

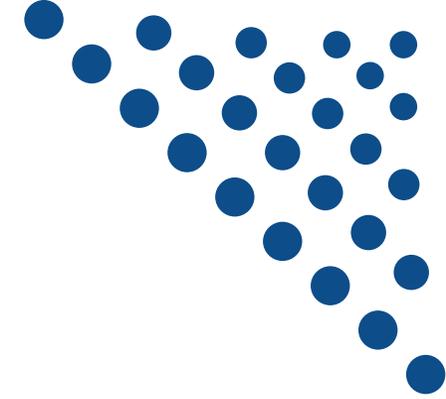
Osher Lifelong Learning Institute, Winter 2026

The Economics of Public Policy Issues

American University

**Host: Geoffrey Woglom, Director
National Economic Education Delegation**

Course Schedule



Economics of Public Policy Issues

- Week 1 (3/02): Economic Update & Tariffs Geoffrey Woglom, Amherst College
- Week 2 (3/09): Trade and Globalization, Mina Kim, NEED
- Week 3 (3/16): Economics of Immigration, Robert Gitter, Ohio Wesleyan University
- **Week 4 (3/23): Autonomous Vehicles, Arkadiusz Mironko, Kean University**
- Week 5 (3/30): Climate Change Economics, Sarah Jacobson, Williams College
- Week 6 (4/06): Health Care Economics, Robert Rebelein, Vassar College
- Week 7 (4/13): Saving Social Security, Geoffrey Woglom

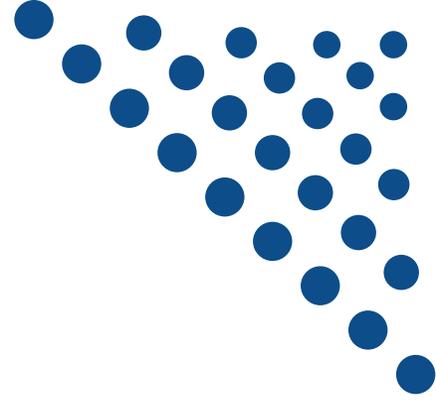


Available NEED Topics Include:

- US Economy
- Healthcare Economics
- Climate Change
- Economic Inequality
- Economic Mobility
- Trade and Globalization
- Minimum Wages
- Immigration Economics
- Housing Policy
- Federal Budgets
- Federal Debt
- Black-White Wealth Gap
- Autonomous Vehicles
- US Social Policy



Submitting Questions



- **Submit questions in the chat or by raising your digital hand.**
 - I will try to handle them as they come up.
- **Short break towards the middle of the talk if needed**
- **We will do a verbal Q&A once the material has been presented.**
- **Slides will be available tonight.**
https://NEEDEcon.org/delivered_presentations.php



OLLI – American University, Washington, D.C.

Driving Change – Autonomous Vehicles' Big Impact

National Economic Education Delegation

Arkadiusz Mironko, Ph.D.

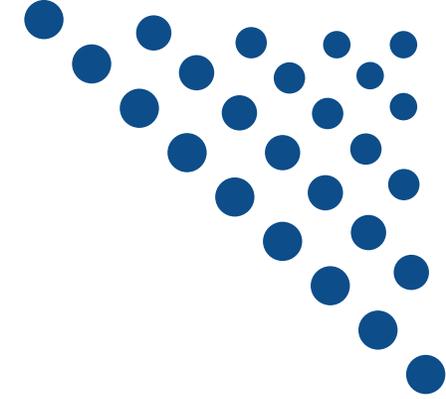
Kean University, College of Business and Public Policy

March 23rd, 2026



**NATIONAL ECONOMIC
EDUCATION DELEGATION**

Credits and Disclaimer



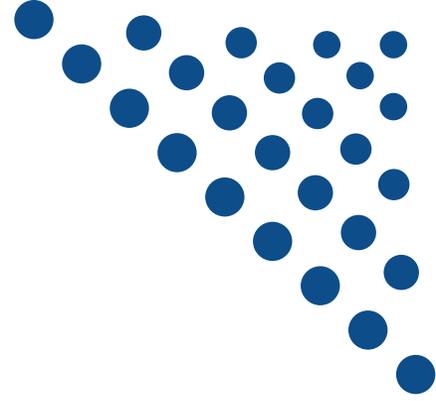
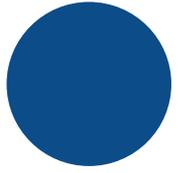
- **This slide deck was authored by:**
 - Jon Haveman, NEED
- **This slide deck was reviewed by:**
 - Ronald Fisher, Michigan State University
 - William F. Fox, University of Tennessee, Knoxville
 - Arkadiusz Mironko, Kean University
- **Disclaimer**
 - NEED presentations are designed to be nonpartisan.
 - It is, however, inevitable that the presenter will be asked for and will provide their own views.
 - Such views are those of the presenter and not necessarily those of the National Economic Education Delegation (NEED).



Outline

- **Where does the AV path lead?**
- **How soon will we get there?**
- **Policy/Planning, Economic/Development Changes**
- **What new business models will emerge?**





All vehicles fall into one of six levels of autonomy as defined by SAE

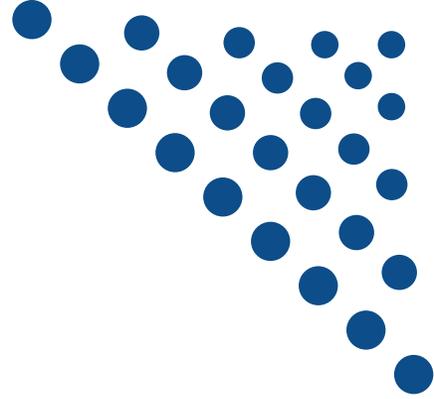
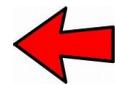
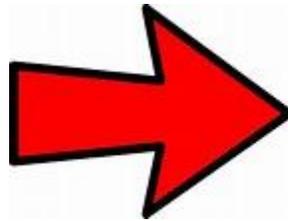
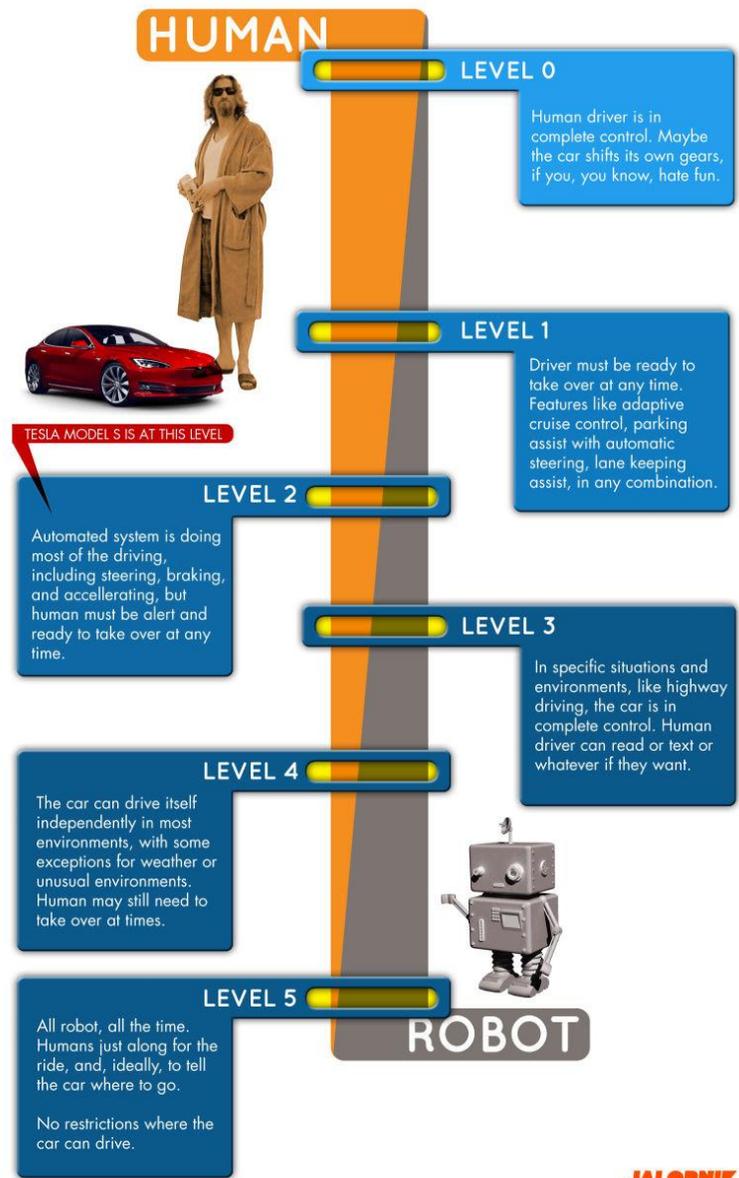




<https://www.freethink.com/hard-tech/driverless-car>

Autonomous Taxonomy

SAE AUTONOMY LEVELS



Copyright © 2021 SAE International. The summary table may be freely copied and distributed AS-IS provided that SAE International is acknowledged as the source of the content.

What does the human in the driver's seat have to do?

SAE LEVEL 0™	SAE LEVEL 1™	SAE LEVEL 2™	SAE LEVEL 3™	SAE LEVEL 4™	SAE LEVEL 5™
You are driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You are not driving when these automated driving features are engaged – even if you are seated in “the driver’s seat”		
You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	

Copyright © 2021 SAE International.

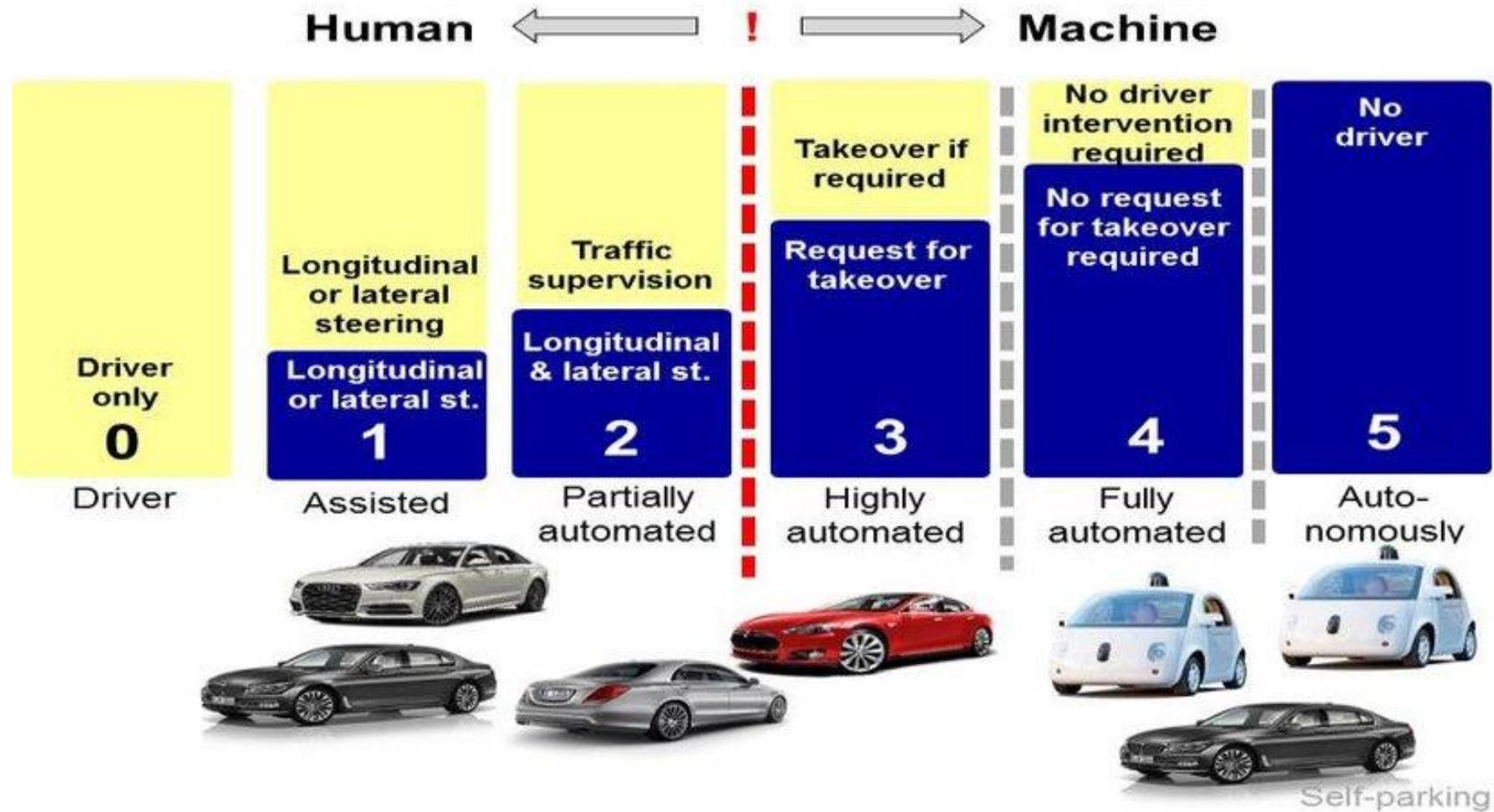
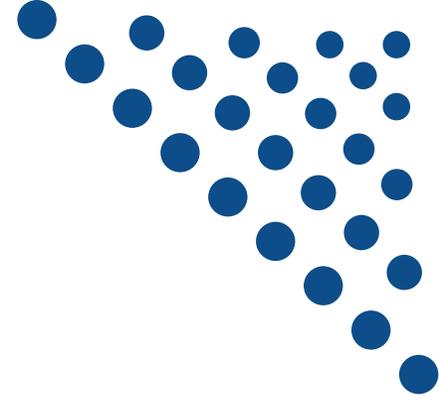
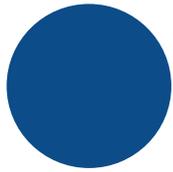
What do these features do?

These are driver support features	These are automated driving features
<p>These features are limited to providing warnings and momentary assistance</p> <ul style="list-style-type: none"> • automatic emergency braking • blind spot warning • lane departure warning 	<p>These features provide steering OR brake/acceleration support to the driver</p> <ul style="list-style-type: none"> • lane centering OR adaptive cruise control
<p>These features provide steering AND brake/acceleration support to the driver</p> <ul style="list-style-type: none"> • lane centering AND adaptive cruise control at the same time 	<p>These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met</p> <ul style="list-style-type: none"> • traffic jam chauffeur • local driverless taxi • pedals/steering wheel may or may not be installed
	<p>This feature can drive the vehicle under all conditions</p> <ul style="list-style-type: none"> • same as level 4, but feature can drive everywhere in all conditions

Example Features

Source: <https://www.sae.org/news/press-room/2018/12/sae-international-releases-updated-visual-chart-for-its-%E2%80%9Clevels-of-driving-automation%E2%80%9D-standard-for-self-driving-vehicles>

Video: <https://youtu.be/zfkDXQ4pS2k>



A TIMELINE TO FULL AUTOMATION



Identifying the Waymo Fully Self-Driving Vehicle

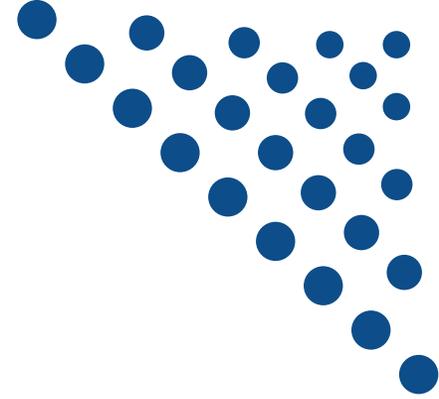
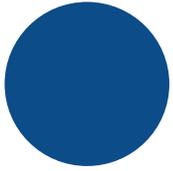
The Waymo fully self-driving Chrysler Pacifica Hybrid minivans can be easily identified by the white color with Waymo logos, roof assembly, front fender additions, or rear roof additions below.

During driverless testing and operation, Waymo's vehicles are fully self-driving at all times, and will not have any person in the driver's seat either steering or otherwise controlling the vehicle.



©2018 Waymo LLC

Page 5

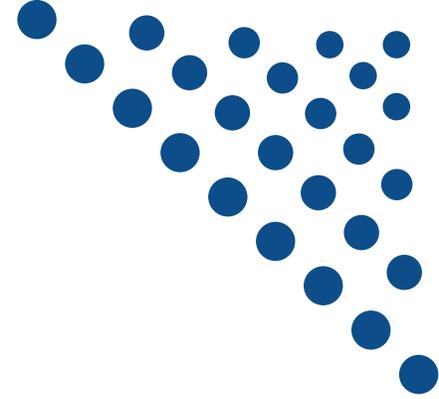
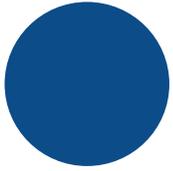


DO NOT DO THIS WHILE DRIVING



Credit: Getty Images / Westend61

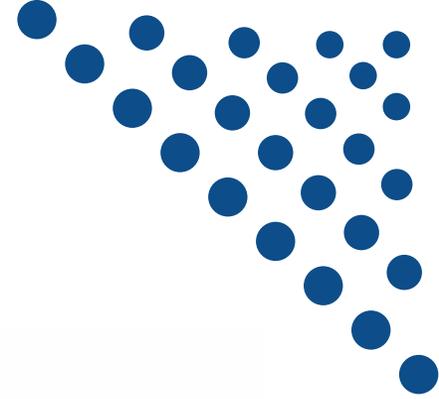
<https://www.verdict.co.uk/fully-self-driving-cars-unlikely-before-2035-experts-predict/?cf-view&cf-closed>



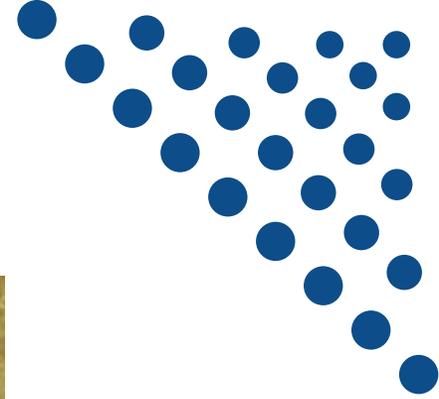
**ALPHABET BACKS WAYMO
IN NEW FUNDING
ROUND VALUING THE
ROBOTAXI COMPANY AT
\$126 BILLION**



Likely future designs



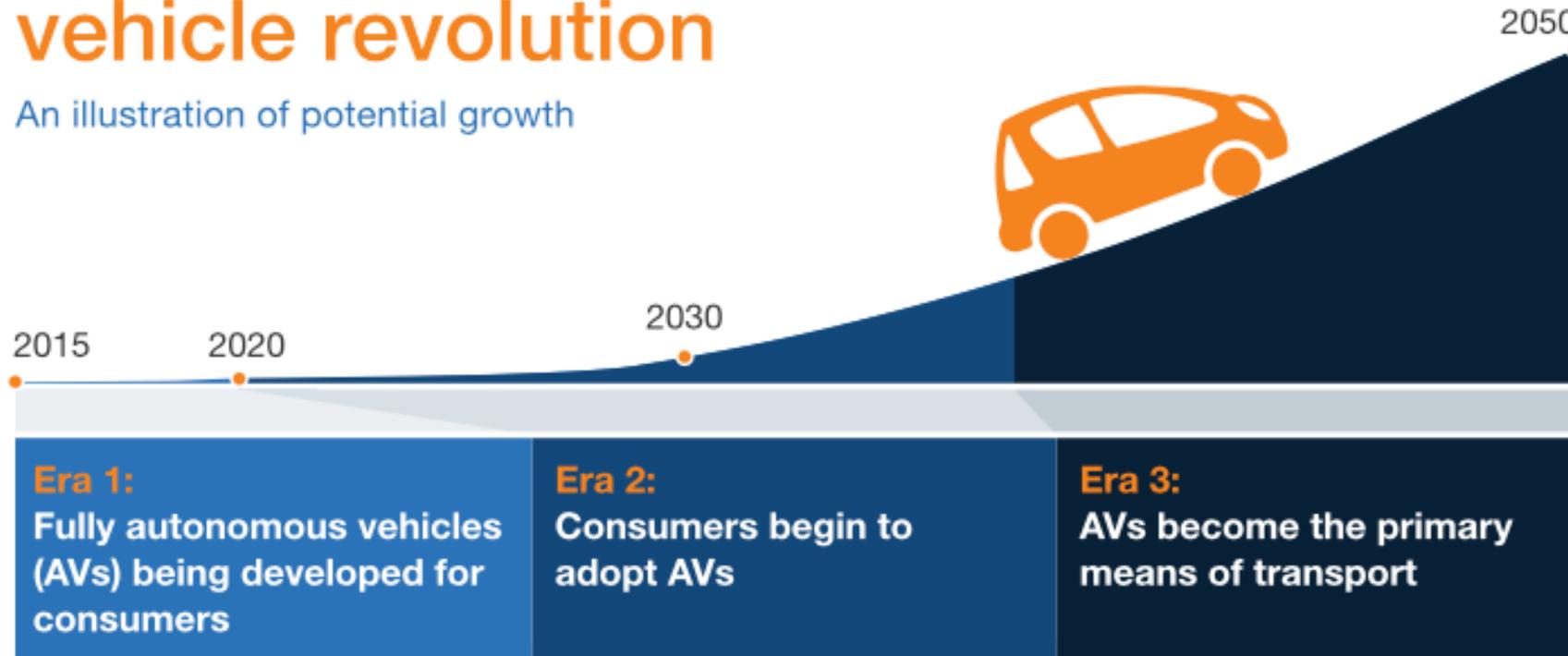
Likely future designs



Projected Growth Path

The self-driving vehicle revolution

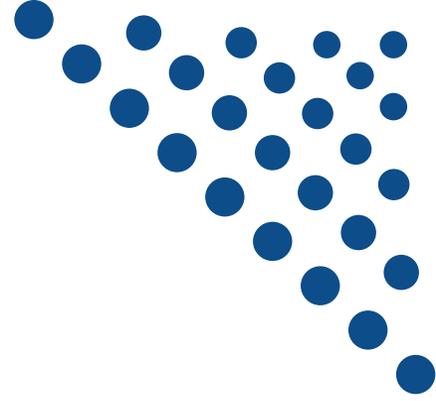
An illustration of potential growth



McKinsey & Company

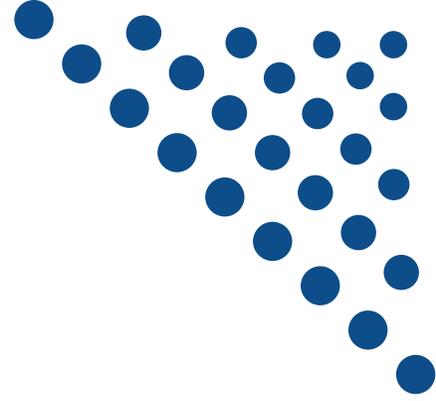


McKinsey isn't Always Spot On



- **"In 1980, McKinsey & Company was commissioned by AT&T to forecast cell phone penetration in the U.S. by 2000.**
 - The consultant's prediction, 900,000 subscribers,
 - was less than 1% of the actual figure, 109 Million."
 - Professor Angel Lozano, 2014

Three Important Questions:



1. **When will Transportation as a Service (TaaS) be available?**
2. **How quick will the transition be?**
3. **What will the future look like?**



WHEN?

What do the headlines say?



NVIDIA to introduce level-4 enabling system by 2018



Audi

Audi to introduce a self-driving car by 2020



Volkswagen

Volkswagen expects first self driving cars on the market by 2019



First autonomous Toyota to be available in 2020

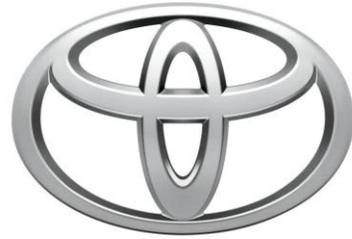


TESLA MOTORS

Elon Musk now expects first fully autonomous Tesla by 2019, approved by 2021



40+ Corporations Working On Autonomous Vehicles



TOYOTA



WAYMO



HONDA



Audi



WHEN?

What do the headlines say?

Forbes Business – Breaking

Elon Musk Predicts Tesla Self-Driving Cars Will Arrive ‘This Year’

Robert Hart is a London-based Forbes senior reporter.

Jul 6, 2023,

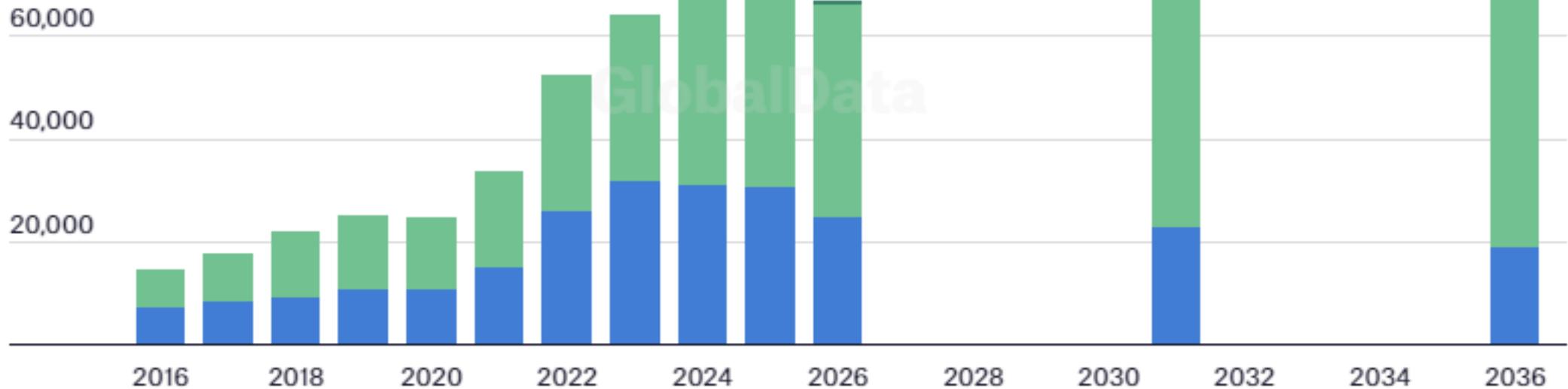
Source: <https://www.forbes.com/sites/roberthart/2023/07/06/elon-musk-predicts-tesla-self-driving-cars-will-arrive-this-year/>



Global autonomous vehicle market volumes by level of autonomy

Vehicle autonomy levels, units in thousands, 2016–36

Level 1 Level 2 Level 3 Level 4 Level 5



Source: GlobalData



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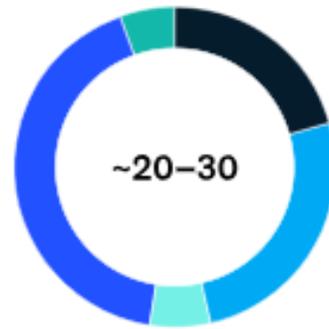
The total value of advanced driver-assistance systems and the autonomous-driving hardware market could reach \$55 billion to \$80 billion by 2030.

Autonomous-driving hardware value pools,¹ \$ billion

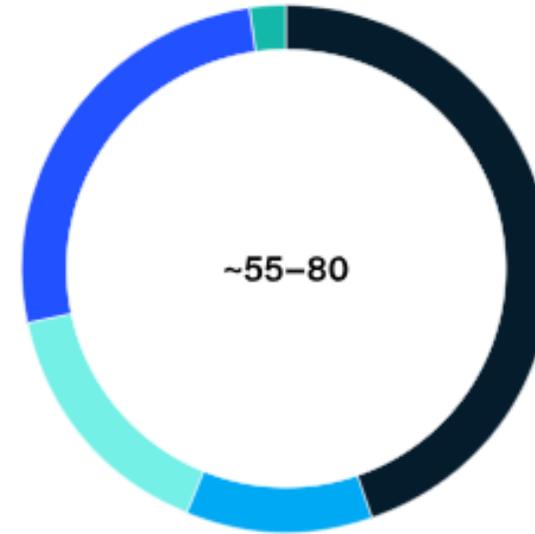
- Domain control unit/electric control unit
- Camera
- Lidar
- Radar
- Sensors safety



2021



2025



2030

¹Estimates are for the passenger car market.
Source: McKinsey Center for Future Mobility

McKinsey & Company



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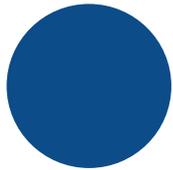
Automakers and Auto Parts Providers

Technology Providers

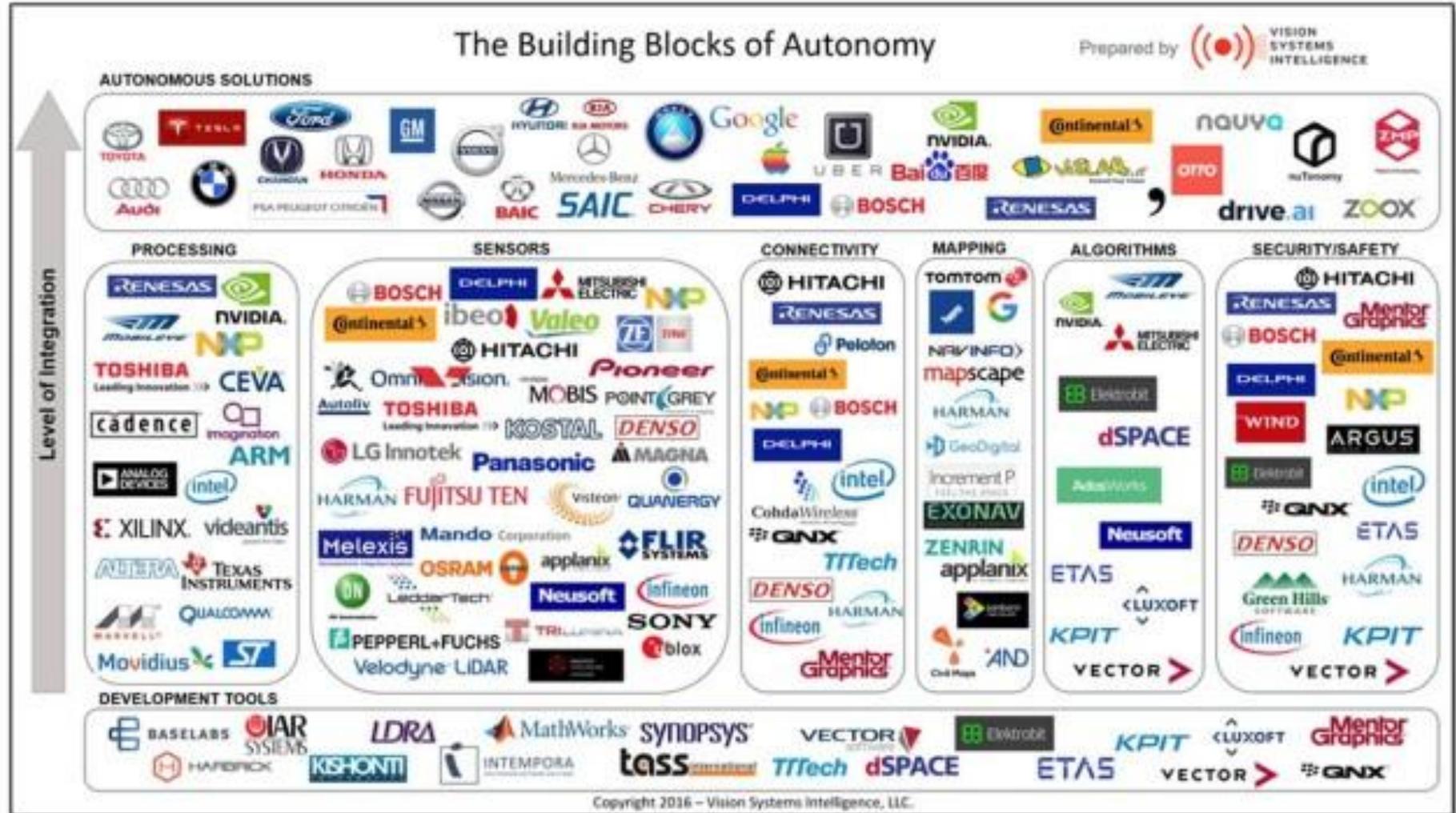
Services Providers

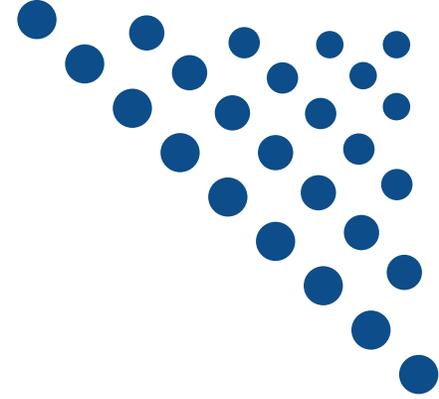
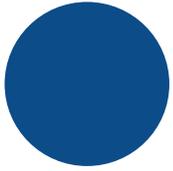
Start-Ups





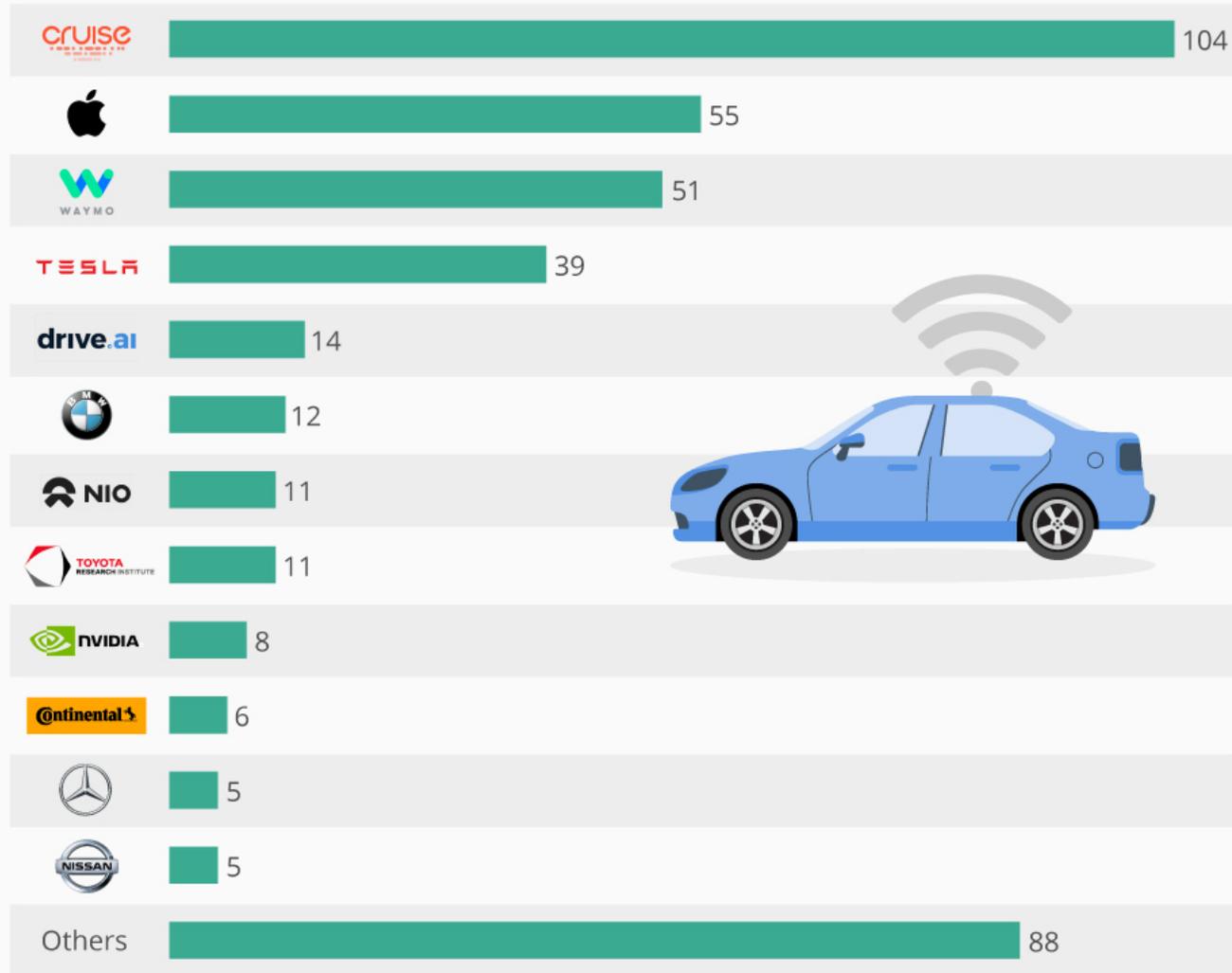
Number of participants is growing

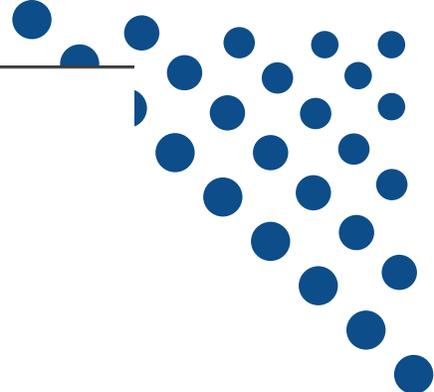
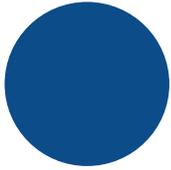




These Companies Are Testing Self-Driving Cars in California

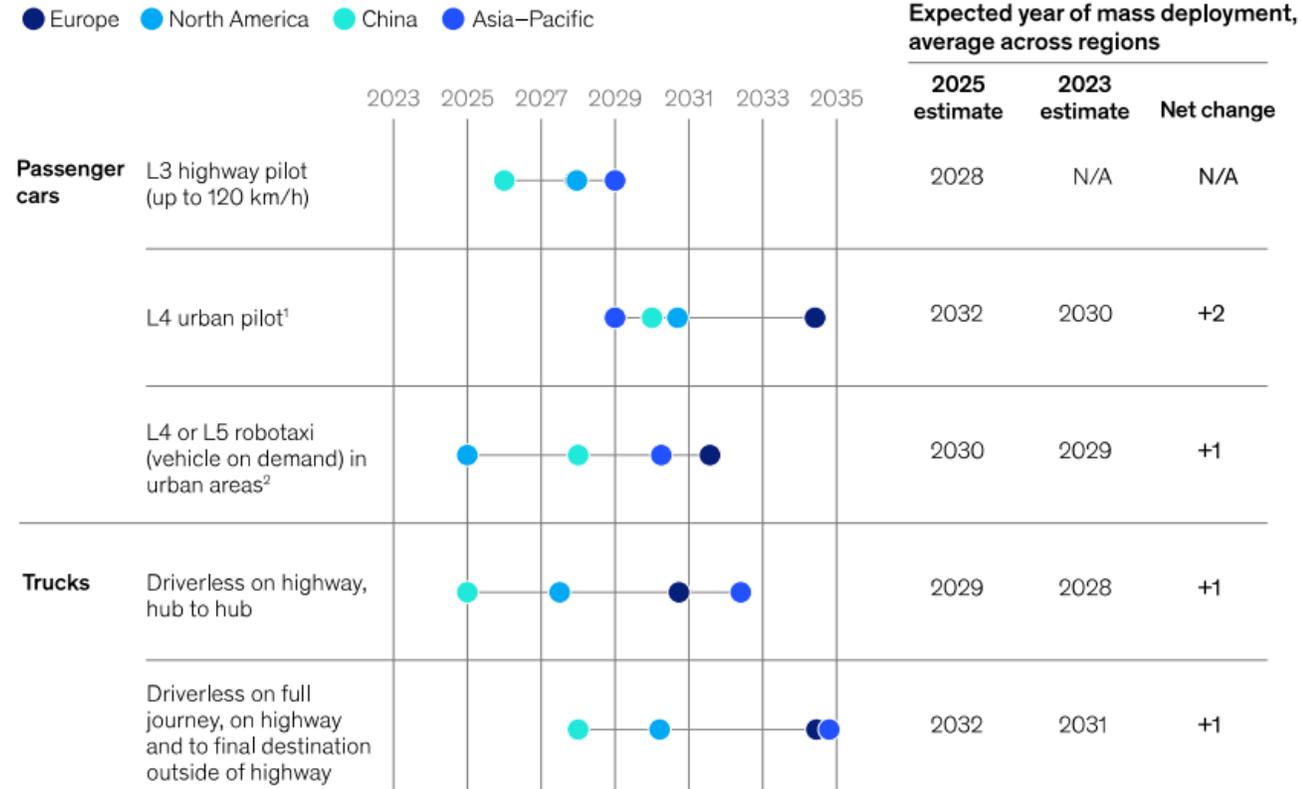
Number of autonomous vehicles registered to be tested on public roads in California*





Although timelines are extending, Level 4 use cases are expected to emerge by the end of the decade, with some variation across regions.

Timeline of Level 4 (L4) use cases expected to emerge by end of decade



Question: In your estimation, what is the rollout (ie, commercial availability of vehicles or service) timeline for autonomous driving across use cases in your region?
¹Driver can use the time on highways in urban environments for work or leisure activities using in-car or own solutions; there might be certain situations in which the driver needs to take over. ²Robotaxis are driving everywhere in fully automated mode with no driver and are accepting and conducting transportation requests (eg, goods, passengers). Passengers can use the travel time for work or leisure activities.
 Source: McKinsey Center for Future Mobility survey of global decision-makers, 2025 (n = 91; 43 from Europe, 35 from North America, 5 from China, 7 from Asia-Pacific, 1 from other)

WHEN?

What is possible?

- **By 2026 (?)**
- **Potentially 95% of VMT by 2035.**
 - Last 5% may be very difficult to achieve.
- **Is this possible?**
 - Horses to cars: 10 years – early 1900s
 - But adoption of EVs is so slow!
 - Range anxiety and sticker shock.
 - Adoption of AVs will be rapid.

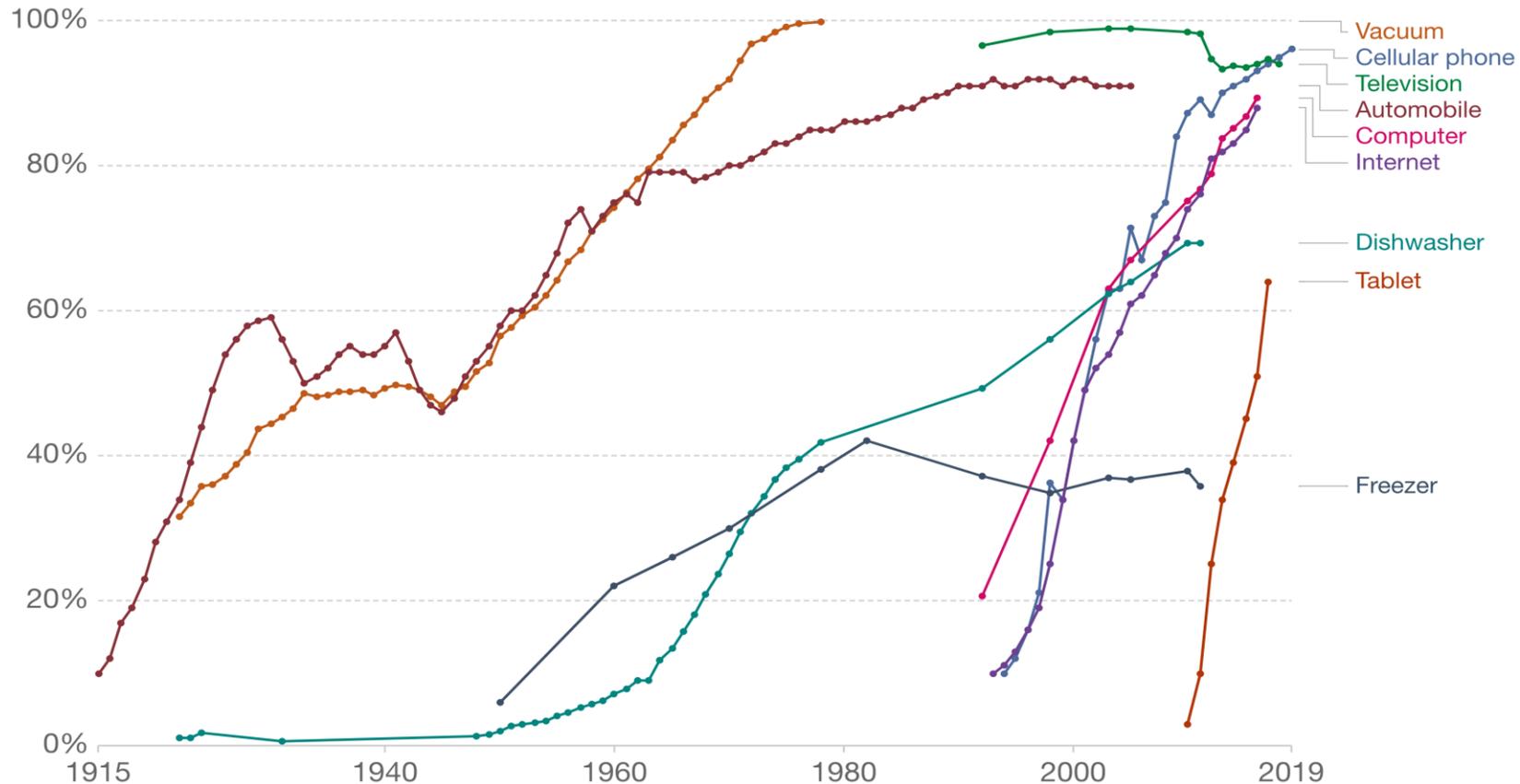


Rate of Technology Adoption – Faster!

Technology adoption in US households, 1915 to 2019

Technology adoption rates, measured as the percentage of households in the United States using a particular technology.

Our World
in Data



Source: Comin and Hobijn (2004) and others

OurWorldInData.org/technology-adoption/ • CC BY

Note: See the sources tab for definitions of household adoption, or adoption rates, by technology type.



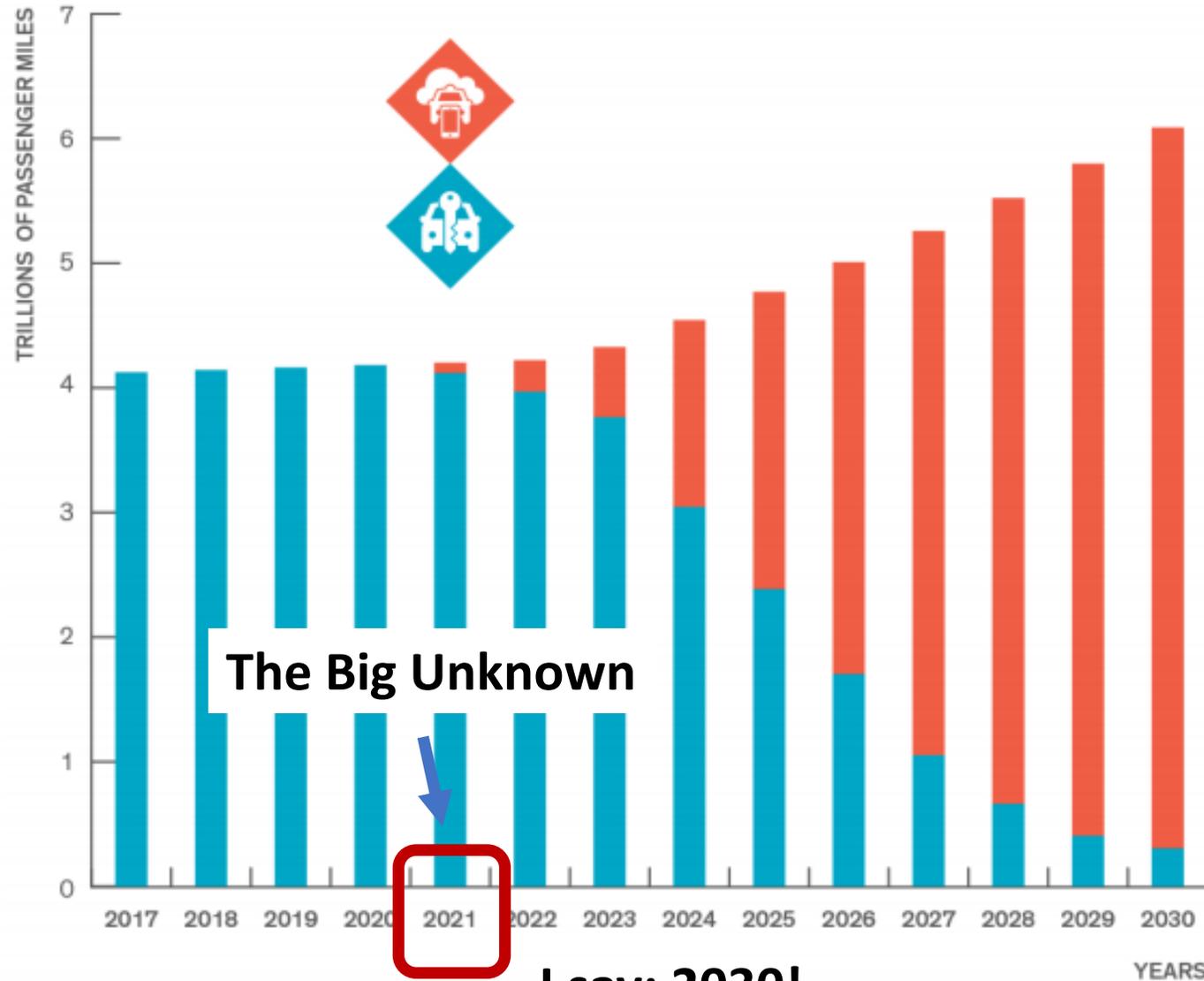
Forecast

Timing may be off.

But the point is:

RAPID ADOPTION!

» *Speed of TaaS adoption*



Waymo's self-driving cars are now available on Lyft's app in Phoenix

Lyft and Motional's all-electric robotaxi service is now live in Las Vegas

Singapore's self-driving cars can now be hailed with a smartphone

NuTonomy joins forces with 'the Uber of Southeast Asia'

~~**Cruise is now charging for rides in its driverless vehicles in San Francisco**~~

Waymo is (was?) Exploring New York City!



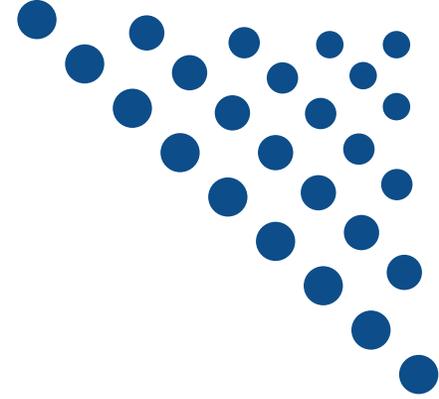
New York
City



Image courtesy of Waymo



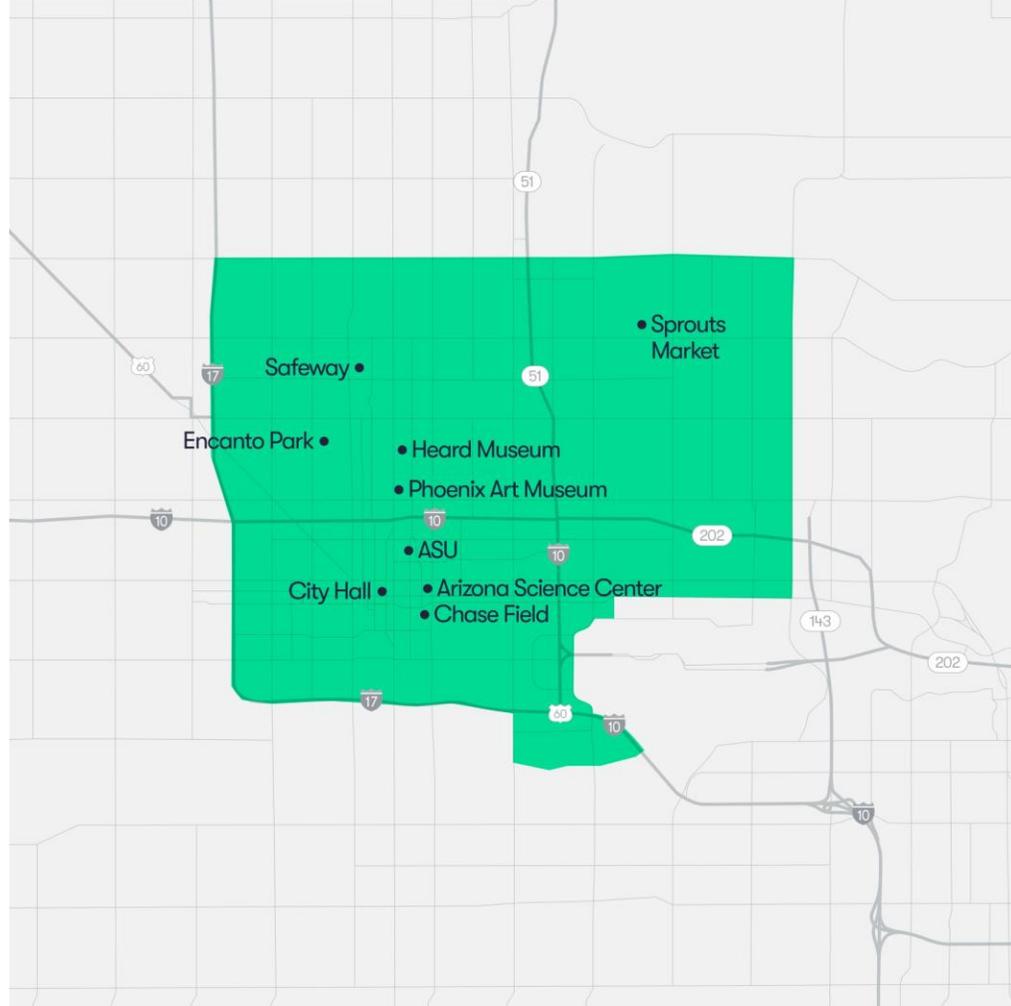
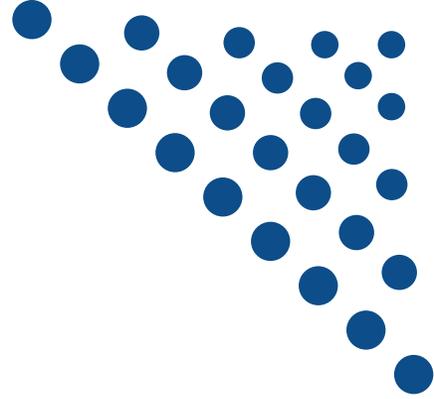
Fee For-Service Autonomous TaaS



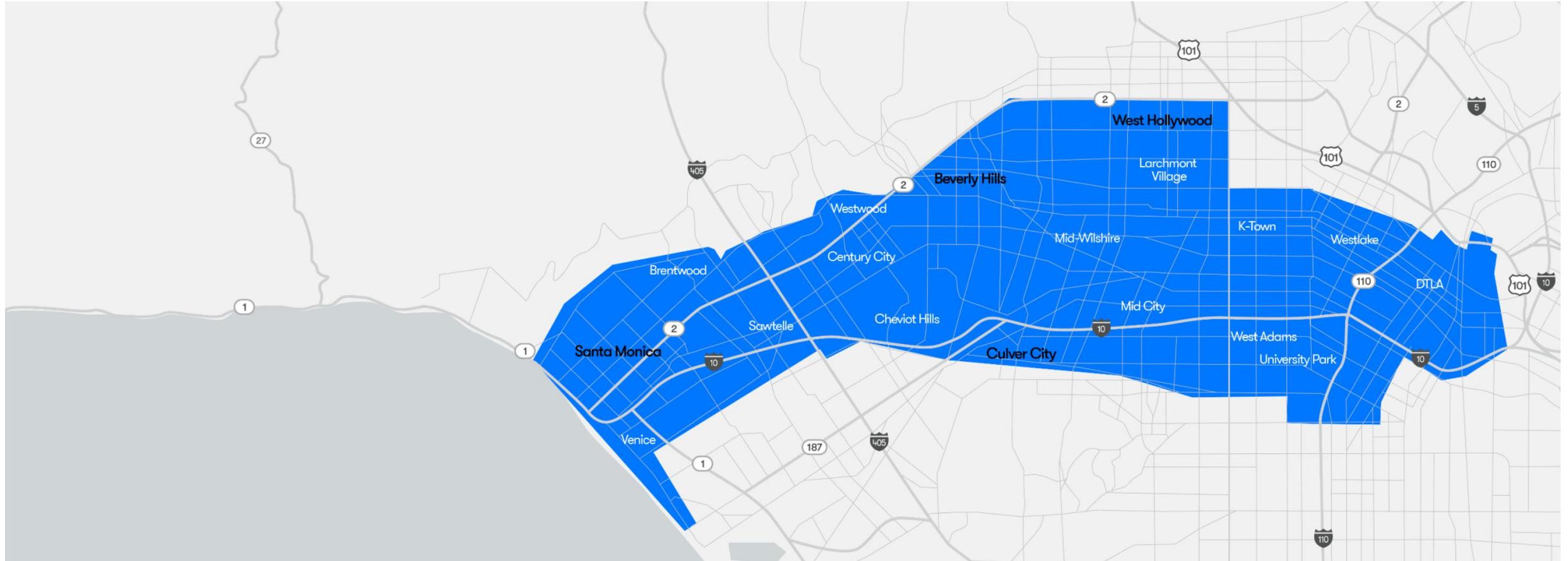
- **Waymo: Charging for rides in SF , LA, and Phoenix**
- **Motional: Las Vegas**
- **Arlington, TX: Minibuses – Milo and Drive.ai**
- **More are surely coming soon....**



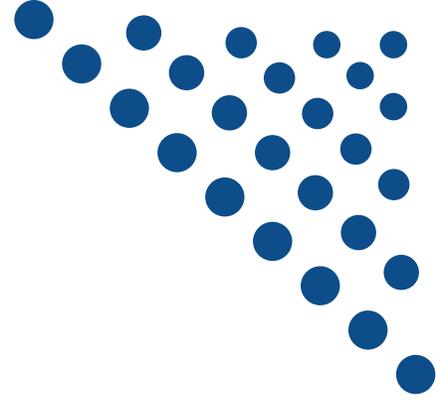
Waymo is Exploring Phoenix, AZ



Waymo is in Los Angeles, CA



Trucking – Highly Fertile Ground



- **Long haul trucking is likely the first place we will see it adopted.**
 - Reduces costs associated with drivers.
 - End run around limits on hours of driving.
- **Where does it stand?**
 - Lots of trials underway.
 - TuSimple – actively building a long haul network.
 - Waymo – focused more on last mile/local delivery.



TuSimple Current and Future Routes (Level 4)



44 states
allow autonomous semi-truck testing

26 states
allow autonomous semi-truck commercial deployment

50 states
cohesive AV operations framework laid out in US DOT 4.0 AV Regulations

the Autonomous Freight Network (AFN)

The most rigorous independent assessment ever undertaken on an automated driving system



700+ safety portfolios. One uncompromising safety ecosystem. Gatik's framework redefines what it means to be safe by design.

 ORGANIZATIONAL SAFETY CULTURE

 ENGINEERING QUALITY
(functional, behavioral and operational safety)

 VEHICLE SAFETY

 CYBER SECURITY

 SAFETY CASE CONFORMITY TO UL4600 AND OTHER INDUSTRY STANDARDS

FREIGHT-ONLY READINESS MEASURE (FRM)

01

Autonomy Readiness Measure (ARM)

Autonomy software ready and validated for the Operational Design Domain.

02

Platform Readiness Measure (PRM)

Commercial-ready vehicle platform including redundancy and hardware reliability.

03

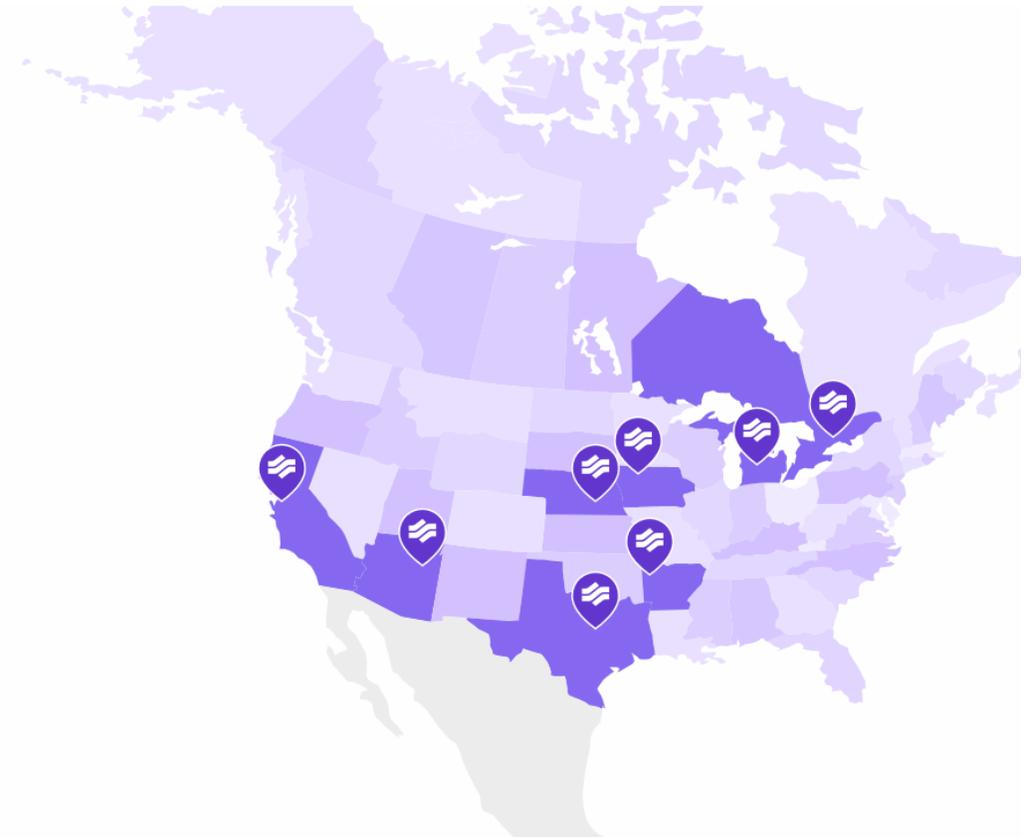
Operational Readiness Measure (ORM)

Comprehensive operational safety & preparedness for Freight-Only deployment.

<https://gatik.ai/about/>

Our locations

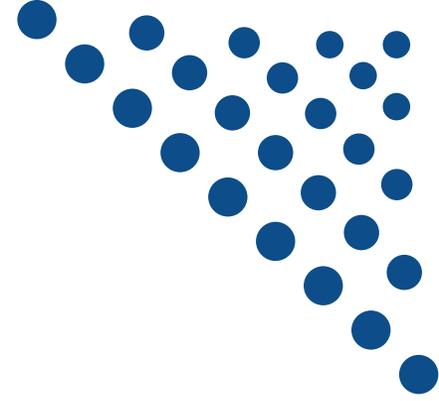
- California, US
- Michigan, US
- Arkansas, US
- Nebraska, US
- Texas, US
- Arizona, US
- Ontario, Canada
- Iowa, US



Actively Pursuing Autonomous Local Delivery

- Dominos
- Walmart
- Amazon
- CVS Pharmacy
- Stop and Shop
- Postmates
- Kroger





What will the future look like?



This:



But, will it be:

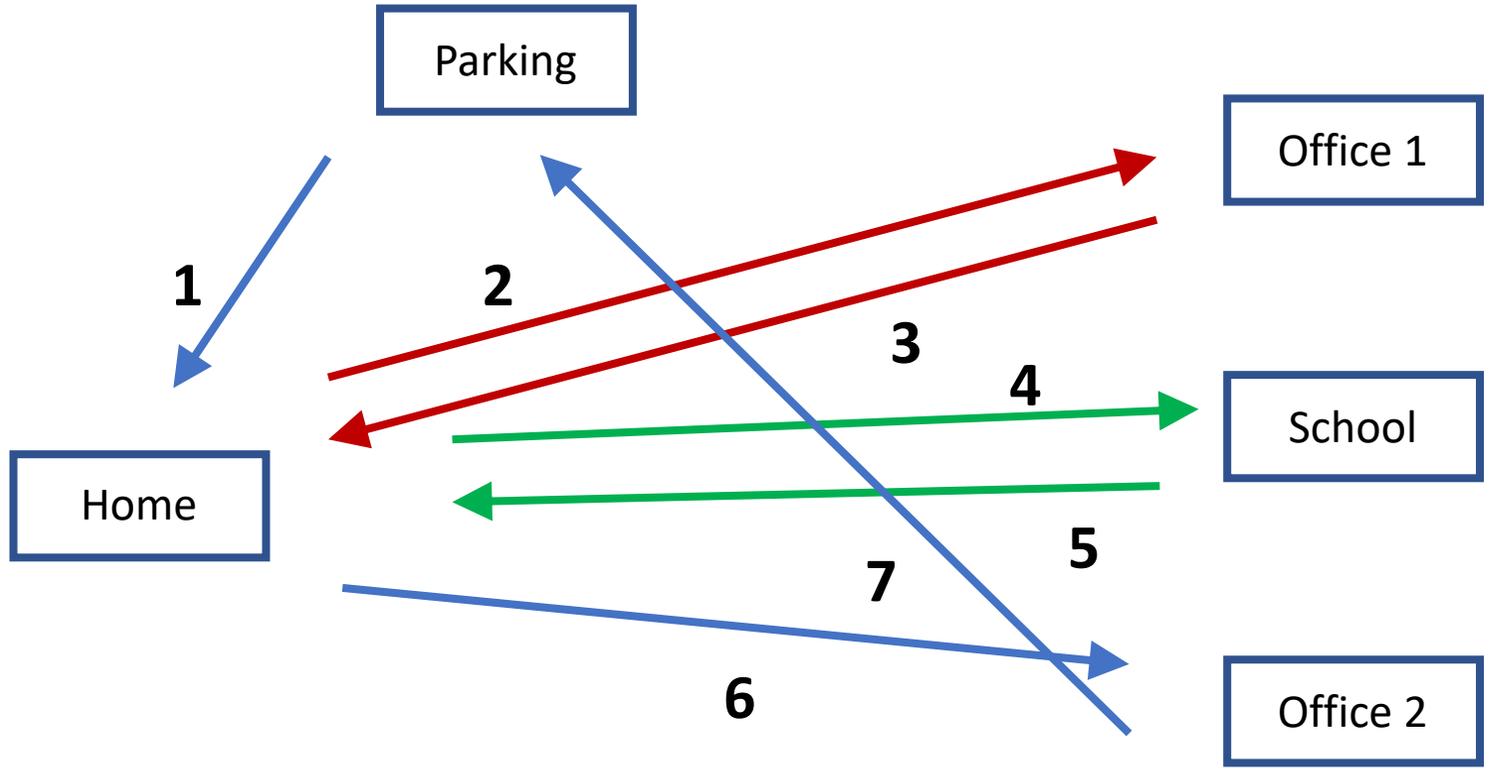


Hell

- **Primarily individual private car ownership**
 - Much as today.
- **Internal combustion engines**
- **Why Hell?**
 - Dramatically increased VMT and pollution.
 - Potentially increased congestion.
 - Parking



Two Adults and a Child: Morning Miles



And this is just the morning.....

Heaven



- **Vehicle ownership will be very limited**
 - Private ownership for those with specialized vehicle needs.
 - Fleet ownership will serve everybody else.
- **Engines: electric**
- **Insurance: product liability**
- **Not clear when we will get there, but this is the likely model.**
 - 2030 for widespread adoption in many regions.



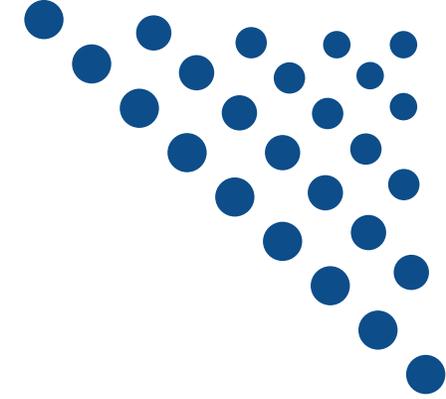
Figure 2: Attitudes of working families with children, who are interested in self-driving cars



Source: Ericsson ConsumerLab Analytical Platform, 2016

Base: 23.040 smartphone owners who used internet on a smartphone on a monthly basis, aged 15–69 across 27 countries

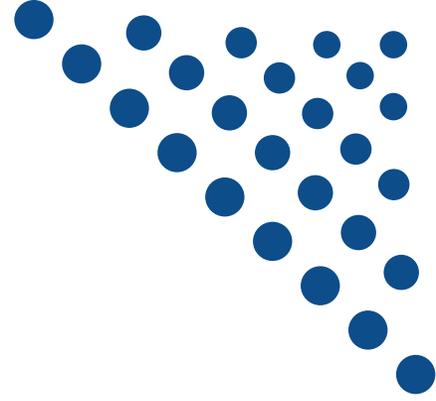
Why is this Heaven?



- **Not only autonomous, but:**
 - Shared
 - Connected
 - Green
- **Far fewer cars in existence.**
 - Better resource utilization: steel, rubber, aluminum, and land!
- **VMT could go up or down, but more productive than in Hell.**
- **Congestion effects – unclear, but likely reduced.**
 - Right-sized vehicles, platooning, sharing, V2V communication
- **Minimal (lower) need for parking.**



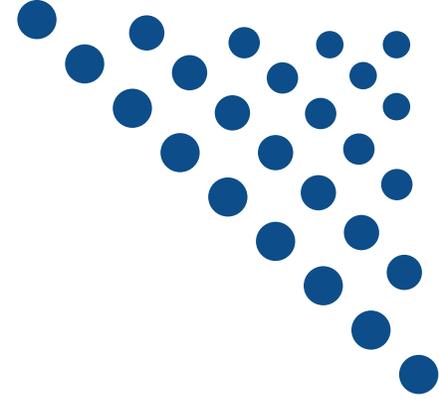
Transition



- **Short term: Tesla model of highway autonomy**
 - Level 2, adaptive cruise control
- **Medium term:**
 - short period of personal vehicle ownership with level 3 capability
 - introduction of independent private fleets – Uber, Lyft, Google, nuTonomy, etc., with level 4/5 capability
- **Long term:**
 - Personal vehicle ownership is largely a thing of the past



Economics Drives Transition: Private



- **Adoption dividend for private individuals**

- Eliminate car ownership
 - Ave annual cost of owning a car: \$12,182 (2023)
 - Cost per mile will fall: \$0.72 to \$0.19
- Repurpose your garage
 - \$50,000 from transition to bedroom

Average Ownership Costs Per Mile

Miles per Year	10k	15k	20k
Average Cost	76¢	72¢	70¢

- **Time recovery (pre-pandemic)**

- 50% of the SF Bay Area workforce has a commute in excess of 30 minutes.



Economics Drives Transition: Public

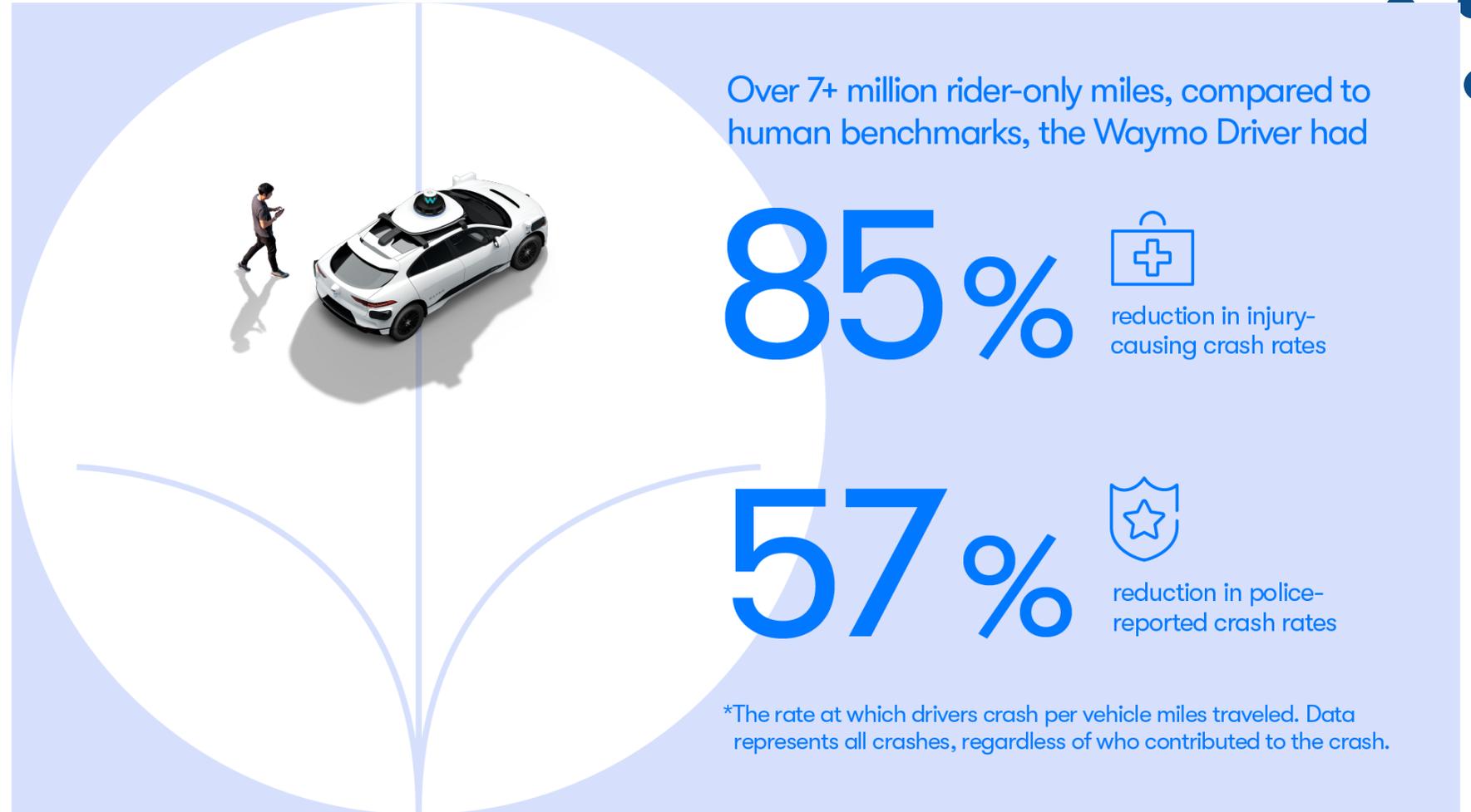
- Economic and social costs associated with human drivers are enormous:
 - ACCIDENTS:
 - Drive 25% of congestion.
 - Result in 40,000 deaths.
 - And 2 million injuries.
 - 90+% caused by human error.
 - Increased productivity from not driving.
 - Costs of human drivers estimated at up to \$1.3 **TR**illion each year

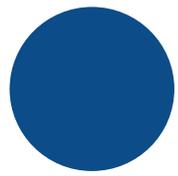


Human drivers vs AVs

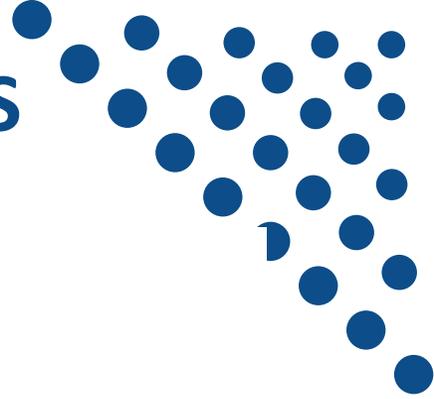
“Waymo significantly outperforms comparable human benchmarks over 7+ million miles of rider-only driving”

Source:
<https://waymo.com/blog/2023/12/waymo-significantly-outperforms-comparable-human-benchmarks-over-7-million/>

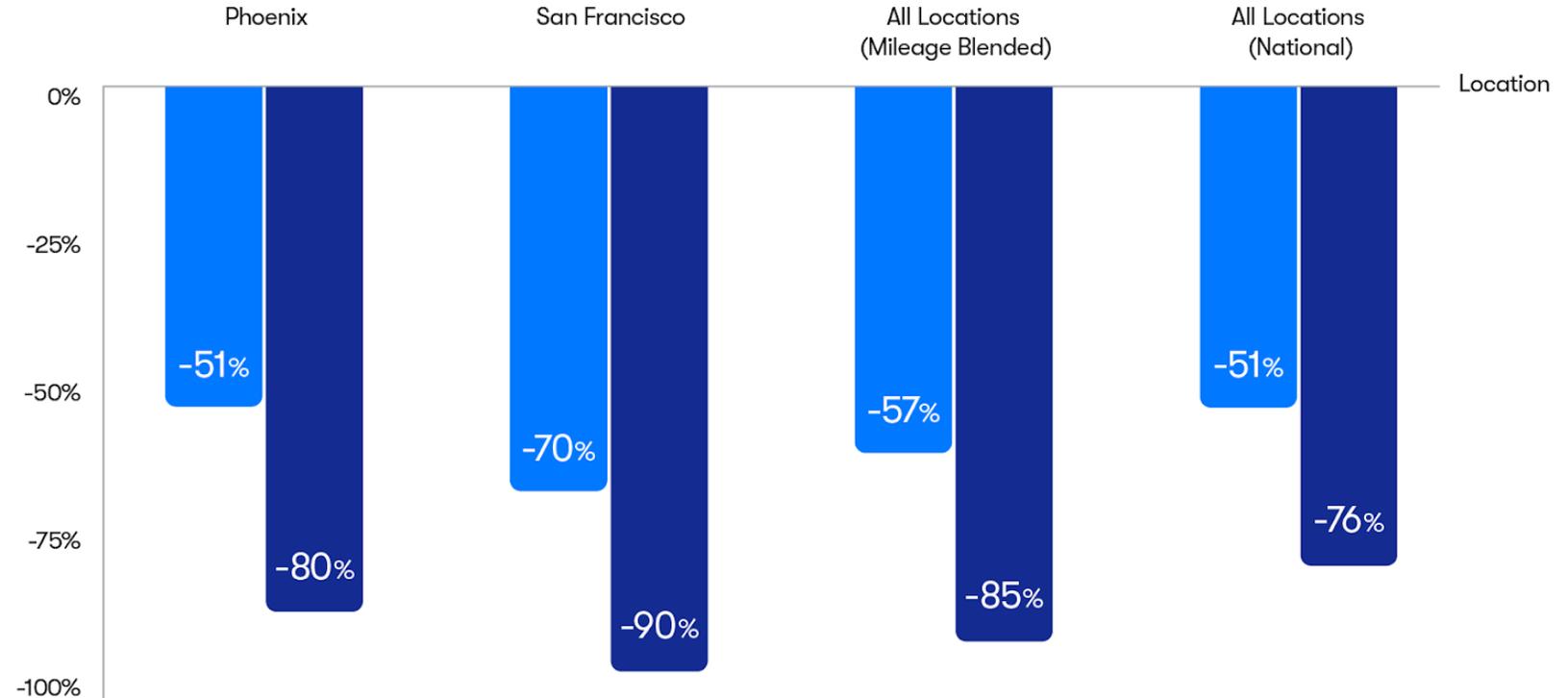




WAYMO DRIVER INVOLVED IN SIGNIFICANTLY LESS CRASHES



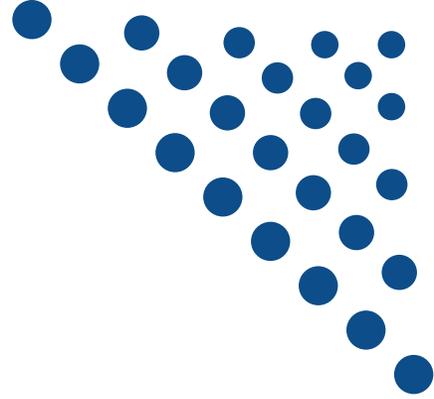
Waymo % Change for Police / Injury-Reported Rate



Benchmark Source ■ Police-Reported ■ Any-Injury-Reported

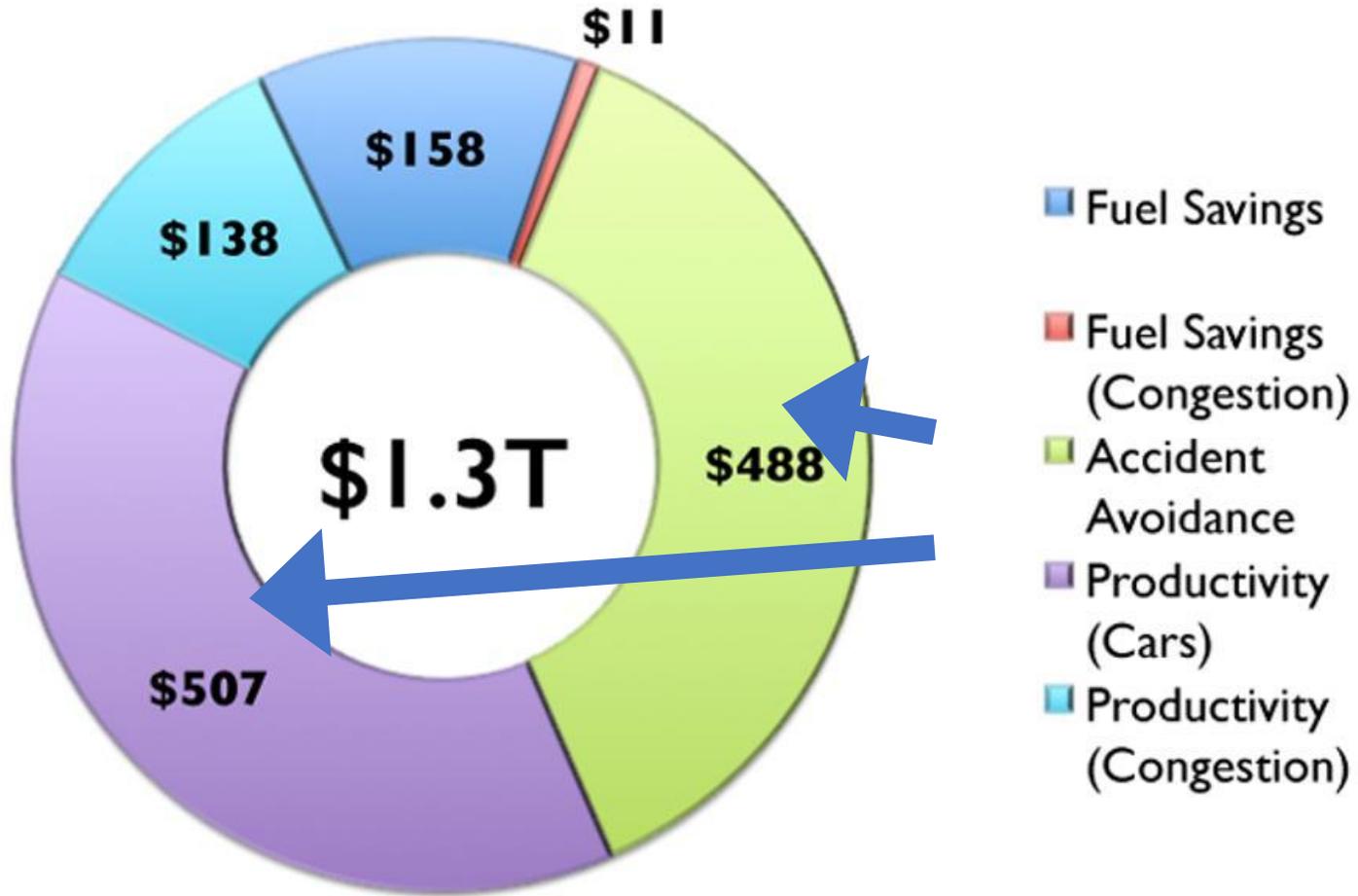


Safety and Productivity



Potential Savings

Potential US Savings (\$B)

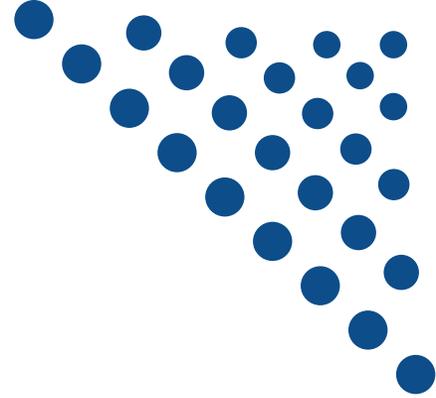


Public Policy/Planning Issues

- **Government buy-in:**
 - Essential – gov't must encourage progress
 - Difficult – because of displacement issue
- **Important transitional issues:**
 - What infrastructure should be developed?
 - What to do about public transportation?
 - What to do with all of the parking spaces?



Planning



- **Respond to the coming changes**

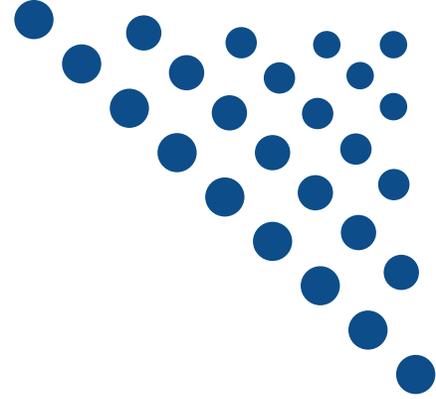
- The planning horizon for any investment in transportation infrastructure based on today's predominant technology has changed.
 - It may have gotten **MUCH shorter**.

- **Encourage the changes to happen more quickly**

- Mobility, safety, productivity, and environmental benefits abound.



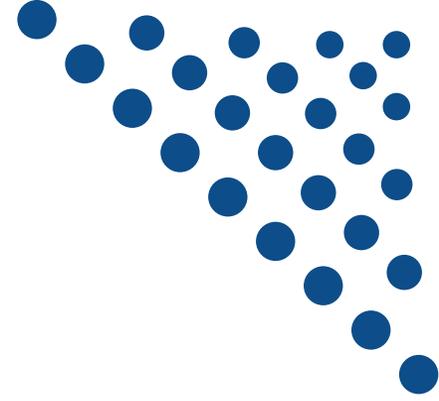
Responding to the coming changes:



- **Transportation organizations must develop a forecast for adoption in their specific geography**
 - San Francisco – faster than Chicago
 - Chicago – faster than Fresno
 - Fresno - faster than Kansas
- **How does this affect the ROR calculation on projects?**
 - Highway expansion? Public Transportation?



Encourage Change



- **Mobility and equity considerations**
 - Elderly/disabled/impooverished
- **Safety:** only way to reduce traffic fatalities is by coordinated effort
- **Productivity:** reduced congestion
- **Environment:** speed transition to electric vehicles

These are all societal benefits that come about too slowly if the private market is left to itself.



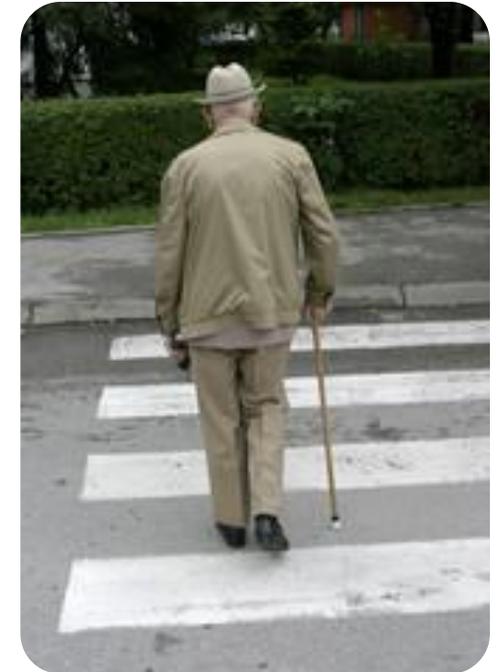
Mobility and Equity

- **Mobility**

- Handicapped
- Elderly
- Lower income

- **Equity**

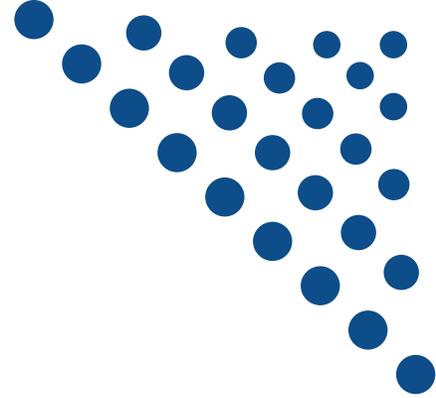
- Public Transportation often does not work well for low-income workers/residential workers
 - Does not go from residential to residential, but from residential to commercial



Environment



Environmental Implications Depends: Heaven or Hell

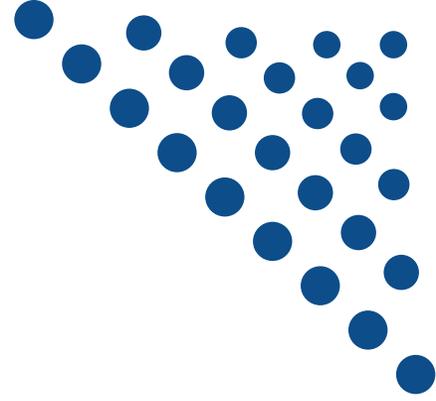


- **Improved resource utilization**
- **More efficient travel**
 - Right sized vehicles
 - Optimized routes
 - Reduced congestion
 - No searching for parking
- **Increased VMT**
- **Cleaner technologies**
 - Electric
 - Lighter vehicles
- **Energy use of onboard electronics**
 - Weight and functional
- **Increased urban sprawl**

Bottom line: push governments at all levels to embrace and to implement policies deterring private vehicle ownership and zero passenger miles



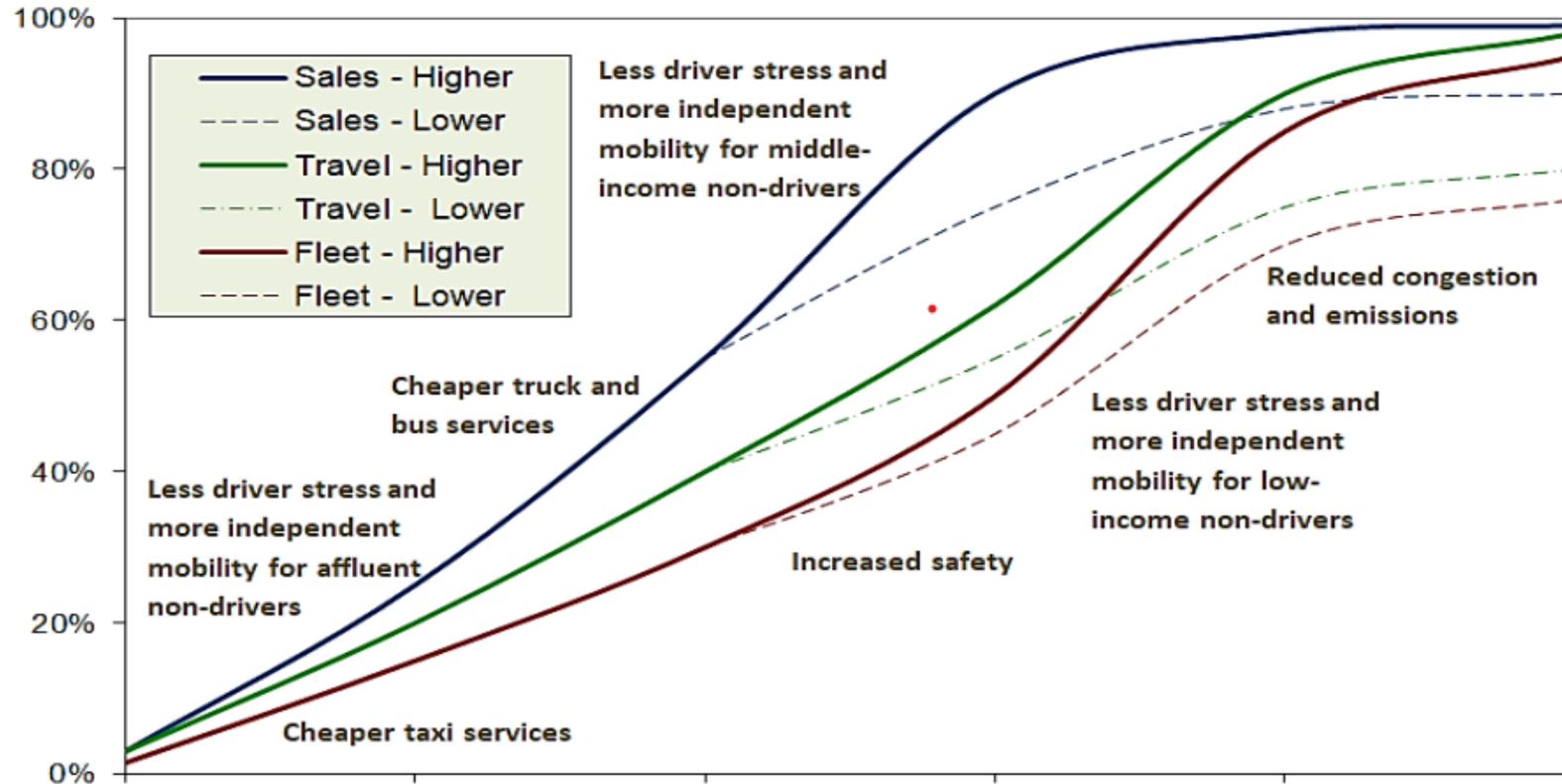
Incentives Through Policy and Planning



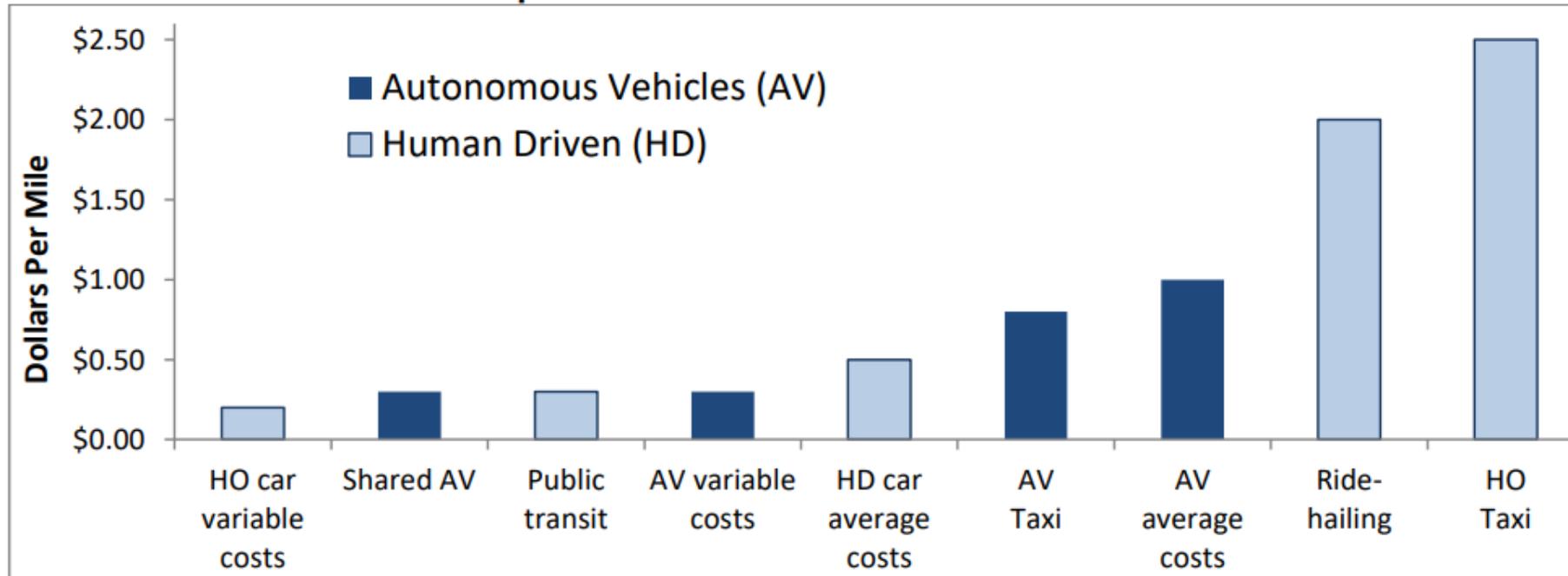
- **Allow vehicles equipped with ACC into HOV lanes**
 - Eventual conversion of HOV lanes to ACC/AV lanes
- **Allow ACC/AV equipped vehicles to travel faster in HOV lanes**
- **Subsidize ACC/AV upgrades**
 - Arguably more concrete benefits than electric vehicles
- **Sticks: higher costs of vehicle ownership**
 - Registration fees, VMT taxes, etc.



Autonomous Vehicle Sales, Fleet, Travel and Benefit Projections



Cost Comparison



Autonomous vehicles (AVs) are likely to cost more than human-operated (HO) private vehicles and public transit, but less than human-driven taxis and ridehailing services.



Autonomous Vehicle Equipment and Service

Requirements

Shared Autonomous Vehicles

- Dispatching and fleet management.
- Business administration and insurance.
- Business profits.
- Security.
- Frequent cleaning and repairs.
- Delays and empty vehicle-miles for passenger loading.

All Autonomous Vehicles

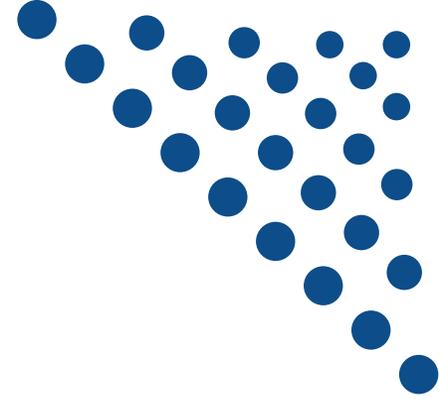
- Sensors (optical, infrared, radar, laser, etc.).
- Automated controls (steering, braking, signals, etc.)
- Software, servers and power supplies.
- Data networks to access special maps, software upgrades, plus vehicle-to-vehicle connections.
- Software and navigation map update subscriptions.
- Critical component maintenance, repair and testing

Autonomous vehicles, **particularly those that are shared**, will incur additional costs.

Source: <https://www.bilbloggen.dk/wp-content/uploads/2023/04/Autonomous-Vehicle-Implementation-Predictions.pdf>

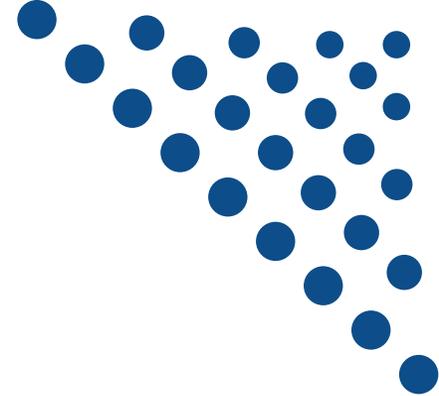
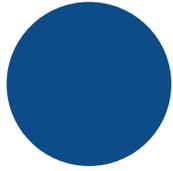


Interim Summary



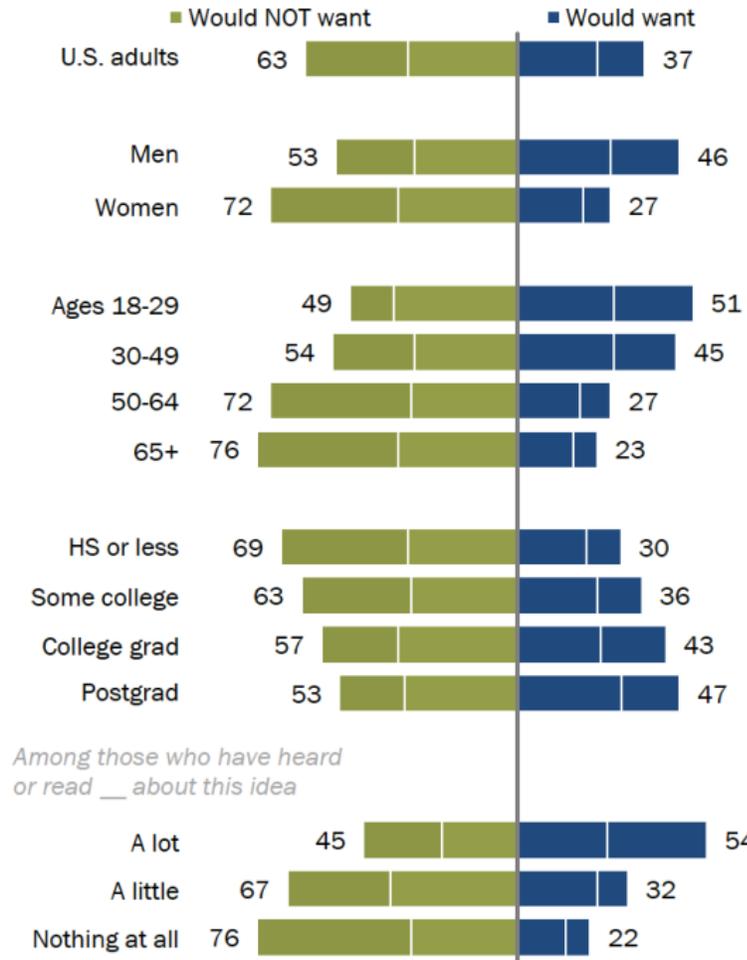
- **Transition is coming very quickly!**
 - Most reports are extremely conservative
 - Apply generally, but faster in many regions.
- **Very important to start incorporating AVs into planning now.**
 - To realize the benefits of AVS.
 - Sacrifice expansion for maintenance.





Majority of Americans say they wouldn't want to ride in a driverless vehicle, but men, adults under 50 and those with a college degree are more open to the idea

% of U.S. adults who say they definitely or probably ___ to ride in a driverless passenger vehicle if they had the opportunity

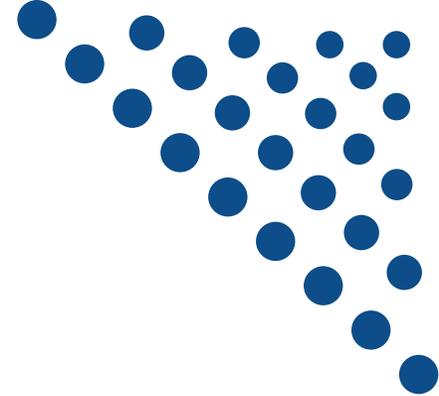
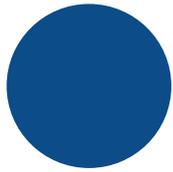


Note: Respondents who did not give an answer are not shown.

Source: Survey conducted Nov. 1-7, 2021.

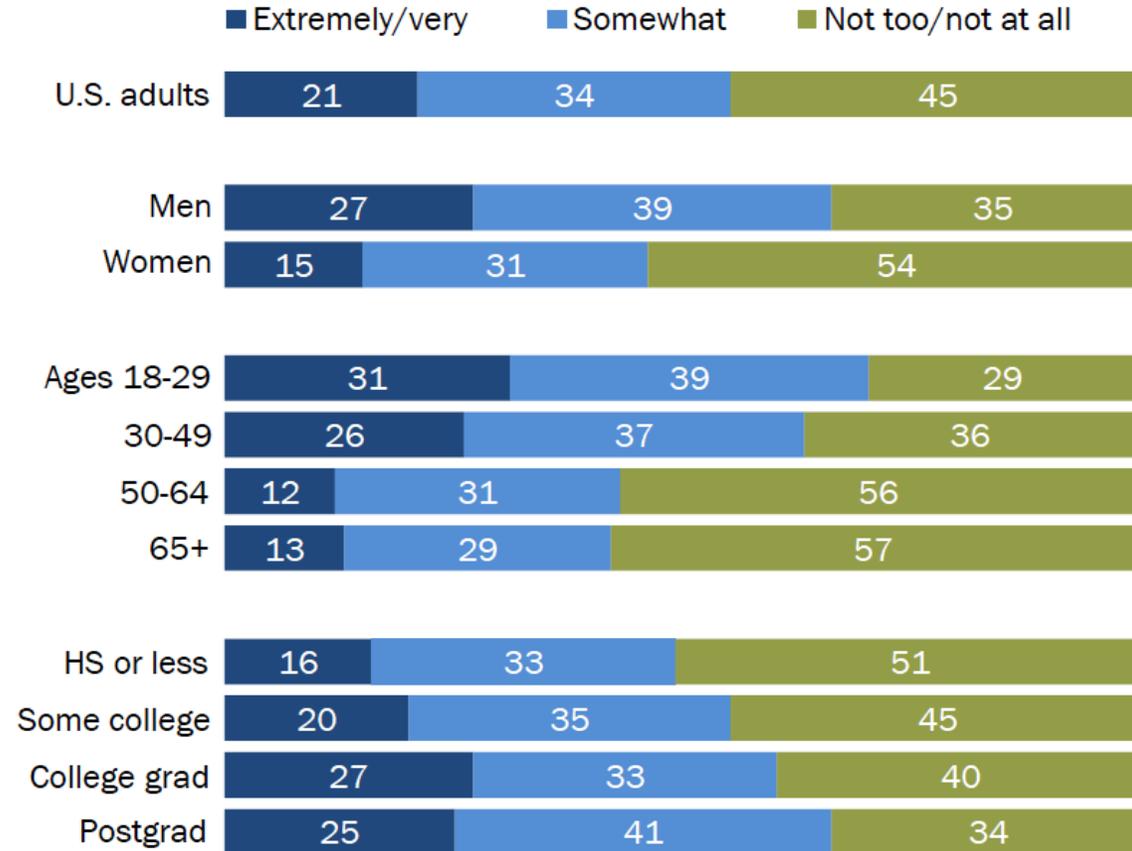
"AI and Human Enhancement: Americans' Openness Is Tempered by a Range of Concerns"

PEW RESEARCH CENTER



About one-in-five Americans say they'd be extremely or very comfortable sharing the road with driverless cars

% of U.S. adults who say if the use of driverless passenger vehicles became widespread, they would feel ___ comfortable sharing the road with them



Note: Respondents who did not give an answer are not shown.

Source: Survey conducted Nov. 1-7, 2021.

"AI and Human Enhancement: Americans' Openness Is Tempered by a Range of Concerns"

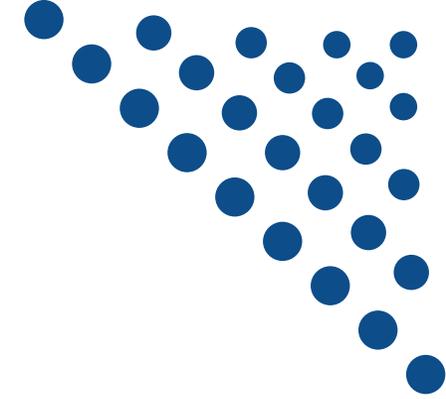


**NATIONAL ECONOMIC
EDUCATION DELEGATION**

https://www.pewresearch.org/internet/2022/03/17/americans-cautious-about-the-deployment-of-driverless-cars/ps_2022-03-17_ai-he_04-03-png/

PEW RESEARCH CENTER

What Changes Will This Bring?



- Disposable income
- Government finances
- Transportation demand
- Infrastructure
- Housing
- Public transportation
- Employment
- Parking

Potentially dramatic improvements in infrastructure planning and maintenance -
Data sharing and integration



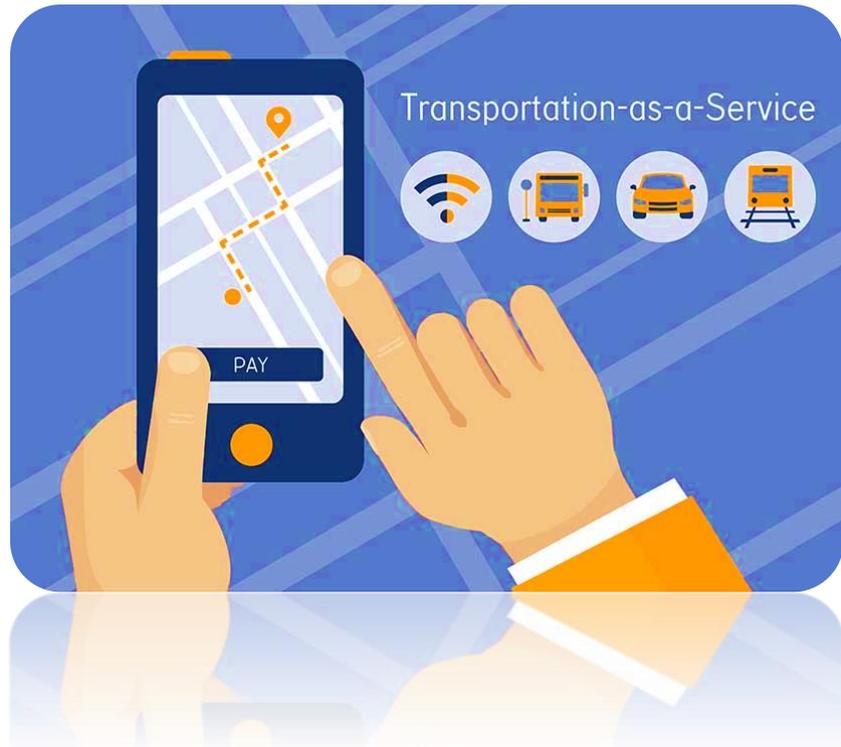
Housing



- **Housing is suddenly easier to build**
 - Issue of traffic congestion is significantly reduced.
 - Space for new housing is available where parking lots used to be.
- **Existing houses can now accommodate more people: garage to bedroom conversions.**



Public Transportation



- **Ambiguous implications for public transportation**
- **Demand may:**
 - Shrink because of low cost of TaaS
 - Grow because last mile problem is solved
- **Extensions may be added through contract with TaaS company**



Disposable Income



- Costs \$12,182 to own a car.
- Will cost \$3,000 to use TaaS.
- Net increase in disposable income of > \$9,000.
- Spread across all households: more than \$1.3 trillion in new spending in the economy.
- Major boost to economic activity.
 - CREATING JOBS!



Government Finances

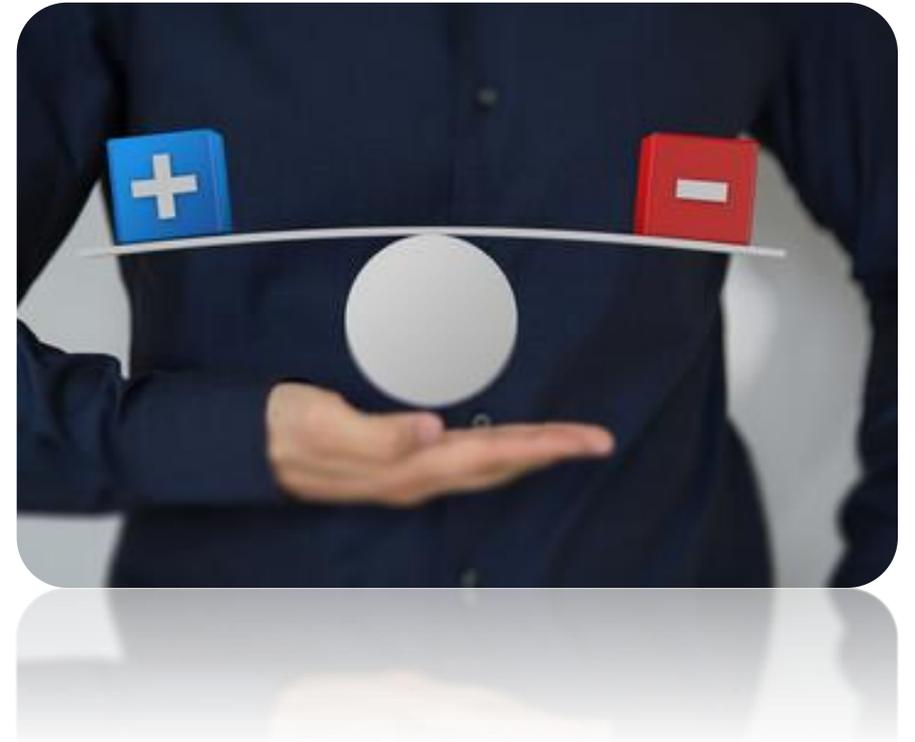


- **Government finances thrown for a loop:**
 - Revenues up and down:
 - Parking revenue, tickets, traffic violation revenues
 - More commercial, retail and residential space
 - Less spending on road development
 - More (maybe less) spent on road maintenance
 - Fewer road miles
 - but perhaps more VMT



Transportation Demand

- **Demand for transportation will likely increase significantly: price falls, demand rises**
 - Commutes may increase in distance, but not necessarily in duration.
 - Zero passenger trips will arise.
 - Deliveries
- **At the same time, demand for roadway lane-miles will likely decrease**
 - AVs make significantly more efficient use of space.
 - Front to back and side to side.



Infrastructure

- **Focus of transportation infrastructure:**
 - Currently on expansion
 - Will turn toward:
 - Maintenance
 - Signage and striping has to be robust
 - TaaS providers push for fewer potholes?
 - Adding technology
 - Stop lights will be digital as well as visual
 - Some will disappear: Signs!

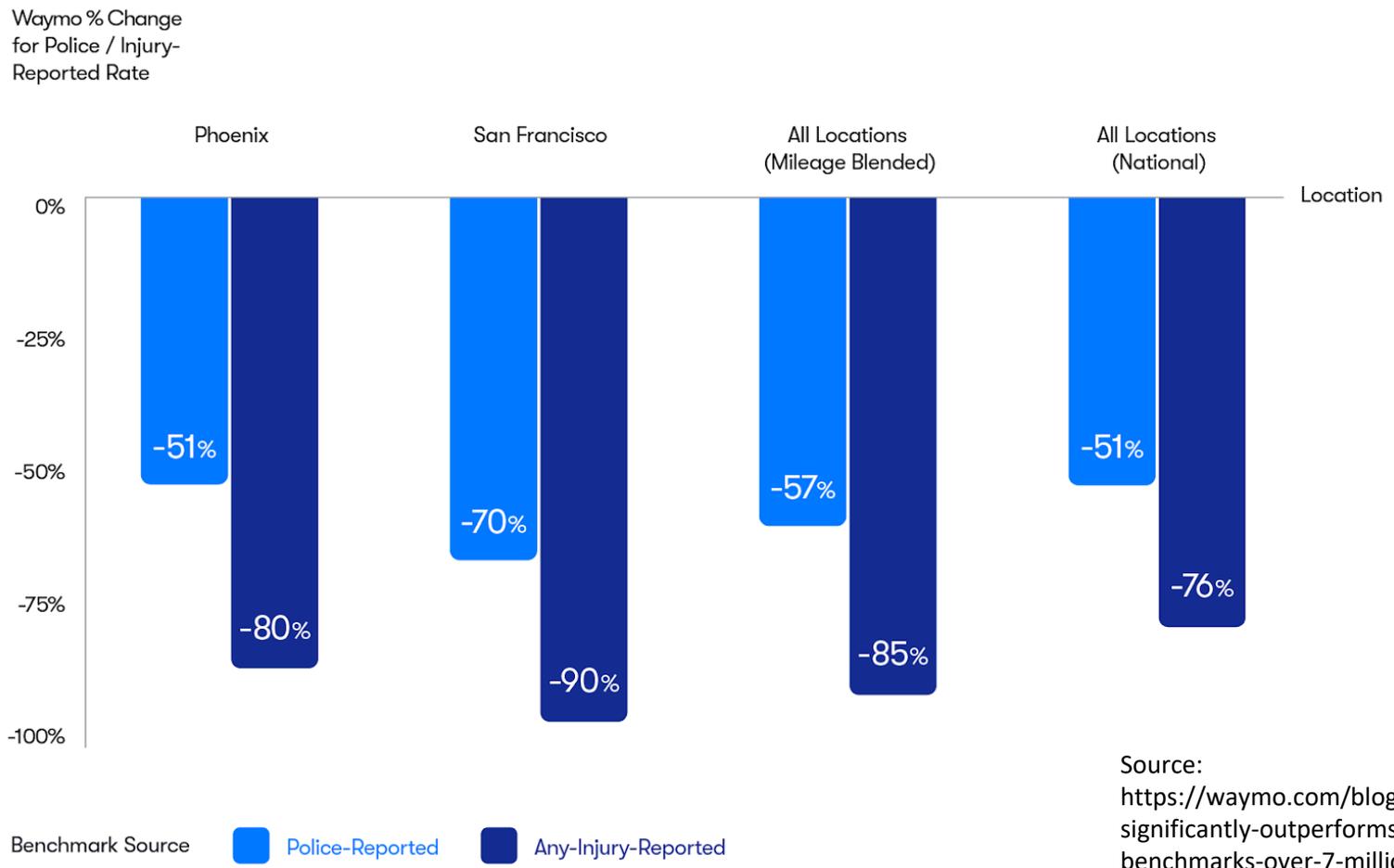




Photo courtesy of Mcity. Source: <https://stpp.fordschool.umich.edu/research/policy-brief/mobility-socioeconomic-implications-autonomous-vehicles>

Who will pay the speeding ticket while using AV

Percent reduction for the Waymo Driver in police-reported and any-injury-reported crashed vehicle rates compared to human benchmarks



Source: <https://waymo.com/blog/2023/12/waymo-significantly-outperforms-comparable-human-benchmarks-over-7-million/>

Cautionary Tale From Long Ago

- **Automobiles impact on rail:**

“The increasing dominance of cars was also felt by railway companies, which by June 1894 had to start making **pricing concessions** for transporting goods, even including free transport.”



- Samuel I. Schwartz, No One at the Wheel, 2018

Employment

- **Massive job displacement/relocation (Millions!):**

- Drivers of all varieties: truck, taxi, delivery...
- Car production jobs, car parts production jobs
- Gas station, vehicle repair, and body shop
- Police and fire
- Health care workers
- And so on...



Employment (con't)



- **What jobs will be created?**
 - IT jobs - Data and AI Specialists
 - Cybersecurity Experts
 - Infrastructure and Smart City Development
 - User Experience and Customer Support
 - Policy and Regulatory Roles
 - AV Fleet Management and Operations
 - Retail/Production jobs
 - ??
- **Always easier to identify things that will go away than to identify what will pop up in its place.**
- **Regardless of where they are created, training programs will be crucial to the transition.**

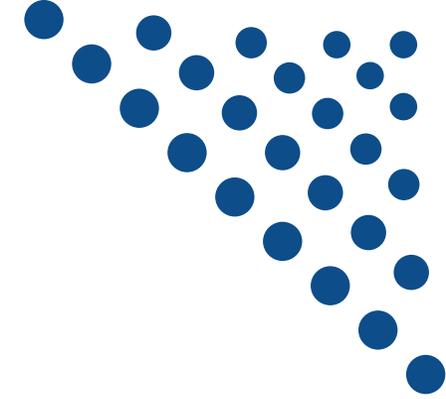


Parking

- **Greatly reduced demand for parking lots.**
- **Service providers will own parking lots in strategic places.**
 - Where the cost of land is low.
- **Street parking will largely be a thing of the past.**
 - More green space in cities.
- **Shopping mall parking will be converted to:**
 - More shopping mall? Housing?
- **Apartment complexes will convert parking.**



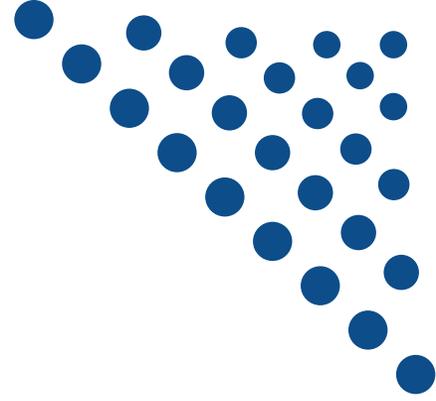
Freeing Up Urban Space from Parking



- **Los Angeles: 14% of incorporated land area**
 - 200 Square miles
- **San Francisco: 275,450 on-street parking spaces**
 - Enough to parallel-park a line of cars 900 miles.
 - California's entire coastline is 840-miles.
 - Enough parking to cover the **Presidio, Golden Gate Park, and Lake Merced.**
- **Nationwide: (estimate) 500 million spaces**
 - That's larger than Delaware and Rhode Island combined.
 - Could be as many as 2 billion (add in Connecticut and Vermont).



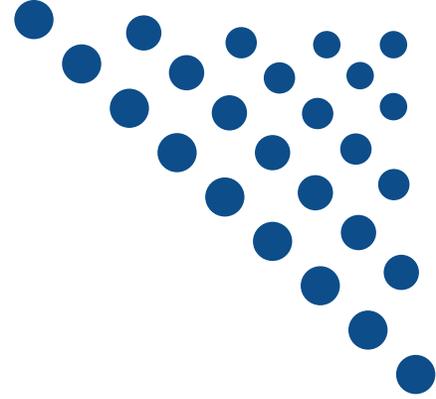
Potential Problems and Concerns



- **Expansion of the electric grid to provide sufficient capacity.**
- **Mining for rare earth minerals for batteries.**
- **Hacking of autonomous vehicles for nefarious purposes.**
- **Competition in service provision in some markets.**
- **And many more...**



Summary of Change



- **Massive employment upheaval.**
- **Local government finances will look very different.**
- **Housing will be easier to build and more plentiful.**
- **Parking conversions will be commonplace.**
- **Demand for transportation infrastructure will likely decline.**
 - Transportation infrastructure technology will be a booming business.
- **Demand for public transportation may decline.**
- **Coming likely sooner rather than later!**

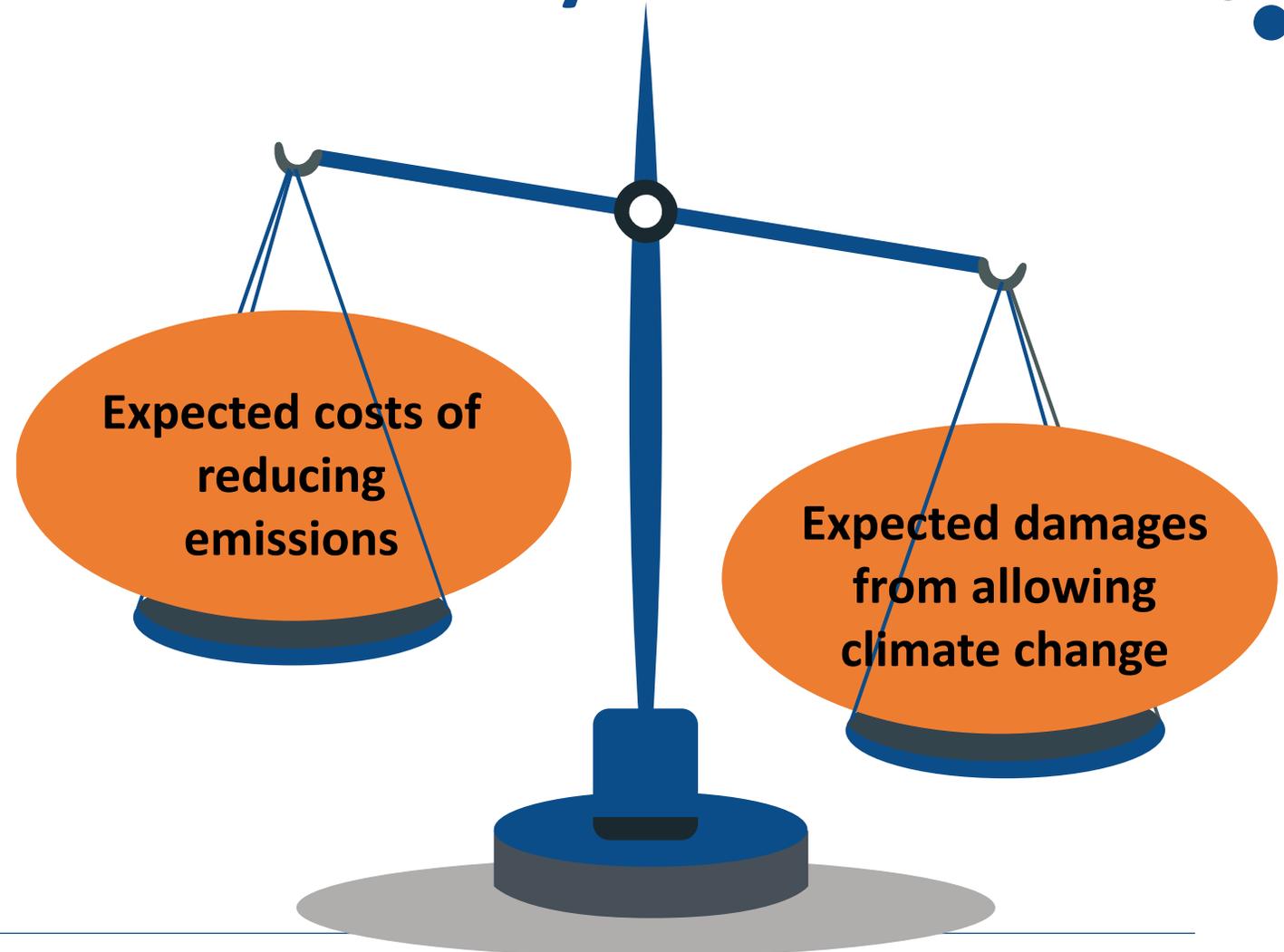


How Economists Decide How Much to Fight Climate Change: Cost Benefit Analysis

Abating greenhouse gas emissions is costly...

... but without action, climate change damages are even more costly.

Goal is not zero emissions, but efficient level that achieves a balance.



Thank you!

Any Questions?

www.NEEDEcon.org

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