

# INNOVATIONS IN TRANSPORTATION: WHERE IS IT GOING AND HOW WILL IT AFFECT THE FUTURE?

May 24, 2019



# What is Calmentor?

- Promotes small business involvement in A&E Contracts
- Provides Networking & Education
- Facilitates Mentor/Protégé Pairings
- Supports our business community
- Encourages partnerships

# Caltrans Deputy District Director

- Speaker: Marlon Flourney



# The Future in Transportation

Marlon Flournoy

Deputy District Director, Planning, Local  
Assistance and Sustainability

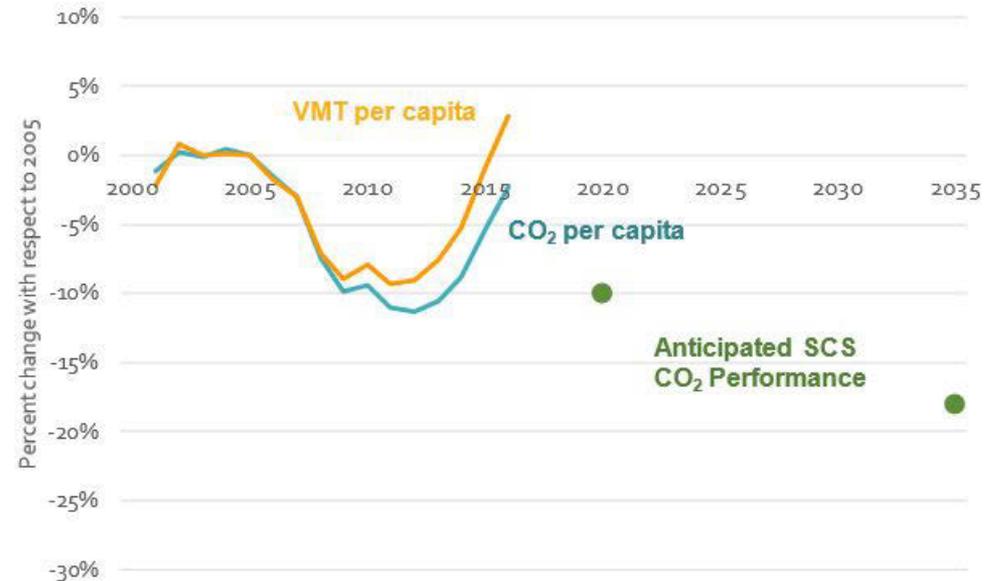
## Caltrans Sustainability Goal

Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl.



# Have Greenhouse Gases From Personal Vehicle Travel Declined?

Figure 1. Statewide CO<sub>2</sub> and VMT Per Capita Trend with Respect to Anticipated Performance of Current SB 375 SCs<sup>27</sup>



Source: CDTPA, U.S.EIA, U.S. EPA, CARB

# Transportation Innovations

- Multi-Modal Corridor Planning
- Zero Emission Vehicles
- Sharing Economy
- Connected Autonomous Vehicles
- Integrated Travel Project



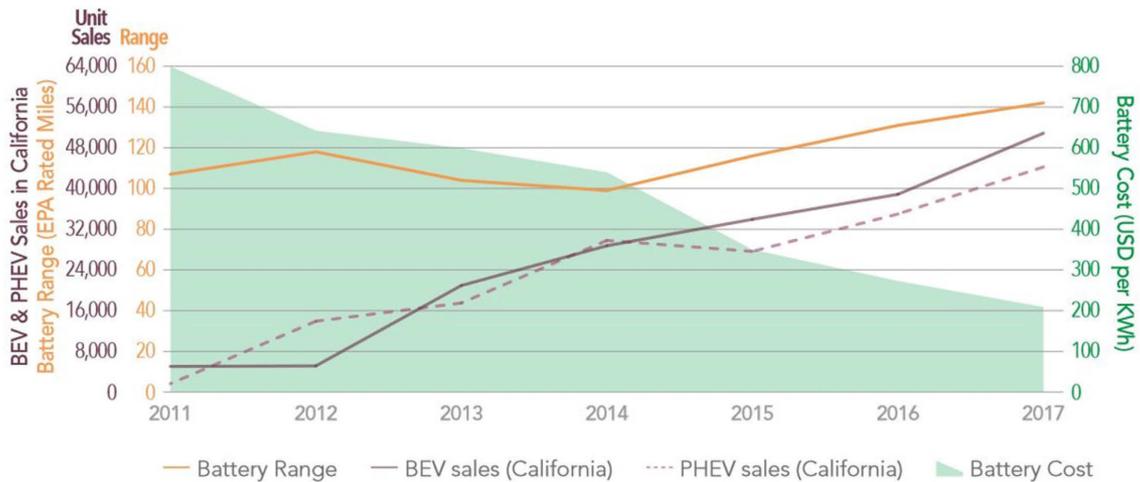
# Multi-Modal Corridor Planning

- Reduce congestion in highly traveled corridors by providing more transportation choices for residents, commuters, and visitors (e.g. state highways, local arterial roadways, rail lines, and transit systems).
- Preserve the character of local communities
- Create opportunities for neighborhood enhancement.
- Achieve a balanced set of transportation, environmental, and community access improvements.



# California's Zero Emission Vehicle Goal

**Figure 1:** Lithium-Ion Battery Cost, Battery Range (BEV), and Sales in California (BEV)



Source: U.S. Department of Energy; U.S. Environmental Protection Agency; Bloomberg New Energy Finance; Alliance of Automobile Manufacturers

Note: Range estimates are based on EPA ratings (not NEDC ratings)

- Five million ZEVs in California by 2030
- 250,000 charging stations and 200 hydrogen fueling stations by 2030

# Zero Emission Vehicle Efforts

- 2018 ZEV Action Plan
- Incentive Programs (HOV Access, Pricing Programs, Rebates)
- Charging Infrastructure (Public, Workplace, Fleet, Freight Charging)



# Sharing Economy

- Car Sharing
- Ride Sharing
- Bike Sharing



## Connected and Automated Vehicles

### Benefits

- Increased Safety
- Increased Access
- Increased Public Health



0

No  
Autonomy

Zero autonomy; the driver performs all driving tasks.



1

Driver  
Assistance

Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.



2

Partial  
Autonomy

Vehicle has combined automated functions, like acceleration and steering, but the driver must remain ready to take control.



3

Conditional  
Automation

Driver is a necessity but is not required to monitor the environment. The driver must be ready to take control of the vehicle.



4

High  
Automation

The vehicle is capable of performing all driving functions under certain conditions. The driver may have the ability to take control.



5

Full  
Automation

The vehicle is capable of performing all driving functions under all conditions. The driver may have the ability to take control.

# Integrated Travel Project

- Improve efficiencies that lower costs and barriers to trip planning and payment for transit, regional and interregional journeys, and beyond.
- Enhance the customer experience for accurate and convenient trip planning and payment
- Integrate first mile through last mile mobility needs (e.g. transit/rail, bikeshare, carshare, etc.)



Questions?



# California High Speed Rail

- Speaker: Mark McLoughlin, Director of Environmental

# CONNECTING CALIFORNIA

**Mark McLoughlin**

Director of Environmental Services



# CONNECTING CALIFORNIA

## CALIFORNIA HIGH-SPEED RAIL



**Increase Mobility**



**Needed Alternative**



**Better Air Quality**



**Job Growth**



■ Phase 1

■ Phase 2

○ Stations



# HSR Expands Business Opportunities



Bay Area

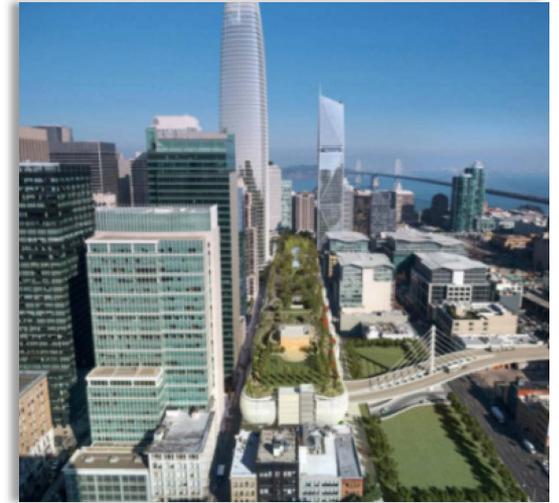


Fresno

# MORE THAN A TRANSPORTATION PROGRAM

## CALIFORNIA HIGH-SPEED RAIL

### Ties Economies Together



- Connects With and Reinforces Local Mobility
- Foundation for Sustainable Growth
- Opportunities for Revitalization in Downtown Cores

# A MORE EFFICIENT ALTERNATIVE

CALIFORNIA HIGH-SPEED RAIL

Equivalent new capacity between San Francisco and Los Angeles would cost \$158 billion, and would require:



**4,300**

New Highway Miles



**115**

New Airport Gates



**4**

New Airport Runways



# A MORE EFFICIENT ALTERNATIVE

CALIFORNIA HIGH-SPEED RAIL



Committed to Energy Efficiency  
and Green Building



# A MORE EFFICIENT ALTERNATIVE

CALIFORNIA HIGH-SPEED RAIL



**AVOIDS**

**178 LB**

CARBON (CO<sub>2</sub>e)

**1 Rider**



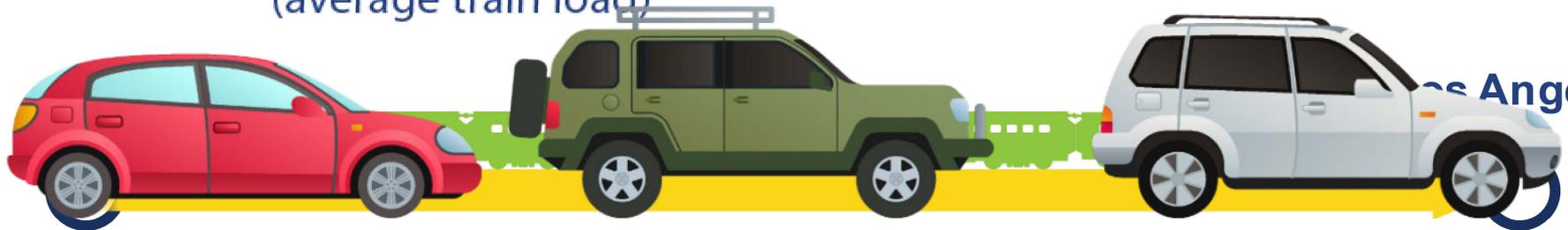
**AVOIDS**

**58,000 LB  
or 27 Metric Tons**

CARBON (CO<sub>2</sub>e)

**330 Riders**

(average train load)



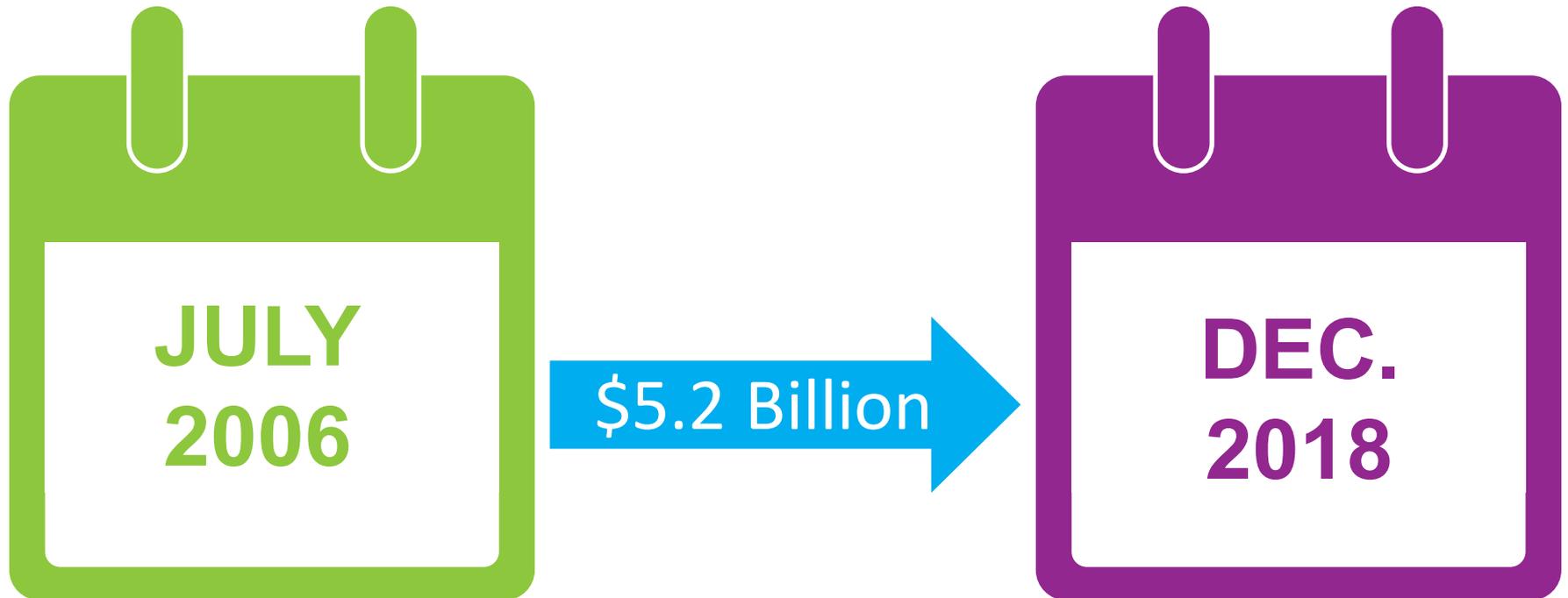
**San Francisco**

**Los Angeles**



# STATE WIDE ECONOMIC IMPACTS

CALIFORNIA HIGH-SPEED RAIL



95% Went to California Firms and Workers

# PROJECT SCOPE

## CALIFORNIA HIGH-SPEED RAIL

### Phase I:

- » 520 Miles
- » San Francisco to Los Angeles/Anaheim

### Phase II:

- » Extends 300 Miles
- » Connections to Sacramento and San Diego

At Least 200 mph

Up to 24 Stations



# 2019 PROJECT UPDATE REPORT

CALIFORNIA HIGH-SPEED RAIL



# 2019 PROJECT UPDATE REPORT

## CALIFORNIA HIGH-SPEED RAIL

### Key Themes

- Builds on 2018 Business Plan
- Refocusing delivery around “building block” approach
- Deliver what we can with what we have
- Demonstrate benefits ASAP
- Continue advancing San Francisco to LA/Anaheim system



# MERCED-FRESNO-BAKERSFIELD

## CALIFORNIA HIGH-SPEED RAIL

- Merced-Fresno-Bakersfield is the first step towards Valley to Valley
- Matches available funds to doable projects
- Connects to high-ridership regional transit systems
- Important building block towards full vision



# CONSTRUCTION PACKAGE 1-4

MADERA TO NORTH OF BAKERSFIELD



Approximately \$4.8 Billion  
Investment



# SMALL BUSINESS PARTICIPATION

CALIFORNIA HIGH-SPEED RAIL

## 500 Certified Small Businesses Working on HSR Statewide

NORTHERN CALIFORNIA

**185**

Certified Small Businesses

CENTRAL VALLEY

**144**

Certified Small Businesses

SOUTHERN CALIFORNIA

**156**

Certified Small Businesses

**30%**

Goal for Small Business Participation

- » 10% Disadvantaged Business Enterprises (DBE)
- » 3% Disabled Veteran Business Enterprises (DVBE)



# TARGETING THE CENTRAL VALLEY

## CALIFORNIA HIGH-SPEED RAIL



**2,900+**  
**Construction Workers**



**20**  
**Active Construction Sites**



**\$500 Million**  
**Improvements in Fresno**



# NORTHERN CALIFORNIA

CALIFORNIA HIGH-SPEED RAIL

## MOBILITY IMPROVEMENTS



Upgrades Bay Area  
Transportation  
Infrastructure



Connects Bay Area  
to Central Valley



Multi-Model  
Transportation  
Hubs



# MOBILITY IMPROVEMENTS



**Closes Bakersfield to Palmdale Rail Gap.**



**Eases Congestion**

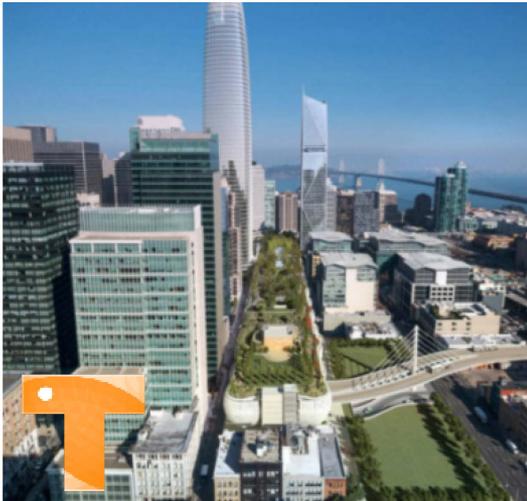


**Multi-Model Transportation Hubs**

# CONNECTIVITY & BOOKEND PROJECTS

CALIFORNIA HIGH-SPEED RAIL

## 15 Projects Including:



**\$400 Million**

Salesforce Transit  
Center



**\$115 Million**

Regional Connector  
Transit Project



**\$68 Million**

Rosecrans/Marquart  
Grade Separation



# CONNECTING CALIFORNIA

CALIFORNIA HIGH-SPEED RAIL



## Headquarters

California High-Speed Rail Authority

770 L Street, Suite 800

Sacramento, CA 95814

[www.hsr.ca.gov](http://www.hsr.ca.gov)



# Calmentor Steering Committee / Aerial Zeus

- Speaker: Luis Robles



# THE FUTURE OF TRANSPORTATION

CALMENTOR NORTH REGION EVENT



# WHERE IS NASA CALTRANS GOING ?

**NASA** FY2019 Aeronautics Budget: \$633.9M



Program	Amount
Low Sonic Boom X-Flight	\$80.3M
X-57 Maxwell	\$100.0M
AAVP (Advanced Air Vehicle Program)	\$230.8M
TACP (Transformative Aircr Concepts Program)	\$128.3M

**NASA** FY2019 Astrophysics: \$4,558.8M



Program	Amount
Hubble Space Telescope	\$78.3M
SOFIA (Stratospheric Observatory for Infrared Astronomy)	\$74.0M
JWST (James Webb Space Telescope)	\$304.6M
Orion Program	\$1.330M

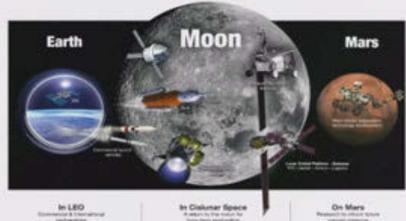
**NASA** FY 2019 Deep Space Exploration: \$4,184M



Program	Amount
EGS (Exploration Ground Systems)	\$482.7M
SLS (Space Launch System)	\$2,007.1M
Orion Program	\$1.330M
Orion Program	\$1.330M

**NASA** Where NASA Is Going

- NASA will establish a Lunar Gateway to eliminate the risk of deep space travel. This outpost will serve as support for astronauts preparing for missions to the moon and later to Mars.



Location	Activities
In LEO (Low Earth Orbit)	Orbiting & International Space Station
In Distalunar Space	A hub in the moon for long-term exploration
On Mars	Prepared for future of space exploration

**NASA** Where Is NASA Going



**SURVEYORS WANTED**

**NASA** Where Is NASA Going



CONFIDENTIAL

# CULTURAL SHIFT

## MILLENNIALS

### The rise of the millennials

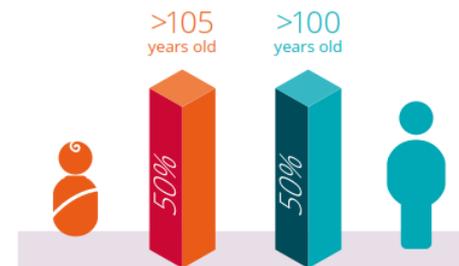
Much gets said about generational differences, and a lot of it focuses on three generations:

- **Baby Boomers** (people born between early/mid 1940s and early/mid 1960s)
- **Generation X** (people born between mid 1960s and early 1980s)
- **Generation Y** (millennials, born between early 1980s and mid 1990s)

The big news is that Generation X is no longer the largest component of the US labor force – millennials are, and this is a momentous shift.

## LONGEVITY

Meanwhile, younger people keep joining the workforce. This means we have a multi-generational workplace whose composition is unlike any we have seen before. Did you know that a child born in the west today has a more than 50% chance of living to be at least 105? Or that a 20-year-old has a 50% chance of living beyond 100?



THE  
FUTURE  
OF  
WORK IN  
AMERICA

# America is a mosaic of local economies on diverging trajectories

Automation could widen existing disparities

13 community segments have varying economic and demographic profiles

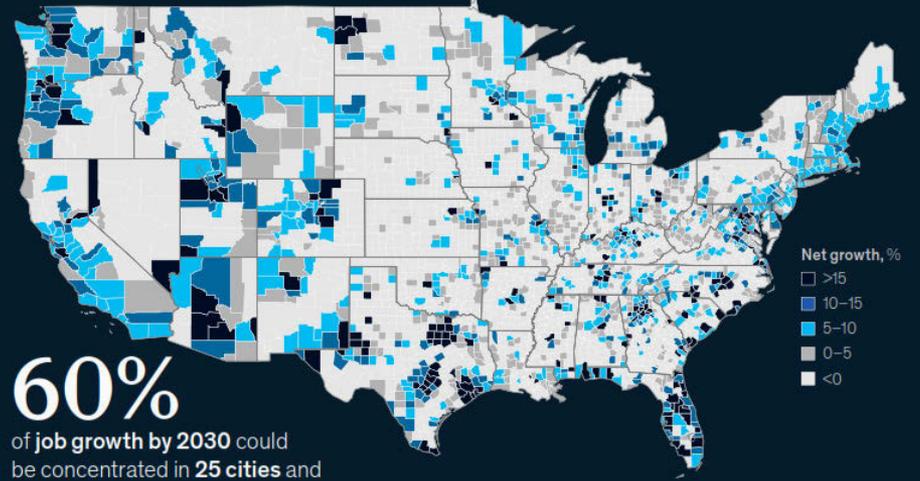
Economic dynamism Most Least	<b>Urban core</b> Megacities; High-growth hubs	63 counties	30% of US population
	<b>Periphery</b> Urban periphery	271 counties	16% of US population
	<b>Niche cities</b> Small powerhouses; Silver cities; College-centric towns	89 counties	6% of US population
	<b>Mixed middle</b> Stable cities; Independent economies; America's makers	325 counties	24% of US population
	<b>Low-growth/rural areas</b> Trailing cities; Americana; Distressed Americana; Rural outliers	2,365 counties	24% of US population

Employment change for select community segments, % of 2007 employment



25 CITIES TO  
GENERATE 60%  
OF JOB  
GROWTH

Estimated net job growth in midpoint adoption scenario, 2017–30, %



**60%**

of job growth by 2030 could be concentrated in **25 cities** and their peripheries

Potential workforce displacement in midpoint adoption scenario, 2017–30

**14.7M**

Young workers age 18–34

**11.5M**

Workers over age 50

**11.9M**

Hispanics and African Americans

**4x**

Higher displacement risk for workers with high school diploma or less

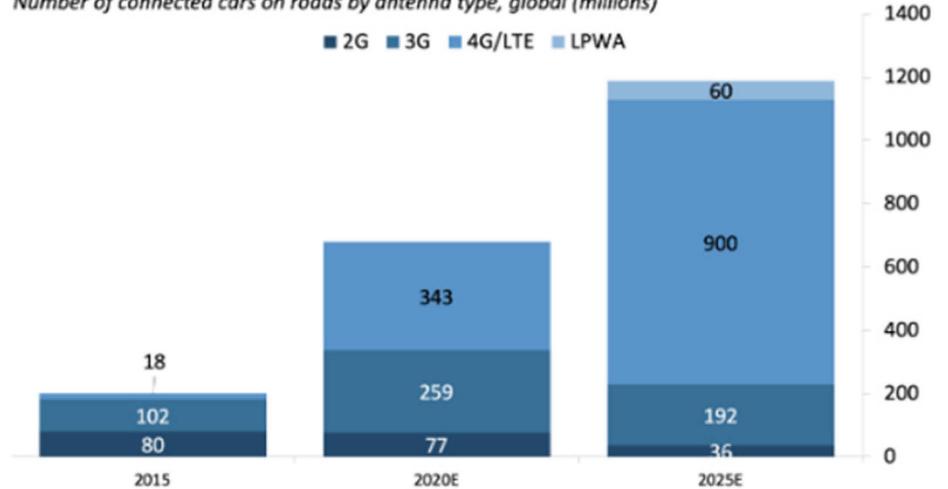
McKinsey  
Global Institute

Source: McKinsey Global Institute analysis

# INFOTAINMENT, LTE & OEM'S

## LTE Connections Will Take Over The Connected Car Market By 2025

Number of connected cars on roads by antenna type, global (millions)



Source: Gartner, 2018; McKinsey, 2019

BUSINESS  
INSIDER  
INTELLIGENCE

# WHAT IS TRANSPORTATION?



Definition of  
transportation



1 : an act, process, or  
instance of  
transporting or being  
transported



2a : means of  
conveyance or travel  
from one place to  
another



b : public conveyance  
of passengers or goods  
especially as a  
commercial enterprise



3 : banishment to a  
penal colony

MODES OF  
TRANSPORTATION?



Terrestrial



Aerial



Maritime

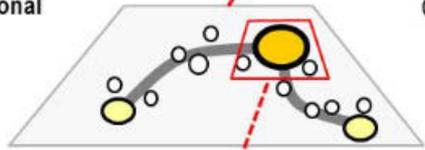
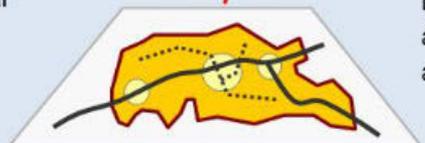


Space

# HYBRID SYSTEM



## Scales of Spatial Organization for Transportation

Scale		Nodes	Links	Relations
Global		Gateways and hubs (airports and ports)	Air and maritime lanes	Investment, trade and production
Regional		Cities	Corridors (rail lines, highways, canals)	Urban system and hinterland
Local		Employment and commercial activities	Roads and transit systems	Commuting and distribution

# AUTO AND MOBILITY TRENDS



- R&D and design
- Material supply, parts sourcing, and vehicle assembly
- Distribution, marketing & sales
- Aftermarket services and vehicle use

LET'S GET IT  
RIGHT!

If done right, **seamless mobility** could

accommodate

**30%**  
more traffic

reduce congestion by

**10%**

---

lower greenhouse gas  
emissions by

**30%**

# SHARED ECONOMY & MICROMOBILITY



Source: Lime

# ELECTRIFICATION

## ELECTRIFICATION BACKDROP

Electric vehicles make up a sliver of total auto sales, but are slated to gain share

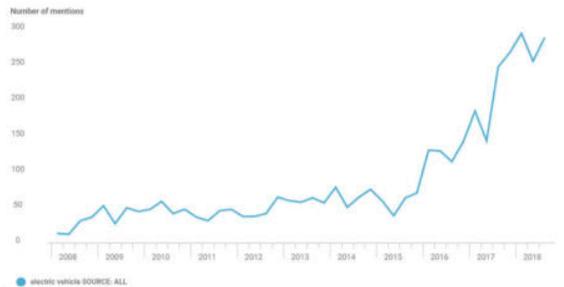
Global share of electric vehicles



● Electric vehicle (HEV, PHEV, BEV) ● Internal-combustion engine

## Electric vehicles taking center stage

Mentions of "electric vehicles" on corporate earnings calls (from 2008)



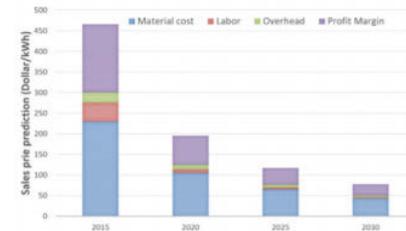
Source: cbinsights.com

CBINSIGHTS

## Batteries cheaper to make, EVs easier to scale

Multiple factors are expected to **drive down the cost of manufacturing a lithium-ion battery**:

1. Improvements in material sciences
2. Maturing of the battery market
3. Higher production of electric vehicles

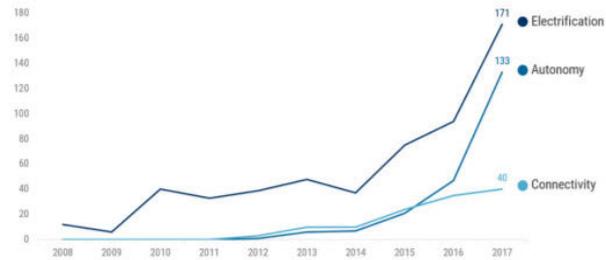


CBINSIGHTS Source: Energy

# IMPROVED TECHNOLOGY

## Suppliers prioritizing electrification and autonomy

Mentions of auto tech<sup>1</sup> on auto supplier earnings calls; 2008-2017



<sup>1</sup>Note: Electric includes "electric" and "EV"; Autonomous includes "autonomous," "autonomy," "self-driving," and "driverless"; Connected includes "connected" and "connectivity".  
Source: cbinsights.com

CBINSIGHTS

## Funding to electric car manufacturers is peaking

Funding dollars and number of deals to EV manufacturers (includes cars, light trucks, personal electric vehicles, and commercial vehicles)



Source: cbinsights.com

CBINSIGHTS

# SHOW ME THE MONEY!



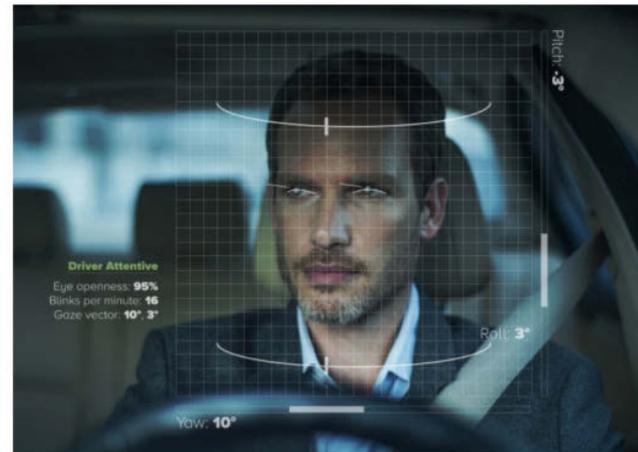
# COOL STUFF...

BOEING, AIRBUS, UBER & DUBAI



Source: Airbus

HUMANLY ERRONEOUS



Source: eyeSight

# WHO NEEDS MAPPING?



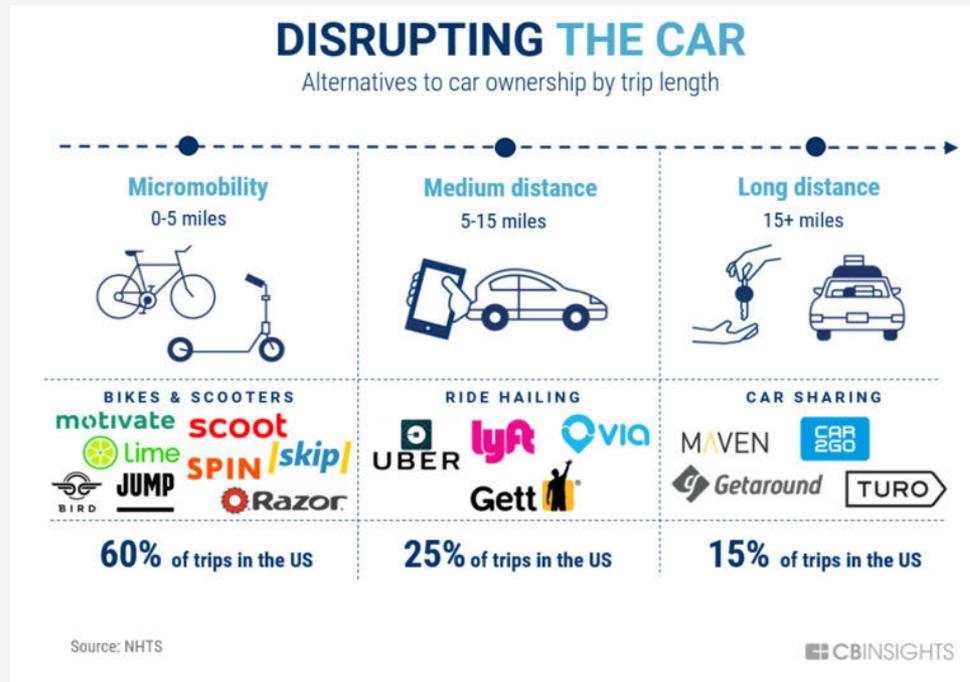
Source: NVIDIA



Source: DeepMap



# WHO CARES?



# QUESTIONS???



# Q&A Session



# Calmentor North Region

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