ANALYSING LONG-DISTANCE TRANSPORT: SIMULATING POLICIES TO REDUCE DOMESTIC AIR TRAVEL IN AN INTERMODAL TRAVEL DEMAND MODEL FOR GERMANY

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Agenda

Idea & current status

Building the model

Scenarios

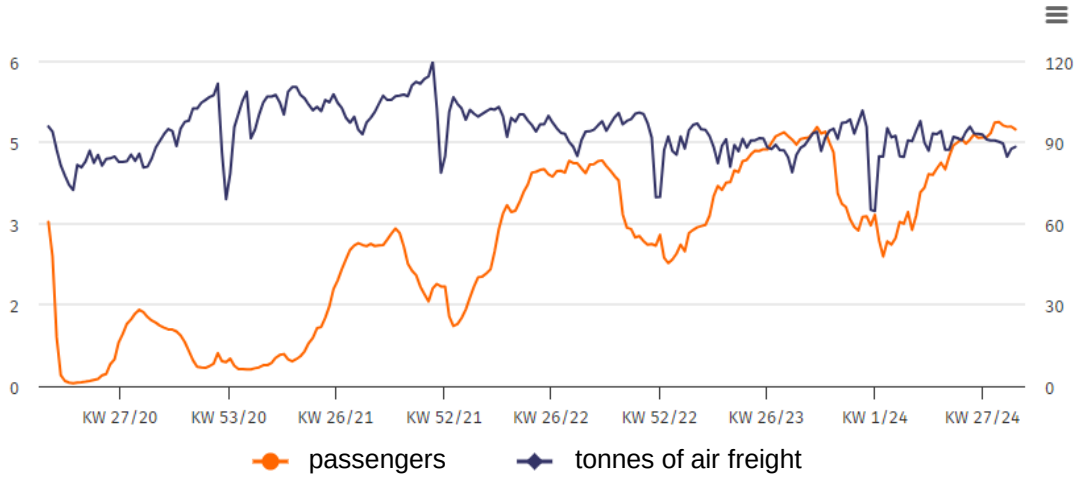
Summary & future work

Motivation

- Transport sector is responsible for a large share of greenhouse gas emissions
- Air traffic tax increased every year since 2020 (over 100% for short flights)
- Still every seventh short flight is a German domestic flight

Air traffic in Germany[1]

Air traffic in million passengers (left axis), air freight in thousand tonnes (right axis)



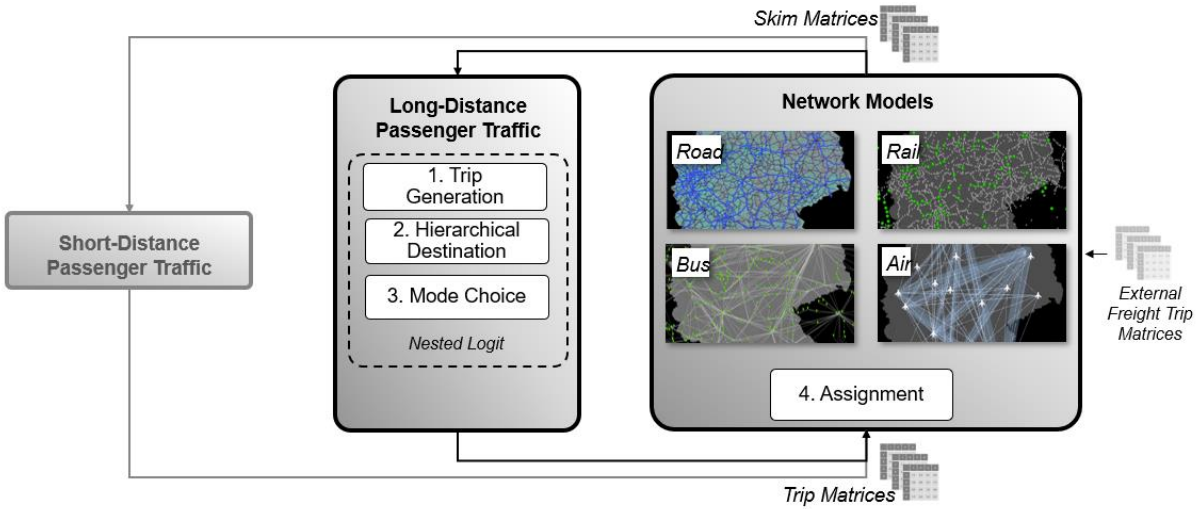
[1]Flugverkehr Deutschland - Dashboard Deutschland

What we work with

DEMO – Germany Model

- 4 step model
- **Macroscopic** travel demand model
- Spatial granularity:
  - Short-Distance ~7.000 traffic analysis zones (TAZ)
  - Long-Distance ~400 traffic analysis zones (TAZ)
- **Multi-modal** model where all modes are considered
- Temporal granularity: estimation of average working day
- Synthetic model, validated and calibrated[1]
  - NHTS MiD 2017, value of time study[2]

Short & long-distance traffic



[1] Winkler, Christian; Mocanu, Tudor (2017): Methodology and Application of a German National Passenger Transport Model for Future Transport Scenarios. In: Proceedings of the 45th European Transport Conference.
[2] Ehreke, Ilka; Hess, Stephane; Weis, Claude; Axhausen, Kay W. (2015): Reliability in the German Value of Time Study. In: Transportation Research Record 2495 (1), S. 14–22. DOI: 10.3141/2495-02.

Things we can and things we would like to do

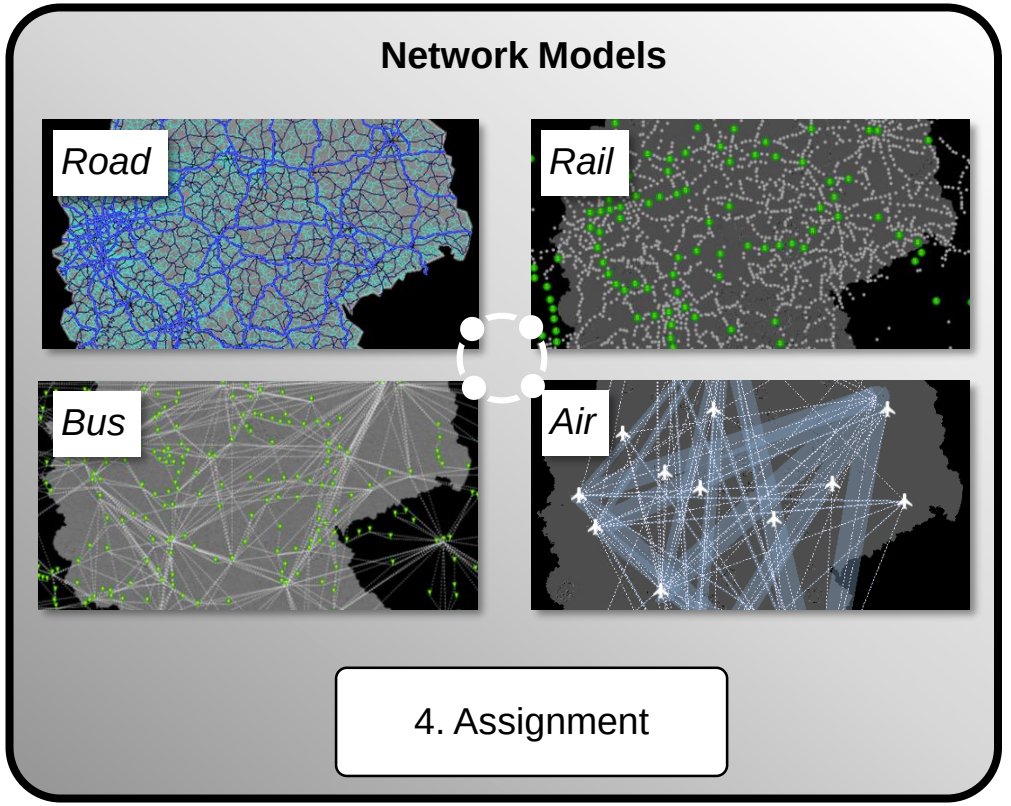
Can

- Mapping changes in structural and socio-economic characteristics of Germany and its regions
- Forecasting travel developments and evaluating the effects and impacts of policy measures and new services

Would also like

- Mapping of the intermodal route from origin to destination

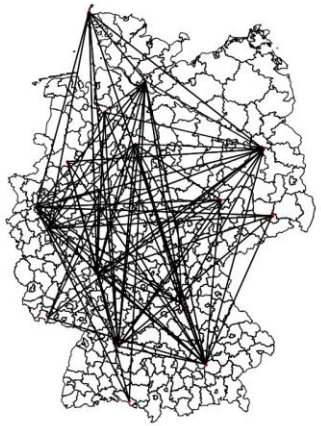
→ Better recognition of interactions with different policies



- Create and connect network models for different modes of transport for long-distance travel
- Enable interchanges between modes
- Enable simulation of infrastructure changes and changes in transport services

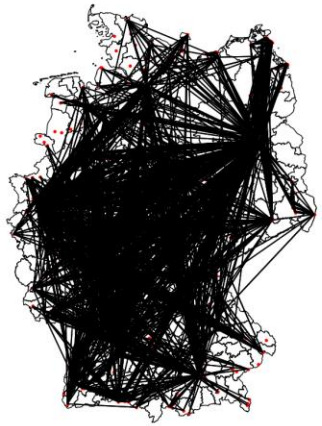
Preparation of the transport network model

TAZ from DEMO



DLR – LV (Institute of Air Transport)

GTFS data

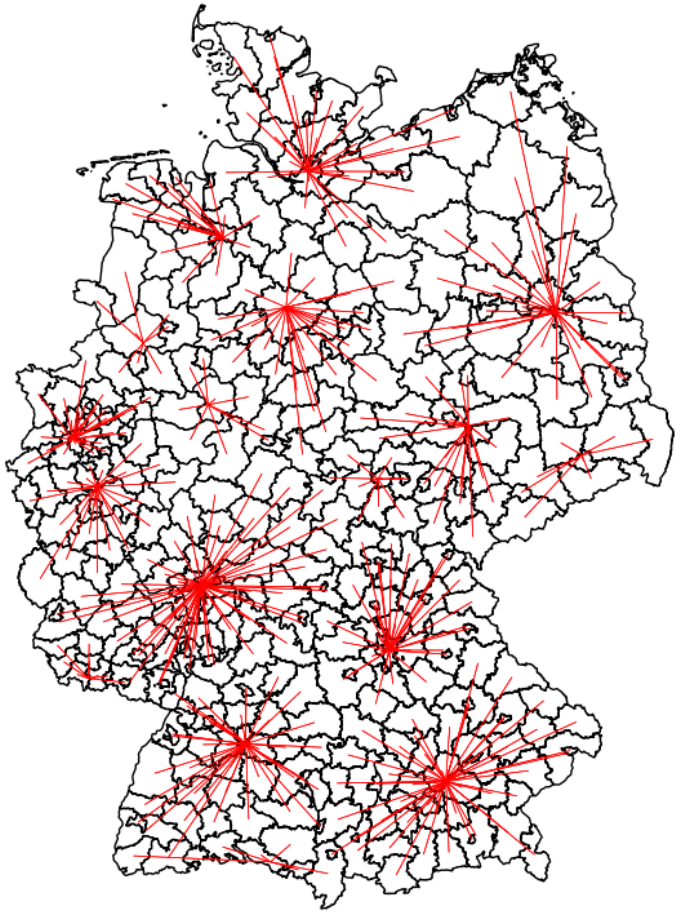


Flixbus GTFS data

Connecting all networks

1. Connecting the TAZ with the hubs
   - Each TAZ is connected to exactly one airport, long-distance bus station and long-distance railway station
2. Connect all hubs that are directly accessible in a mode with each other
   - to find the connections, routing is done on the gtfs data
3. Hubs of different modes that are close to each other are connected to each other to allow for transfers

Step 1:



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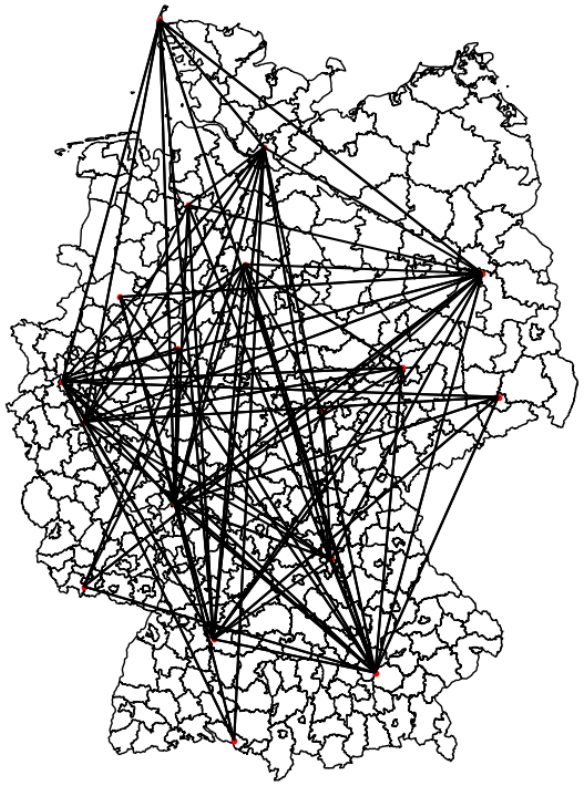

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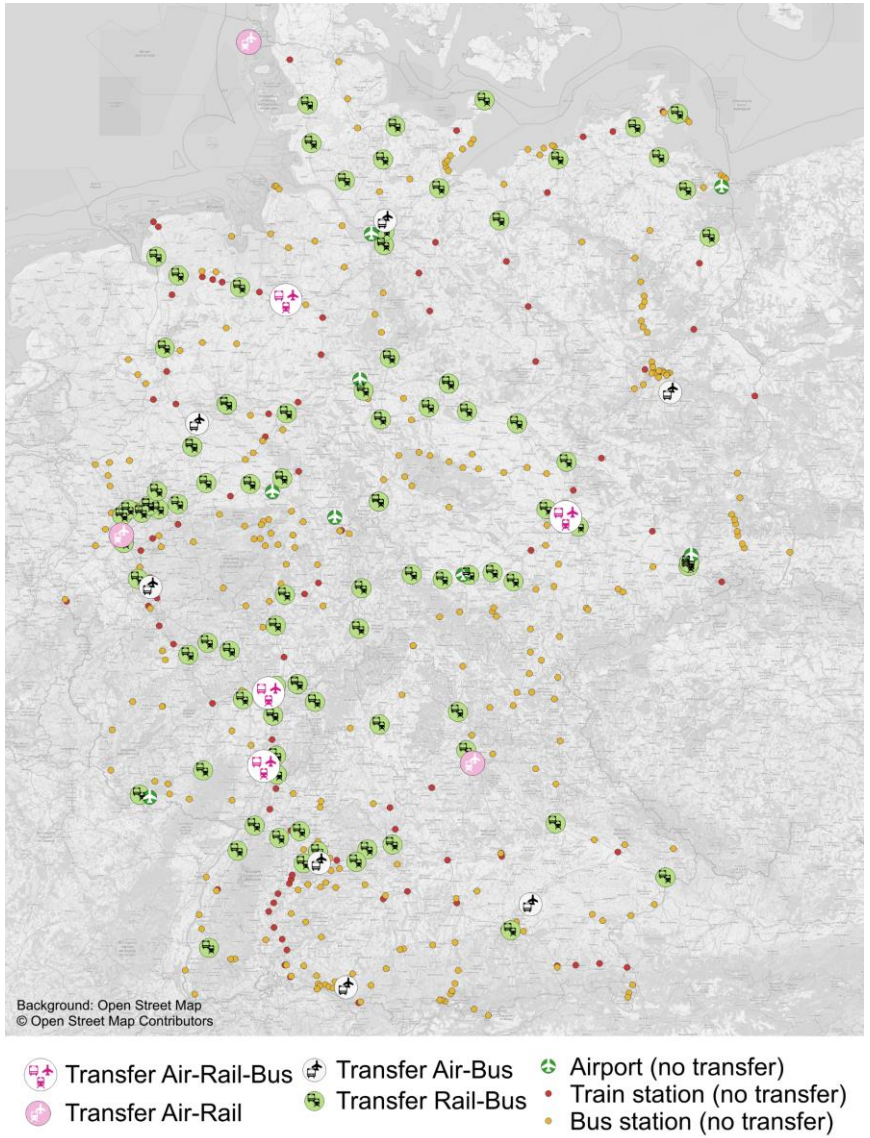
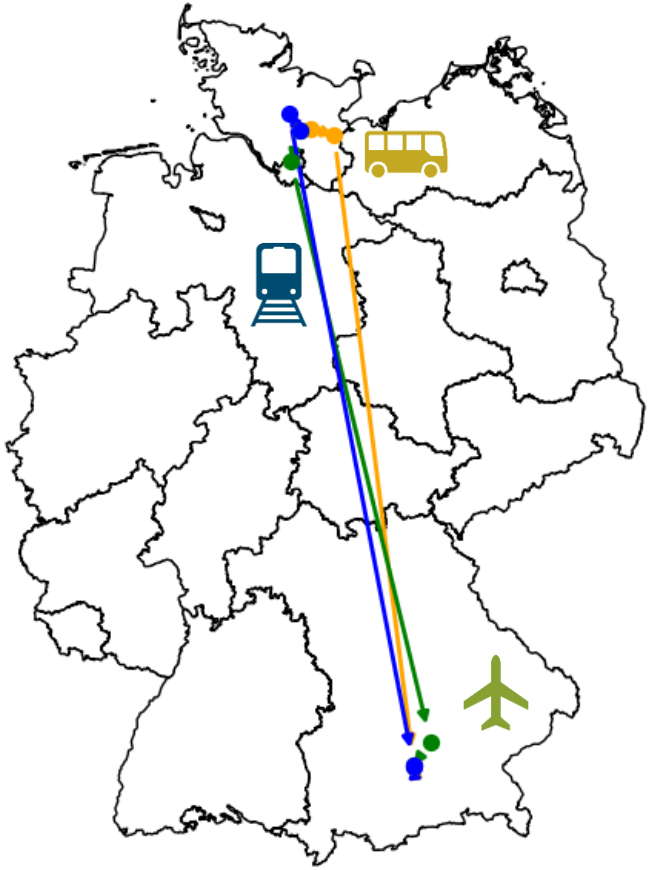
Step 3:



Intermodal routing and demand distribution

1. Calculation of the k best routes from each TAZ to each other in the network
   - Several routes are calculated to deal with finding very similar routes
2. Choose the best route for every mode
   - The main mode is the mode with the longest distance travelled
3. Distribution to the best route from each mode if a route for that mode was found
   - Distribution is based on the generalised cost



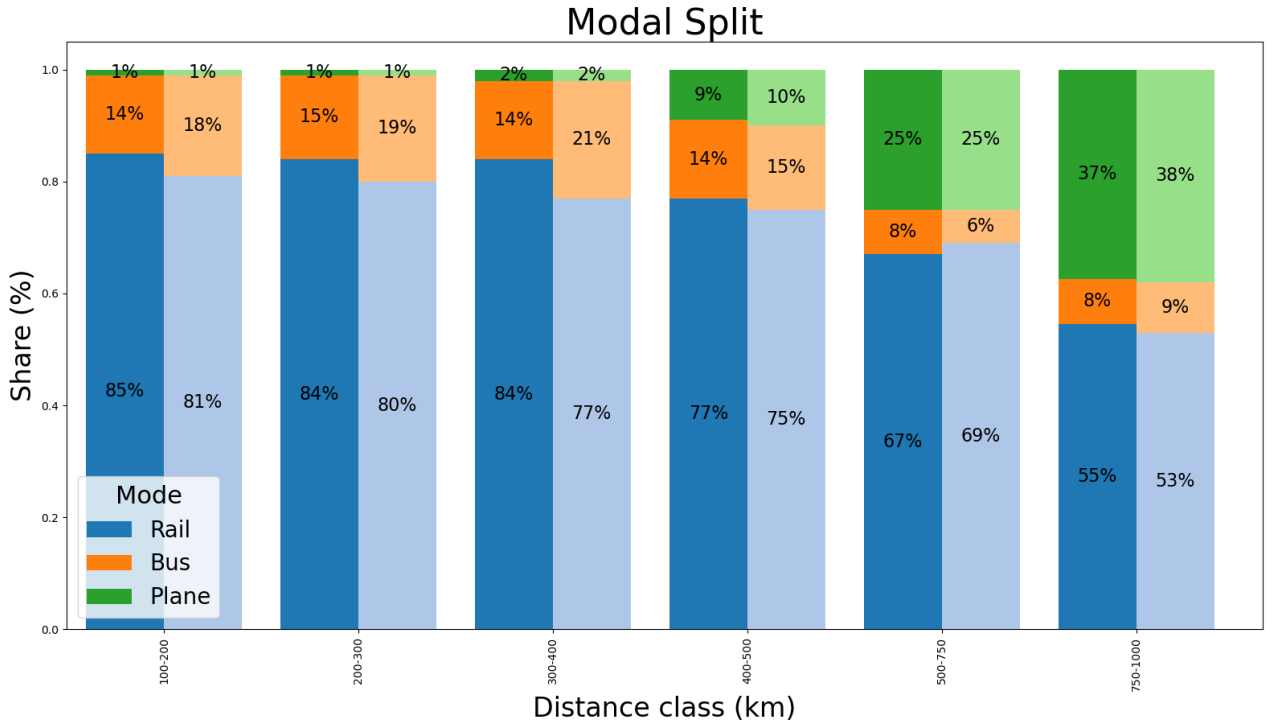
What the real world looks like

MID (Mobility in Germany)

- collect representative and reliable data on the socio-demographics of individuals and households as well as their everyday traffic over the course of a year

Share of intermodal trips

- MID: 6.34%
- Model: 5.18%



Id	Train	Bus	Plane	Train+Bus	Plane+Train	Plane+Bus	Plane+Bus+Train
MID	73.1%	11.5%	9.2%	3.2%	2.5%	0.3%	0.1%
Model	74.1%	16.9%	3.8%	4.2%	0.9%	0.1%	0.0%

Some possible policies

Increased Air Tax	• Continuing the trend of increased taxes in order to further increase the pressure on short flights in particular
Sprinter	• New direct connections without intermediate stops, this should make it possible to use these rail connections for the main route and, if necessary, to change trains for fine distribution
Shuttle Service	• A shuttle service to long distance bus and train stations will be set up to make it more attractive to use buses and trains for the final journey

Some possible policies

Increased Air Tax

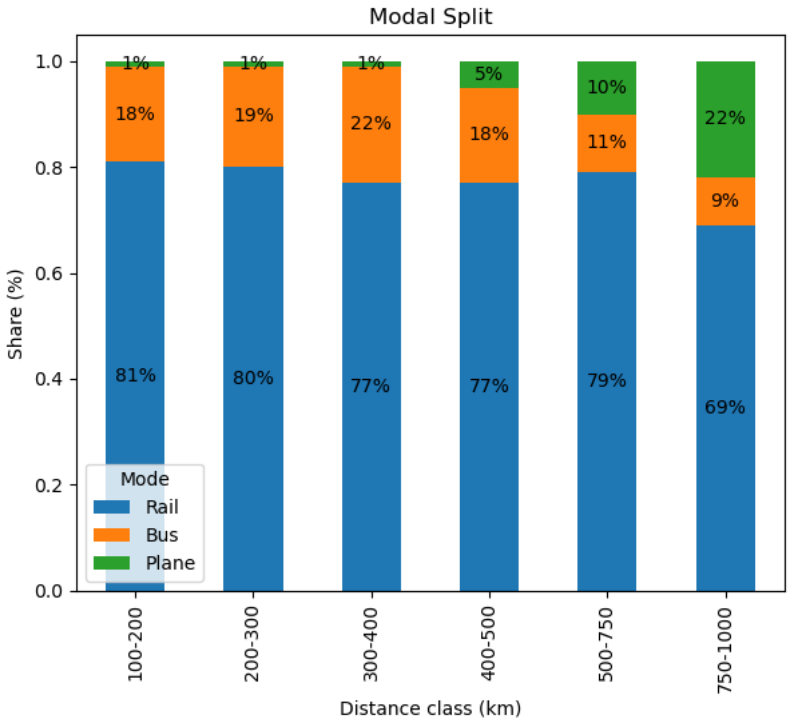
- Intermodal 5.48%
- Average cost +2.6%

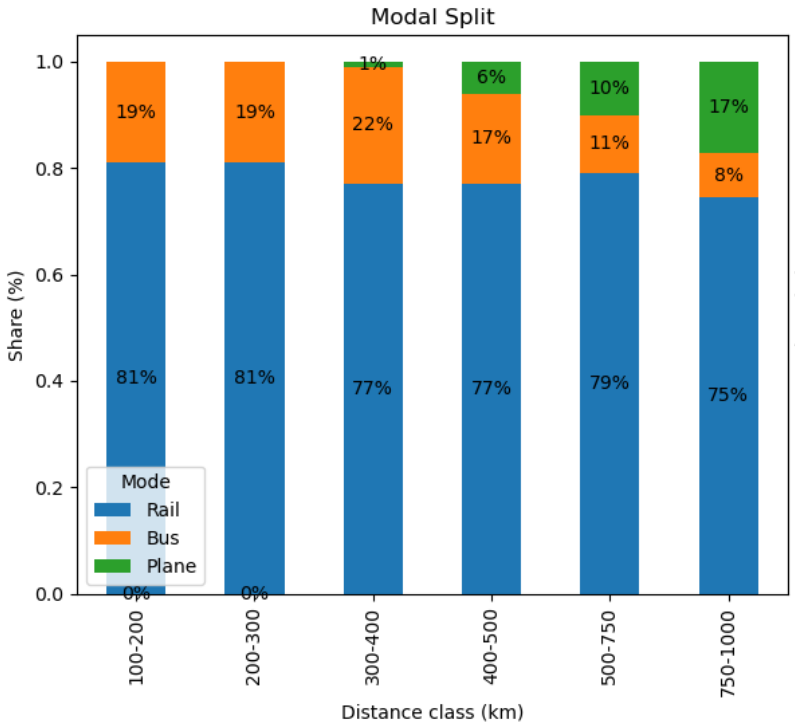
Sprinter

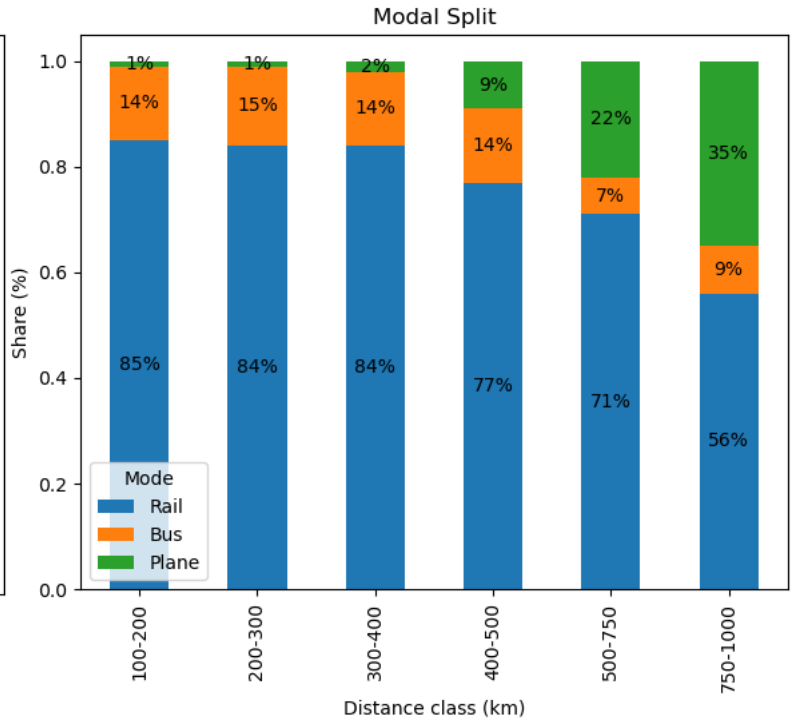
- Intermodal 5.23%
- Average cost -3.3%

Shuttle Service

- Intermodal 5.18%
- Average cost -2.7%

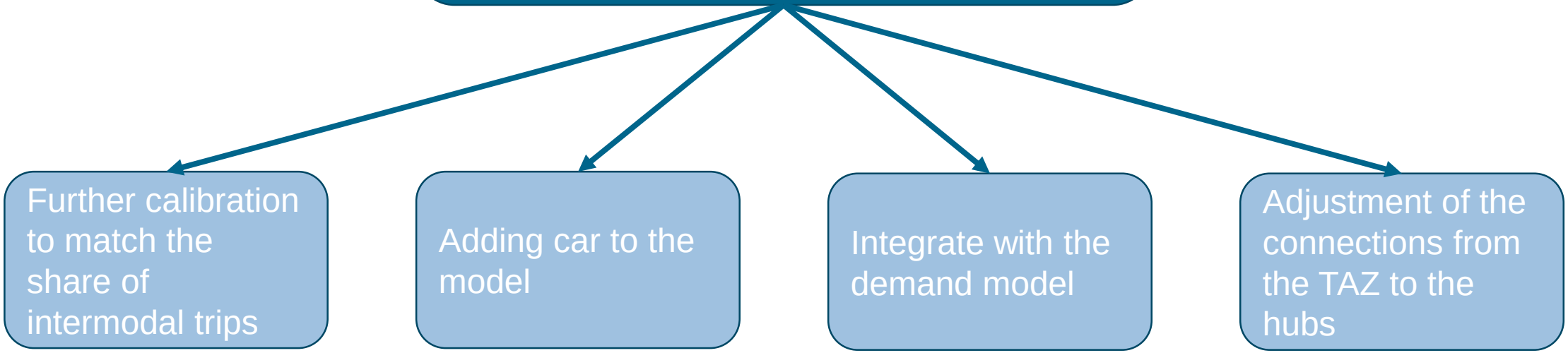






What we have now and the next steps

- Successful implementation
- Model for origin to destination intermodal routing in long-distance transport
- Reactive to policy changes



Imprint

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