ETH zürich

Center for Sustainable Future Mobility (CSFM)

Empirical use and Impact analysis of MaaS (EIM)

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Abstract

We conducted a tracking study during the roll-out of yumuv [1, 2] - a new Mobility as a Service (MaaS) offer in Zürich. We collected the world largest empirical MaaS dataset (work package 1 (WP1)) to analyze how MaaS bundles affect mobility behavior (WP3) and propose a representation for individual mobility (WP2) that enables the development of prediction and analysis methods that generalize across heterogenous datasets (WP4).

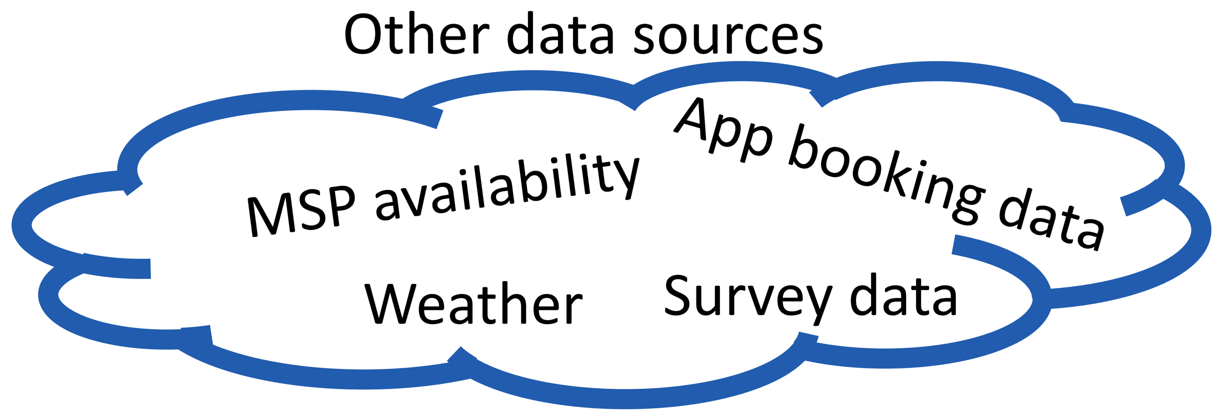
WP1: Data elicitation

Treatment group (TG)	Survey 1	Tracking Access to YUMUV bundles	Survey 2
Control group (CG)		Tracking	

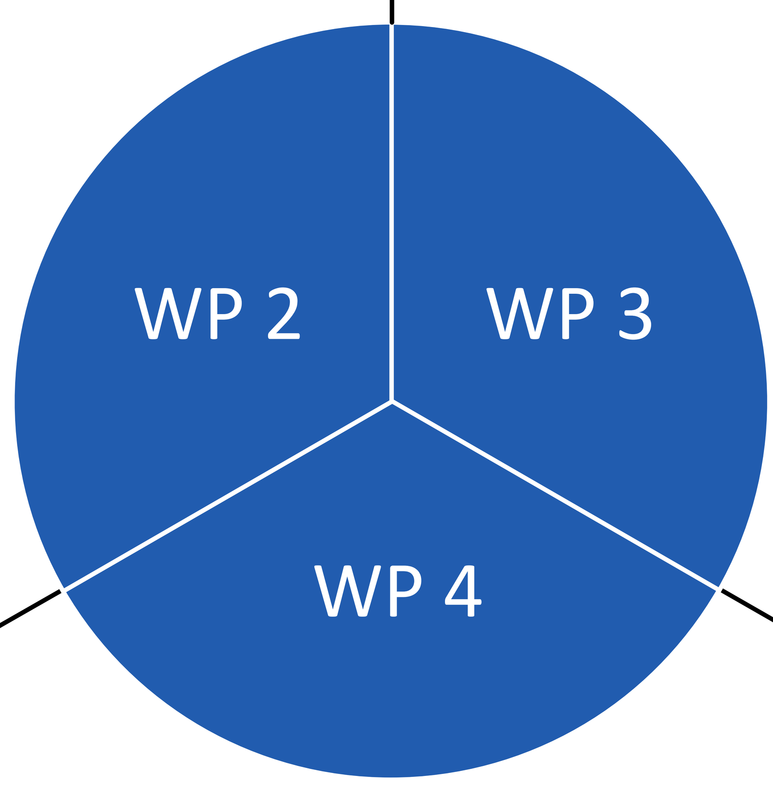
Jul 2020 → Aug 2020 → Sep 2020

Tracking data	Control group	Treatment group
Nb of users	672 (**427**)	148 (**71**)
Triplegs	371'000	112'000
Staypoints	248'000	65'000
Labels	Mode of transport + activity label	
Tracking time	3 - 4 months	
Total km tracked	3.9 M km	1.5 M km

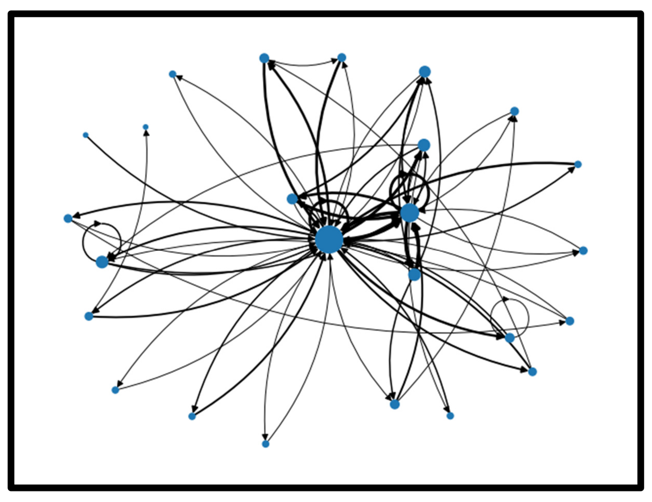
Other data sources



Preprocessing methods are open source:
https://github.com/mie-lab/trackintel



Development of a graph representation of individual mobility based on visited locations [3, 4]:



+ Compact
+ Efficient
+ Privacy friendly
+ Few dataset specific assumptions

Analysis of MaaS usage and impact:

- Effect of yumuv bundles on transport mode choice [5]:
  - e-scooters (++); public transport (+)
  - own e-bike (--); Own bicycle (-)
  - No significant effect: Private vehicle; shared e-bikes; own e-scooter
- Shared scooter often replace low emission modes in Zürich [6]

Analysis and prediction:

- Graph based method to identify user groups with similar mobility behavior [7]
- Graph based mobility prediction is planned for the remainder of 2022

References

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3. Martin, H., Perez-Cruz, F. Raubal, M., 2021. A graph-based representation for human mobility data (in preparation).
4. Martin, H., Wiedemann, N., Suel, E., Hong, Y., and Xin, Y., 2022 Influence of tracking duration on the privacy of individual mobility graphs (under review).
5. Martin, H., Reck, D. J., Axhausen, K. W., & Raubal, M. 2021. ETH Mobility Initiative Project MI-01-19 Empirical use and Impact analysis of MaaS. ETH Zurich.
6. Reck, D.J., Martin, H., Axhausen, K.W., 2021. Mode choice, substitution patterns and environmental impacts of shared and personal micro-mobility. Transportation Research Part D: Transport and Environment.
7. Martin, H., Wiedemann, N. Reck, D.J., Raubal, M., 2022. Graph based mobility profiling for longitudinal and cross-sectional tracking studies (under review).

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