Geography Department

HUMBOLDT-UNIVERSITÄT ZU BERLIN

Scenarios of developing sustainable urban living environments and the role of mobility

Tobia Lakes[1]*, Daniel Krajzewicz[2], Michael Hardinghaus[2], Simon Nieland[2]
[1]Humboldt-Universitaet Berlin, Applied Geoinformation Science
[2]German Aerospace Center (DLR) Institute of Transport Research
*** contact: Tobia.Lakes@hu-berlin.de**

DLR Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center

Motivation and background

The aim of urban development strategies to make cities safe, resilient and sustainable is directly intertwined with mobility concepts.

While benefits of active mobility (walking and cycling) as well as access to public transport are generally well-recognised, in planning practice and concepts, urban development is frequently taking place without considering the association with individual mobility patterns.

Current debates and plans of intra-urban development versus suburban development are rarely taking into account the effect on urban mobility and the associated challenges (e.g. traffic, noise pollution, and air quality).

The aim of this poster is to present a sustainability analysis of planned urban development and an analysis of projected future mobility patterns.

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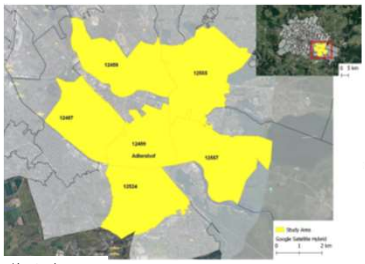
Case Study: methods

We focus on a local study area in the suburban district Adlershof of Berlin that has been subject to rapid development in recent years and further planned developments in the future (1, 2).
We use different datasets to evaluate environmental (such as NDVI to capture greenness, noise, and pollution) and social indicators (e.g. crime data) to characterize and compare different aspects of sustainability of the existing and planned urban development in a spatially explicit multi-criteria analysis (2, 3).
We define different scenarios, varying the weights for more social or ecological preferences and evaluate the areas according to these scenarios.
Moreover, we use data from a mobility survey we conducted in Adlershof with detailed information to describe the mobility in the area. Finally, we apply an agent-based demand model (TAPAS) and a microscopic traffic flow simulation (SUMO) to model future transport demand for different modes of transport (cycling, PT, car) and the expected traffic load in the network (4, 5). Finally, we enrich the used indicators by describing accessibilities within the area using the UrMoAC tool.

TAPAS: Heinrichs, Matthias; Krajzewicz, Daniel; Cyganski, Rita and von Schmidt, Antje (2017): Introduction of car sharing into existing car fleets in microscopic travel demand modelling. In: Personal and Ubiquitous Computing, pp. 1-11. Springer. doi: 10.1007/s00779-017-1031-3. ISSN 1617-4909, https://github.com/DLR-VF/TAPAS.

UrMoAC: Krajzewicz, Daniel; Heinrichs, Dirk and Cyganski, Rita (2017): Intermodal Contour Accessibility Measures Computation Using the 'UrMo Accessibility Computer'. In: International Journal On Advances in Systems and Measurements, 10 (3&4), pp. 111-123. IARIA, https://github.com/DLR-VF/UrMoAC.

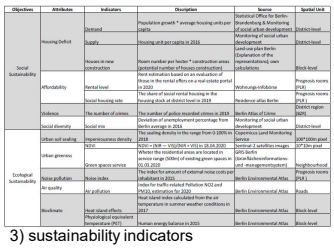
SUMO: Alvarez Lopez, Pablo; Behrisch, Michael; Bieker-Walz, Laura; Erdmann, Jakob; Flötteröd, Yun-Pang; Hilbrich, Robert; Lücken, Leonhard; Rummel, Johannes; Wagner, Peter and Wießner, Evamarie (2018): Microscopic Traffic Simulation using SUMO; In: Proceedings of the IEEE Intelligent Transportation Systems Conference (ITSC), http://sumo.dlr.de



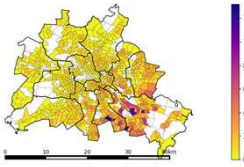
1) study area

2) potential areas and constructions in plan

4) simulated road network



3) sustainability indicators



5) simulated origins of employees

Results and conclusions

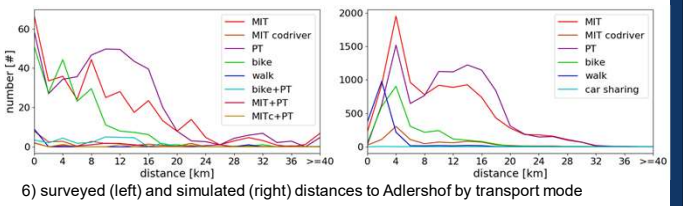
Key findings:

- Initial framework for a sustainability analysis of planned urban development and future mobility patterns is developed
- The impact of the expected growth in the area on the transport system is estimated and related concerns are discussed
- Simulation meets survey to a large degree (6)
- Prediction shows high increase in transport demand for 2030 (7)
- Most sustainable areas for housing development are identified (8)

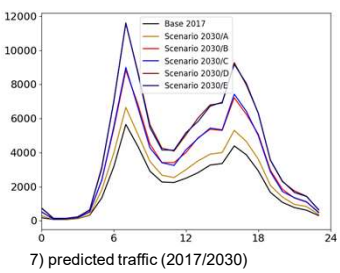
Future research challenges:

- How can we combine spatially explicit urban land use development models and scenarios with mobility models?
- Which role can scenario-analysis play for discussing current urban development strategies?

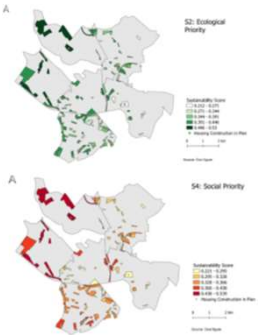
With our analysis we show how important the intertwined perspective from urban development and mobility concepts is and that indicator- and model-based approaches can provide important insights for different urban scenarios.



6) surveyed (left) and simulated (right) distances to Adlershof by transport mode



7) predicted traffic (2017/2030)



8) Example scenario: ecological priority (upper) and social sustainability (lower)

References:

Tang, Gongmingyue (2020): Multi-criteria analysis of urban development in Berlin. Bachelor thesis under supervision of Prof. Lakes, Applied Geoinformation Science Lab, Geography Department, Humboldt-Universität zu Berlin.

Krajzewicz, Daniel; Heinrichs, Matthias; Wagner, Peter; Flötteröd, Yun-Pang (2019): Mobilität Johannisthal / Adlershof 2030. Abschlussbericht.