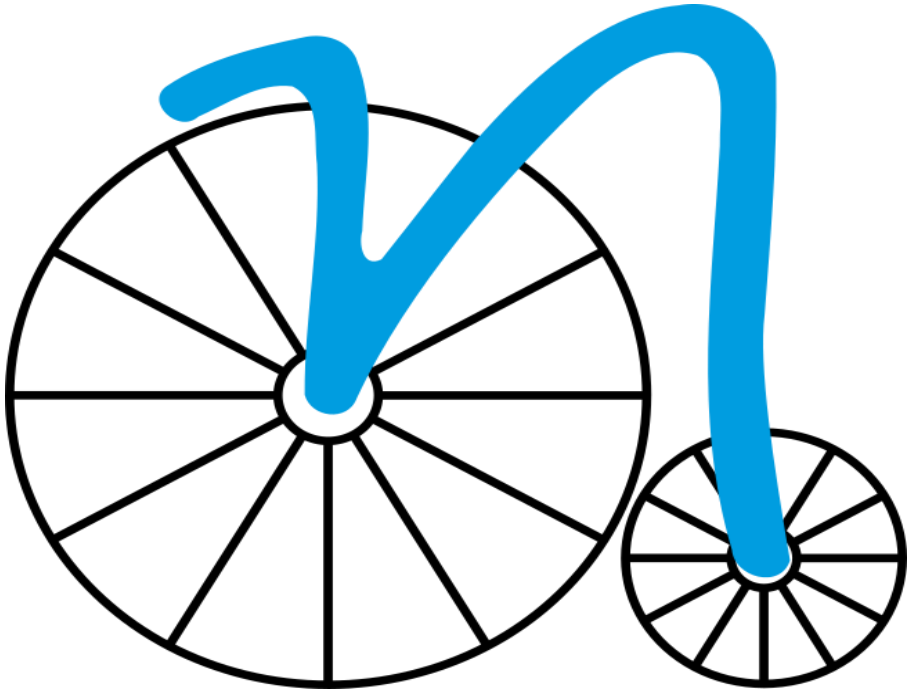
Hochschule
Bonn-Rhein-Sieg
University of Applied Sciences

TREE
Institut für Technik, Ressourcenschonung und Energieeffizienz

Forschungsprojekt eTa

Development of computational methodologies for sustainable planning of infrastructure for charging stations

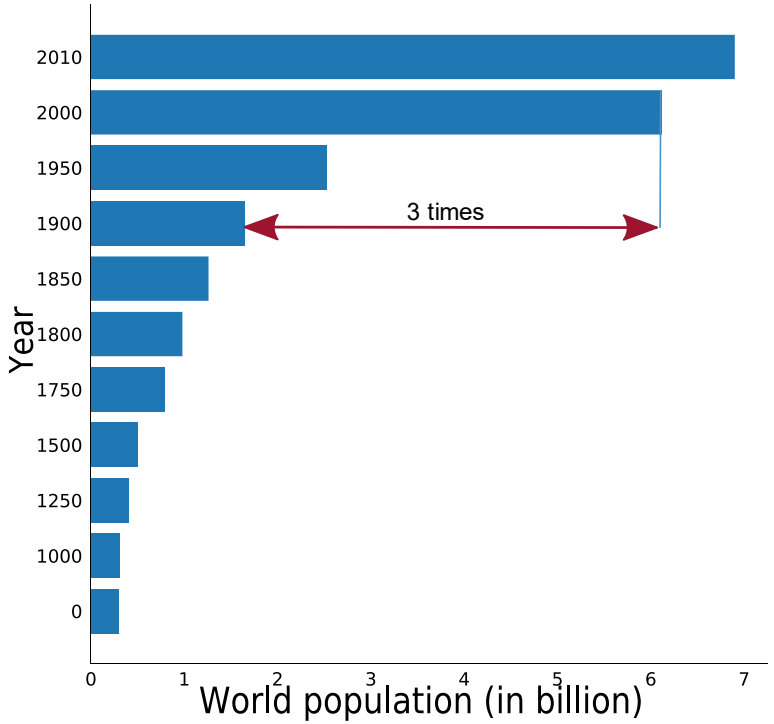


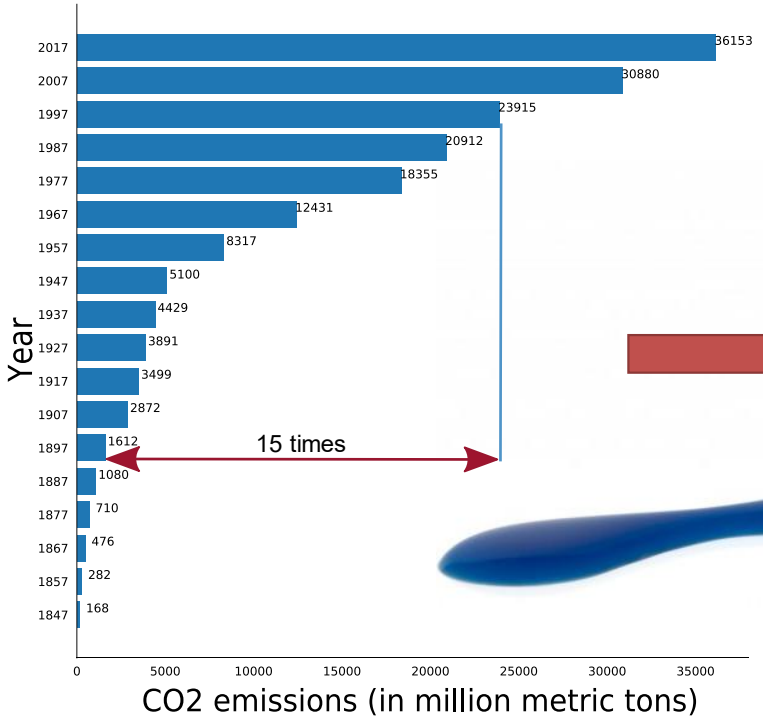
effiziente Transportalternativen

Pranjal Dhole, M.Sc.

Supervisors:
Prof. Dr. Stefanie Meilinger
Prof. Dr. Alexander Asteroth

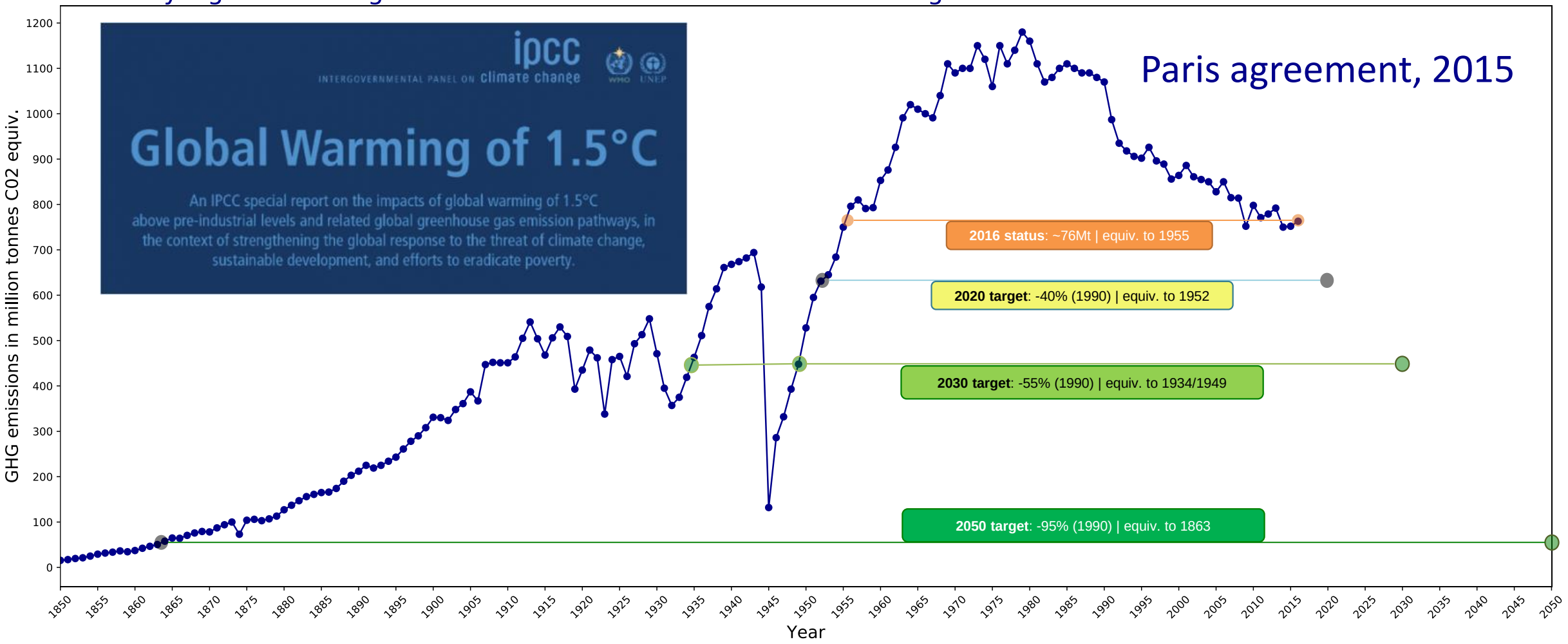
Why should we bother?





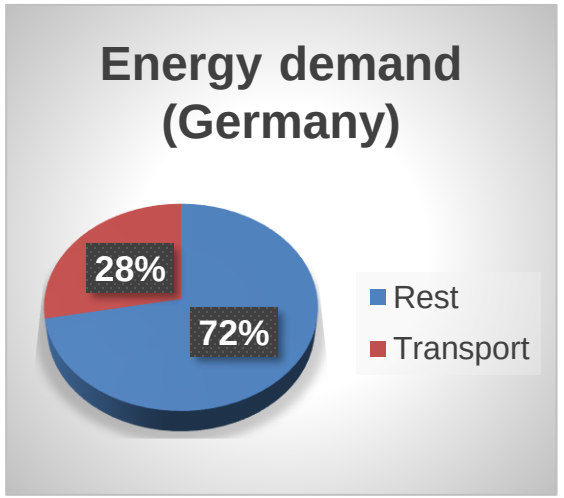
Climate protection goals for Germany

Germany's greenhouse gas emissions 1850-2016 and reduction targets

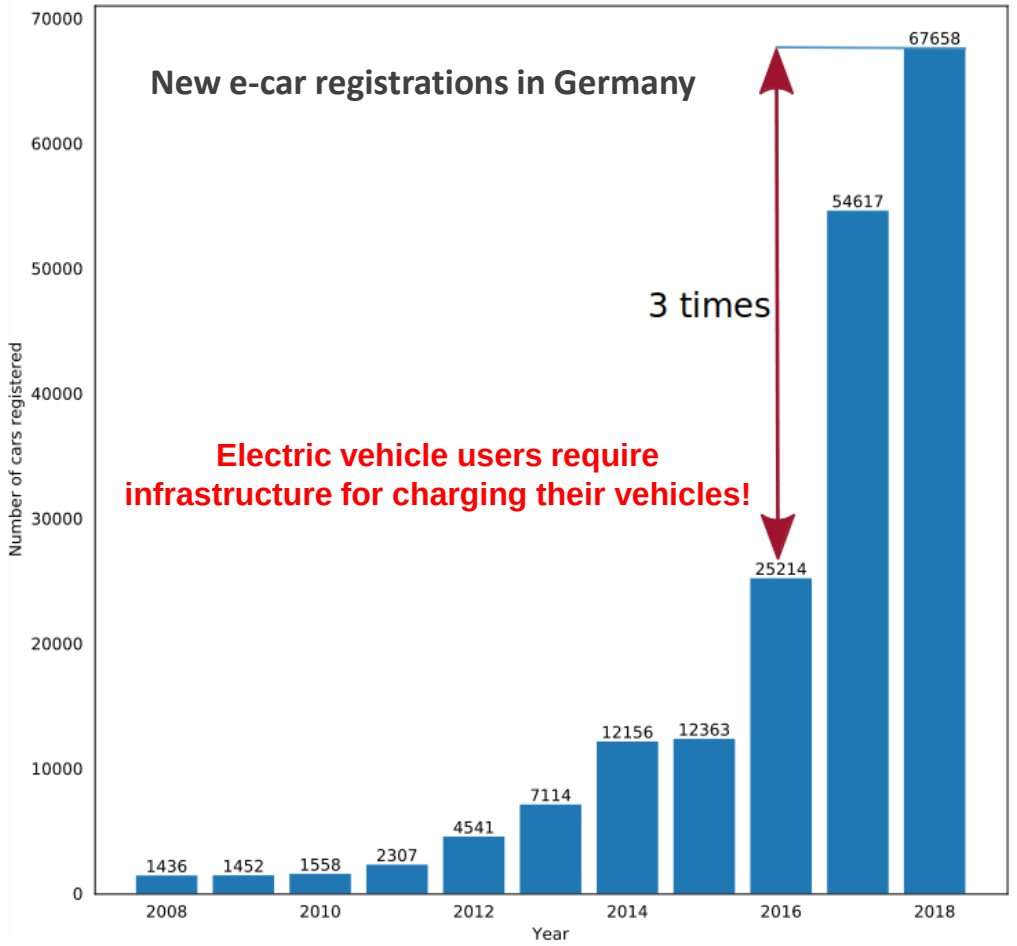


Data: Gütschow, et. al. (2019): The PRIMAP-hist national historical emissions time series (1850-2016). V. 2.0. GFZ Data Services. http://doi.org/10.5880/PIK.2019.001

Why invest in electro-mobility?



2030-2035



Project goals

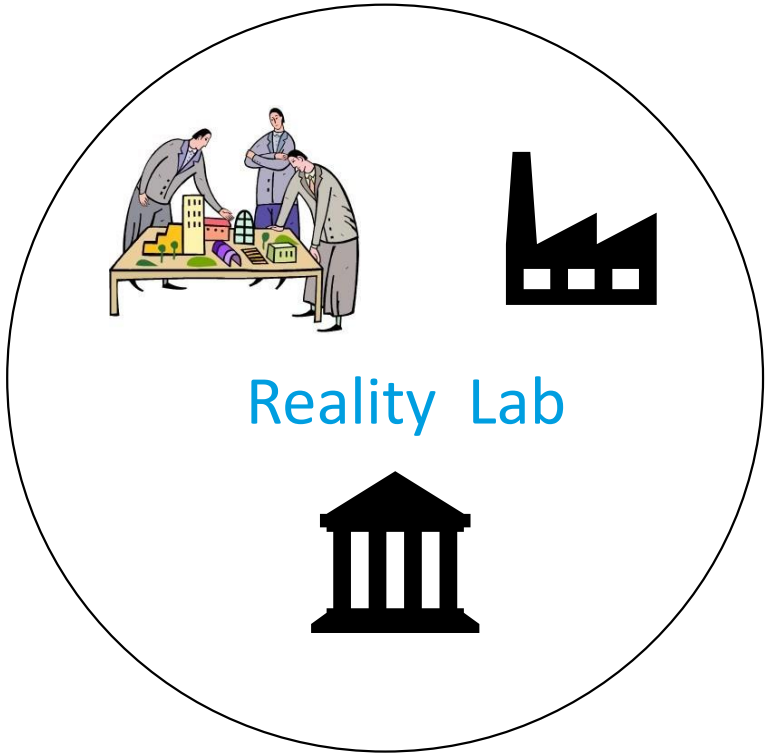
Officially cooperating cities

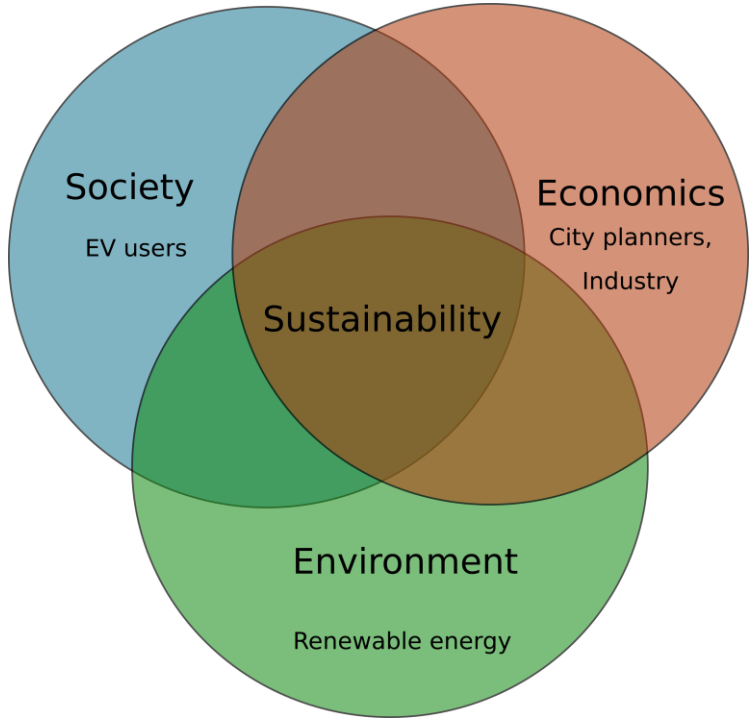
STADT. CITY. VILLE. BONN.

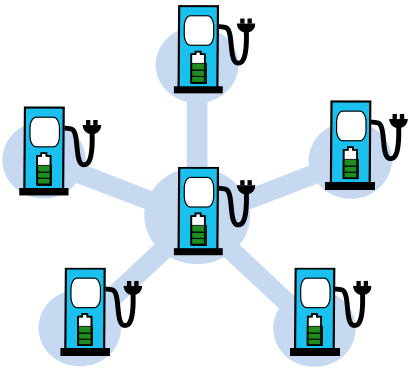
:rhein-sieg-kreis

Frequent communications

- Sankt Augustin
- Stadtwerke Bonn

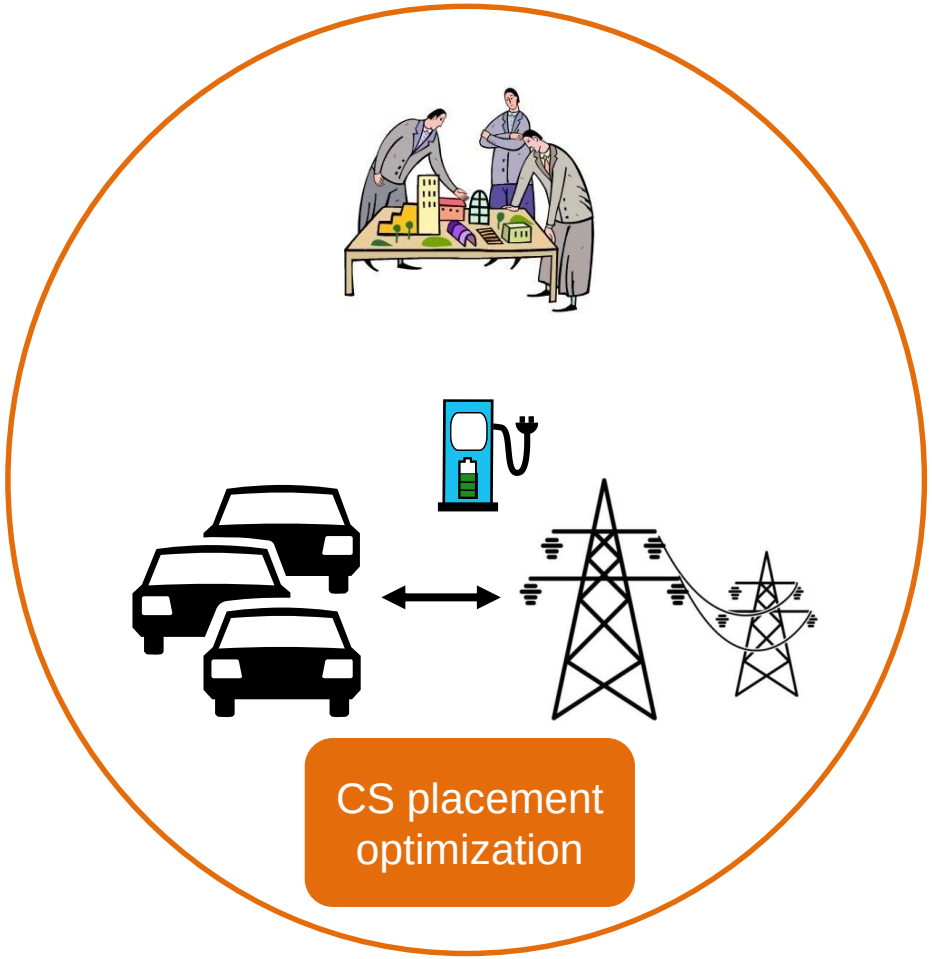






effiziente Transportalternativen (eTa)

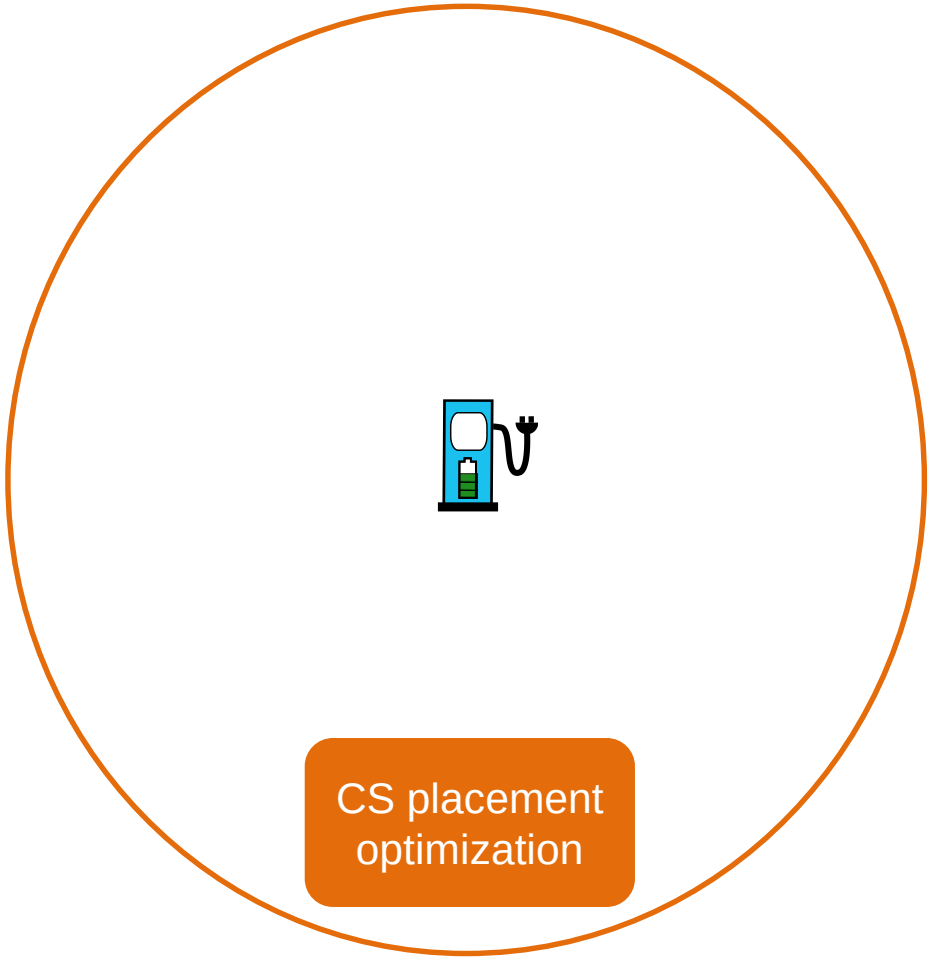
This work



Understanding demand

Statistics

This work



Realistic traffic simulation

CS placement based on traffic-flow

This work

Understanding demand

Statistics

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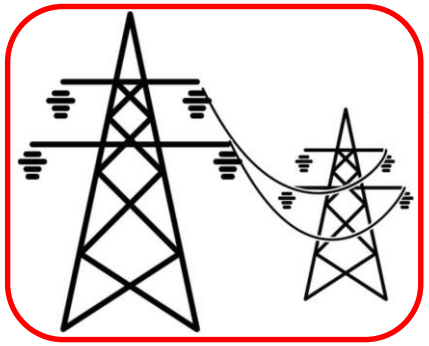
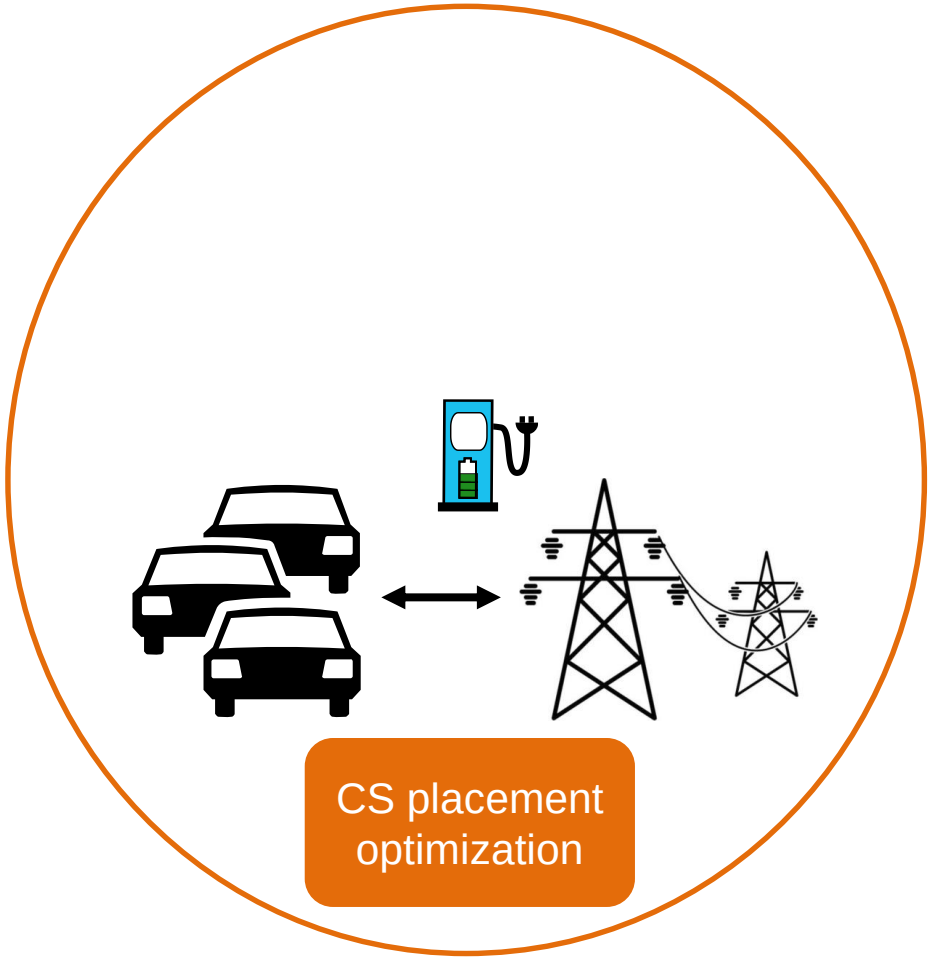


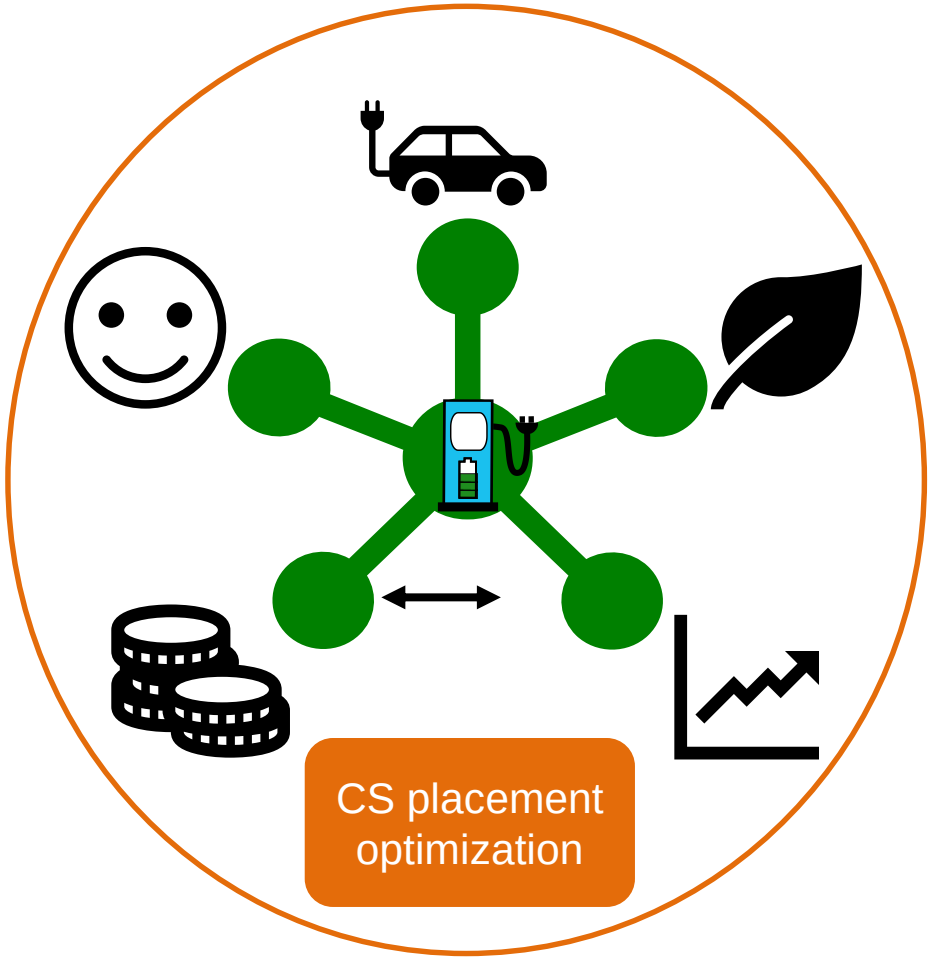
Statistics

Understanding supply



- Realistic traffic simulation
- CS placement based on traffic-flow
- CS placement based on grid-capacity
- Combining demand and supply

This work



Quality diversity solutions for n-criteria

This work

Understanding demand

Statistics

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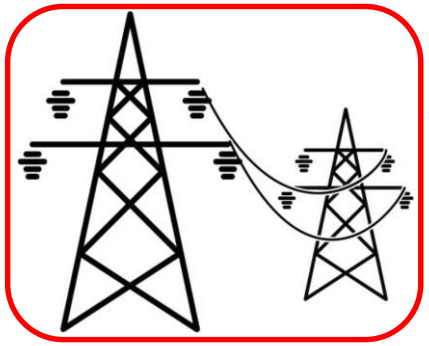
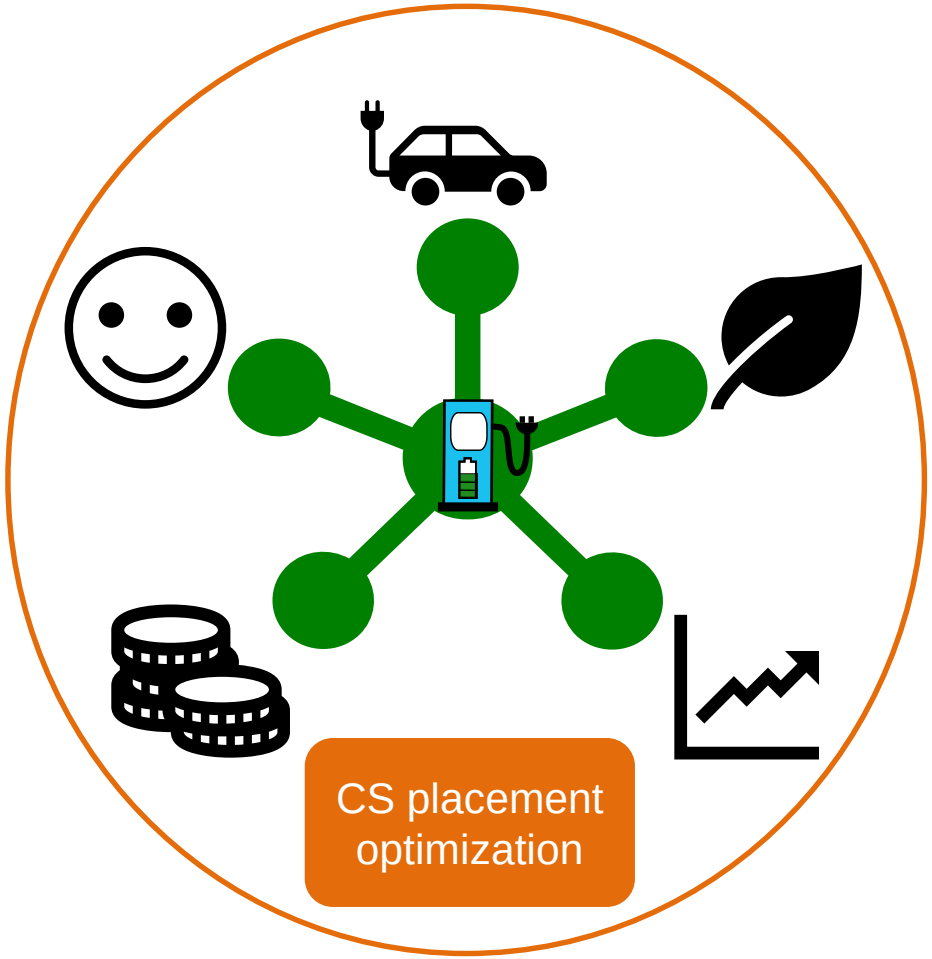


Statistics

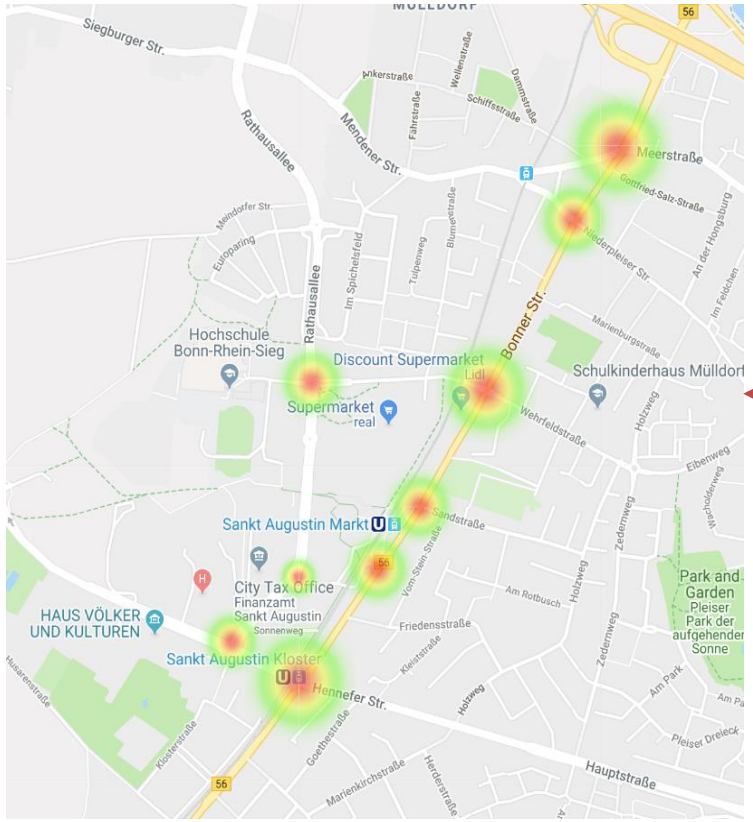
Understanding supply



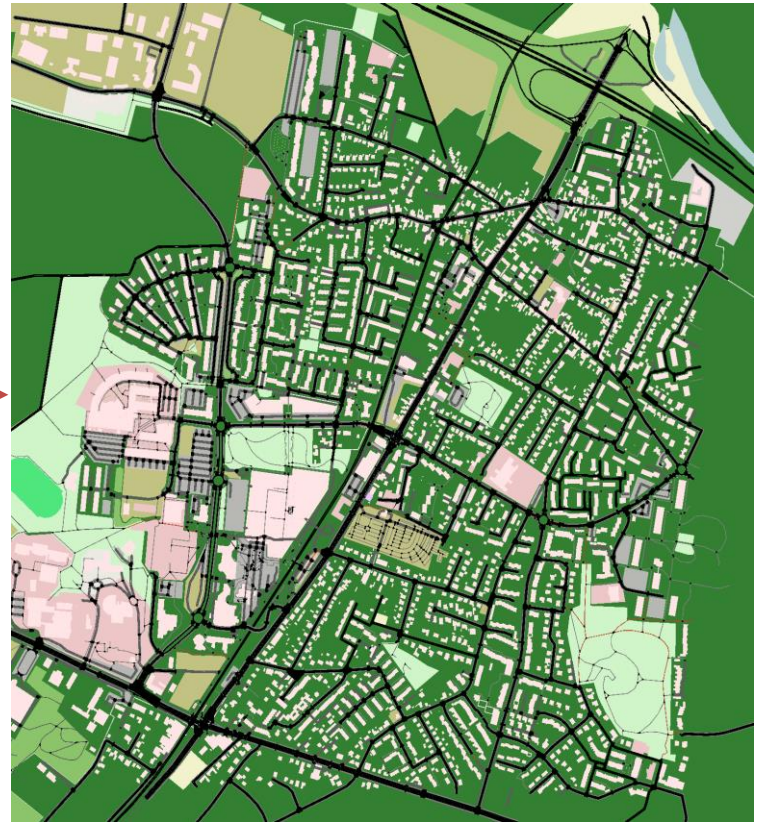
- Realistic traffic simulation
- CS placement based on traffic-flow
- CS placement based on grid-capacity
- Combining demand and supply
- Quality diversity solutions for n-criteria

WP1 - Realistic Simulation with SUMO

WP1 - Realistic Simulation with SUMO

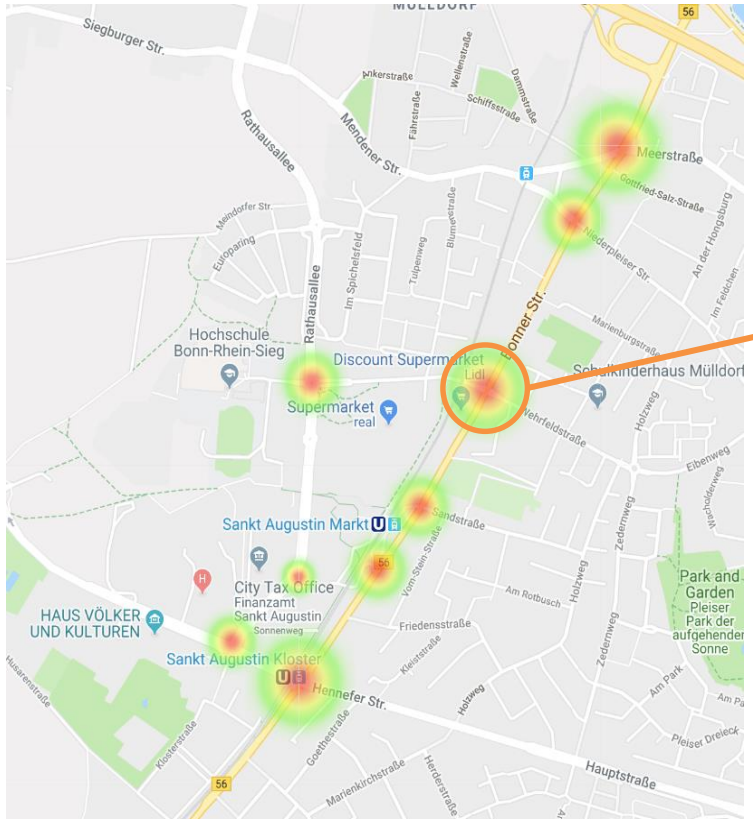


Traffic density data at cross-sections at Route B56

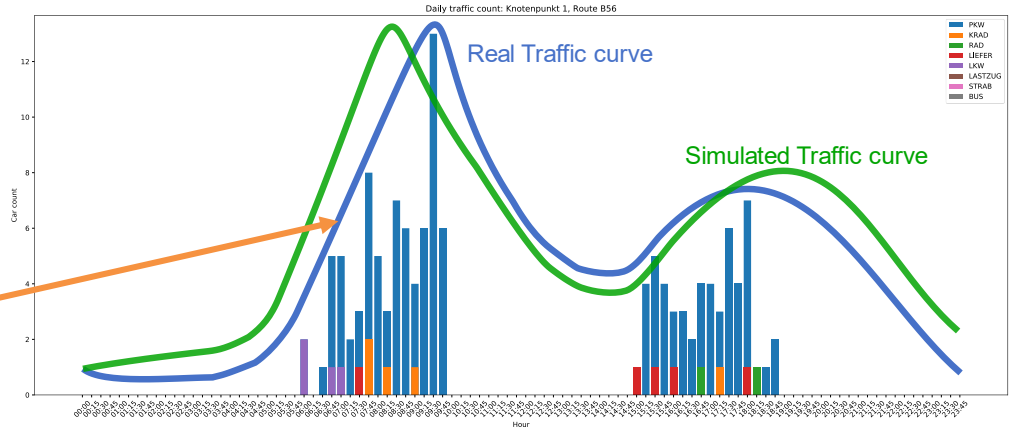


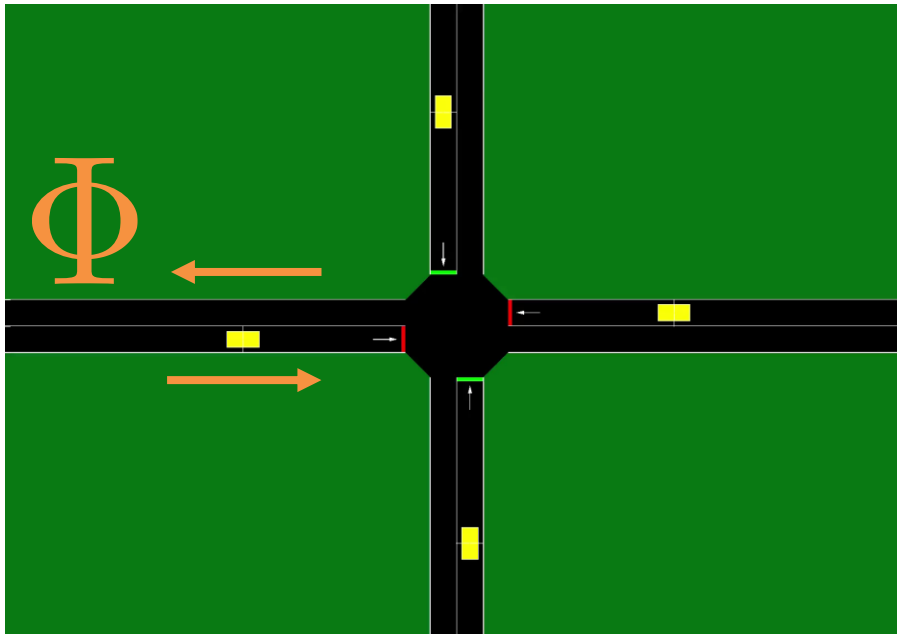
Route B56 simulation with SUMO

WP1 - Realistic Simulation with SUMO

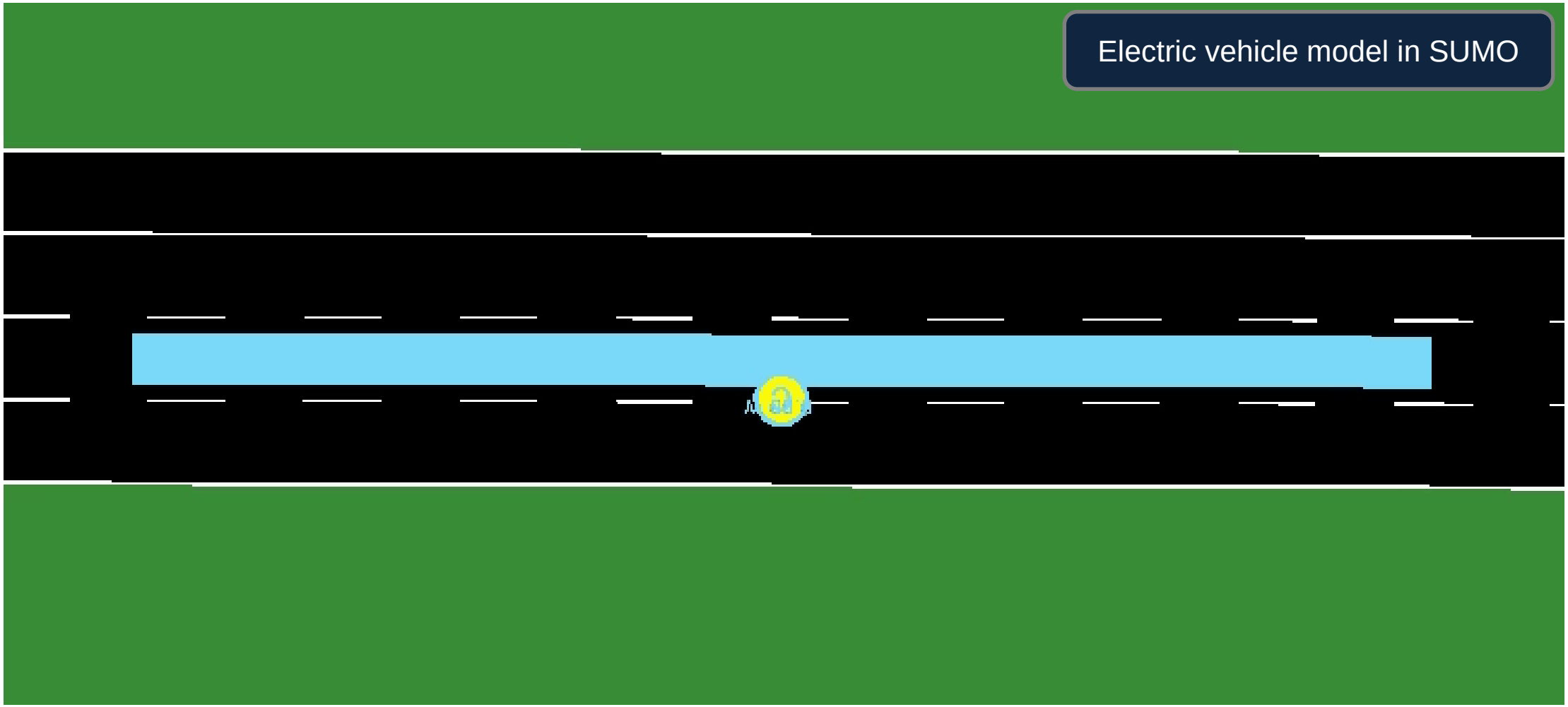


Traffic density data at cross-sections at Route B56

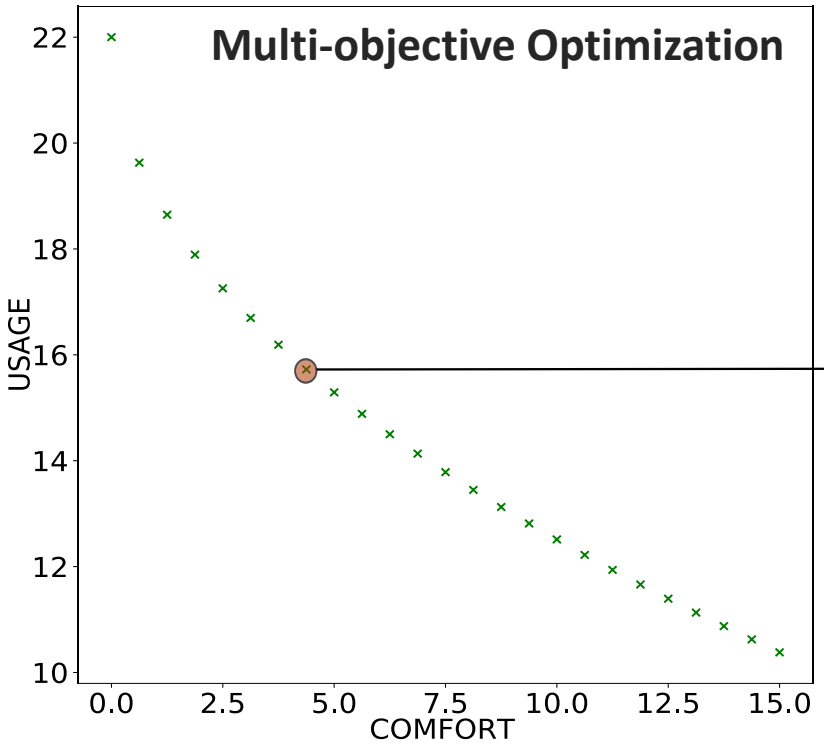


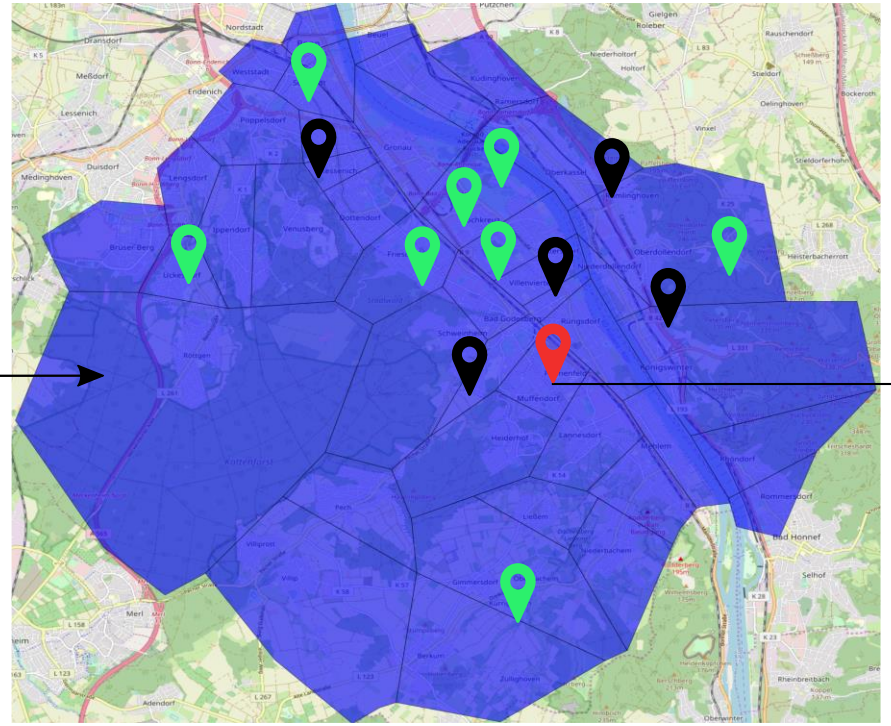


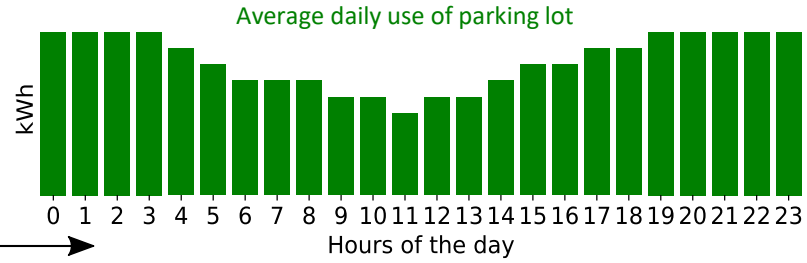
WP2 - CS placement with traffic-flow optimization

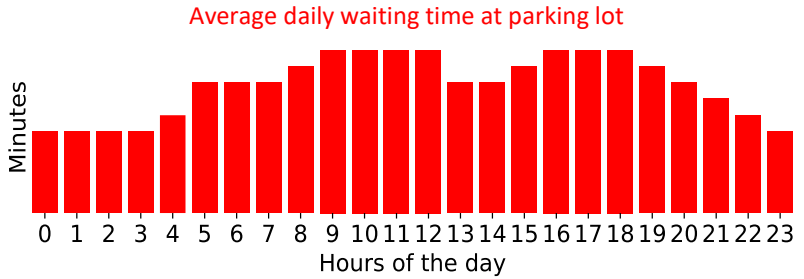


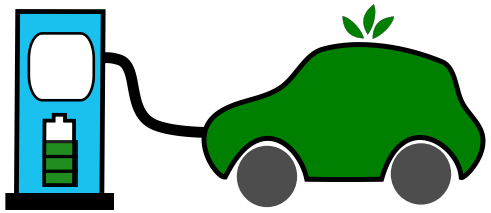
WP2 - CS placement with traffic-flow optimization



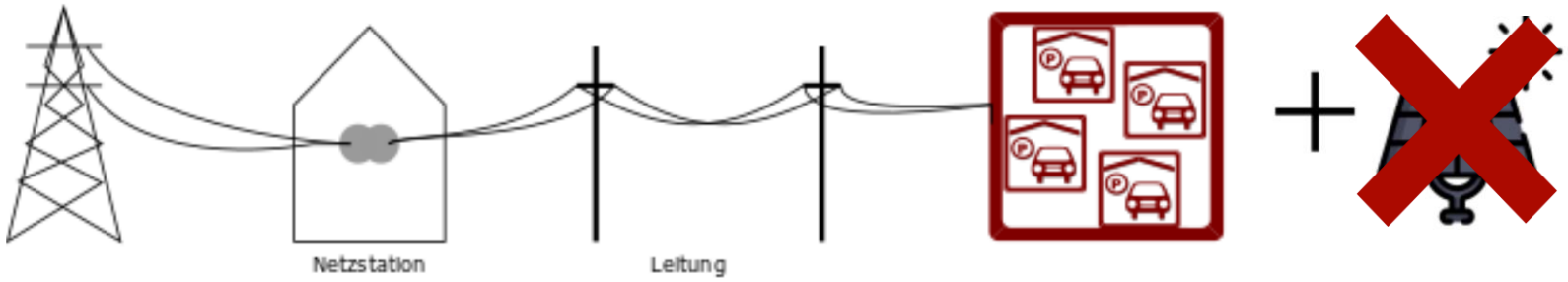


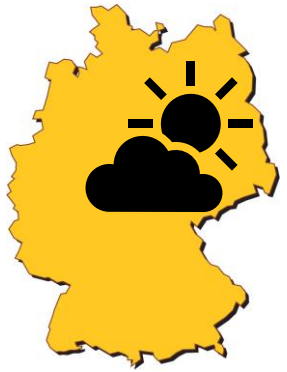


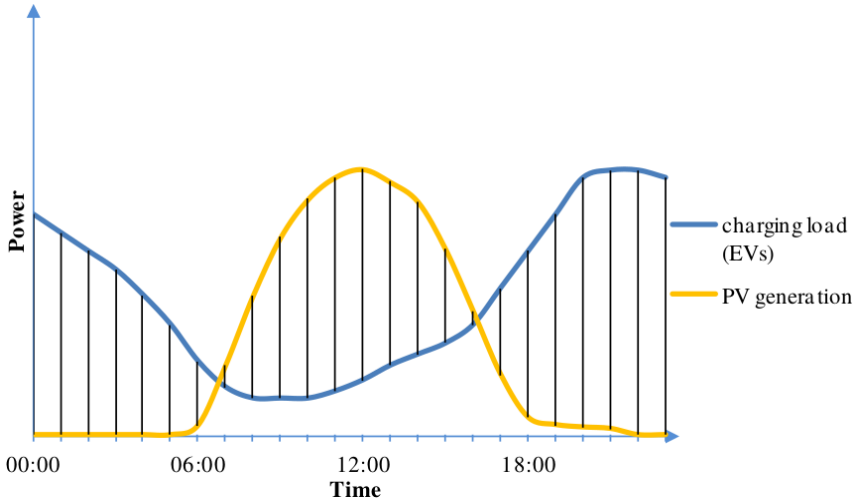




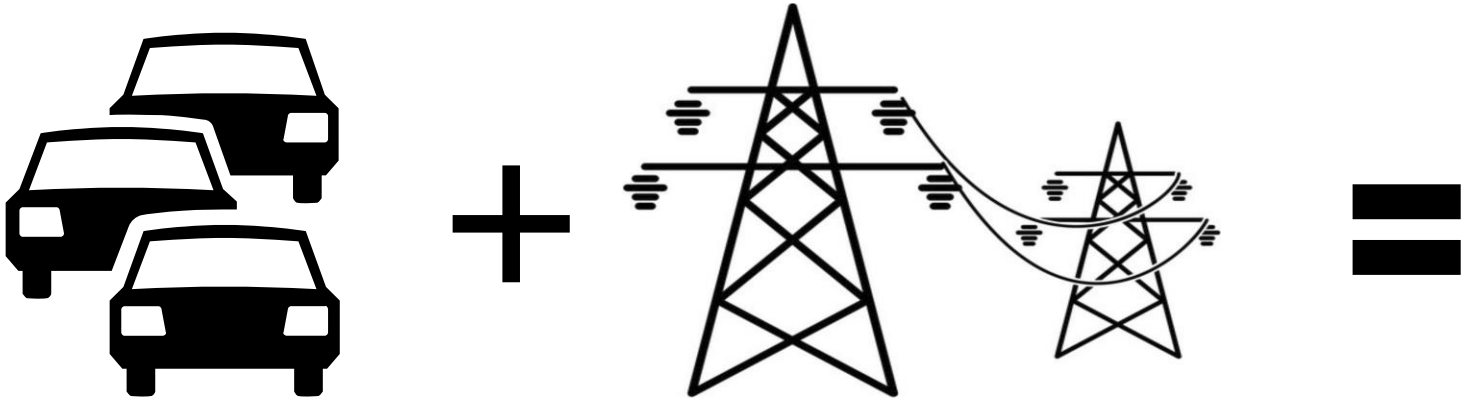
WP3 – CS placement with grid-capacity optimization



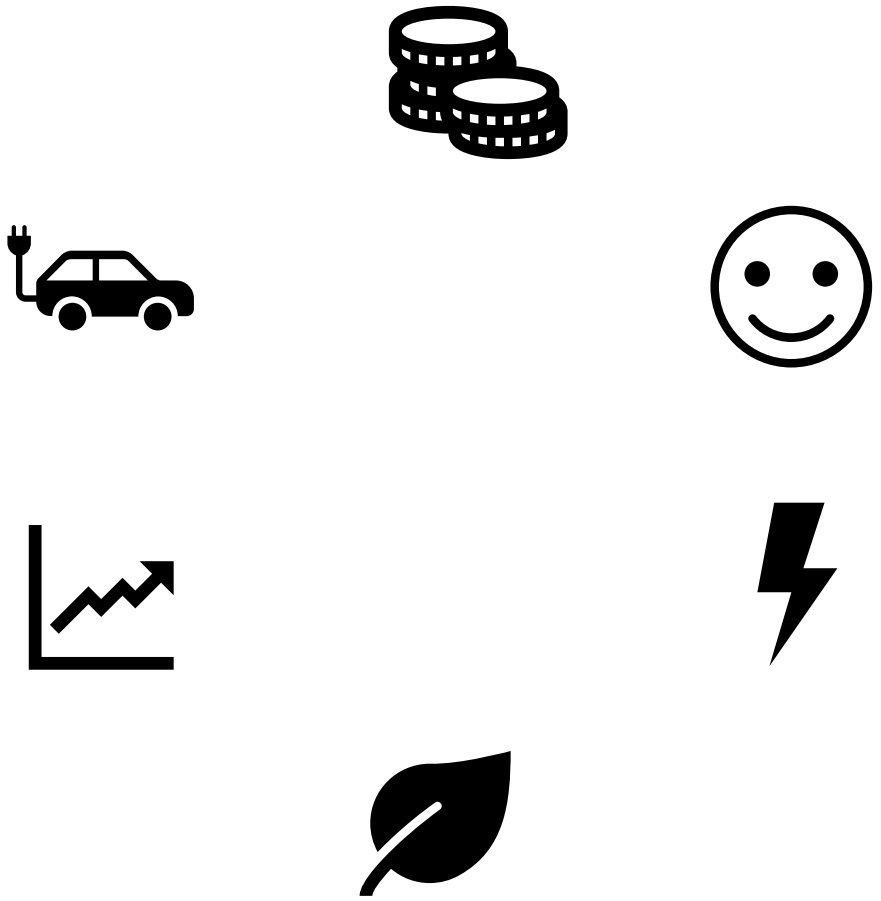




WP4 – Combining demand and supply

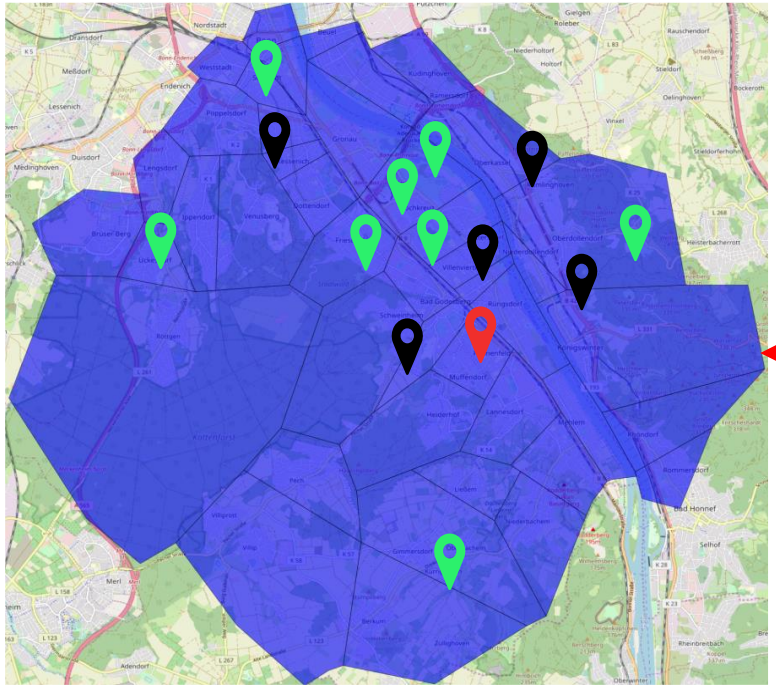


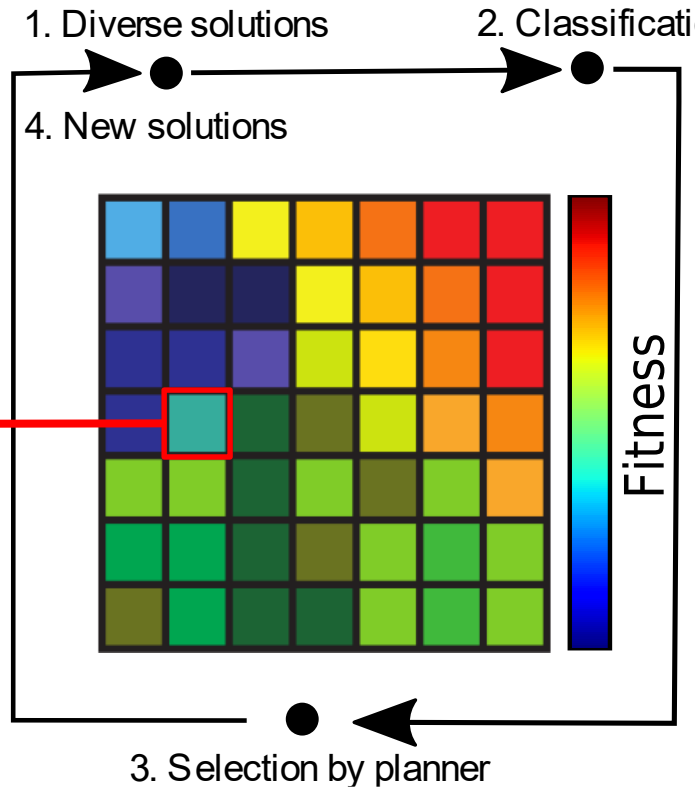
CS placement optimization over n-criteria

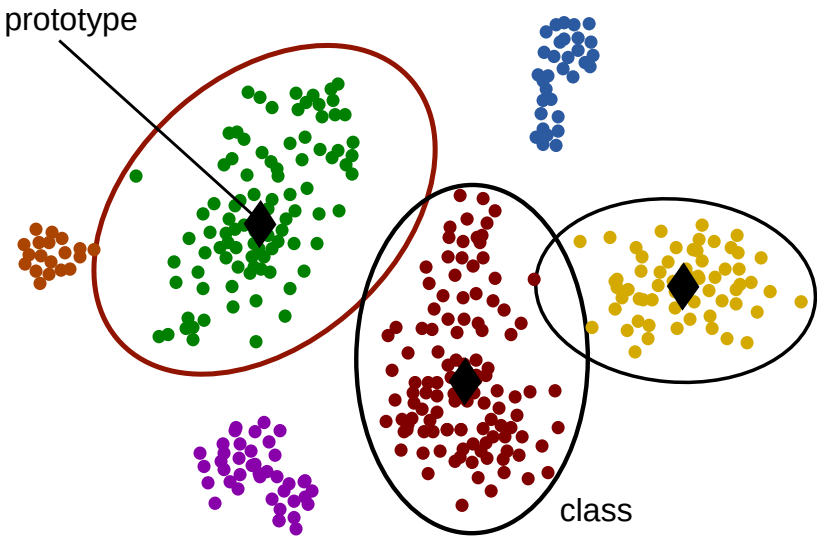


WP5: Quality diversity of solutions

- Evaluating all solutions is computationally expensive!
- Planners prefer to pick solutions → Get planners-in-optimization-loop!







Thank you – Questions?

Pranjal Dhole M.Sc.

Prof. Dr. Stefanie Meilinger

Prof. Dr. Alexander Asteroth

Forschungprojekt *eTa - effiziente Transportalternativen*

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Ministerium für Innovation,
Wissenschaft und Forschung
des Landes Nordrhein-Westfalen

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