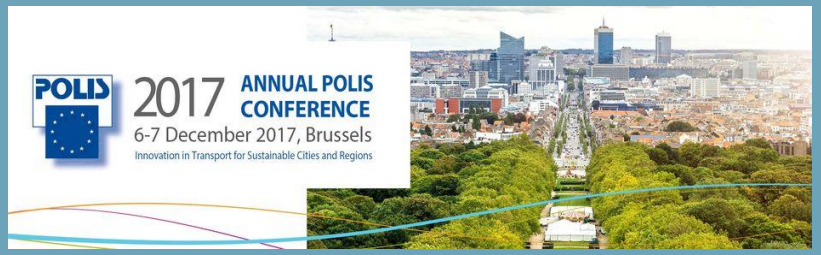
UNIVERSITY of SALZBURG

Geography as melting pot for cross-domain bicycling research and promotion



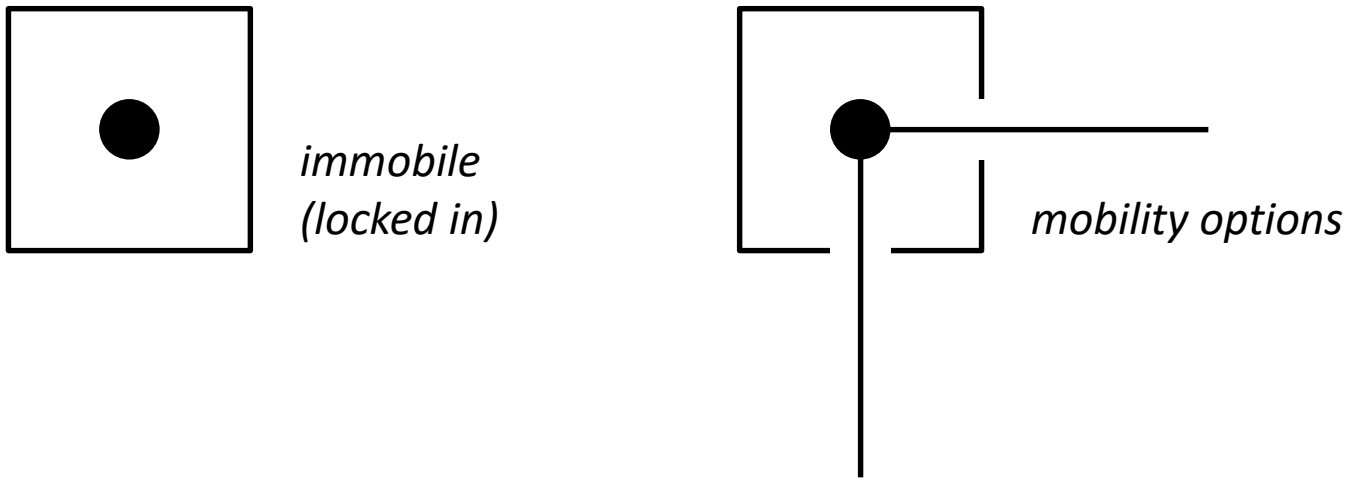
Dr. Martin Loidl | martin.loidl@sbg.ac.at

Z GIS

DEPARTMENT OF GEOINFORMATICS - GI Mobility Lab

Mobility

- Mobility = **ability** to move

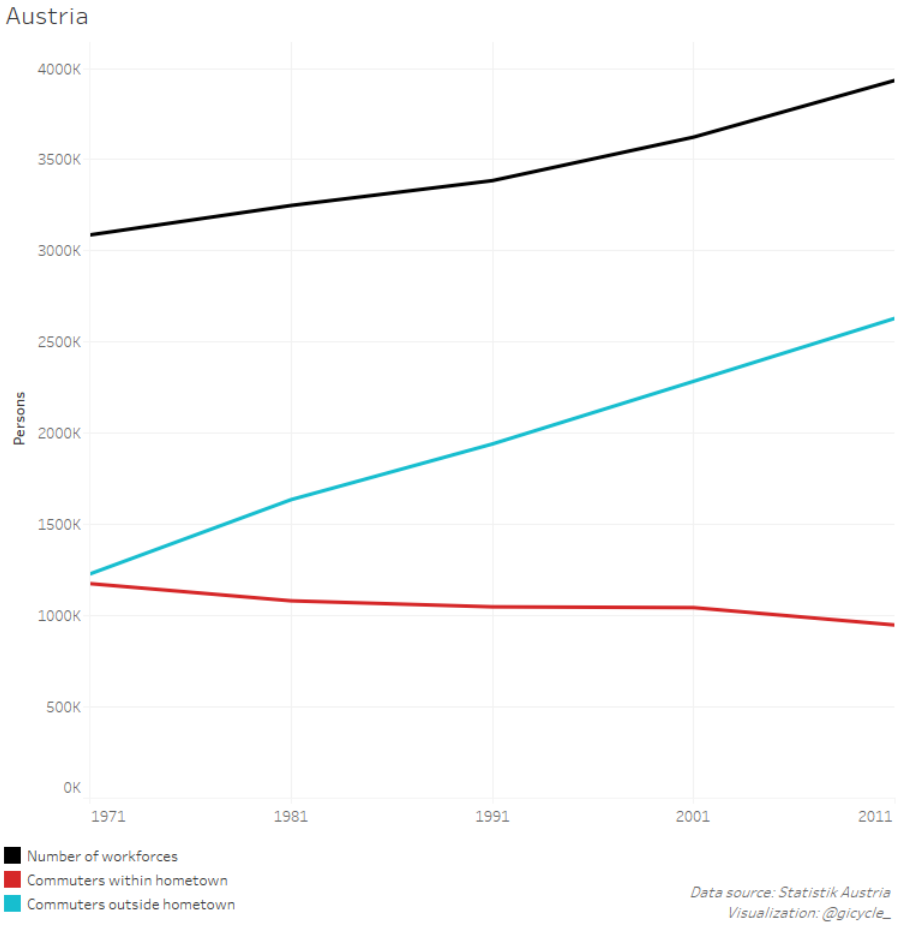


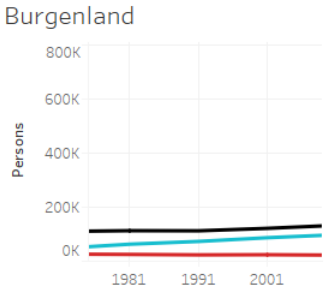
- Spatial determinants for bicycle mobility

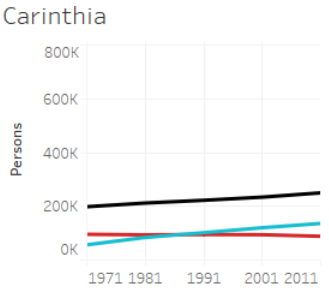
Accessibility

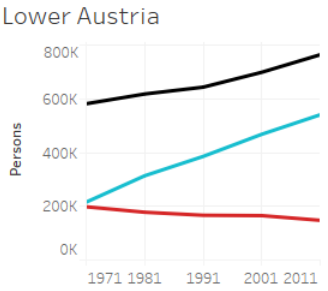
great parking facility
poor accessibility

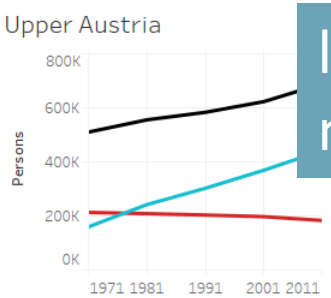
Proximity



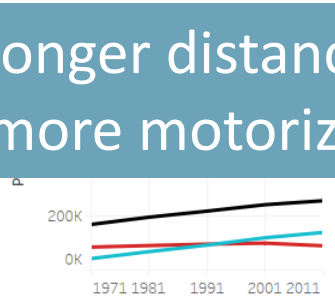


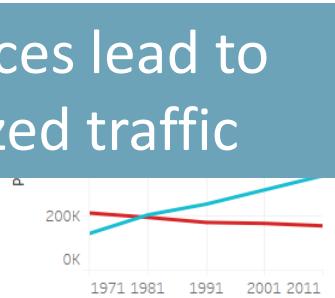


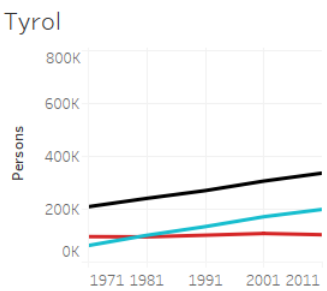


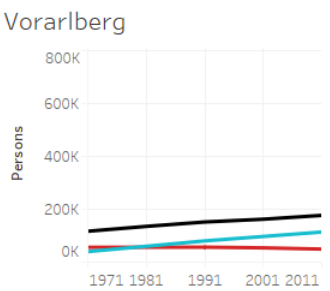


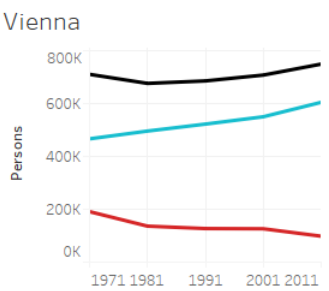
longer distances lead to more motorized traffic











Connectivity

dedicated bicycle way …

… ends abruptly, …

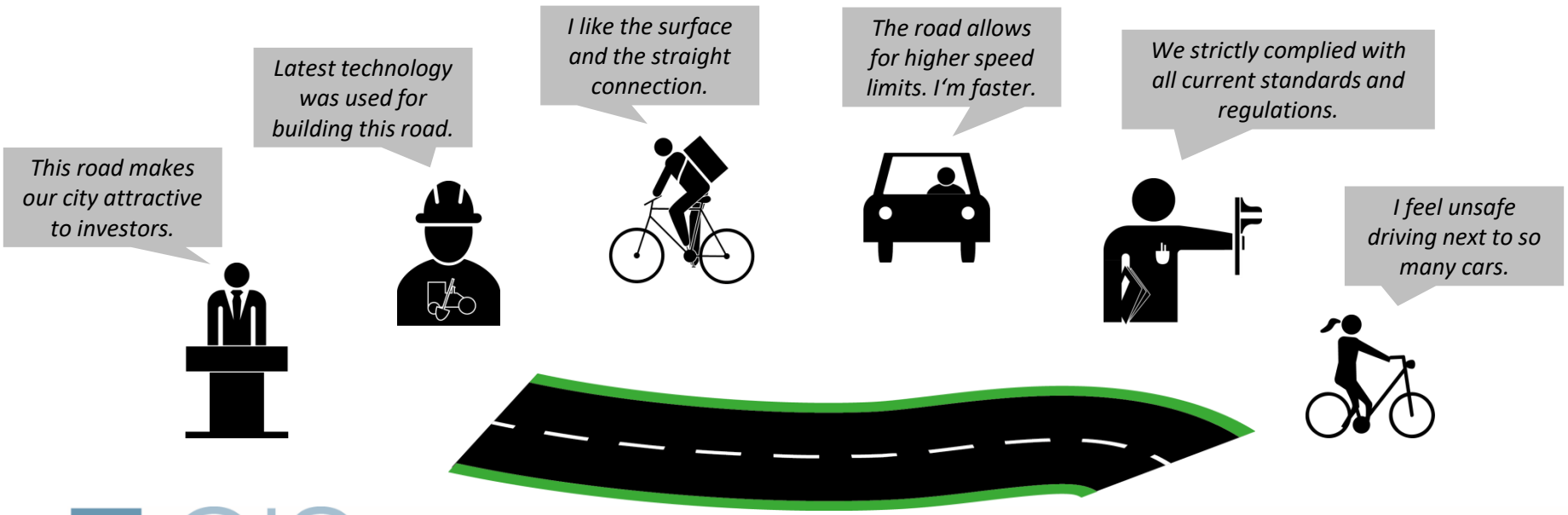
… unambiguously …

… and finally in a taxi stand.

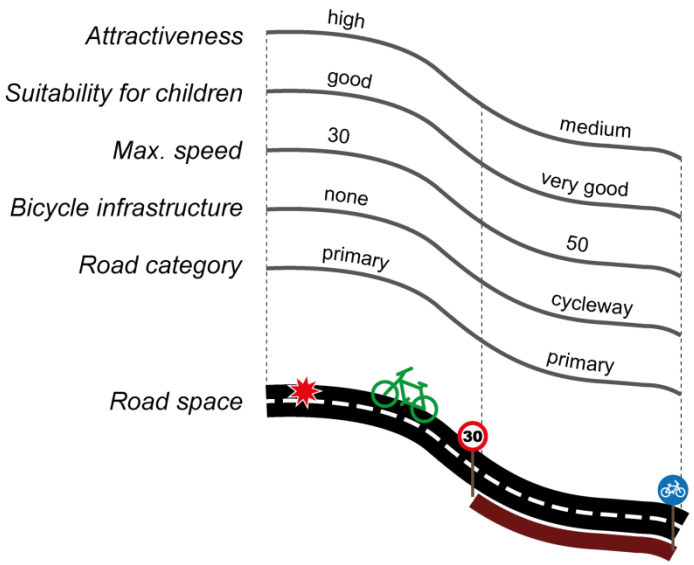
poor connectivity makes an intuitive network impossible

Spatial perspective

- **Spatial environment** decides on **mobility options**
  - Consideration in decision making and promotion of active mobility
- Geographical coordinate as **common denominator** for **multiple perspectives** on the road space



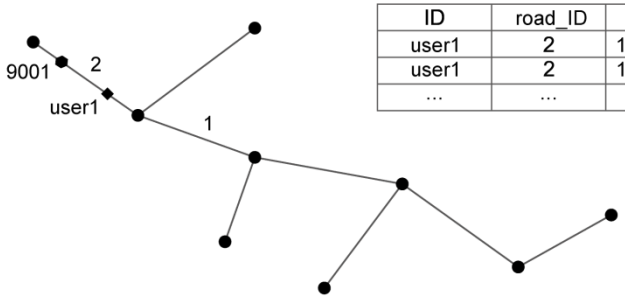
Representation of physical environment (road infrastructure) with descriptive attributes and users/events



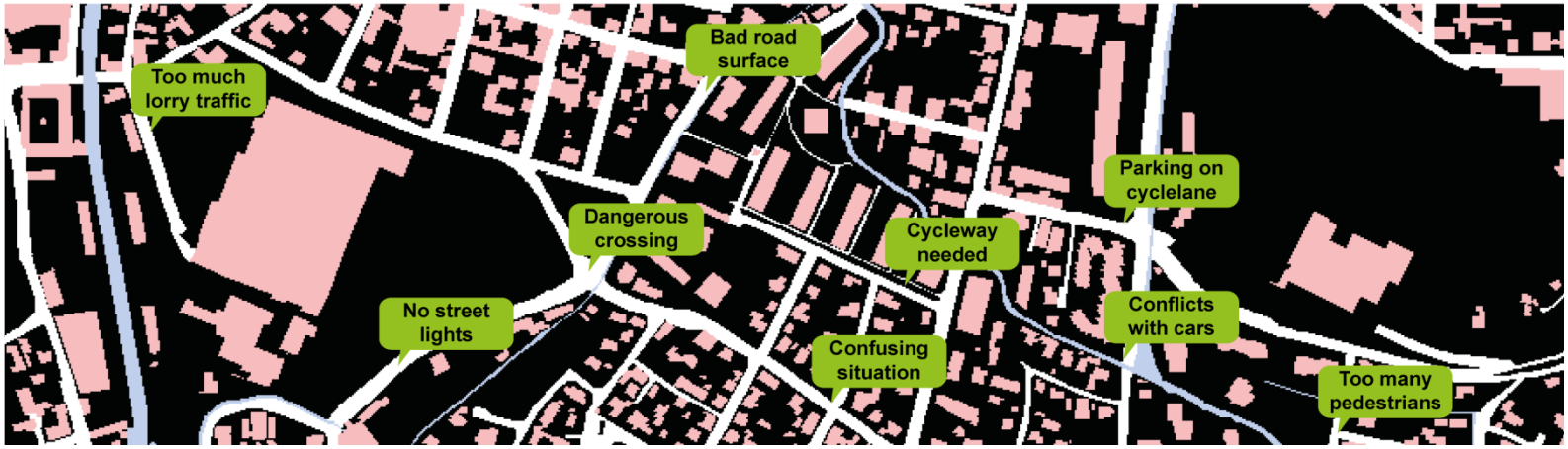
ID	categ	infra	speed	suitab	attrac
1	primary	cycleway	50	very good	medium
2	primary	none	30	good	high
…	…	…	…	…	…

ID	road_ID	code
9001	2	36
…	…	…

ID	road_ID	time
user1	2	1218:1240
user1	2	1218:1242
…	…	…



Virtual, map-based communication about the road space

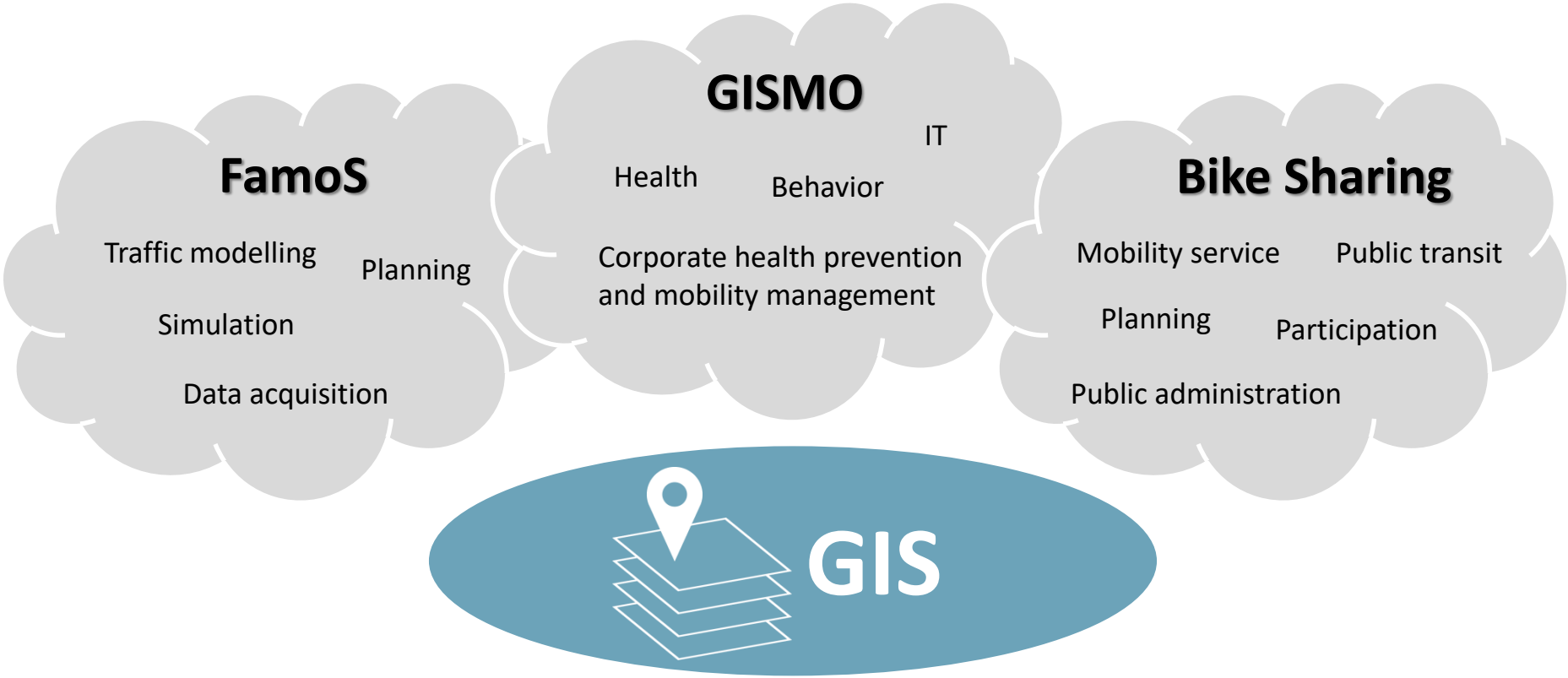


LOIDL, M. 2016. Spatial information for safer bicycling. *In:* GÓMEZ et al. (eds.) *Advances and new Trends in Environmental Informatics.* Berlin, Heidelberg: Springer.

Geographical Information Systems

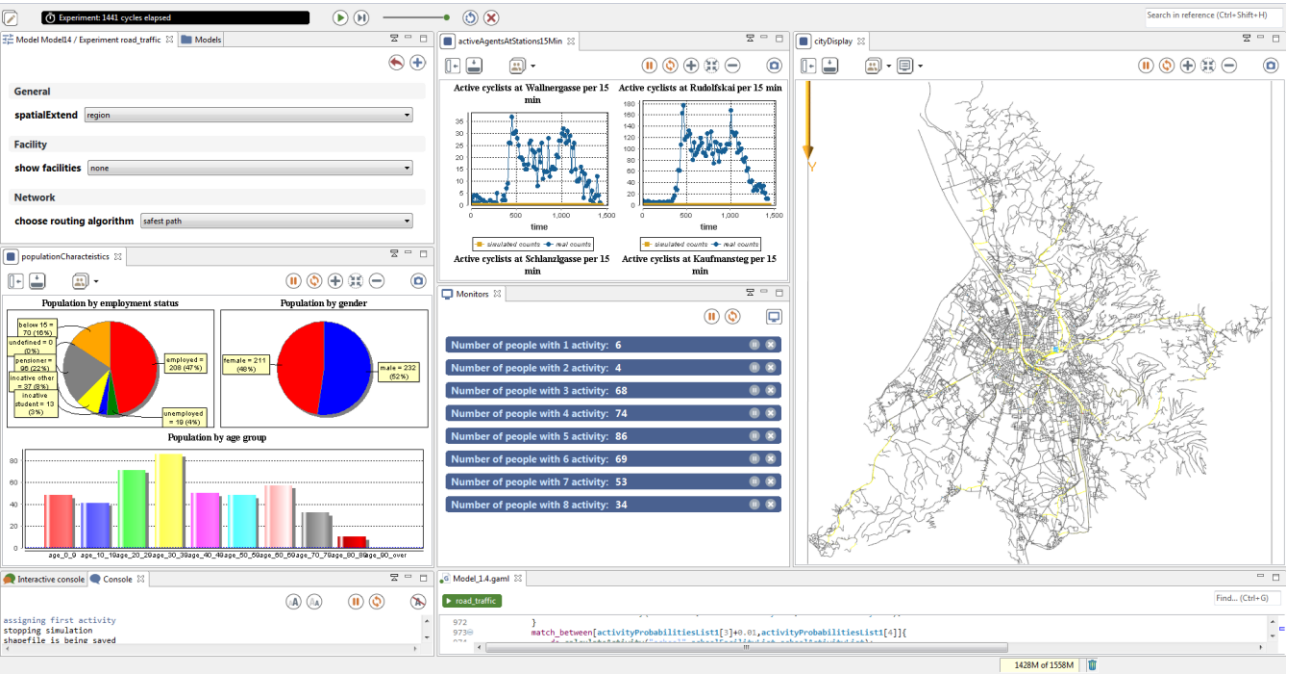
- Geographical Information Systems (GIS) are capable to
  - **Acquire** and **store** relevant data
  - **Model** and **simulate** current and future real-world situations/scenarios
  - Relate data layers to each other and retrieve relevant information through **spatial analysis**
  - **Visualize** results and serve as communication platform
- GIS in bicycling research
  - **Systemic** approach for complex phenomenon
  - **Integrating** domain knowledge

Examples


FamoS
Traffic modelling
Planning
Simulation
Data acquisition
GISMO
IT
Health
Behavior
Corporate health prevention
and mobility management
Bike Sharing
Mobility service
Public transit
Planning
Participation
Public administration
GIS

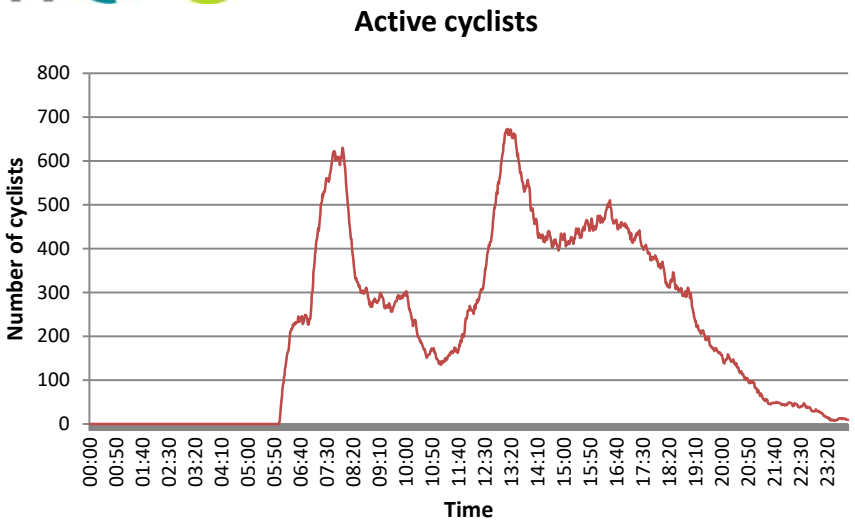
FamoS

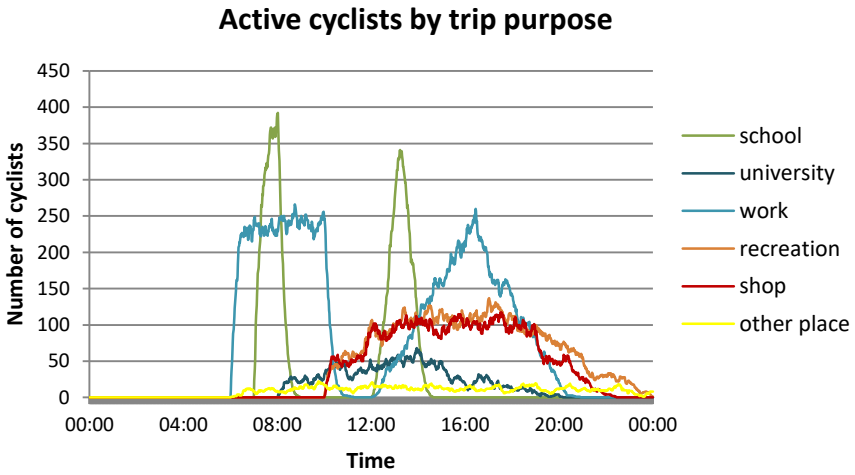
- Agent-based bicycle flow model for entire city
  - Wide range of behavior and influential factors → bicyclists are hard to model and predict



- 150.000 individual agents
- Highest possible spatial and temporal resolution
- Input data <> calibration <> validation
- Result = sum of individual behavior → emergent phenomena

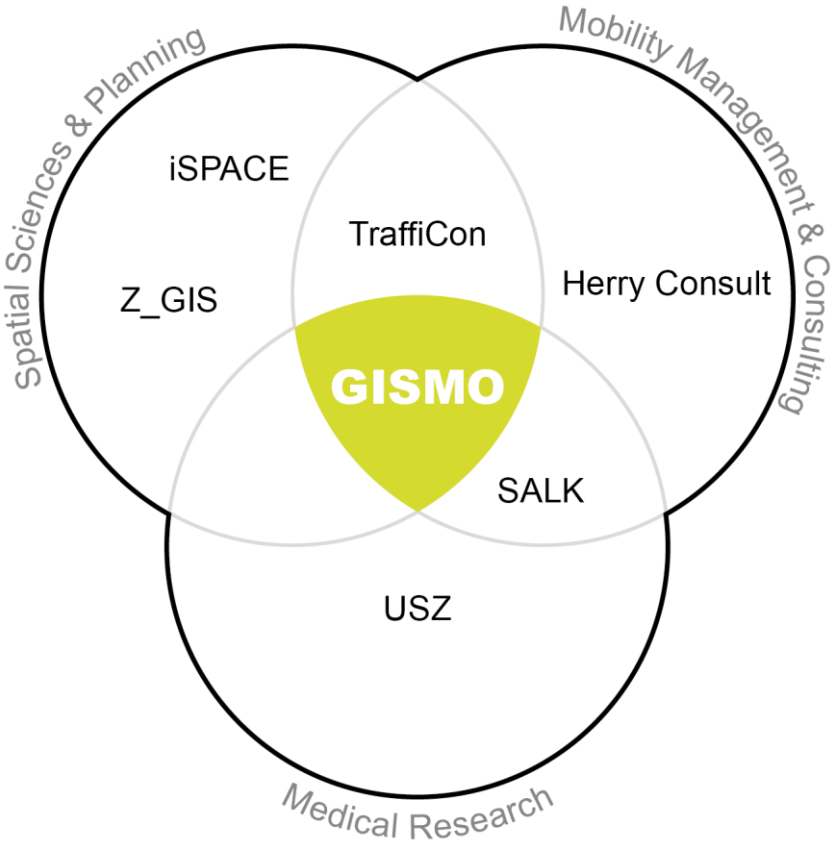
FamoS


Active cyclists
Number of cyclists
800
700
600
500
400
300
200
100
0
00:00
00:50
01:40
02:30
03:20
04:10
05:00
05:50
06:40
07:30
08:20
09:10
10:00
10:50
11:40
12:30
13:20
14:10
15:00
15:50
16:40
17:30
18:20
19:10
20:00
20:50
21:40
22:30
23:20
Time


Active cyclists by trip purpose
Number of cyclists
450
400
350
300
250
200
150
100
50
0
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
school
university
work
recreation
shop
other place


Preliminary results
0
1
2
3
4 km

GISMO


Spatial Sciences & Planning
Mobility Management & Consulting
Medical Research
iSPACE
TraffiCon
Z_GIS
Herry Consult
GISMO
SALK
USZ


Evidence base
Information
Awareness
Promotion of active = healthy commuting mobility
M. Loidl

GISMO

gefördert durch (FFG Projektnr. 854974):
bmvit

clinical intervention study
from car to active commuting
2:1 randomization
N = 70, 1 year

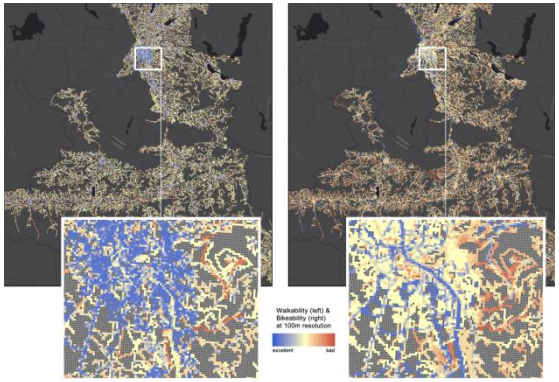
spatial models
suitability analysis of environment
routing algorithm (active mobility ↔ travel time)

web-based information platform
individual commuting recommendations with expectable health effect

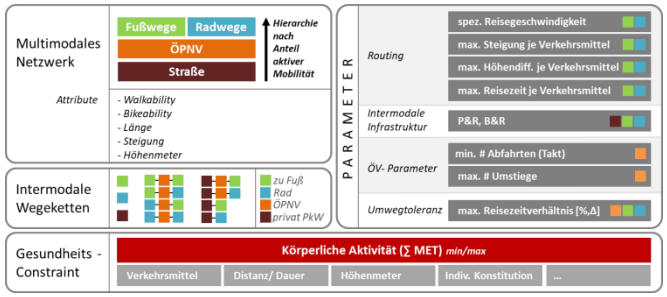
evaluation
contribution of “space-sensible” information to corporate mobility management and health prevention programs

pre-intervention investigation

validation mobility diary

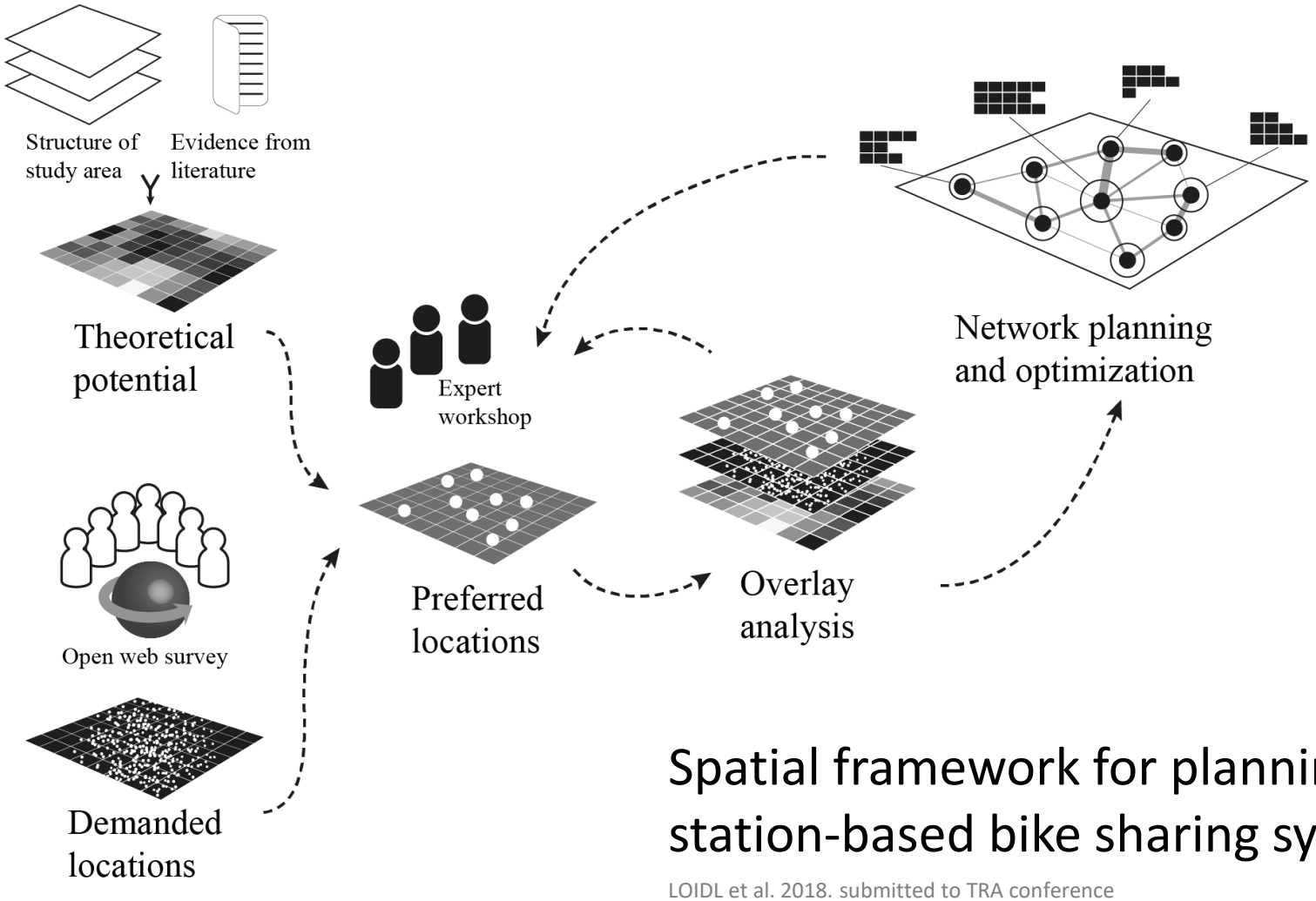


walkability & bikeability index



routing algorithm

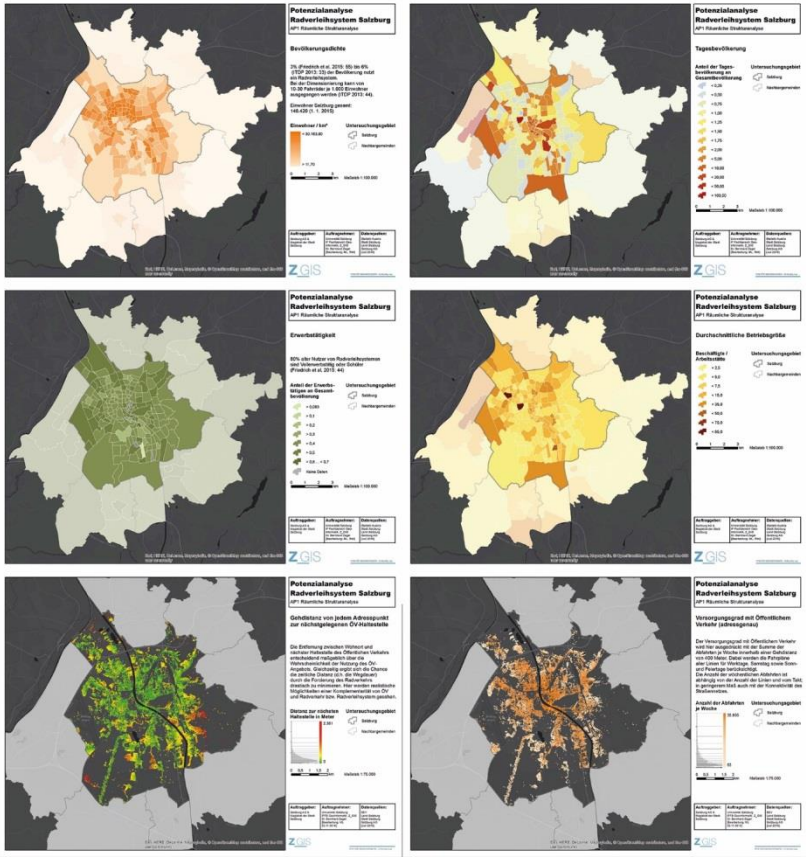
Bike Sharing



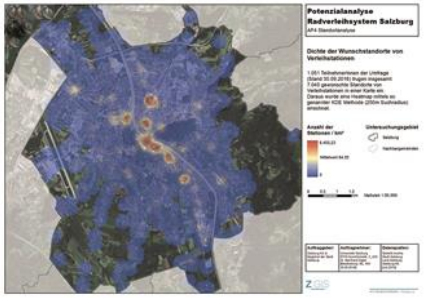
Spatial framework for planning station-based bike sharing systems

LOIDL et al. 2018. submitted to TRA conference

Bike Sharing

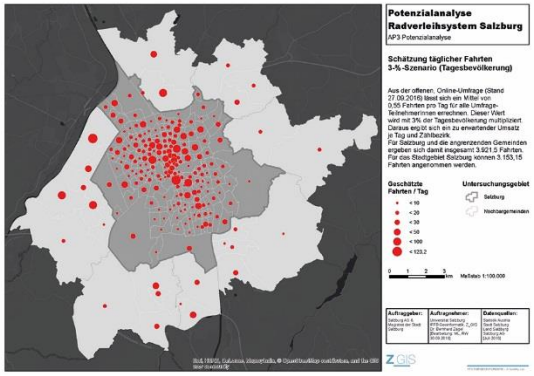


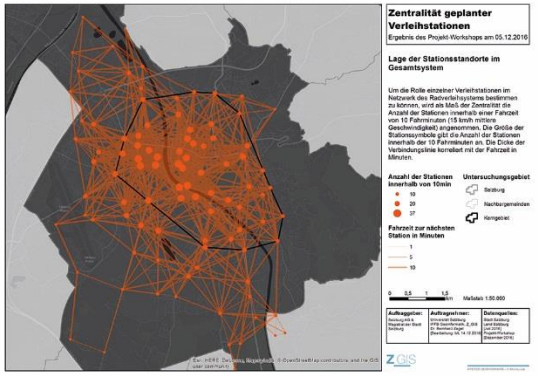
1. analysis of city structure

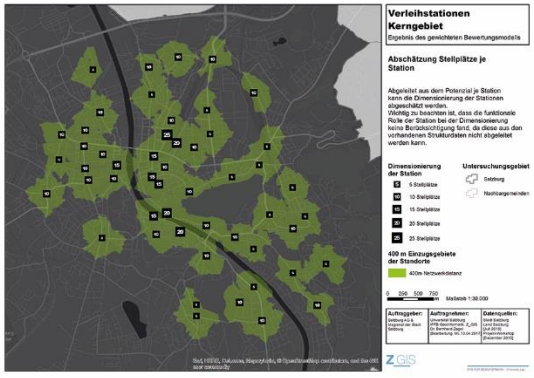


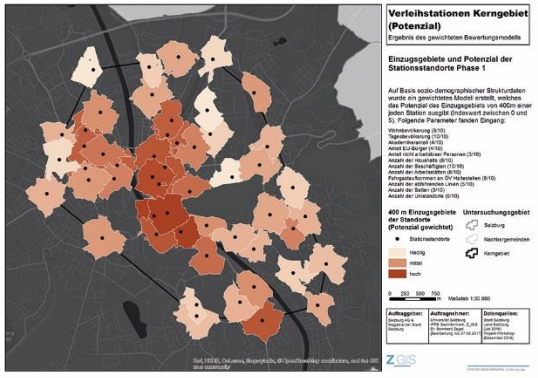
2. result survey

3. expert workshop









4. network design & performance estimation

ZGIS

Conclusion

- Maps = ideal integrators for **multidisciplinary research**
  - Intuitive metaphor („common ground“)
- Spatial perspective facilitates **additional insights**
  - **Multiple perspectives** ↔domain silos
  - „Layer approach“ in GIS accounts for **complexity** of bicycling mobility
  - GISs provide **evidence base** for policies, decision making, bicycling promotion
- (Bicycling) mobility = spatial by its very nature
  - **Spatial characteristics** need to be explicitly considered

Thank you for your attention!

gicycle.wordpress.com

@gicycle_