@rmchase

The National Highway Traffic Safety Administration's 5 Levels of Automation

LEVEL 3 Tesla

Vehicle integrates detection/response.
Driver ready to take control.

LEVEL 4

May/may not have steering wheel
Geofenced or restricted

LEVEL 2 Cars today

Vehicle provides information/warnings.
Drive has informed control.

LEVEL 1 Car in 1970

Vehicle has no automation.
Driver has full control.

LEVEL 5

Everywhere, all the time,
no steering wheel


I'm here to
distract you

There were 1.2m traffic deaths and 100s m of serious injuries worldwide

BETTER QUESTIONS

1. What fraction involved these ethical choices?
2. Do humans react fast enough to make a choice?
3. Will Avs result in fewer deaths & injuries than now?

Sales Promised by 2019-2021

& New Companies Emerging

Old guard:

- GM
- Ford
- Toyota
- Nissan
- Volvo
- BMW
- Audi
- Volkswagen

New companies:

- Google
- Tesla
- Uber
- Apple
- Many startups

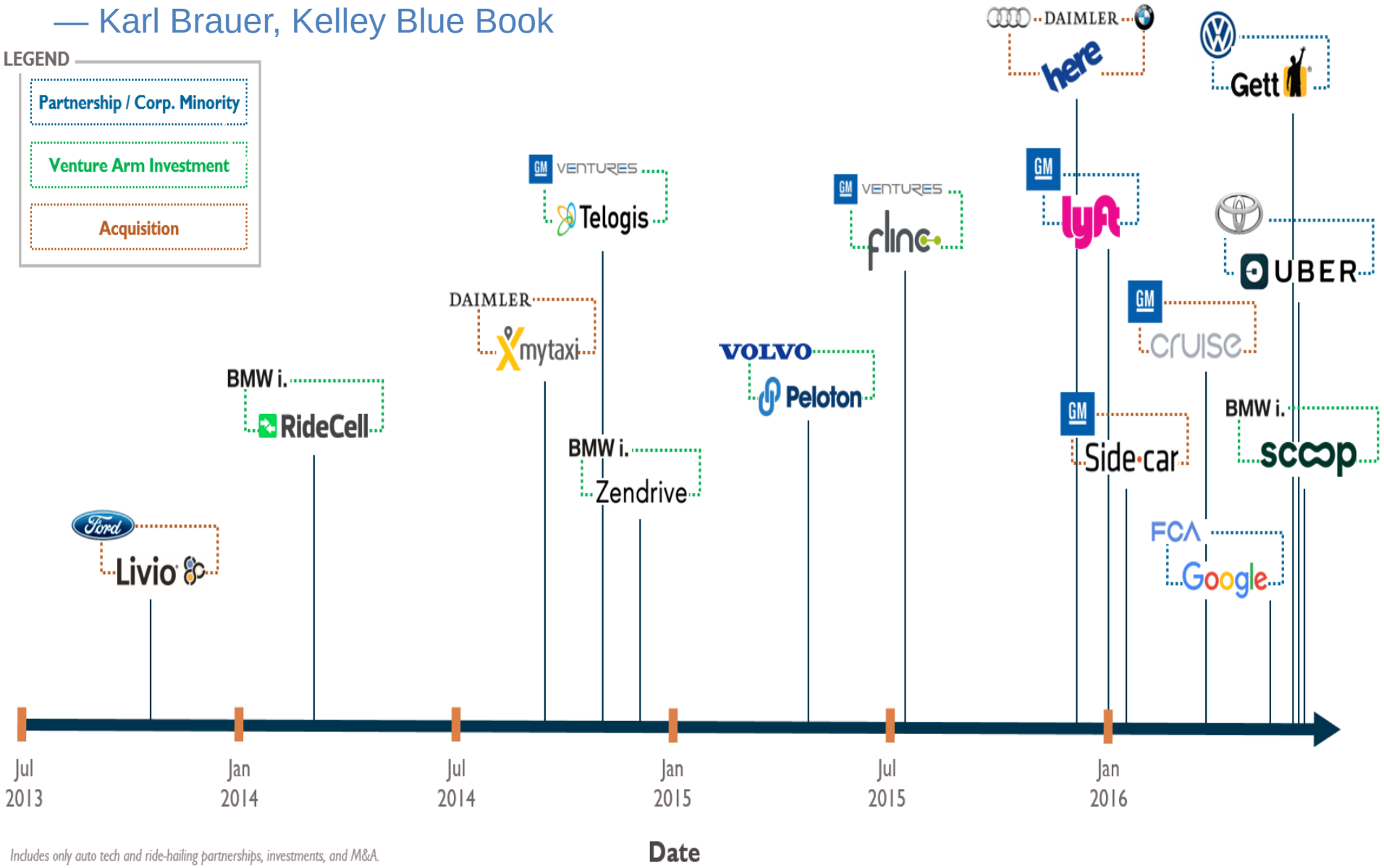
Driverless Car Market Predictions

Prediction	Year in the Market (Year Announced)
Google's founder Sergey Brin	2018 (2012)
Volkswagen head of Digitalization Strategy, Johan Jungwirth (not necessarily Volkswagen brand)	2019 (2016)
General Motors head of foresight, Richard Holman	2020 (2016)
Ford's head of production development, Raj Nair	2020 (2016)
Toyota	2020 (2015)
Andy Palmer, the Executive Vice President of California-based Nissan Motors Ltd	2020 (2013)
Ford CEO, Mark Fields	2021 (2016)
BMW CEO, Harald Krueger	2021 (2016)
Baidu's Chief Scientist	2021 (2016)
Tesla's Founder, Elon Musk	2021 (2015)
Justin Rattner, CTO of Intel	2022 (2012)
Jaguar and Land Rover's Director of Research and Technology	2024 (2014)
U.S. Department of Transportation	2025 (2015)
Dieter Zetsche, Chairman of Daimler	2025 (2014)
Automotive Supplier Continental	2025 (2012)
Robert Hartwig, President of the Insurance Information Institute	2028 (2013)
Institute of Electrical and Electronics Engineers (IEEE)	2040 (2012)

verless Car Market Predictions. Information from Driverless Car Market Watch

“2016 will go down in history as the year of the autonomous vehicle partnership”

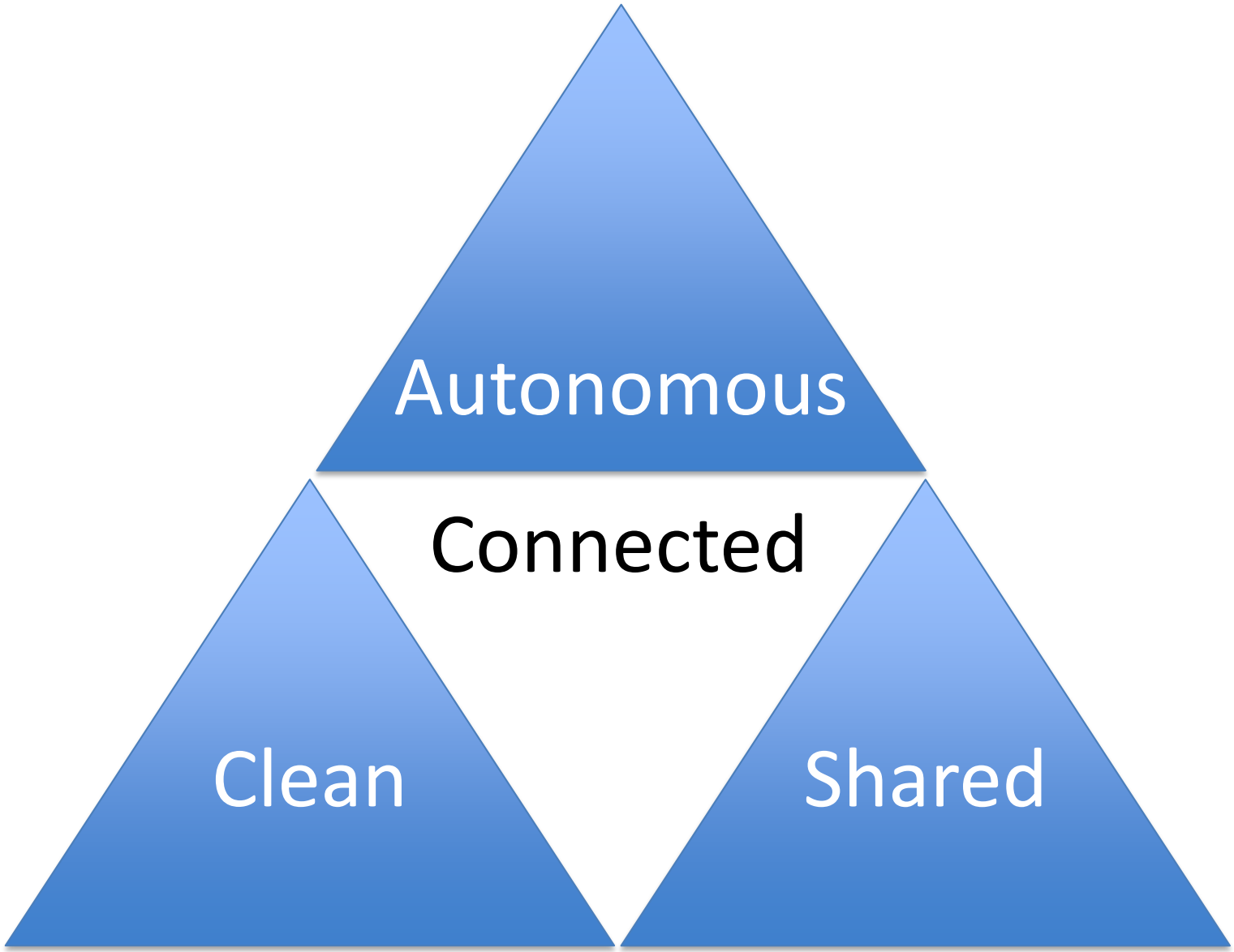
— Karl Brauer, Kelley Blue Book



Includes only auto tech and ride-hailing partnerships, investments, and M&A.

CB INSIGHTS

www.cbinsights.com


Autonomous
Connected
Clean
Shared

PREDICTIONS FOR THE INDUSTRY:

Goldman Sachs:
North American auto sales could be almost 60 percent autonomous by 2030.

Tesla CEO Elon Musk:
In 7 to 8 years, fifty percent of cars sold will be autonomous.

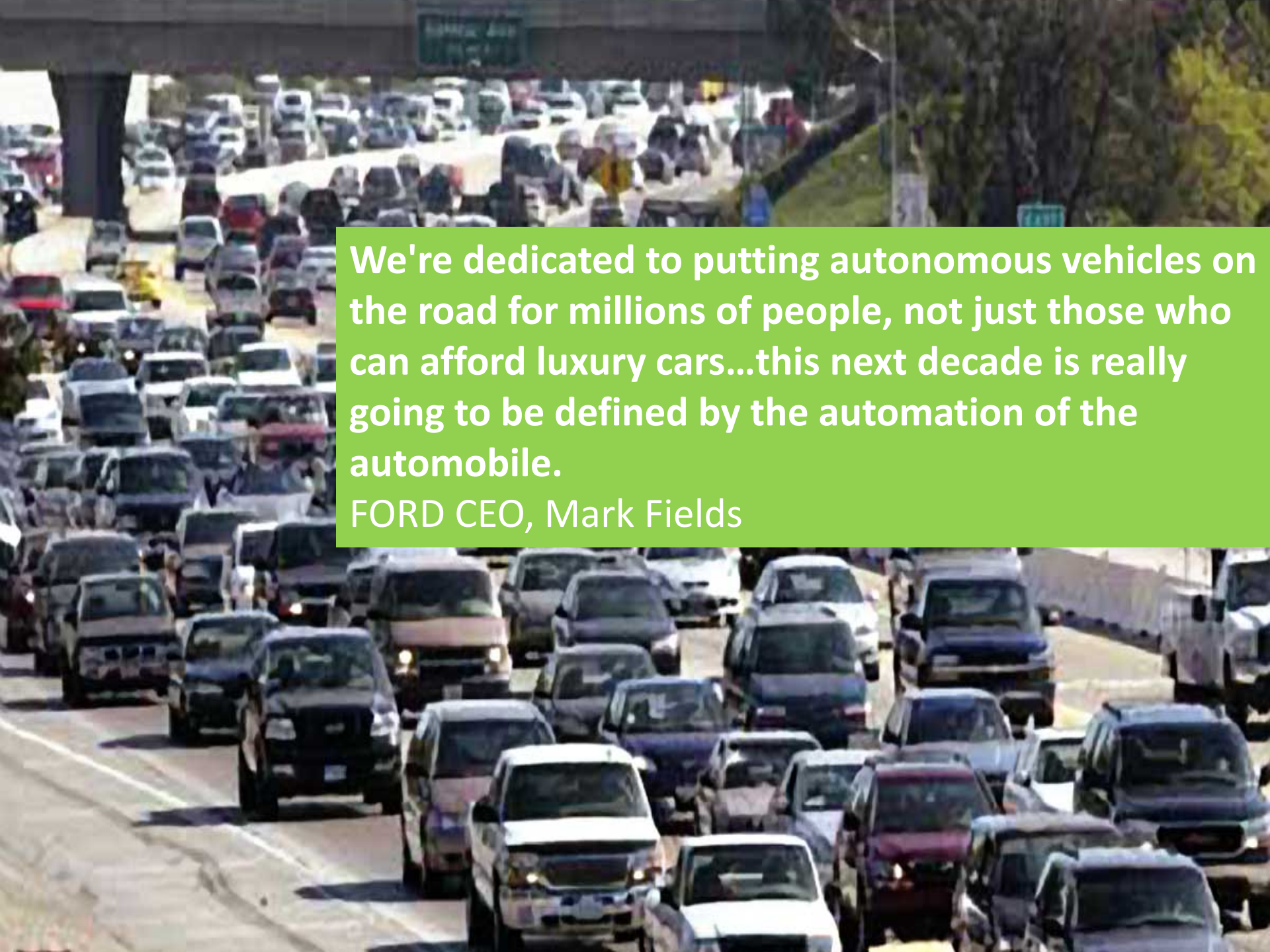
BUT FOR CITIES:

Deloitte:

These changes could occur more quickly and at greater scale than many are prepared for, especially in densely populated areas. If shared and autonomous vehicles are adopted as quickly as other technologies (like smartphones, cellphones, and the Internet), our modeling finds that significant change will begin within five years and that the market for personal mobility could transform dramatically over the next 25 years.

Lyft President John Zimmer:

By 2025, private car ownership will all-but end in major U.S. cities.



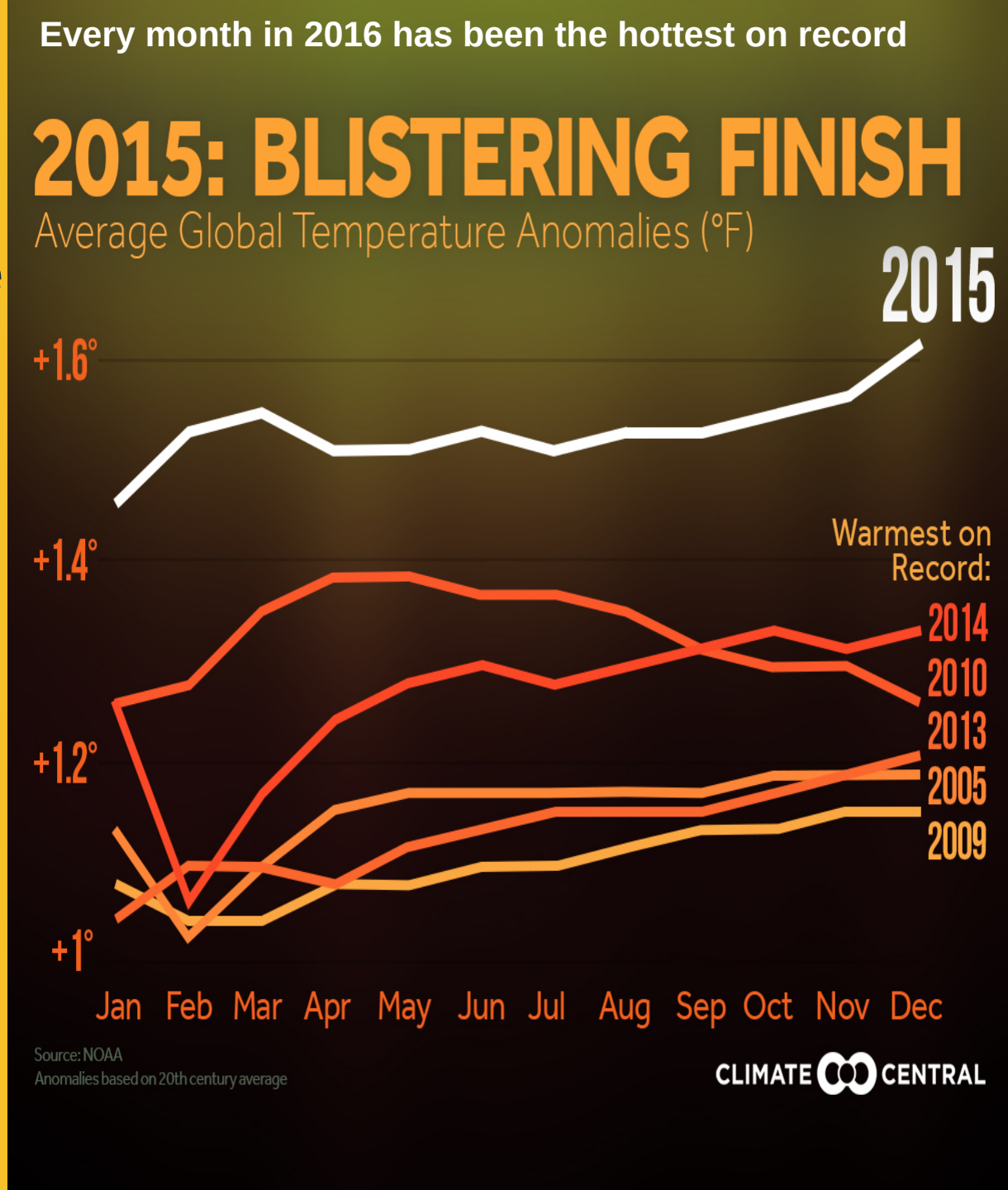
We're dedicated to putting autonomous vehicles on the road for millions of people, not just those who can afford luxury cars…this next decade is really going to be defined by the automation of the automobile.

FORD CEO, Mark Fields

There’s an urgency to our mission about being part of the future. This is not a side project. This is existential for us.
UBER CEO Travis Kalanick on deploying Autonomous UBERs in Pittsburgh (August 2016)

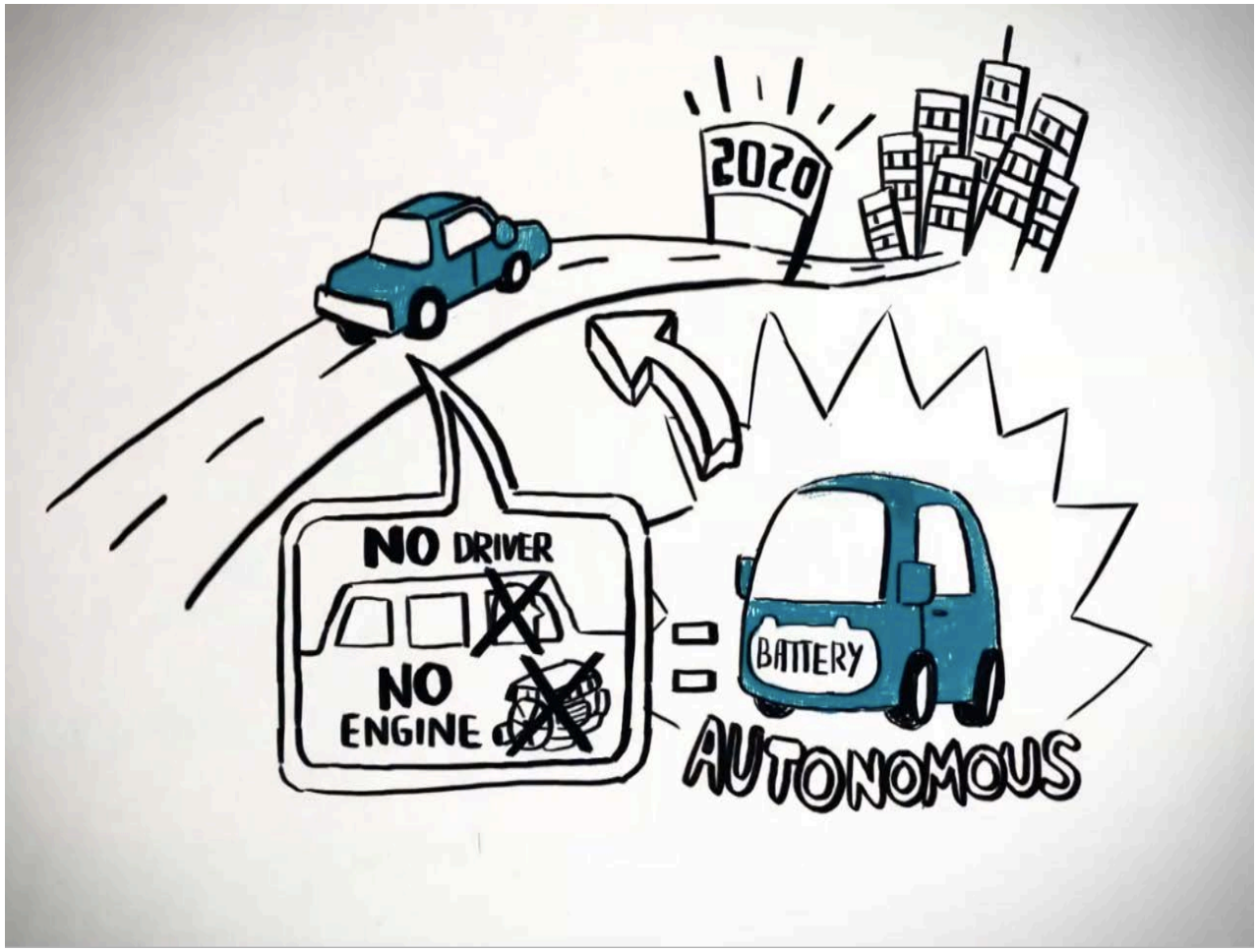
The infrastructure we build over the next 4 years will determine the fate of humanity.

-Christiana Figueres

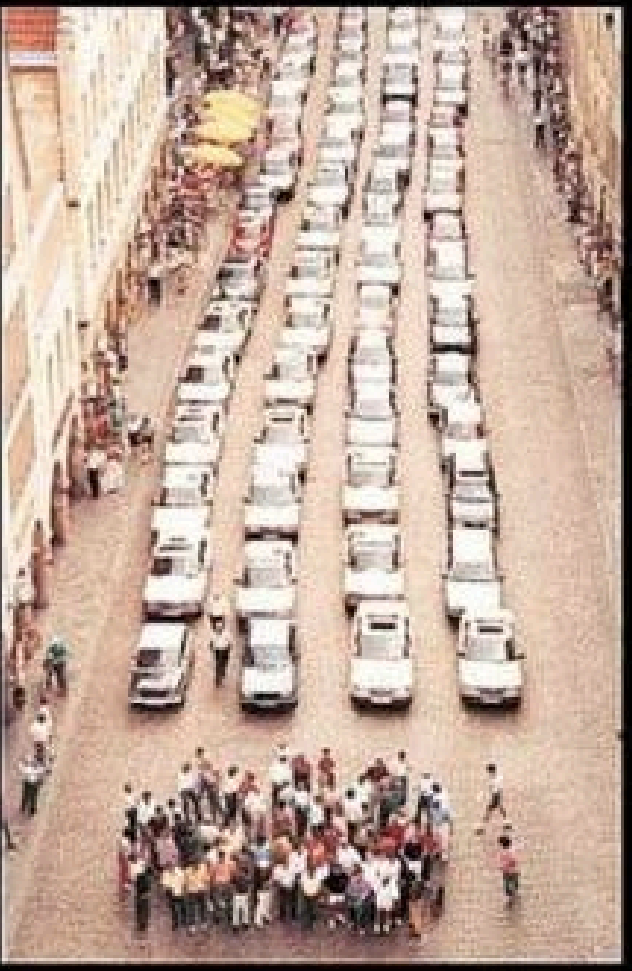



With AVs, We Have
Two Paths

https://www.youtube.com/watch?v=VjcMZJm0L9A



space required
to transport **60 people**



car

Autonomous is the battleground for cities. Not all AVs are alike!

AVs

We swap out personal ICE vehicles for personal AVs

maybe electric, maybe not

Perceived costs are just the marginal costs

FAVES

Fleets of AVs that are Electric & Shared

Full costs experienced for each trip.

AV benefits are differentiated by geography.

AVs

Personal & Electric

Exurban

Safety benefits felt here.

FAVES

Fleets of AVs that are Electric & Shared

Urban.

Fewer cars (shared) & better air quality (electric) key benefits here.

Most important takeaway:

When you take the driver out of the car:

THE ECONOMIC THRESHHOLD for moving a vehicle is low.

EXPLOSION OF VIABLE USES

HOW WE TAX MATTERS

Taxes for Motor vehicle manufacturing & use = $206 Billion/year*
($110b state & $96b in federal)

Current Sources:	With electric Avs
~~Gas Taxes~~	None
~~Toll revenues~~	**Fall by 60-90%** **(the higher end if we go to FAVES (reduced vehicles through tolls))**
~~Permits & Fees~~	
~~Tickets & Fines~~	
~~Parking~~	
~~Registrations~~	

& 2nd order effects
Loss of taxes on associated labor & businesses now defunct

* http://www.autoalliance.org/files/dmfile/2015-Auto-Industry-Jobs-Report.pdf
Center for Automotive Research, Ann Arbor MI

Taxing AVS

Getting the incentives right

Vehicles on purchase category

- *Fuel type*
- *Weight*
- *Square footage*

Road user fees (based on category)

- *Distance*
- *Congestion*
- *ZERO OCCUPANCY PREMIUM*

Retail

- *Pickup/Dropoff*
- *VAT*

HOW WE INTRODUCE MATTERS

WRONG: We won't get there by replacing buses with AV buses

Good for bus company
Bad for passengers

This will NOT encourage the switch from personal cars to FAVES.

RIGHT:
#1: Start with small vehicles to deliver quality experience.
#2: Increased demand will require larger vehicles on some O-D trips.

Las Vegas' Strip Express is the kind of Bus Rapid Transit system that could eventually be self-driving. (Photo: ITDP)

A LIKELY SCENARIO: 5-year transition from CARS to FAVES

Year 1: 100 small vehicle pilot in mid-size city (students/tourists)

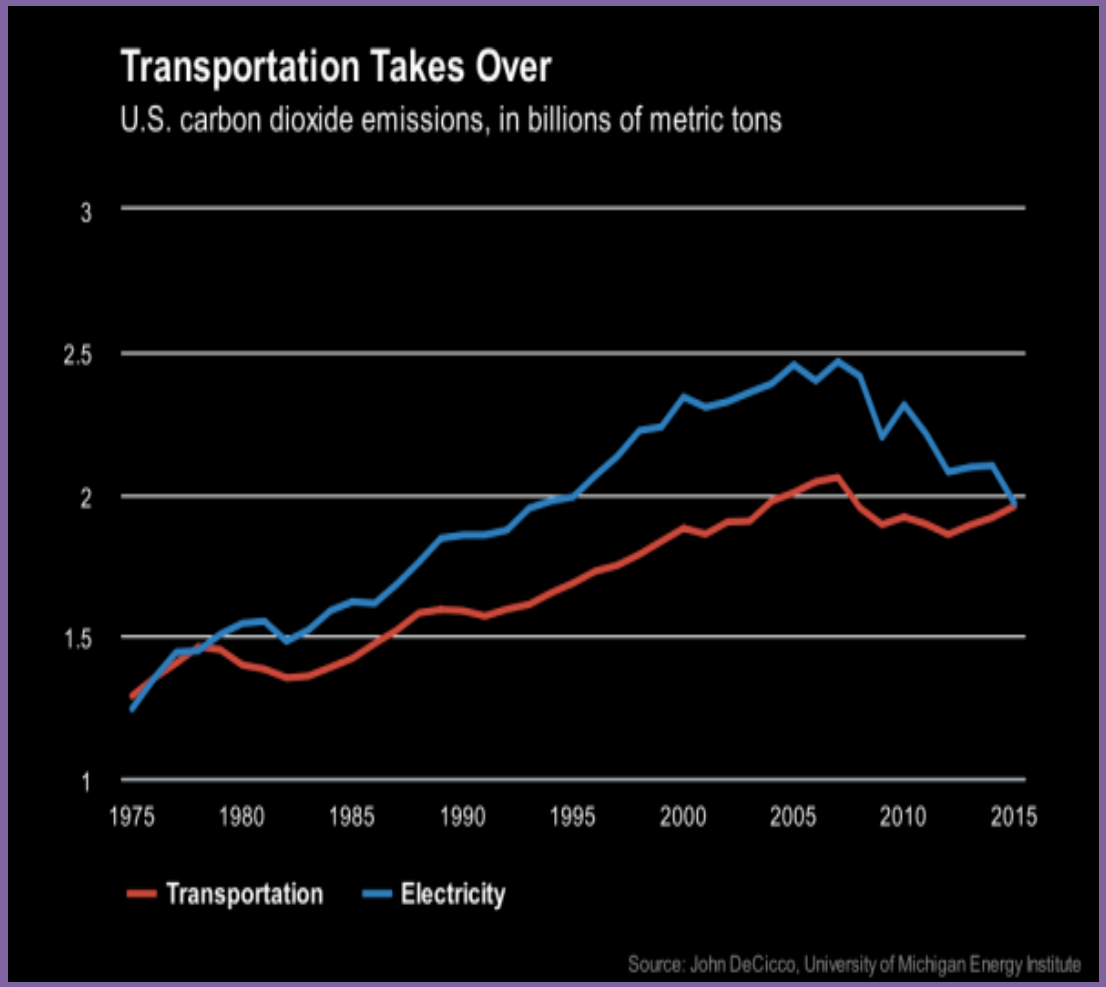
Years 2-5: Expands to 1000 vehicle fleet. *Cheaper & more convenient than status quo*. First 2nd vehicles sold. Then primary. On some routes, vehicles will become shuttle & bus size.

Years 3-5: Other cities need to adopt to be competitive/modern, innovative.

AVs for Urban & trucking
→
Suburban & Rural?

Electric

Climate Friendly



FAVES will be the fastest path to electric mobility

HOW WE HANDLE LAND USE MATTERS

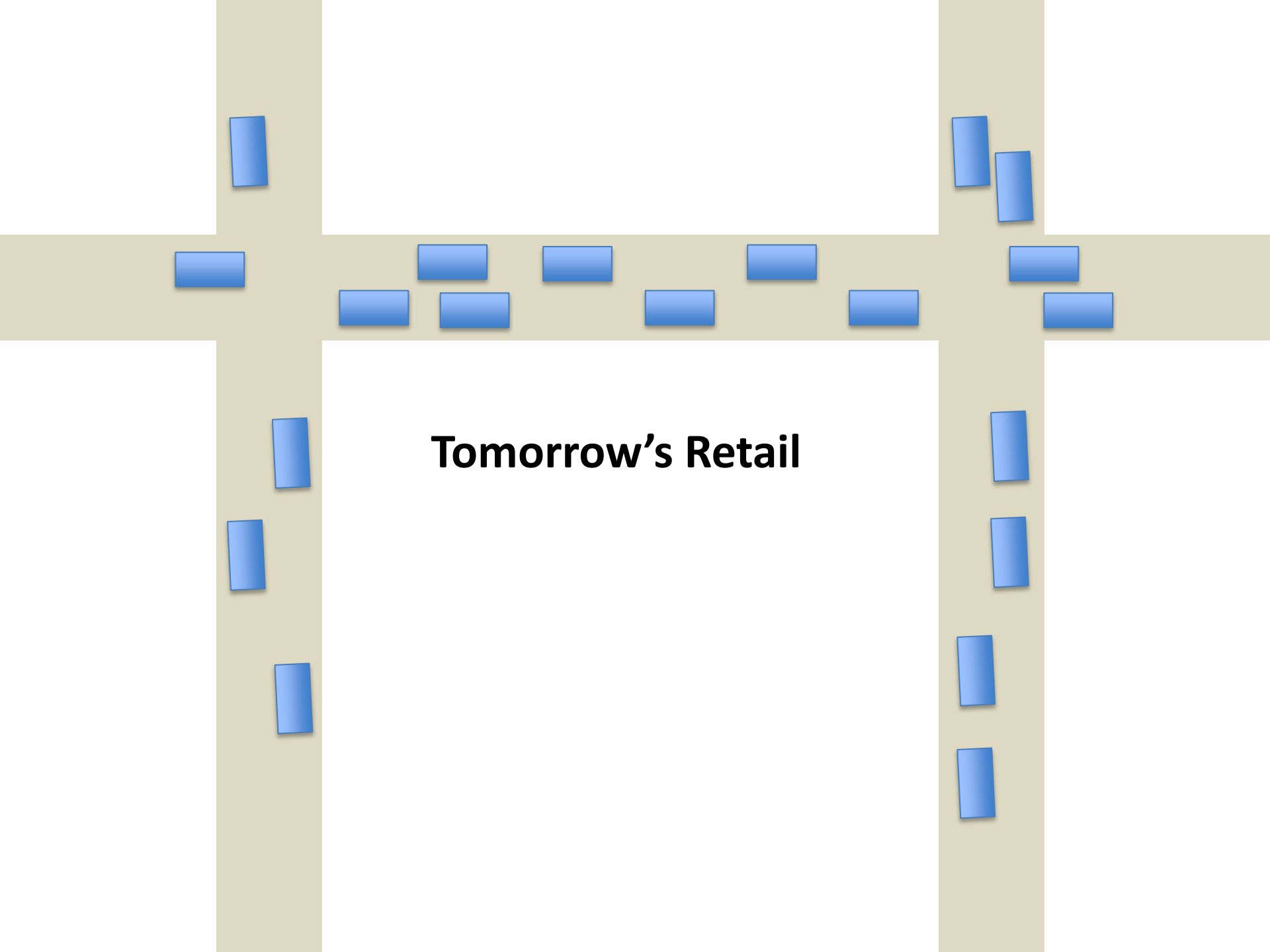
Cheonggyecheon River in Seoul

Cheonggyecheon River in Seoul

50% trips active modes?

Today's Retail in Urban Areas

Suburban warehouse


Tomorrow’s Retail

HOW WE HANDLE LABOR MATTERS

JOB LOSS (US example)

We need no drivers & with FAVES only a fraction of manufacturing

Today, we have:

3.5 million freight and delivery truck drivers
665k bus drivers
90k licensed taxi drivers in NYC alone

5.6 million in direct automotive manufacturing
1.65 million automotive dealerships

Vehicle cleaning, maintenance & repair crews
Gas station attendants & insurance agents
Waiters & cooks that feed the 3.5 million truckers

http://www.autoalliance.org/files/dmfile/2015-Auto-Industry-Jobs-Report.pdf
Center for Automotive Research, Ann Arbor MI

Registry: Laid off, first hired
Pilot Universal Basic Income

Match this against:
dramatic increase in access to jobs & jobs with higher wages

Do Transit and AVs Coexist?

YES!

Metro, light rail, BRT in dedicated ROW will be faster than vehicles. But buses will disappear.

To accomplish this big vision
10% OF CURRENT VEHICLES
We need to the involvement of many sectors

COMMUNITY
Demand for FAVES vision

LAND USE & URBAN PLANNING
Planning & Criteria for New Space

TRANSPORT INFRASTRUCTURE REVS
No gas tax, parking, tickets, 1/10th tolls
New: fuel type, weight, distance, congestion, occupancy

Shared, Electric

TRANSPORT
w/out ownership, integrated multimodal

VICTIMS
Organize those who have suffered

LABOR
Rapid crash in sector jobs
Enable diversification today; plan for future

ENERGY
New grid load must be renewables

DATA
Open APIs, Privacy, Security
Transparency, Portability

A FUTURE PRIORITIZING PEOPLE NOT CARS

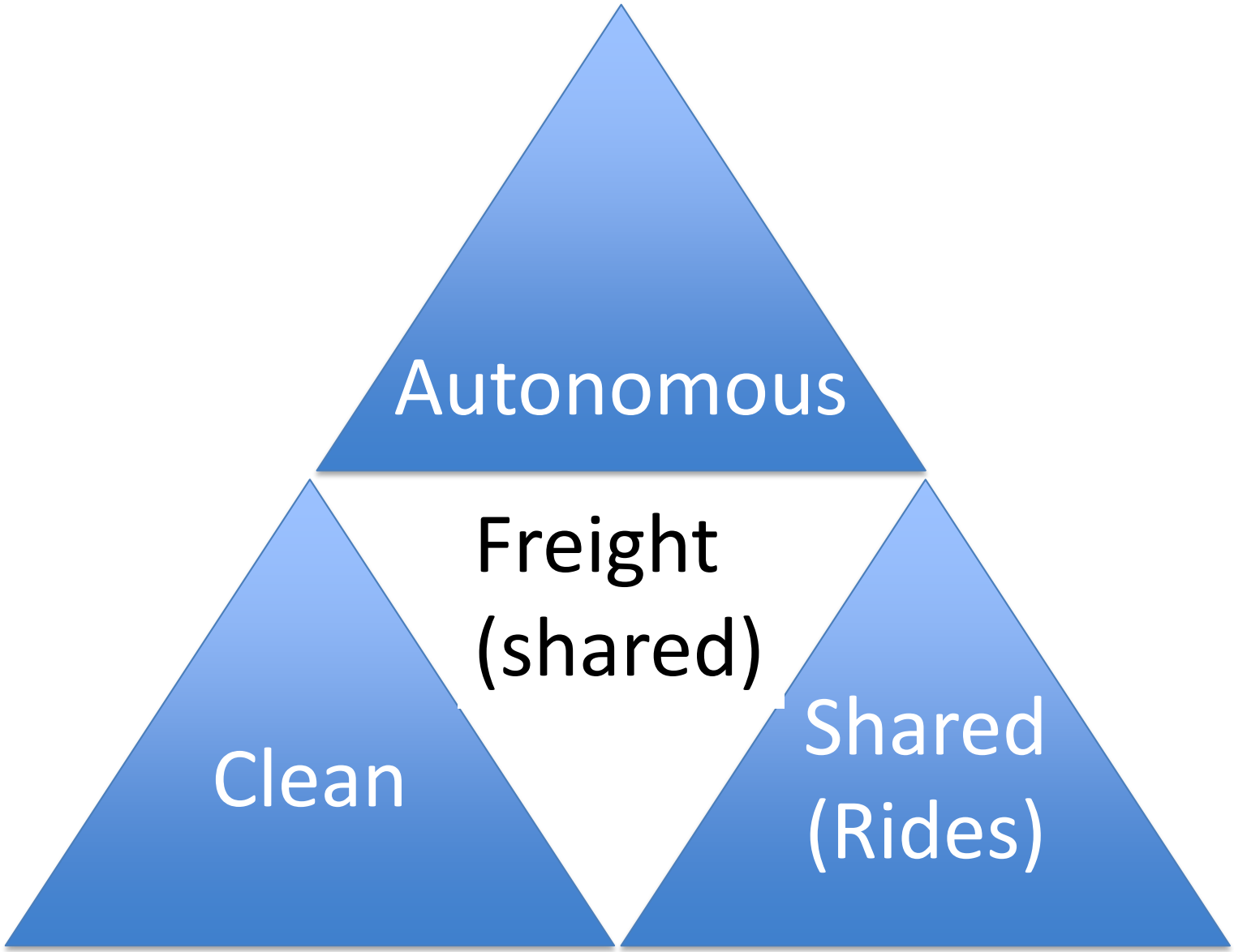
Legislation:

1. **All passenger AVs must be clean fuel or EVs.**

2. **New addition to energy grid must be renewable.**

3. **For the first 5 years, manufacturers can only sell to fleets (FAVES).**
   - **maximize learning per vehicle**
   - **benefits available to all, not just the rich**
   - **matches OEM intent w/ early constrained supply**

4. **FAVES must use standard open APIs.**
   To maximize likelihood of shared trips for passengers (and freight).
   Today, drivers can run with several apps; tomorrow strong monopoly


Autonomous
Freight
(shared)
Clean
Shared
(Rides)

Local (metro) research

To quantify benefits:

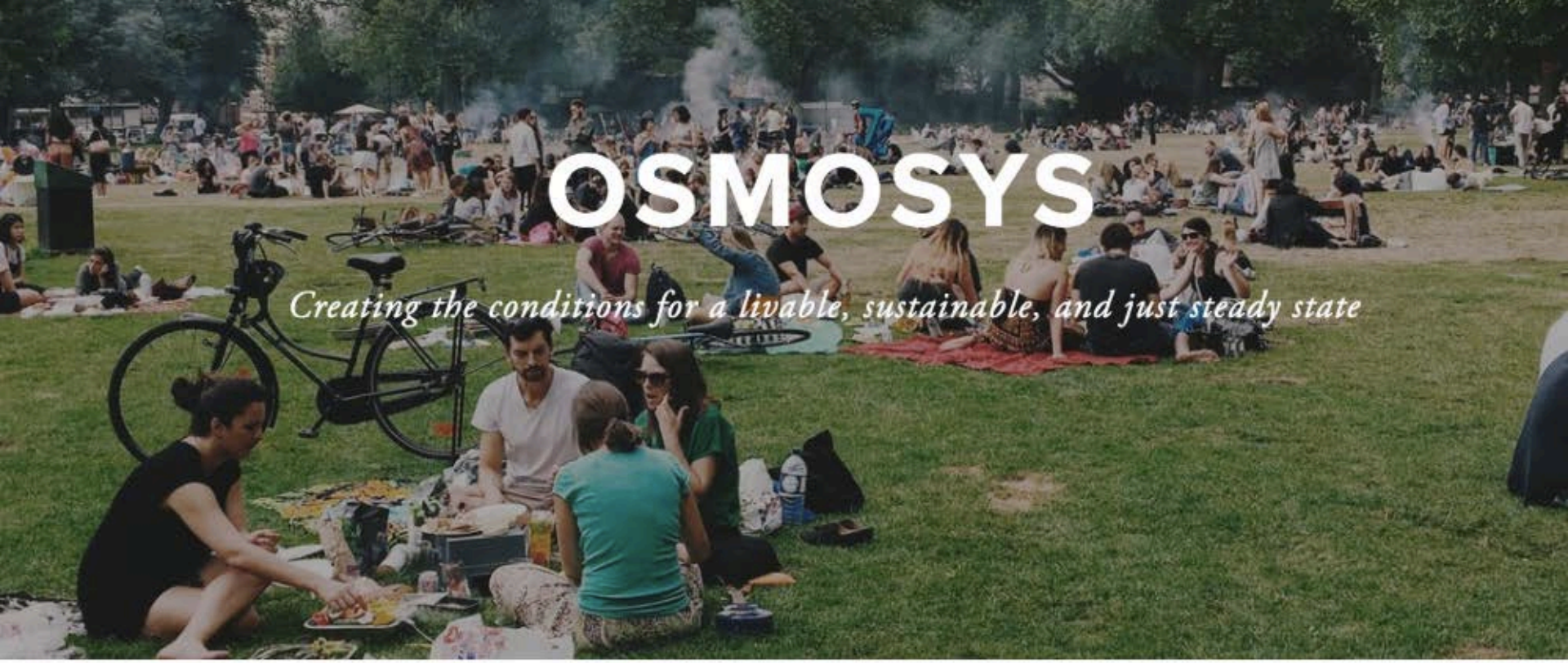
- **How many jobs newly accessible? Increased wages?**
- **Inventory on-street & off-street parking. What better uses? What value?**

To quantify costs:

- **How many jobs lost?**
- **How much transportation & labor tax revenue lost?**

Time to Seize the Moment

What are we waiting for?



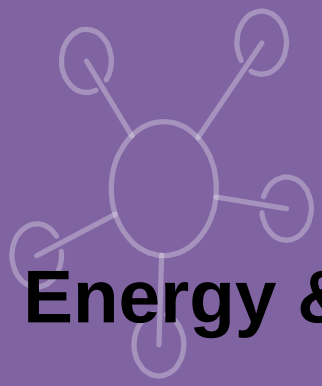
OSMOSYS

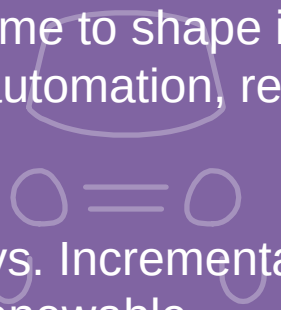
Creating the conditions for a livable, sustainable, and just steady state

OSMOSYS IS A RAPID RESPONSE ALLIANCE OF PEOPLE, NGOS, INSTITUTIONS, AND CITIES WORKING TOGETHER AND WORKING THROUGH THE INTRODUCTION OF AUTONOMOUS VEHICLES INTO CITIES.

GUIDING PRINCIPLES

Community	Vision zero safety for all modes; Demand for FAVES not Avs. Environmental & social justice
Transport	Multimodal: 50% physically active modes (walk/bike) FAVES not AVs: 50% shared vehicles (all sizes)
Land Use	Repurpose ROW & parking for livable, equitable, sustainable communities. Create local criteria & priorities now.
Labor	Build fund for inevitable driver job losses & registry; pilot UBI. Enable income diversification & protect this way of working.
Taxation	New transport tax regime to shape incentives & cover costs. AVs model for automation, rethink labor & corporate taxation.
Energy & Climate	Urban AVs must be Evs. Incremental demand on energy grid must be renewable
Data	Standard Open APIs to support multimodal transport, shared trips, data commons. Protect privacy & security.





LITHIUM : TOMORROW'S TRANSPORTATION. TODAY.

India's first 100% electric solution for corporate transport.

OWNER LOGIN

Clean

Green fuel
Hygienic vehicles
Well groomed crew

Connected

Location aware
Situation aware
Monitored

Shared

Easy
Anytime
Anywhere
Flexible

Smart

Data driven
Self learning
Insightful visualizations
Pre-emptive not reactive