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The Potential of the Traffic Transformation towards Sustainable Mobility for the Re-design of the Urban Environment to Improve the Supply of Space for the Housing Market

GIS Day 2019, 13.11.2019, Potsdam

GFZ Helmholtz Centre Potsdam

PIK

HELMHOLTZ SPITZENFORSCHUNG FÜR GROSSE HERAUSFORDERUNGEN

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Agenda

0	Overview
I	Social, Environmental and Academic Relevance
II	State of the Art in Research / Research Gaps
III	Research Questions
IV	Methodological Approach
V	Milestones
VI	Research Plan and Timetable
VII	Literature
VIII	Discussion

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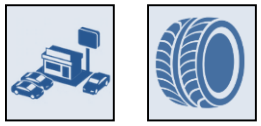
0 Overview

Framework II

Housing Crisis

Shortage of Space

Effect I	Redistribution of Road Space in Favor of SM (MobG)	✓
Effect II	Potential of …nfrastructure?	✗



Research Question	How much automob… per kind of au…	…y flats could be build …n takes place?

Bevölkerungswachstum in der Hauptstadt

Berlin ist voll – jetzt ziehen alle ins Umland

Statistiker melden drastisch steigende Bodenpreise und Mieten. Und das nun auch in Brandenburg. In der Hauptstadt gibt es indes kaum noch Grundstücke. *Von Ralf Schönball* mehr... [22 Kommentare]

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I Social, Environmental and Academic Relevance

Socially

- Need for traffic transformation
- Focus on electrification, sharing and autonomous driving
- Potentials of behavior change neglected
- Political action is missing, car dependency backed by massive subsidies
- Housing crisis

Environmentally

- Focus on air pollution and emission of climate relevant gases
- Carbon-free transport 2050 Berlin, -95% until 2050 (11.5 Verkehr (BEK), Berliner Energiewende- und Klimaschutzprogramm)
- Land use mostly neglected

Academically

- Focus on the distribution of road space (Nello-Deakin 2019: Amsterdam and Gössling et al. 2016: Freiburg)
- “The distribution of urban mobility space and its “fairness” has so far not been quantified both rigorously and on large scale” (Szell 2018)
- Off-street space consumption of automobile infrastructure neglected

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II State of the Art in Research / Research Gaps

“The distribution of urban mobility space and its “fairness” has so far not been quantified both rigorously and on large scale” (Szell 2018)

Research Gaps

- The status quo analysis of the space consumption of overall automobile infrastructure
  car repair shops, tyre retailers, filling stations, car dealerships, car wash facilities and car parks, rental services
- The correlation between traffic transformation and space allocation of off-street automobile infrastructure
- Research dealing holistically with the fields of transport & urban planning (urban design, transport policy)

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III Research Questions

The Potential of the Traffic Transformation towards Sustainable Mobility for the Re-design of the Urban Environment to Improve the Supply of Space for the Housing Market

A) Best practices of redistribution of automobile infrastructure - paper 1

- What are the best practices?
- Where?
- Which effects through redistribution?

B) Status quo of space consumption of automobile infrastructure in Berlin(+Amsterdam) - paper 2

- How much?
- Which kind of automobile infrastructure?
- Ratio to other land use?
- Correlation to socio-economic patterns?

C) Space gains of traffic transformation in the normative scenario for Berlin (+Amsterdam)

- Scenario of carbon-free sustainable transport in 2050?
- Modal-shares and motorisation rates in normative scenario?
- Space gains per type of infrastructure?

D) What Potential for the housing market could be derived by the space gains? - paper 3

- Is the gained space from automobile infrastructure usable for the housing market?
- How many flats could be built (based on international standards) on the gained space?

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III Research Questions

Optional

E) Alternative usages of the space gains

- Urban agriculture
- Climate change adaption measures (greening, water supply, shadow, seating)

F) Policy recommendations

- How has a traffic transformation to look like to lever the potentials?
- Which kind of political action is required to lever the potential of the traffic transformation for the housing market?

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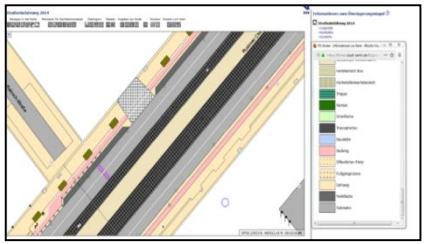
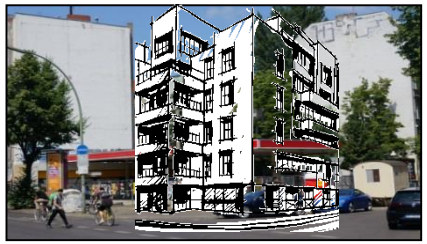
IV Methodological Approach

GIS **GIS**

A) Best Practice Analysis	B) Status Quo Analysis	C) Normative Sc. Analysis	D) Explorative Analysis
▪ best practices of redistribution of space of automobile infrastructure ▪ cities, kind of infrastruct. redistributed towards alternative usages like housing, climate adaption measures, urban agricul.) ▪ traffic, environmental & social effects caused by the redistribution ▪ Interactive website with examples of off-street infrastr. transformation in Berlin	▪ status quo analysis for space consumption per kind of automobile infrastructure ▪ GIS modal Berlin(+other?) ▪ analysis for automobile infrastructure (car repair shops, car rental, tyre retailers, filling stations, car dealerships, car wash facilities and car parks) ▪ analysis of socio-economic and land-use patterns	▪ on basis of selected scenario for carbon free transport in 2050 derivation of space consumption per automobile infrastructure ▪ comparison of space consumption status quo and carbon free scenario ▪ calculation , allocation and mapping of net space gains in the carbon free scenario	▪ spatial analysis of gained space about usability for housing ▪ analysis based on zoning plans, access to transport, education, noise register etc. ▪ classification of space regarding its potential for the housing market ▪ calculation of the potential amount of flats which could be built due to the traffic transformation





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IV Methodological Approach - Best Practice Analysis

- Choice of cities e.g.: Oslo, Odense, Barcelona, Genk, Berlin, Seoul, Amsterdam

Where

- Countries
- Cities
- Categories of Cities

Type of Infrastructure

- Car Recycling
- Car Repair Shops
- Parking
- Tyre Sellers
- Filling Stations
- Car Dealerships
- Car Wash Facilities
- Car Rental Business

New Purpose and Analysis of Effects

- Housing, Climate Adaption, Agriculture
- Effects on the housing market
- Kind of flats (social, rent, property)
- Acceptance of the Public
- Environmental Effects
- Social Effects
- Traffic Effects

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IV Methodological Approach - Status Quo Analysis I

- Status Quo Analysis of space consumption of automobile infrastructure in Berlin
- Examination of the correlation of space consumption of automobile infrastructure in to urban patters like modal share, housing, income, population density etc.

Data Base

Desktop research including various sources like
- open data esri
- geofabrik
- osm
- Amt für Statistik Berlin-BB
- fis broker Berlin
- street view
- google earth
- satellite pictures
- Eurostat
- Data from societies, networks like „Bundesverband Tankstellen und Gewerbliche Autowäsche“

Type of Infrastructure

- Car Recycling
- Car Repair Shops
- Parking
- Tyre Sellers
- Filling Stations
- Car Dealerships
- Car Wash Facilities
- Car Rental Business

Output

- Locations p. type of infrastr.
- Size p. type of infrastr.
- Correlation to urban patterns Like land value, unemployment rates, modal shares, districts, density etc.
- Densities per type of infrastructure

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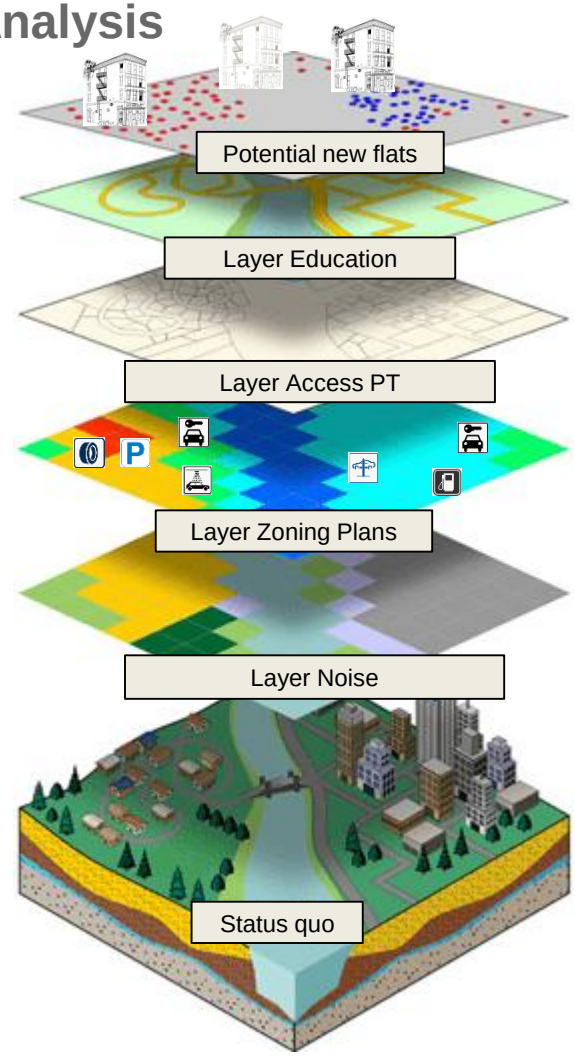
IV Methodological Approach - Explorative Analysis

- Net space gains of the normative scenario will be analysed about their potential for the housing market
- Tool: spatial gis analysis including layers for:
  - land use planning/ zoning plans
  - noise register
  - PT access
  - Access to education etc.
- Output 1: Classification of the space reg. usability for:
  - A) housing
  - B) other (urban agriculture, climate change adapt. meas.)
  - C) not usable
- Output 2: Ranking classification of the space reg. usability for:
  - The spaces which are usable for housing will be ranked based on expert interviews
- The gis software will be based on open source (quantum gis)



Example of layers in gis-based planning approach, Source: GIS layers model. www.gembc.ca.

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V Milestones

1 State of the art traffic transformation and spatial justice research
2 Overview of best practices of redistribution of space from automobile infrastructure
3 Stakeholder identification
4 Development of gis-model Berlin
5 Mapping space consumption per mode of transport
6 Analysis of automobile infrastructure
7 Selection of normative (carbon-free) traffic transformation scenario
8 Calculation of modal share of the normative scenario
9 Analysis of space consumption of automobile infrastructure. in normative sc.
10 Calculation of additional space for SM
11 Comparison of space cons. normative sc. vs. status quo
12 Derivation of pot. space gains from automobile infrastructure in norm. sc.
13 Overview of potent. Space gains p. kind of automobile infrastructure.
14 Spatial analysis of pot. space gained from automobile infrastructure.
15 Classification of gained space
16 Ranking of space for housing market
17 Calculation of flats per scenario
18 Extrapolation for other districts of Berlin (+other city)
19 Potential for climate change adaption measures
20 Potential for urban gardening/ agriculture
21 Recommendations for policy action
22 Critical review of the dissertation
23 Derivation of additional research areas

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VI Research Plan and Timetable

Time Span	Research Topic	Milestones	Methodology	Chapter	MS	Output		
WS 19/20	State of the art in research, terminology, best practices	State of the art traffic transformation and spatial justice research	Literature review	A)	1	**Paper 1:** Overview of best practices of redistribution of space from automobile infrastrucur		
		Overview of best practices of redistribution of space from automobile infrastructure	Literature review, field & desktop research		2			
SS 20	Status quo analysis, spatial justice	Stakeholder identification	Desktop research	B)	3		**Paper 2:** Spatial analysis of off-street automobile infrastruct. (eventually in comparison to another city)	**Interactive project-website:** crowdsourcing of examples of traffic transformation from automobile infrastructure towards housing
		Development of gis-model Berlin	GIS-model, field research		4			
		Mapping space consumption per kind of automobile infrastructure			5			
		Analysis of automobile infrastruture (correlation to spatial patterns)			6			
WS 20	Scenario analysis	Selection of normative (carbon-free) traffic transformation scenario	Scenario review	C)	7	**Paper 3:** Potential of the traffic transformation for the housing market		
SS 21	Deployment of the scenarios in the gis model	Calculation of modal share of the normative scenario	GIS-model		8			
		Analysis of space consumption of automobile infrastr. in norm. sc.			9			
		Calculation of additional space for SM			10			
		Comparison of space cons. normat. sc. vs. status quo			11			
		Derivation of pot. space gains from autom. infra. in norm. sc.			12			
		Overview of potent. space gains p. kind of automobile infrastr.			13			
WS 21/22	Examiniation of usability for housing market	Spatial analysis of pot. space gained from automobile infrastr.	GIS-model	D)	14			
		Classification of gained space			15			
SS 22		Ranking of space for housing market	Expert interviews, gis-model		16			
		Calculation of flats per scenario			17			
		Extrapolation for other districts of Berlin (+other city)			18			
WS 22	Alternative space usage	Potential for climate change adaption measures	Literature review, gis, expert interviews	E)	19			
		Potential for urban gardening/ agriculture			20			
SS 23	Recommandations	Recommendations for policy action	Derivation from the research results	F)	21		Optional: Policy Recommendations	
		Critical review of the dissertation			22			
		Derivation of additional research areas			23			

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VII Literature

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VIII Discussion

Your questions and input, please!