



Stadt Köln



Co-funded by the
European Union



MoCKiii

Mobility-Cockpit Cologne
innovative - integrative - intelligent

Real-time analysis of the
traffic and emission status

© KI-generiert

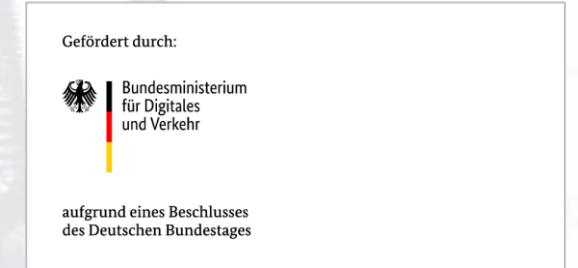
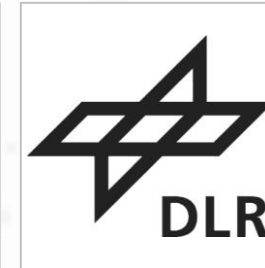
The Project



Goal of the project: Extend the traffic management center with a reporting system and a visualization of trends in traffic demand, emissions, and modal split

As well as implementing traffic- and environmentally-aware management

Schedule / Timetable

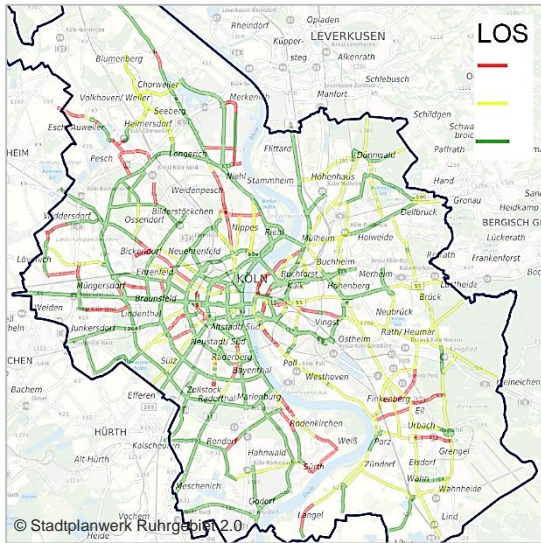


Project lead is with the Department of Traffic Management of the city of Cologne

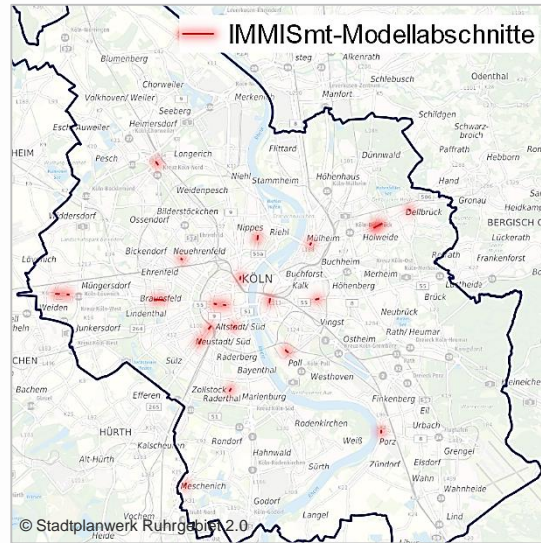
Project partner: DLR, the Institutes of Transport Research and Transport Systems

Funding by the Federal Ministry of Digitalization and Transport, tender: “Digitalization of Urban Transport Systems“ which funded 60% of the total volume of about 2.3 Mio €

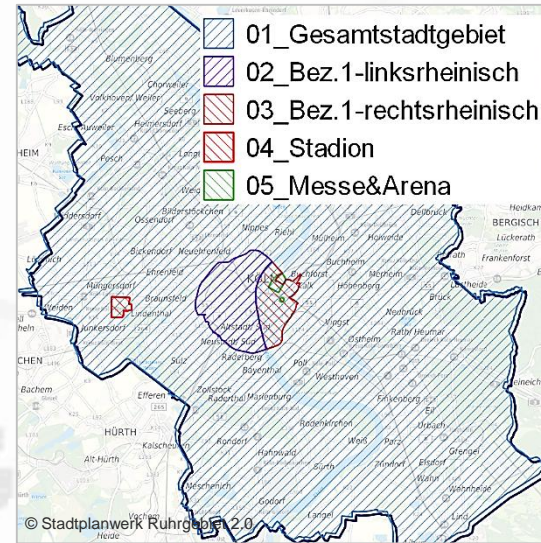
Backend topics



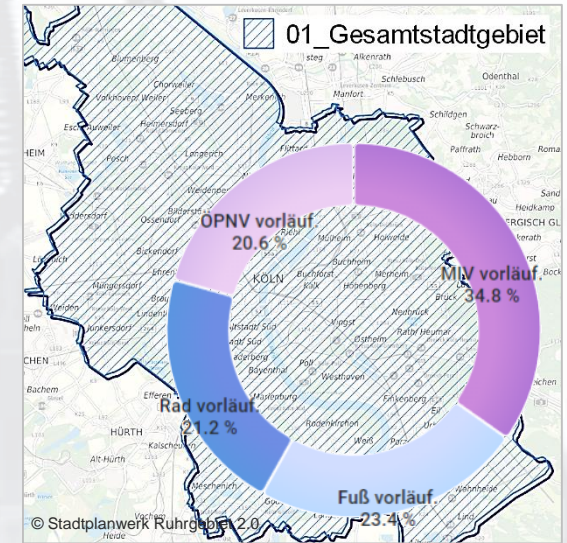
- Computation of:
- **Traffic flow** on major streets (any 30 min)
 - **Level of service** (LOS) any minute
 - Travel time on selected routes



- Modelling of **pollutants** (NO₂, PM_{2.5} und PM₁₀), any 30 min, at ~20 sites with passive sampling

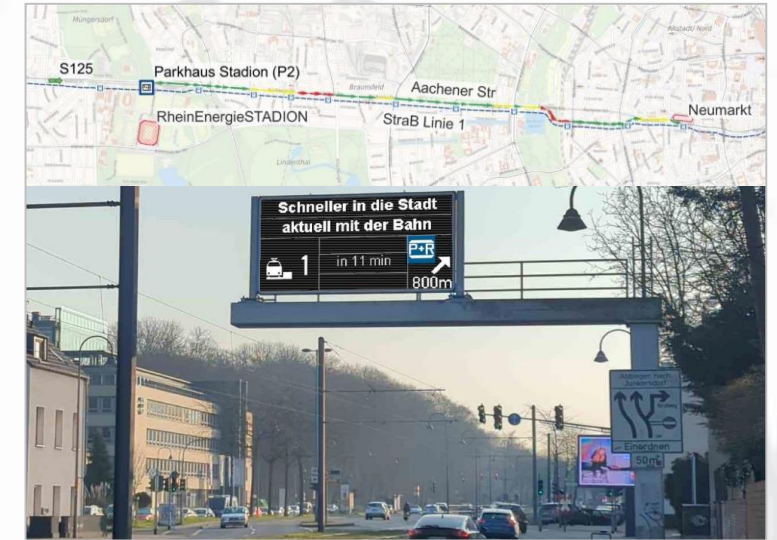
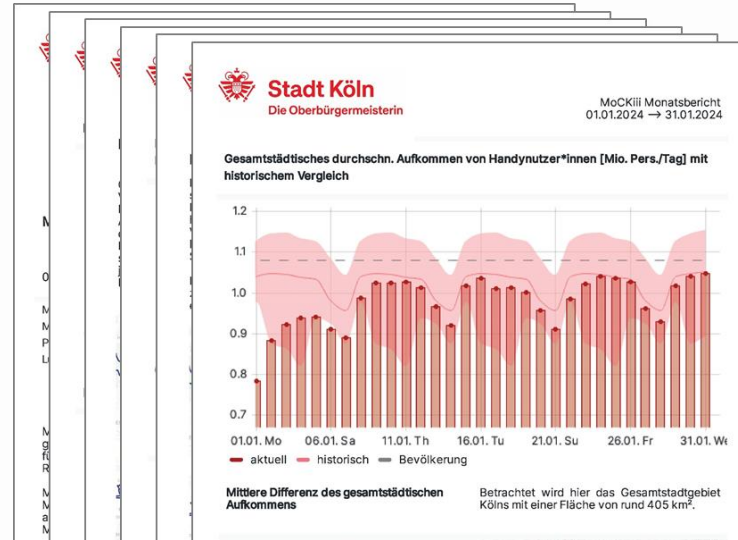
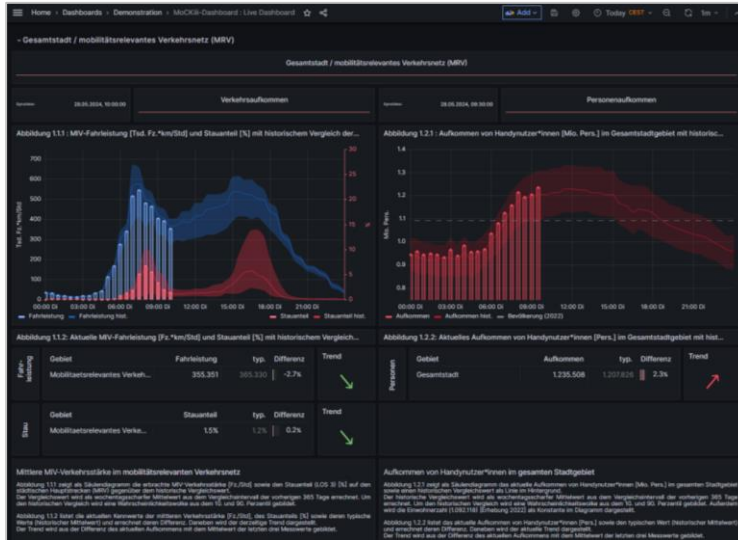


- Computation of:
- **person density** in 30 min aggregation
 - LOS-clustered **mileage** for selected POIs



- Computation of the **Modal Split in Cologne** (per day); uses data from traffic management center together with phone data

Frontend



Presentation in MoCKiii-Dashboard for the near real-time analysis of the traffic and emission status, and map-based representation of the LOS in the 24/7 Traffic and Tunnel Management Center

Aggregation to periodic MoCKiii-state reports

- To document long-term changes as weekly, monthly or annually reports
- Event-triggered (e.g. Cologne Carnival or European Soccer Championship)

Data are being used to trigger the strategy module of the traffic management center automatically and to switch to an environment-aware control

Modal Split determination nowadays

„**Modal Split**“: Shares in use of traffic modes 1. Motorized individual traffic, 2. Bicycle, 3. Pedestrian, 4. Public transport
Goal / Subject: Monitoring of changes in the mobility behaviour of a city's population

Household surveys in time intervalls of years or some years

 <p>Mobilität in Deutschland mobilitaet-in-deutschland.de</p> <p>MiD 2002, 2008, 2017, 2023 some cities / municipalities with local extensions</p>	 <p>SrV 2018 - Mobilität in Städten https://tu-dresden.de/bu/verkehr/ivs/srv/</p> <p>SrV 2013, 2018, 2023</p>	 <p>Deutsches Mobilitätspanel(MOP) https://mobilitaetspanel.ifv.kit.edu/</p> <p>MOP 1994 till 2022 (not anymore since 2024)</p>
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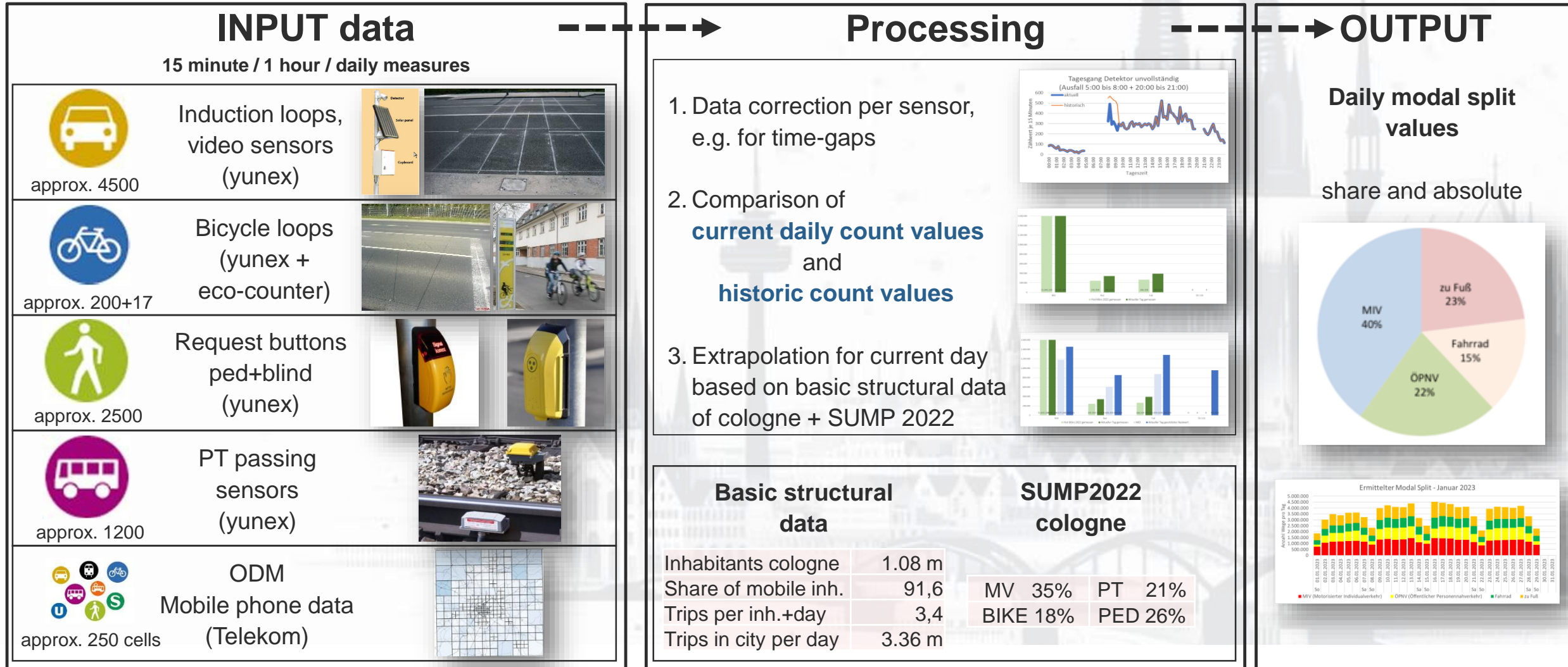
- In recent years: City-self conducted household surveys currently and probably in the future yearly (e.g. „Mobilität in Hamburg 2022“, „SUMP Köln 2023“).

Disadvantage: Very expensive and thus not suitable for a high-frequency determination!

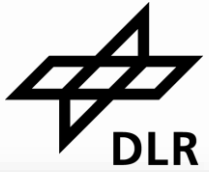
Alternative: E.g. data of telecommunication providers

- Would be a comprehensive data source, but - by now - do not distinguish between traffic modes!

Modal Split determination daily(!) for the city of cologne by using data which already exist



Modal split determination for 2 months



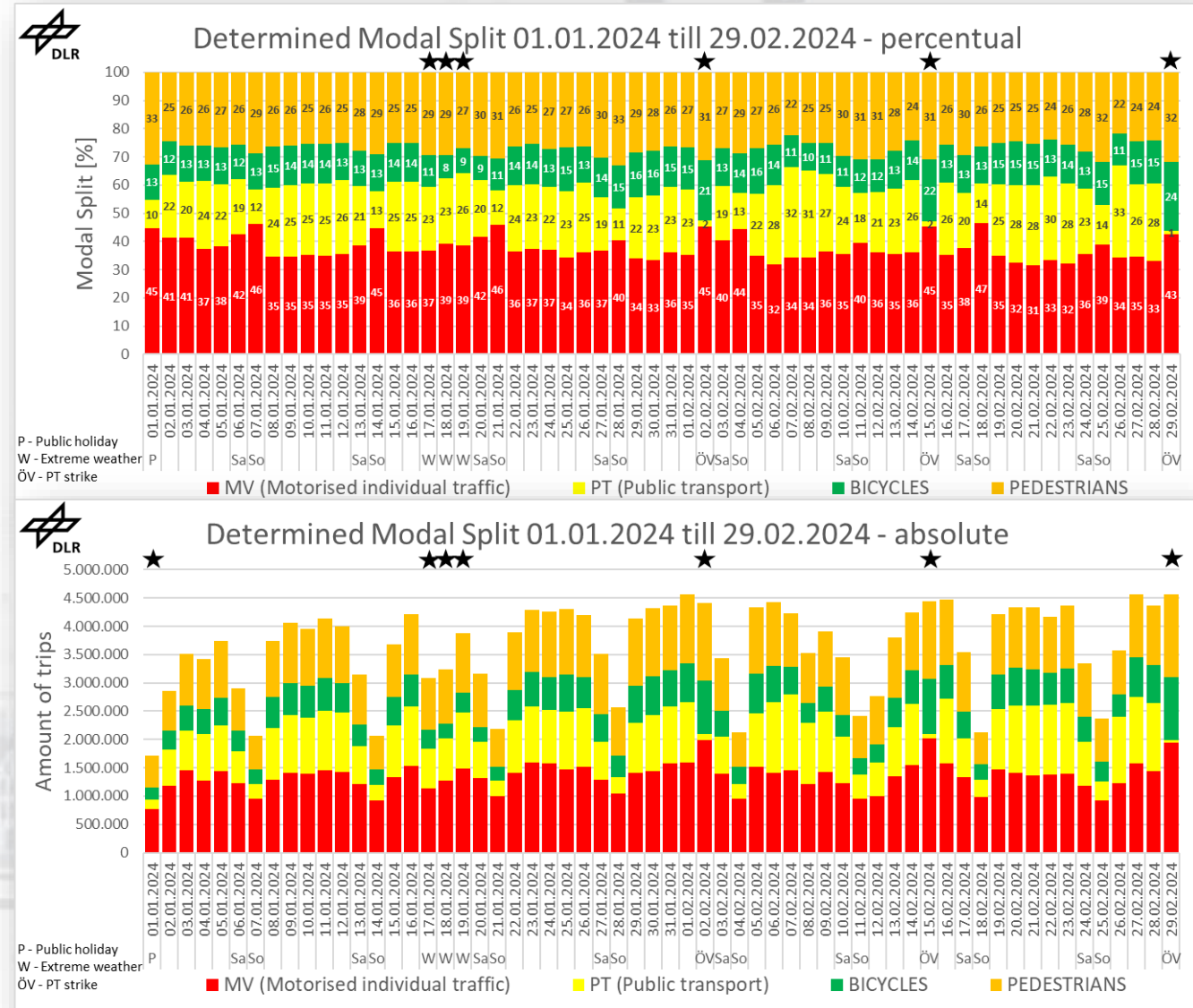
Results (1/3)

Typical weekly variations are quite well reproduced:

- saturdays less total amount of trips and a bit less public transport
- sundays less total amount of trips and much less public transport

On special days abnormous behaviour is detected reasonably:

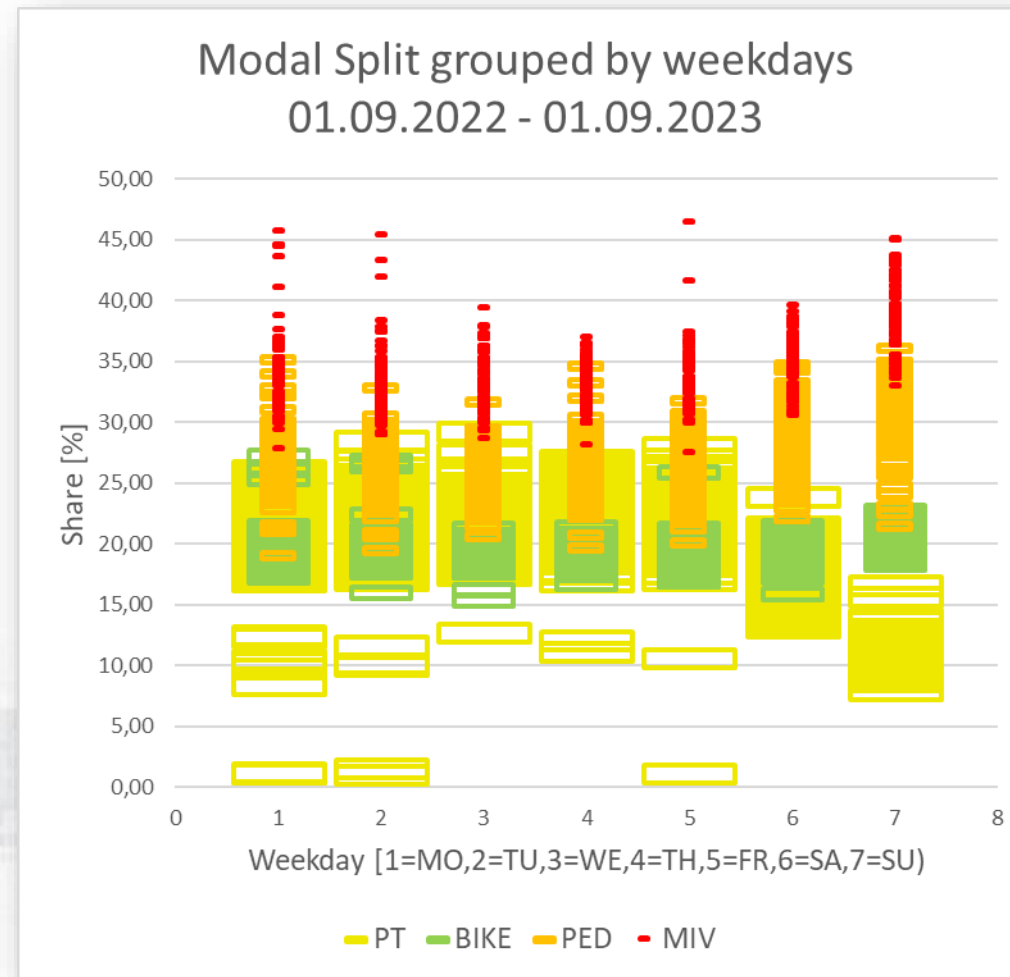
- 01.01. **public holiday**: less total amount of trips and public transport
- 17./18./19.01. **bad weather conditions** (snow/ice): less bicycle traffic
- 02./15./29.02. **public transport strikes**: „mobility turnaround“ in wrong direction ☹️



Modal split determination - distribution of shares over 1 year

Results (2/3)

- Values of the four modes are stable concerning weekdays in ranges within +/- 5 percentage points
- Extreme / unusual values occur, but for explainable special days ...



Modal split determination - distribution of shares over 1 year



Results (2/3)

Low PT, high MIV/PED:

11 public holidays

10 of them low pt shares

1 of them on sunday and thus typical

- 01. Jan 2022 Neujahr
- 15. Apr 2022 Karfreitag
- 18. Apr 2022 Ostermontag
- 01. Mai 2022 Tag der Arbeit
- 26. Mai 2022 Christi Himmelfahrt
- 06. Jun 2022 Pfingstmontag
- 16. Jun 2022 Fronleichnam

- 03. Okt 2022 Tag der Deutschen Einheit
- 01. Nov 2022 Allerheiligen
- 25. Dez 2022 1. Weihnachtsfeiertag
- 26. Dez 2022 2. Weihnachtsfeiertag

- 01. Jan 2023 Neujahr
- 07. Apr 2023 Karfreitag
- 10. Apr 2023 Ostermontag
- 01. Mai 2023 Tag der Arbeit
- 18. Mai 2023 Christi Himmelfahrt
- 29. Mai 2023 Pfingstmontag

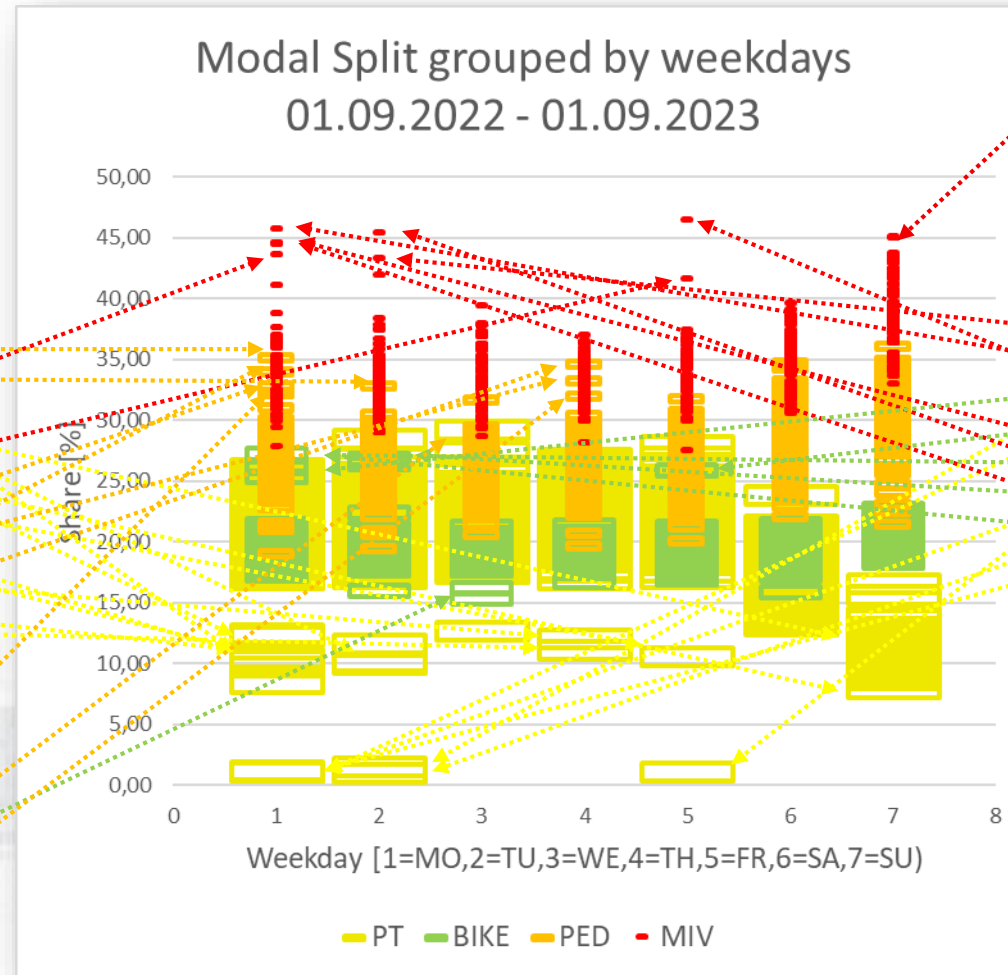
- 08. Jun 2023 Fronleichnam
- 03. Okt 2023 Tag der Deutschen Einheit
- 01. Nov 2023 Allerheiligen
- 25. Dez 2023 1. Weihnachtsfeiertag
- 26. Dez 2023 2. Weihnachtsfeiertag

High PED

Rose Monday 20.02.

Mi 29.03.

Do 01.09.



High MIV

So 18.09. first stormy rain day (after summer)

Extremely low PT, high MIV/BIKE

6 strike days Feb / Mar

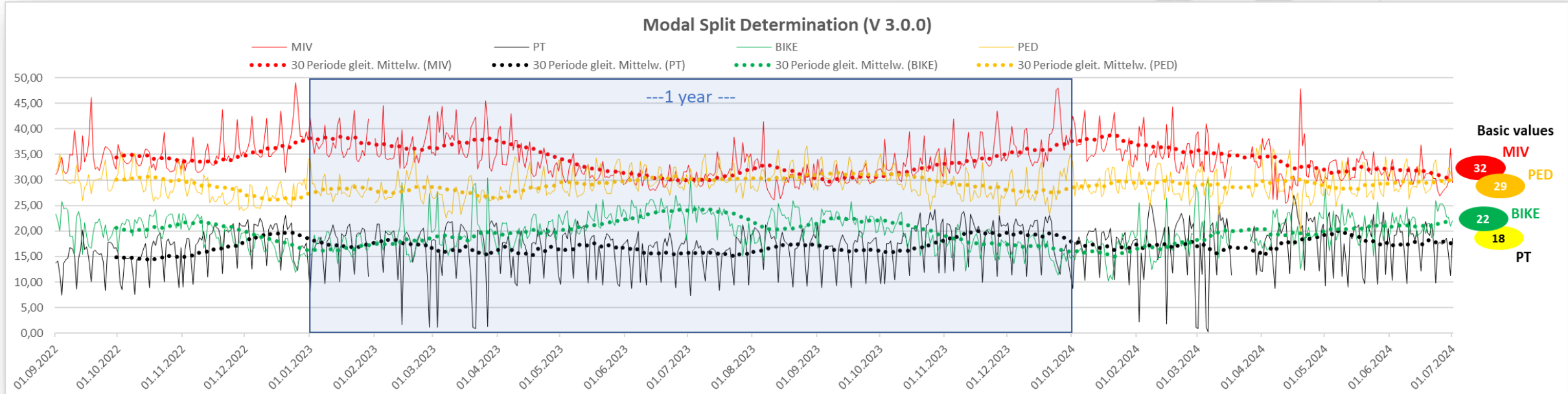
Di	14.02.2023	Strike KVB
Mo	27.02.2023	Strike KVB
Fr	03.03.2023	Strike KVB
Mo	20.03.2023	Strike DB
Di	21.03.2023	Strike DB
Mo	27.03.2023	Strike DB

Nearly all extreme / unusual values can be reasonably explained by

- public holidays
- strike days
- extreme weather conditions!

Modal split determination - shares over 2 years + future work

Results (3/3)



Modal Split determination by DLR is able to reproduce daily city-wide values especially concerning the following characteristics:

- Regular / periodical:
 - daily variations
 - weekly variations
 - (school) holidays
 - yearly / seasonal variations
 - public holidays and bridge days („Brückentage“)
- Irregular/occasional:
 - public transport strikes (Deutsche Bahn)
 - local public transport strikes (Kölner Verkehrsbetriebe (KVB))
 - special weather situations (ice, snow)
 - (major events)

Some current and future work:

- Evaluation / quality checks**, e.g. by comparison to MiD2017
- Application in **other cities** / regions
- Not just daily, but even **hourly during the day**
- Not only for the whole city, but even for **districts** or **free-definable areas** (e.g. „hotspots“ or around event locations or areas which are affected by traffic management measures or packages of measures; for this comprehensive geolocalisation is needed!)
- Forecast** of modal split for current and following days