CIVITAS FORUM 2016

Sep 28th 2016

Gdynia, Poland

Piotr Marek SMOLNICKI – Gdansk University of Technology
Autonomous/Automated Automobiles

VS.

Self-driving Cars/Vehicles

VS.

Driverless Shuttles/Podcars

Understanding different impacts of each automated mobility solution on metropolitan (urban and suburban) spatial structures
AA vs. SV/SC vs. DS/DP – different impacts

Gdynia now

photo: Author 2014
AA vs. SV/SC vs. DS/DP – different impacts

Personal Rapid Transit in Gdynia?
artist vision: Author 2014
AA vs. SV/SC vs. DS/DP – different impacts

But does Gdynia need PRT?
Do other cities need it?

It depends:

NO – if we consider new expensive infrastructure

YES – if we consider use of existing infrastructure

BUT – transport automation brings new opportunities
AA vs. SV/SC vs. DS/DP – different impacts

What do we have right now?

Car-centric development:

• which is justified by swearing for improvement of personal transport conditions

• but in reality the conditions get worse in already 100 years since car invention
AA vs. SV/SC vs. DS/DP – different impacts

What paradoxes & non-intuitive laws are related to this problem? Examples:

1. **Jevons’ Efficiency Paradox**— in relation to transport is e.g.: electric vehicles users drive more, thus create bigger environmental impacts (Jevons WS 1866)

2. **Braess’ Paradox**— bigger or smaller congestion when, accordingly: adding new or removing existing part of the road infrastructure (Braess D 1968)

3. **Induced Traffic Demand**— the more roads—the bigger traffic (Leeming JJ 1969)

4. **Risk Compensation/Peltzman’s Effect**— the more safe you feel—the bigger risk emerge (Leeming JJ 1969; Peltzman S 1975)
5. **Downs-Thomson Paradox** — investing in individual transport creates additional traffic by reducing mass transit use (Thomson JM 1972; Downs A 1992)

6. **Narrow lane safety** — the narrower lane—the safer road, even without reducing the capacity (Schwartz S 1988)

7. **Lewis-Mogridge Position** — traffic is growing to fulfil road capacity (Lewis D; Mogridge MJH 1990)

8. **Marchetti’s Constant** — the average time travelled is constant for any mode of transport, due to the different distances passed and scopes operated (Marchetti C 1994)
Examples of “traditional” car-centric viewpoints on automation:

- **pushing for the creation of dedicated traffic lanes for autonomous automobiles throughout the 225 km stretch of highway between Seattle and Vancouver**

- **ideas of ultra-efficient (scary) automated V2V (vehicle to vehicle) & V2X (vehicles to infrastructure) crossroads – green light for everybody at once**

- **free autonomous D2D rides (door to door) to shopping malls outside of the city centre**
This is why we should distinguish technical & organizational solutions of automated mobility such as AA-s, SV-s & DS-s
AA vs. SV/SC vs. DS/DP – different impacts

I. What I understand by Autonomous/Automated Automobiles?

1. It is just an evolution of traditional 100 years old model of the car

2. It still needs the driver (in the meaning of the owner) and steering wheel

3. It does not make any difference between other cars since newer cars have already safety- and other kind of automation

4. Thus it is just marketing
AA vs. SV/SC vs. DS/DP – different impacts

Examples for autonomous/automated automobiles:

• *Tesla Model S* (*autopilot* software update of an electric but traditional car)

• *Mercedes F 015* (*AA concept* that is still focused on self-ownership)

• *Yanfeng AA* (premiere 2017 – user interface presented 2016 in Frankfurt)

• *Volvo, Ford, Chrysler, Nissan etc.* are preparing their own AAs for the next 2-5 years (all major automotive producers will present AA until around 2020)
AA vs. SV/SC vs. DS/DP – different impacts

II. What I understand by Self-driving Vehicles/Cars?

1. It is a revolution after 100 years of the same car model

2. It does not need the driver (no driving license needed) nor steering wheel

3. Thus the owner does not need to keep its belonging car with him/her

4. Actually the traveler does not need to own the car – he/she can use it as todays taxi, ridesharing or car sharing services
AA vs. SV/SC vs. DS/DP – different impacts

Examples for self-driving vehicles/cars:

- **Google** has been testing its self-driving car for example in Kirkland, Washington
- **Uber** opened the first self-driving fleet in Pittsburgh, USA
- **nuTonomy** announced a partnership with South East Asia’s largest ride-hailing service, Grab, in order to further expand the reach of fleet of self-driving vehicles
III. What I understand by **Driverless Shuttles/Pods/Podcars**?

1. It fills the on-demand (OD) gap between taxi service and public transit

2. It allows to cover the first/last mile problem

3. It competes with walking and biking

4. But it complement public transit making it cheaper to maintain (no drivers)
Examples for driverless shuttles/podcars:

- **BestMile** signs its first commercial project with **CarPostal**, the company leading the sector of public transportation in Switzerland. This collaboration between the EPFL spin-off and the subsidiary of the Swiss Post will allow to operate **driverless shuttles** in urban areas.

- Livermore Amador Valley Transit Authority (LAVTA) introduced two innovations: partnering with **transportation network companies** (TNCs), such as **Uber** and **Lyft**, to reach commuters in neighbourhoods big buses cannot serve, and exploring **driverless shuttles** to solve first and last mile issues to connect people to stations.
What future transportation problems do cities have to solve?
AA vs. SV/SC vs. DS/DP – different impacts

We have stakeholders:

• Chaotic
• Monopolizing
AA vs. SV/SC vs. DS/DP – different impacts

We need stakeholders:
• Cooperating
• Complementing
AA vs. SV/SC vs. DS/DP – different impacts

How to solve the problem?

We need to implement Mobility as a Service (MaaS) paradigm

Why?

Because automation is a disruptive innovation that may have significant negative side effects on functional, physical & socio-economic spatial structures, as much as on transportation, including personal, group and mass public transit.
AA vs. SV/SC vs. DS/DP – different impacts

What ways do cities can follow? – example of (automated) car-sharing

Source: Author 2016. *Car-sharing: The Impact on Metropolitan Spatial Structures*
Examples of shared on-demand rides on the city theoretical model:

- **Rideshare picks-up 2 or more passengers on way**

- **Rideshare prolong it’s route if its <1,4 length**

- **Rideshare is complementing public transit**

*Source: Author 2016*
AA vs. SV/SC vs. DS/DP – different impacts

“Don't say I didn't say I didn't warn you” – Taylor Swift
Thank you!

Piotr Marek Smolnicki

Contact Details

Gdansk University of Technology
Narutowicza 11/12 Street
80-233 Gdańsk, Poland
piotr.smolnicki@pg.gda.pl
http://www.civitas.eu
AA vs. SV/SC vs. DS/DP – different impacts

Author’s chosen literature

• Smolnicki PM. 2016. “Mobility Oriented Development (MOD): Public-Private Partnership in Urban Parking & Traffic Management with the Use of Autonomous Automobiles, Car-sharing, Ridesharing Modes of Transport & Mobility as a Service (MaaS)”. Springer: Happy City: eds Brdulak H, Brdulak A

• Smolnicki PM, Sołtys J. 2016. “Car-sharing: The impact on metropolitan spatial structures”. [accepted post-print]

AA vs. SV/SC vs. DS/DP – different impacts

REFERENCES
AA vs. SV/SC vs. DS/DP – different impacts


AA vs. SV/SC vs. DS/DP – different impacts

33. (2016). Interview with Dimitris Papastergiou Mayor of Trikala (Greece). In CityMobil2 Newsletter. Cities Demonstrating Automated Road Passanger Transport (No. 7).


50. Sullivan, P. (2015). Getting Ready for Driverless Cars: Everything you need to know to invest now in the companies developing the technology that will revolutionize the way we commute (eBook; Kindle Edition).


