Our Shared Autonomous Future

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The change will happen faster than you think
The big stick driving the change: insurance

**Figure 2. Stakeholders and insurance products in the future of mobility**

<table>
<thead>
<tr>
<th>Future state</th>
<th>Stakeholder model</th>
<th>Stakeholder</th>
<th>Primary coverages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Personally owned driver-driven</strong></td>
<td>Traditional personal auto insurance</td>
<td>Vehicle owner (individual)</td>
<td>Driver liability, collision, comprehensive</td>
</tr>
<tr>
<td></td>
<td>Fleet (e.g., yellow cab, limo)</td>
<td>Vehicle owner (commercial)</td>
<td>Driver liability, collision, comprehensive</td>
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<tr>
<td></td>
<td>Owner/operator (e.g., black car)</td>
<td>Vehicle owner (individual)</td>
<td>Driver liability, collision, comprehensive</td>
</tr>
<tr>
<td><strong>2. Shared driver-driven</strong></td>
<td>Rental</td>
<td>Vehicle owner (commercial)</td>
<td>Comprehensive, liability (e.g., road worthiness)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicle driver (individual)</td>
<td>Driver liability, collision</td>
</tr>
<tr>
<td><strong>3. Personally owned autonomous</strong></td>
<td>Personal autonomous vehicle insurance</td>
<td>Vehicle owner (individual)</td>
<td>Comprehensive, liability (e.g., road worthiness)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AV system manufacturer/ OS provider (commercial)</td>
<td>AV product liability</td>
</tr>
<tr>
<td><strong>4. Shared autonomous</strong></td>
<td>Commercial autonomous vehicle insurance</td>
<td>Vehicle owner (commercial)</td>
<td>Comprehensive, liability (e.g., road worthiness)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AV system manufacturer/ OS provider (commercial)</td>
<td>AV product liability</td>
</tr>
</tbody>
</table>
A big driver of this change: the cost of driving

Despite high costs and fast depreciation, substantial utilization can make shared, high-tech “mobility vehicles” economically compelling.

Today’s car

- 21¢ per mile

Future mobility car

- 17¢ per mile
- 26¢ per mile

The “mobility vehicle” is based on a small sedan that costs $25,000 and is completely replaced every three years with no residual value. It is shared and, therefore, driven 40,000 miles per year. The average NYC cab is driven an average of 70,000 miles per year.

- Fixed Costs (per mile)
- Depreciation, insurance, finance, and registration-related costs
- Operating Costs (per mile)
- Gas, maintenance, and tires

Sources: AAA, NYC Taxi and Limousine Commission, “KPMG LLP’s: Me, my vehicle, my life...in the ultra connected age”
A second driver: personal safety

U.S. Fatality Reduction Expected with Autonomous Vehicles
(Units in deaths per 100 million vehicle miles traveled)

- 2013 National Average: 1.1
- Autonomous Vehicle: 0.2
A third driver: reduced pollution

Three Revolutions in Urban Transportation

Business-as-Usual Scenario
20th Century Technology
Through 2050, we continue to use vehicles with internal combustion engines at an increased rate, and use transit and shared vehicles at the current rate, as population and income grow over time.

2 Revolutions (2R) Scenario
Electrification + Automation
We embrace more technology. Electric vehicles become common by 2030, and automated electric vehicles become dominant by 2040. However, we continue our current embrace of single-occupancy vehicles, with even more car travel than in the BAU.

3 Revolutions (3R) Scenario
Electrification + Automation + Sharing
We take the embrace of technology in the 2R scenario and then maximize the use of shared vehicle trips. By 2030, there is widespread ride sharing, increased transit performance—with on-demand availability—and strengthened infrastructure for walking and cycling, allowing maximum energy efficiency.

Number of Vehicles on the Road by 2050
- 2.1 billion
- 2.1 billion
- 0.5 billion

CO₂ Emissions by 2050
- 4.600 megatones of CO₂
- 1.700 megatones
- 700 megatones

www.itdp.org
Complete autonomy is coming this year
Private sector gains, public sector challenges

The route to the autonomous car

Advantages

- Safety: 90% reduction in road traffic accidents currently caused by human error.
- Economic benefits: US$ 1.3 trillion saved every year for the US economy, globally this translates into US$ 5.6 trillion.
- Social: Greater mobility for disabled and elderly people.
- People over the age of 60 expected to double from 130 to 2050.

Potential obstacles

- Liability: Who accepts responsibility in the case of an accident?
- Legislation: EU infrastructure effort means that US$ 10.8 billion had to be found to keep the Highway Trust Fund solvent until May 2015.

Consumer adoption

- Once people accept and trust the systems, adoption will speed up and climb.

Welcome to the autonomous car

Part of a larger value shift to a sharing economy

Revenue for all ten sectors: US$ 255 billion
Revenue for five Sharing Economy sectors: US$ 15 billion

Revenue for all ten sectors: US$ 670 billion
Revenue for five Sharing Economy sectors: US$ 335 billion
Public rights of way will feel the change first
Creating a lot more space for other things
Cities will have more higher-value taxable land
Homeowners will gain both land and interior space
The suburban landscape will change the most
Parking ramps will have to find other uses
Highways will become multi-modal
How will cities adapt to lost revenue?

*Governing* magazine estimates that cities will lose $129 per capita annually in revenues related to parking meters, fines, citations, gas taxes, vehicle registration, and licensing fees.
What will cities do with the higher-value land as it becomes available?

The National League of Cities estimates that cities have, on average, **30% of their land area devoted to parking**, which will be available for higher and better uses within the next decade or two.
How will cities handle pedestrians who can cross streets anywhere without fear of being hit?

“From the point of view of a passenger in an automated car, it would be like driving down a street filled with unaccompanied five-year-old children,” Adam Millard-Ball, UC Santa Cruz
What will cities do when companies propose becoming their mobility providers?

“Ford City Solutions will work with municipalities to propose, pilot and develop mobility solutions tailored to the community. Discussions are already under way with several global cities.” Ford media center, Sept. 2016
How will governments help displaced workers?

SAV’s will displace “5 million people nationwide who make their living driving taxis, buses, vans, trucks and e-hailing vehicles. That’s almost 3% of the workforce”, according to Lawrence Katz, a labor economist at Harvard. “Most of these drivers belong to the same demographic as factory workers who’ve already been hit hard by the loss of 5 million manufacturing jobs since 2000.” LA Times, 9/22/2016
How will cities adapt their infrastructure to the transition to shared autonomous vehicles?

“Curb space will become much more valuable, with new design standards for drop-off areas and fees for access.” Brookings, 10/16/2017
How can governments encourage multi-modal transportation?

S.F’s MuniMobile app allows “Users (to) easily compare trips via rail, bus, single or shared ride service, single or shared autonomous vehicle, bike, or by foot. Behind-the-scenes, app technology allows cities to collect trip data, track revenue, and synchronize transportation services.” Brookings, 10/16/2017
How will governments deal with transit in the era of shared autonomous vehicles?

“Driverless cars could help solve the “last mile” problem of better connecting people in less populated areas to transit hubs. They could also cut labor costs, which comprise about three-quarters of bus operating expenses for the nation’s largest transit systems.”

Governing
What regulations need to change to reduce barriers to this technology?

“States traditionally regulate the driver while the federal government regulates the car, but that division of labor may be hard to maintain when cars have no drivers.” Insurance Journal, 9/19/2017
What is needed to ensure equitable access?

“A future with shared, electric autonomous vehicles holds many promises. But without an intentional focus on equity, it may exacerbate existing barriers and increase inequality. Policymakers must consider...how it can be used to improve the lives of those who need it most.”

Stuart Cohen, Transform, Sahir Shirazi, State of CA