

Person-based simulation of mobility and traffic for the city of Hamburg

Daniel Krajzewicz, Antje von Schmidt

German Aerospace Center (DLR), Institute of Transport Research, Berlin (Germany)

TAPAS

TAPAS is an agent-based demand model. It calculates the movement of each person in a modelled region during a usual working day. Each person is represented in TAPAS by different socio-demographic attributes, including:

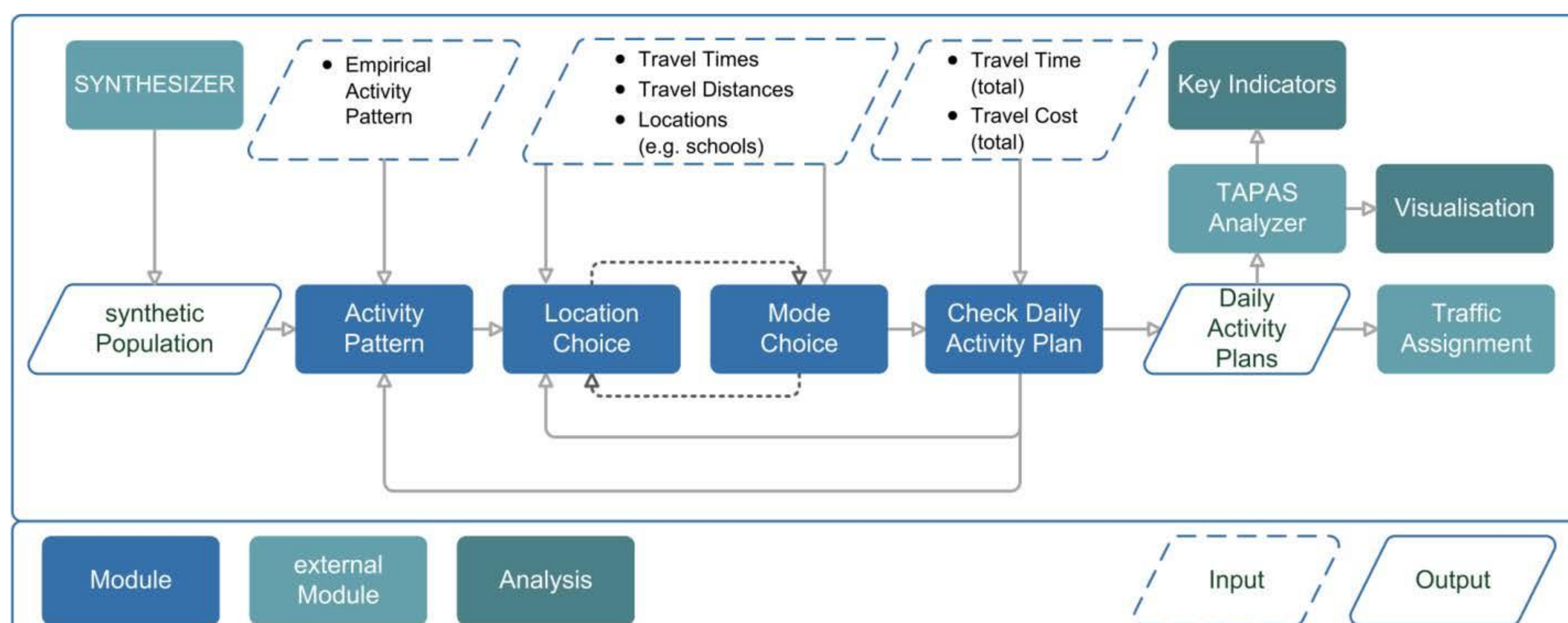
- age,
- sex,
- employment status,
- availability of a public transport subscription and of a driver license,
- availability of mobility options, such as an own car or an own bike.

Individuals are assigned to households that share resources such as available cars.

The output of a TAPAS run consists of so-called trip chains for every simulated person. A trip chain describes how the person was mobile during the day. The following information, among other, is provided for each trip:

- departure time,
- trip duration,
- used mode of transport,
- activity at destination,
- activity duration.

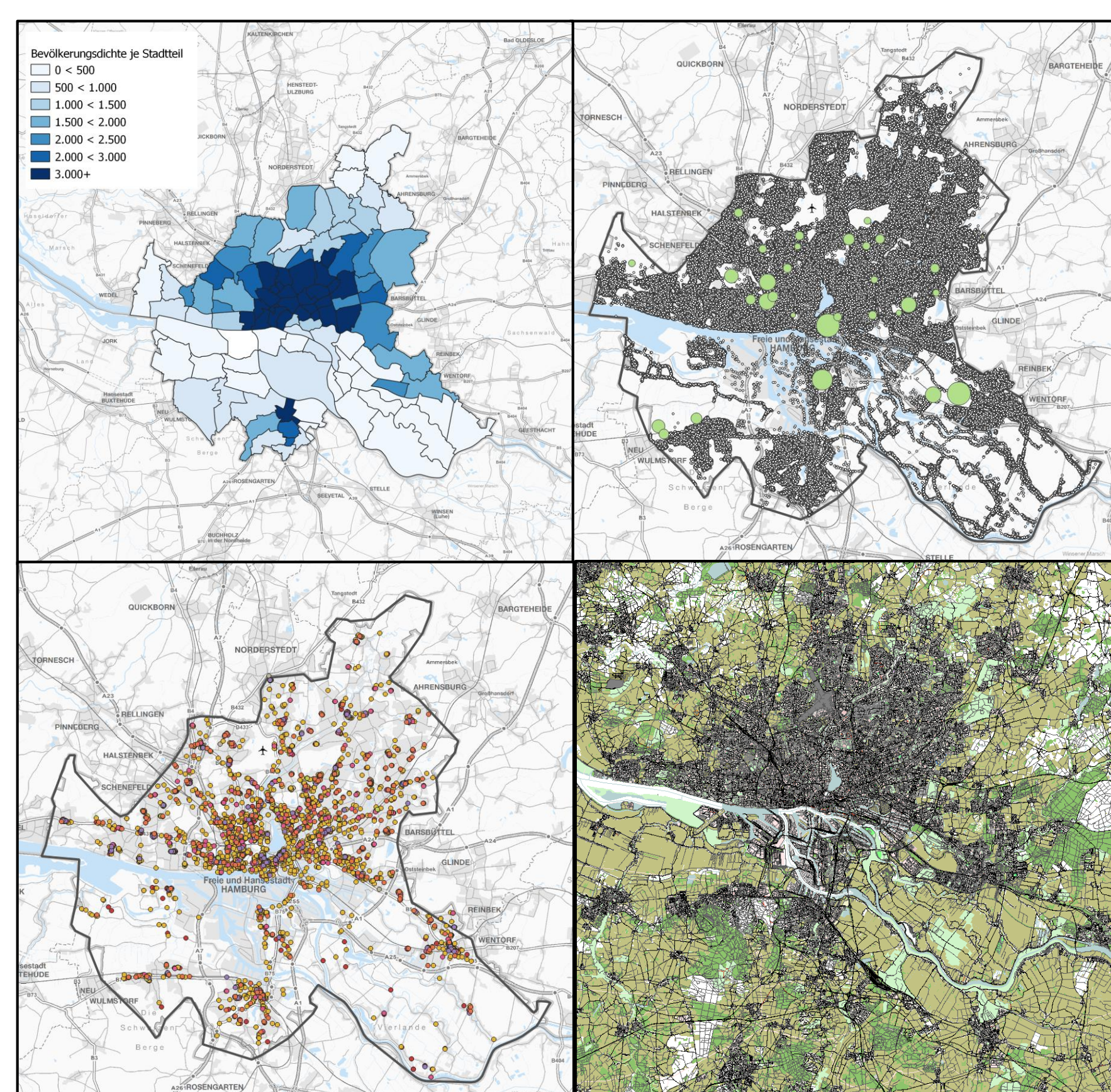
TAPAS workflow.



Scenario preparation

According to the fine granularity of the representation of the population, a lot of information needs to be collected and calculated for modelling an area, including:

- the socio-demographics of the population and the availability of mobility options,
- the transport system performance in terms of travel times, distances and prices for public transport,
- the locations of places where different activities can be carried out.



A subset of the information required for calculating the mobility of the population using TAPAS. Inhabitants per city district (top left); new buildings in 2030 (top right); shopping locations (bottom left); road network modelled in SUMO (bottom right).

Measures

Within the project ELK, the simulation settings for calculating the traffic in the city of Hamburg for the years 2019 and 2030 were generated. Different measures will be simulated in subsequent project steps.

Since TAPAS is sensitive to a large variety of influences – prices, travel times, mobility offers, etc. – it can be used to predict the effects of different measures. In previous applications, it has been used to simulate

- changes in public transport prices, e.g. the introduction of free public transport,
- the introduction of feeder shuttles to mass public transport lines,
- spatial restrictions for using private vehicles,
- changes in speed restrictions,
- effects of introducing automated vehicles.

Additional investigations

The trip chains generated by TAPAS can be processed by the open source simulation “SUMO” to obtain vehicle trajectories. Such trajectories can be used to calculate noise levels and the vehicle emissions within the simulated area.

Open source

TAPAS is available as open source. You can find the software and the documentation at:



<https://github.com/DLR-VF/TAPAS>