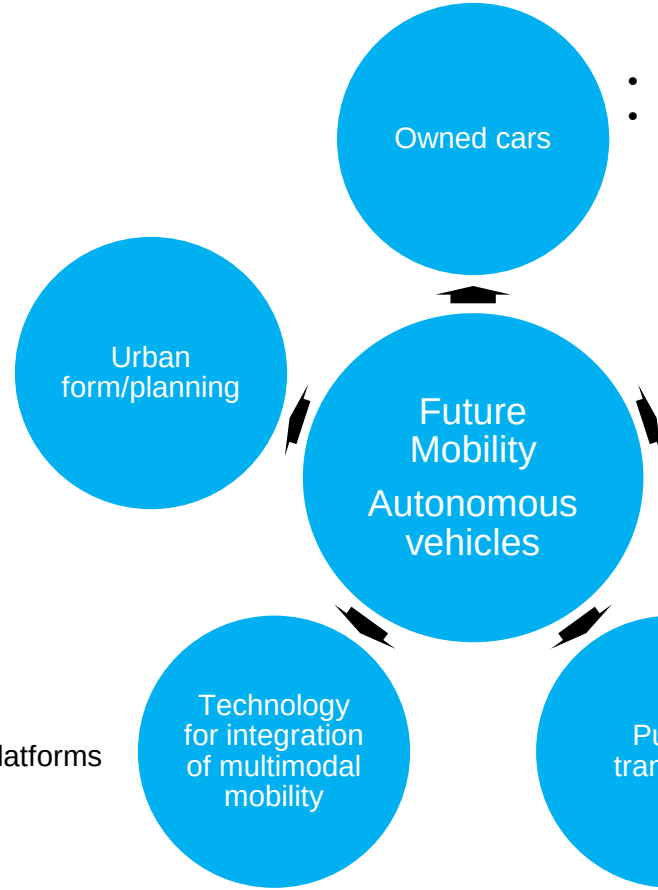
Hur kan automatiserade fordon bidra till mer effektiv kollektivtrafik?

Erik Jenelius



- Changes in demand behavior
- Interaction between conventional and self-driving vehicles

(Correia and van Arem, 2016; Fagnant and Kockelman, 2015)

- Low densities
- Increasing urban sprawl
- Space reallocation
- Parking space

- MaaS
- Less owned cars
- Less public transport

(Fagnant and Kockelman, 2016; ITF, 2015; Liang et al., 2016; Burghout et al., 2015)

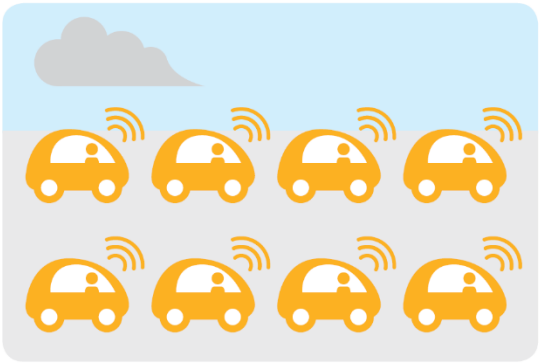
- Service Platforms

- Low levels of demand
- Smaller vehicles
- Last mile solutions
- On demand services

(Bergqvist and Åstrand, 2017; Scheltes and Correia, 2017)

Shared fleets

Privately owned cars



- No effect on car ownership
- No effect on number of parked cars (cars unused most of the day)
- No effects on costs /km
- No effects on mobility for people that do not own a car
- Even more car traffic (as it is even more comfortable and attractive to go by car)

> Unsustainable, even more car traffic

AV's will only help to meet public policy goals if they come as shared fleets integrated with PT

Source: UITP (2017)

Fleet cars INTEGRATED with traditional public transport services

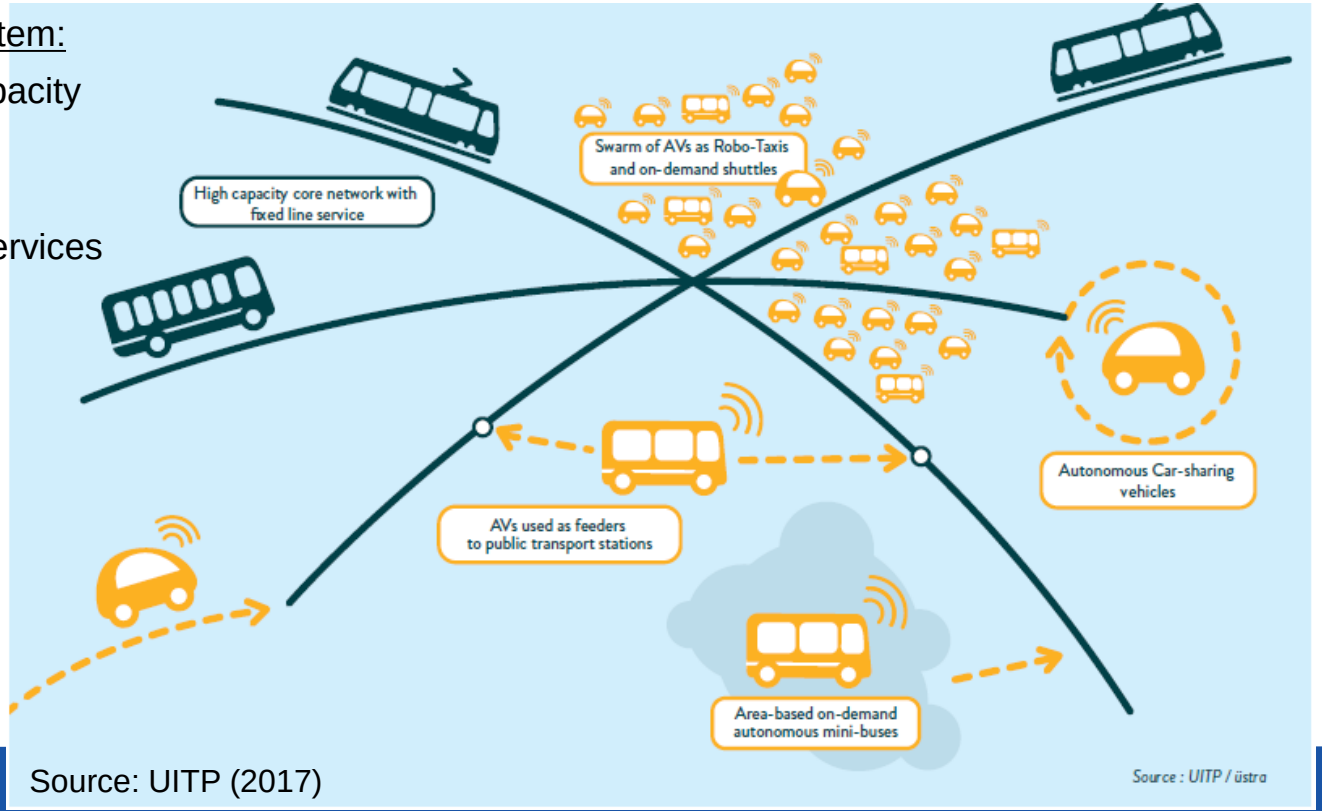
- Large scale street reclaiming
- Highly improved access to public transport
- Highly improved mobility for people that do not own a car
- Strong decrease in VMT
- High gain of efficency (large and small vehicles perfectly mixed)
- Low costs/km

> Sustainable, better mobility and equity

Shared fleets as part of PT system

Hierarchical system:

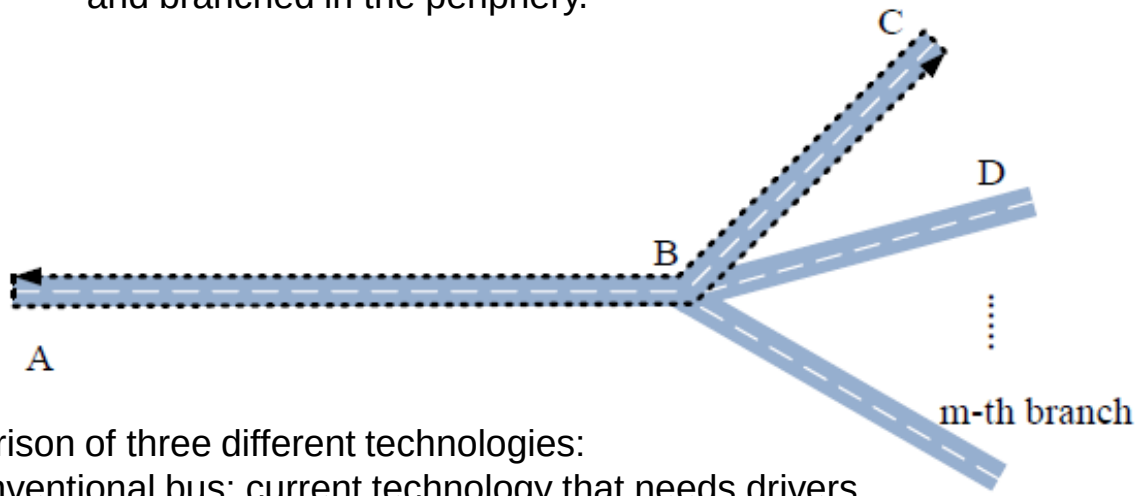
- Fixed high-capacity lines
- Feeder lines
- On-demand services
- Shared AV's



Source: UITP (2017)

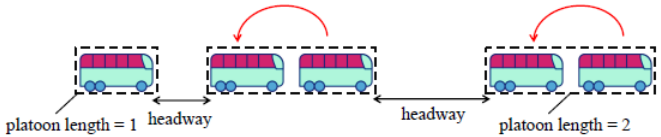
Evaluation of bus service automation

Scenario study: Group of lines gathered in a trunk corridor (city center) and branched in the periphery.



Comparison of three different technologies:

- conventional bus: current technology that needs drivers
- full-autonomous bus: drivers will be removed
- semi-autonomous bus: drivers will be partially removed working by platoons

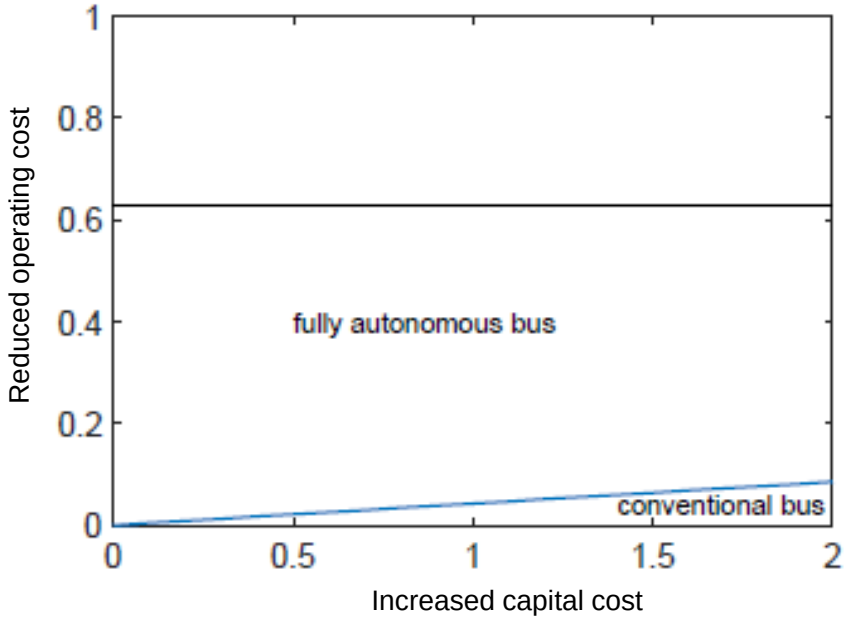


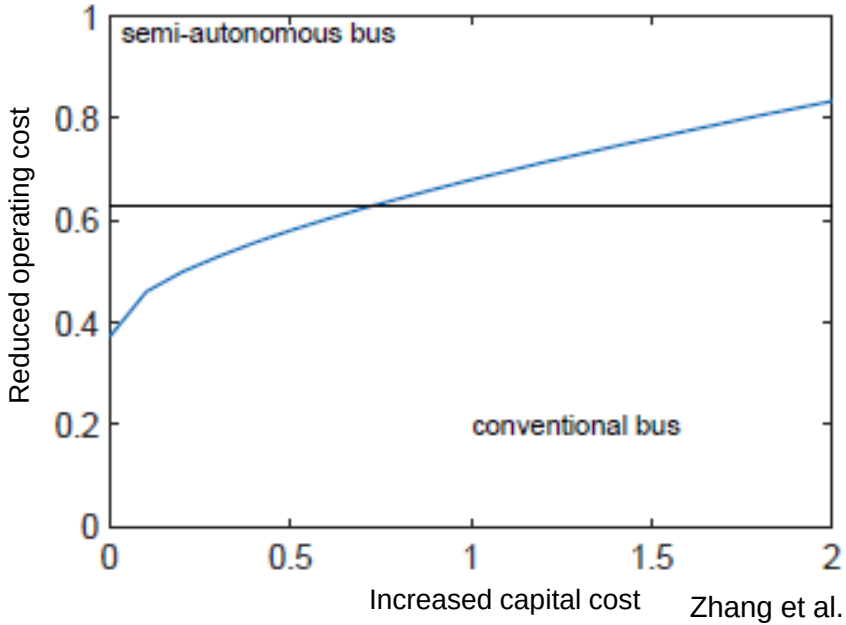
Zhang et al. (2018)

Effect of capital and operating costs

Fully autonomous buses advantageous if similar commercial speed

Semi-autonomous buses competitive mainly in inter-regional service





Zhang et al. (2018)

iQMobility

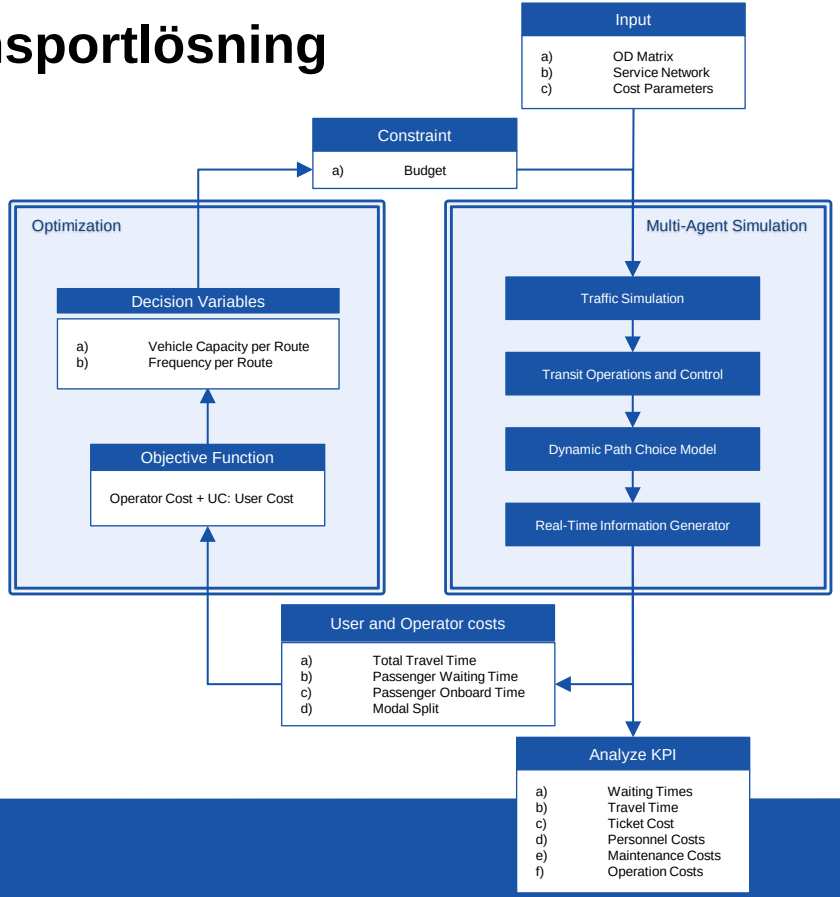
Automatiserad kollektivtransportlösning för bussar i storstadsmiljö

How should the AV bus network be designed?

Where is the deployment of AV bus networks most profitable?

Simulation Optimization approach

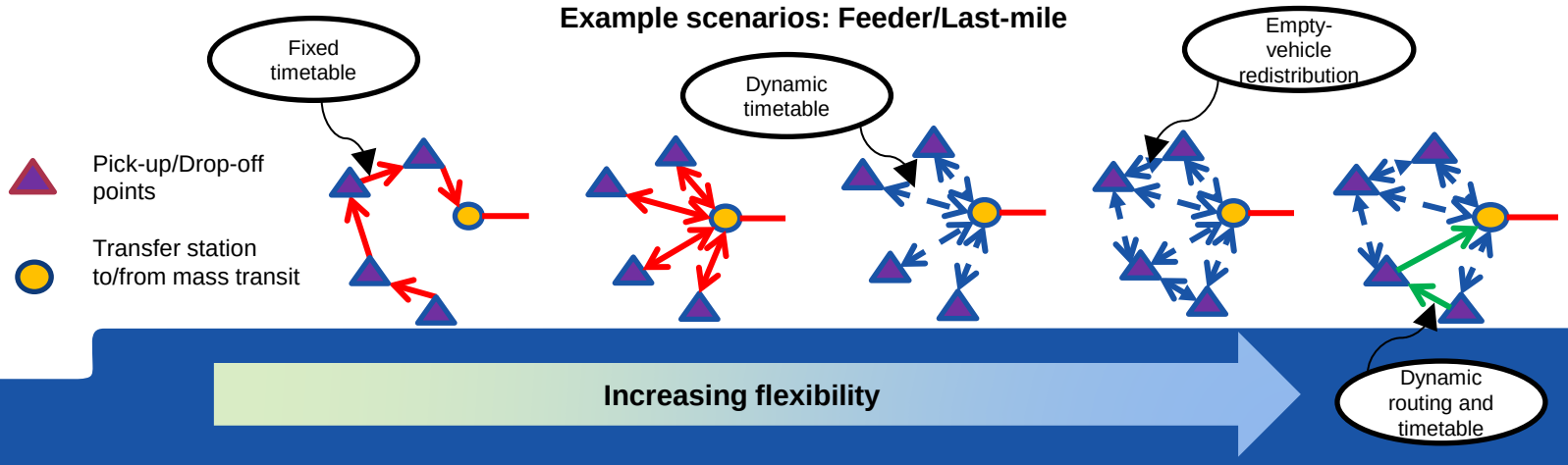
Application to Stockholm



SMART

Simulation and Modeling of Automated Road Transport

- Modeling requirements for simulating shared AVs in mesoscopic simulation models?
- When can demand-responsive AVs be an alternative or complement to fixed-route, fixed-schedule public transit?
- How can real-time coordination of shared AVs influence operating and passenger costs in flexible public transit?



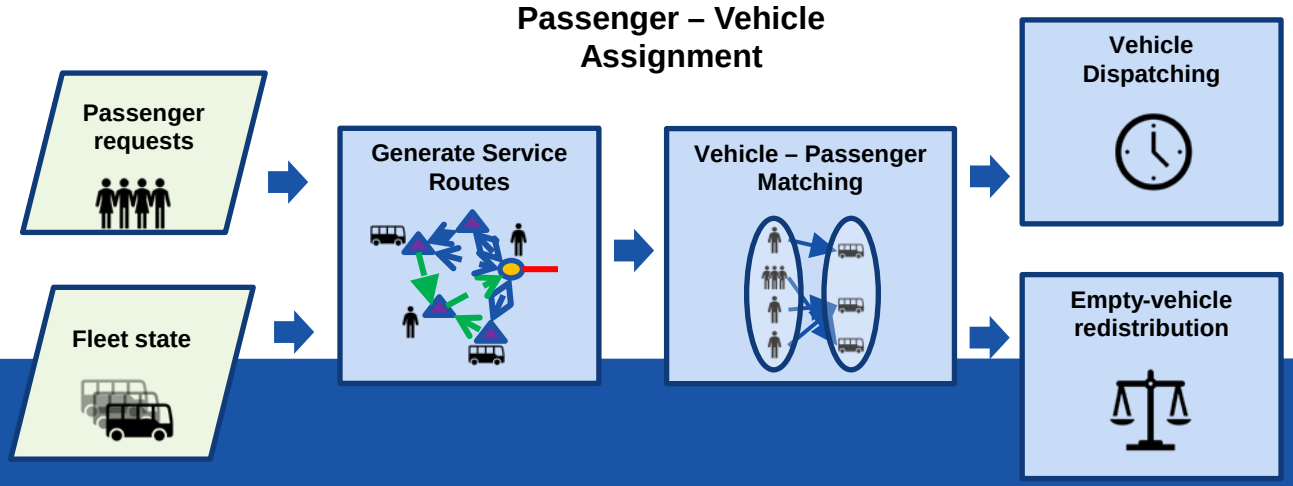
Methodology

BusMezzo public transit simulator (line-based)

Individual vehicle and passenger agents

Day-to-day learning for route and mode choice

Extension with dynamic routing and dispatching capabilities



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