

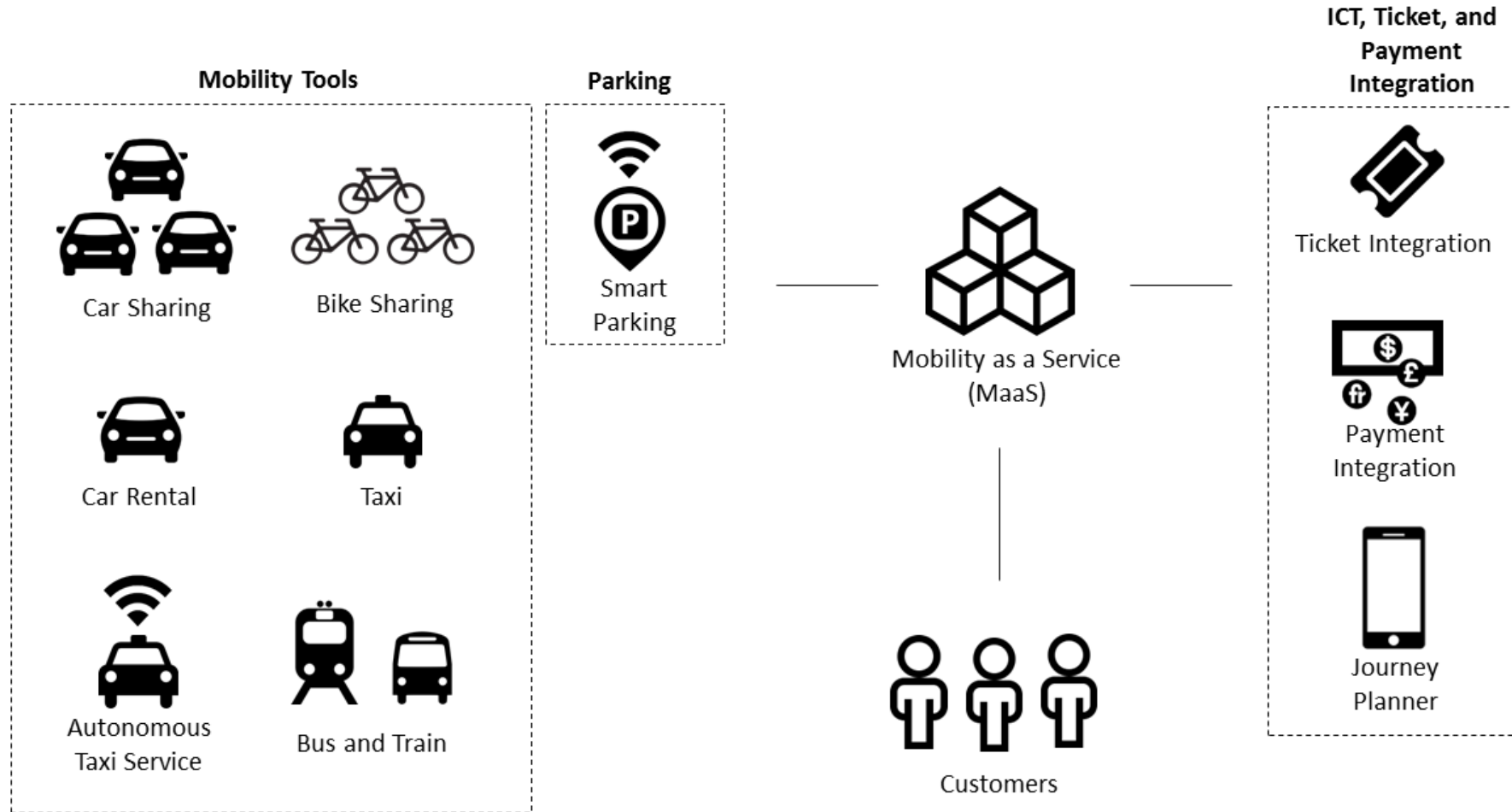
Service Bundling in the Passenger Transportation Market

The Case of Mobility as a Service (MaaS)

Sergio Guidon, Institute of Science, Technology and Policy (ISTP), ETH Zurich

Mobility as a Service (MaaS) - Characterization

- Mobility tools and services are provided in an integrated and cohesive manner
- Focus on the trip, not on the transport mode
- Unified gateway (e.g. smartphone app) with journey planner offering a multitude of transport modes
 - Ticket and payment integration, mobility package/ bundle, ICT integration
- Demand oriented provision of transportation services (real-time)



Credits (symbols):
 Taxi, train, bus, payment: AIGA (<http://www.aiga.org/>); Bike: DOTon PAPER (<https://dotonpaper.net/>); Iphone: Hiren Vanza; Ticket: Dave Gandy

Bundling in Marketing and MaaS

- Nothing new: bundling is common practice in marketing (combinations of airline tickets and car rental, software bundles such as Microsoft Office, Spotify, etc.)
- Reasons for bundling: implementing corporate strategies, introducing new products, deterring competitors from entering a market, price discrimination, ...
- In the case of MaaS: not a vertical integration by a monopoly provider, but an integration of services across different mobility providers

McAfee et al. (1989), Sheikhzadeh and Elahi (2013), Vamosui (2018)

Bundling in Marketing and MaaS

- **Price bundling:** The sale of two or more separate products as a package at a discount, without any integration of the products
- **Product bundling:** The integration of the products at any price
- **Pure bundle:** A company only sells bundles and the bundles are not offered separately
- **Mixed bundle:** Products can also be purchased separately

Stremersch et al. (2002)

MaaS Definition

Pure or mixed bundle of transportation services that are integrated using a comprehensive multimodal journey planner

Why MaaS and Why Now?

- Unused potential of ICT
 - Providing better, real-time information (public transport and complementary services)
 - Intermodal trips
 - Facilitating access to all transport services (unified gateway)
- Tackling shortcomings of public transportation (PT)
 - Transport of heavy goods, remote locations, off peak hours etc.
 - Providing an alternative to car depended trips and car ownership
- Is there a need for more real-time information and integration? What about habit formation?
 - Habit formation is difficult with free-floating services (car sharing, bike sharing, etc.)

Why MaaS and Why Now?

- Landscape developments
 - Decreasing the environmental burden of transportation
=> limiting fossil fuel dependency
 - Increasing congestion
=> better usage of existing capacity
 - Digitalization
=> digital transformation and personalization

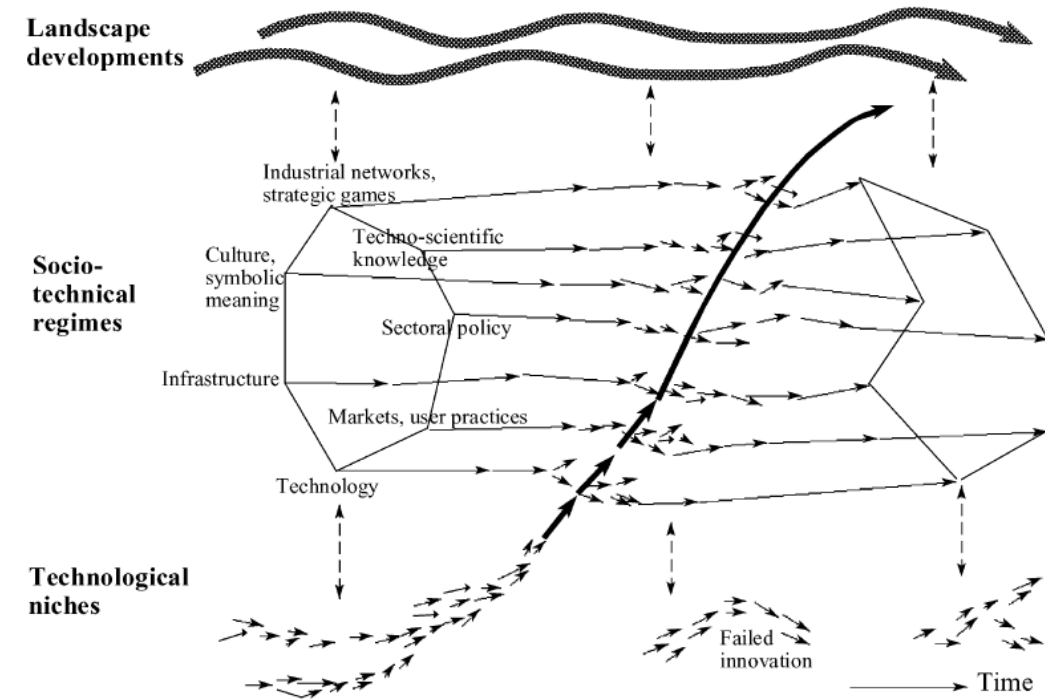


Fig. 5. A dynamic multi-level perspective on TT.

Source: Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes : a multi-level perspective and a case-study 31, 1257–1274.

Open Questions

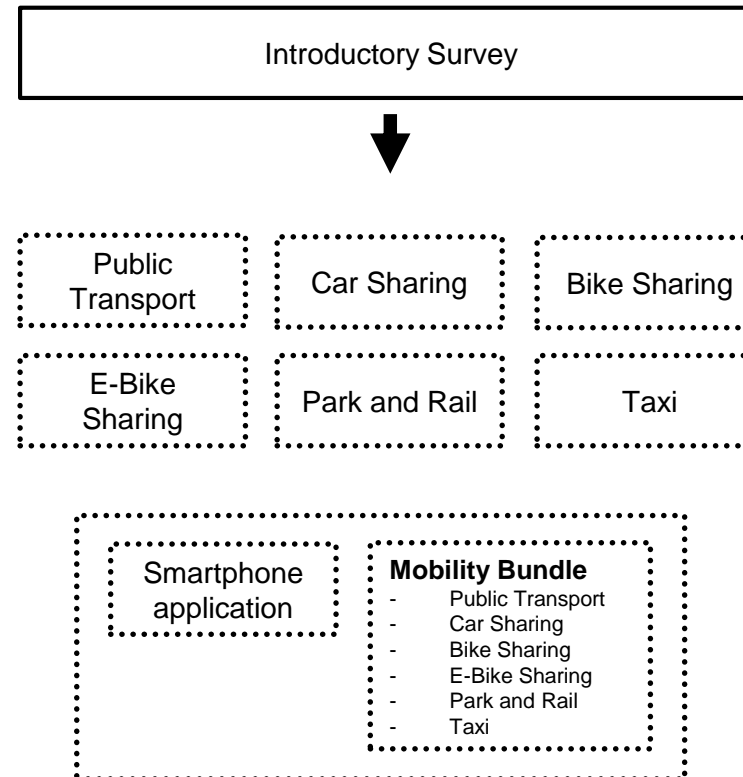
- What is the potential of MaaS?
 - MaaS for which trips?
 - Is there a need for more real-time information and integration? What about habit formation?
 - Can MaaS help to increase the market share of public transport?
 - Scalability? Transfer penalty?
- How should MaaS bundles be provided? Which services should be included?
- Are consumers more likely to consume new mobility services when they are offered in a bundle?
- Do consumers view MaaS bundles as performance enhancing?

MaaS Research (Selection)

- Discrete Choice Experiments (DCEs): User preferences regarding included modes and willingness to pay (WTP), valuation of integration
 - Ho et al. (2018) for Sydney, Guidon et al. (2019) for Zurich, ...
- Results from field trials and case studies
 - UbiGo: Sochor et al. (2016), Smith et al. (2018), ...
- Discussions of potential impact on future public transportation services
 - Mulley (2018), Hensher (2017), ...

MaaS DCE in the Canton of Zurich

- MaaS bundles by third parties can only be profitable if there is a positive valuation of bundling by consumers
- Goal: Investigating consumers' valuation of MaaS bundles as compared to valuation of stand-alone services



WTP for integration?

MaaS DCE: Choice Set Examples

Mobility as a Service Bundle

	Variante 1	Variante 2
Preis (pro Monat)	CHF 400	CHF 300
Smartphone App	Ja	Nein
ÖV Abo (2. Klasse)	ZVV 4 Zonen	ZVV alle Zonen
Car Sharing (Kilometer pro Monat)	125 km	50 km
Bike Sharing (Stunden pro Monat)	5 h	3 h
E-Bike Sharing (Stunden pro Monat)	3 h	5 h
Parkplatz Abo (Tage pro Monat)	7 Tage	14 Tage
Taxi Abo	60 min	30 min

Ihre Auswahl:

- Variante 1
 Variante 2
 Ablehnen

Car Sharing

	Variante 1	Variante 2
Kosten (pro Monat)	CHF 100	CHF 70
Kilometer (inkl. pro Monat)	125 km	50 km

Public Transport

	Variante 1	Variante 2
Abokosten (pro Monat)	CHF 240	CHF 120
Gültigkeit	ZVV 5 Zonen	ZVV 4 Zonen
Klasse	2. Klasse	2. Klasse

Park and Rail

	Variante 1	Variante 2
Abokosten (pro Monat)	CHF 200	CHF 50
Tage pro Monat	14	7

Bike Sharing

	Variante 1	Variante 2
Abokosten (pro Monat)	CHF 30	CHF 60
Stunden pro Monat	5 h	10 h

Taxi

	Variante 1	Variante 2
Abokosten (pro Monat)	CHF 30	CHF 60
Guthaben pro Monat	30 min	120 min

E-Bike Sharing

	Variante 1	Variante 2
Abokosten (pro Monat)	CHF 20	CHF 100
Stunden pro Monat	3 h	10 h

MaaS DCE: Results

WTP [CHF]

Service	Stand-alone services		Pure bundle	
	WTP1	WTP2	WTP1	WTP2
Smartphone App	-	-	103.9	127
Public Transportation	46	77.4	120.2	139.7
Car-Sharing	0.5	1.2	2.3	2.3
Park and Ride	2.9	6.7	7.6	7.9
Bicycle-Sharing	0.8	3.4	-15.2	(2.6)
E-Bike-Sharing	2.6	11.9	-18.8	(3.3)
Taxi	-1.2	1.6	-2.4	(0.1)

Share of
positive WTP1
values

Service	Stand-alone services	Pure bundle
	Smartphone App	-
Public Transportation	73.7%	89.6%
Car-Sharing	66.9%	100%
Park and Ride	67.9%	97.1%
Bicycle-Sharing	59.6%	1.8%
E-Bike-Sharing	59.7%	1.9%
Taxi	32.6%	0%

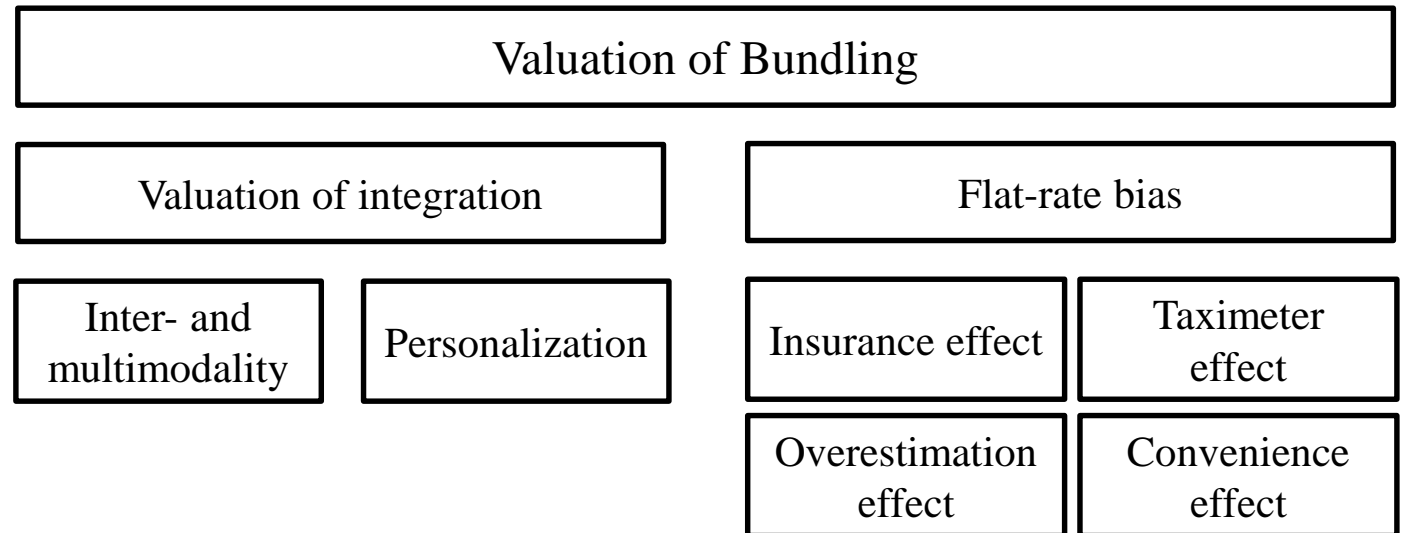
- High WTP for App and PT
- low WTP for (e-)bike sharing and taxi

MaaS DCE: Limitations

- External validity, hypothetical market
- Sources of WTP difference cannot be separated: utility of integration or flat-rate bias (insurance effect, taxi meter effect, convenience effect)
- Overcoming the limitations:
 - Revealed preference data, real world experiments on the market
 - GPS tracking of subjects to evaluate utility of the bundle (and separate it from the flat-rate bias)

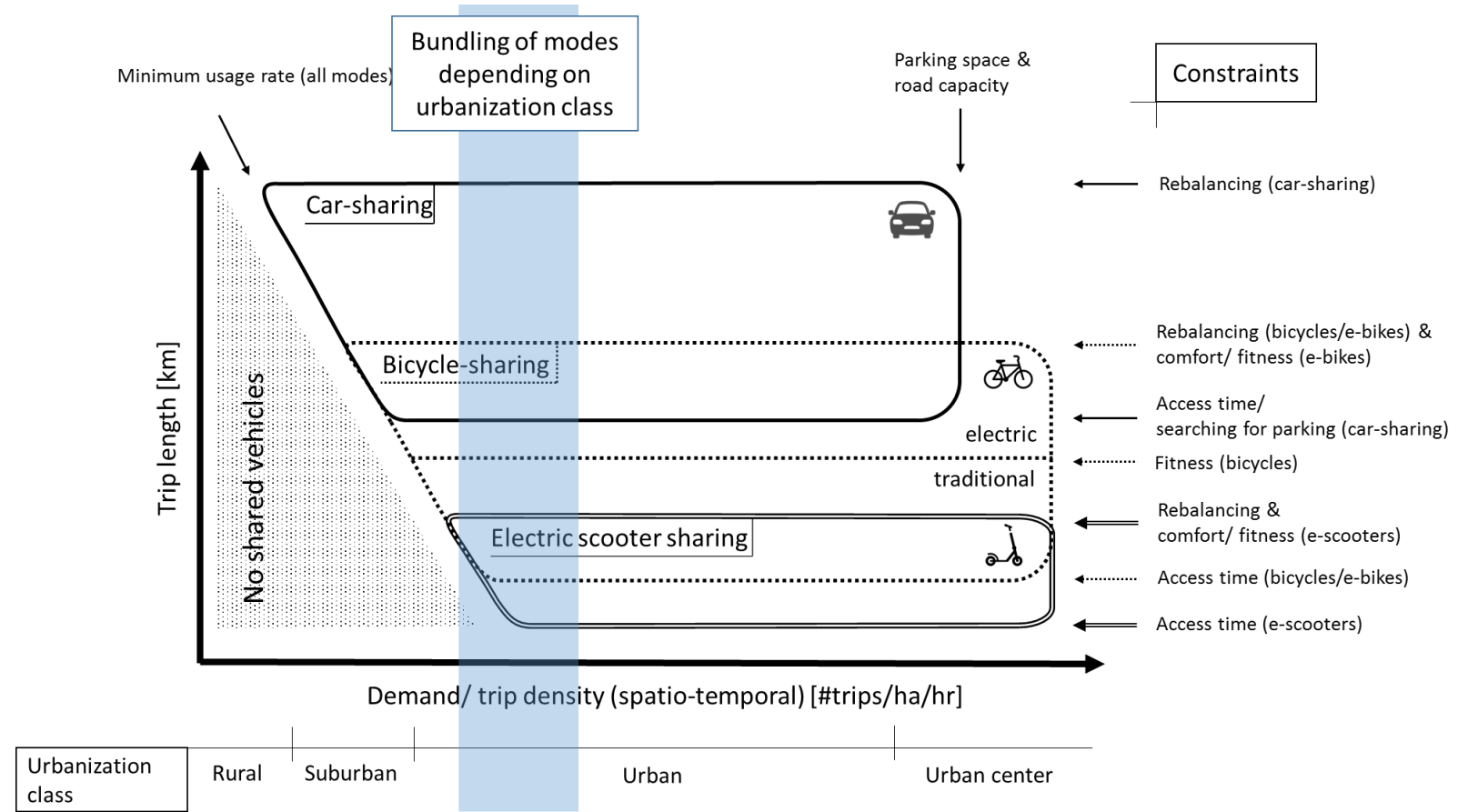
MaaS DCE: Explaining the WTP Difference

- Actual added value by bundling vs. the flat-rate bias



MaaS DCE: Explaining the WTP Difference

- Mode availability and urbanization class



MaaS DCE: Conclusions

- Exploit positive WTP difference between stand-alone services and bundles by providing them
- (E-)Bike sharing and taxi services could be added on a pay-as-you-go basis
- Technology competence and acceptance are less of an issue (in an urbanized canton such as Zurich)

Discussion

Literature

- Geels, F. W. (2002) Technological transitions as evolutionary reconfiguration processes : a multi-level perspective and a case study, 31, 1257–1274.
- Guidon, S., Wicki, M., Bernauer, T., and Axhausen, K. W. (2019) Transportation service bundling – for whose benefit? Consumer valuation of pure bundling in the passenger transportation market, Accepted for the Special Issue on Mobility as a Service in Transportation Research Part A: Policy and Practice 2019, Edited by Professors David Hensher and Corinne Mulley.
- Hensher, D. A., 2017. Future bus transport contracts under a mobility as a service (MaaS) regime in the digital age: Are they likely to change? Transportation Research Part A: Policy and Practice 98, 86–96.
- Ho, C. Q., Hensher, D. A., Mulley, C., Wong, Y. Z., 2018. Potential uptake and willingness-to-pay for Mobility as a Service (MaaS): A stated choice study. Transportation Research Part A: Policy and Practice 117, 302–318.
- McAfee, R. P., McMillan, J., Whinston, M. D., 1989. Multiproduct Monopoly, Commodity Bundling, and Correlation of Values. The Quarterly Journal of Economics 104 (2), 371–383.
- Mulley, C., Nelson, J. D., and Wright, S. (2018) Community transport meets mobility as a service: On the road to a new a flexible future, Research in Transportation Economics, 69, 583–591.
- Sheikhzadeh, M., Elahi, E., 2013. Product bundling: Impacts of product heterogeneity and risk considerations. International Journal of Production Economics 144 (1), 209–222.
- Smith, G., Sochor, J., and Sarasini, S. (2018) Mobility as a service: Comparing developments in Sweden and Finland, Research in Transportation Business & Management, 27, 36–45.
- Sochor, J., Strömberg, H., Karlsson, M., 2014. Travellers' motives for adopting a new, innovative travel service: insights from the UbiGo field operational test in Gothenburg, Sweden, 21st World Congress on Intelligent Transportation Systems, Detroit.
- Sochor, J., Karlsson, M., and Strömberg, H. (2016) Trying Out Mobility as a Service, Transportation Research Record: Journal of the Transportation Research Board, 2542(2542), 57–64.
- Stremersch, S., Tellis, G. J., 2002. Strategic Bundling of Products and Prices: A New Synthesis for Marketing. Journal of Marketing 66 (1), 55–72.
- Vamosiu, A., 2018. Optimal bundling under imperfect competition. International Journal of Production Economics 195 (September 2017), 45–53.

Contact information and credits

ETH Zurich

Institute of Science, Technology and Policy (ISTP), ETH Zurich
Universitätstrasse 41
8092 Zürich

<https://istp.ethz.ch/research/mobility.html>

DCE 1-6 (individual): Attributes and Levels

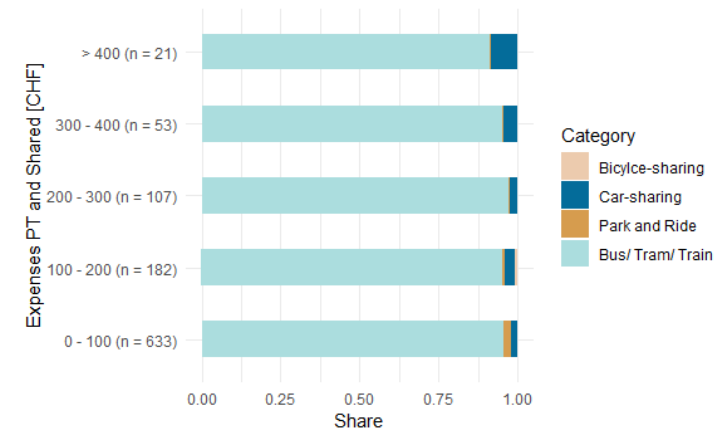
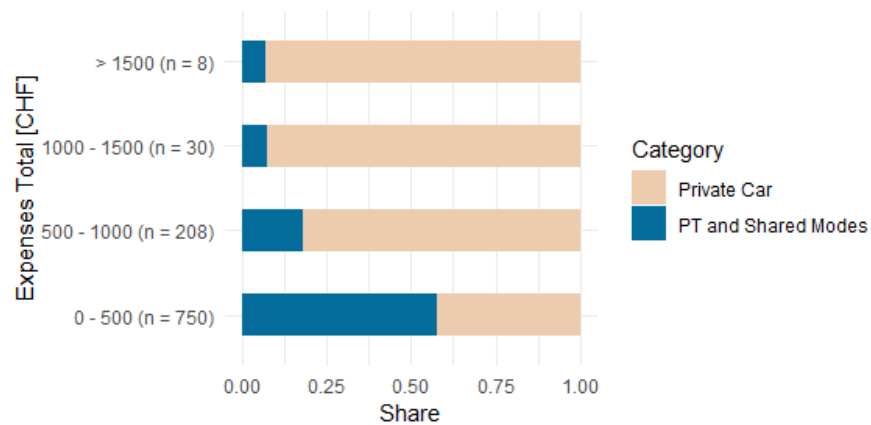
Experiment	Attribute	Levels
Public Transport	Cost (CHF p.m.)	20, 50, 120, 180, 360, 500, 650
	Ticket Category	1-2 zones, 3 zones, 4 zones, 5 zones, all zones, GA
Car Sharing	Cost (CHF p.m.)	30, 70, 100, 200, 350
	Km incl.	50, 75, 125, 150
Bike Sharing	Cost (CHF p.m.)	5, 10, 20, 30, 40, 60
	Hours incl.	3, 5, 7, 10
E-Bike Sharing	Cost (CHF p.m.)	20, 60, 100, 200, 300
	Hours incl.	3, 5, 7, 10
Park & Ride	Cost (CHF p.m.)	10, 20, 50, 100, 150, 200
	Days incl.	4, 7, 14
Taxi	Cost (CHF p.m.)	15, 30, 60, 150, 300, 600
	Min. incl.	30, 60, 120

DCE 7 (bundle): Attributes and Levels

Attribute	Levels
Cost [CHF p.m.]	150, 200, 300, 400, 900, 1800
Smartphone App	0,1
Public Transport [Ticket Category]	1-2 zones, 3 zones, 4 zones, 5 zones, all zones, GA
Car Sharing [Km incl.]	50, 125
Bike Sharing [Hours incl.]	3, 5
E-Bike Sharing [Hours incl.]	3, 5
Park & Ride [Days incl.]	7, 14
Taxi [Min. incl.]	30, 60

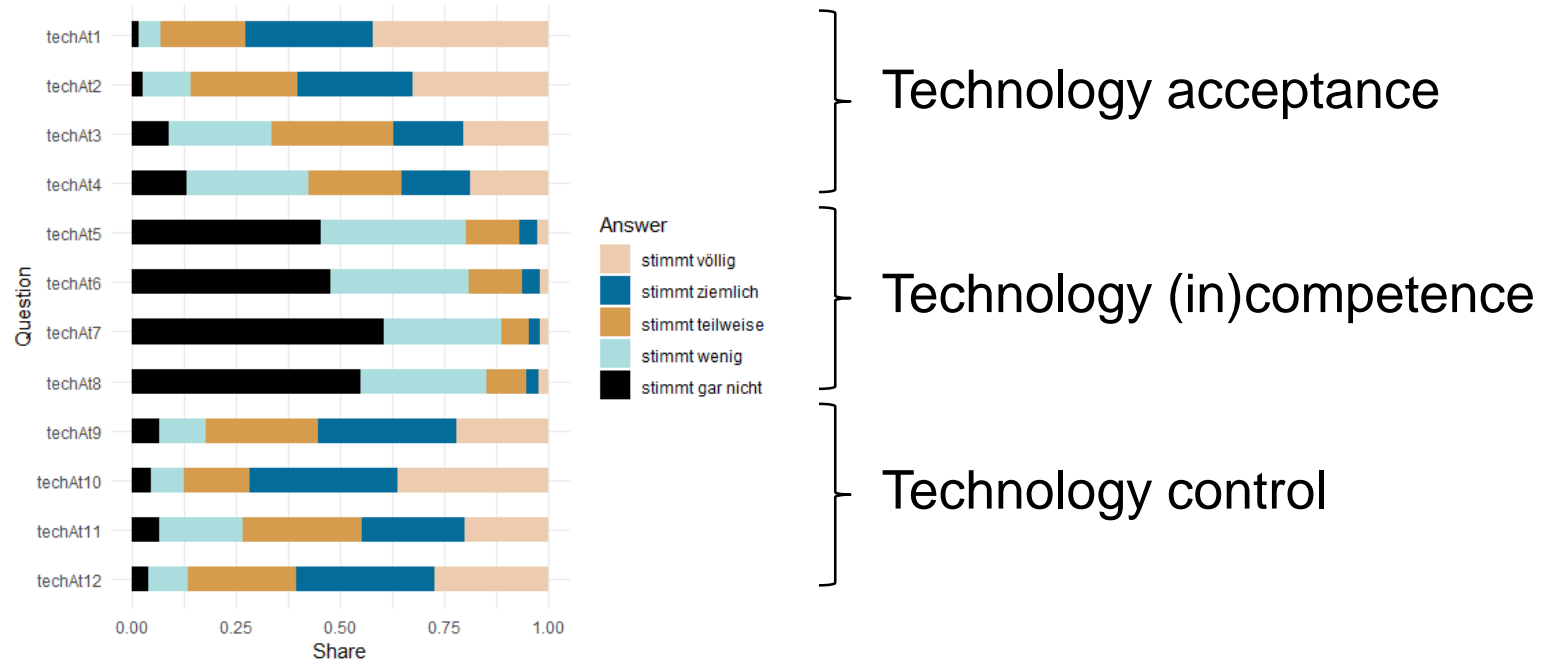
Results: Descriptive Statistics

- (Very) low expenses for shared modes and park and ride



Results: Descriptive Statistics

- Most participants accept new technologies and feel competent to use them



Results: Descriptive Statistics

- Most participants accept new technologies and feel competent to use them

Acceptance	techAt1	Hinsichtlich technischer Neuentwicklungen bin ich sehr neugierig.
	techAt2	Ich finde schnell Gefallen an technischen Neuentwicklungen.
	techAt3	Ich bin stets daran interessiert, die neuesten technischen Geräte zu verwenden.
	techAt4	Wenn ich Gelegenheit dazu hätte, würde ich noch viel häufiger technische Produkte nutzen, als ich das gegenwärtig tue.
Competence	techAt5	Im Umgang mit moderner Technik habe ich oft Angst, zu versagen.
	techAt6	Für mich stellt der Umgang mit technischen Neuerungen zumeist eine Überforderung dar.
	techAt7	Ich habe Angst, technische Neuentwicklungen eher kaputt zu machen, als dass ich sie richtig benutze.
	techAt8	Den Umgang mit neuer Technik finde ich schwierig – ich kann das meistens einfach nicht.
	techAt9	Ob ich erfolgreich in der Anwendung moderner Technik bin, hängt im Wesentlichen von mir ab.
Control	techAt10	Es liegt in meiner Hand, ob mir die Nutzung technischer Neuentwicklungen gelingt – mit Zufall oder Glück hat das wenig zu tun.
	techAt11	Wenn ich im Umgang mit Technik Schwierigkeiten habe, hängt es schlussendlich allein von mir ab, dass ich sie löse.
	techAt12	Das, was passiert, wenn ich mich mit technischen Neuentwicklungen beschäftige, obliegt letztlich meiner Kontrolle.