

14/06/2022

Agent-based simulation of future mobility systems in the Paris area

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AnthroPOLIS
HUMAN CENTERED MOBILITY

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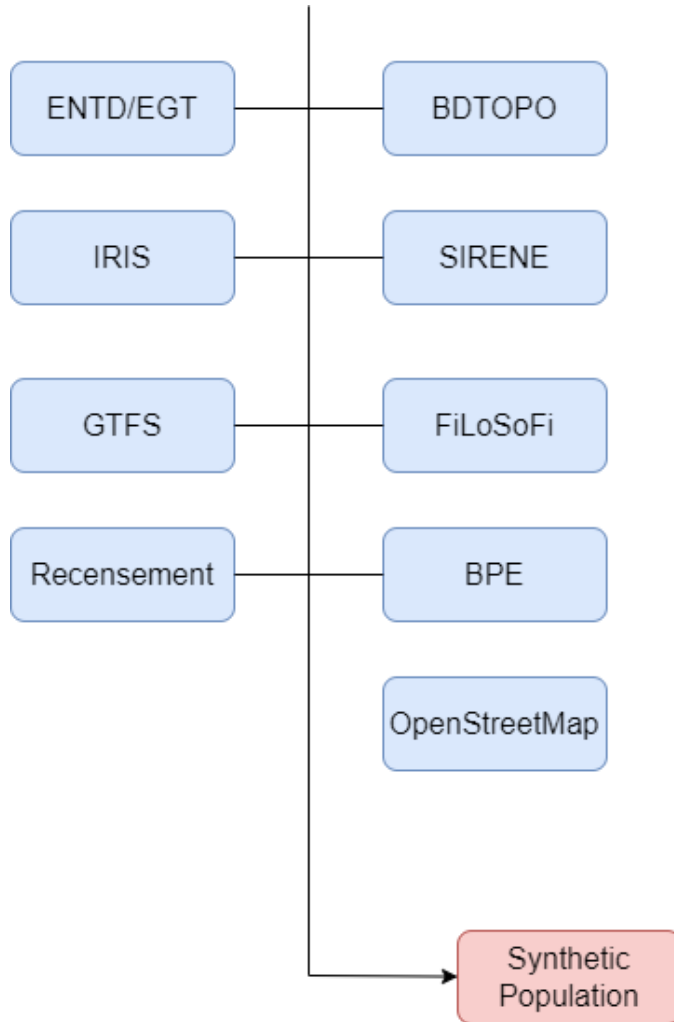
Researcher @ IRT SystemX

Jakob Puchinger

Professor @ LGI

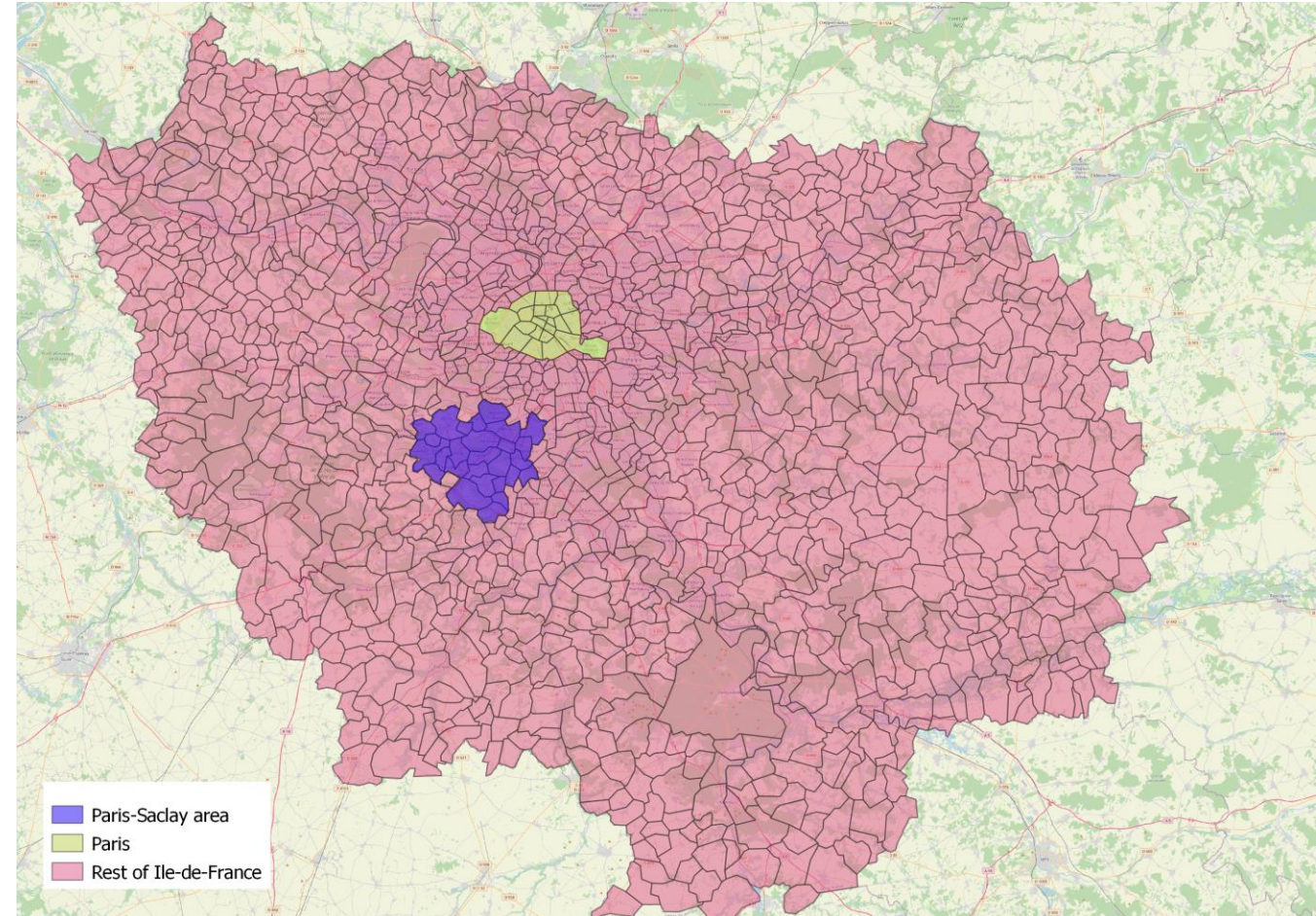
Senior Researcher @ IRT SystemX

MATSim Mobility Simulations: general methodology for Ile-de-france



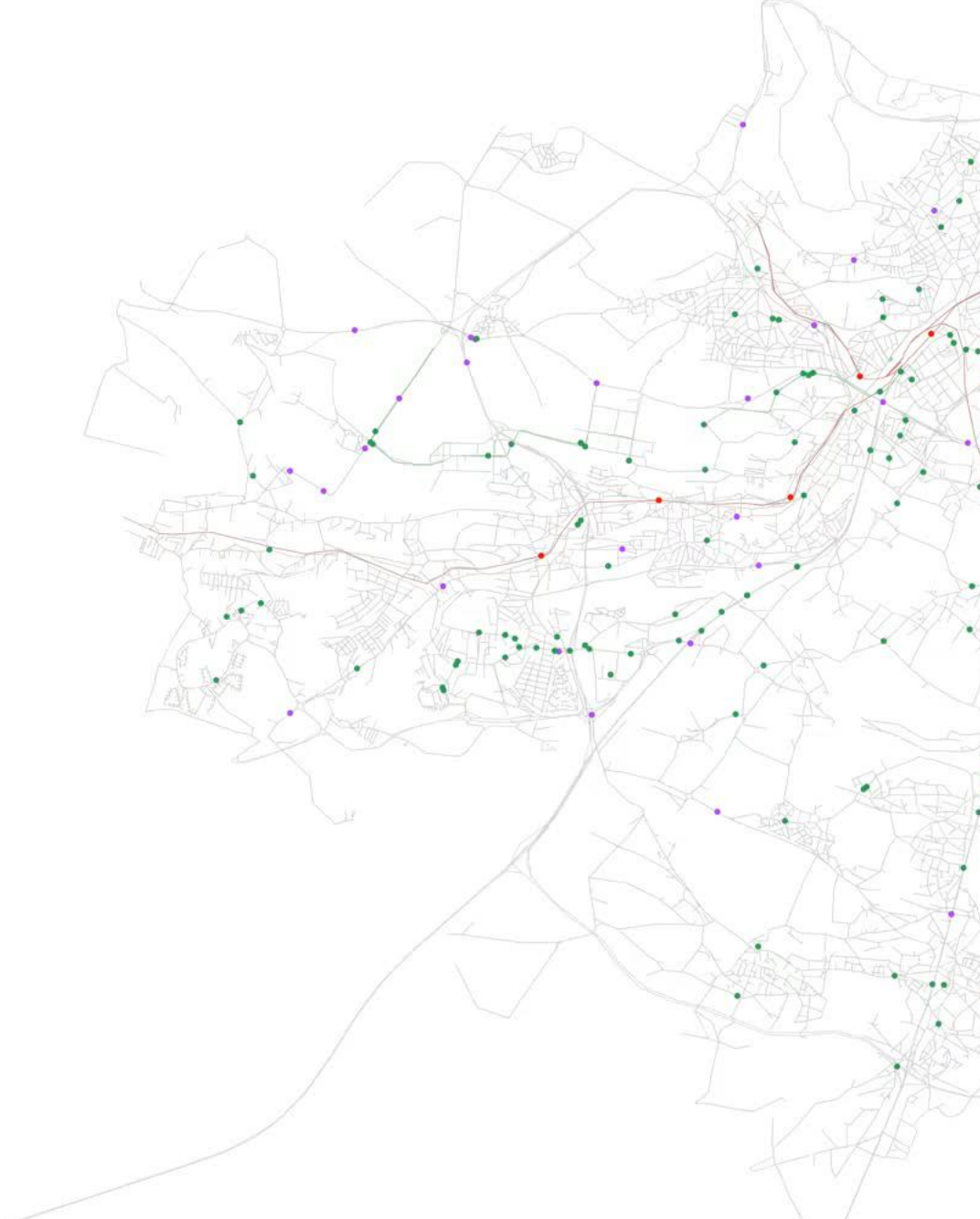
MATSim Mobility Simulations: Zoom on Paris Saclay Area

- 27 communalities
- 318k residents
- 65k students and 15k researchers
- 18 RER (train) stations
- 1 High speed train station

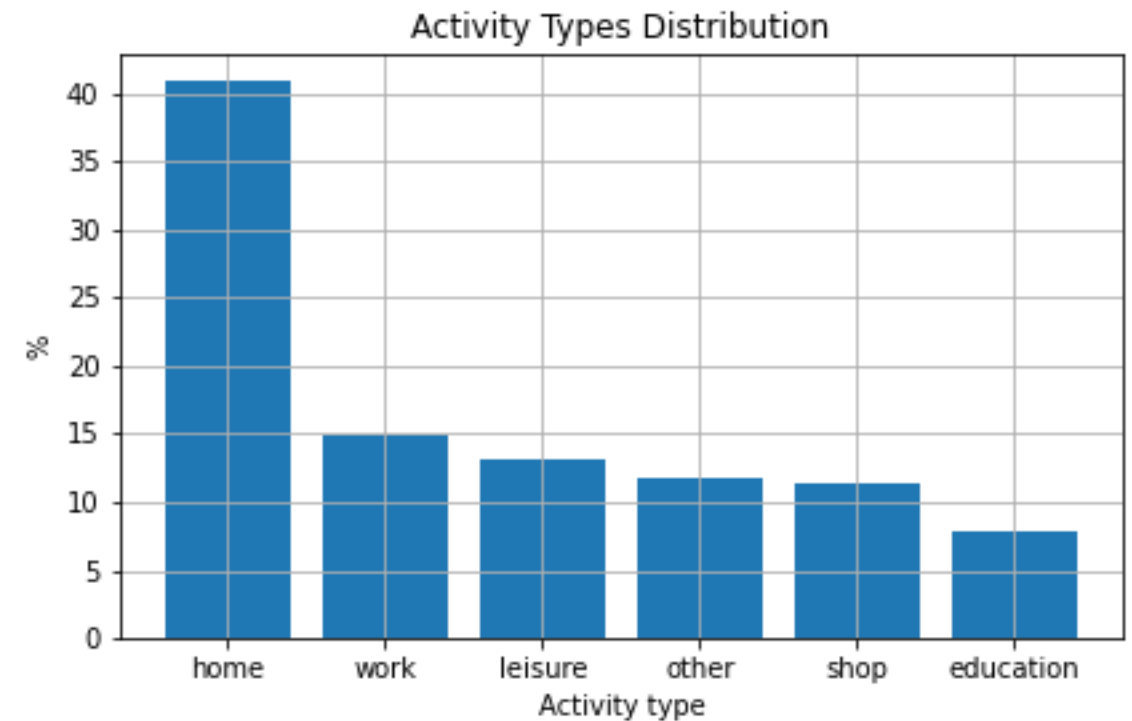
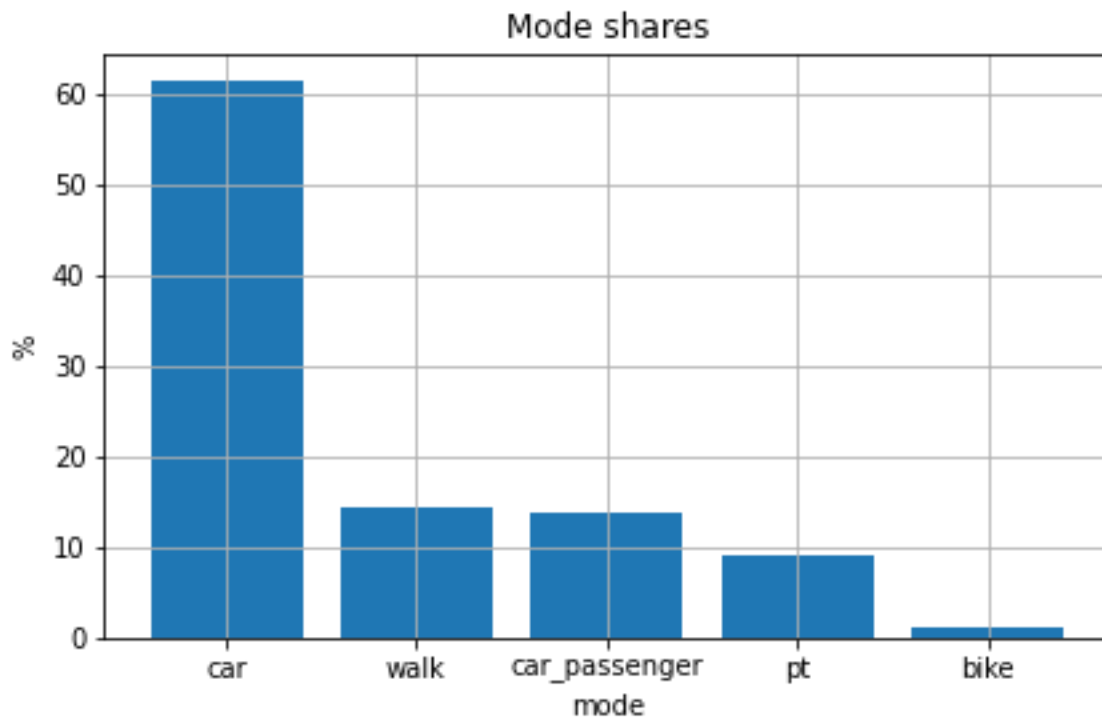


MATSim Mobility Simulations: Zoom on Paris-Saclay Area

- Ile-de-France Scenario is cut to keep only the Paris-Saclay area
- Simulating with 10% of the real population
- Baseline scenario with latest demand data and PT schedule



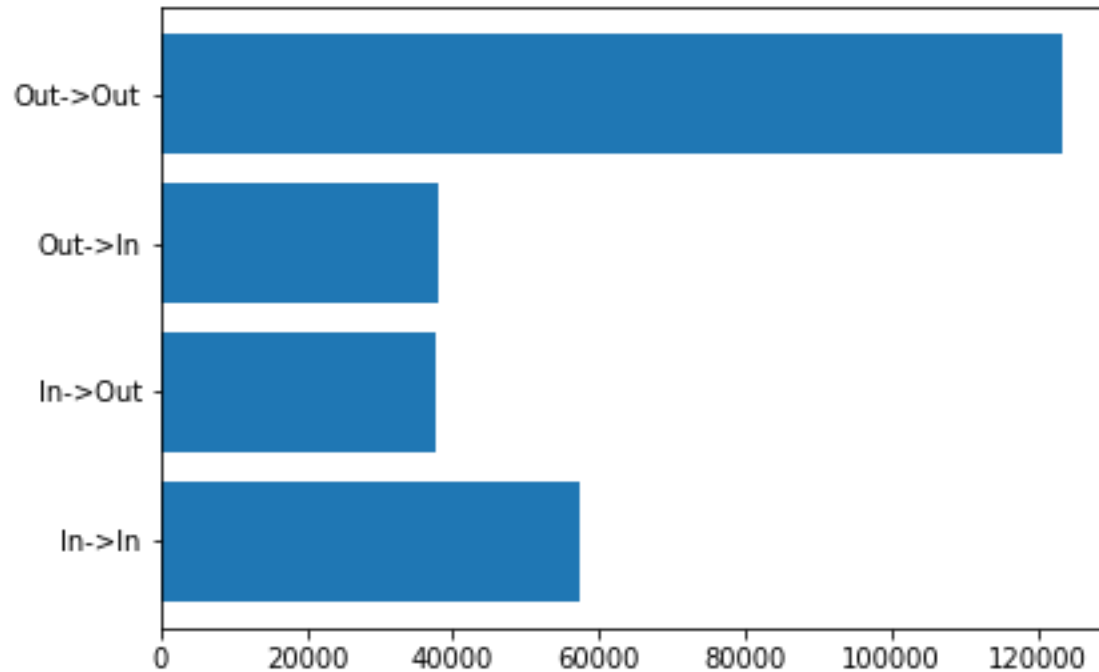
MATSim Mobility Simulations of Paris-Saclay | baseline metrics



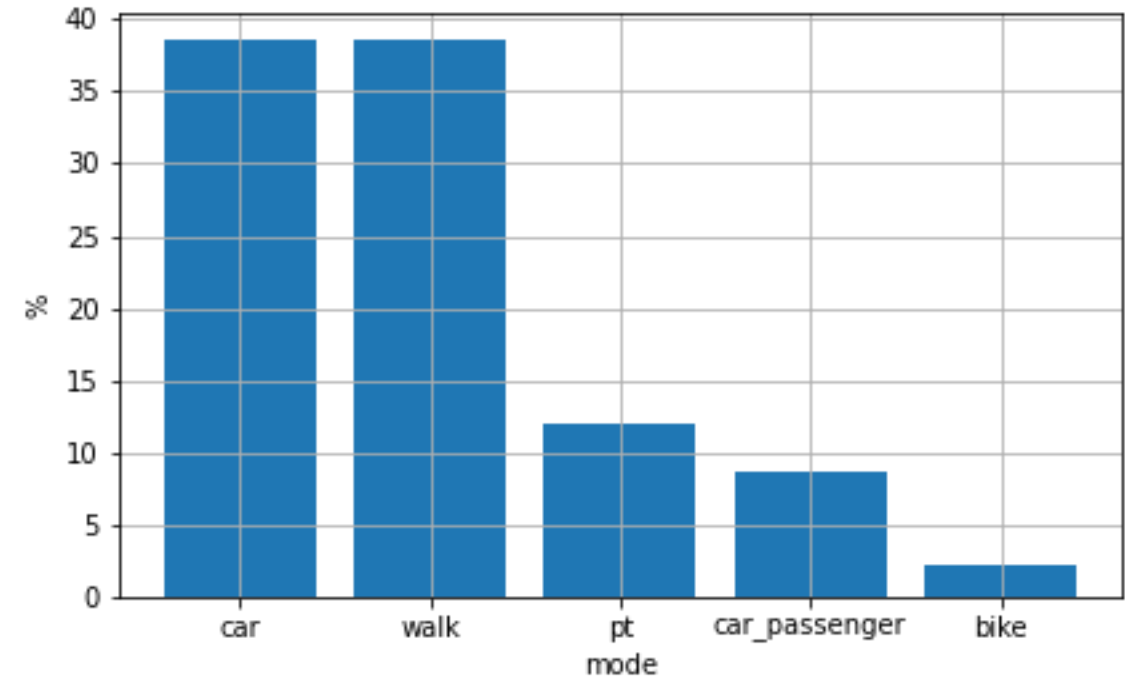
MATSim Mobility Simulations of Paris-Saclay | baseline metrics

- Considering only inside trips

Distribution of Trips' ODs relatively to Paris-Saclay area

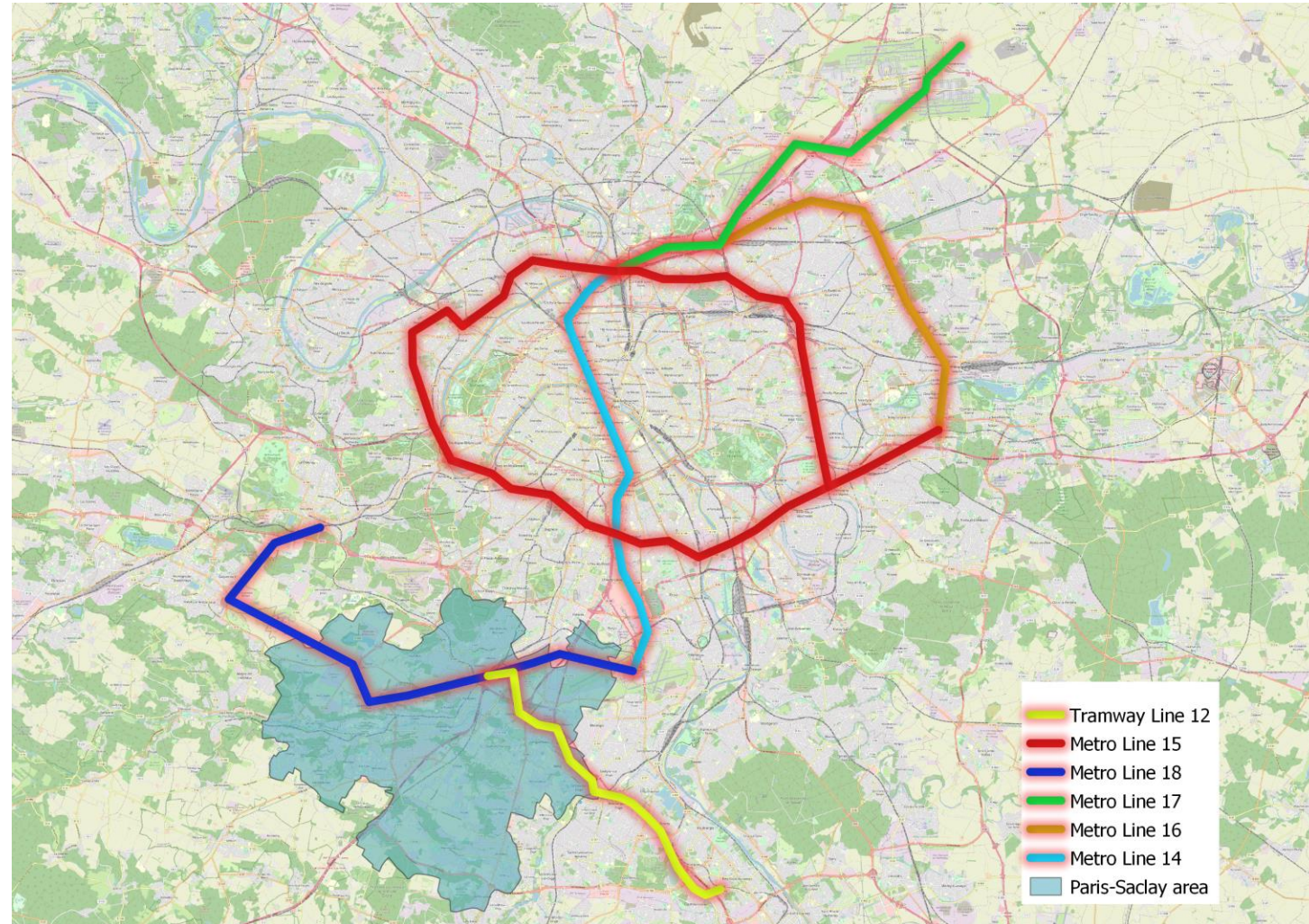


Mode shares



MATSim Mobility Simulations of Paris-Saclay | Grand Paris Express

- A project of 5 Metro lines (4 of them brand new)
 - To be delivered gradually between 2024 and 2030
 - One of them (Metro Line 18) passes by the Paris-Saclay area
 - Data regarding this future offer are available
- Upcoming Tramway Line 12
 - To be delivered on late 2023
 - Also linked with our area of interest
 - Data regarding it were not available to us

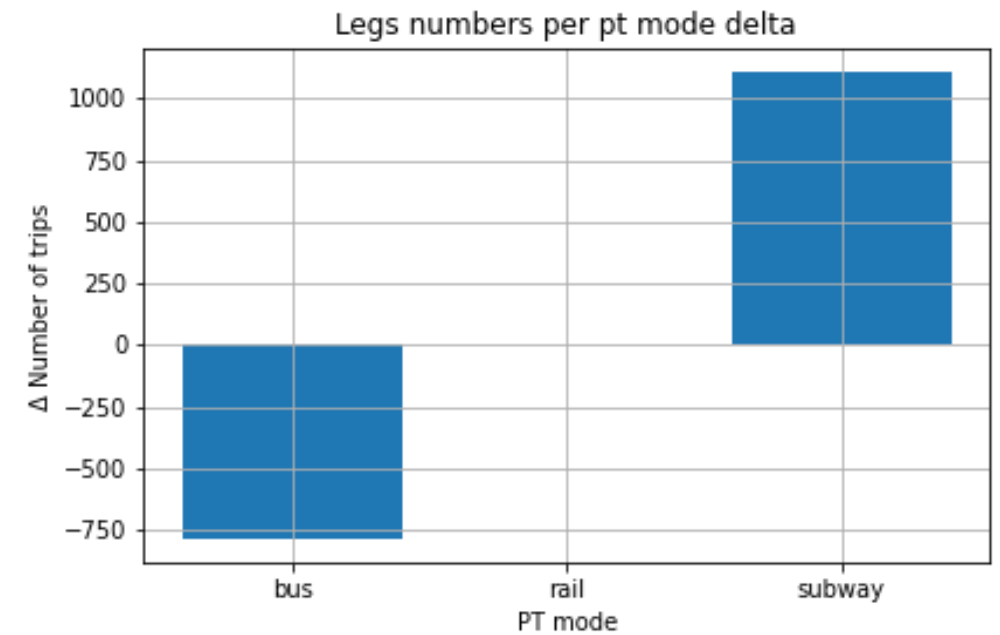


MATSim Mobility Simulations of paris-saclay | Grand Paris Express

- Grand Paris Express (Metro Line 18) was integrated
 - On the Baseline scenario (to obtain the GPE scenario)
 - Using available data regarding locations of stations and frequency
 - Running both Baseline and GPE scenarios for 150 iterations before comparison

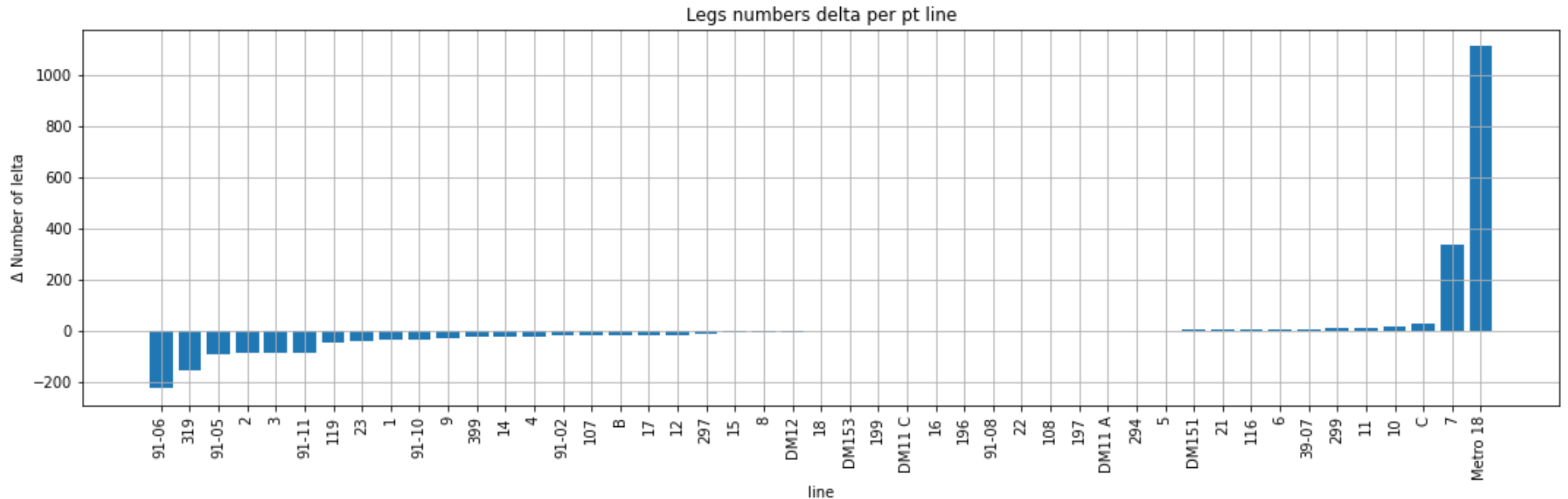
MATSim Mobility Simulations of paris-saclay | Grand Paris Express | Comparison

- Overall modes shares do not substantially change
- Bus legs share decreases in favor of the GPE subway

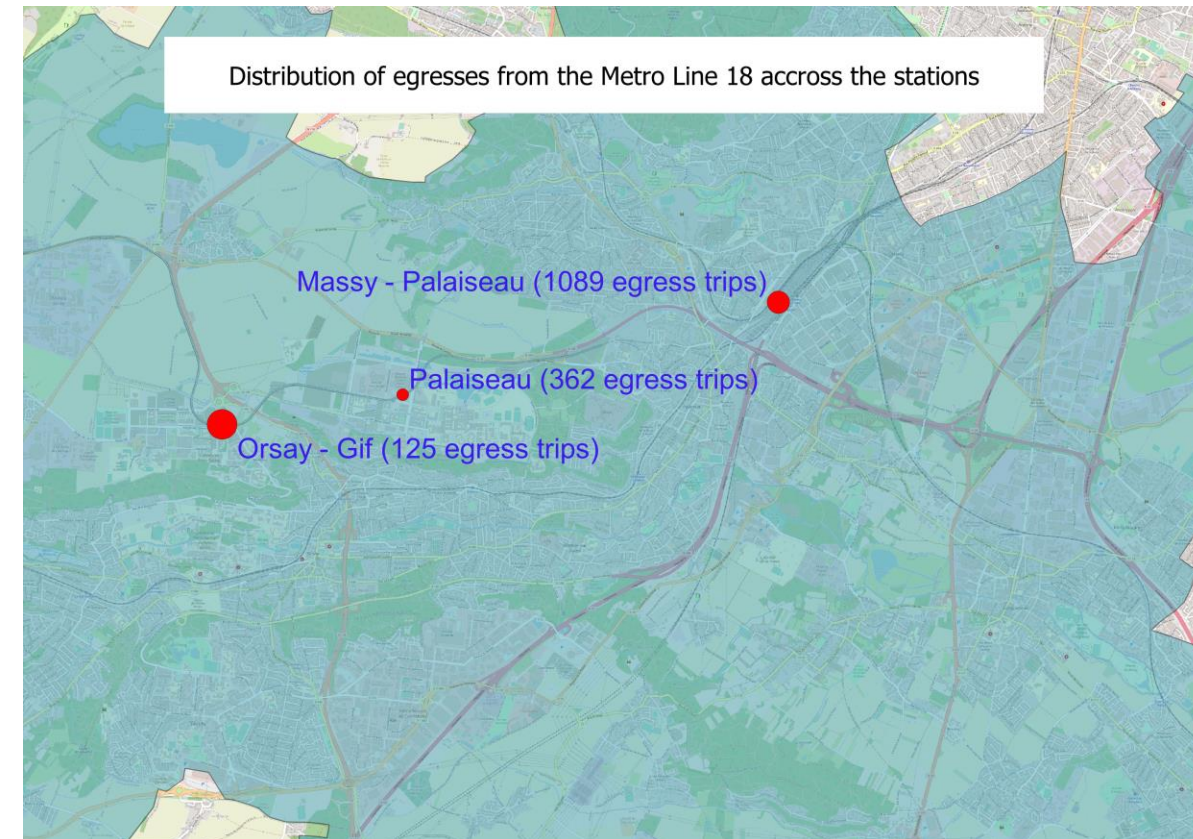
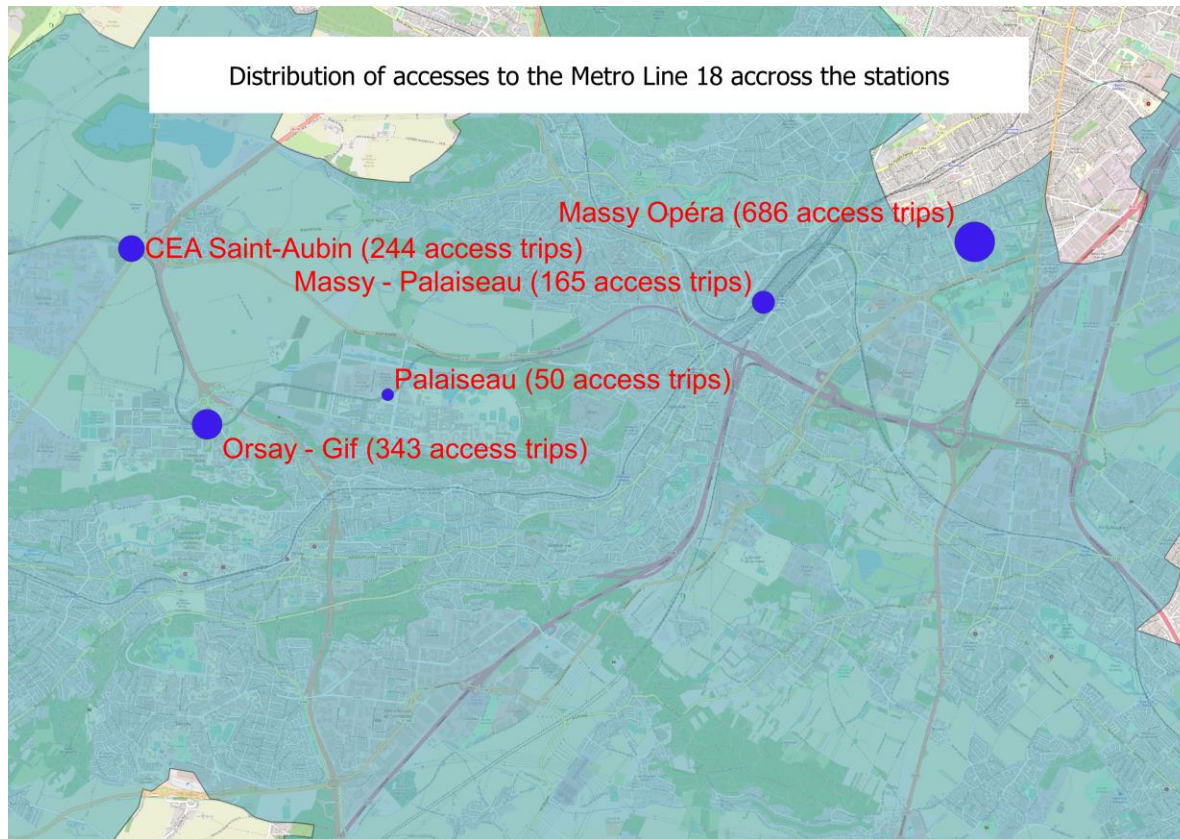


MATSim Mobility Simulations of paris-saclay | Grand Paris Express | Comparison

- PT lines other than GPE also see an increase in the number of legs



MATSim Mobility Simulations of paris-saclay | Grand Paris Express | Results

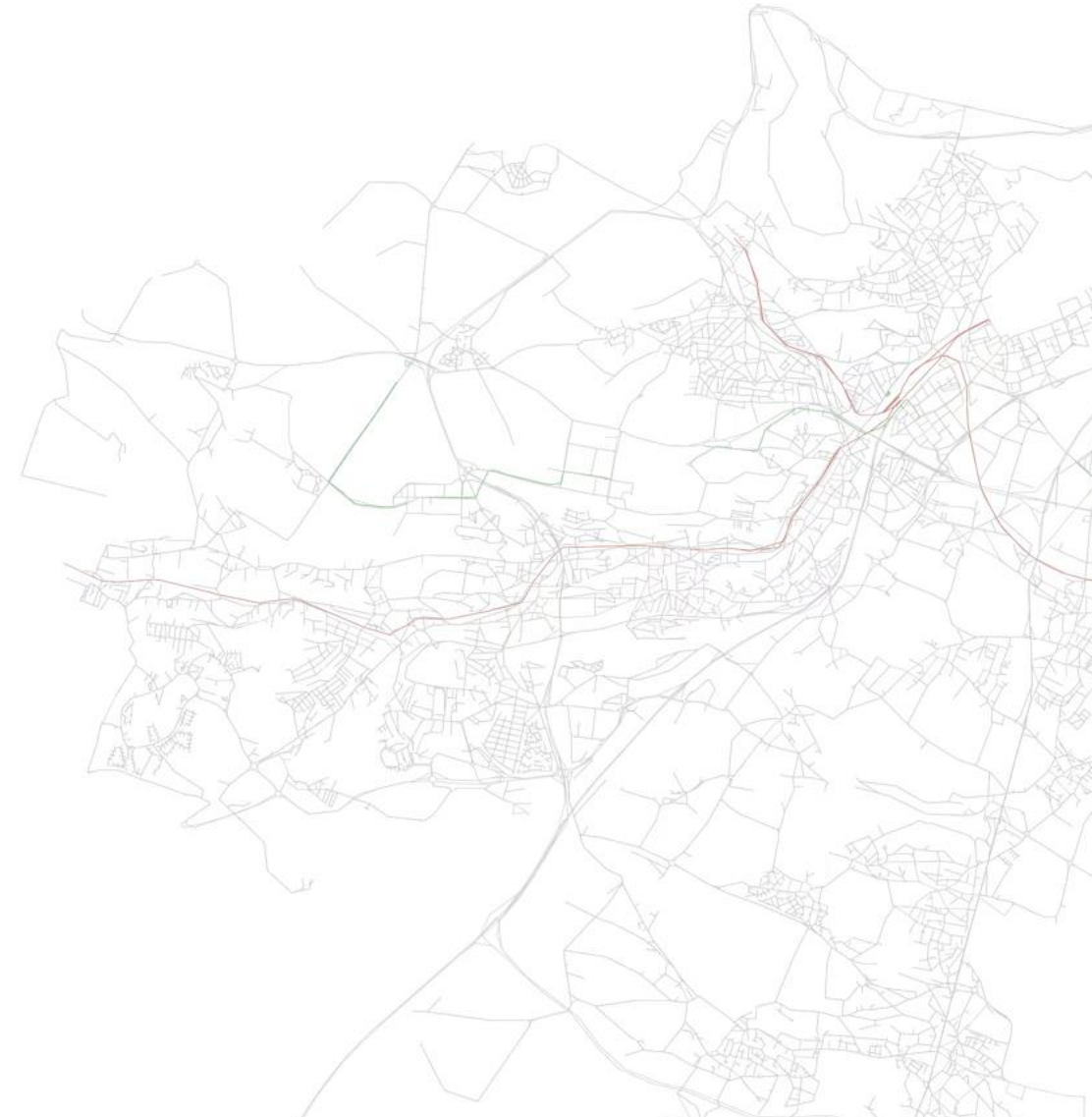


MATSim Mobility Simulations of Paris-Saclay: A feeder MoD System

07:00:00

Feeder MoD system

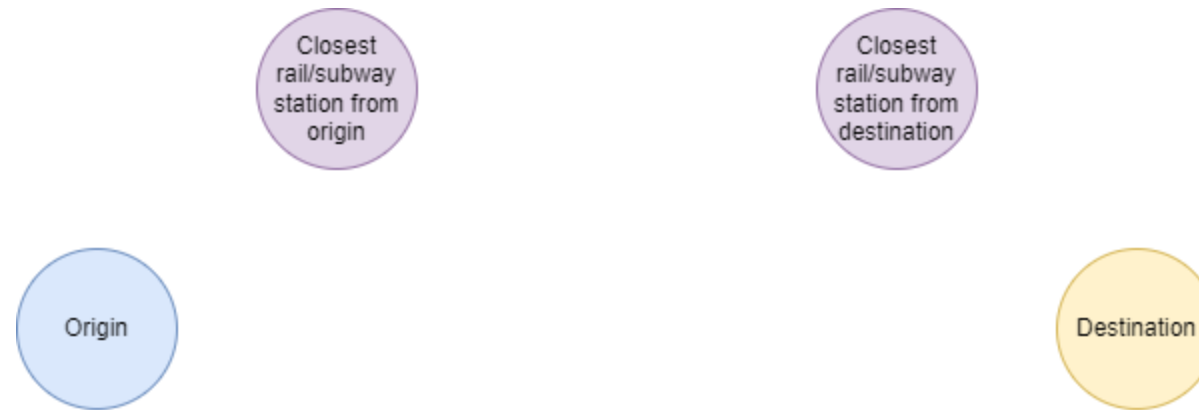
- Intermodality with rail and subway modes
- Provides alternative pt routes with DRT access/egress
- Tests done with a fleet of 100 vehicles



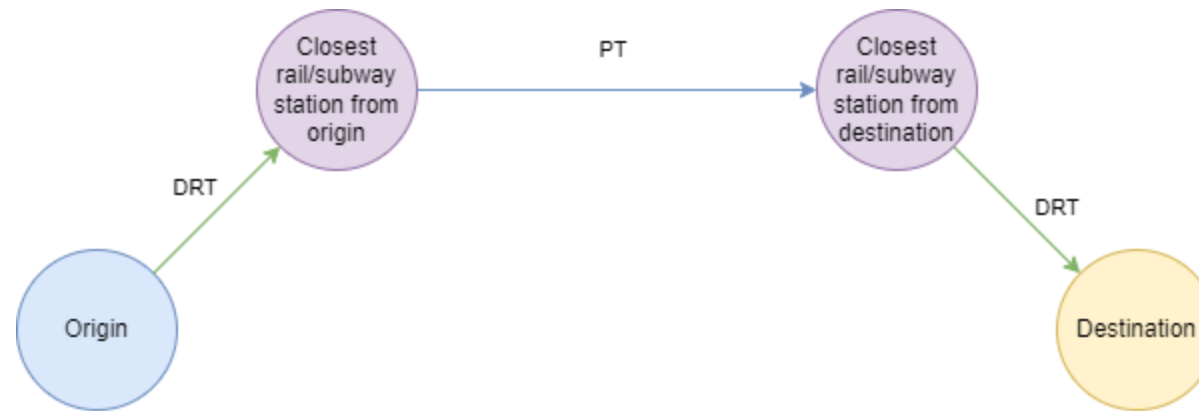
MATSim Mobility Simulations of Paris-Saclay: A feeder MoD System | Routing and Mode Choice



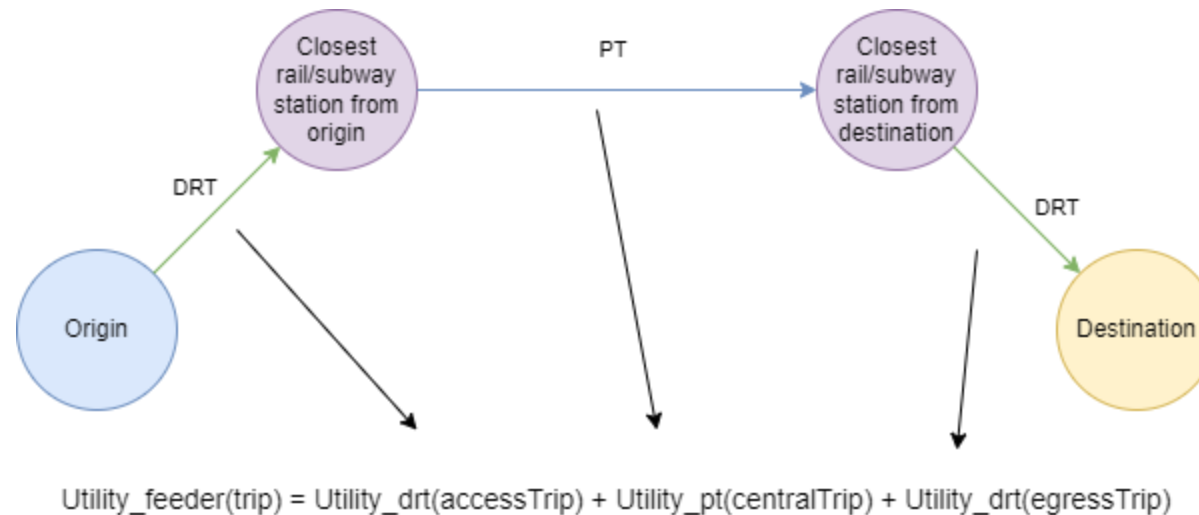
MATSim Mobility Simulations of Paris-Saclay: A feeder MoD System | Routing and Mode Choice



MATSim Mobility Simulations of Paris-Saclay: A feeder MoD System | Routing and Mode Choice

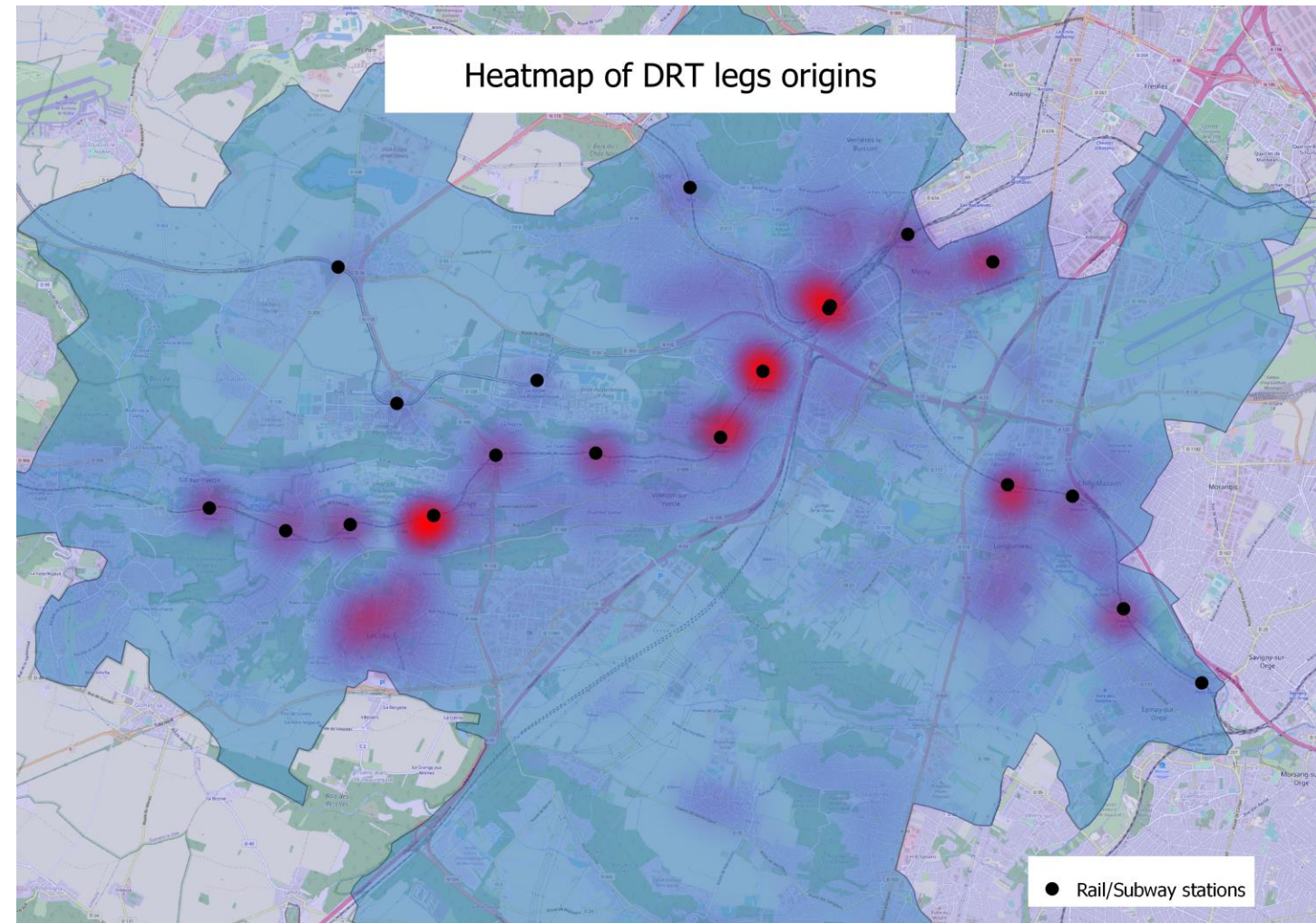
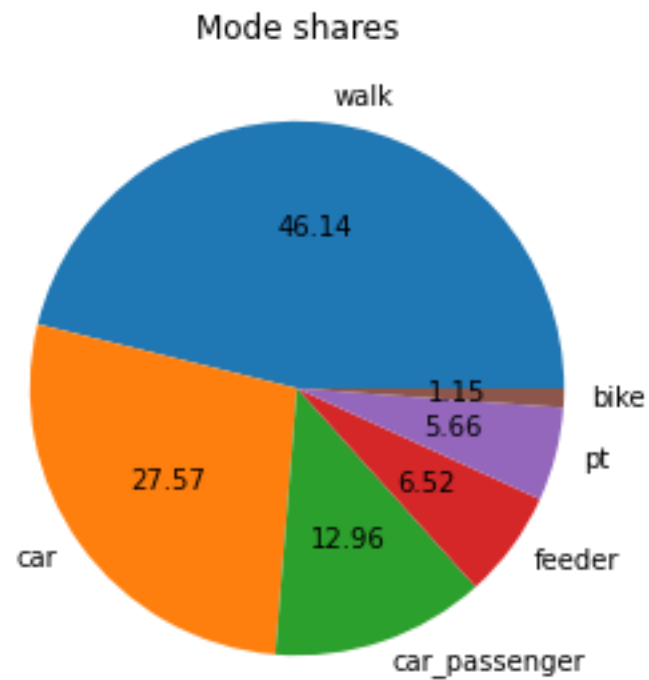


MATSim Mobility Simulations of Paris-Saclay: A feeder MoD System | Routing and Mode Choice

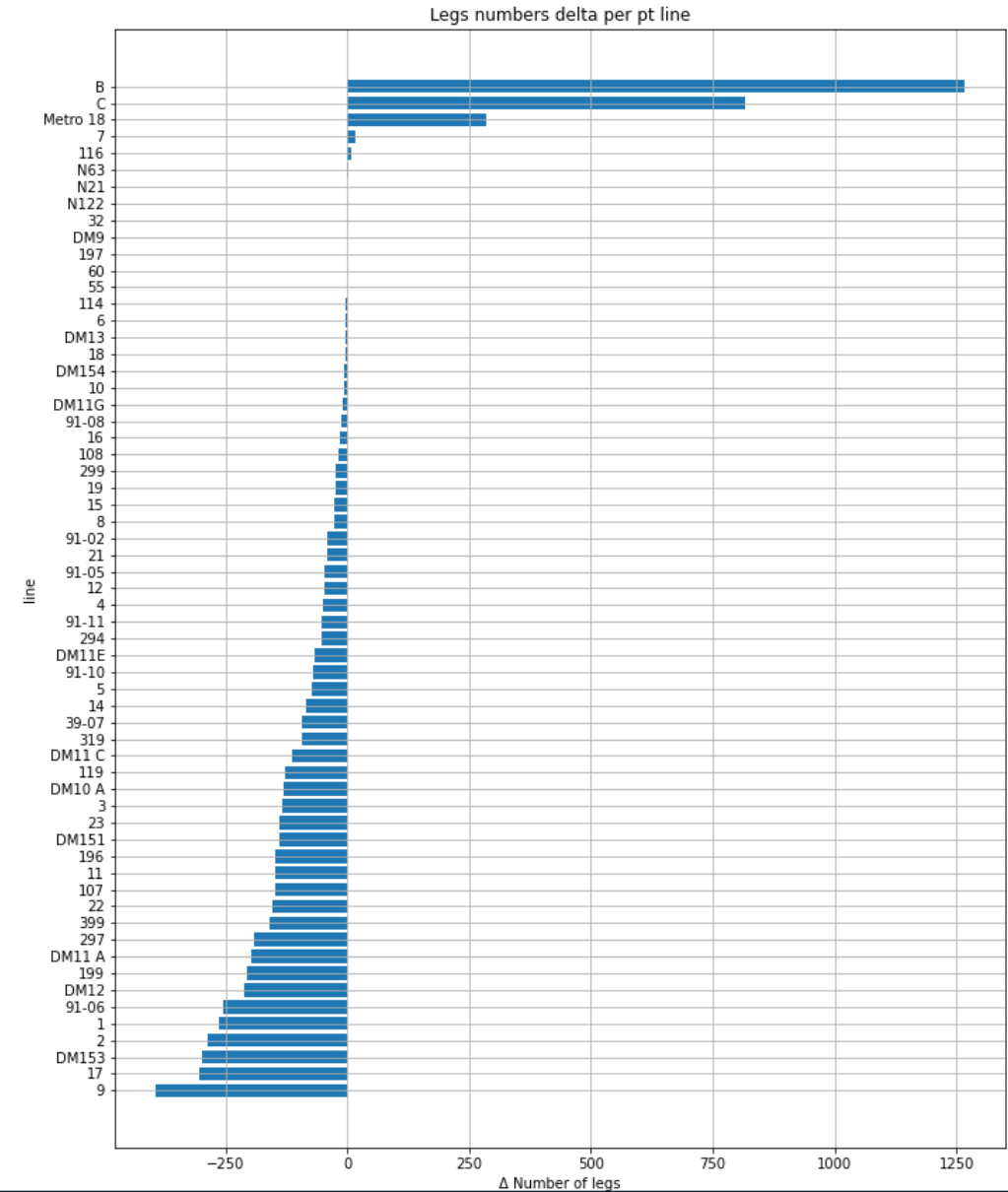
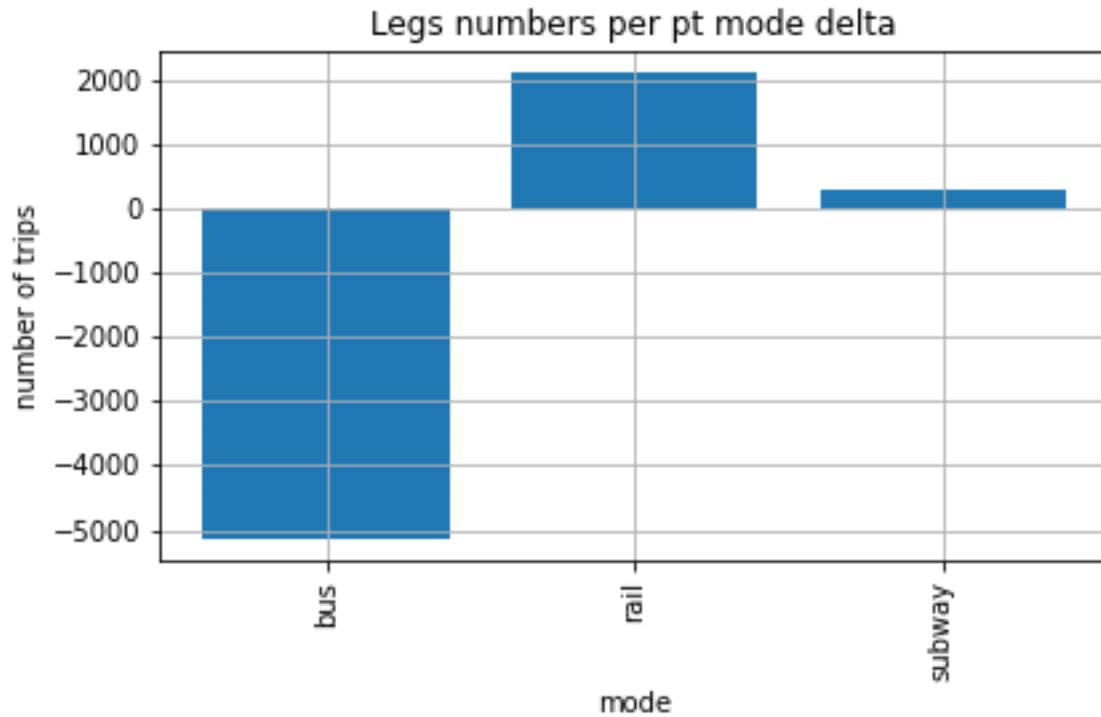


- The computation of the utility for DRT modes relies on (optimistic) estimations regarding its performance

MATSim Mobility Simulations of Paris-Saclay | A Feeder MoD System | observed metrics



MATSim Mobility Simulations of Paris-Saclay | A Feeder MoD System | observed metrics



MATSim Mobility Simulations of Paris-Saclay | Conclusions

- A first assessment of the impact of the Grand Paris Express
- Combining rail transport modes with a MoD service increases their frequentation

MATSim Mobility Simulations of Paris-Saclay | Perspectives

- Include Tramway Line 12 in future assessments
- Estimate the future demand to better assess the impact of future mobility systems
 - Using data regarding the evolution of the population in the study area
- Implement pre-booking of feeder MoD systems
 - Arrival time guarantees
 - Implies changes on DRT's insertion algorithm for vehicle assignment
- Focus on operation strategies for DRT
 - Use of RL techniques for rebalancing access/egress station selection
 - Study different objective/reward functions

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Thank you for your attention

