

The background is a dark blue gradient with a starry or particle-like texture. On the left side, there are several overlapping circular elements. A prominent one is a large scale with tick marks and numbers ranging from 140 to 260. Other circles contain curved lines and arrows, suggesting motion or data flow.

THE AUTONOMOUS VEHICLE REVOLUTION ... IS HERE

MOIS NAVON

EVERYTHING ... IS ABOUT TO CHANGE



TIKUN OLAM – MAKING A BETTER WORLD

תלמוד בבלי עירובין כב:

יהושע אוהב ישראל היה, עמד ותיקן להם דרכים וסרטיא [דרכי טיול]. כל היכא דניחא תשמישתא - מסרה לרבים, כל היכא דלא ניחא תשמישתא - מסרה ליחיד.

Joshua, who loved the people of Israel, established roads and thoroughfares for them. Thus, he assigned convenient roads for public use and those that were not convenient for private use.

FIXING THE WORLD WITH AUTONOMOUS VEHICLES

The image features a central, glowing blue car with a digital, wireframe-like texture. The car is positioned on a circular platform with concentric rings. The background is a dark blue gradient with various technical and futuristic elements, including a city skyline on the left, a large circular gauge with numbers (150, 170, 180, 190, 200) on the right, and several glowing green and red circles and lines. The overall aesthetic is high-tech and futuristic.

DISRUPTIONS

TRAFFIC ACCIDENTS

- World Health Organization:
 - **3,400** die in traffic accidents every day.
 - 54,000 to 136,000 injured in traffic accidents every day.
- “Vision Zero” – No Car Fatalities/Serious-Injuries
 - Realistically: Reduce Fatalities by 90%
 - Mobileye working to achieve even before L5
- End of “Crash Economy”

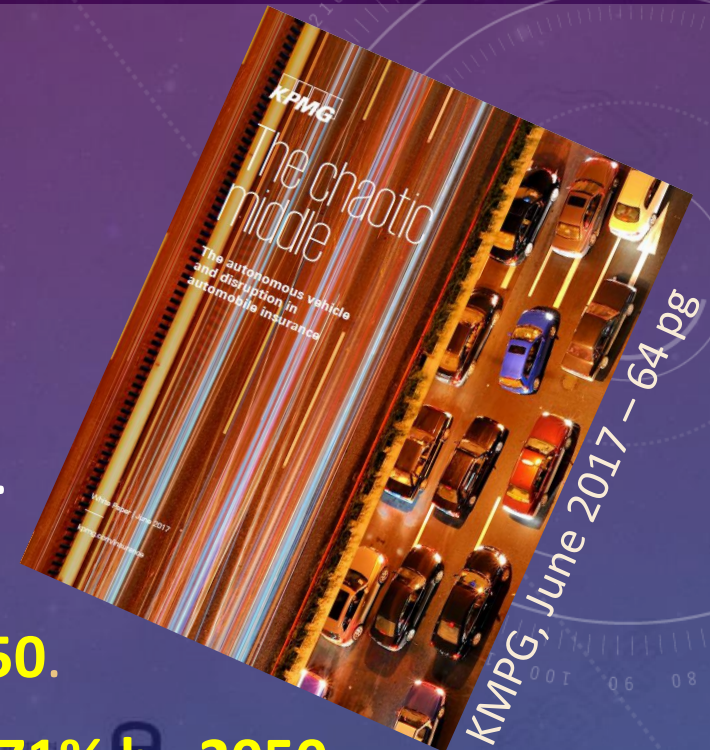


“CRASH ECONOMY” - INSURANCE

- Disruption of **\$247 billion** auto insurance marketplace.
 - Loss frequency (i.e., likelihood of collision losses) will be reduced **90% by 2050**.
 - Auto vehicle technology could shrink auto insurance sector **71% by 2050**.

*“Some aspects of insurance will be impacted as autonomous cars become the norm. There will still be a need for liability coverage, but over time the coverage could change, as **manufacturers** and **suppliers** and possibly even **municipalities** are called upon to take responsibility for what went wrong.”*

- Insurance Information Institute



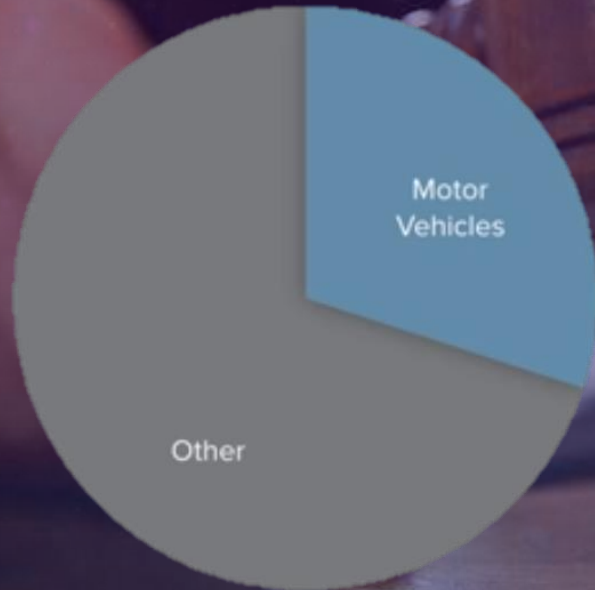
“CRASH ECONOMY” - CAR BODY PARTS

\$1 Trillion/Year

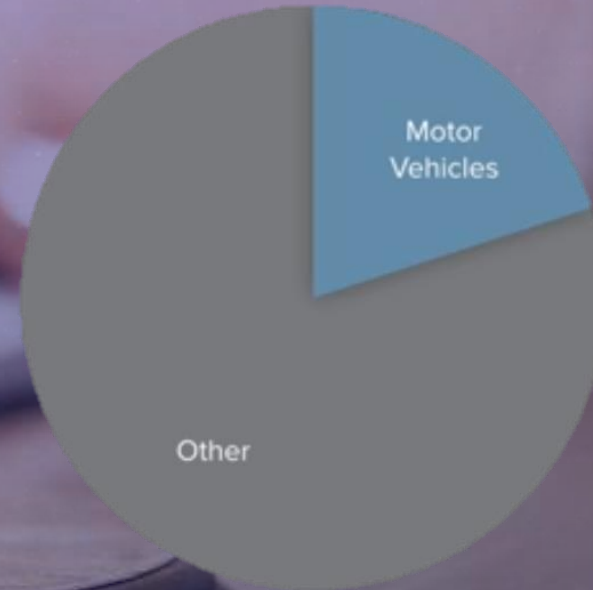


“CRASH ECONOMY” - LEGAL SYSTEM

Motor Vehicle Accidents account for more than a **third** of civil trials



Motor Vehicle Claims comprise **20%** of tort trials



No more traffic court, etc.



TRAFFIC/PARKING TICKETS

A Thing of the Past

GOVERNMENT SPENDING/REVENUE

Countries spend **3% of GDP** on traffic accidents
- *World Health Organization*

A stack of Euro coins is the central focus, with several coins visible in the foreground and background. The background is a dark blue gradient with faint, light blue circular patterns and a scale-like graphic on the right side, suggesting a financial or data-related theme.

MOBILITY FOR ALL



"Self-Driving Cars: THE
IMPACT ON PEOPLE WITH
DISABILITIES," 2017, 35pp

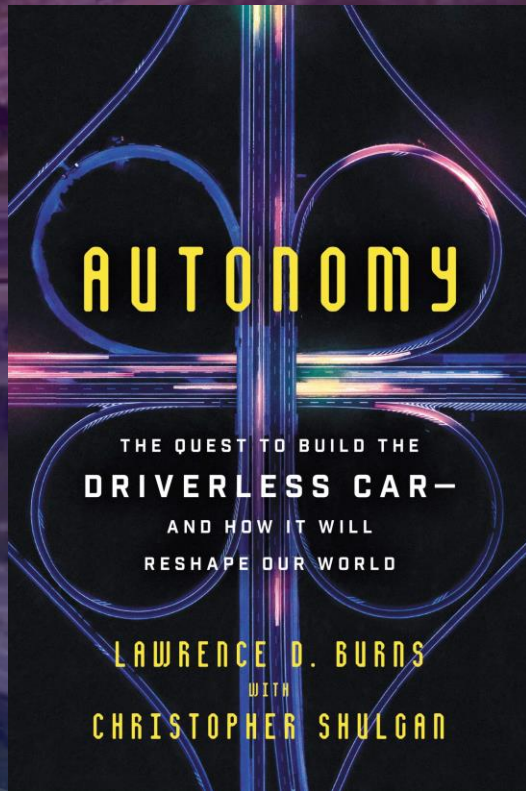


NO DRIVERS

- No Driver's License
- No Driver Training
- No DMV

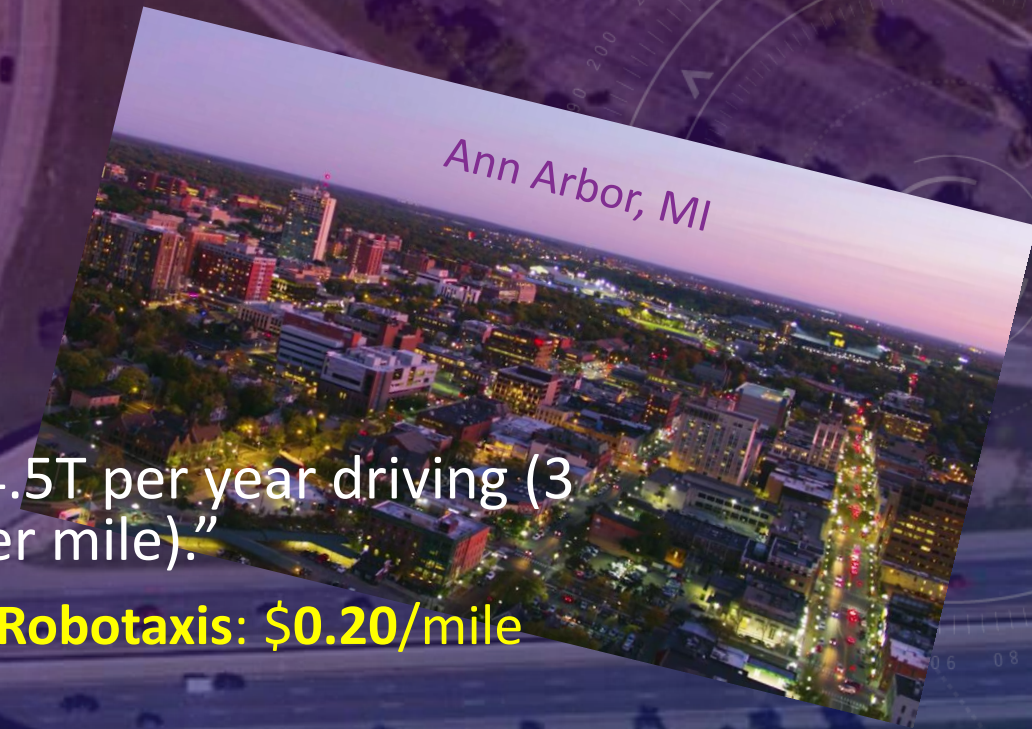


THE \$4 TRILLION DISRUPTION

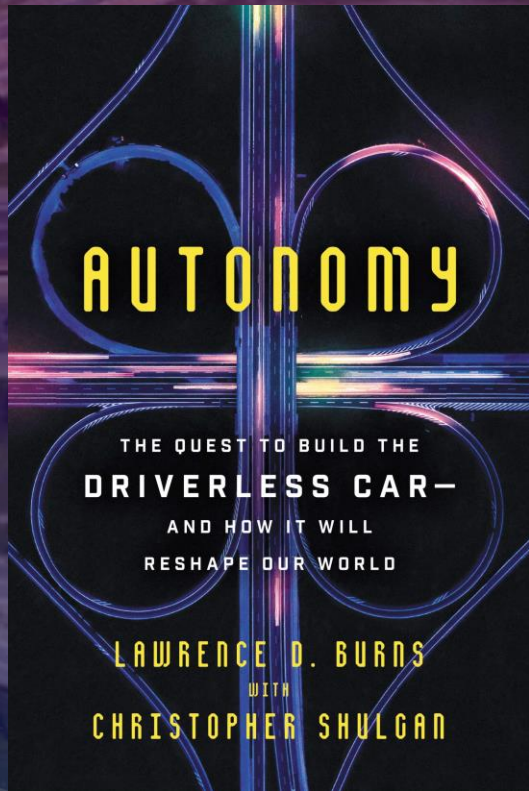


- “Americans spend about \$4.5T per year driving (3 trillion miles times \$1.50 per mile).”
 - **Private Cars: \$1.50/mile; Robotaxis: \$0.20/mile**
- Case Study: Ann Arbor, MI.
 - How many AVs/Robotaxis would it take to service the entire city – i.e., get everyone a car to take them to where they need to go 24/7, without having to wait more than 2 min for a car to come?

The answer stunned even them ...



THE \$4 TRILLION DISRUPTION



“Salt Lake City, UT; Rochester, NY; Columbus, OH; Austin, TX; Sacramento, CA. In every case, a shared fleet size equal to about **15 percent** of the number of cars owned in these cities would provide responsive and efficient mobility service” (Autonomy, p. 223).



PRIVATE CAR OWNERSHIP

- “By **2030**, within 10 years of regulatory approval of fully autonomous vehicles, **95% of all U.S. passenger miles will be served by transport-as-a-service (TaaS) providers who will own and operate fleets of autonomous electric vehicles** providing passengers with higher levels of service, faster rides and vastly increased safety at a cost up to 10 times cheaper than today’s individually owned vehicles.” (Tony Seba, RethinkX, p.15).
- “UBS predicts that by **2035, 80% of people will use robotaxis in cities where they are available, and that urban car ownership will fall by 70%**. ... and by 2050 those vehicles will be split roughly equally between robotaxis and privately owned AVs.” (The Economist, 2018)

TRAFFIC?

“A University of Illinois study found that if just five percent of vehicles are autonomous on a regular road, that's enough to eliminate those stop-and-go pulses of traffic that humans cause by not driving smoothly. **The team sent one autonomous vehicle onto a track with 20 regular drivers, and found it completely cut “phantom traffic jams,” by acting as a pace car.**” (WIRED, 2017).

COMMUTE TIME

Beyond the savings in time due to the smooth flow of traffic, the fact that all cars know exactly where all other cars are at all times, and have the ability to respond to changes immediately, will allow cars to travel at high speeds unimaginable for human drivers limited by human reaction times.

Audi designed a car that can drive itself at speeds of up to **220 kmh / 136 mph!!**



Guinness World Records 2022 – Robocar: **309 kmh / 192 mph!!**

REAL ESTATE - HOUSING

- Self-Driving Cars May Kill That Old Real Estate Mantra Of 'Location, Location, Location' – Forbes, 2018
- “We anticipate ... as soon as the **2020s, the most desirable suburbs and rural areas may experience growing demand** as some consumers, who previously chose smaller, higher density living to avoid long commutes, purchase AVs to make their commutes less arduous... At the same time, as **urban living becomes more affordable many people may continue to prefer living in cities**. Tracking how consumer preferences change over the next several decades will be crucial to understanding how AVs might ultimately affect housing.” – “The Advisory,” RCLCO, 2015

REAL ESTATE – CITY SCAPE

- “... there are around 500 million, and as many as 2 billion, parking spaces in the United States that occupy anywhere from 4,000 to 16,000 square miles (the equivalent of all the land in Connecticut and Vermont combined).”
- City centers will be transformed as robo-taxis need not park in the city center where real estate is at a premium.
 - All the massive parking lots in buildings will now be available for apartments, offices, stores, etc..
 - The underground parking, which is not suitable for apartments can be used for underground datacenters, for storage – personal and industrial.
 - All the sprawling parking lots not in buildings will be freed up for other uses such as parks, etc..

Peru

Cusco



PRICE OF GOODS

- A significant component of the goods we buy are due to the costs of delivering them.
 - With robo-trucks, goods will be **delivered faster and cheaper** than having drivers limited to eleven hours of driving per day.
 - Furthermore, it is estimated that **energy consumption will be greatly reduced** due to the computer driving at consistent and optimal speeds, avoiding the inefficiencies of human drivers. And on top of this trucks will be able to “freight-train” / “platoon” themselves one to the other to **reduce wind drag**.
 - Finally, the trucks themselves will be **cheaper** without the need for a driver’s cabin – with heat/ac, windshield, interior design, etc.



FAST-FOOD/RESTAURANT INDUSTRY

- “Restaurant industry will be **shaped by AI, autonomous vehicles** in 2030” (Restaurant Dive, 2019).
- McDonalds reports that **70%** of its sales come from the **drive-through window**. But people in AVs are more likely to go from point A to point B without stopping for food. So they are looking in to: adding electric vehicle charging stations at its thousands of locations across the U.S., drones or self-driving trucks for deliveries, or even a custom **interface with autonomous vehicles that would enable riders to easily get a burger on the fly**.
- “Hands-free driving will also give restaurants the opportunity to market foods at the drive-thru that would be too challenging to eat while driving a standard car.”

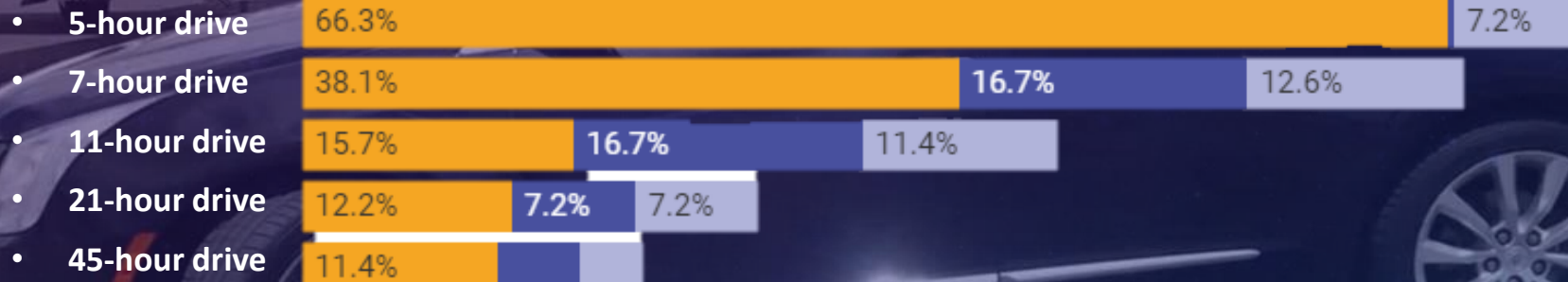
CAR MANUFACTURING INDUSTRY

- “... post-disruption vehicles will last 300,000 miles accumulated in just four or five years. Which, in turn, affects how many vehicles are manufactured. My own calculations suggest **we could get by with about half the vehicles we use today** – and the ones we do use will be lighter, with fewer parts.” (Autonomy, p. 253).
- “Annual **manufacturing of new cars will drop by 70%** during the same period” (Tony Seba, RethinkX, p.32).

AIRLINE INDUSTRY

Do you want to skip the flight, and take a drive?

Some people would **prefer driving over taking a plane, no matter the distance**. The option to **take a self-driving car** makes people less interested in flying – especially if it means **avoiding renting a car at the destination**. Everyone else would head to the airport.



Driverless cars are going to disrupt the airline industry

June 10, 2019 10:55pm AEST

*“These changes could substantially change the aviation industry, with **airlines ordering fewer airplanes from manufacturers**, airports seeing fewer daily **flights** and lower revenue from **parking lots**, and even airport **hotels** hosting fewer guests.”*

AIRPORTS “AUTONOMIZE”

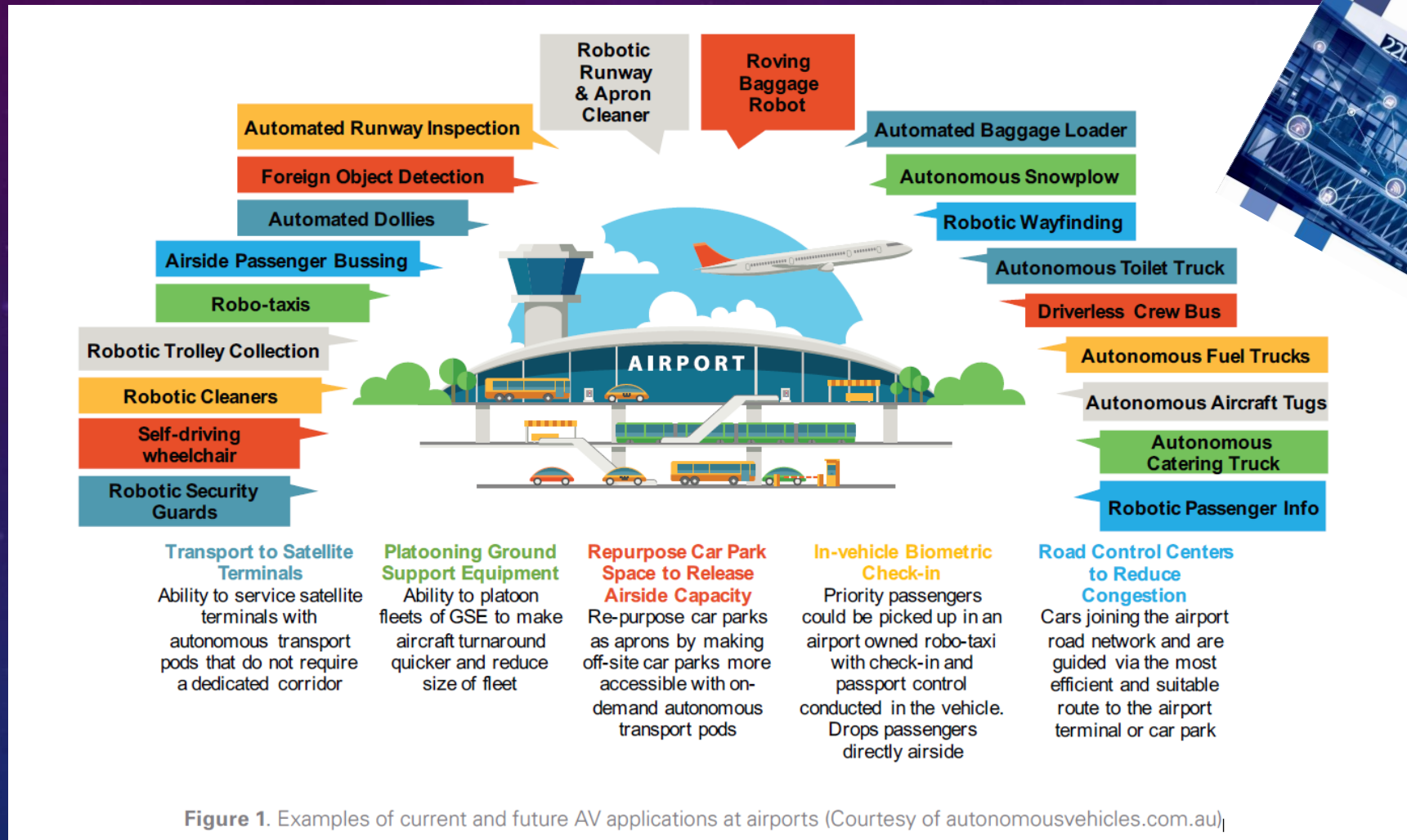


Figure 1. Examples of current and future AV applications at airports (Courtesy of autonomousvehicles.com.au)

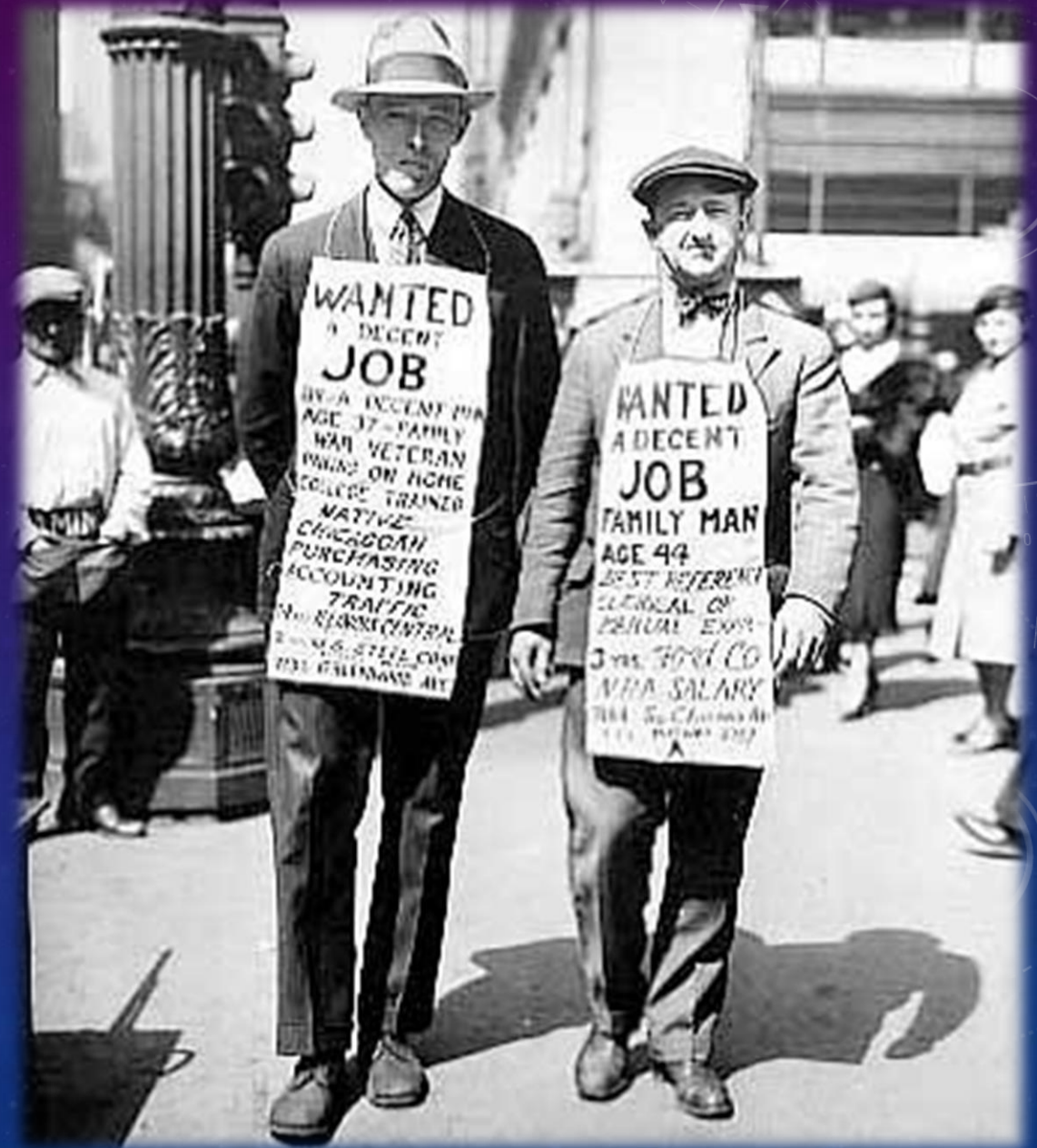
FIXING THE WORLD WITH AUTONOMOUS VEHICLES

Negative Consequences & Positive Responses



THE NEGATIVES – JOB LOSS

- **Drivers:** 3% of American labor force is drivers – i.e., 4M people.
- **Car Manufacturing:** 50-70% cut in number of cars being manufactured.
- **“Crash Economy”:** insurance companies, body shops, chiropractors, lawyers and others.
- **Peripheral Economy:** Traffic Police, Car Garages/Mechanics, etc.
- **Airport/Airline Industry:** Security, People & Luggage Transport, etc.



RESPONSES

Retrain / Retire Early
(paid for by 3% GDP windfall).



Adapt:

- “In 1800, the proportion of the total labor force that worked in agriculture was near 80%. In 2000, ... less than 5%...” (Autonomy, p. 254).
- “Remember, more than a century ago, plenty of people worked as blacksmiths providing horses with shoes – and years later, it turned out most of them navigated the automobile disruption just fine” (Autonomy, p. 325).



New Jobs: “... for every job the Internet eliminated, 2.4 new positions had been created.”
(Autonomy, p. 255).



COMPANIES ADAPT

Panasonic: established automotive R&D division, transferring about 350 engineers from TV, the company's mainstay at the time, and other consumer electronics businesses.



Polaris: produces off-road vehicles (e.g., snowmobiles), now developing autonomous vehicles for combat and military applications.

McDonalds: electric vehicle charging stations, drones or self-driving trucks for deliveries, enable riders to easily get a burger on the fly.



COMPANIES ADAPT

BIG DATA



Insurance

Leapfrog your competition with proven risk models



Shared Mobility

Optimize costs to make room for growth



Telematics-based Ad Targeting

Target the best drivers for your business



Mobile Apps

Enhance user experience with mobility data

THE NEGATIVES – ORGAN LOSS >> TECHNOLOGY SAVES

Self-Driving Cars Will Make Organ Shortages Even Worse



3D-printing organs moves a few more steps closer to commercialization

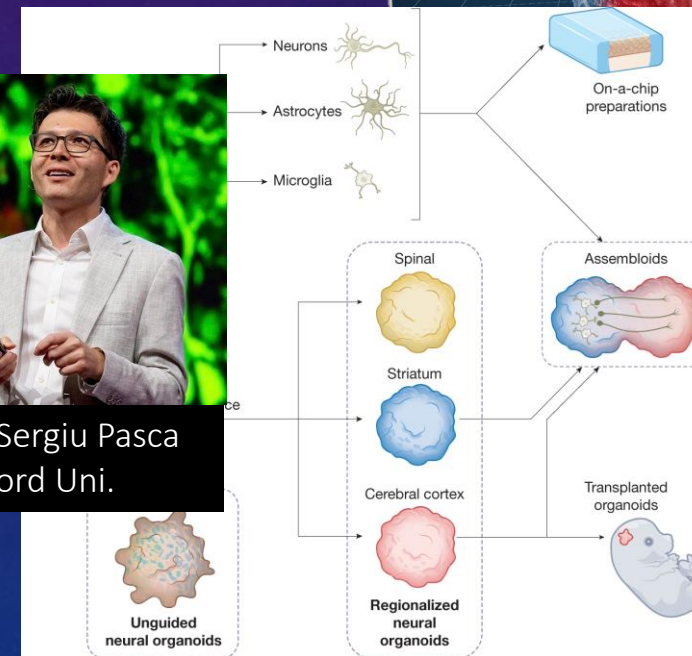
Jonathan Shieber @jshieber / 12:37 am IDT • August 12, 2019



<https://www.pascalab.org/>



Prof. Sergiu Pasca
Stanford Uni.



3D printed organs can fulfill the need

- 20% of organ donations come from car accident victims

- Organoid development can fulfill the need

THE NEGATIVES - CLIMATE CHANGE >> TECHNOLOGY SAVES



National
Science
Foundation

Computers that power self-driving cars could become a driver of global carbon emissions

Study shows that hardware efficiency will need to advance rapidly to keep computing-related emissions in check

In the future, self-driving cars' computational needs may fuel a large increase in global carbon emissions. The energy needed to run the powerful computers onboard a global fleet of autonomous vehicles could generate as much greenhouse gas emissions as what all global data centers combined currently emit.



EESI

Environmental and Energy
Study Institute

AVs can safely be run at higher speeds ... which would **increase energy consumption** over the same distance.

MIT-IBM Watson AI Lab

[Avoiding stop-and-go at intersections] reduces fuel consumption and emissions while improving average vehicle speed. ...

If every vehicle on the road is autonomous, their control system can **reduce fuel consumption by 18 percent and carbon dioxide emissions by 25 percent**, while boosting travel speeds by 20 percent. ...



EESI

Environmental and Energy
Study Institute

[If] driving could become much less risky and many **safety features in cars could become superfluous** ... safety features that are no longer necessary could make AVs up to **75 percent lighter** than conventional vehicles, which could make them **significantly more energy efficient**.

THE NEGATIVES - CLIMATE CHANGE >> TECHNOLOGY SAVES

The impact of ELECTRIC Autonomous Vehicles

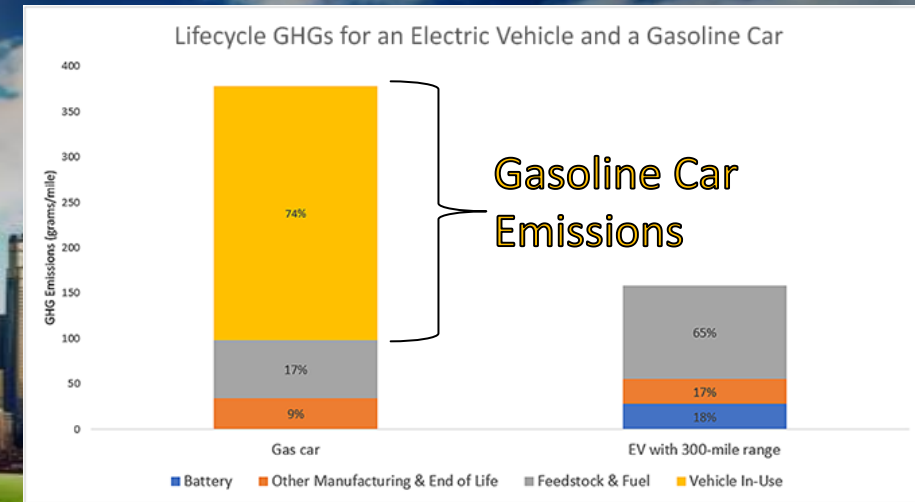


Myth #1: Electric vehicles are worse for the climate than gasoline cars because of power plant emissions.

- **FACT:** Electric vehicles typically have a smaller carbon footprint than gasoline cars, even when accounting for the electricity used for charging.

Myth #2: Electric vehicles are worse for the climate than gasoline cars because of battery manufacturing.

- **FACT:** The greenhouse gas emissions associated with an electric vehicle over its lifetime are typically lower than those from an average gasoline-powered vehicle, even when accounting for manufacturing.



- The blue bar represents emissions associated with the battery.
- The orange bars encompass the rest of the vehicle manufacturing (e.g., extracting materials, manufacturing and assembling other parts, and vehicle assembly) and end-of-life (recycling or disposal).
- The gray bars represent upstream emissions associated with producing gasoline or electricity (U.S. mix)
- The yellow bar shows tailpipe emissions during vehicle operations.

WHEN?

- “The era of the human-driven automobile, its repair facilities, its dealerships, the media surrounding it – all will be gone in 20 years [i.e., **2035**]” – Bob Lutz, Vice Chairman of General Motors (2015)
- “Self Driving Cars can replace 90%+ of all cars on the road between **2025-2055+**” – IHS, Global Information Company (2014)
- 95% of all passenger vehicle miles being driven by on-demand, fully autonomous vehicles by **2030** – Tony Seba, RethinkX (2017)
- “Widespread adoption by **2035-2040.**” – The Advisory, RCLCO (2015)
- “You Won't Need a Driver's License by **2040**” – WIRED (2012)

TIKUN OLAM –
MAKING A BETTER WORLD



GRACIAS!

RESOURCES

- [“The Chaotic Middle – The Autonomous Vehicle and Disruption in Automobile Insurance,” KMPG, 2017](#)
- [“Background on: Self-driving cars and insurance,” Insurance Information Institute, 2018](#)
- [“Autonomous Vehicle Technology - A Guide for Policymakers,” RAND, 2016, 214pp](#)
- [“A Driverless Vehicle Roadmap for the Real Estate Practitioner,” RCLCO, 2015-2017, 3 part Series](#)
- [“Self-Driving Cars: The Impact On People With Disabilities,” 2017, 35pp](#)
- [“Rethinking Transportation 2020-2030,” RethinkX \(Tony Seba\), 2017, 77pp](#)
- [“Autonomous Vehicles and Systems at Airports,” Airports Council International \(ACI\), 2019, 48pp](#)
- [“Autonomy - The Quest to Build the Driverless Car—And How It Will Reshape Our World,” Burns, 2018](#)
- [“Autonomous Vehicles: State of the Technology and Potential Role as a Climate Solution”](#)



RESOURCES – CITY PLANNING

- [National Association of City Transportation Officials - Design Guides and Publications](#)
- [Blueprint for Autonomous Urbanism: Second Edition](#)
- [Redesigning urban elements and structures considering autonomous vehicles: Preparing design strategies for wide implementation in cities](#)
- [Are Cities Prepared for Autonomous Vehicles? Planning for Technological Change by U.S. Local Governments](#)

