



RAMBOLL

Bright ideas.
Sustainable change.

Connecting Mobile Network Data with Transport Modelling and other data sources

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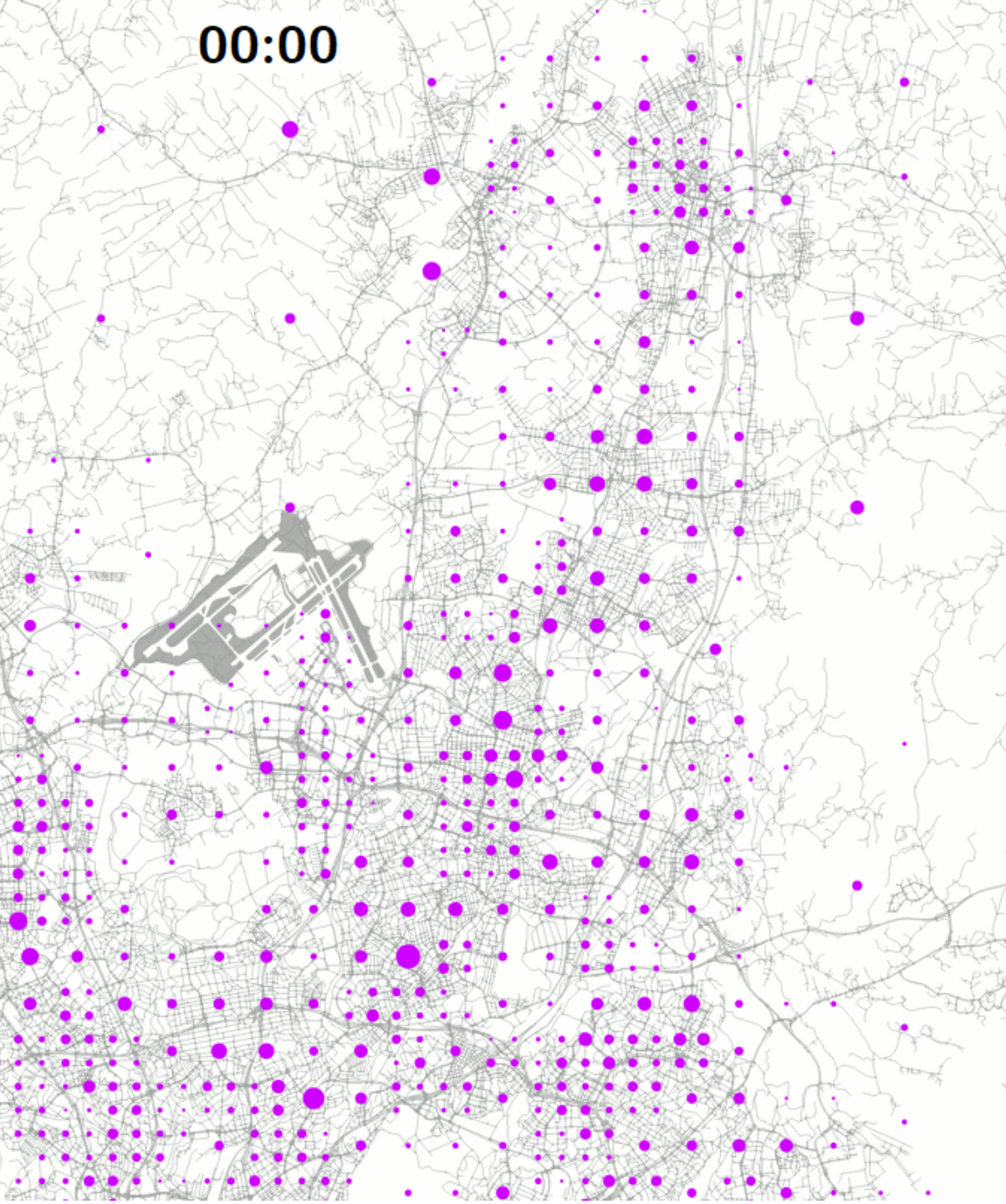


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- Ramboll head office
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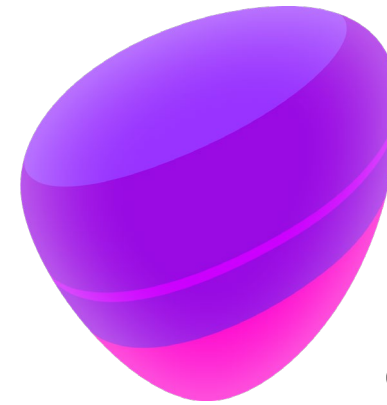
WHAT IS CROWD INSIGHTS?

Insights of people movements based on Telia's anonymized and aggregated mobile network data.

RELIABLE

HOLISTIC

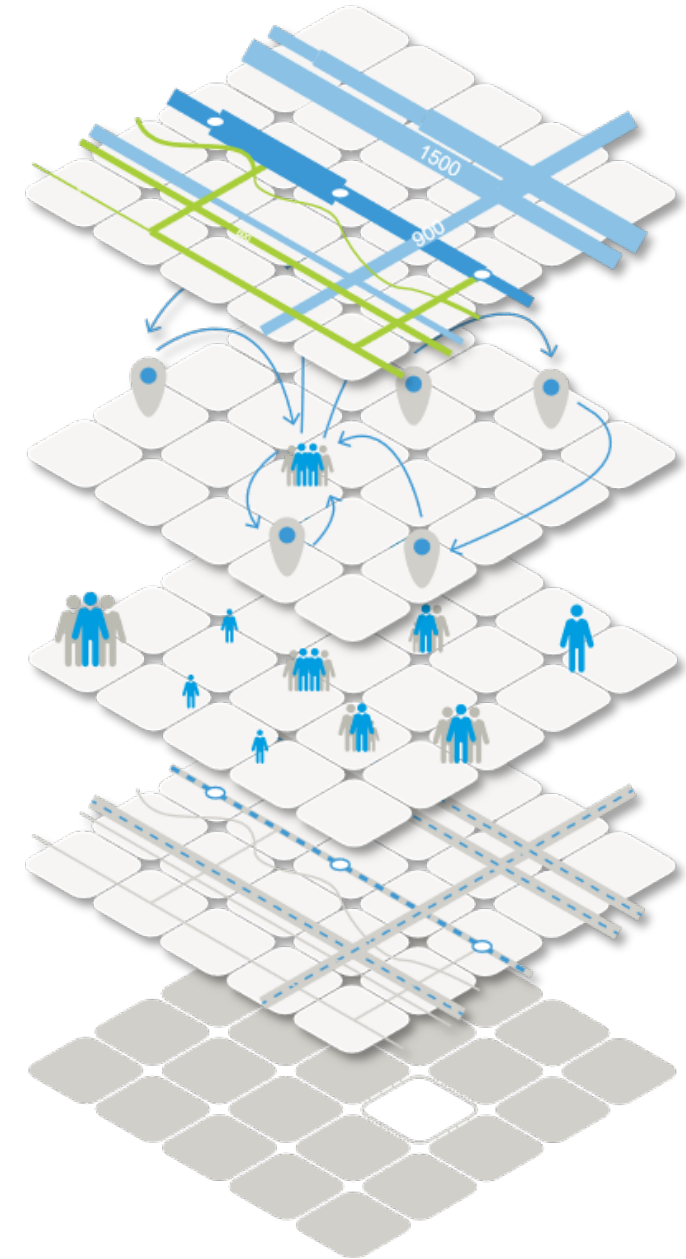
CONTINUOUS



BRUTUS by Ramboll

A state-of-the-art activity-based travel demand model.

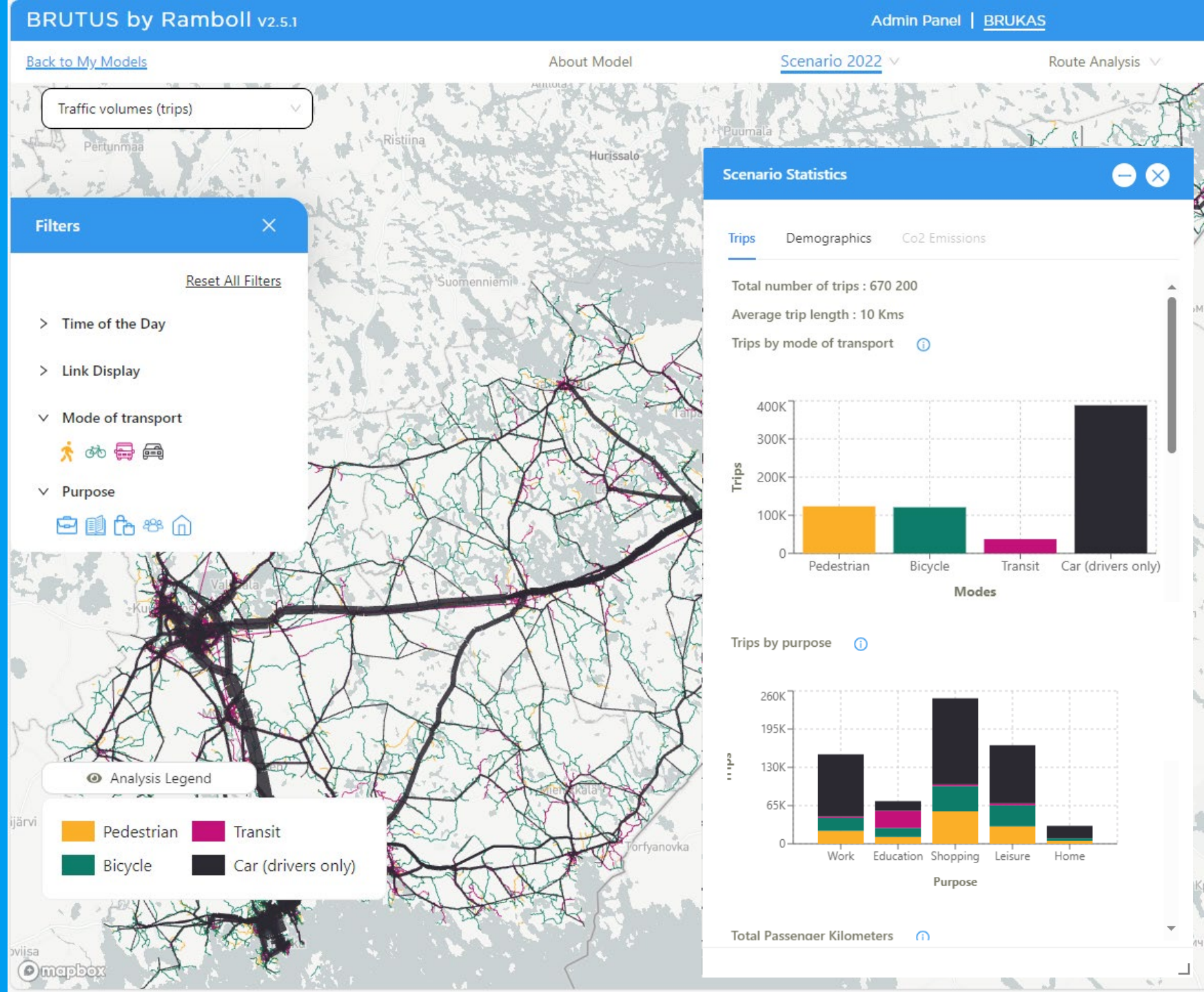
- BRUTUS treats **journeys as temporally and spatially continuous**, so the results can be viewed in desired locations at desired time intervals.
- **Individual-based modelling** means that the BRUTUS model includes information about the travellers' age, working hours, family size and car ownership.
- BRUTUS contains **modes-specific networks** and information about the **purpose of the trip**.
- The BRUTUS model is estimated using the data observed in the traffic survey, but the analyzes are based on a synthetic population. The results are thus **anonymized and meet data protection requirements**.
- BRUTUS can also be used to **forecast future scenarios**, to illustrate the impacts of changes in land use and the transport network.



South-Eastern Finland Transport Model

We build a state-of-art hybrid transport model (BRUTUS-demand model + EMME network assignment model).

As there was not adequate travel survey data available, we used Telia Crowd Insight mobile network data for calibrating the local demand and distribution of trips.



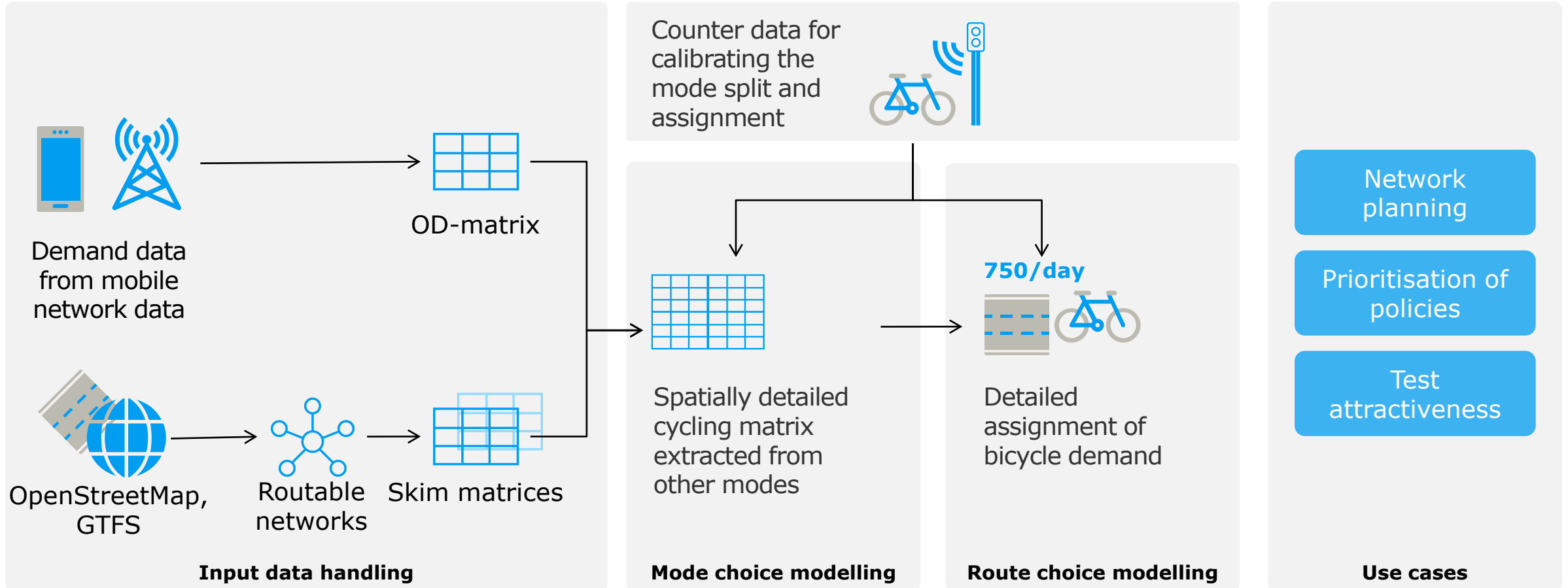
Park&Ride Strategy

A Park & Ride Strategy for the Central Finland Region to determine the Park & Ride locations and classify their significance.

Telia data were used in unison with individual-level transport demand modelling to determine the maximum potential of users that could use the Park & Ride to lessen their usage of passenger vehicles both on trips within the region and on trips that cross the region border.



Detailed cycling flow and route analysis in an instant



Out-Of-Home Advertising

Demand data from mobile network data (scaling of OD-matrix).

Calibration based on counter data.

High demographic granularity from the synthetic population.

Modelling complete trip chains for individual people beneficial for traffic flows.

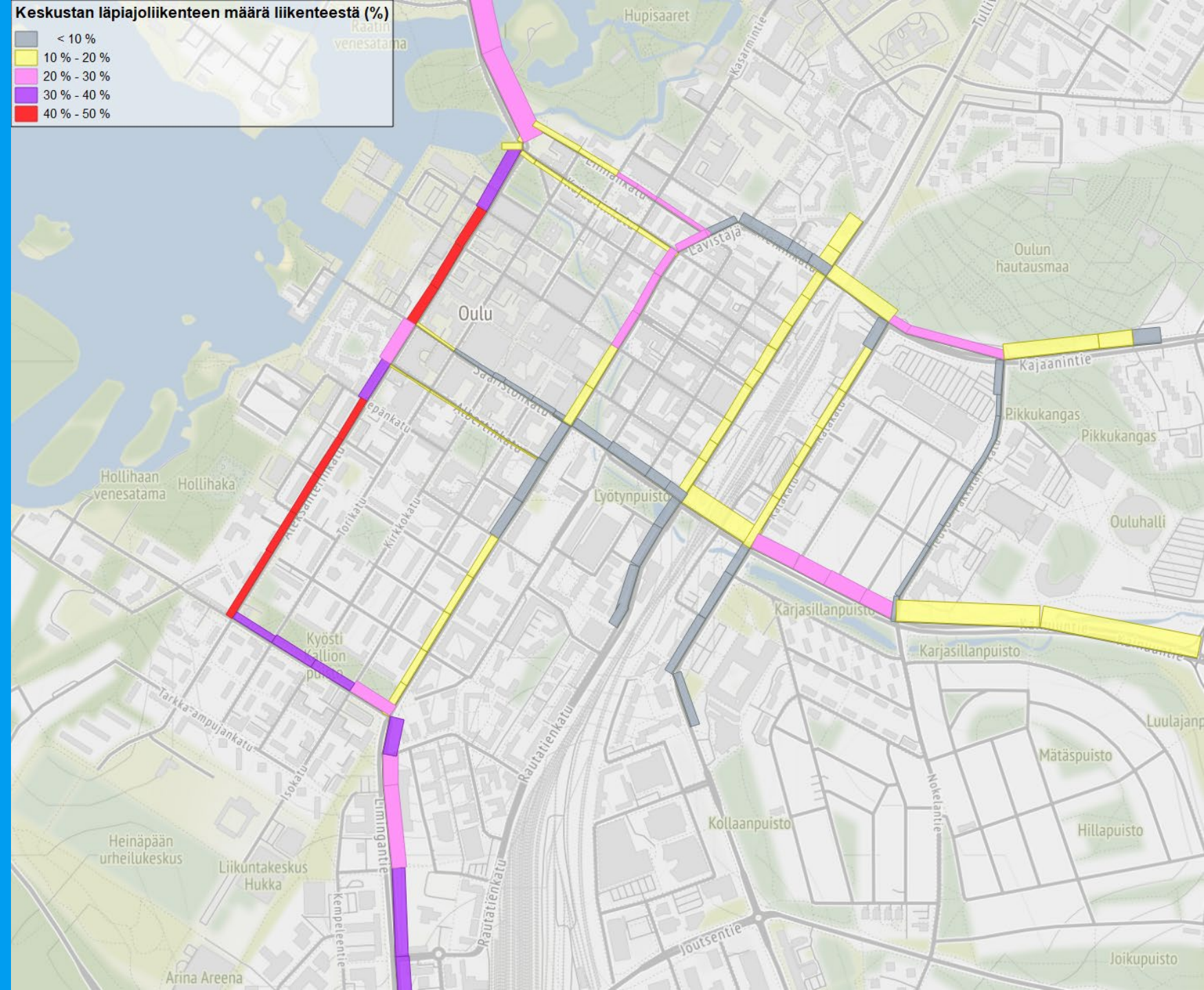


Through traffic analysis

New analysis method combining the use of various data sources (mobile network data, TomTom, traffic counts, PT-ticketing system) to recognise origins and destinations and used routes for through traffic.

Actions could be defined for rerouting and supporting use of sustainable modes for through traffic

Before and after analyses of implemented traffic management actions.

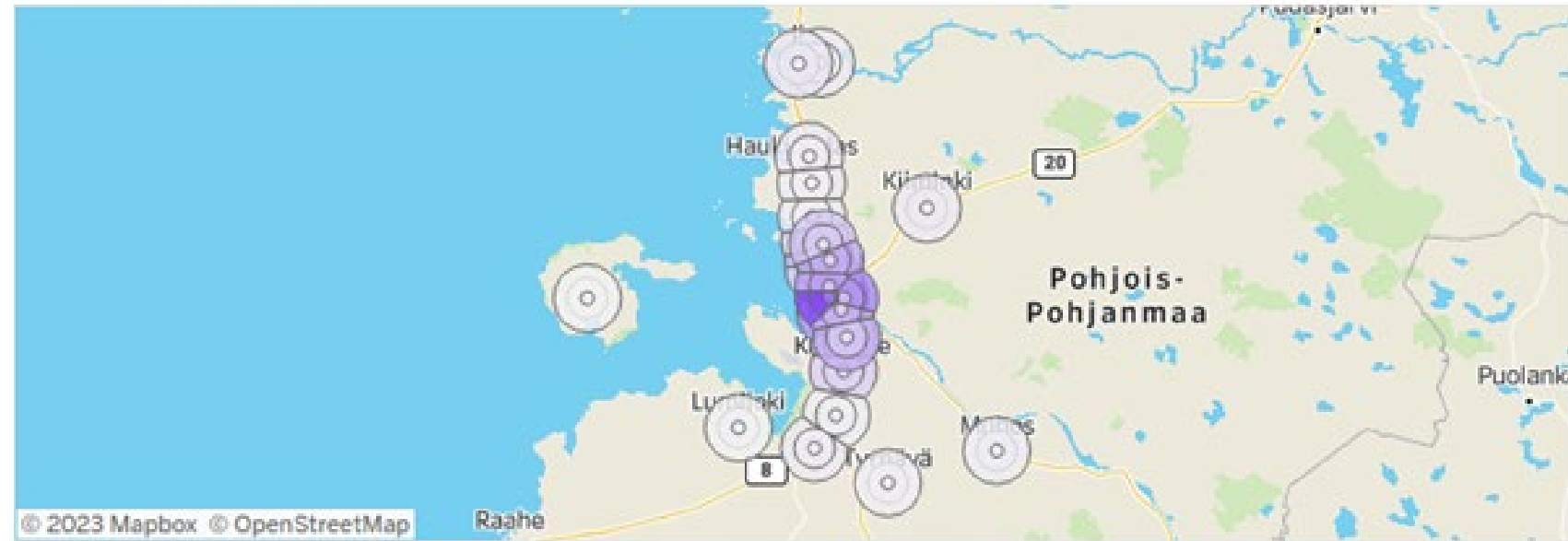


Customized Zones - Public transport demand analysis

Customized zones used to analyse Public Transport in a line level.

Example pictures from the demand analysis for tram and/or commuter train systems for the Oulu Region.

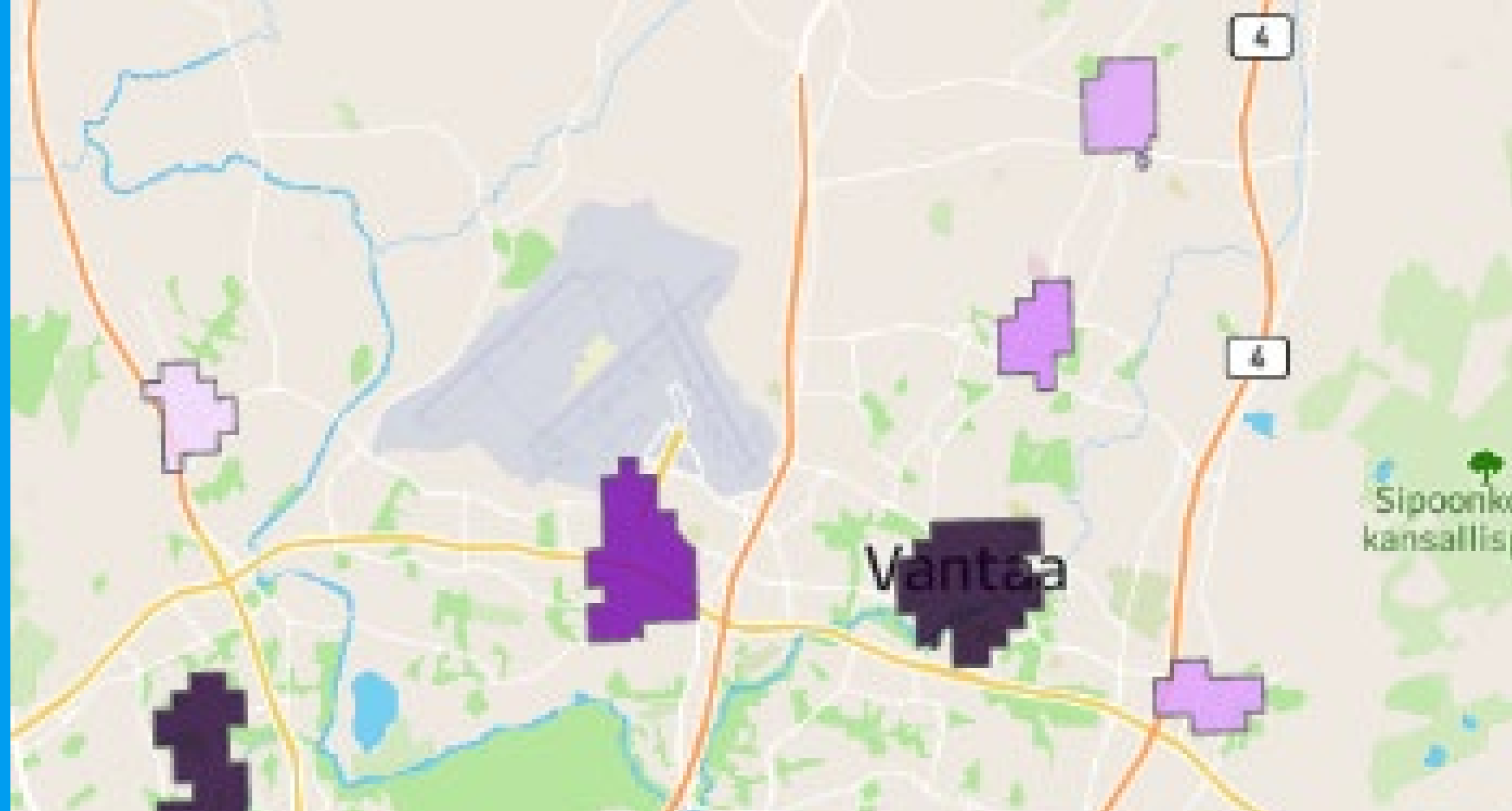
Destination Map



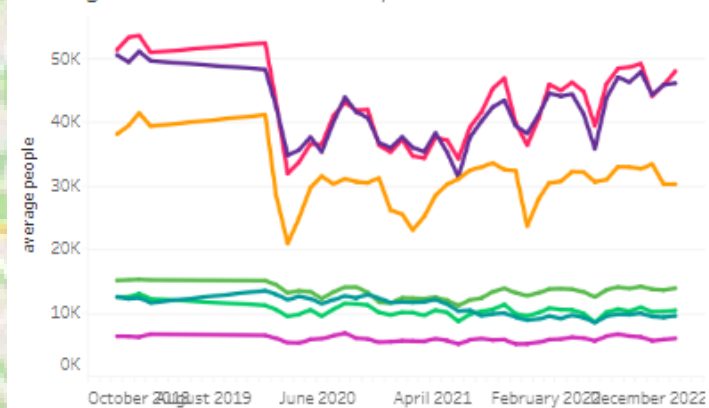
Customized Zones – Central Business District analysis

Customized zones used to
analyse Central Business
Districts in business-level.

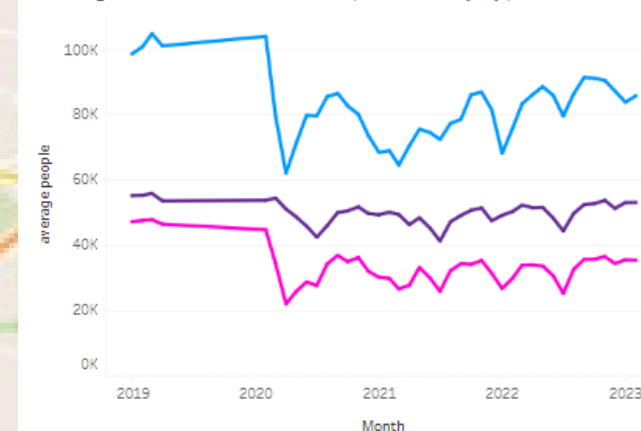
Example pictures from the
activity monitoring of local
centres of the City of Vantaa.



Average amount of activities per month



Average amount of activities per activity type



Dimensioning charging infrastructure at hospitals

Mapping the need for charging infrastructure in Region Zealand, Denmark, an analysis involving multiple data sources.

Focus on the number of guests who were not patients as the region had no data on this group. Mobile network data showed how large the group was, where the group came from and how long they stay at the region's properties.



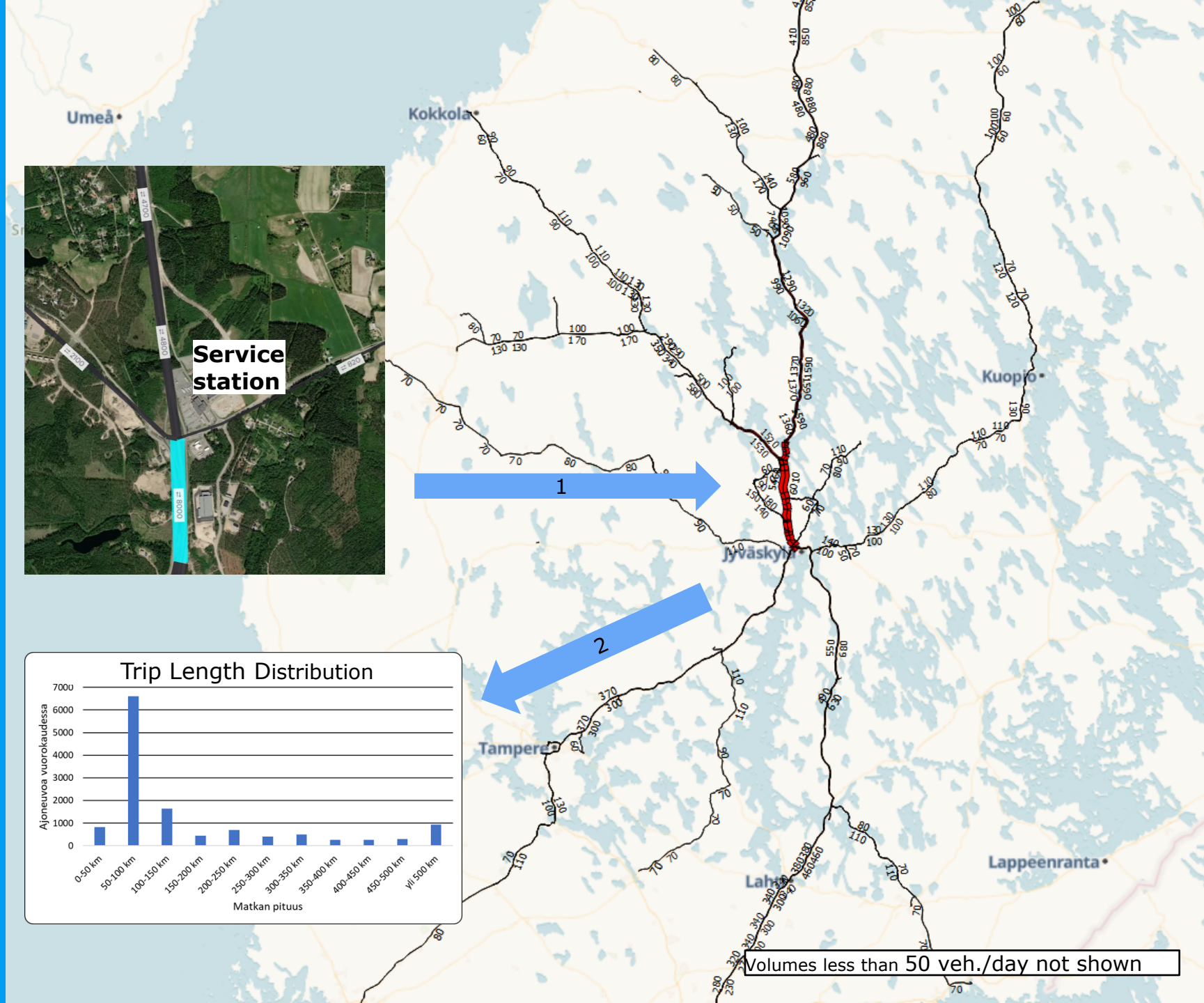
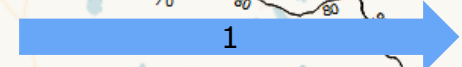
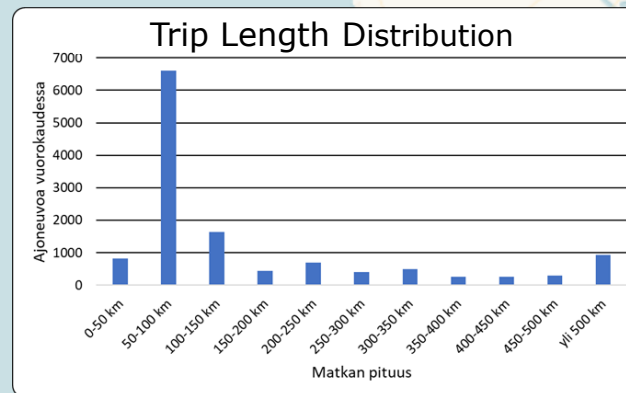
Virtual roadside interview

Challenge

Virtual roadside interview using mobile network data allows recognition of OD, home zone and seasonal and hourly distributions.

Direct analyses of trip length distributions, driven mileage at the selected location and the impact area.

Home zone allows for connection to open data sources such as household data, car ownership data, income classes etc.



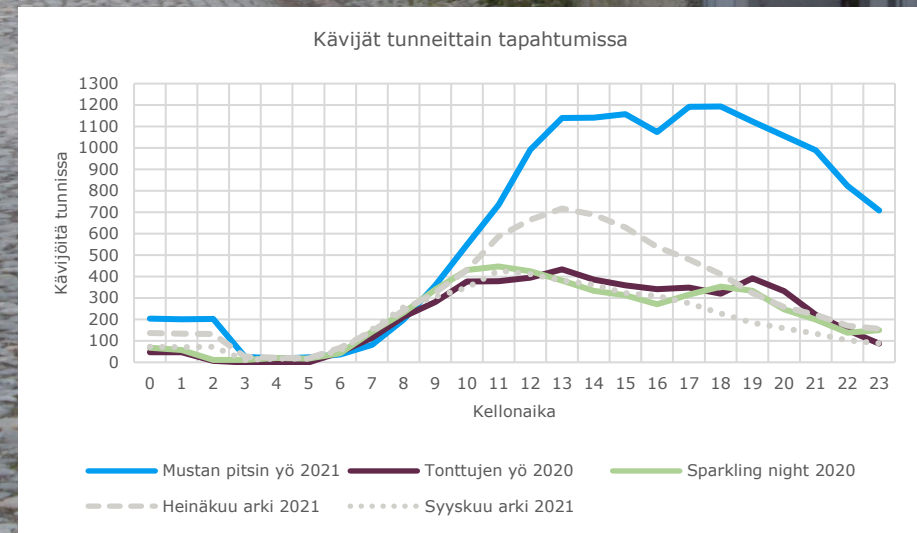
Volumes less than 50 veh./day not shown

Walking Strategy

Challenge

How and where locals and tourists are moving within old Rauma area, and how temporary pedestrianized zones are impacting the travel behaviour.

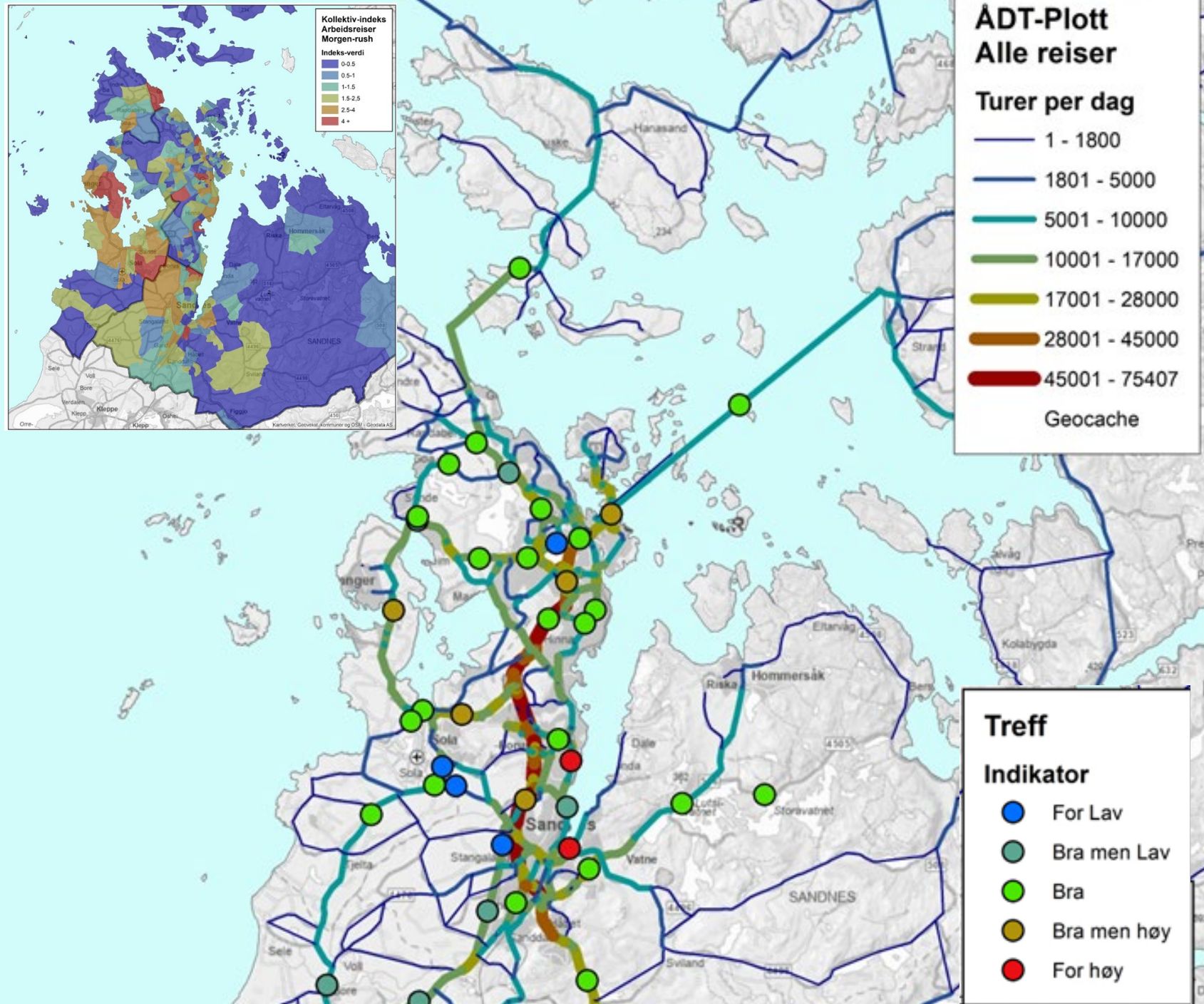
Telia mobile network data revealed that Old Rauma attracts visitors outside Rauma especially during periods when pedestrianized zones are activated.



MobTrans approach in Norway

MobTrans uses the OD-matrixes from the Norwegian Regional Transportation Models (RTM) to disaggregate the Telia data into five different modes and trip purposes.

Example projects: Mobility and Land-use in Tønsberg (2021), Mobility and Land-use in Arendal Region (2022), Mapping the public transport potential in Stavanger Region (2023).

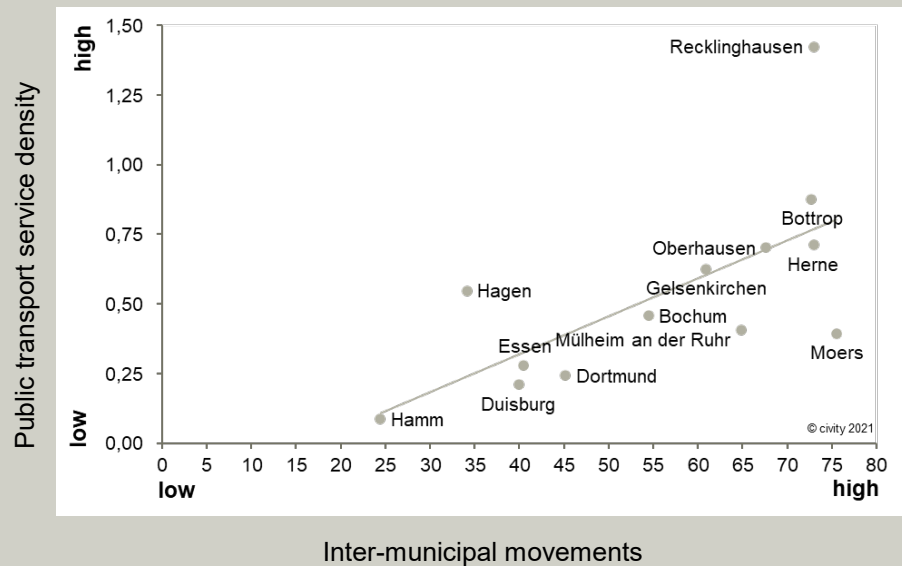


Use Cases in Germany with Teralytics data

Building an understanding of the study area and spatial interdependencies

Aims of analysis was to understand

- › The interdependencies between the different spatial area
- › How movement patterns differ between rural and urban areas
- › The temporal aspect of movements between different spatial areas
- › How the movements relate to the public transport service



Derive a probable demand for our on-demand simulation and other analytics

Aim was to derive traveling behaviors between space units to identify potential demand and temporal and spatial distributions.

Mobile network data intersect with other data like operational data from on-demand mobility systems and journey planner enquiries.

The outcome (demand data) is used to route public transport and car traffic to determine competitiveness and to calculate the operating figures and profitability from on-demand mobility simulation cases.



Use Case 1 – Building an understanding of the study area

The analysis of mobile phone movements shows very different movement patterns between day and night

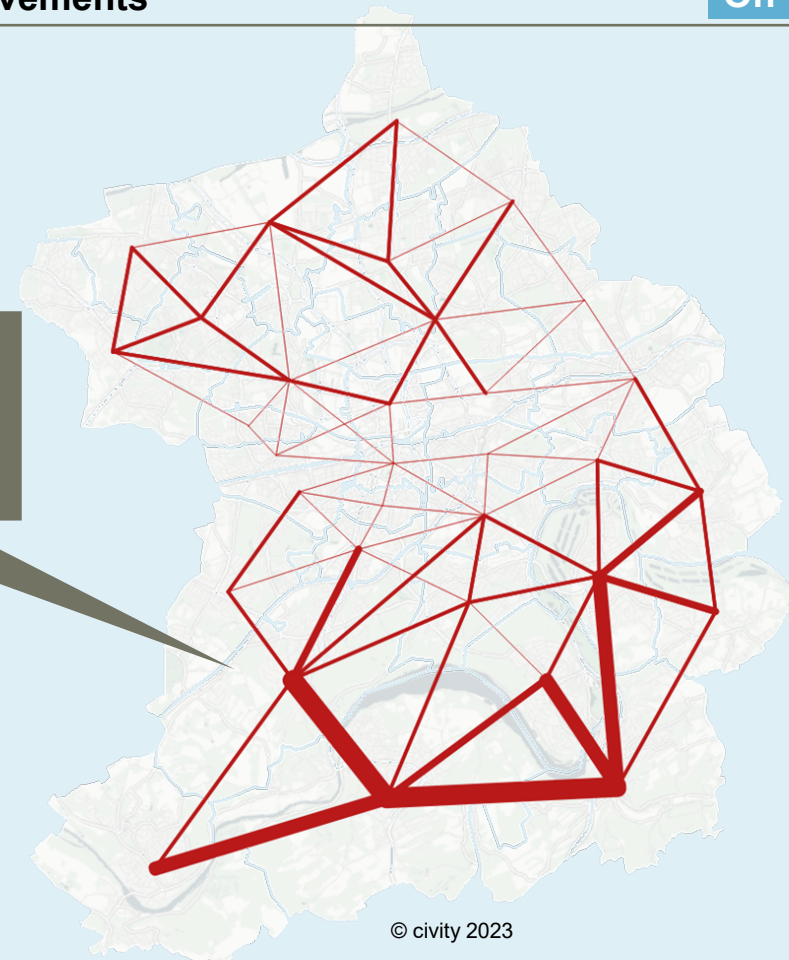
Hourly movements

Peak time

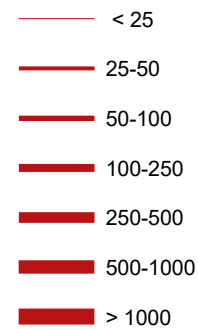


Hourly movements

Off-peak time



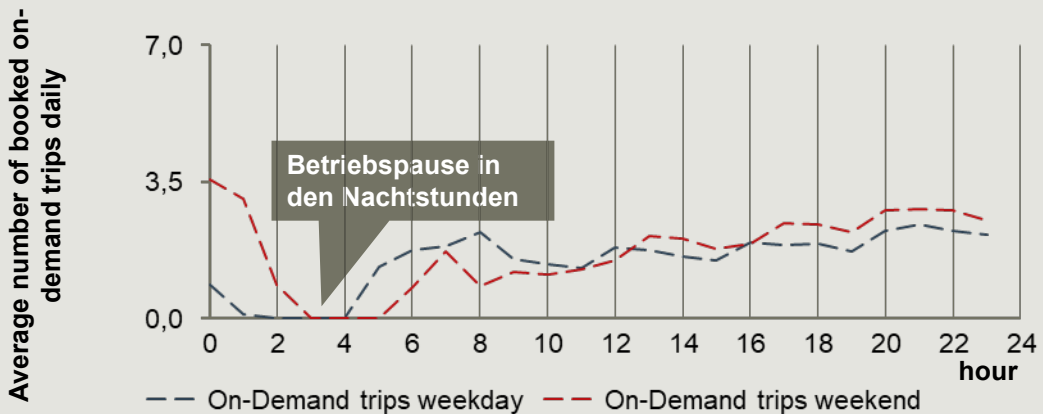
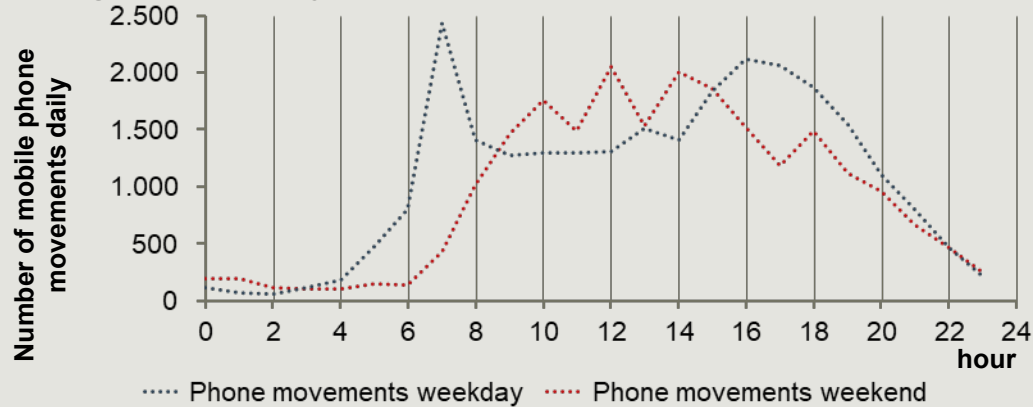
Anzahl der Bewegungen pro Stunde¹:



Source: Teralytics mobile network data 2021

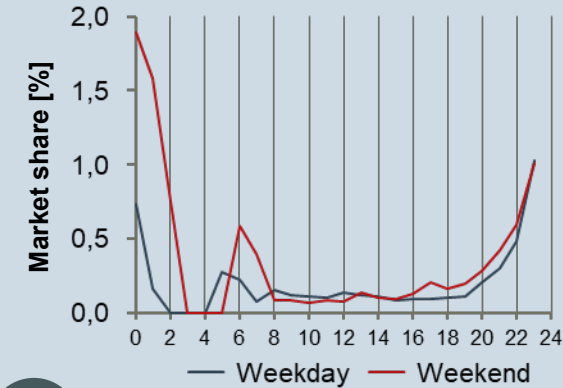
Demand is modeled based on telephone movements and on-demand trips from comparable cities

Analysis of phone movements and on-demand journeys throughout the day



Market share of on-demand trips

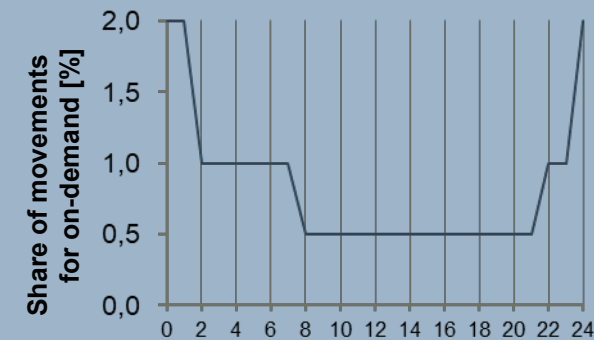
- The market share of on-demand trips is derived from the two data sets on the left
- The market share is significantly higher in the evening and at night
- A strong morning peak can be seen at weekends



Final demand

Additional assumptions for the demand for on-demand transportation:

- Constant demand at night when public transport service is available
- No differentiation between weekday and weekend



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