


More thinking about autonomous vehicles: Business models and demand growth

Other Conference Item

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More thinking about autonomous vehicles: Business models and demand growth

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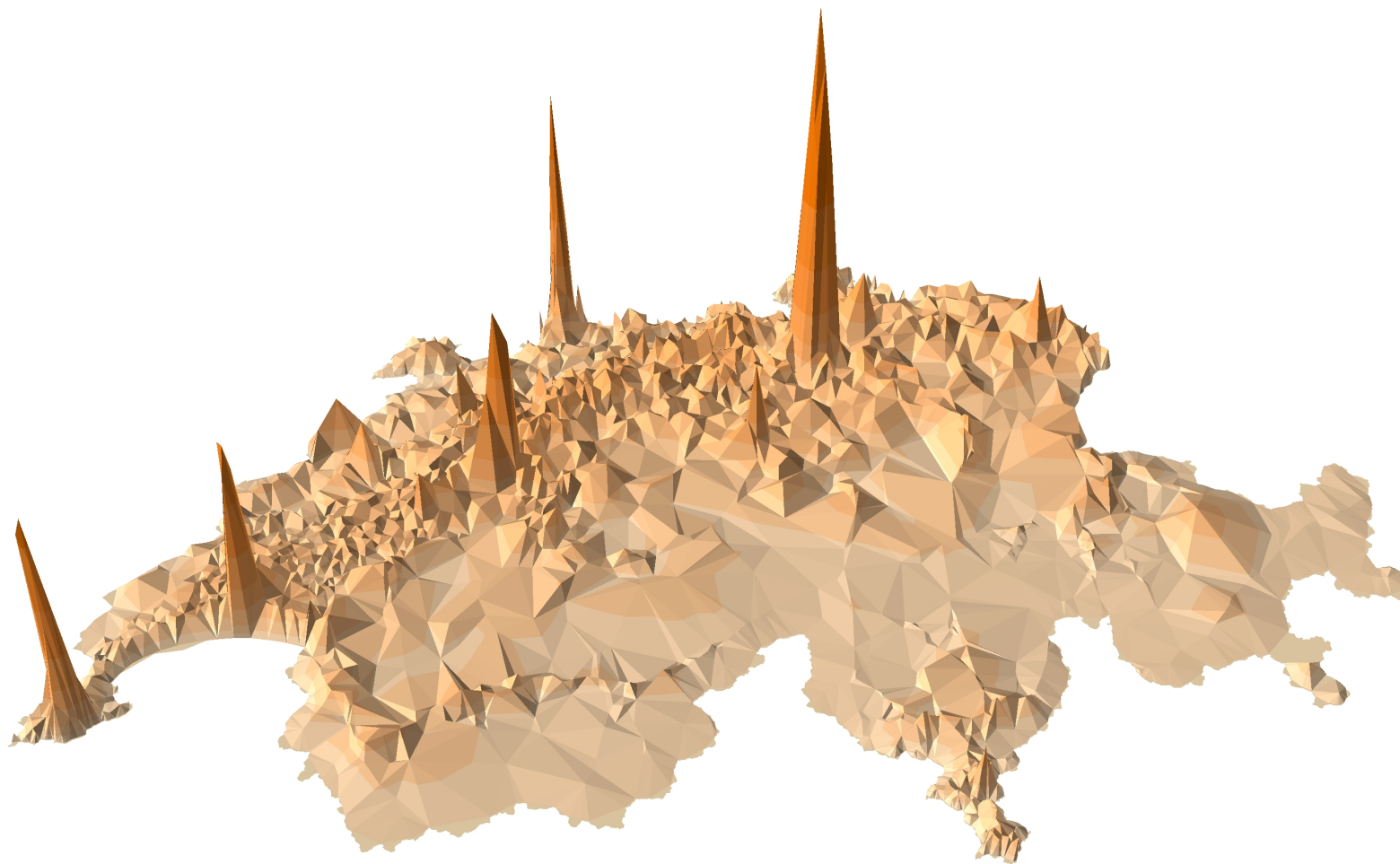
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Acknowledgements

- Weis: Induced demand
- Meyer, Becker, Bösch: Accessibility and AV
- Bösch, Becker and Becker: Cost calculations

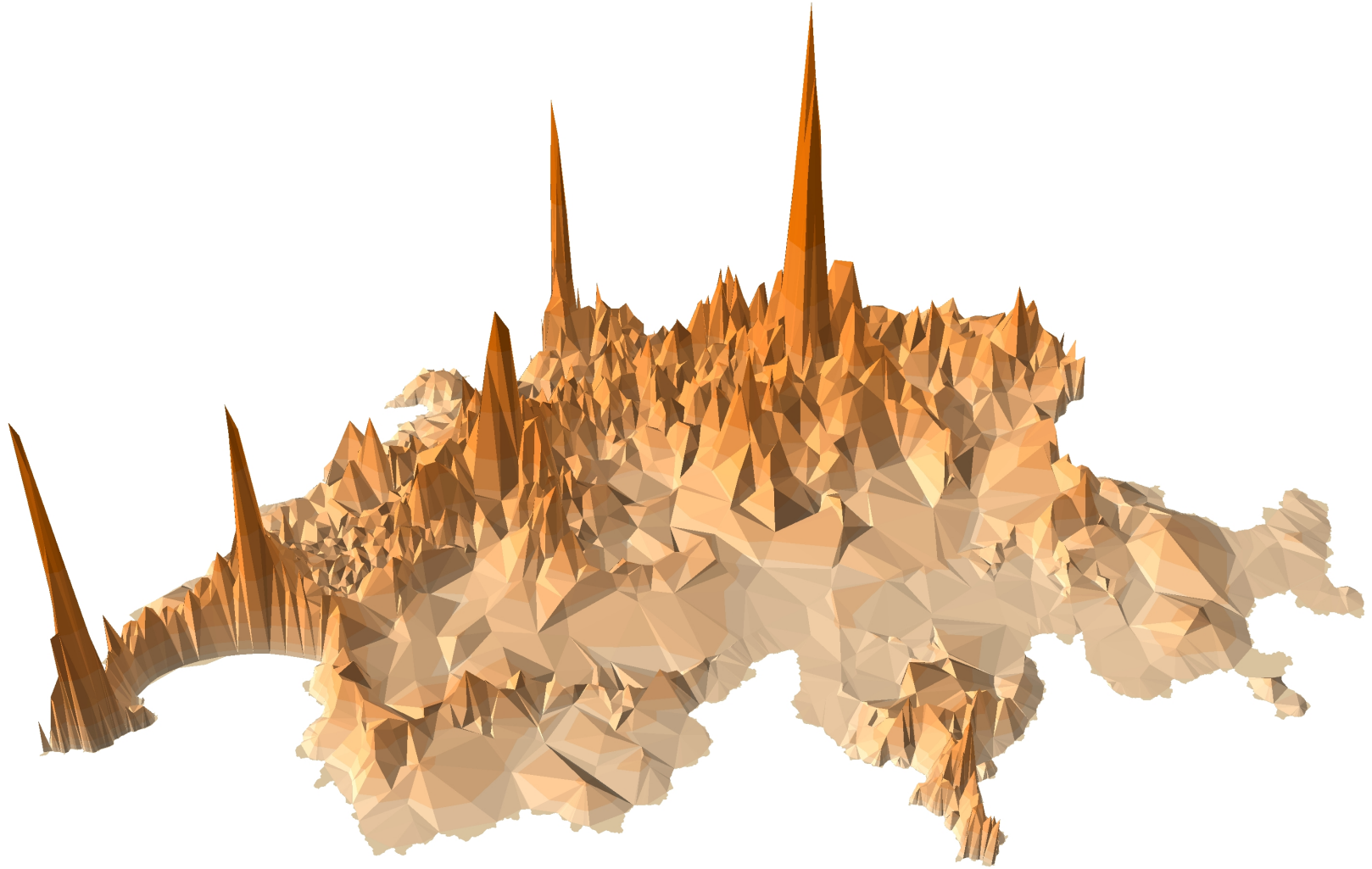
Accessibility since 1950

Accessibility: Switzerland 1950 - car



Quelle: Axhausen, Fröhlich und Tschopp (2006)

Accessibility: Switzerland 2000 - car



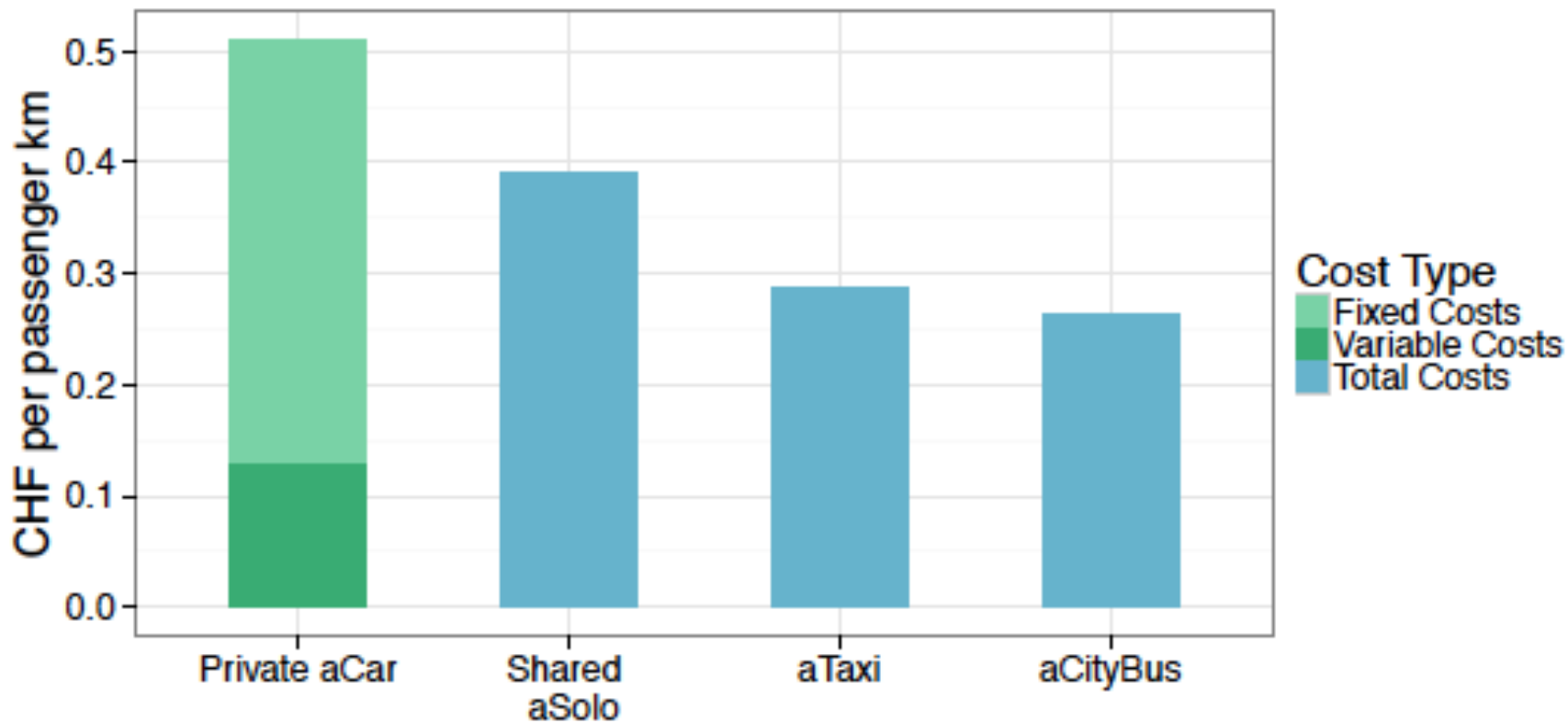
Quelle: Axhausen, Fröhlich und Tschopp (2006)

Basic trade-offs

Basic trade-offs between technologies and suppliers

- Costs
 - Fixed costs
 - Ownership, taxes, insurance, repair
 - Management
 - Variable costs
 - Fuel, toll, parking, maintenance, cleaning
 - Promotion
- Generalised costs
 - Access/egress walk and waiting time
 - Speed (urban, longer-distance trips)
 - Quality of the ride (design, cleanliness, in-vehicle services)
 - Fares (pricing models)

A second estimate of full costs/pkm (at current occupancy)



Some scenarios for a 2030 Level 4 vehicle future

Facets

- Market structure (monopoly, oligopoly, dispersed)
- Role and extent of transit
- System target (system optimum, user equilibrium)
- Type of traffic system manager
- Road space allocation
- Share of autonomous vehicles
- Share of electric vehicles

Scenario 1 – As before

- Dispersed: Current owners replace their vehicles
- Transit scaled down to the high capacity modes
- User equilibrium as system target
- Municipalities remain traffic system manager
- Road space allocation trends towards the AV, maybe even growth
- 100% share of small autonomous vehicles for safety reasons
- 100% share of electric vehicles for climate reasons

Scenario 2: Uber et al take over

- Oligopoly of fleet owners
- Transit scaled down to the high capacity modes
- System optimum via tolls and parking charges
- Operators negotiate slots with each other
- Road space allocation tends towards the slow modes
- 100% share of mixed size autonomous vehicles for cost reasons
- 100% share of electric vehicles for climate reasons

Scenario 3: A new-style local transport operator

- Monopoly, the MTR expands into small vehicles
- Larger vehicles and hub-operations are encouraged
- System optimum routes are allocated over the days
- MTR is the traffic system manager
- Road space allocation unchanged
- 100% share of mixed size autonomous vehicles for cost reasons
- 100% share of electric vehicles for climate reasons

Scenario 1-3: How to enable the low income mobility ?

- Today
 - Public covers the fixed costs, especially for railways
 - Across-the-board operational subsidies
 - Lack of means-testing
 - Low price season tickets/fares
 - Operational support via priority at signals and road space allocation
- Future where each kilometre is tracked and chargeable
 - Income-adjusted rebates ?
 - Income and work-distance adjusted rebates ?
 - Fixed free kilometre budget ?

Induced demand by AV

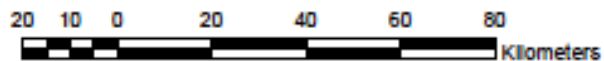
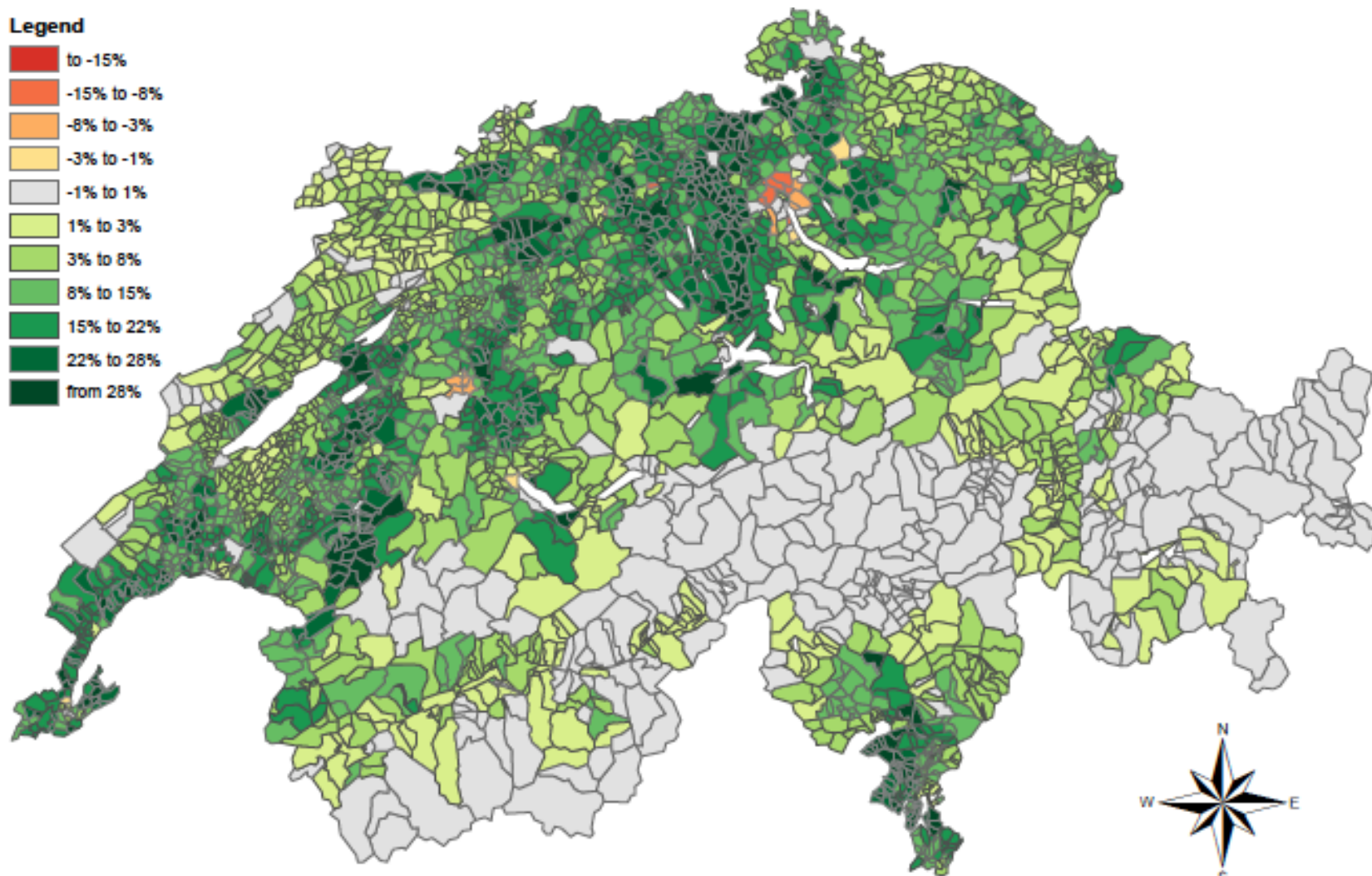
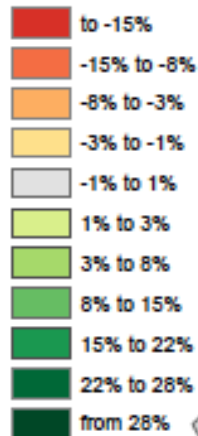
Induced demand elasticities from a pseudo-panel

Accessibility	Share of mobiles	0.61
	Number of trips	0.44
	Trips per hour	0.24
	Out-of-home time	0.10
	Total distance travelled	1.14
Transport price index	Share of mobiles	-0.06
	Number of trips	-0.19
	Trips per hour	-1.66
	Out-of-home time	-1.95
	Total distance travelled	-0.84

Source: Weis und Axhausen (2013)

Accessibility change for scenario 3/0 with induced demand

Legend

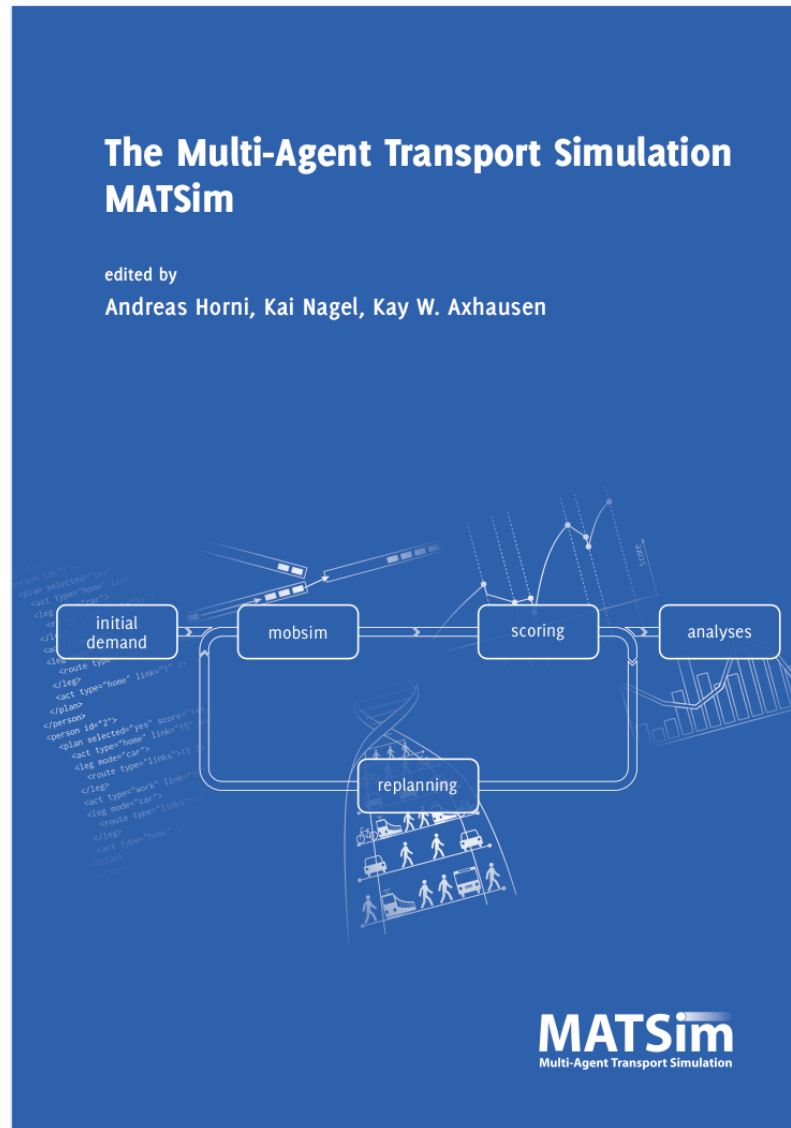


What should we do ?

Next steps

- More work on acceptance of AV
 - By age and education
 - By location of residence
- More work on future cost/prices by type of operator
- More work on the efficiency of the fleets (empty kilometres)
- More work on how to achieve system optimum with fleet operators
- More work on the future of 'transit' ?

Questions ?



Appendix

Cost elements

