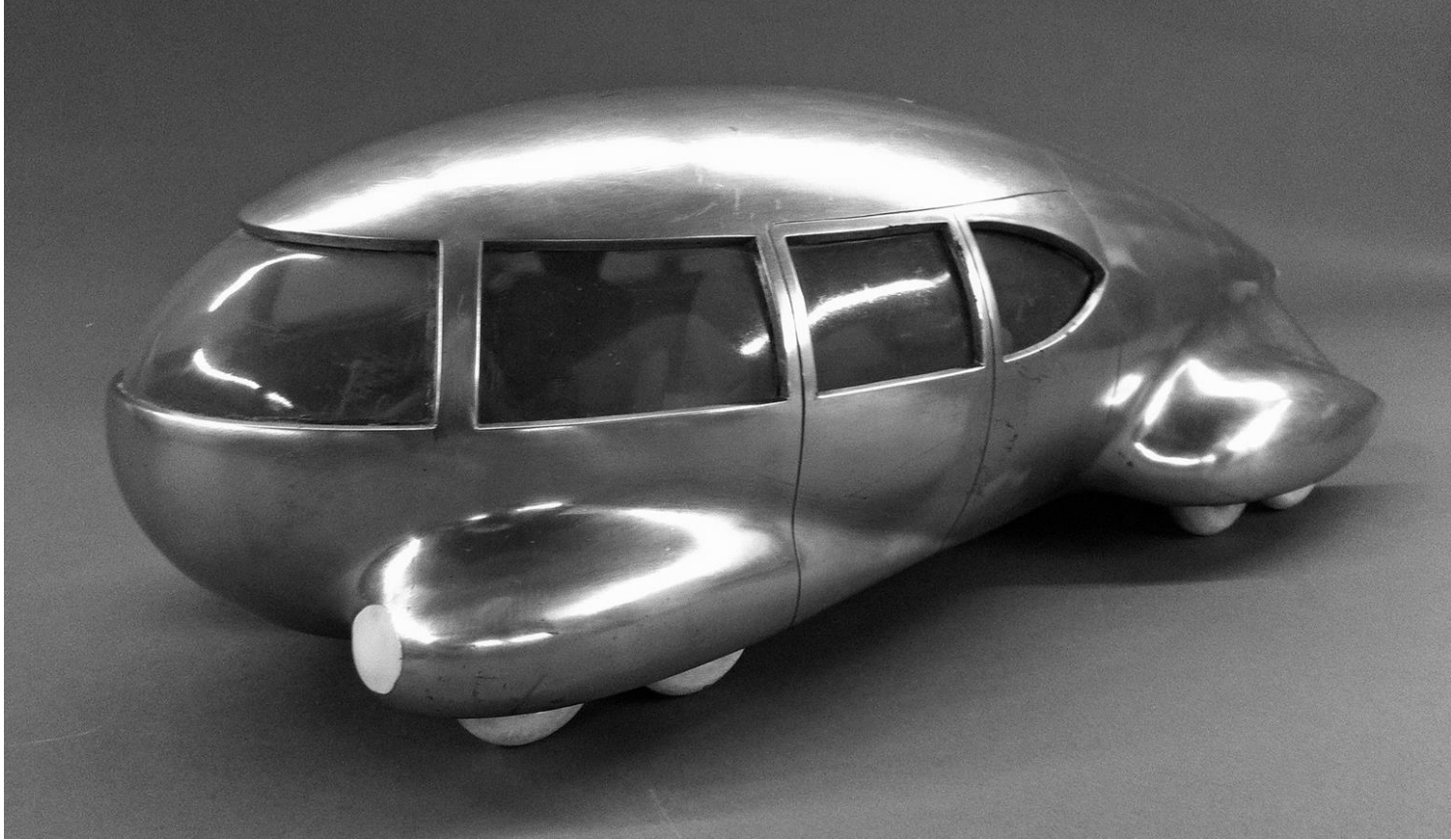
1939 World's Fair Futurama



High spot of the New York World's Fair reopening this Spring—GM Futurama!

You can look over GM's exciting "idea" cars—*Firebird IV* with television, stereo, game table, refrigerator; *GM-X* with jet aircraft cockpit and controls—fascinating design and engineering innovations right out of tomorrow.







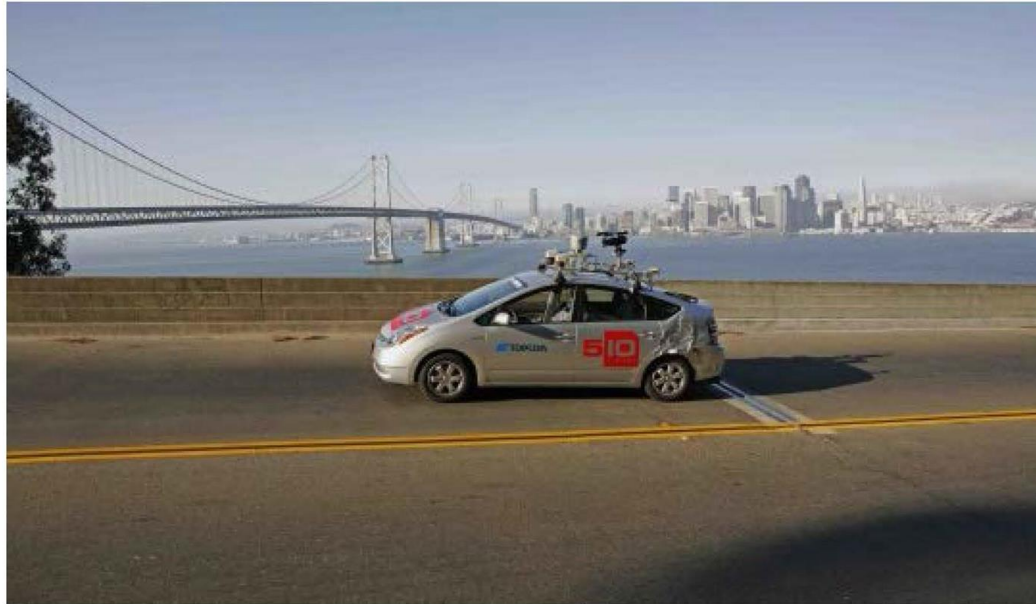
California PATH

2007 DARPA Urban Challenge



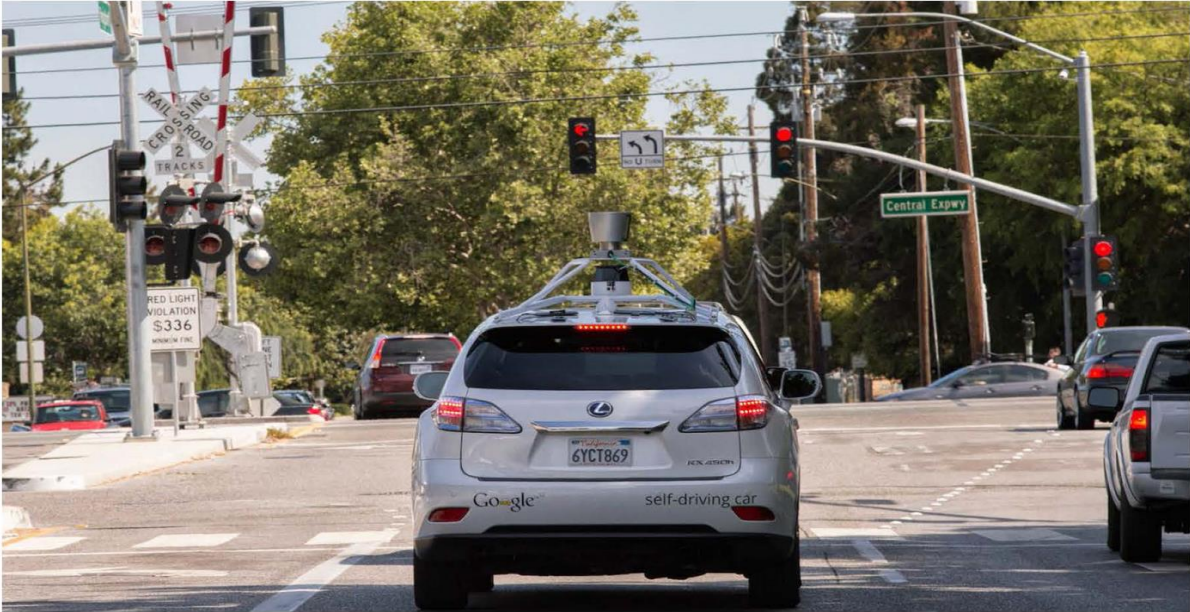
'Boss' CMU Tartan Racing, 60 miles urban, 4h:10m

2008 Levandowski's Pribot



Delivered pizza across SF Bay bridge

2014 Google 'mastering city street driving'



700k miles, cyclists signals, construction zones

A Look At What's on the Horizon...

International Business Machines Corporation (IBM) ★ Watchlist

157.81 -2.96 (-1.84%) NYSE - As of 4:02PM EDT

After Hours: **157.81** ↑+0.49 (0.31%) 05:51pm EDT

1d 5d 1m 3m 6m YTD 1y 2y 5y 10y Max Custom ▾  + Indicator + Comparison Reset   Go To Symbol 



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Facebook, Inc. (FB) ★ Watchlist

77.55 -1.89 (-2.38%) NASDAQ - As of 4:00PM EDT

After Hours: **77.59** ↑+0.04 (0.05%) 6:03PM EDT

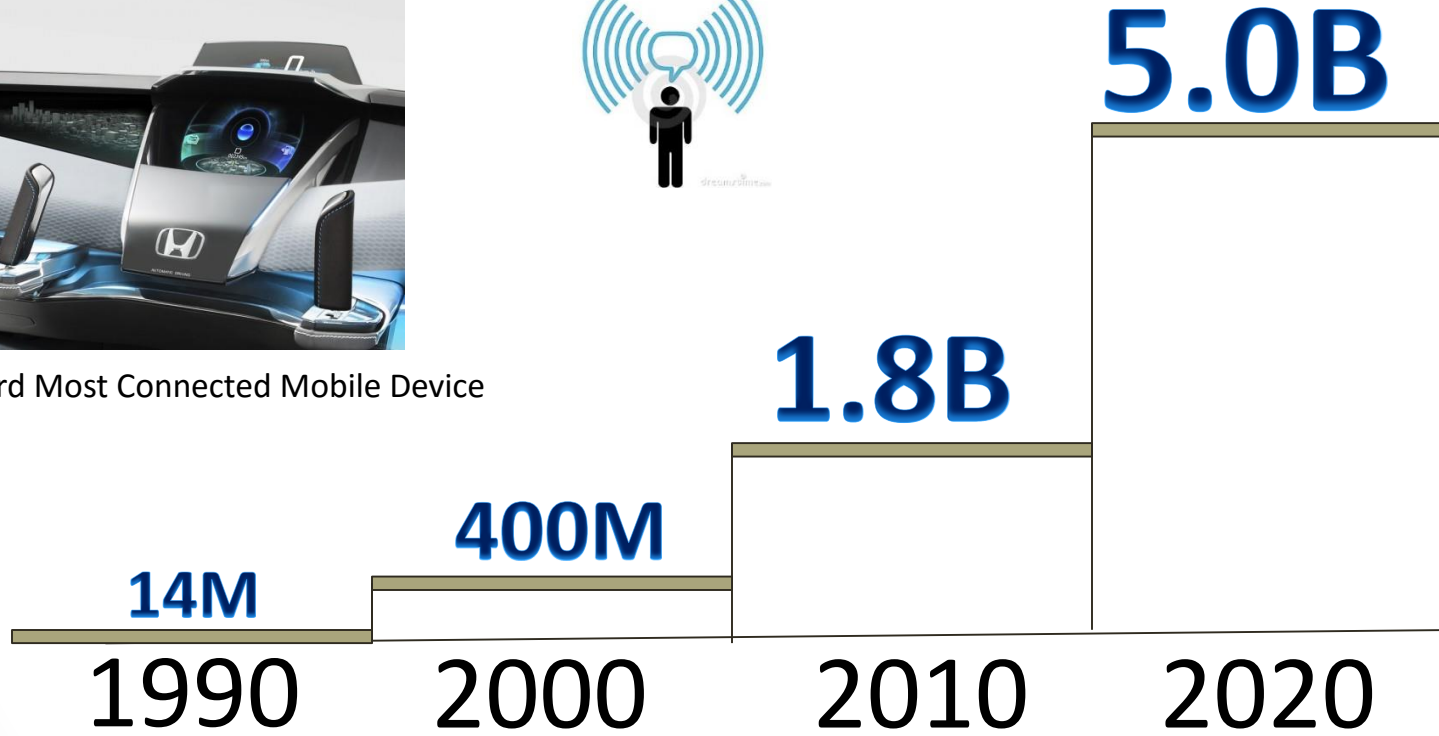
1d 5d 1m 3m 6m YTD 1y 2y **5y** 10y Max Custom ▾ + Indicator + Comparison Reset Go To Symbol



Connectivity Emerging Faster



Third Most Connected Mobile Device



Source: <http://www.internetlivestats.com/internet-users/#trend>

2014-2017 Volvo 'Drive Me', Gothenburg



100 increasingly autonomous – 2020 Zero deaths



2015 Tesla 'Autopilot' (Autonomous 2023)



'will go from on-ramp to off-ramp autonomously'



2015 Mercedes Benz F 015 Concept



“Innovative perspective into the future of mobility.”

Mercedes Benz Future Truck 2025

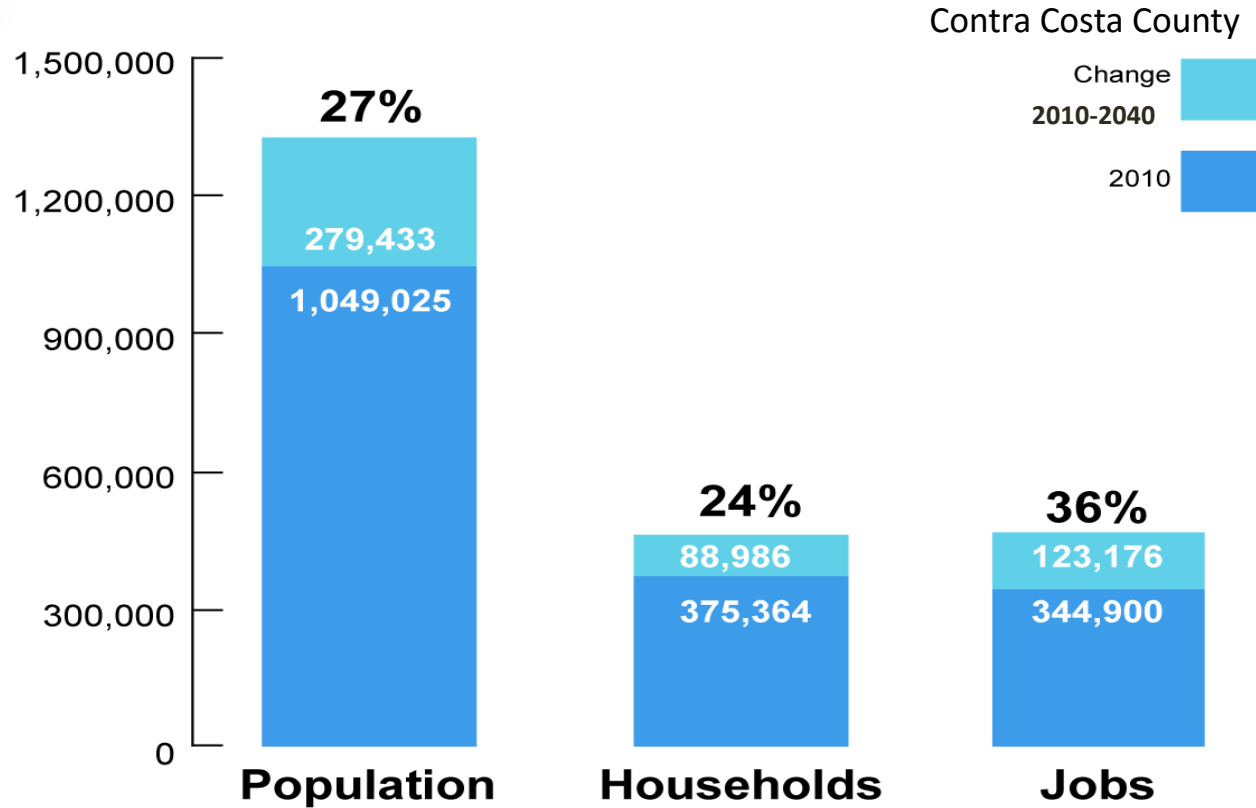


Many technological elements already available



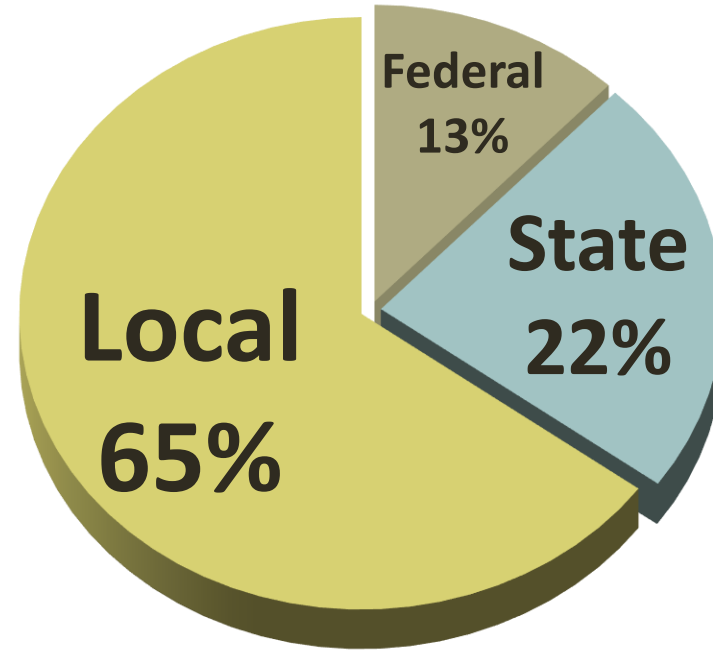
Planning the Future

Continuing Needs



Transportation Funding in California

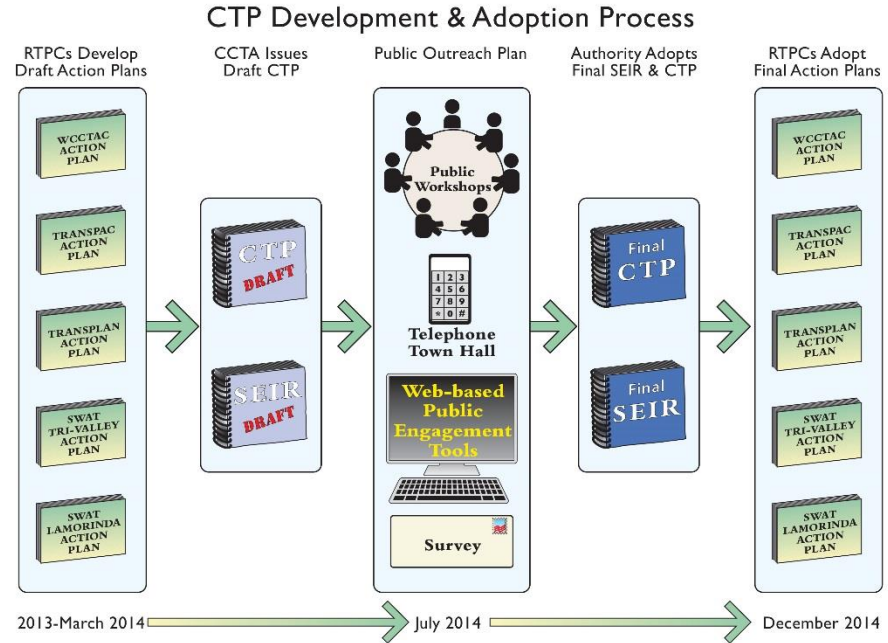
- State and Federal government crisis in transportation funding
- 65% of the dollars spent on transportation in California comes from local sources
 - Sales Tax
 - Fees
 - Tolls



CTC April 19, 2012

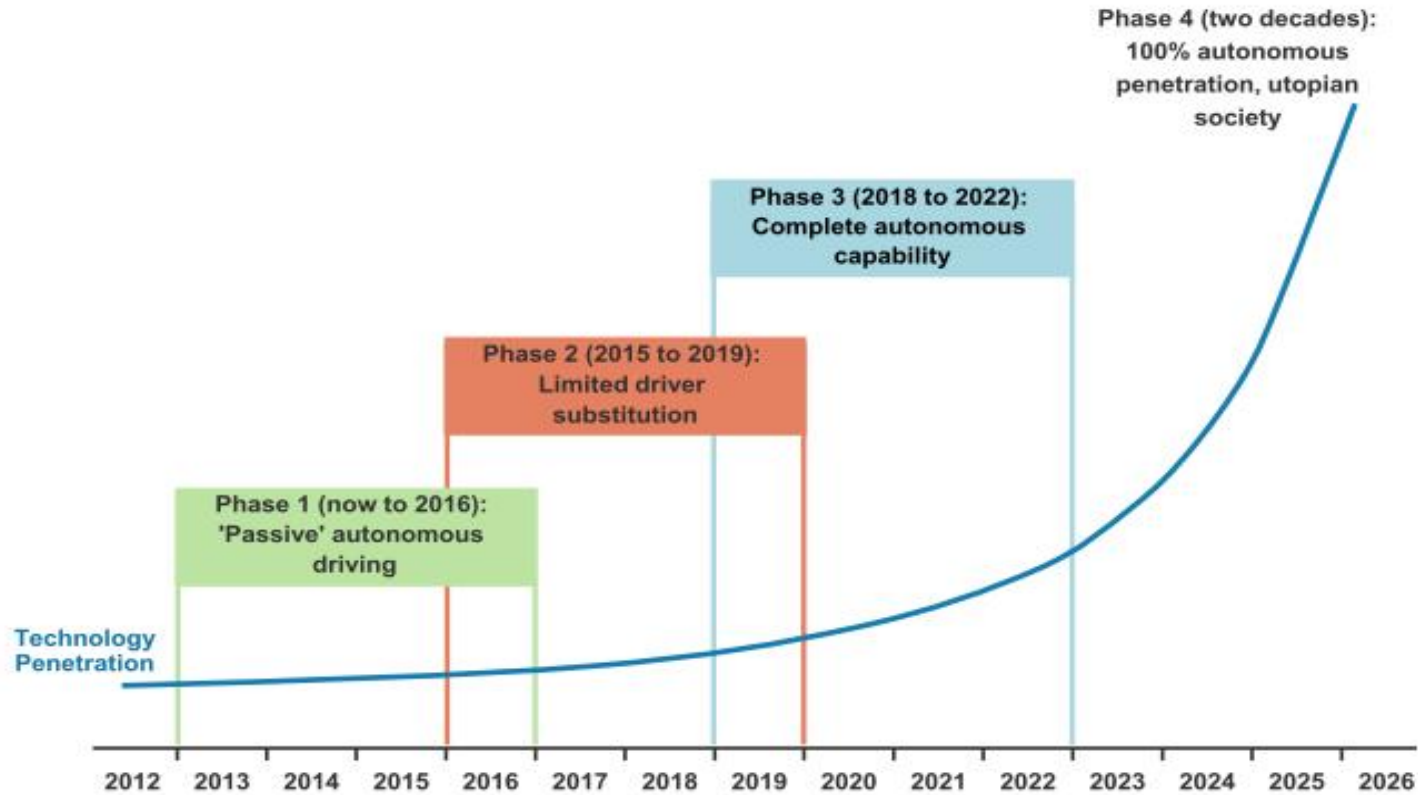
Long Range Planning – The Countywide Transportation Plan

- Updated Every 4-5 Years
- Documents the Authority's Goals, Vision, and Strategies
- Action Plans are Developed by the Regional Committees
- Includes 10- and 20-Year Financially Constrained Project Lists





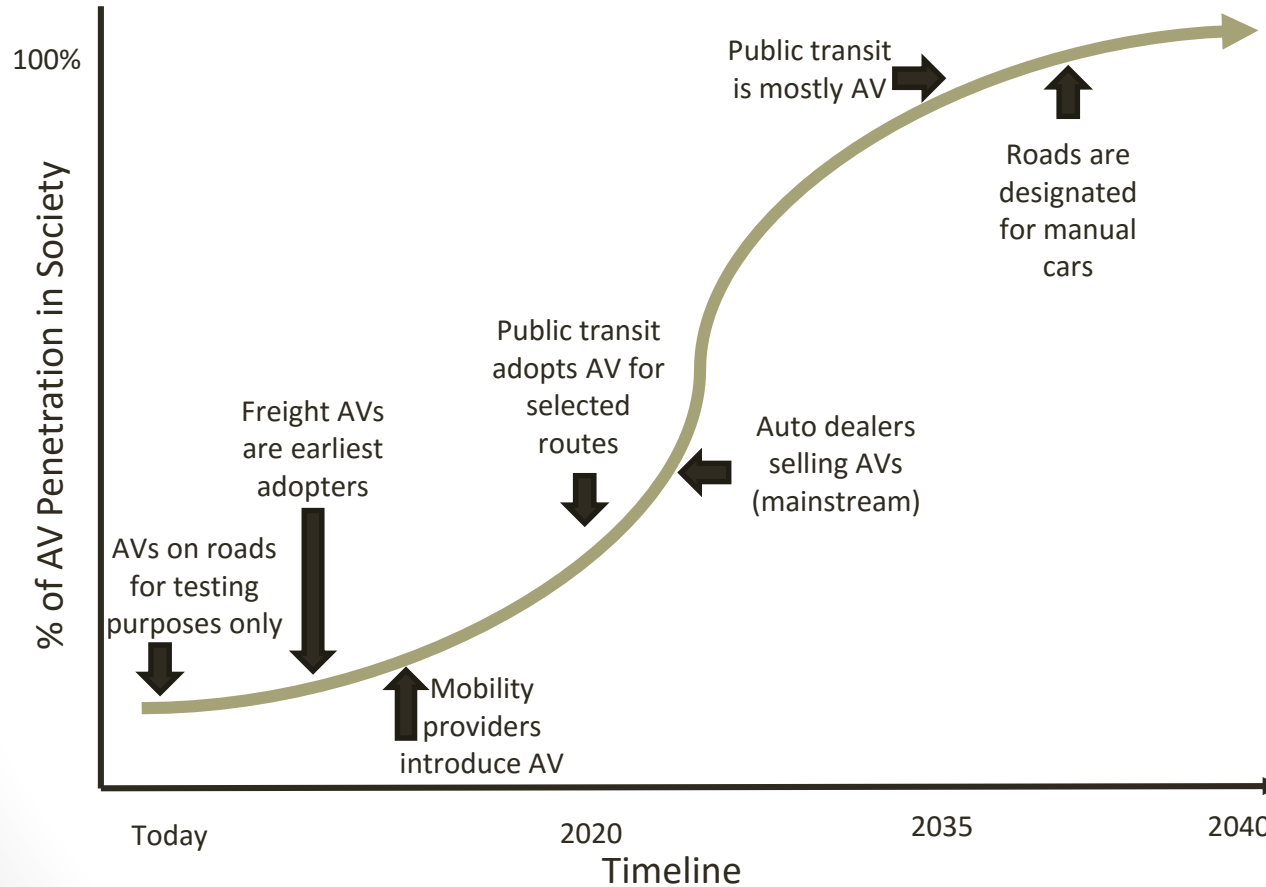
AV Adoption Timeline



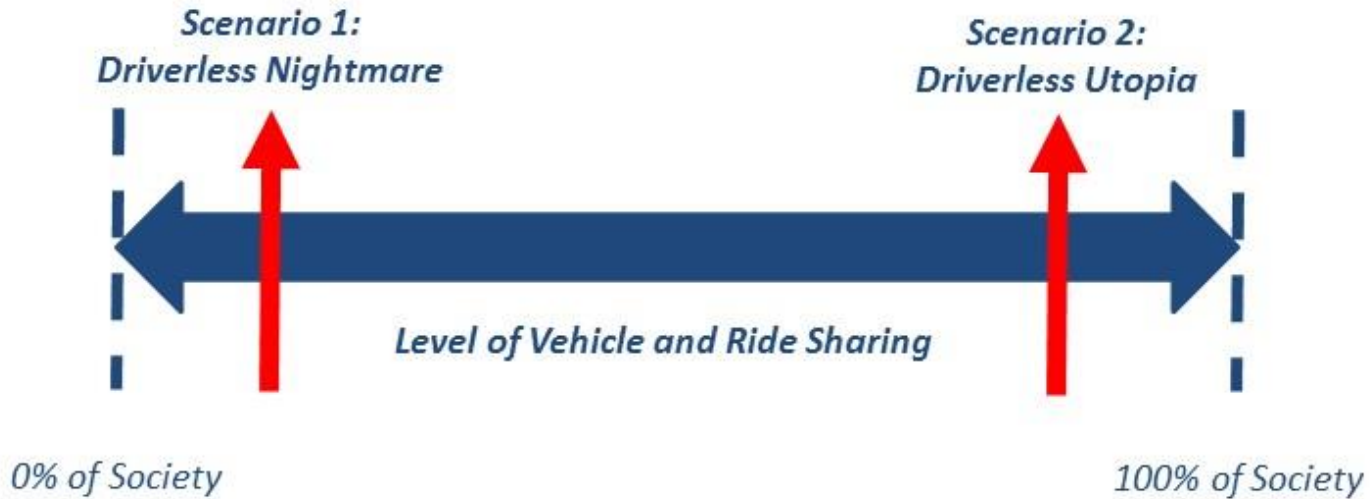
Source: Company Data, Morgan Stanley Research

Source: Morgan Stanley














Path to a Fully AV Society



AV Potential Future Scenarios



AV Future Scenarios Comparison Against Today's Society

	Driverless Nightmare	Driverless Utopia
Safety		
VMT		
GHG Emissions		
Urban Sprawl		
Parking Req'ts	No Change	
Roadway Maintenance Req'ts		
Low Income Mobility		

Current Status of Government with AV

Current Role of U.S. Government

Federal

- Established classification system for various levels of automation of cars
- Research and funding focused on connected vehicles until recently
- Rule-making is delegated to state-level

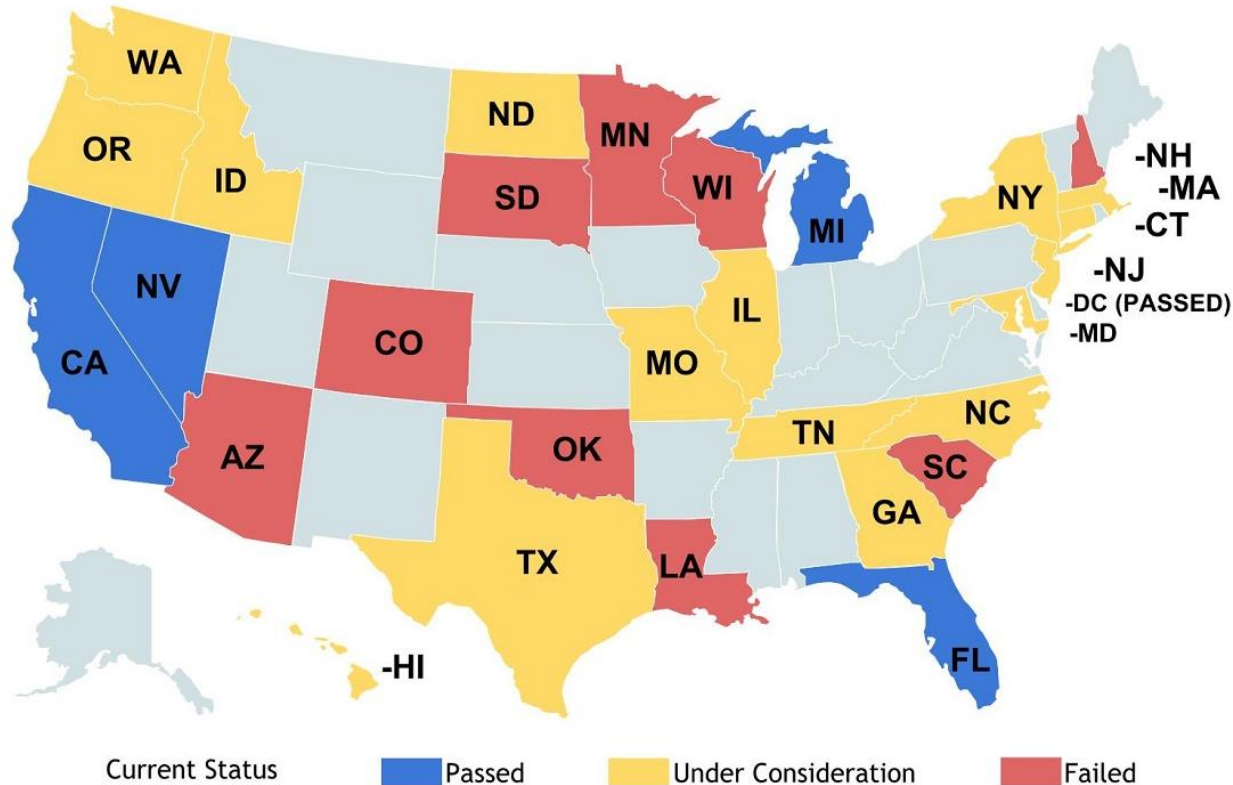
State

- State roles vary significantly. Some have enacted legislation allowing testing and, in some cases, requiring licensing or safety guidance

Local

- Some cities, transit agencies, and other local government organizations are partnering with technology developers to support testing

U.S. States' AV Legislative Update



As of April 2016, California, Michigan, Florida, Nevada, Tennessee, and Washington D.C. have enacted legislation allowing autonomous vehicle testing on public roadways.

Source: http://cyberlaw.stanford.edu/wiki/index.php/Automated_Driving:_Legislative_and_Regulatory_Action

AV Test Sites Involving Local Gov't (Sampling)



Proposed Roles of Government and AV

Proposed Government Role in AV

Federal Role

Update, Establish and Enforce Policies and Regulations

Safety

Privacy/Data Sharing

Cyber Security

Establish and Enforce Standards

Manufacturing

Vehicle Design

Infrastructure

Data/Communications

State and Local Role

Update, Establish, and Enforce Policies and Plans

Mobility

Infrastructure

Transit

Financial





GOMENTUM STATION

Connected Vehicle and Autonomous
Vehicle (CV/AV) Program and Test Facility



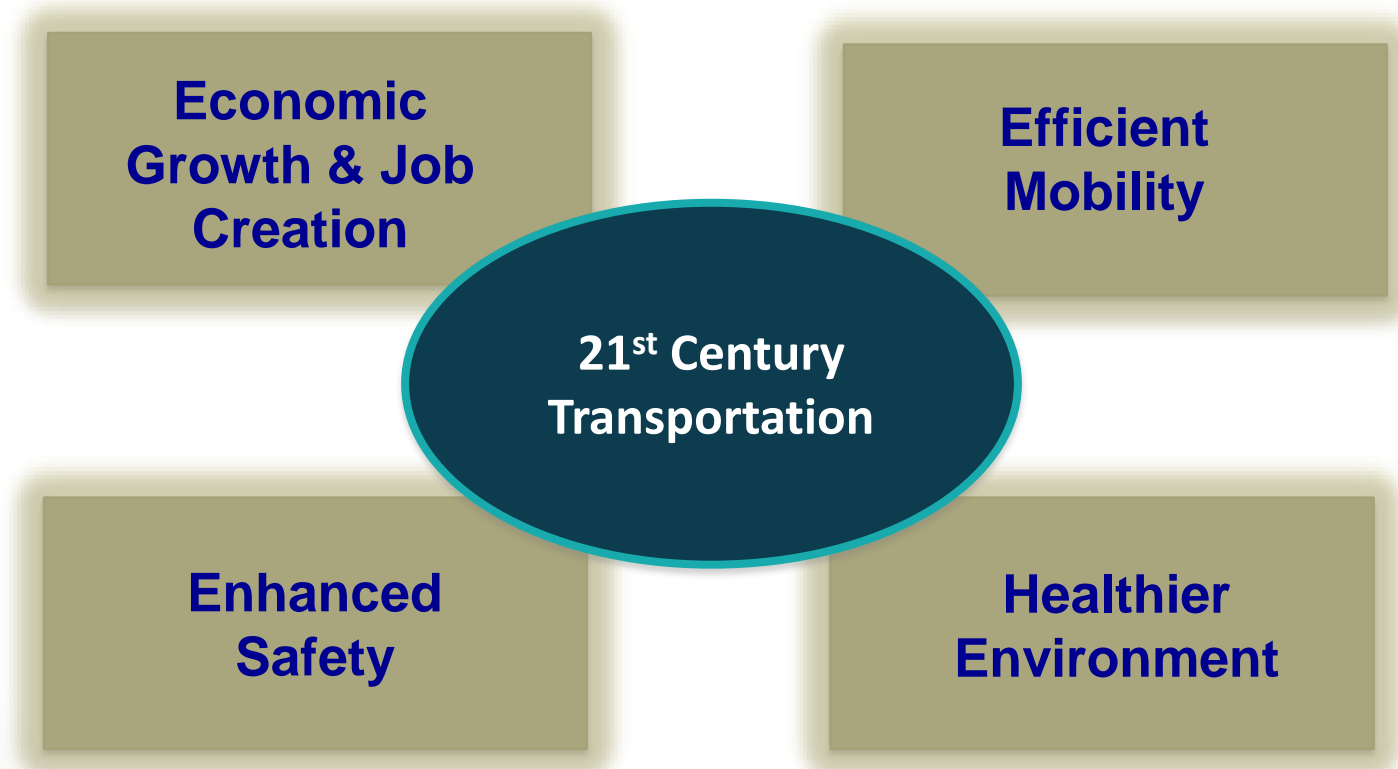
GoMentum Station Program Vision

Create a hub for CV/AV transportation innovation in Contra Costa - called the GoMentum Station Program - where technology, innovation and commercialization converge.

GoMentum Station



CV/AV Program Overarching Goals



1



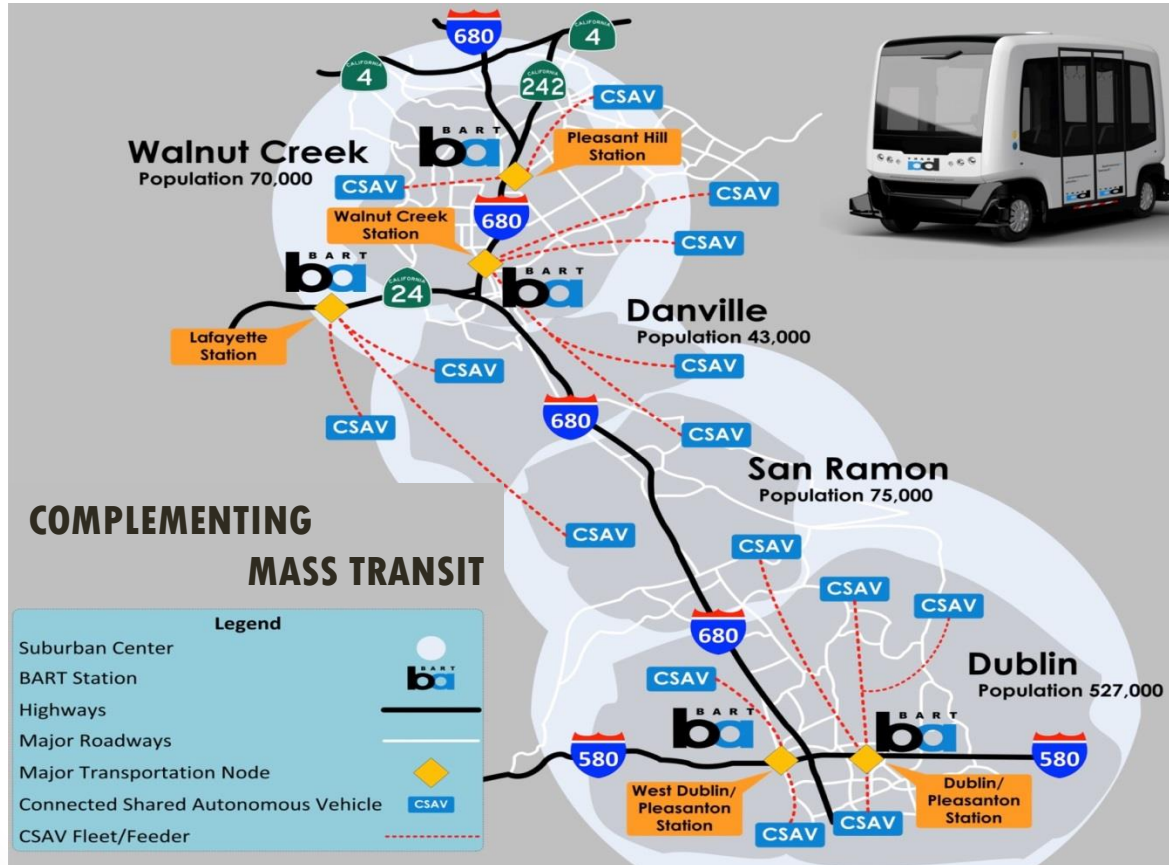
Shared Autonomous Vehicle (SAV)



GoMentum Station and EasyMile announce exclusive agreement to launch Shared Autonomous Vehicles in North America

First Deployment after testing at GoMentum Station will be Bishop Ranch

Complementing Mass Transit



Proposed Actions for State and Local Governments Regarding AV

Local Government Recommendations

- What can be done now?

Stay educated on
driverless vehicles
progress

Incorporate driverless
vehicles into city goals

Establish
communications and/or
coalition with driverless
technology
stakeholders

Support testing
activities

Establish policies and
plans with
consideration for the
future

Encourage open data
sharing



Local Government Recommendations

- Medium (1-2 years) to Long-Term (3-5 years) Recommendations:

Planning

Update travel demand model
Evaluate road capacity needs
Assess transit requirements
Forecast financial implications

Infrastructure Modifications

Update traffic signs and markings
Reduce lane width
Alter speed limits
Adjust traffic signal locations and timing
Eliminate/reduce parking and add more “drop-off/pick-up” locations
Add electric vehicle charging infrastructure
Develop new predictive models for pavement maintenance
Certify roads for driverless and/or manual usage

Miscellaneous

Update enforcement function within the government
Update incident management function within the government
Incorporate driverless vehicle technology into government services
Update government workforce to match needs

Local Government Policy Influencers

Update roadway policies and infrastructure to manage the VMT impact

Adjust land use policies to reduce urban sprawl

Adjust the tax/fee structure to discourage car ownership and/or parking

Alter parking policies to reduce the need for private parking

Change transit pricing

Thank You!

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Twitter: @driverlesslau

Guide: <http://www.wsp-pb.com/en/WSP-USA/What-we-do-USA/Services/All-Services-A-Z/Driverless-Vehicles/>

Blog: www.drivingtowardsdriverless.com

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