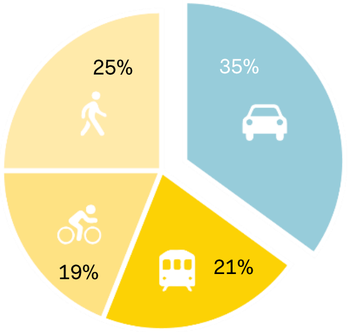
Micro-mobility forecasting analysis
A study on European Cities

Data in urban mobility

Giulia Ceccarelli

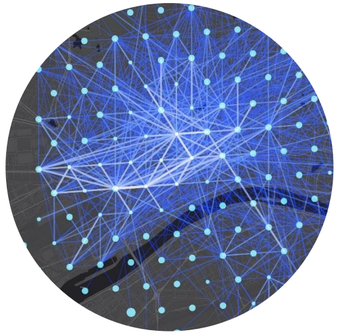
Systematica

Overview



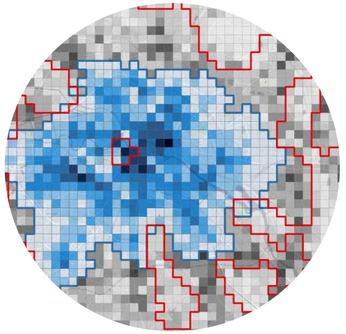
City & Micro-mobility Characteristics

City and micro-mobility characteristics are important to better understand the vocation of the city and its short-medium objectives and potential concerning micro-mobility. This section describes data that was considered as relevant and influential for micro-mobility and provides a study on the most relevant information regarding micro-mobility providers and regulatory framework.



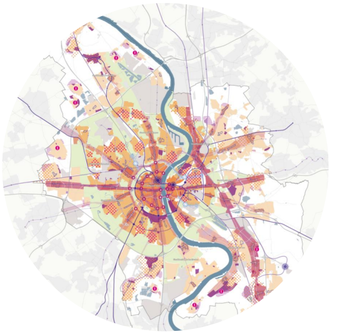
Micro-mobility Data analysis

Micro-mobility data is analyzed to show micro-mobility movements patterns in Cologne. This section includes an in depth analysis of the observed micro-mobility data. Maps and charts were developed to understand changes in micro-mobility usage in different periods and time of the day



Micro-mobility Potential tool

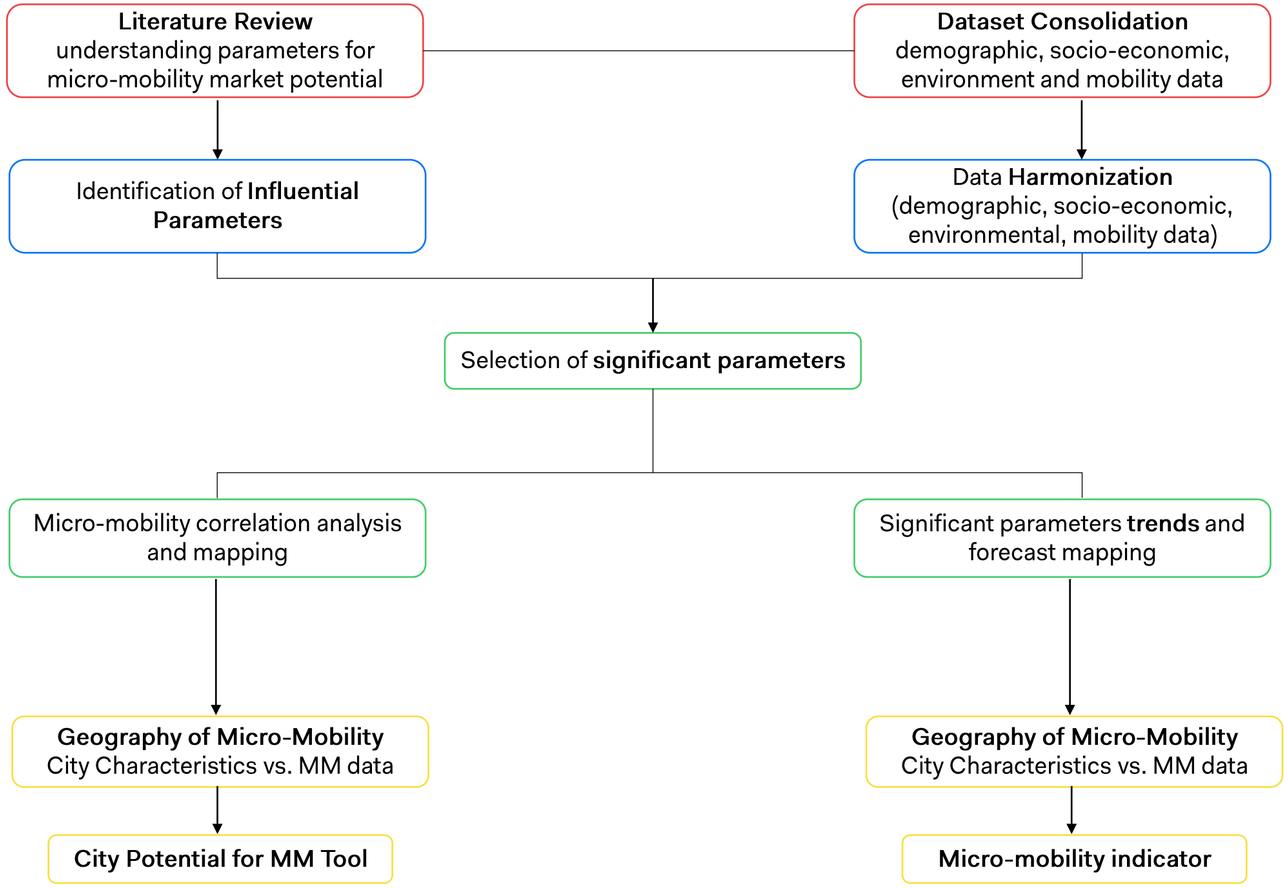
The “micro-mobility potential” tool was developed taking into consideration the city characteristics and the observed micro-mobility data. The two databases were compared to understand mutual relations. The tool is intended to be a flexible and easy instrument to quickly perform analysis on “micro-mobility potential” across European cities.



Micro-mobility Forecasting

The “micro-mobility indicator was developed based on city characteristics data and trends analyses, and on the city’s land use plans. The goal is to summarize the characteristics that influence micro mobility and join trends of micro mobility variables to unveil their aggregated patterns.

Methodology



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Cologne

Cologne, Germany

Main findings

City
Facts and figures

Residents: 1.100.000
Daily employees: 582.328
Of which inbound commuters: 284.207
Growth in bike usage: +4% in 4 years
Avg. Commuting distance IN (one-way): 16 km
Avg. Commuting distance OUT (one-way): 20 km

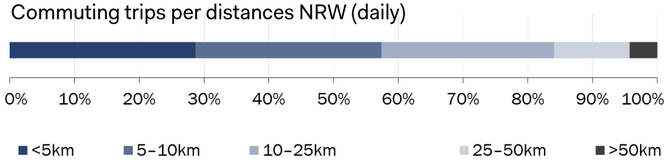
City promotion efforts for soft mobility

mobil.nrw

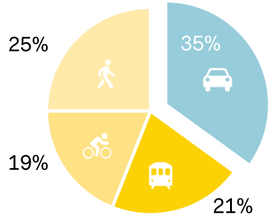
Green City Masterplan

Köln mobil 2025

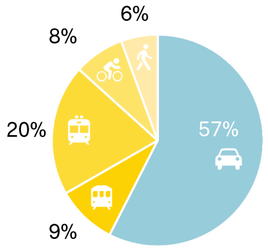
Commuting trips per distances NRW (daily)



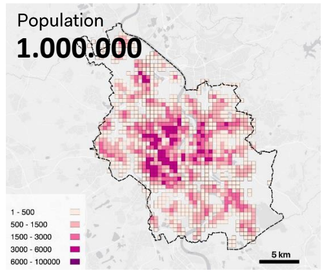
City
Modal Split, 2017
Target: +2% soft modes in 5-10 years

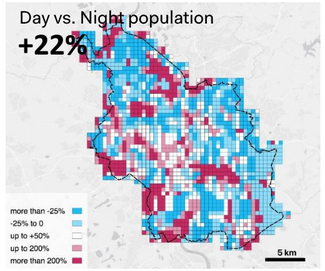


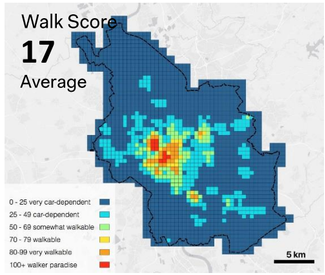
Average daily commuting
Modal Split, 2013

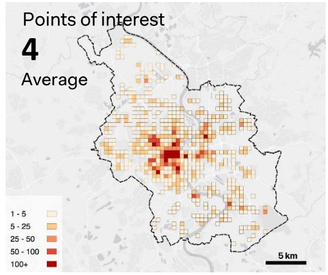


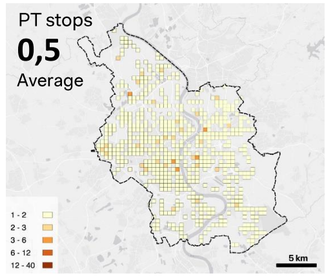
City
Characteristics

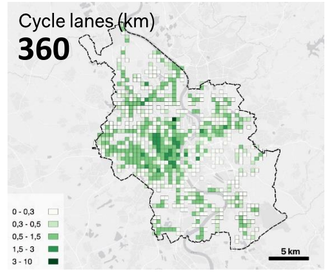












Micro-mobility
General framework

5.000 Shared scooters	10,2 Scooters/1,000 inhab*
3.500 Shared bikes	7,1 Bikes/1,000 inhab*
800 Shared mopeds	1,6 Mopeds/1,000 inhab*

TIER, Lime, BIRD, dott, SPIN

DB Call a Bike, KVB rad *powered by nextbike

TIER, rhingo

Pro-active system
Regulation was imposed before the technology implementation in the city and governs all aspects from distribution to use.

EU Legislation	European Commission Germany as a Member State* is encouraged to promote Sustainable Urban Mobility Plans (SUMPs)
National Legislation Germany	Road Traffic Rules (StVO) Small Electric Vehicles Act (EkFV) Memorandum of Understanding (MoU)
City Legislation	Quality Agreement

Mandatory/law | Voluntary agreement

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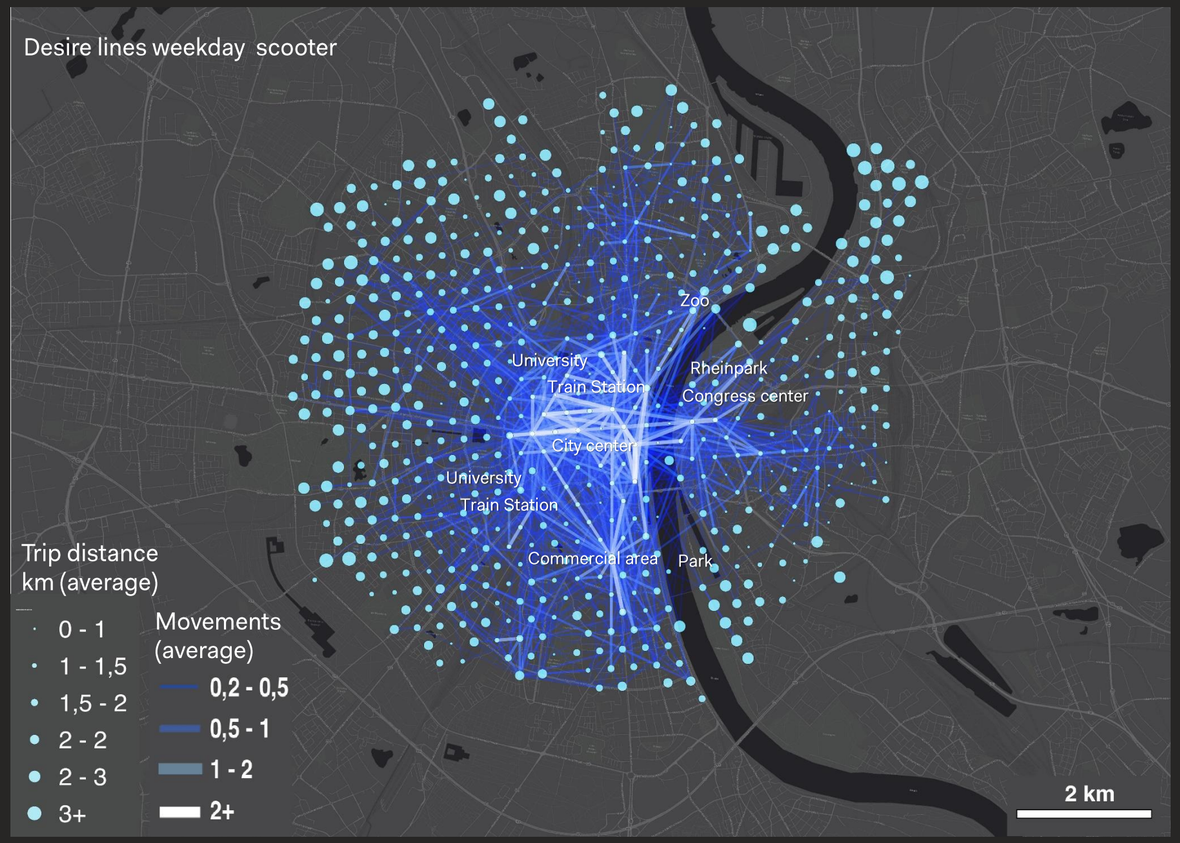
Micro-mobility data analysis & potential tool

Micro-Mobility data scooter

Weekday vs. weekend movements

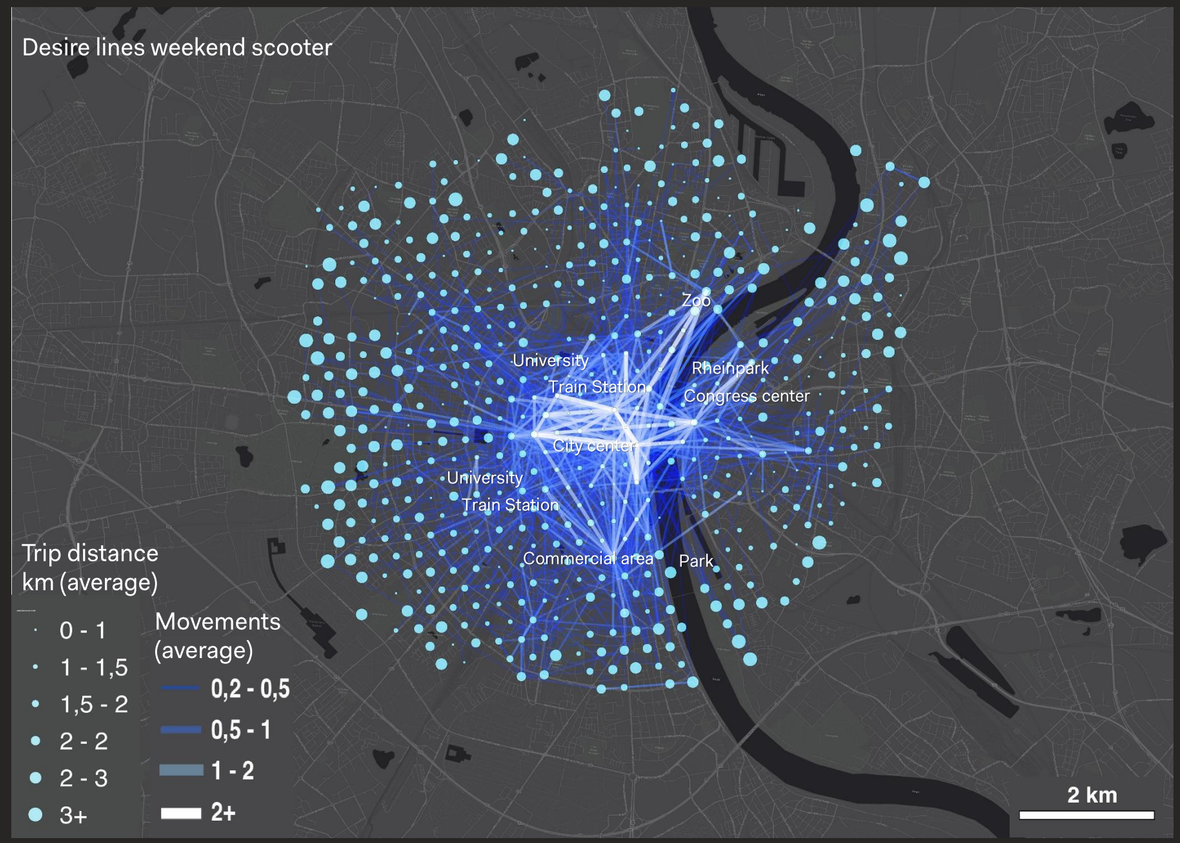
1,57 km

Avg. movements length weekday



1,59 km (+1%)

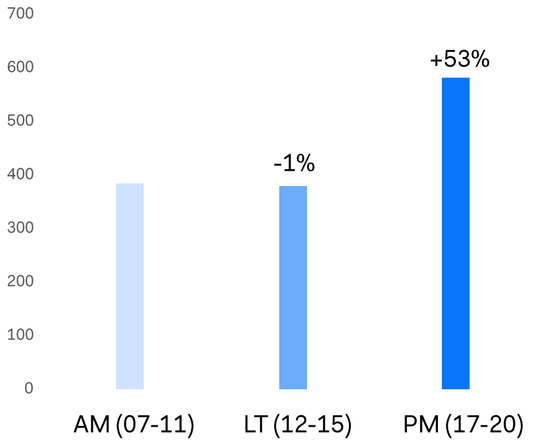
Avg. movements length weekend



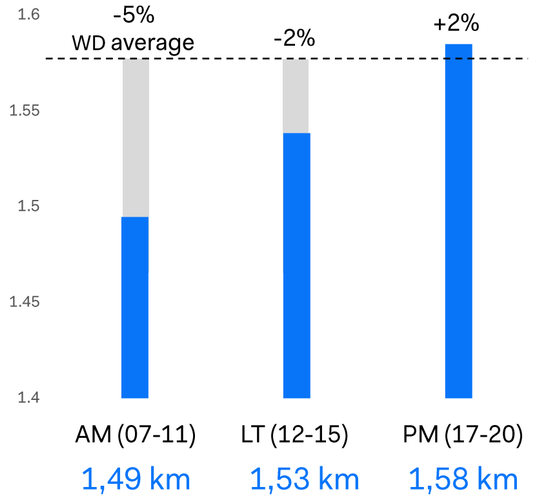
Micro-Mobility data scooter

Average peak hours movements weekday

Average movements in different time of the day - weekday



Average movements length - weekday

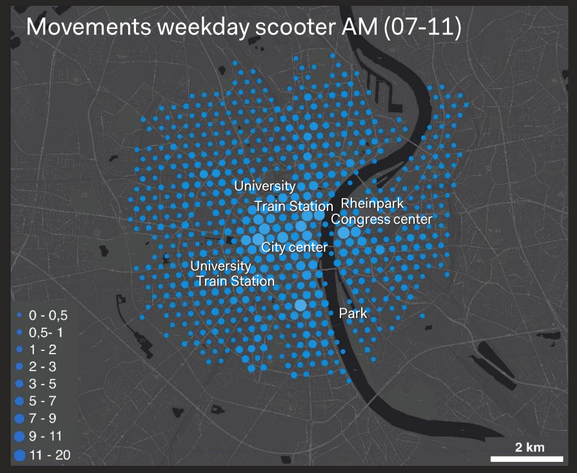


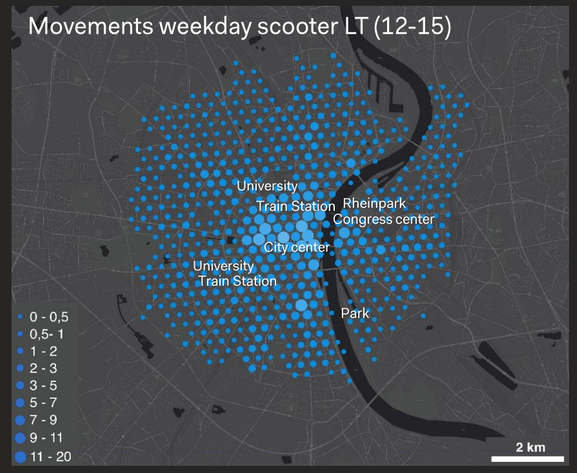
+53%

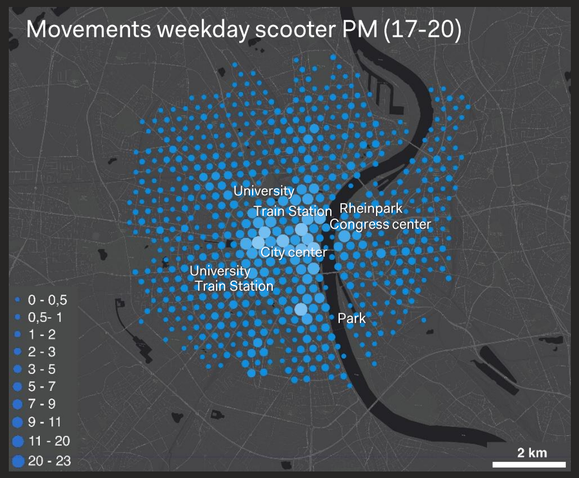
Scooter movements during PM
compared to LT and +51% compared to AM

-2%

Movements length in LT
compared to the weekday daily average (1,57 km)







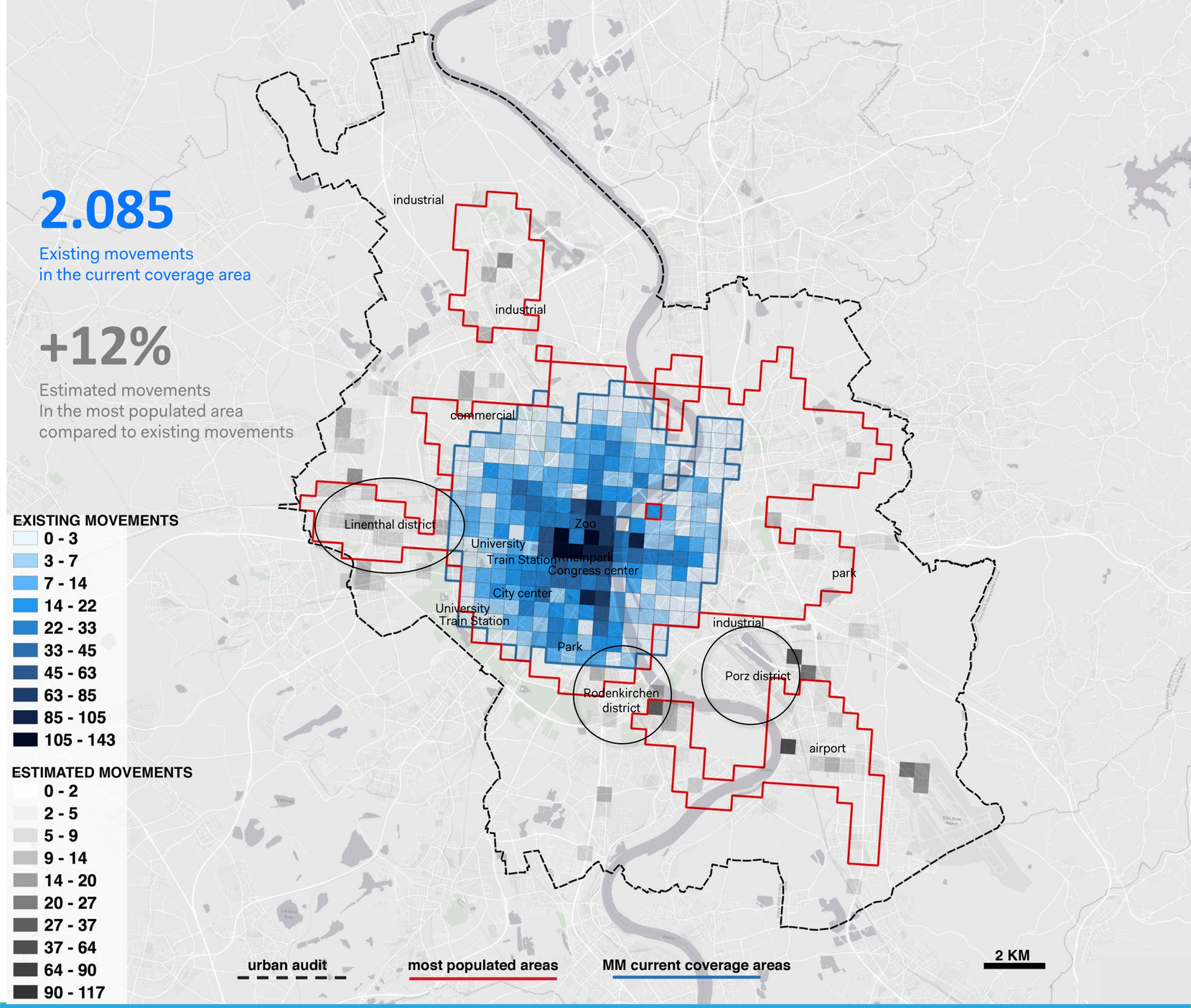
Micro-Mobility potential Scooter

City characteristics and micro-mobility data are compared to understand their relations and potential impacts of city characteristics on micro-mobility using linear regression models.

This exercise allowed to understand city characteristics significance compared to scooter micro-mobility movements density and to define the coefficients that were used in the model to estimate the micro-mobility potential.

In Cologne, there is a potential of +12% of movements outside the city. This percentage is the result of the cumulative sum of all the movements outside the already covered area and inside the most populated areas (red boundary).

Some clusters are recognizable in correspondence of residential districts in the outskirts (e.g. Linenthal, Rodenkirchen, Porz).



Note1: existing movements from CityDive. In some cities data may not cover all providers
Note2: estimated movements refer to all Urban Audit territory
Note 3: city center is intended as the area already covered by MM providers

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Micro-mobility forecasting

Cologne, Germany

Summary

Cologne 2019

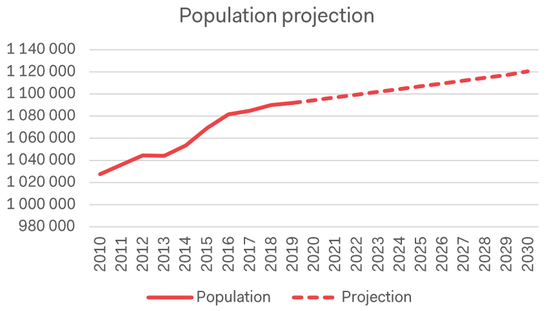
In the present study, eight variables describe districts' characteristics, unveiling patterns and potential of each.

Population and young population density describe the concentration of potential micro mobility users.

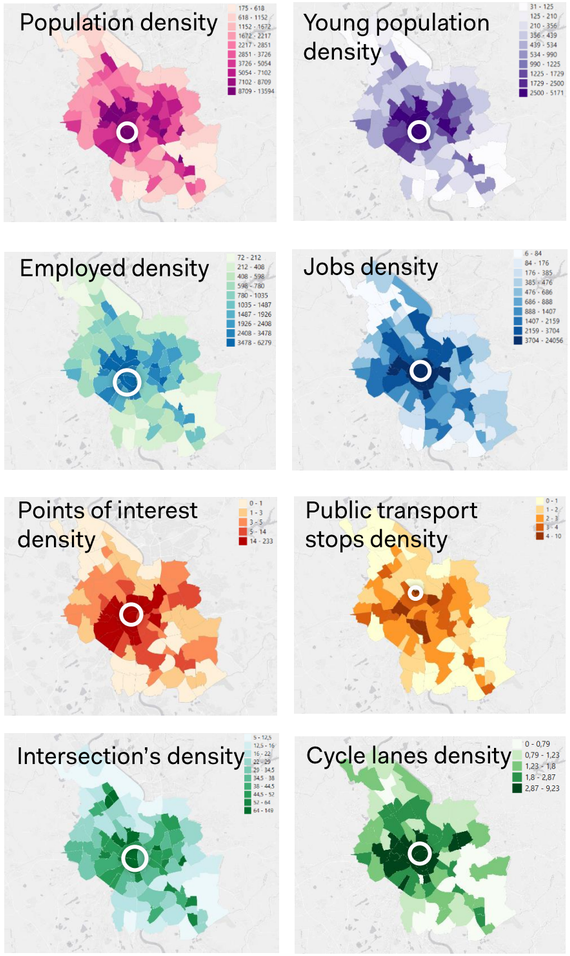
Employed and jobs density describe the spatial structure of the job market, showing where people are more likely to be employed and where the jobs are located.

Points of interest and public transport stops density describe the main attractions and possible begin and end of a micro mobility trip.

Intersection's density and cycle lanes density describe the physical infrastructure of the city.



Variables

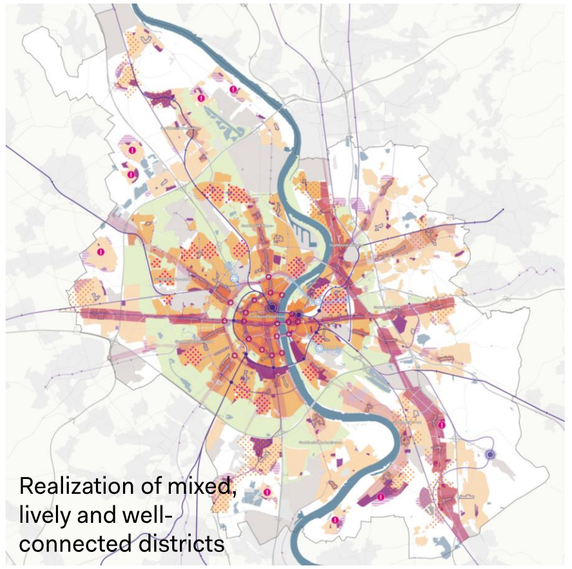


Cologne Perspectives 2030+

The new land use plan for 2030 is structured into five thematic areas, focussing on housing, economy, education, mobility, climate.

Each plan identifies strategies for the development of its theme, linking different goals for the city.

The housing map focusses on the realization of mixed and well connected districts, improving public space and existing settlements.

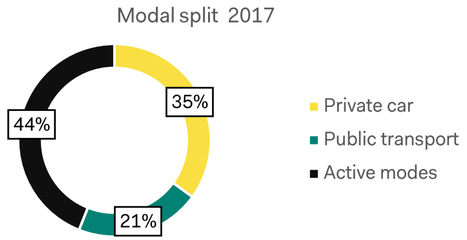


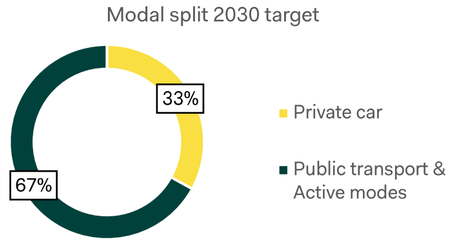
Köln mobil 2025

Promotion of e-bikes and pedelec z. B. by setting up charging stations and suitable parking facilities in order to make the bicycle accessible to other groups of users

Development of "mobility hubs" at the interface between Cologne and the surrounding area, i.e. important stops at which an intermodal chain of routes is made possible

Expansion of the KVB rental bike offer to all of Cologne with 3,000 KVB bikes in 2021





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Micro mobility forecasting

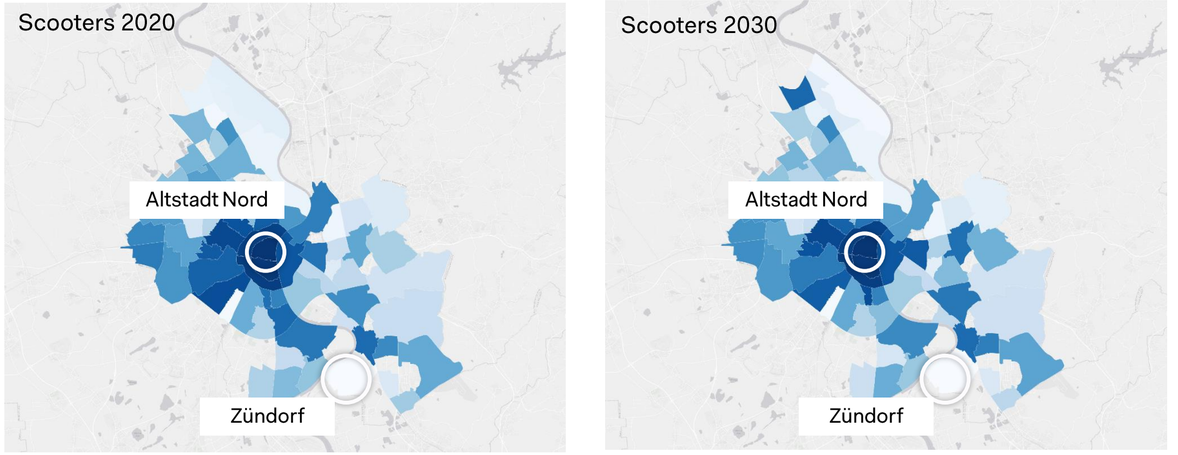
Scooters

Results – overall trends

In 2020, the number of movements for a 100m grid in Cologne ranged from 0.003 in Zündorf to 2.46 in Altstadt Nord.

The overall growth trends in city districts lead to a general increase in the number of movements forecasted for 2030. Different growth rates in each districts would lead to an increase in movements in the central areas, together with a shift in potential for micro mobility toward the western areas of the city.

In 2030, the number of movements for a 100m grid in Cologne ranged from 0.004 in Zündorf to 3.05 in Altstadt Nord.

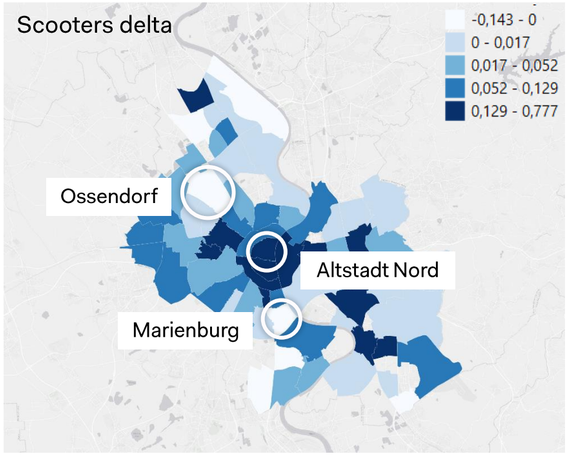


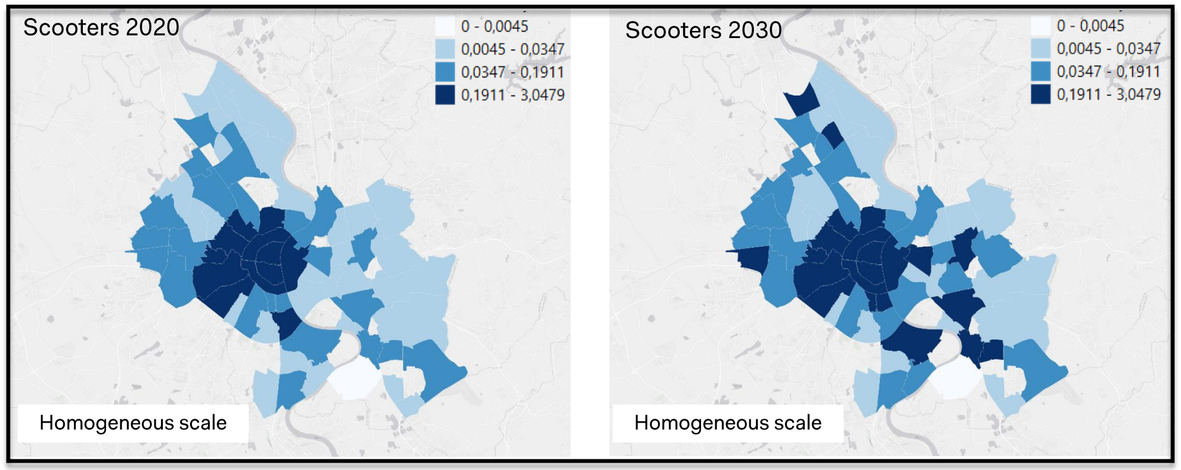
Results for each neighbourhood are normalized to a 100m square to improve comparability between areas

Results – delta analysis

Between 2020 and 2030 the highest difference in movements is expected in Altstadt Nord, with a delta of 0.77 movements for 0.01km^2.

A negative delta of -0.14 movements for 0.01km^2 is expected in Marienburg, while one of -0.03 movements for 0.01km^2 is expected in Ossendorf.





Results for each neighbourhood are normalized to a 100m square to improve comparability between areas

CIVITAS 2030
Sustainable and smart mobility for all

THE CIVITAS INITIATIVE
IS CO-FINANCED BY
THE EUROPEAN UNION

Thank you!

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