CALGARY 2022 CANADA

FEBRUARY 7–11 | 7–11 FÉVRIER | 7–11 DE FEBRERO

MOMENTUM: Leveraging big data to increase urban mobility resilience

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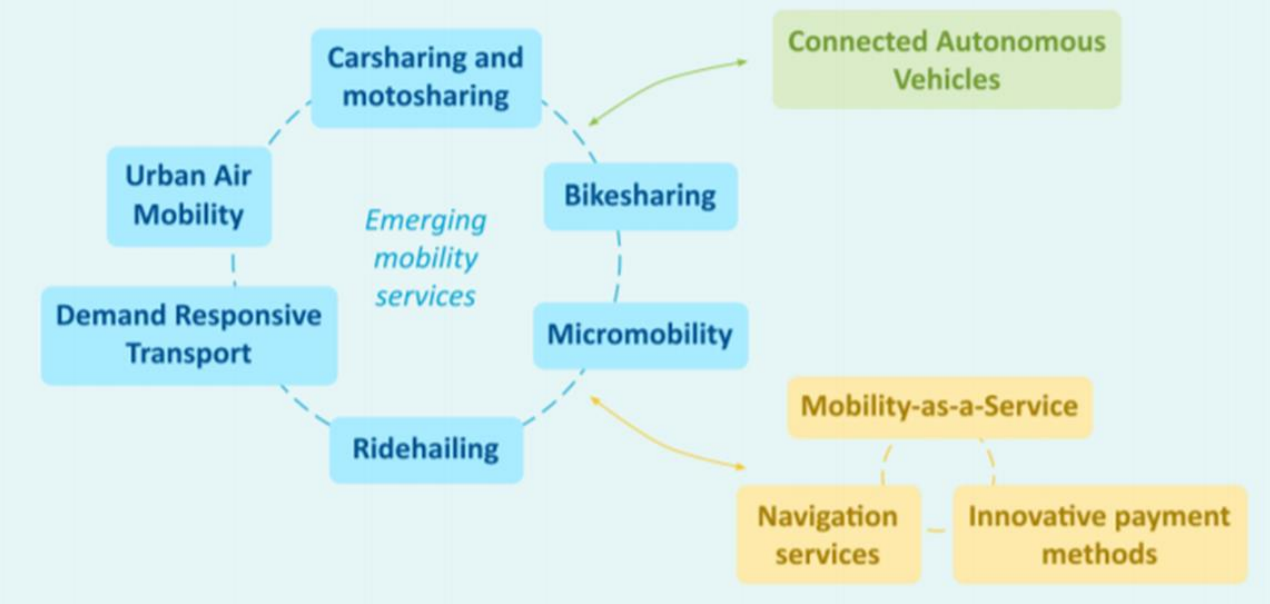
The challenge of new mobility services



- Service adoption drivers
- Supply-demand interaction
- New impacts to assess
- ...

Data analysis and **modelling techniques** used by transport practitioners **need major adaptations**

Technical advancements need to be **integrated in tools that are usable by policy-makers**

MOMENTUM project

- Modelling Emerging Transport Solutions for Urban Mobility
- H2020 project funded by European Commission (May 2019 – May 2022)

Develop a set of **new data analysis methods, transport models and planning support tools** to capture the **impact of new transport options**, in order to **support cities** in the task of **designing the right policy mix** to **exploit the full potential** of these emerging mobility solutions

Case studies

- Leuven
- Madrid
- Regensburg
- Thessaloniki

MOMENTUM project

- **Data analytics developments**: techniques to exploit the data generated by new services – together with other emergent disaggregated demand sources

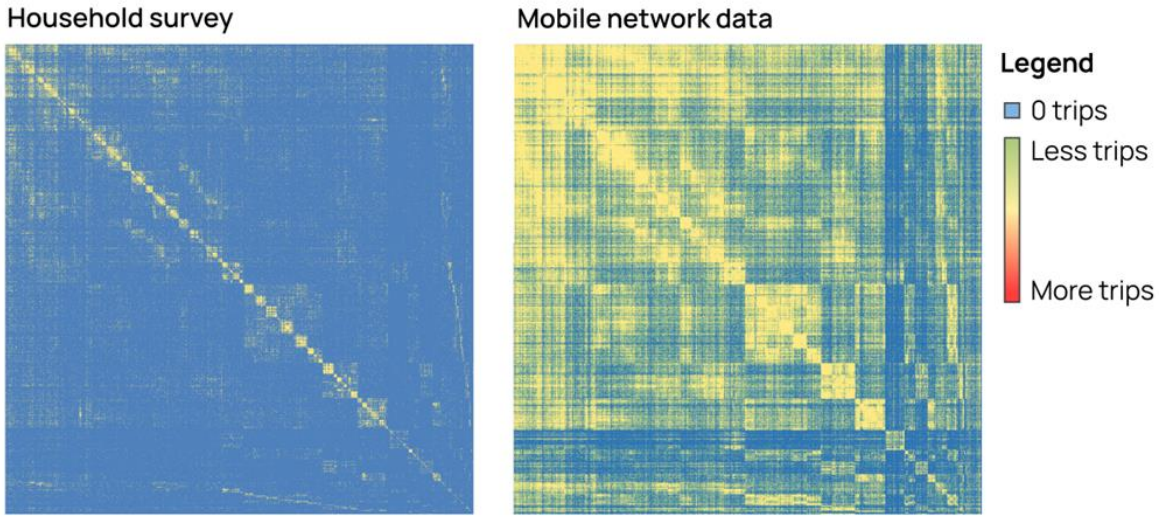
Shared mobility user profiling

Shared mobility demand monitoring

On-demand trip clustering

OD matrices similarity measures

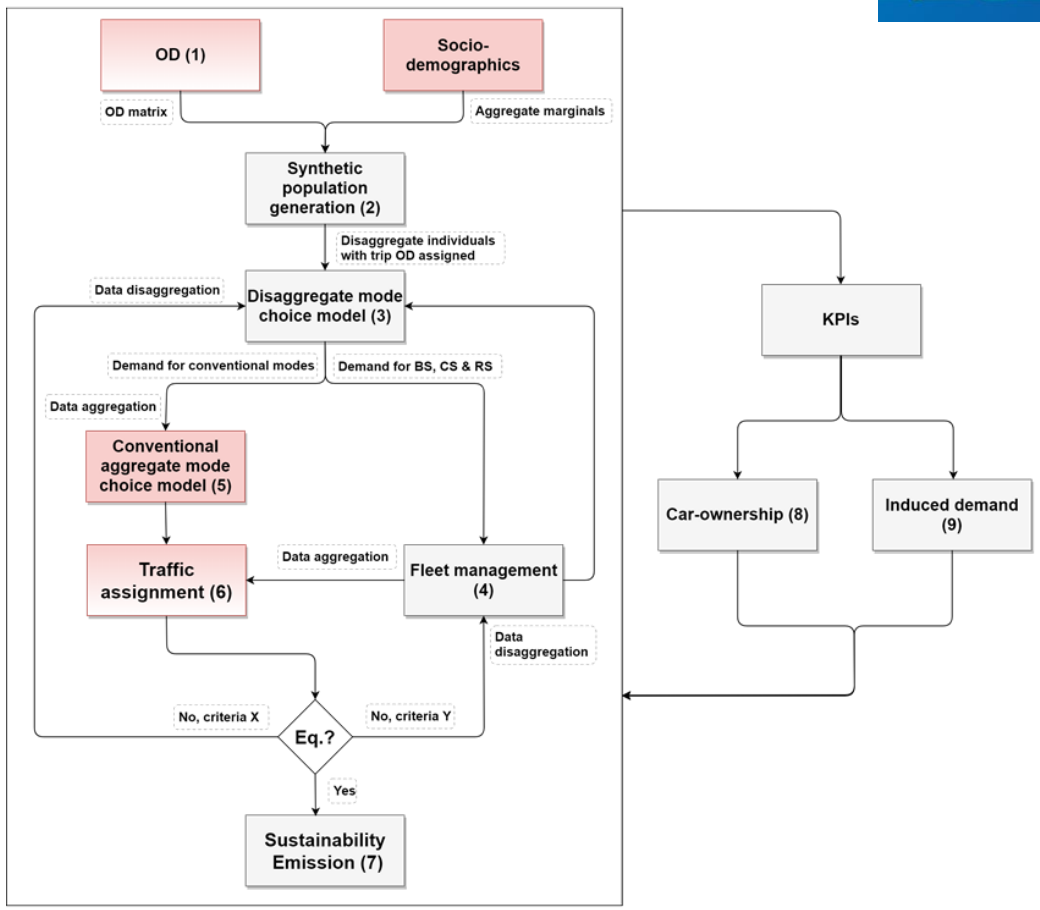
Representative OD matrix estimation



MOMENTUM project

- **Modelling developments**:
  - A modular approach – techniques adapting & improving several transport modelling steps
  - A complete modelling toolset to cover both **low-penetration** and **high-penetration** scenarios for new mobility solutions

https://github.com/h2020-momentum



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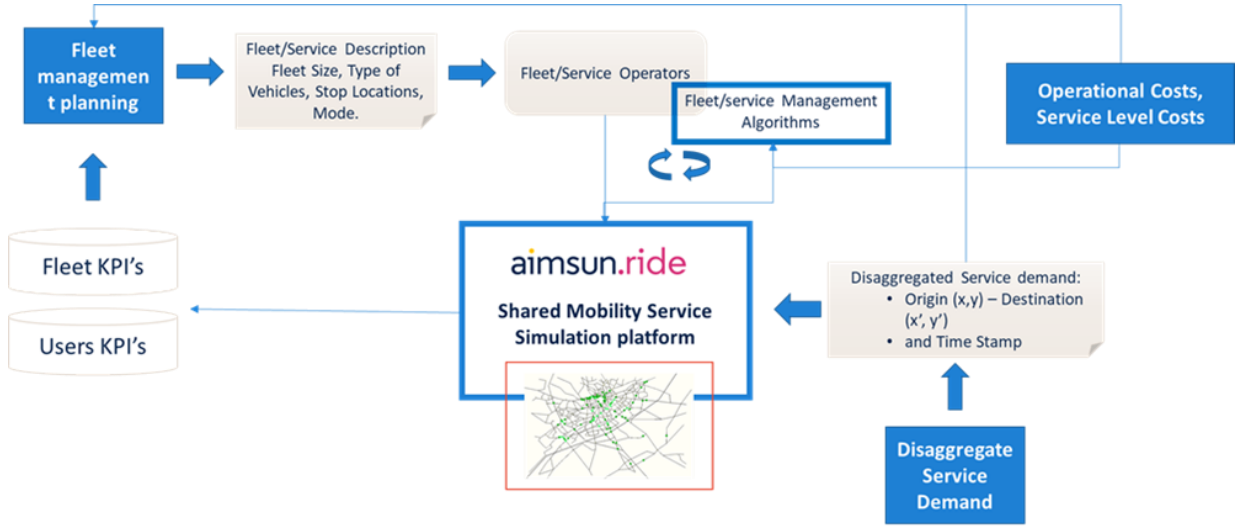
- **Modelling developments**: an example – fleet management solutions
  - Aimsun Ride solution: simulation of shared mobility operations and their impact on the network
  - Set of planning and operation algorithms adapted to different services



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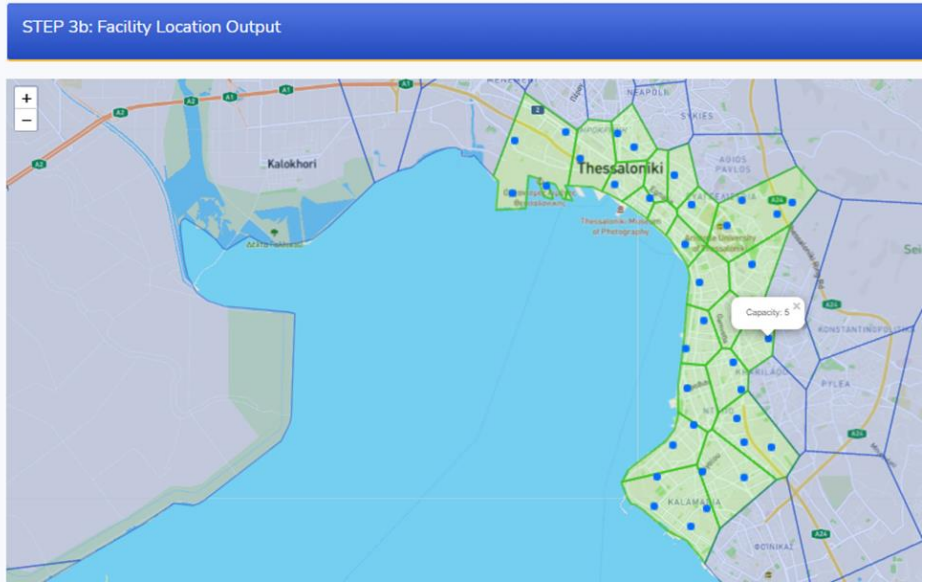
- **MOMENTUM Decision Support Tool:** leverage the data analysis and modelling developments through a flexible DST – enabling evidence-based policy assessment

	Input data requirements	Analysis capabilities
Level 1	**Low**: demographics + socioeconomic data	**Analytical**: preliminary transportation design
Level 2	**Medium**: mobility data	**Extensive**: data-driven decision-system
Level 3	**High**: full information using transport simulation tools	**Comprehensive** transport planning

https://momentum.imet.gr/



A context of increasing uncertainty

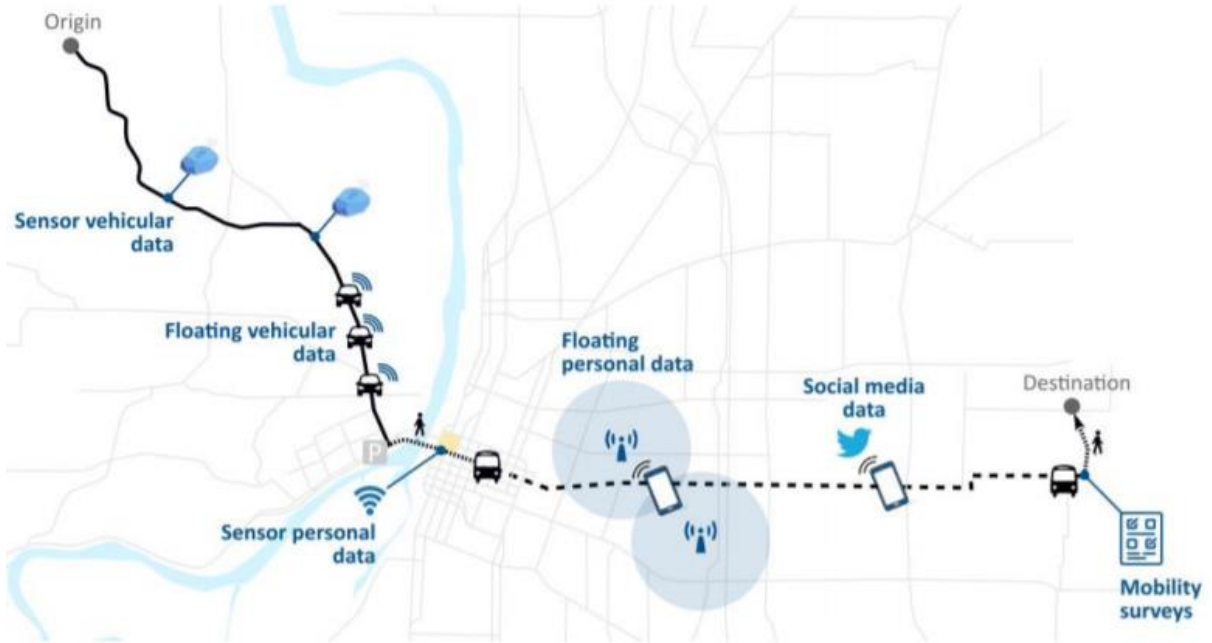
- Faster changes require to move from **cross-sectional analysis to longitudinal approaches**
  - ✓ Emergence of shared mobility services... but not only!
  - ✓ Urban sprawl and relocation of activities
  - ✓ Vehicle automation
- Accelerated travel demand change by the **pandemic**
  - ✓ Dynamic mobility restrictions as the pandemic evolves
  - ✓ Decline in mass transit use due to health risk perception
  - ✓ Reduction of mandatory mobility flows as teleworking increases
  - ✓ Sudden demand changes in touristic areas as travel restrictions are modified
  - ✓ Tactical urbanism and promotion of active mobility

Uncertainty requires resilient strategies!

Big Data as a tool for resilience

Mobile devices + Geolocation + IoT

New Big Data sources for characterising how people, vehicles and goods move



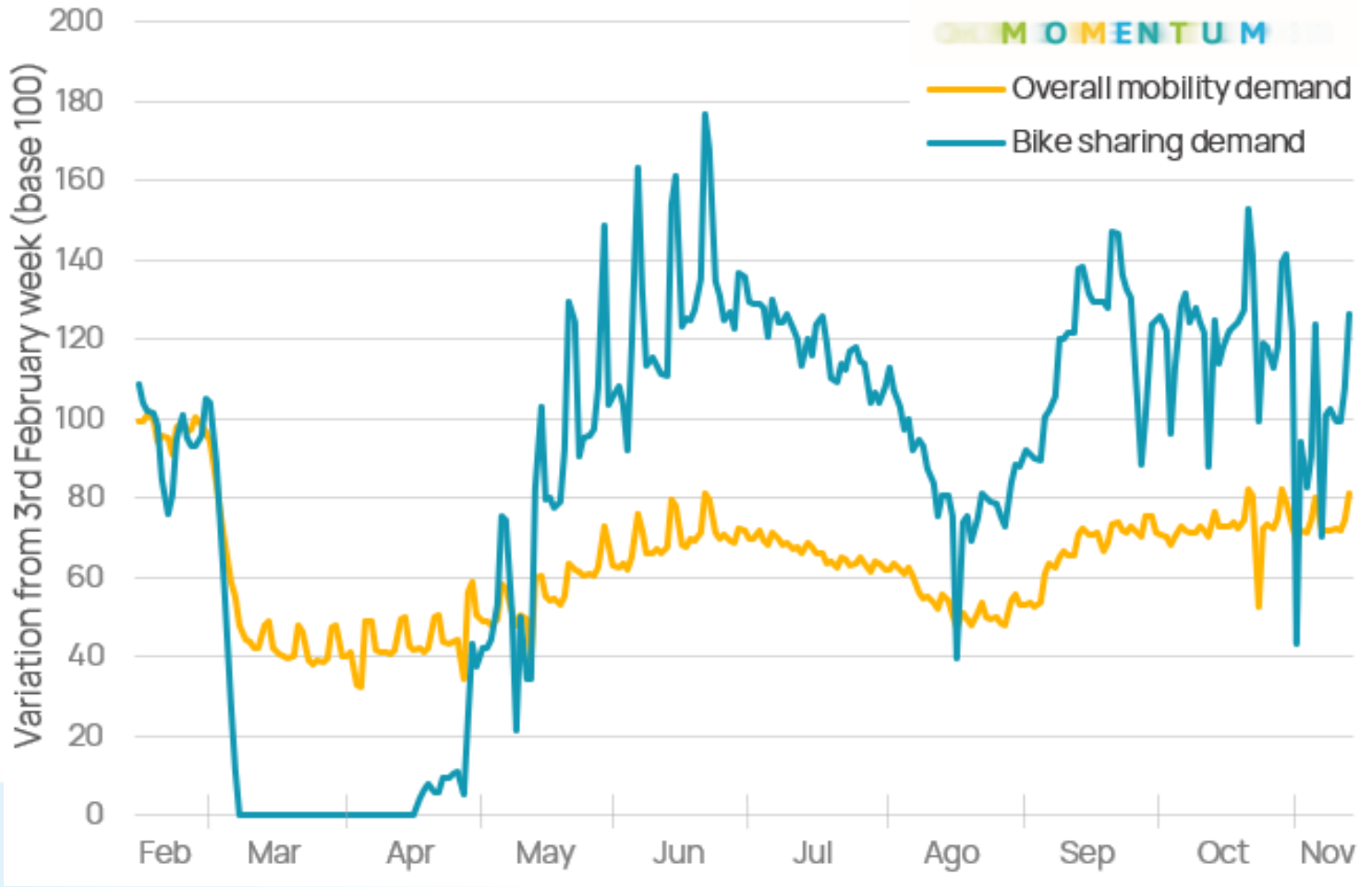
An opportunity for complementing traditional mobility data collection methodologies

Monitoring mobility patterns

- How **bike sharing demand reacted to COVID-19 in Madrid**?

  - ✓ Overall mobility demand can be measured through **anonymised mobile network data** with an unprecedented level of detail (spatial, temporal) and sample size (up to 25%)

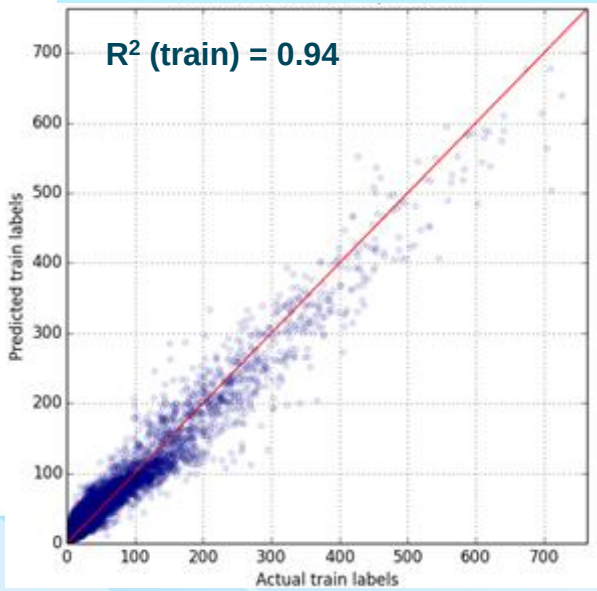
  - ✓ The digital nature of shared mobility services enables fine-grained monitoring of usage patterns

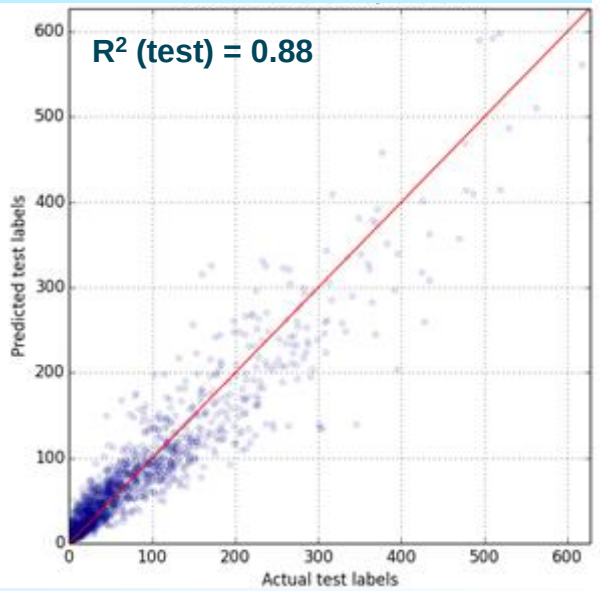


From monitorization to anticipation

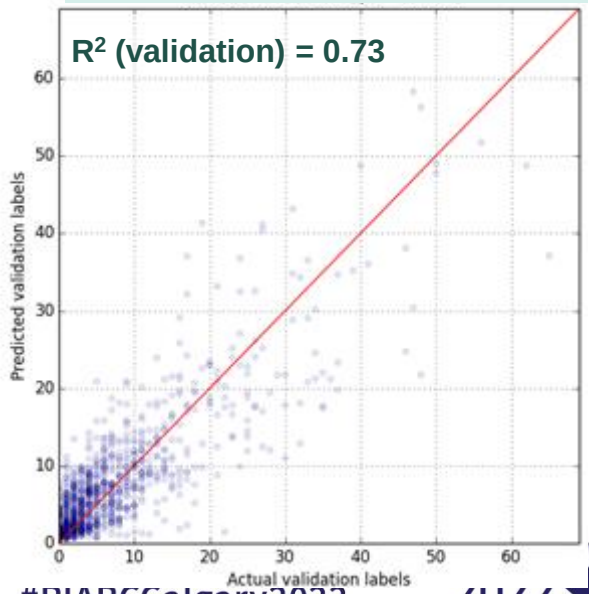
- The availability of longitudinal datasets about travel demand patterns opens the door to the use of **machine learning** techniques
- The combination of mobile network data (potential demand), service operation data (actual demand) and contextual datasets fuels models for **anticipating service needs**

Training and testing a model with data from October 2019 and 3 weeks from February 2020





Can we predict additional days in February 2020?



Key takeaways

- **Conclusions**
  - ✓ Longitudinal data sources are **already being collected**!
  - ✓ **Tailored analytics and data fusion** strategies are key for travel demand monitoring
  - ✓ Monitoring can already improve our adaptation to change, but **predictive analytics** will make the difference
- **Moving forward**
  - ✓ Promotion of data **sharing agreements** and data **standards**
  - ✓ From **travel demand flows** to **traveller mobility patterns**: monitoring and predicting impacts in different population groups

Thank you!

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