ParkingProxy

Matsim User Meeting 2024

Tobias Kohl

senozon

Why is parking important?

- Searching for a parking spot takes time and nerves
- A significant amount of inner-city traffic is parking search traffic
- Sometimes people have to walk long distances between their parking spot and their activity location

Let’s simulate it!

- But… how?

Direct Simulation – The Good

- Real traffic to real parking spots
- Influences jam patterns
- Shows up in traffic counts
- Very accurate depiction of what happens in real life

Direct Simulation – The Bad

- Real traffic takes real computation time (a lot of it)
- Not quite clear with which method the agent should explore the surroundings for a free parking spot
- Being first or second at a free parking spot can have big influences on travel time and score – Tiny causes with huge effects

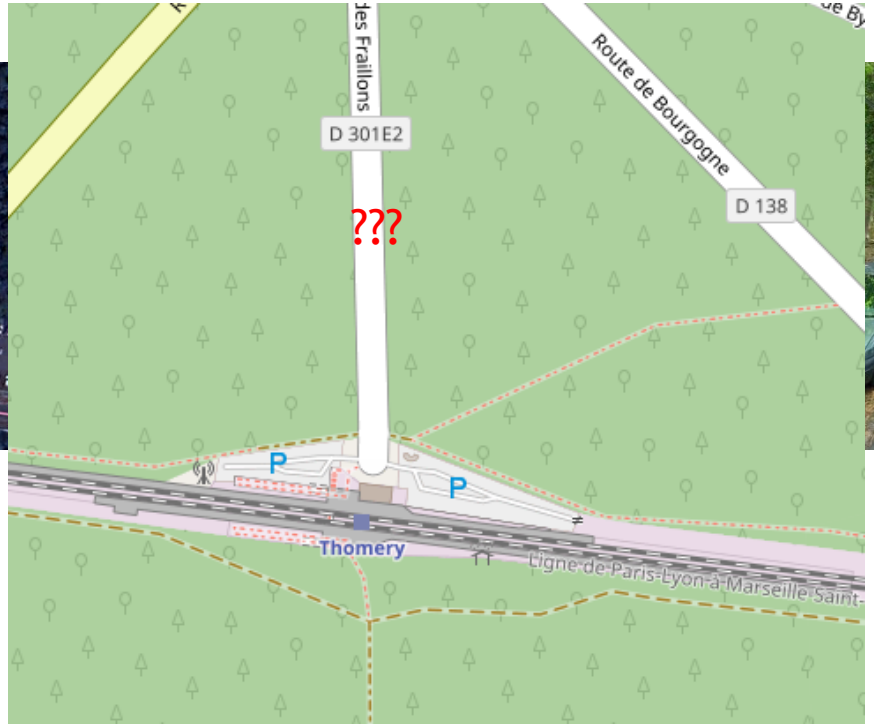
Direct Simulation – The Ugly

- What real parking spots are we talking about exactly?
- Can I park on the street? Does my home have a private driveway? How many cars fit into this parking lot? How many levels does that underground garage have?

Example: Train Station Thomery, Thomery, France

Picture credits: © 2024 Airbus,CNES / Airbus,Maxar Technologies; © 2024 Google

Example: Train Station Thomery, Thomery, France



Direct Simulation – The Ugly

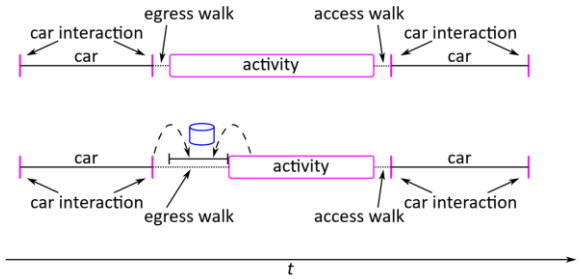
- What real parking spots are we talking about exactly?
- Can I park on the street? Does my home have a private driveway? How many cars fit into this parking lot? How many levels does that underground garage have?
- Way too little reliable data to consistently simulate realistic behavior

Finding a different way

- Direct Simulation too knowledge and time demanding
- Idea: Account for the approximate effect of parking search without actually simulating it
- Be agnostic towards parking infrastructure because no data is better than partial data
- Apply a time penalty to arriving cars based on how many cars already are parked in the area

The core principal

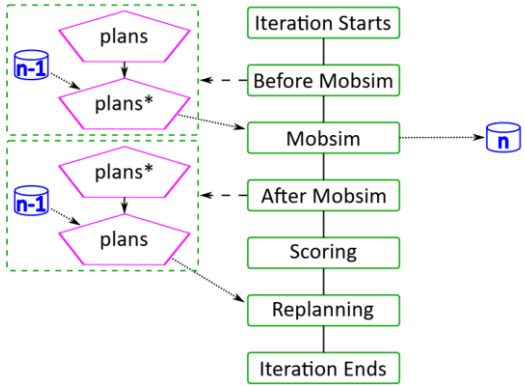
- Modify the egress walk from the car interaction to the real activity:



- Time penalty dependent on load in discrete time-space-cells (here: 15 minutes x 500 meters x 500 meters) of previous iteration
- Zero additional computation times during mobsim

The core principal

- Adhere MATSim rule: Plans are the intention, events/mobsim are the truth
- We want the penalty to be executed in the mobsim, but not show up in the plans (similar to how traffic jams would work)
- Change the egress leg before the mobsim and change it back directly after



The Hanover Case

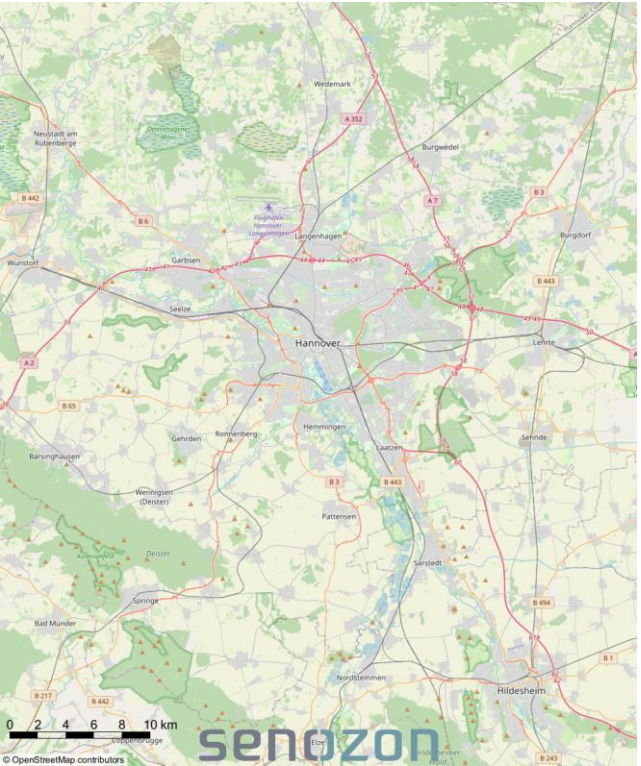
- Based on the current Senozon Model of Germany 2024
- 100pct Sample of the Hanover Region
  - 1.9E06 agents with complete daily schedules
  - 0.7E06 additional cross-border agents with a single trip and fixed transport mode

- Three setups
  - No Parking Penalty
  - Moderate Parking Penalty
  - High Parking Penalty

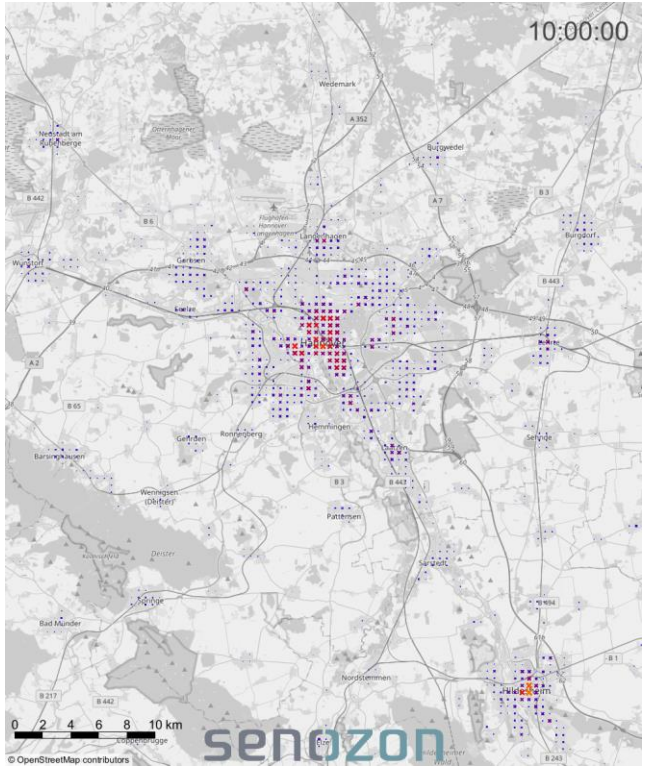
Applied penalty at 10 AM

0.0
40.0
80.0
120.0
160.0
200.0
600.0

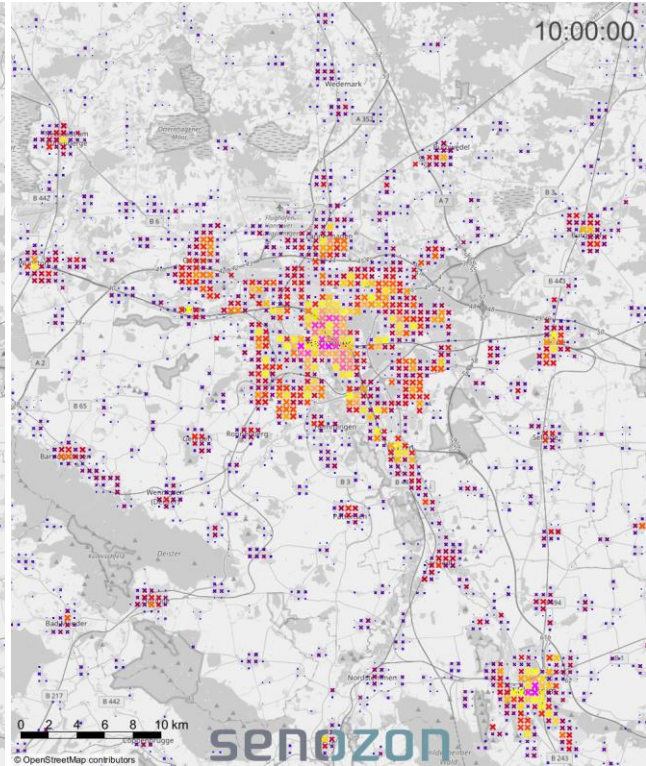
None



Medium



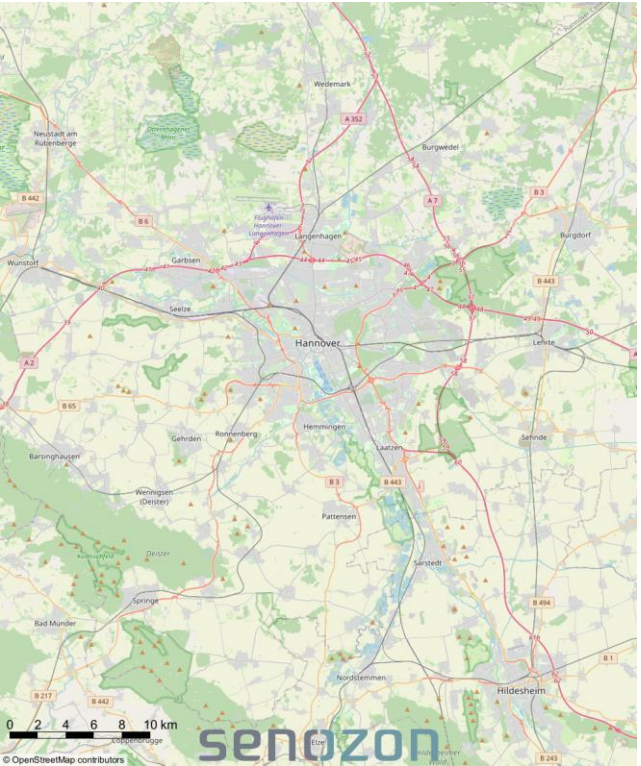
High



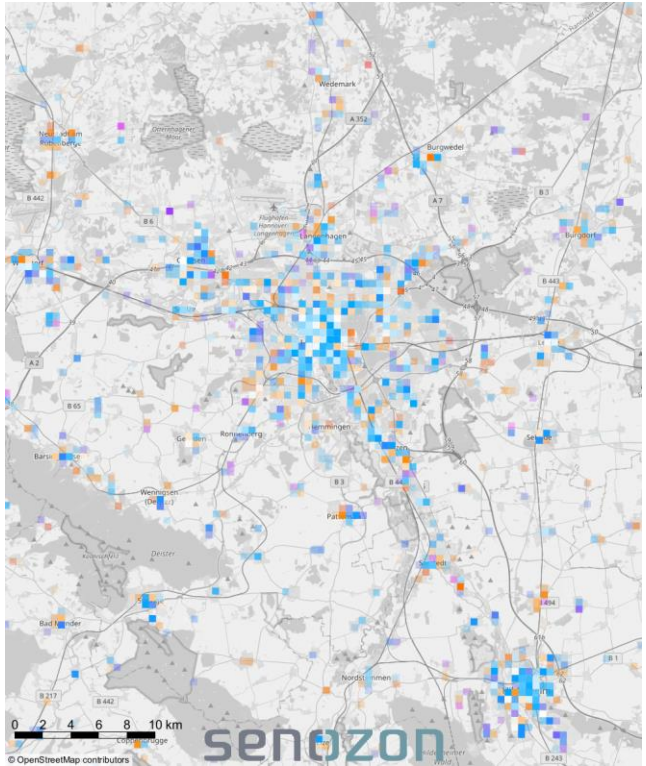
Reduction in car share between 9 and 11

-10.0
-2.0
0.0
2.0
10.0

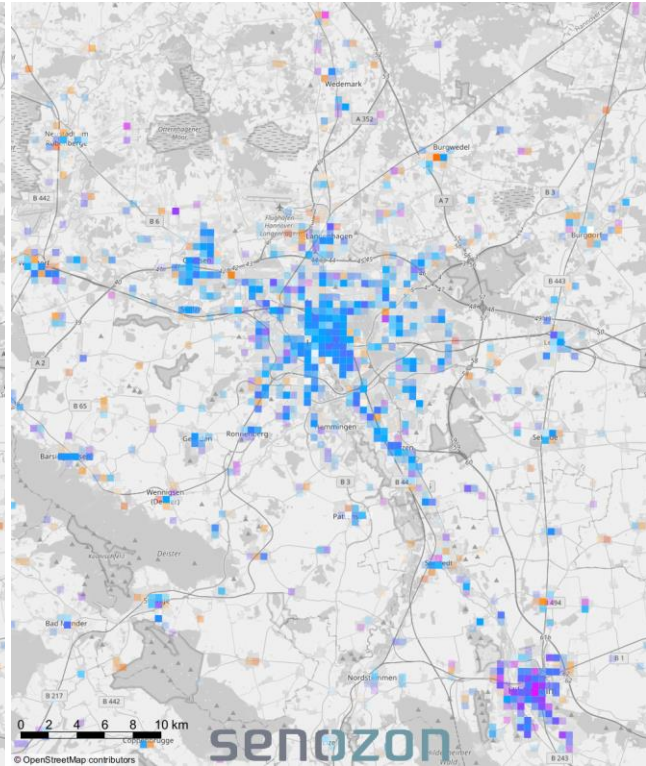
None



Medium



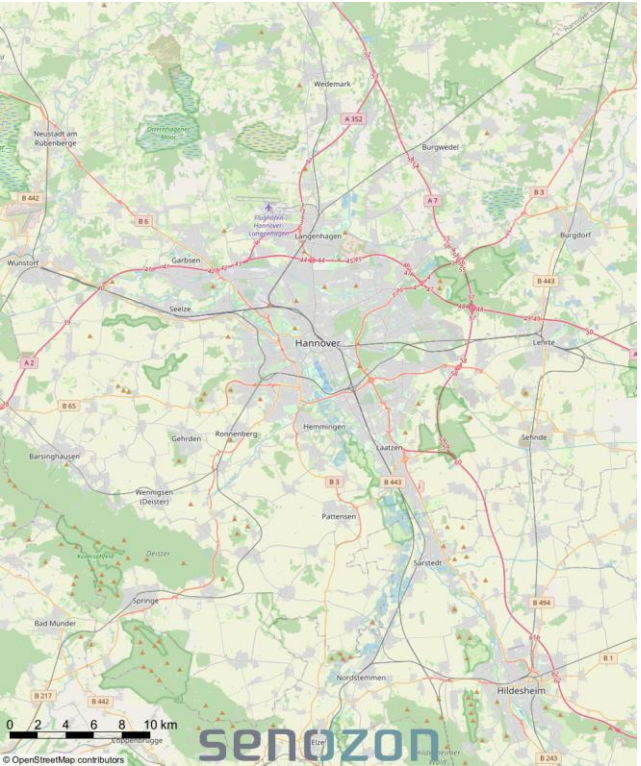
High



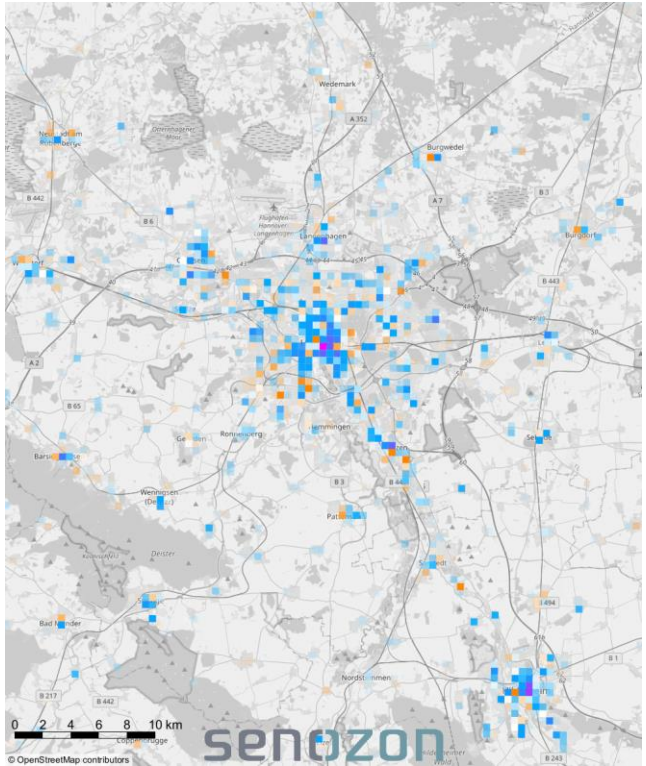
Reduction in car trips between 9 and 11

-100.0
-10.0
0.0
10.0
100.0

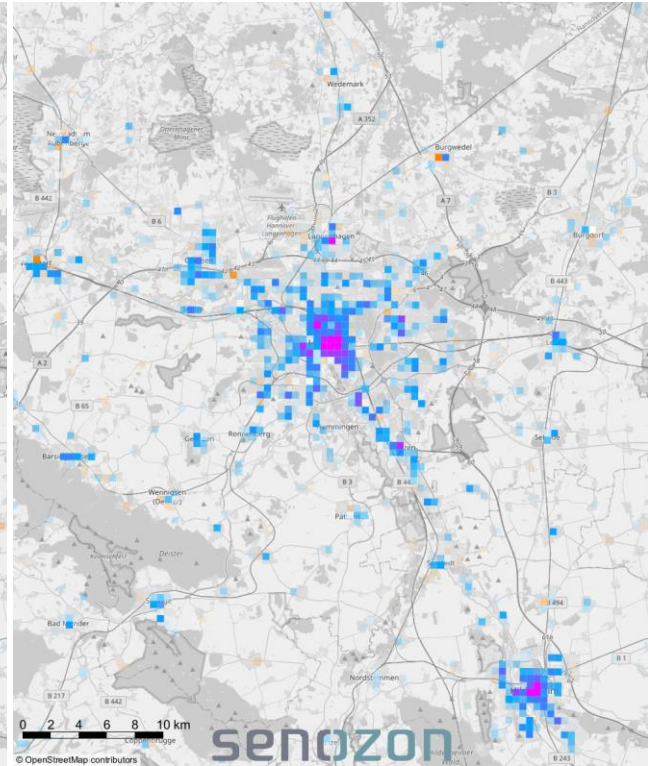
None



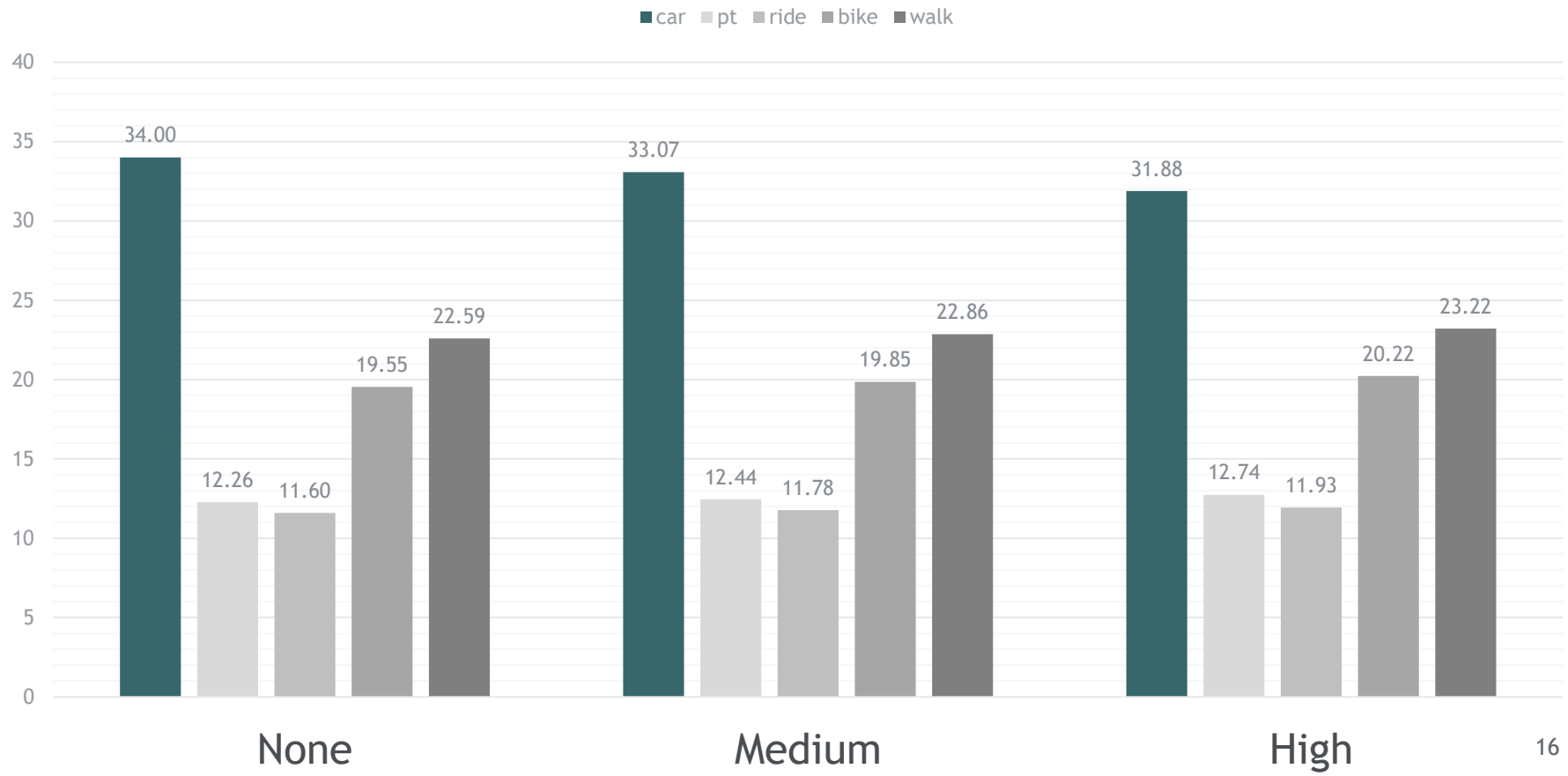
Medium



High



Global modeshare



Final thoughts

- ParkingProxy helps if you…
  - Want to change the car modeshare in dense areas compared to rural ones
  - Want to further penalize peak hour car traffic
  - Want to increase your travel times for parking search
  - Have no spare computing ressources
- ParkingProxy is not suitable if you…
  - Need actual park search traffic
  - Want to use detailed parking infrastructure information
- ParkingProxy is available in the parking contrib

Contact

Senozon AG
Technoparkstrasse 1
CH-8005 Zürich

Senozon Deutschland GmbH
c/o Next-Level-Offices
Franklinstraße11
DE-10587 Berlin

Senozon Austria GmbH
Türkenstraße 25/8
AT-1090 Wien

Tobias Kohl

✉ tobias.kohl@senozon.com

Andreas Neumann

✉ andreas.neumann@senozon.com

Michael Balmer

✉ michael.balmer@senozon.com

www.senozon.com