hybridPY

A Hybrid Traffic Simulation Case Study for Munich

Fabian Schuhmann, Jörg Schweizer, Christian Wiggenhauser, Fabian Netzler, Markus Lienkamp

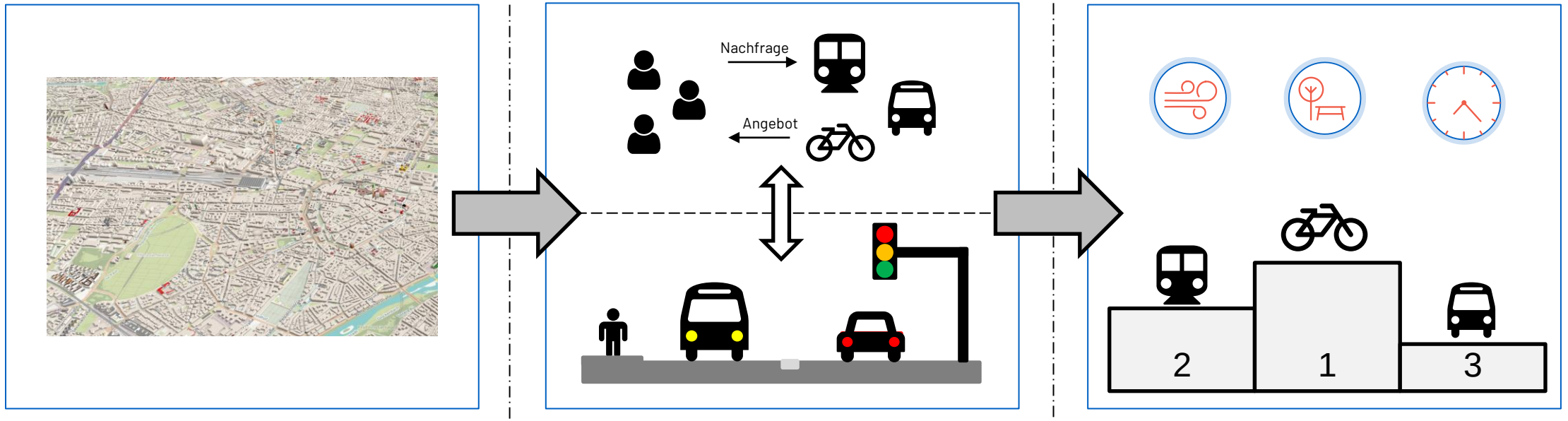
Datum: 17.06.2024

The M Cube Cluster

Our mission is to improve the

	Air	Traffic-related environmental pollution
	Space	Mobility in public spaces
	Time	Efficiency of transportation systems

The M Cube Pipeline

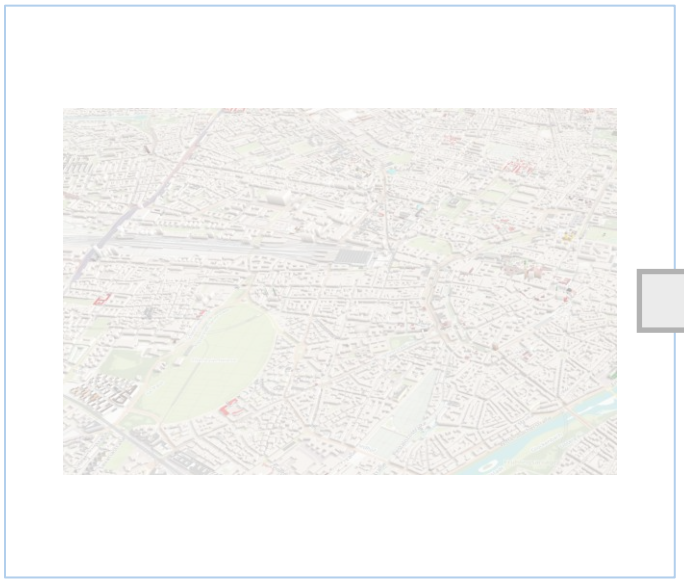


Simulation of urban development and mobility requirements [3]

Simulation of mobility and individual mobility systems

Evaluation of the mobility system and comprehensible presentation of the results

The M Cube Pipeline



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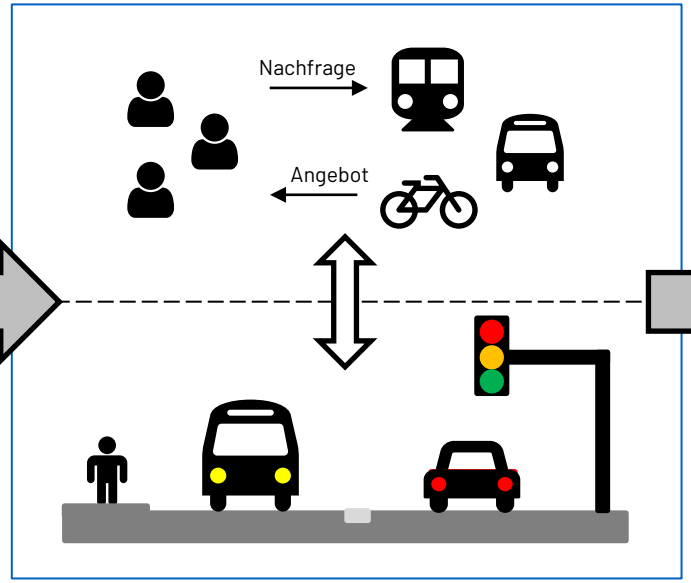
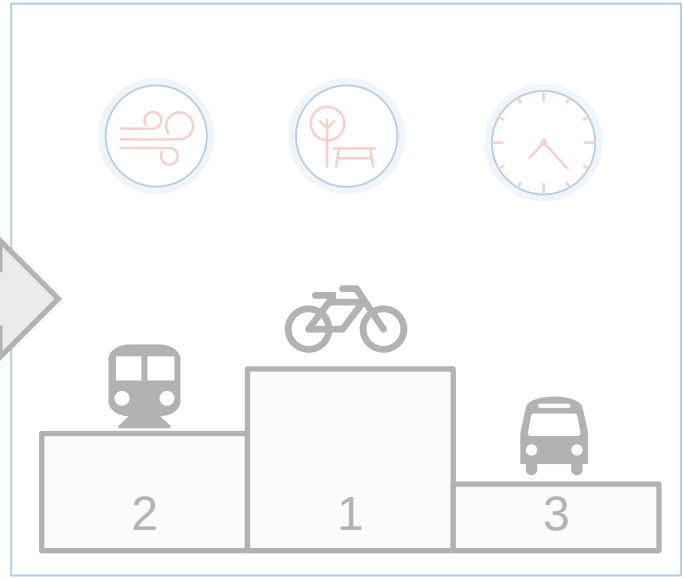
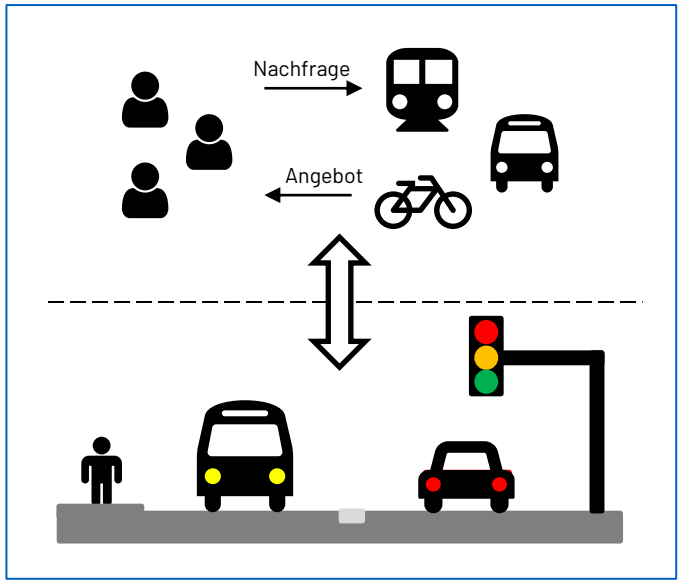


Simulation of mobility and individual mobility systems

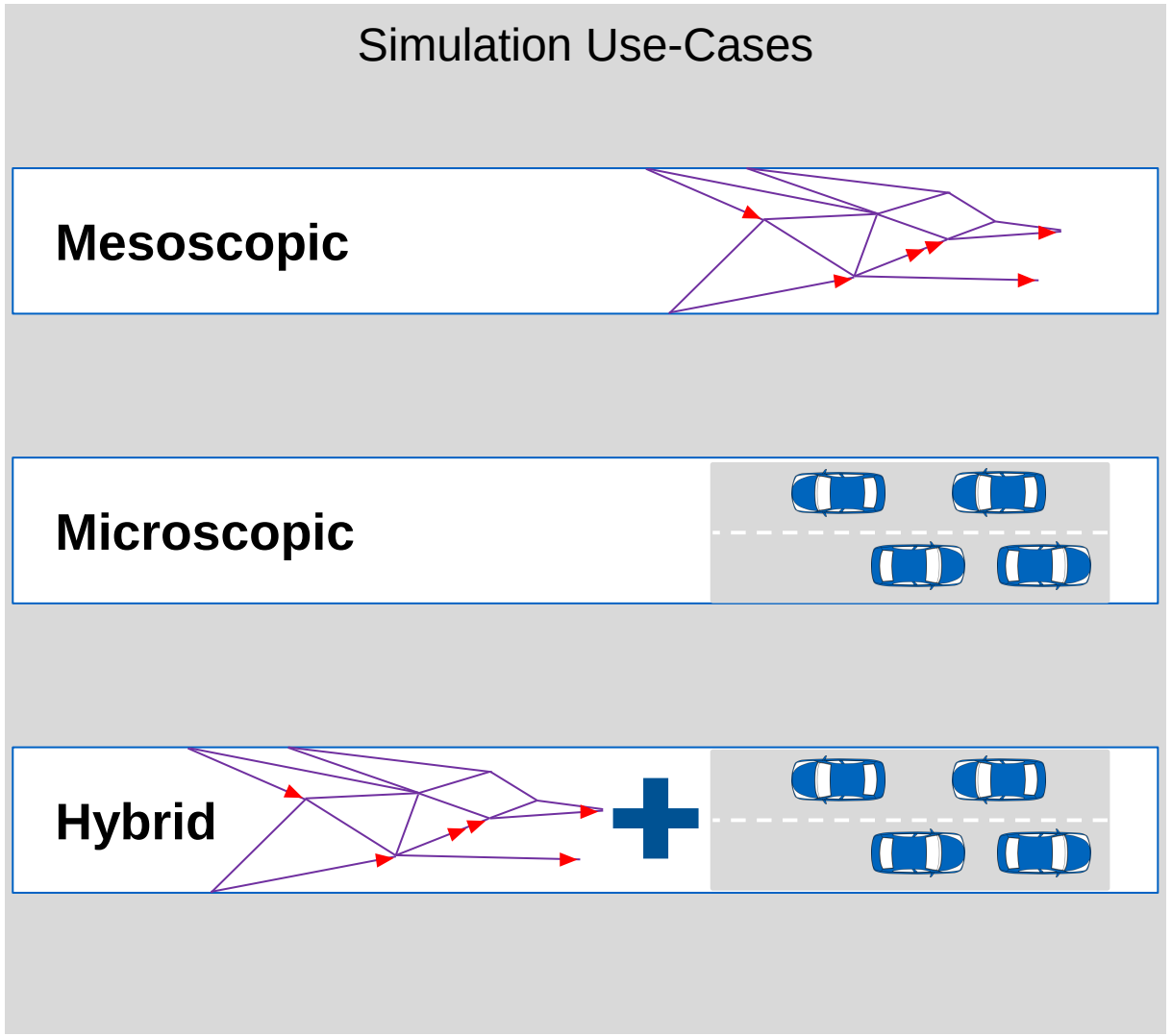


Evaluation of the mobility system and comprehensible presentation of the results

General Approach

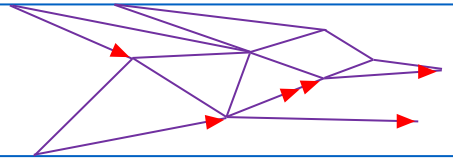


Simulation of mobility and individual mobility systems

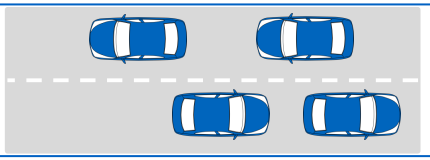


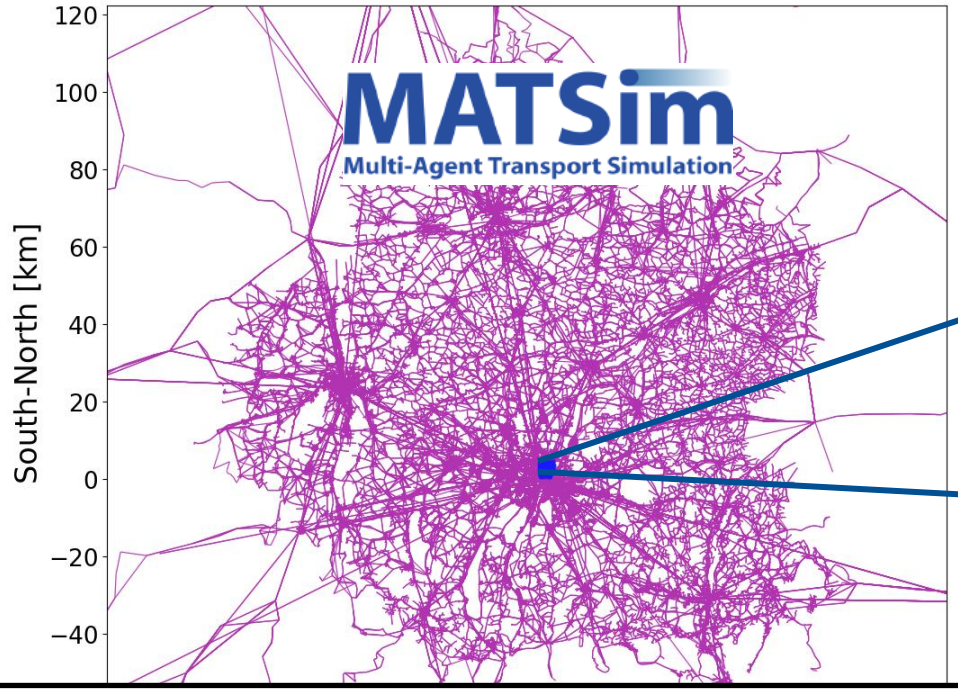
General Aproach

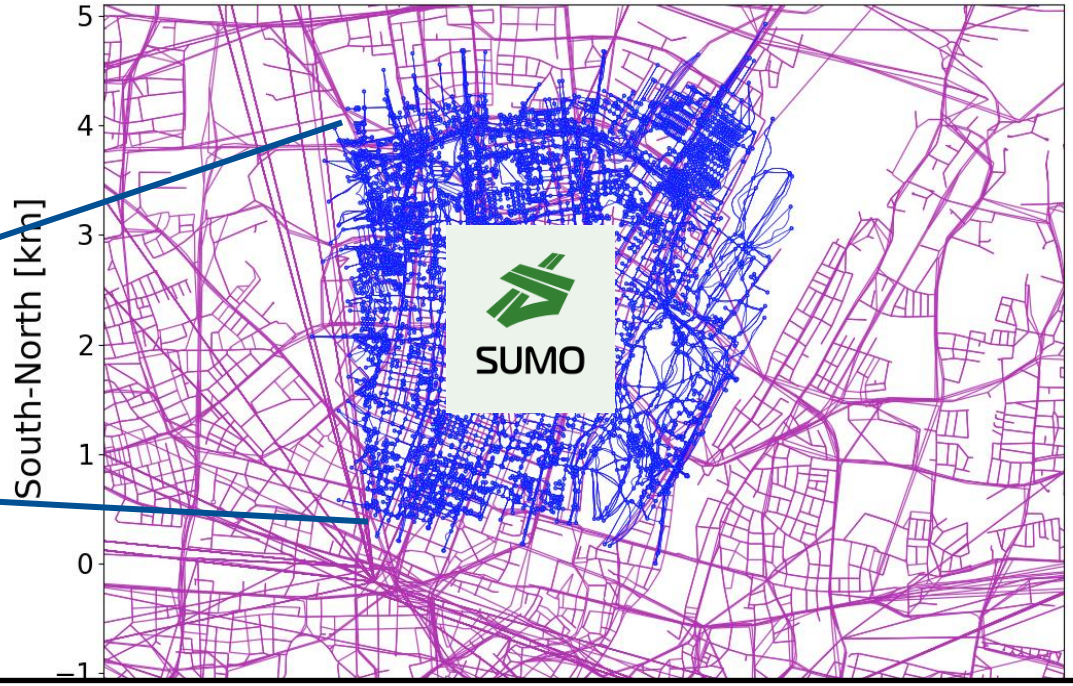
Mesoscopic



Microscopic

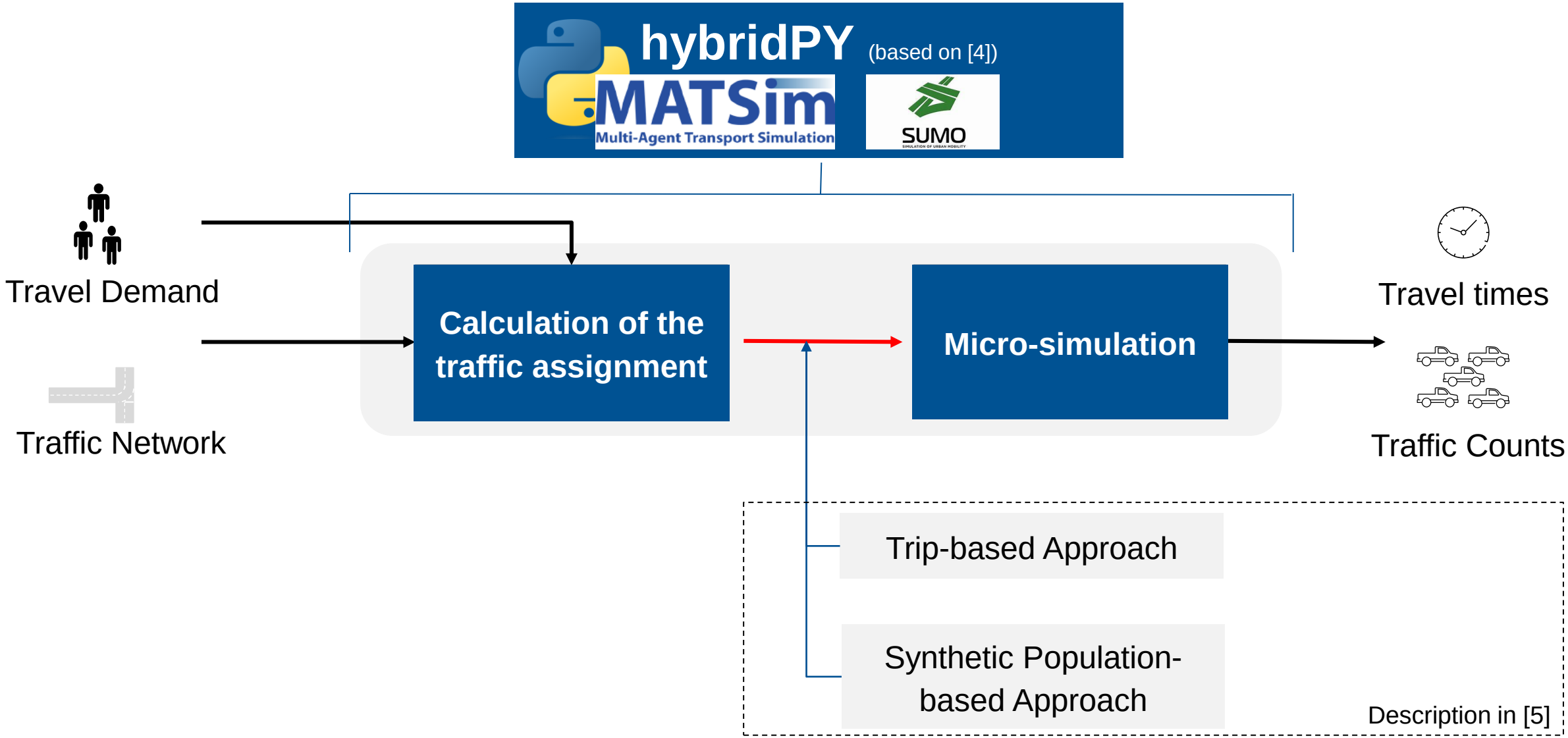






The general approach is combining a global meso- and a local micro-scopic model

The Idea in a Nut-shell



hybridPY - myscenario (hybrid-scenario)

Scenario Network Landuse Demand Simulation Plugins About

scenario

Scenario

Name: hybrid-scenario

Description:

Shortname: myscenario

Workdir: C:\model_demo\scenario-hybrid

Network: net

Landuse: landuse

Demand: demand

Simulation: simulation

Apply Restore

Network Result Viewer

test

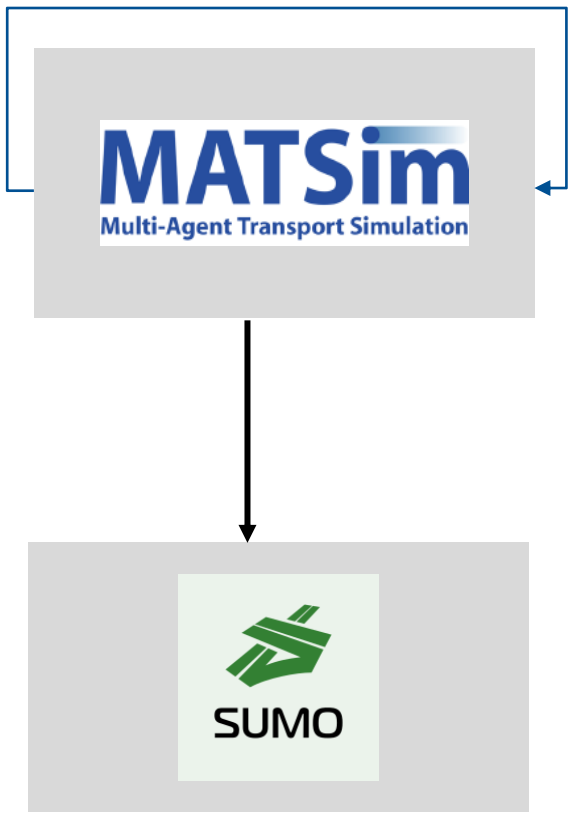
Net Selection

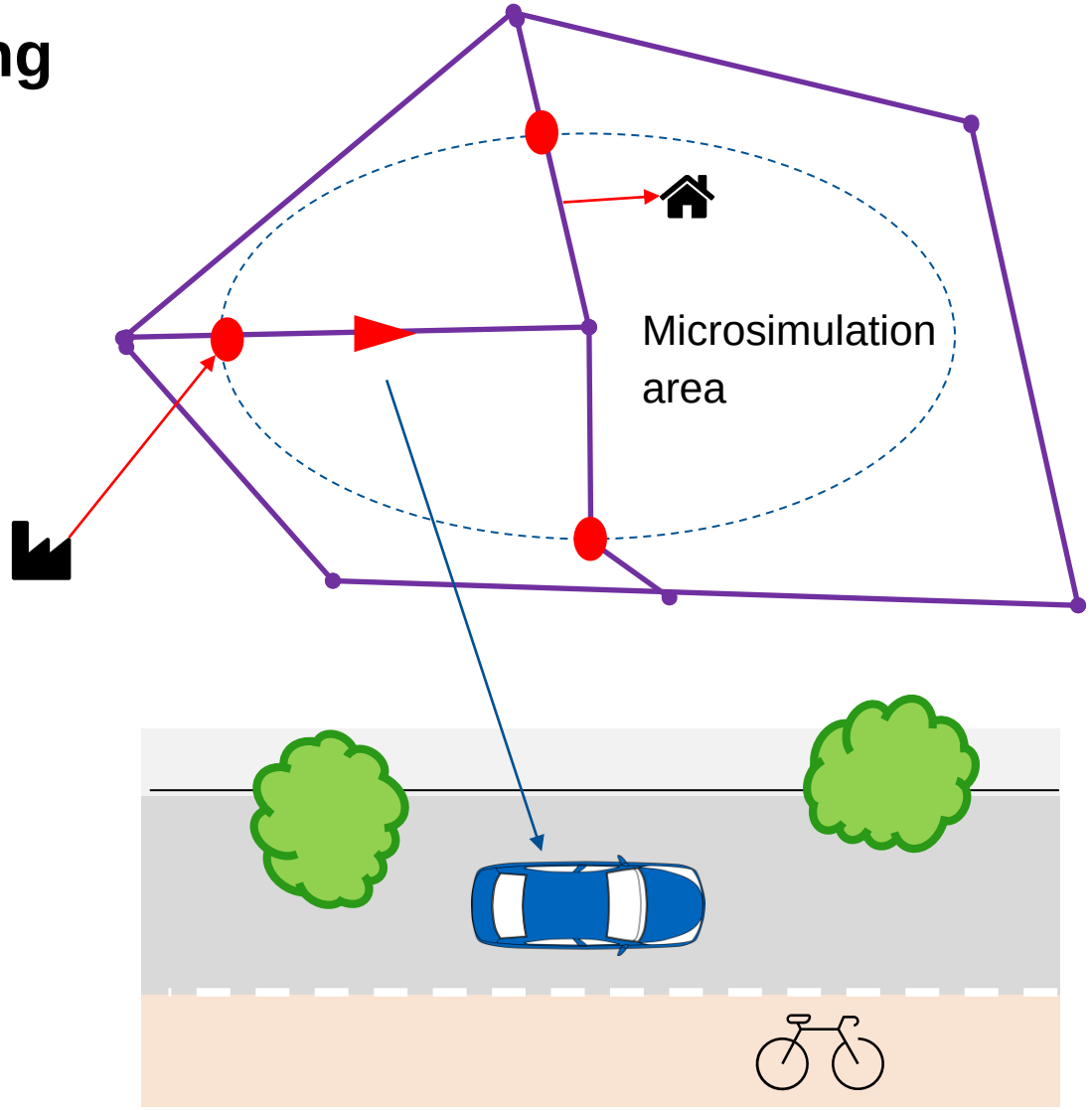
Object

Apply Restore

-261.000, 7.500

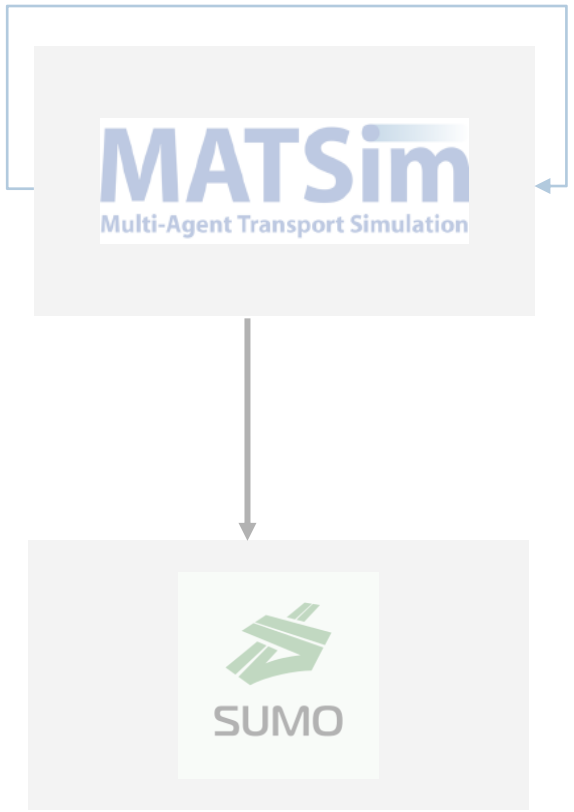
The Demand Handling

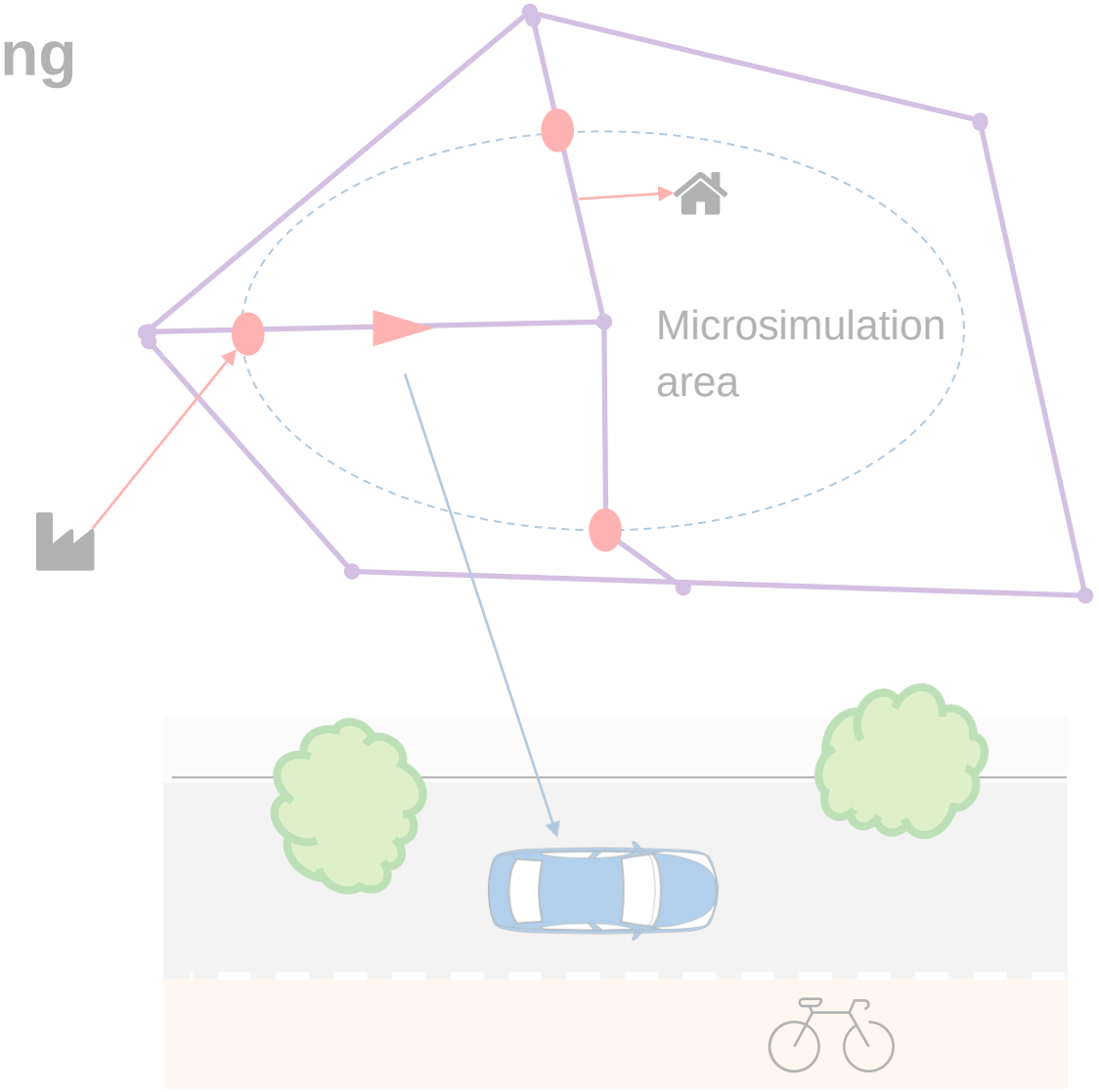




1. Running the MATSim simulation
2. Detection of the system ends in SUMO
3. Analysis of MATSim routes with regard to entering the SUMO area
4. Import as trip or activity
5. Re-routing in SUMO

The Demand Handling





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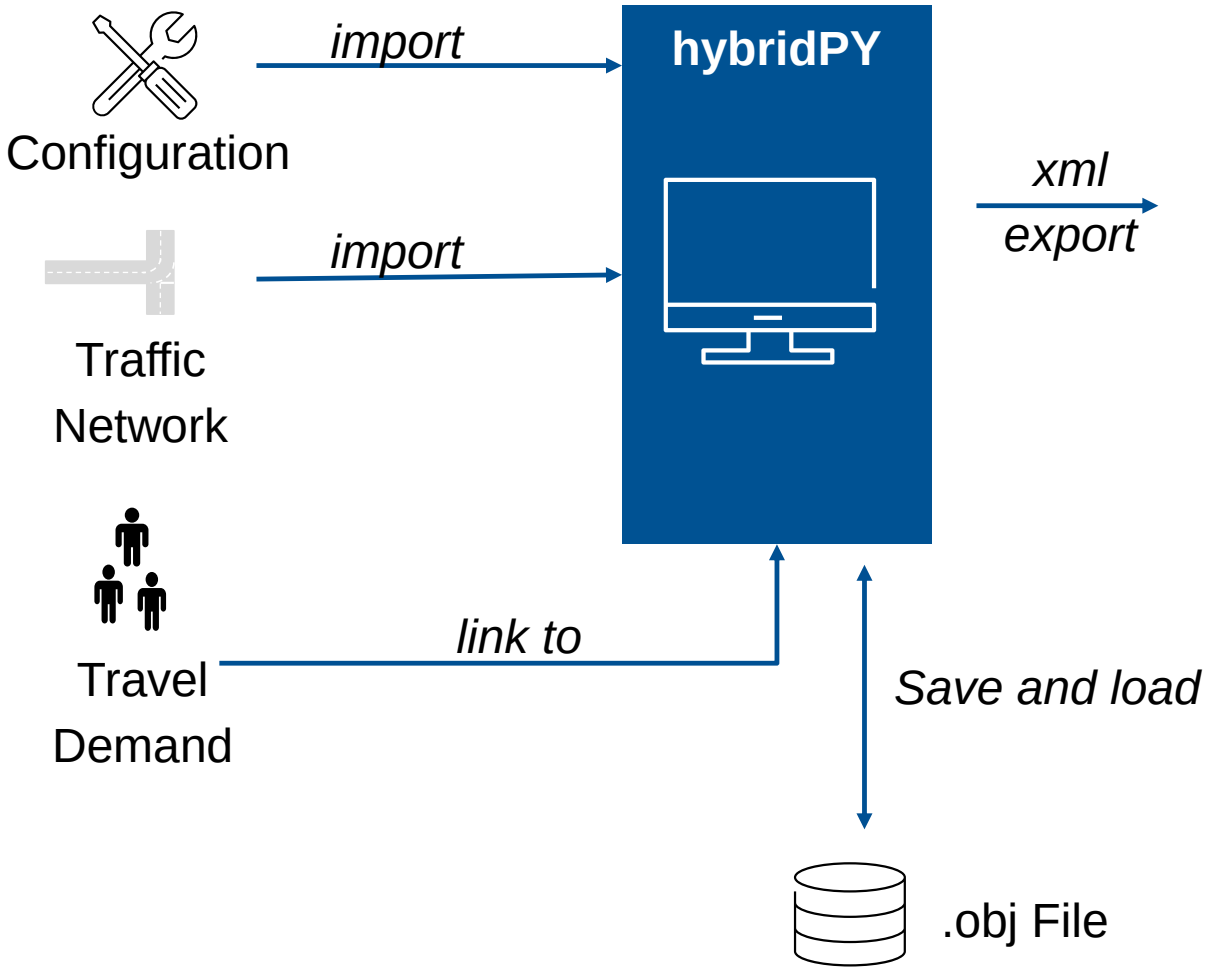
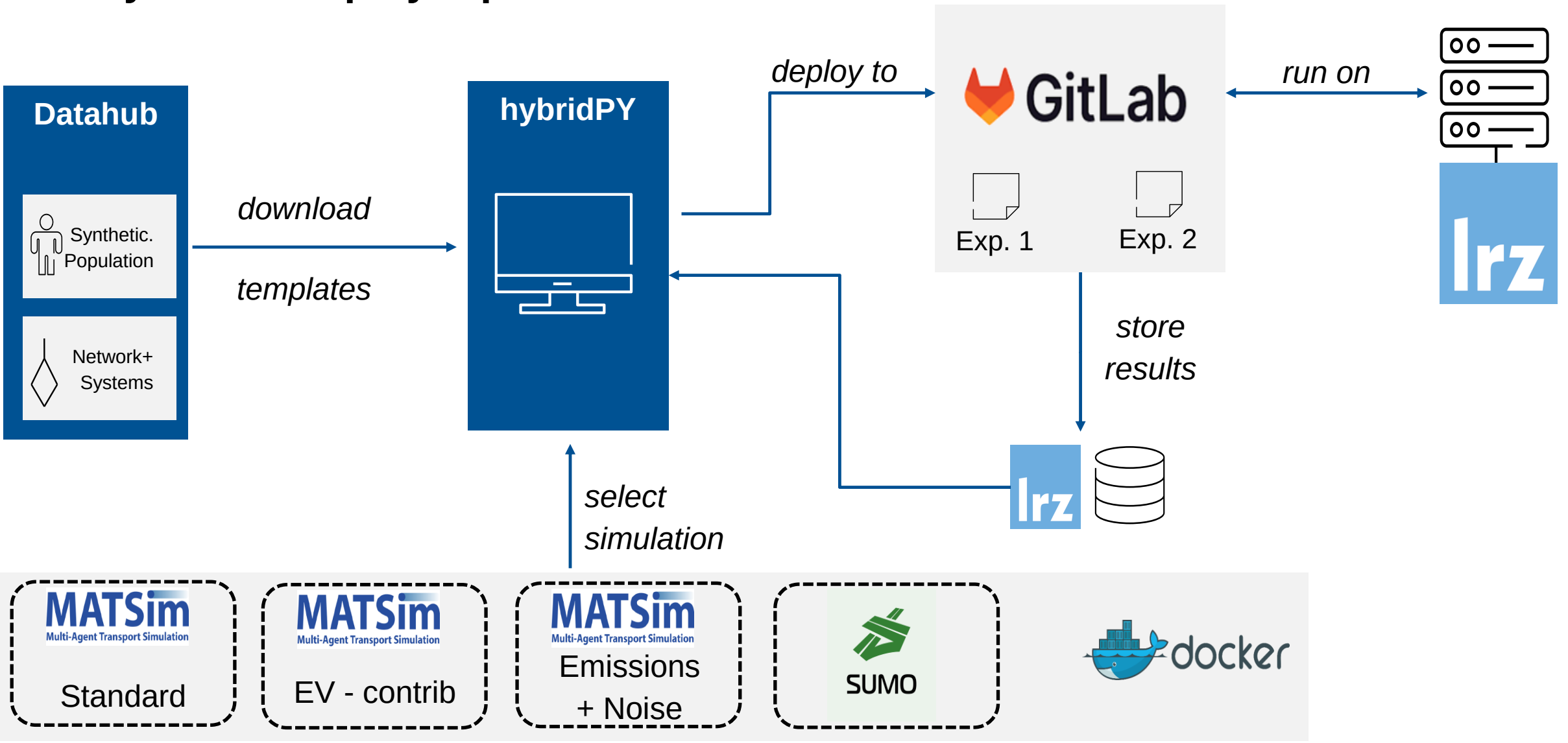
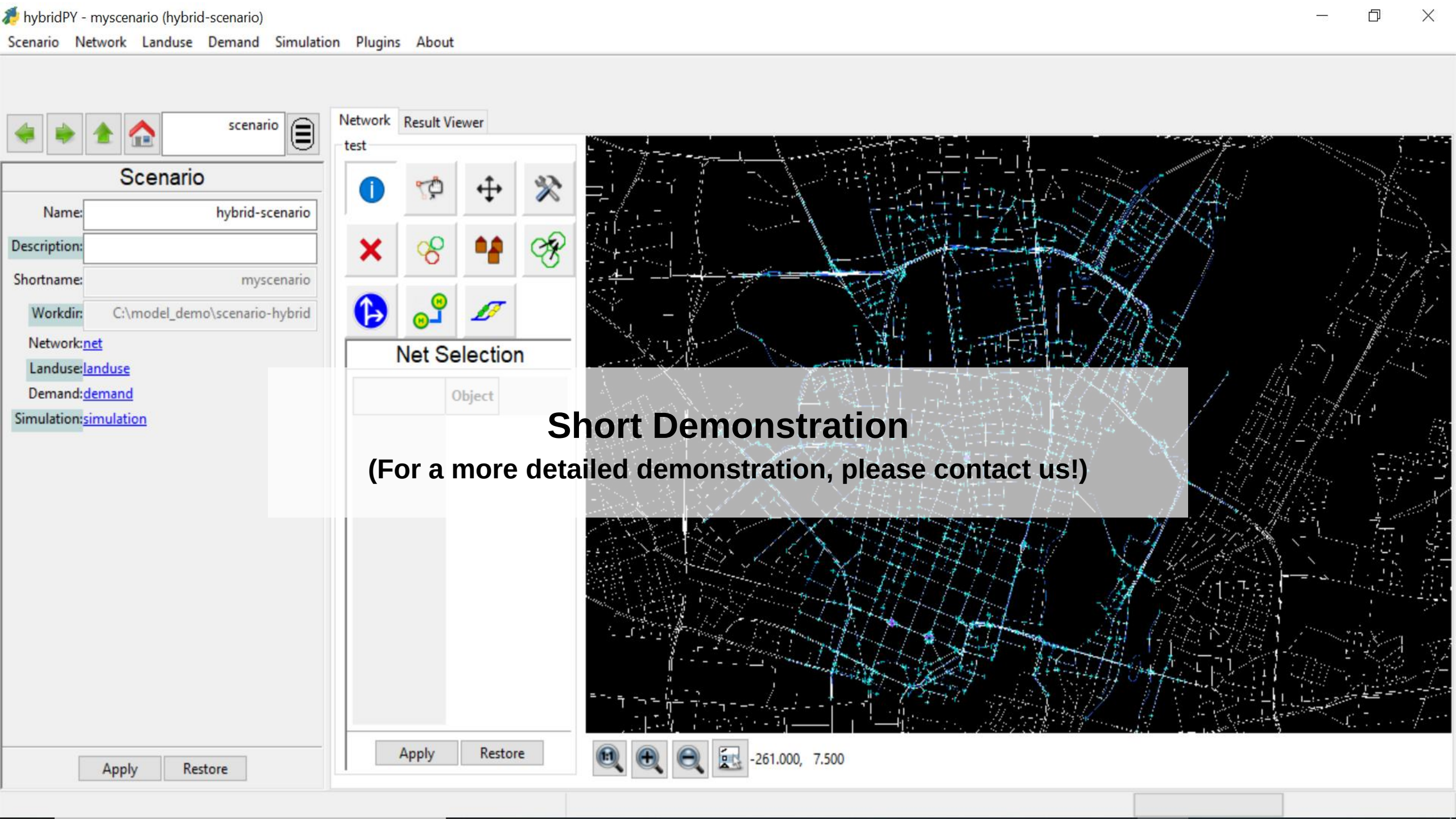
The MATSim Workflow inside hybridPY



The hybridPY Deploy Pipeline

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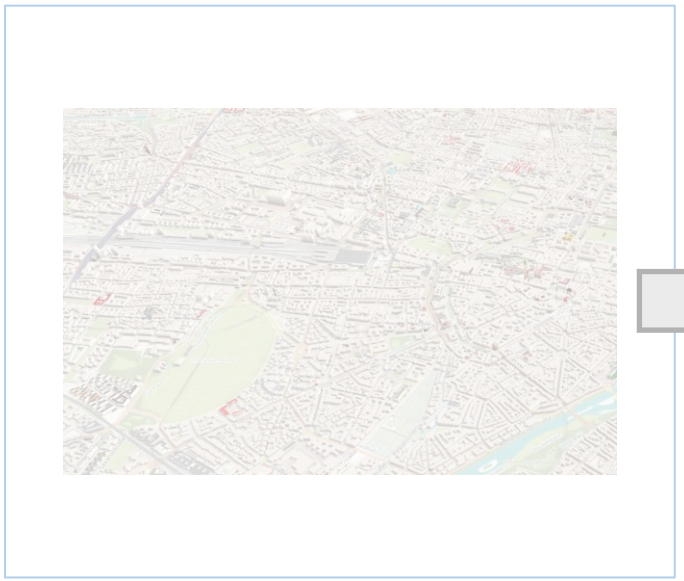
scenario
Scenario
Name: hybrid-scenario
Description:
Shortname: myscenario
Workdir: C:\model_demo\scenario-hybrid
Network:net
Landuse:landuse
Demand:demand
Simulation:simulation
Apply Restore
Network Result Viewer
test
Net Selection
Object
Apply Restore
-261.000, 7.500
Short Demonstration
(For a more detailed demonstration, please contact us!)

The M Cube Pipeline



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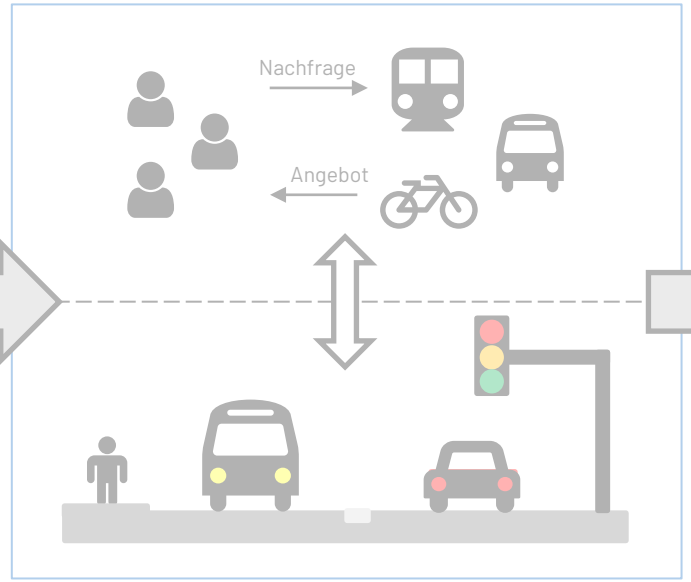

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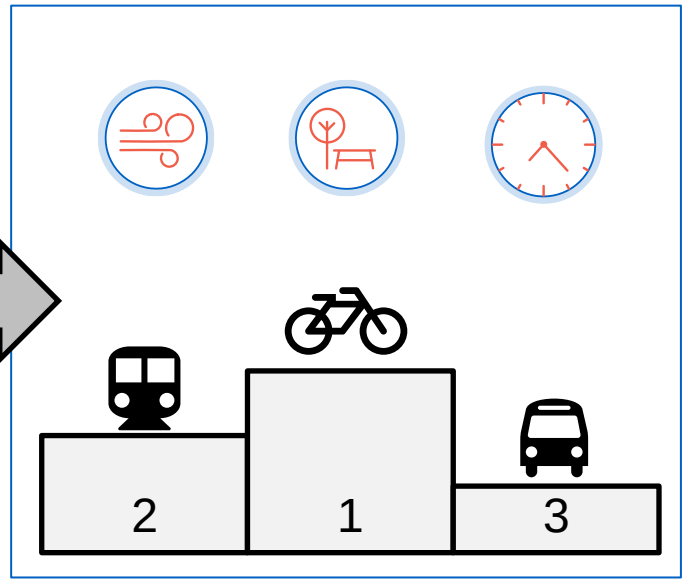
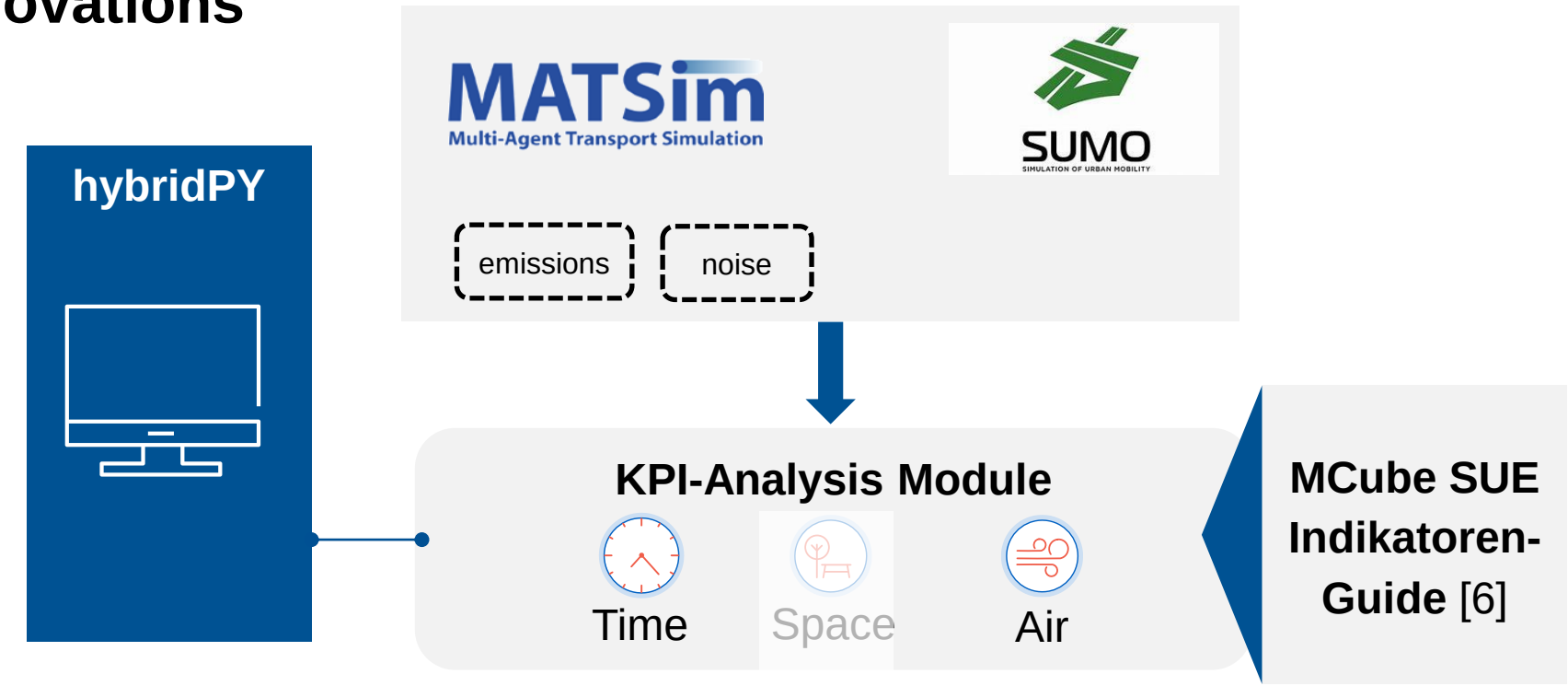


Evaluation of the mobility system and comprehensible presentation of the results

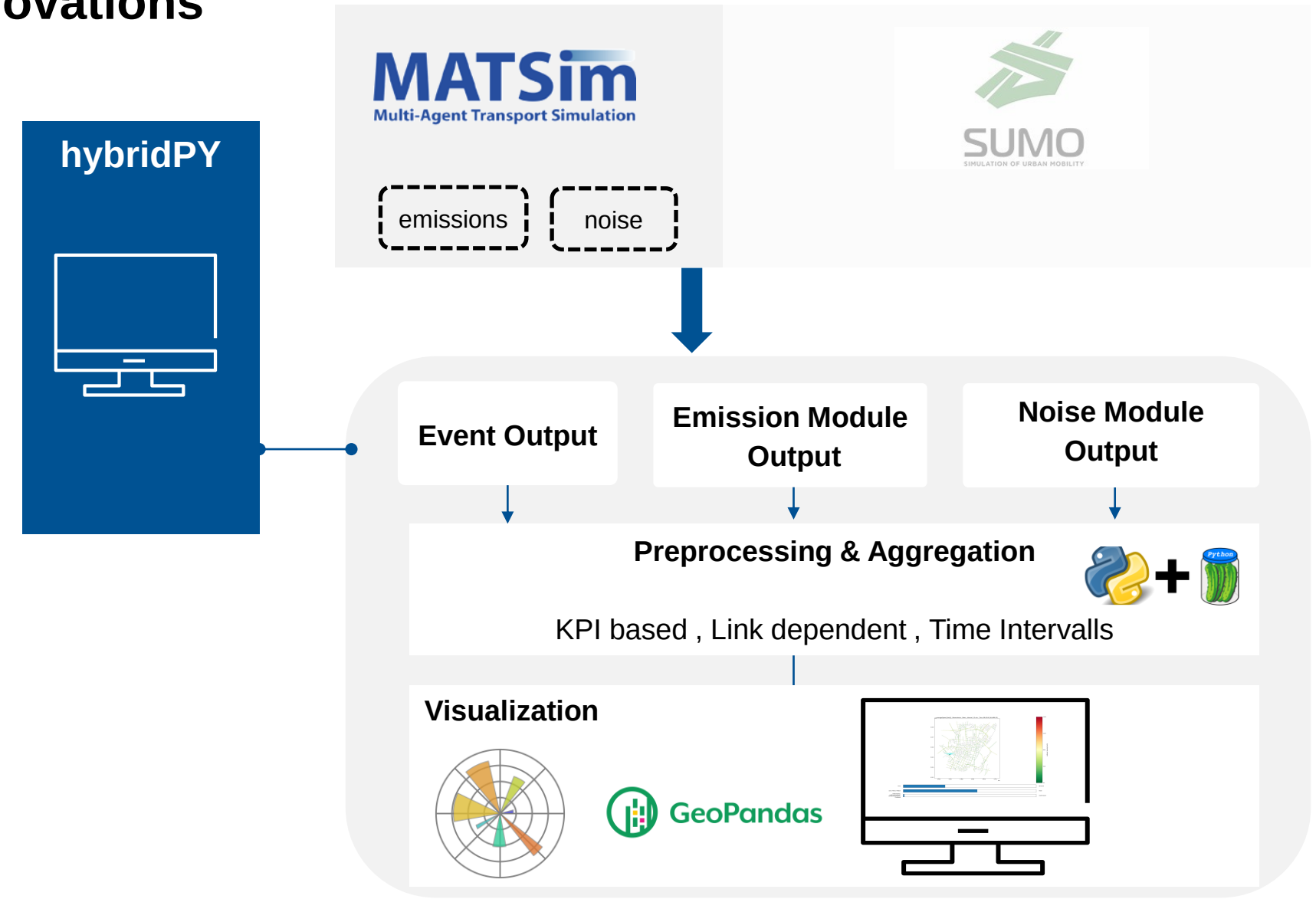
Analyzing Mobility Innovations



KPI Analysis Modul is developed as PlugIn for hybridPY

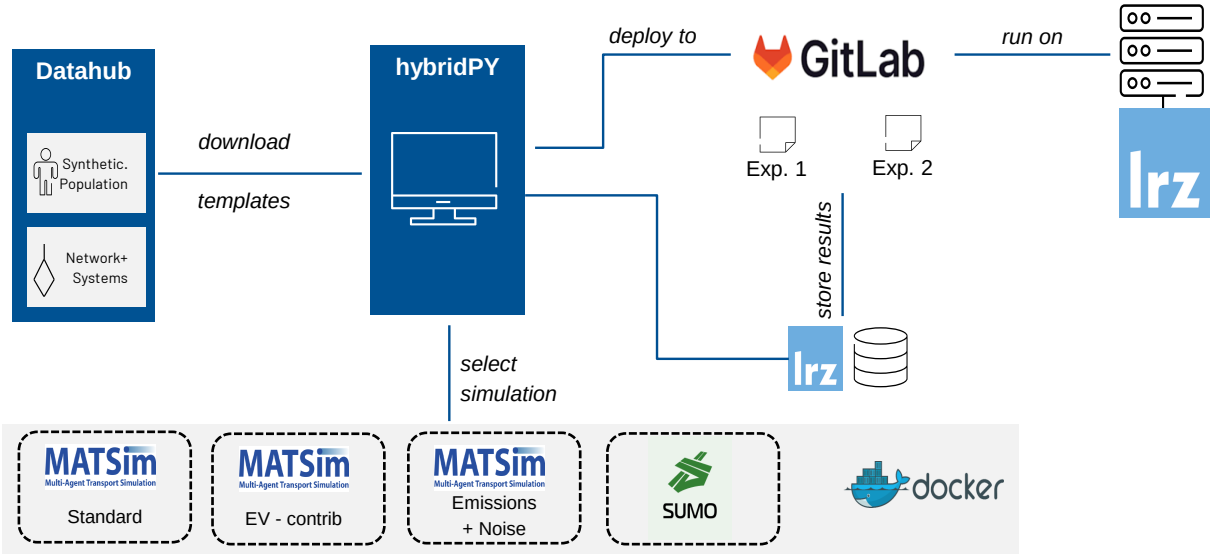
Modul is capable of reading MATSim and SUMO outputs!

Analyzing Mobility Innovations




averageSpeed [km/h] - Maxemission - Mean - Interval: 15 min - Time: 08:00:00 (HH:MM:SS)
1e6
5.338
5.337
5.336
5.335
5.334
5.333
4.466
4.467
4.468
4.469
4.470
4.471
1e6
Indikator Intensity [km/h]
138.2
103.7
69.2
34.6
0.1
Time
08:00:00
Sum | Mean | Median
mean
maxEmission |
coldEmissionEvent |
warmEmissionEvent |
Combined
maxEmission

Summary and Conclusions



- User-friendly Interface
- Customizable and easily extensible
- Supports Cloud-Usage

Future Work

Automatic synchronisation of the traffic networks

Extension of MATSim Integration (Public Transport, PT & Network Editing, Config checks, etc)

Validation

Literature

[1] W Axhausen, Kay; Horni, Andreas; Nagel, Kai (2016): The multi-agent transport simulation MATSim: Ubiquity Press.

[2] Lopez, Pablo Alvarez; Behrisch, Michael; Bieker-Walz, Laura; Erdmann, Jakob; Flötteröd, Yun-Pang; Hilbrich, Robert et al. (2018): Microscopic Traffic Simulation using SUMO. In: The 21st IEEE International Conference on Intelligent Transportation Systems: IEEE. Online verfügbar unter https://elib.dlr.de/124092/.

[3] Moeckel, Rolf; Huang, Wei-Chieh; Ji, Joanna; Llorca, Carlos; Moreno, Ana Tsui; Staves, Corin; Zhang, Qin; Erhardt, Gregory D.: The Activity-based model ABIT: Modeling 24 hours, 7 days a week. Transportation Research Procedia 78, 2024, 499-506, DOI: https://doi.org/10.1016/j.trpro.2024.02.062

[4] Schweizer, Joerg (2014): SUMOPy: An Advanced Simulation Suite for SUMO. In: Michael Behrisch, Daniel Krajzewicz und Melanie Weber (Hg.): Simulation of Urban Mobility. Berlin, Heidelberg: Springer Berlin Heidelberg, S. 71–82.

[5] https://sumo.dlr.de/pdf/2024/4-3.pdf

[6] https://datenhub.mcube-cluster.de/records/725j1-fbe49