Consequences of vehicle automatization

Aspects from a transportation science perspective

Benjamin Kickhöfer

DLR – Institute of Transport Research
City of tomorrow?
How does the video picture the city of tomorrow?

More space for humans
(less parking space needed, more efficient traffic flow)

Less waiting times, smoother operations
(synchronizing transport demand with supply)

Safer, less noisy, and less polluting transport
(smart traffic management, car2car communication)

How do we get there?
• Abandon private vehicles
• Install Shared Autonomous Vehicle services (SAV/AVoD/MaaS)
New SAV/AVoD/MaaS modes:
Autonomous Carsharing (ACS), Autonomous Ridesharing (ARS)

<table>
<thead>
<tr>
<th>Feature</th>
<th>ACS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Vehicles</td>
<td>✓</td>
</tr>
<tr>
<td>Shared Rides</td>
<td></td>
</tr>
<tr>
<td>Detours possible</td>
<td>✓</td>
</tr>
<tr>
<td>Empty rides possible</td>
<td>✓</td>
</tr>
<tr>
<td>Splitting of ride costs</td>
<td></td>
</tr>
</tbody>
</table>
Why do people have cars?

Under which circumstances would they abandon them?
The choice problem for trips and availability of mobility tools

What influences the trip?
- Travel time
- Waiting time
- Costs
- Weather
- Transfers
- Comfort
- Privacy
- …

What influences the availability?
- Other mobility options
- Long-term costs
- Pick-up/drop-off
- Transport of goods
- Holiday trips
- …
Expected effects through the automatization of private cars

- Self-driving cars gradually enter the vehicle fleet
- Mobility-impaired users become more mobile
- Parking is easier and faster
- Travel time in a car can be used more productively

- Up to 20% AVs in the vehicle fleet by 2035
- Up to 10% increase in vehicle kilometers
- Mode shift mainly from public transport

Back to the choice problem
Expected effects through the automatization of fleets (SAV/AVoD/MaaS)

- Business cases for all regions in Germany
- Up to 15% market share
- Up to 10% increase in vehicle kilometers
- Mode shift from all other modes

The city of tomorrow without private cars is a utopia, yet within reach.

Mode shifts are likely to increase traffic problems – simulation models can assist.

Good regulatory framework is required – strong administration and important role of local transport providers.
Feedback

Go to www.menti.com and use the code 20 69 3

How did you like the talk?

- Well...not so much.
- It was ok.
- This was awesome.

9 votes
Backup
Business cases for SAV/AVoD/MaaS systems in Germany

- Simulating transport demand for Germany in 2035
- Allowing people to choose between all modes, including SAV/AVoD/MaaS systems
- Repeat this for various supply parameters
Business cases for SAV/AVoD/MaaS systems in Germany

- Profit range larger in urban areas (still, positive business cases in all regions)
- Ridesharing has great potential in urban areas (user price comparable to public transport), potential in rural areas is limited (no bundling effect)
Summary

• The city of tomorrow without private cars is a utopia, yet within reach.

• Understanding of transport demand and user’s preferences (possibly leading to counter-intuitive (rebound) effects) is crucial – simulation models capturing mode choice effects can assist.

• However, a good regulatory framework is required:
  • Autonomous private cars will increase vehicle kilometers traveled and negative effects on society.
  • SAV/AVoD/MaaS systems have the potential to improve the situation, but only if they
    • Reduce VKT (e.g. forcing them to bundle trips)
    • Are installed in a way that supports and does not compete with public transport, bike, walk

• Managing the transition phase requires a strong collaboration between cities and potential operators.