What does data tell you? – insights from a carpooling dataset

mobil.TUM 2024

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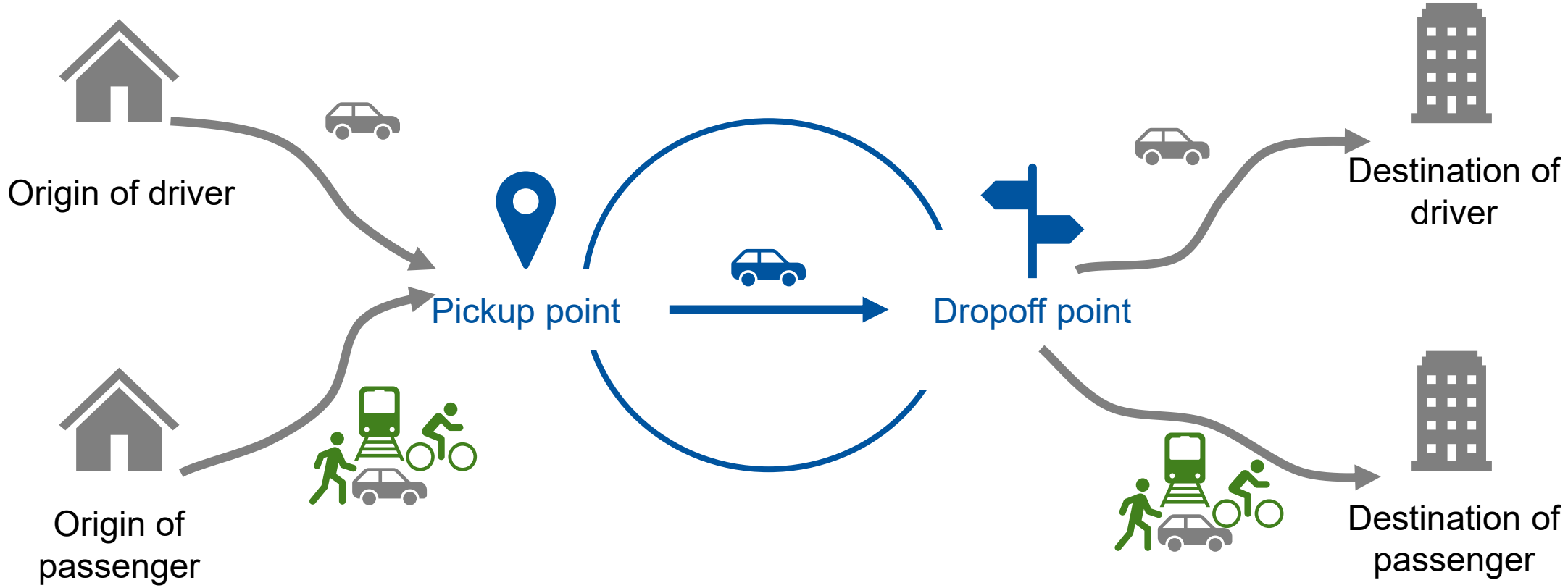
Ridesharing and Carpooling

- Carpooling describes private individuals who share a ride in a private vehicle.
- “Classic” form of ridesharing often with cost sharing schemes or arrangements.
- Has been an important commuting option, especially in the U.S., but is in steady decline.
- Smartphones enable new forms of ridesharing such as ridehailing or ridepooling and potentially enable a renaissance of classic commuter-oriented carpooling.

Elements of carpooling events

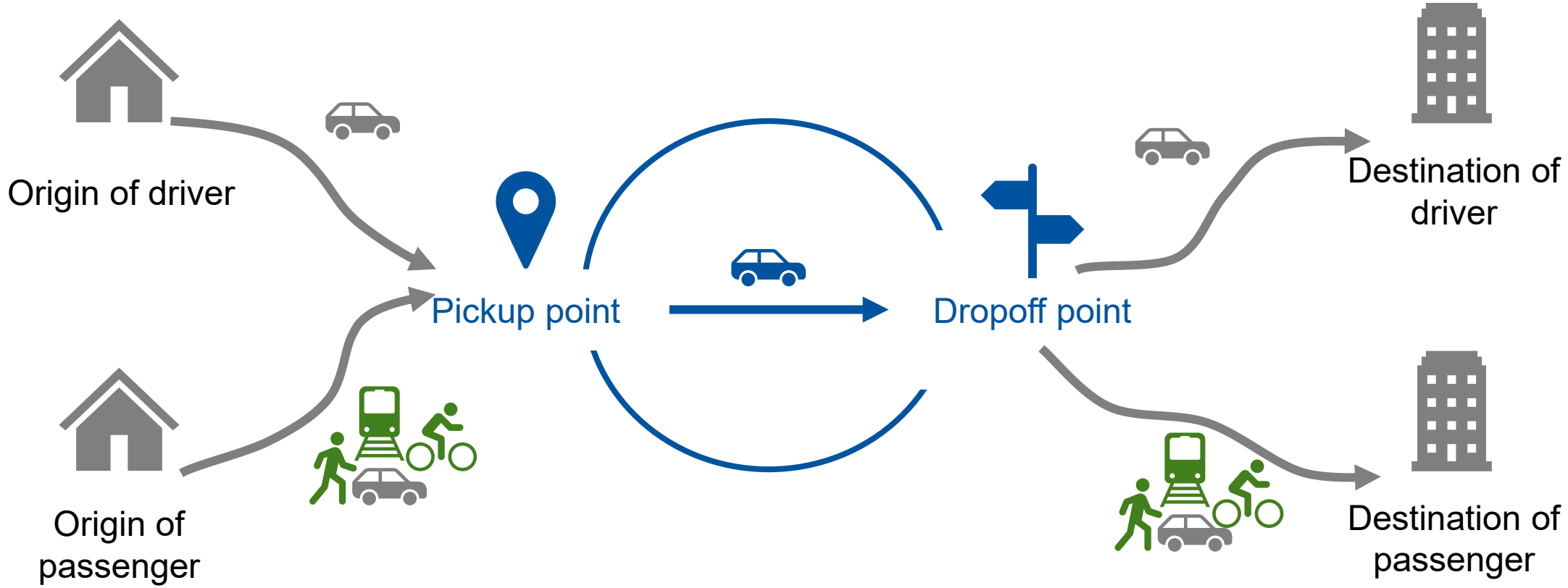


Dataset and attributes

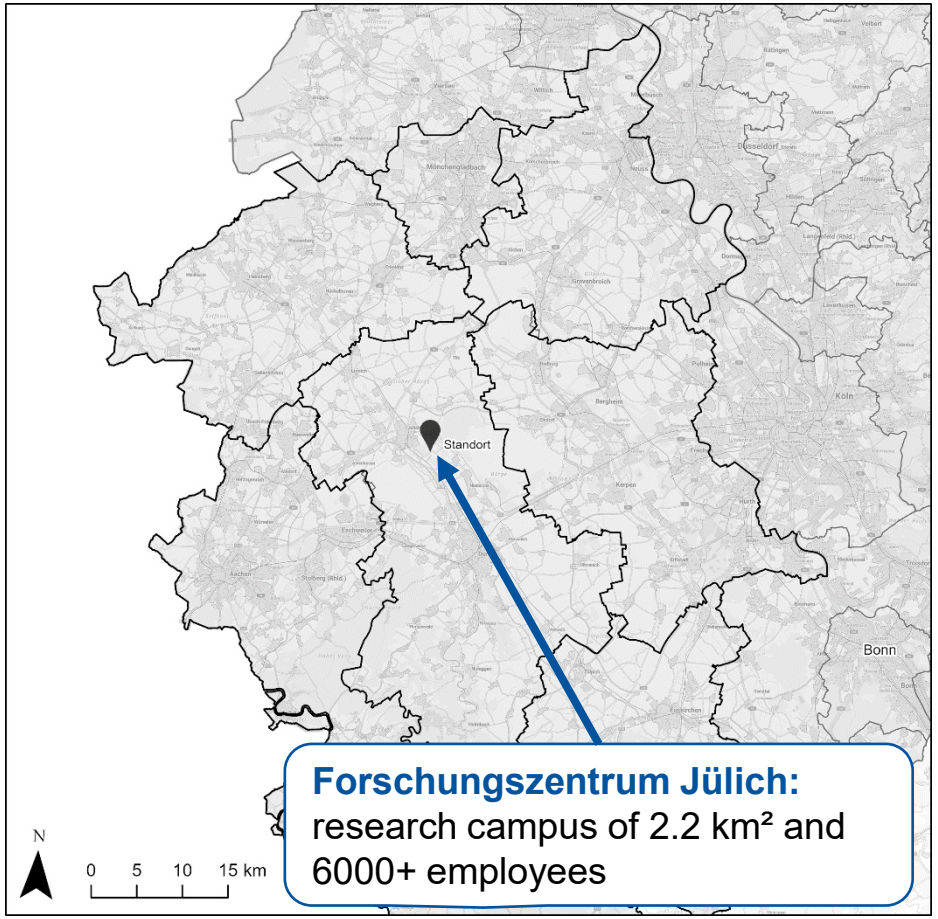
- The basis of the analyses forms a data set of the carpooling app provider goFLUX Mobility GmbH (2023) with about 6,000 carpool trips for the use case “Forschungszentrum Jülich”.

id	time	coordinates		demografics
driver id		driver origin	driver destination	age, gender
passenger id		passenger origin	passenger destination	age, gender
match id	estimated pickup time	pickup point	drop off point	

Elements of carpooling events

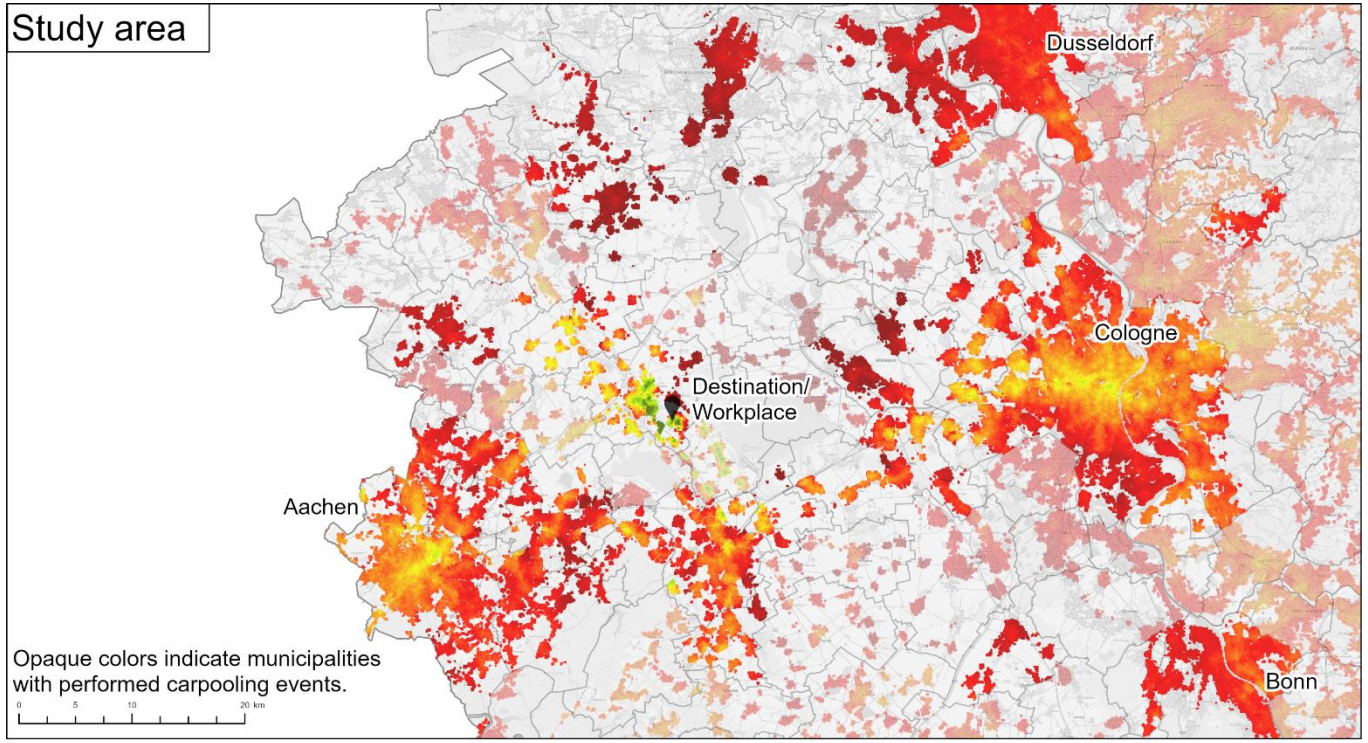


Study region



Study region and dataset

Use case



Travel time ratio (public transport to car)

1.0	1.5	2.0	2.5	3.0
1.1	1.6	2.1	2.6	3.1- 4.0
1.2	1.7	2.2	2.7	4.1- 5.0
1.3	1.8	2.3	2.8	>5
1.4	1.9	2.4	2.9	

Settings:
PT: ideal connection starting
within time window from 15:30 to 16:30
Car: travel times in an uncongested network

Datasources:
BKG, AVV, VRS, VRR, OSM

Basemap:
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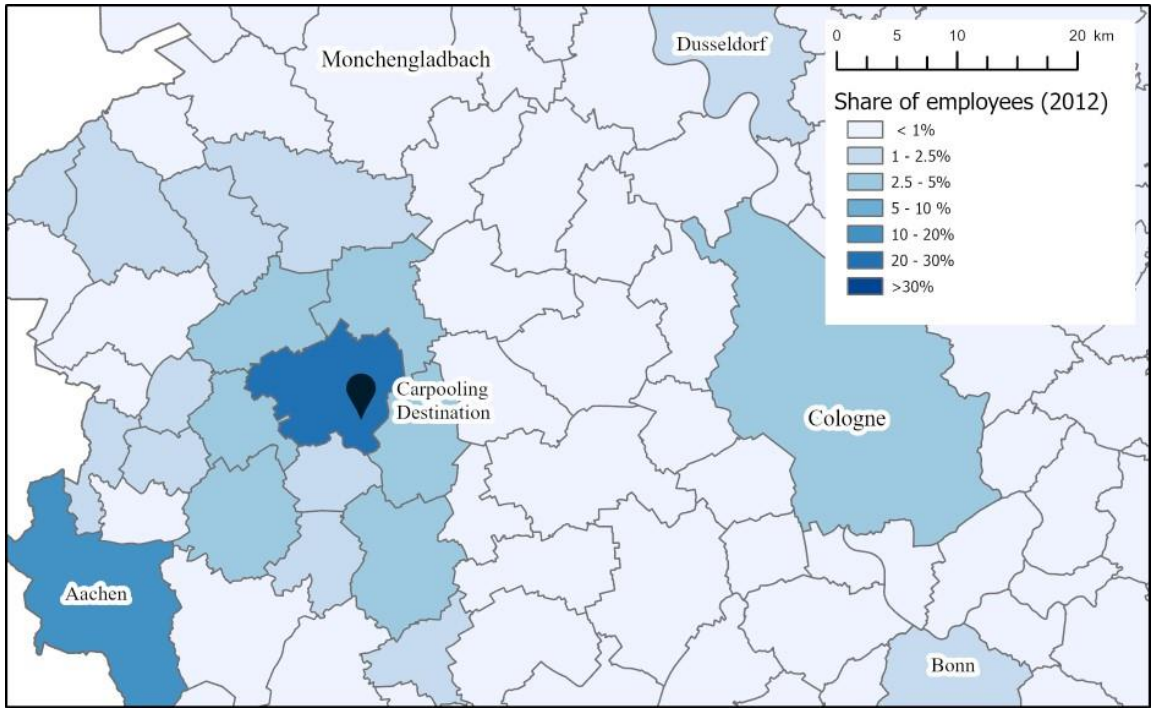
Use case

Residential location of employees in 2012

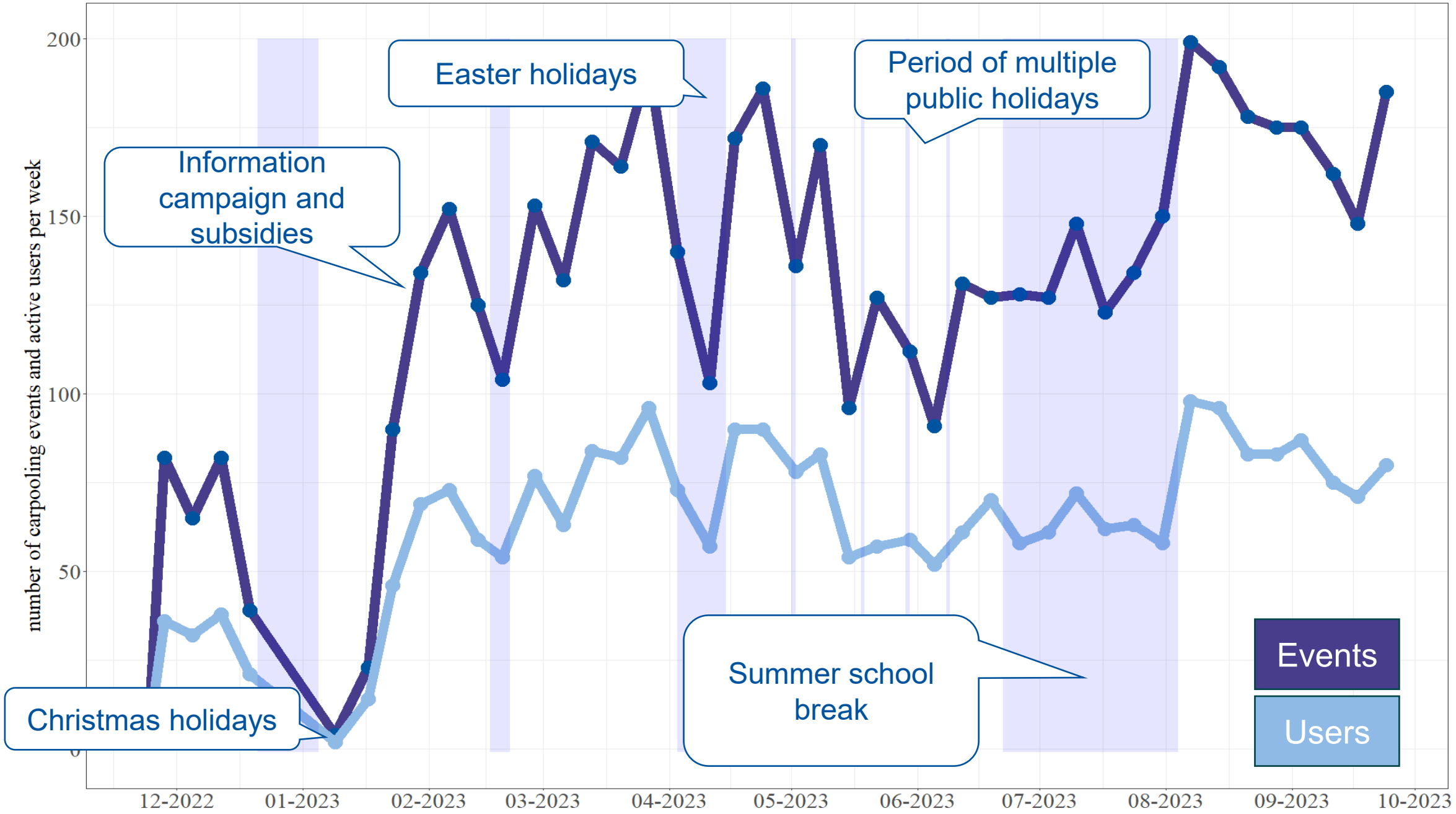


How frequently is the service used?

Event =
1 driver trip +
1 passenger trip

- About 5800 Events (=1 driver trip+1 passenger trip)
  - 2964 carpooling events ending at the workplace
  - 2789 carpooling events starting at the workplace

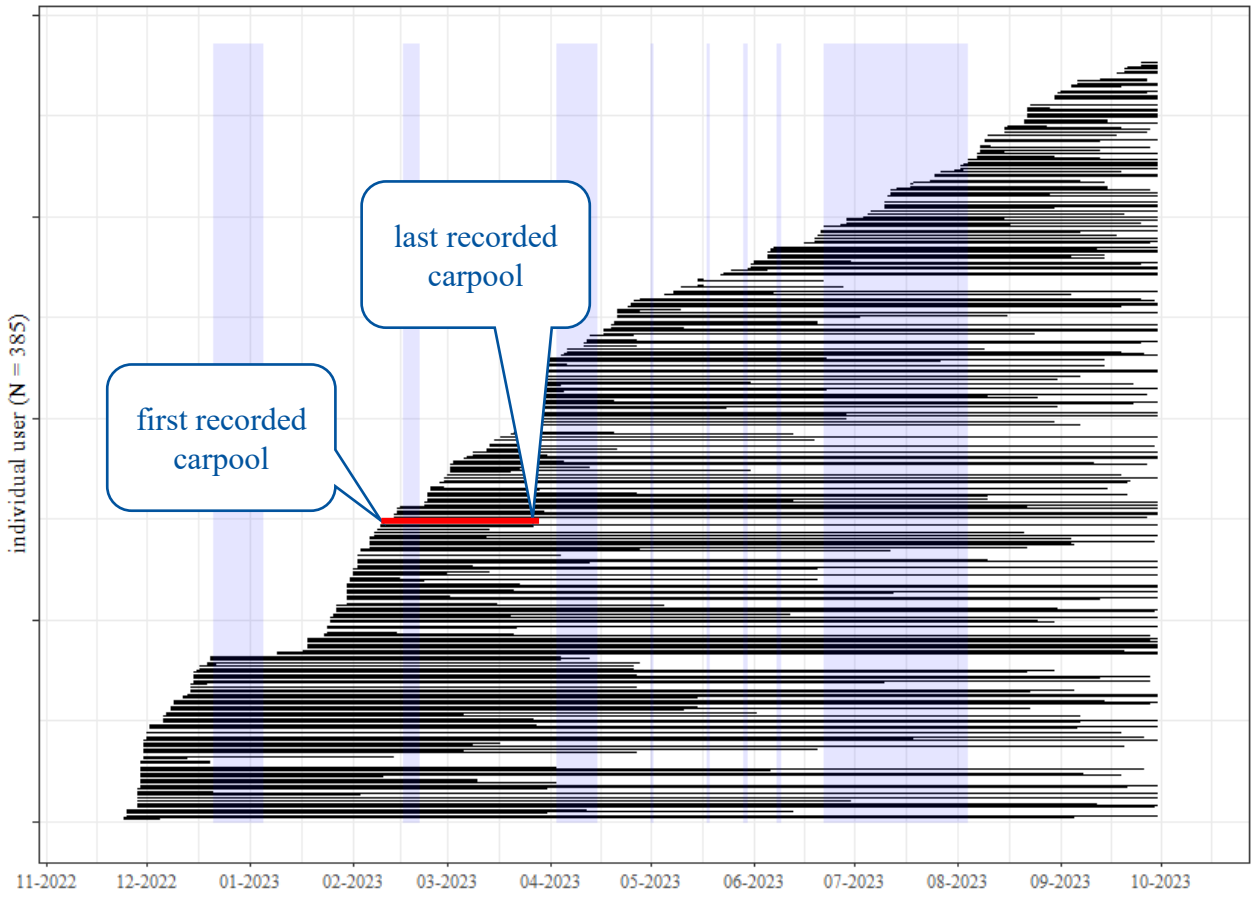
- 385 individuals in 826 unique pair combinations
  - 211 persons with journeys as a driver
    - 107 persons exclusively as a driver
  - 278 persons with journeys as a passenger
    - 174 persons exclusively as a passenger


number of carpooling events and active users per week
200
150
100
50
0
12-2022
01-2023
02-2023
03-2023
04-2023
05-2023
06-2023
07-2023
08-2023
09-2023
10-2023
Easter holidays
Period of multiple public holidays
Information campaign and subsidies
Christmas holidays
Summer school break
Events
Users

Growth in user numbers

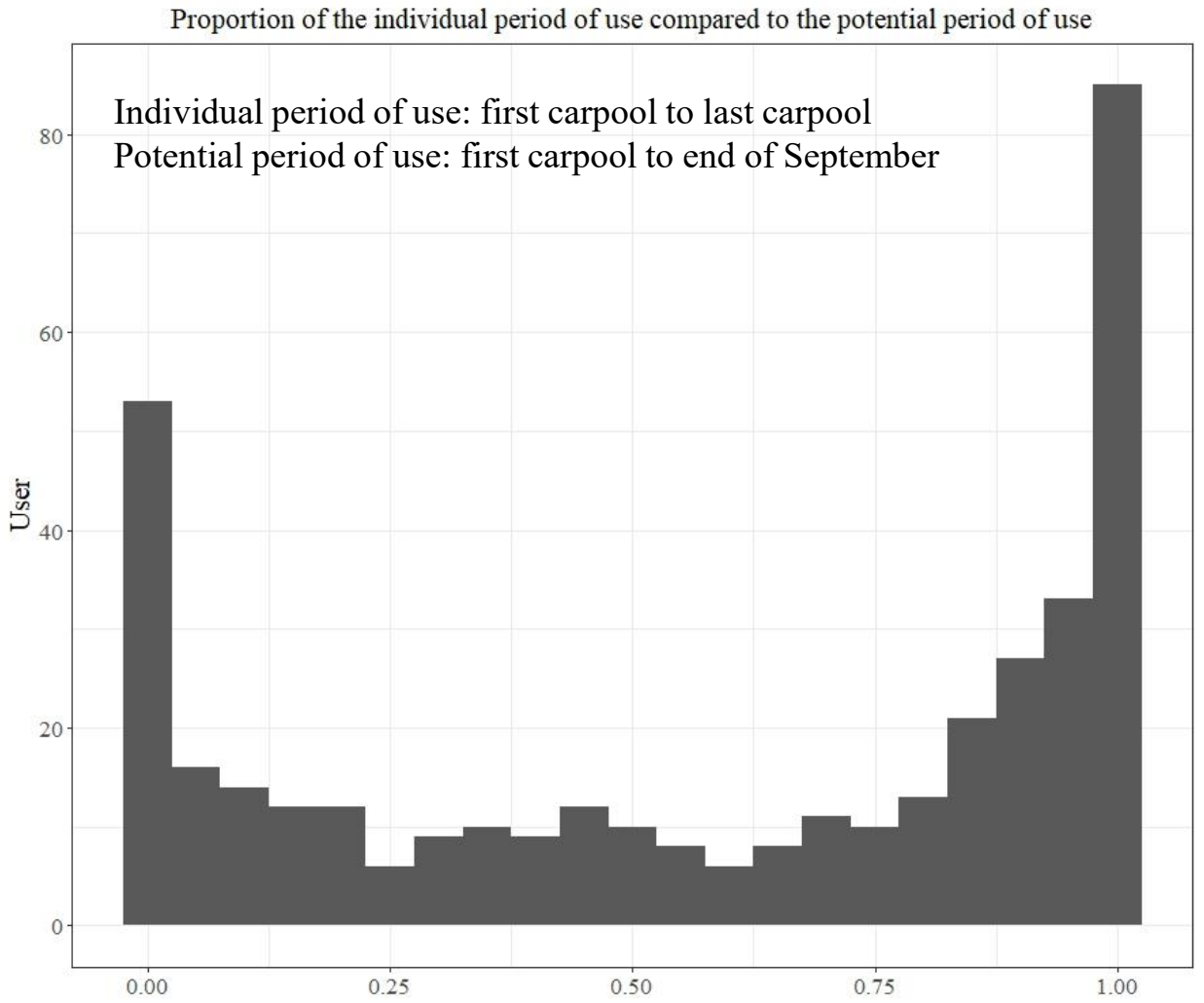
- Initial period of growth ends with Christmas break
- Strong growth after an information event at the end of January and the reintroduction of subsidies
- Slows down after Easter
- New users still join, but fewer than in the beginning

Time span between first and last recorded carpooling trip in the data set



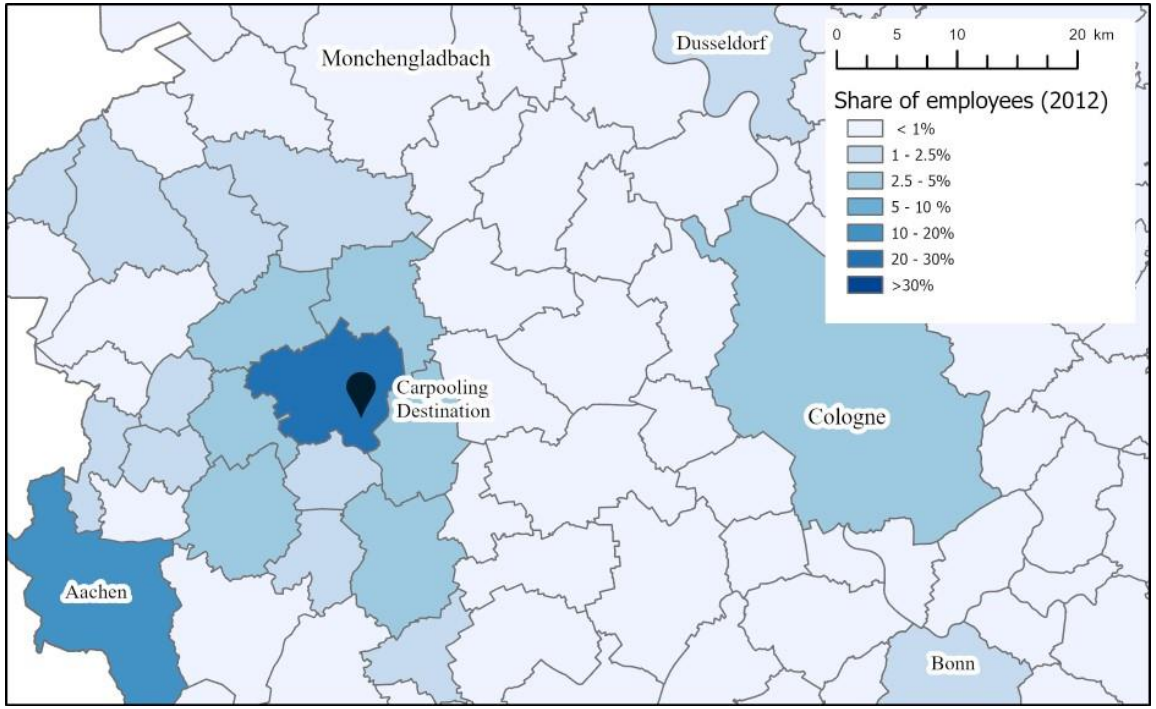
How persistent is the usage?

- Many users have only made one trip with the app
- On the other hand many users have been active since their first trip
- Some individuals have been using the app since its launch period (November 2022-January 2023)
- For some individuals, there are large gaps between recorded events

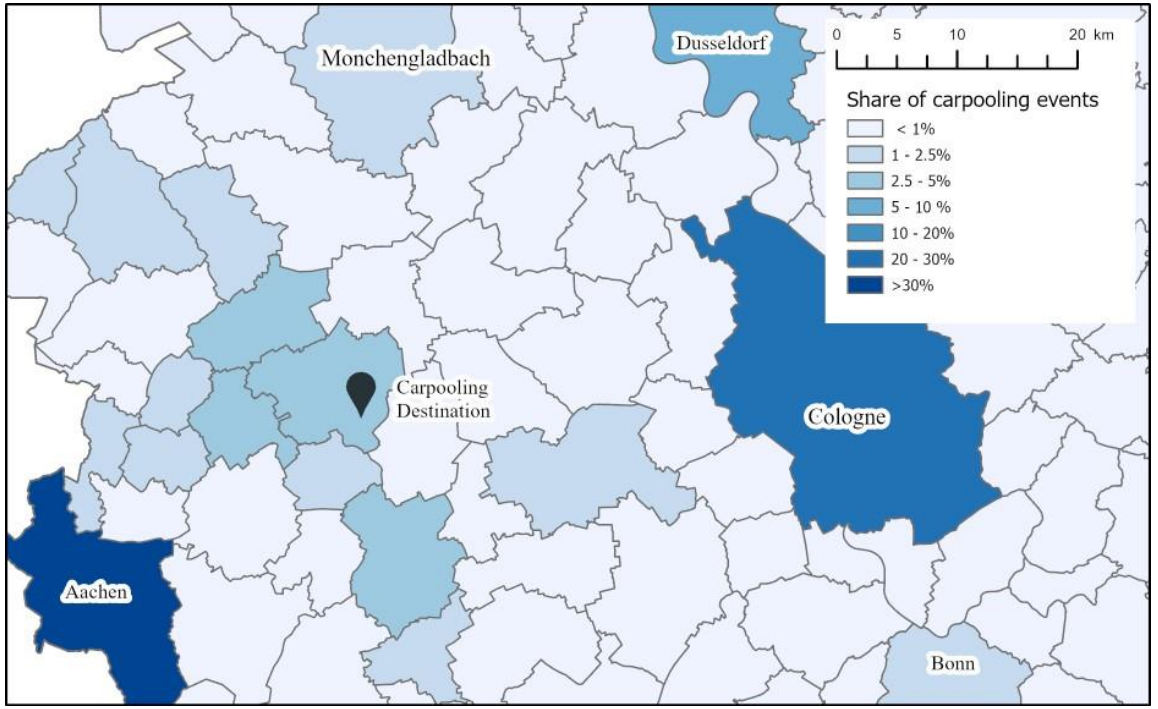


Spatial differences in usage

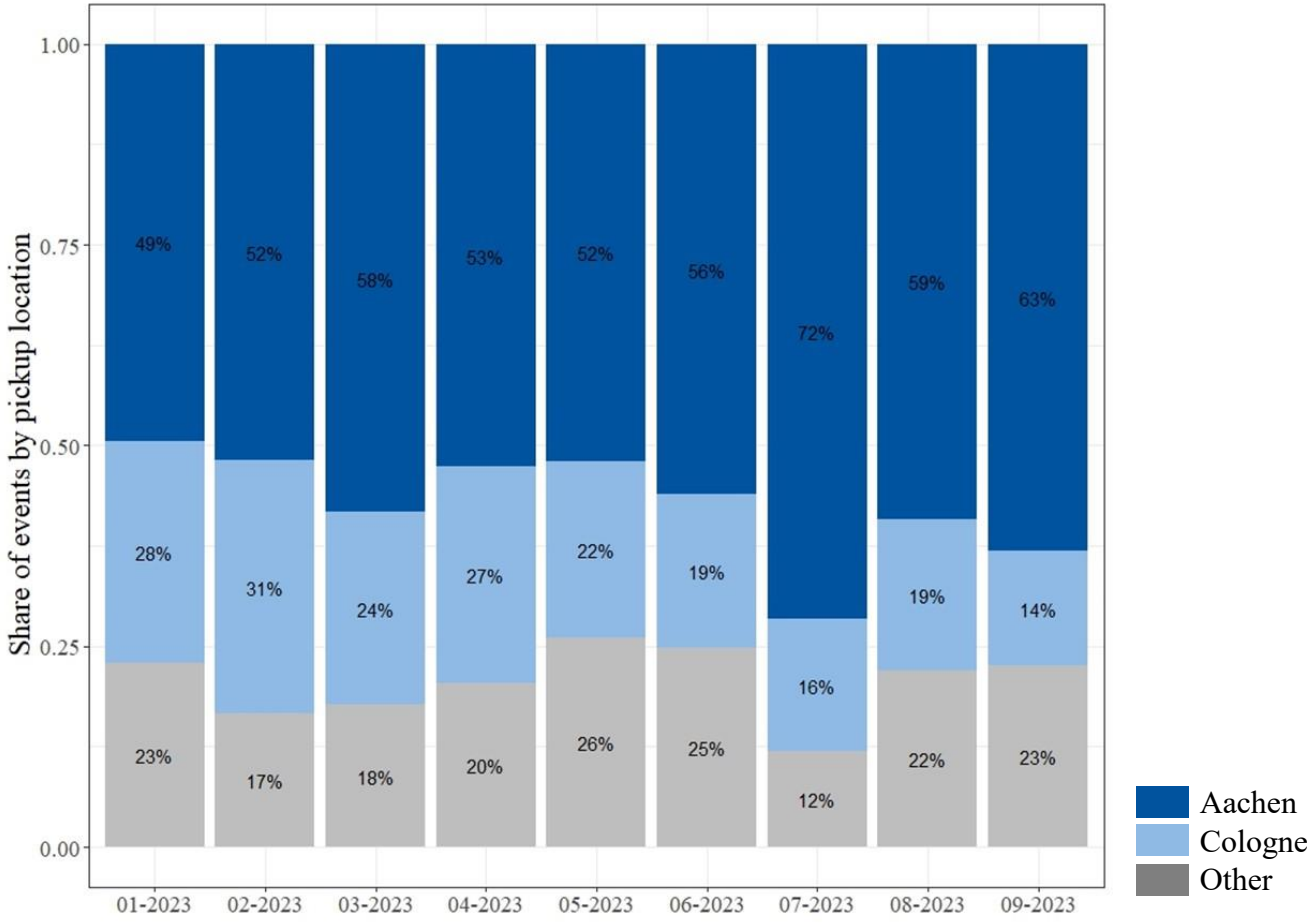
Residential location of employees in 2012



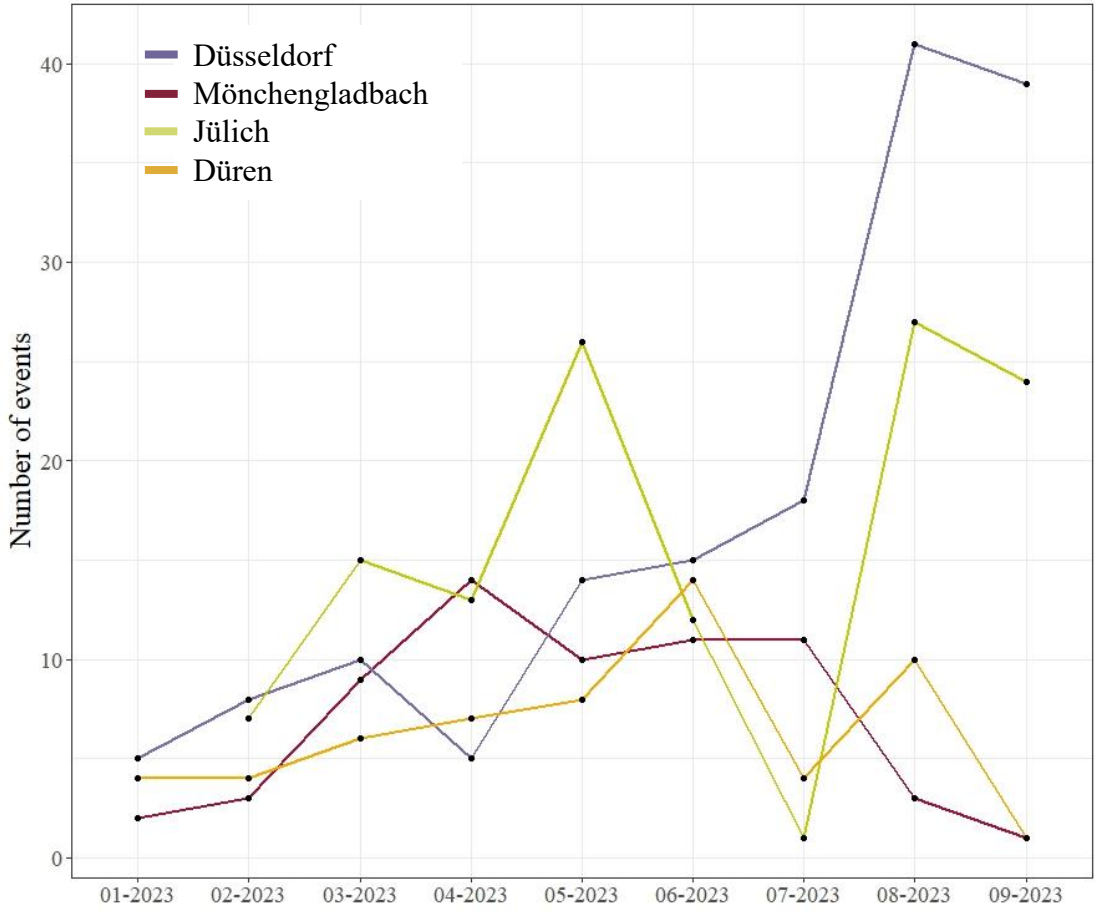
Passenger origin of carpooling events



Spatial differences in usage- Is there a change over time?



What about the „Other“ pick-up locations?



Does the grow in numbers have an impact on the "average" event?

- Median number of trips per active passenger remains at 4 from February 2023 onwards.
- The average number of trips increases from 5.5 trips per active passenger to 6.5 due to afew users with a high number of events.
- Average trip length decreases from over 40 km in January through May to 36.4 km and then increases again to over 38 km in August and September.

Differences in usage

Does the number of active users affect the distance from the passenger's origin to the pickup point??

Depending on location, average pickup distances vary:

Aachen:
Mean: 0.8km
Median: 0.5km

Cologne:
Mean: 2.1km
Median: 0.9km

Differences in usage

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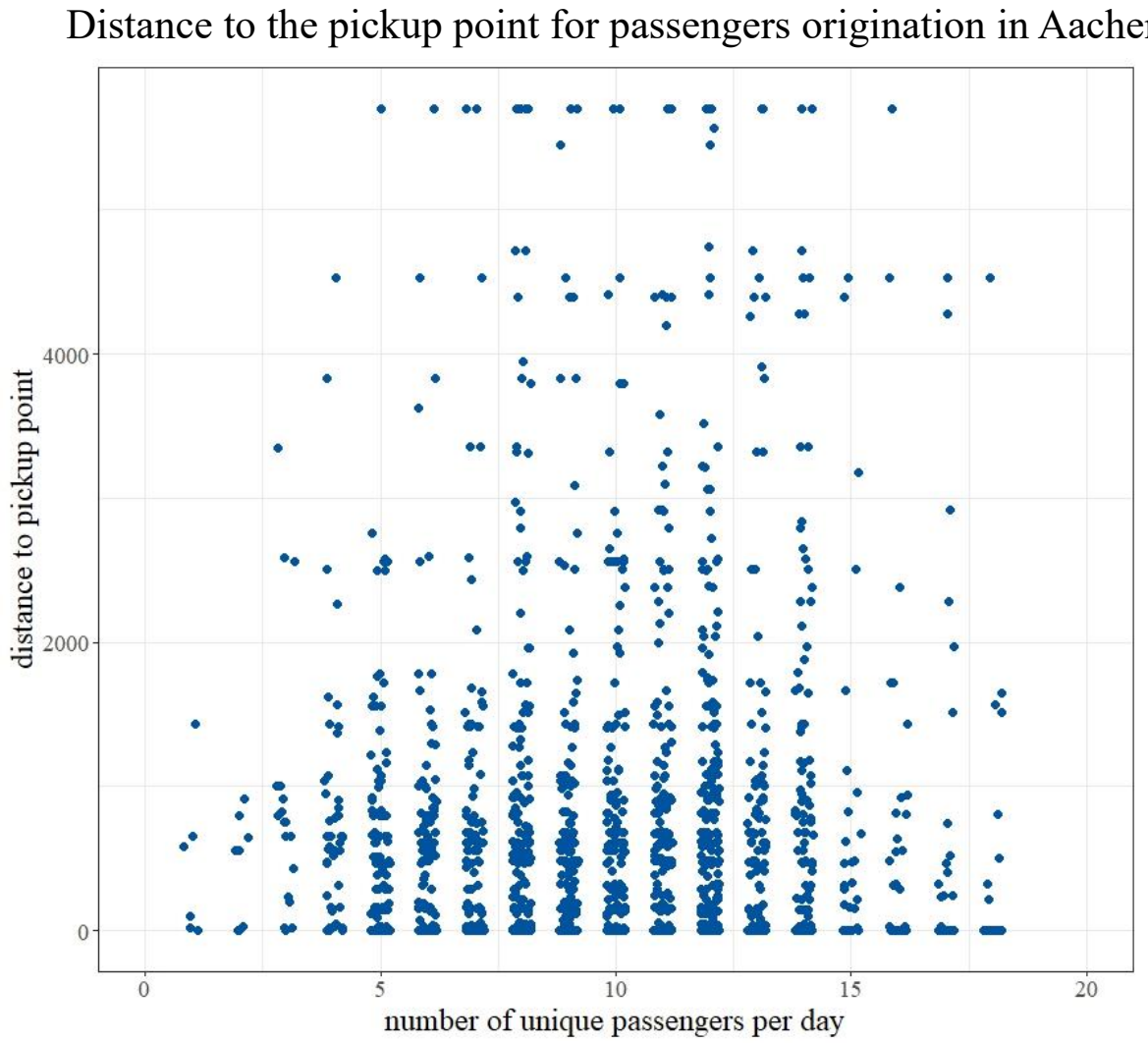
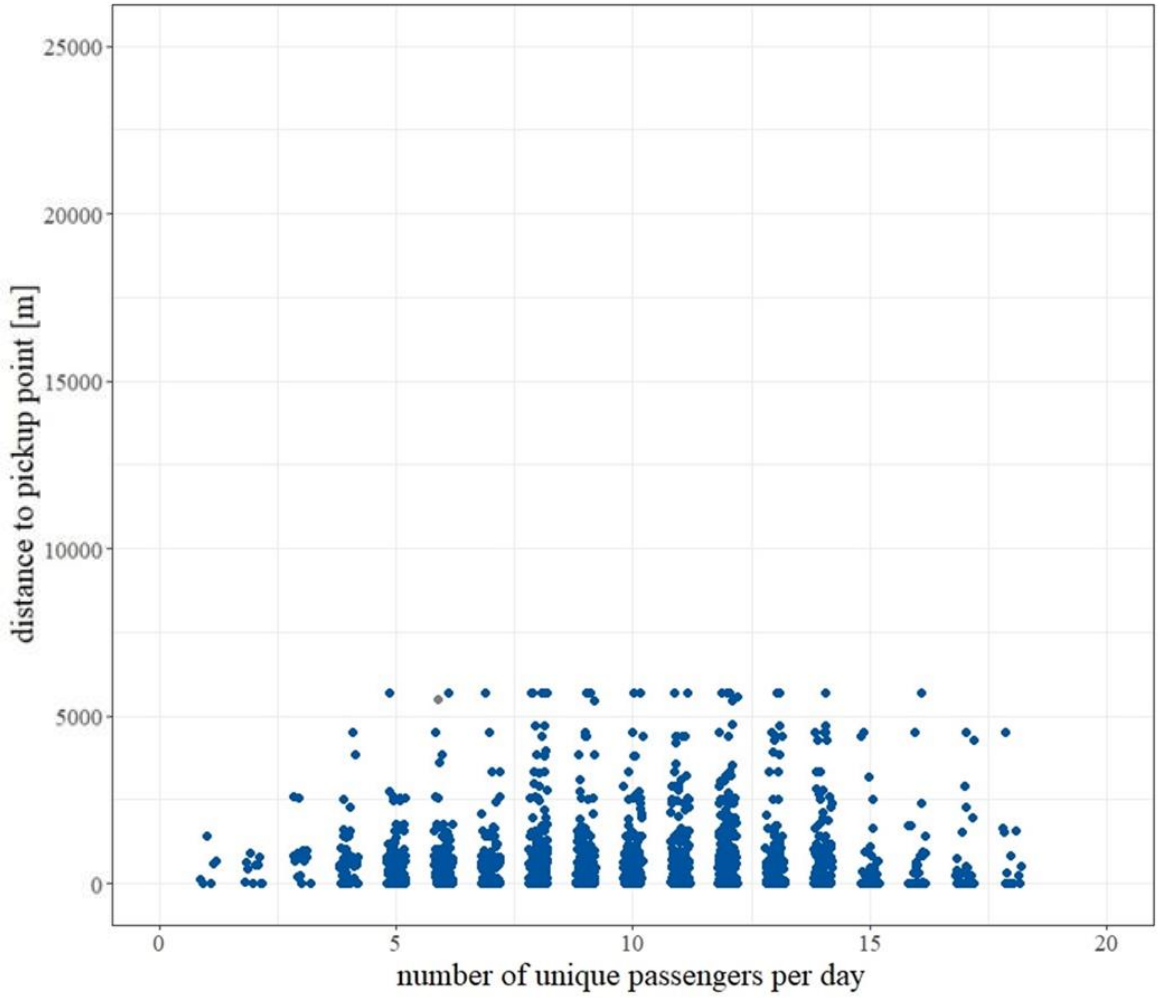


Differences in usage

Distance to the pickup point for passengers origination in Cologne



Summary

- Here, app-based carpooling represents a small fraction of daily commuting.
- Employees who live nearby do not use the service. Short travel times and small monetary benefits do not justify the effort of carpooling.
- Some driver and passenger combinations are formed again and again. Even if other potential drivers or passengers originate from a nearby location.
- (Potential) users are located geographically far apart. This leads to very few users in some subareas.

Summary

- Influences of individual users can be observed in the data set (e.g. vacation of regular users).
- There is no statistically significant relationship between the number of passengers and the distance to the pick-up point in this data set.
- The shortest distance to the pick-up point may not always be the preferred option.
- Looking at the actual trips made, there is little information about matches not being made due to a lack of drivers or passengers within an acceptable distance.

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This work is part of the project RISE (grant no. 19FS2029A) of the funding guideline "mFUND, funding line 2, 2nd call lignite" of the BMDV (German Federal Ministry for Digital and Transport). The carpool dataset was provided by goFLUX Mobility GmbH as part of the project.

Gefördert durch:

Bundesministerium für Digitales und Verkehr

aufgrund eines Beschlusses des Deutschen Bundestages

THANK YOU

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