AALBORG UNIVERSITY
DENMARK

GPS Trajectory Data for Traffic Accident Impact Assessment

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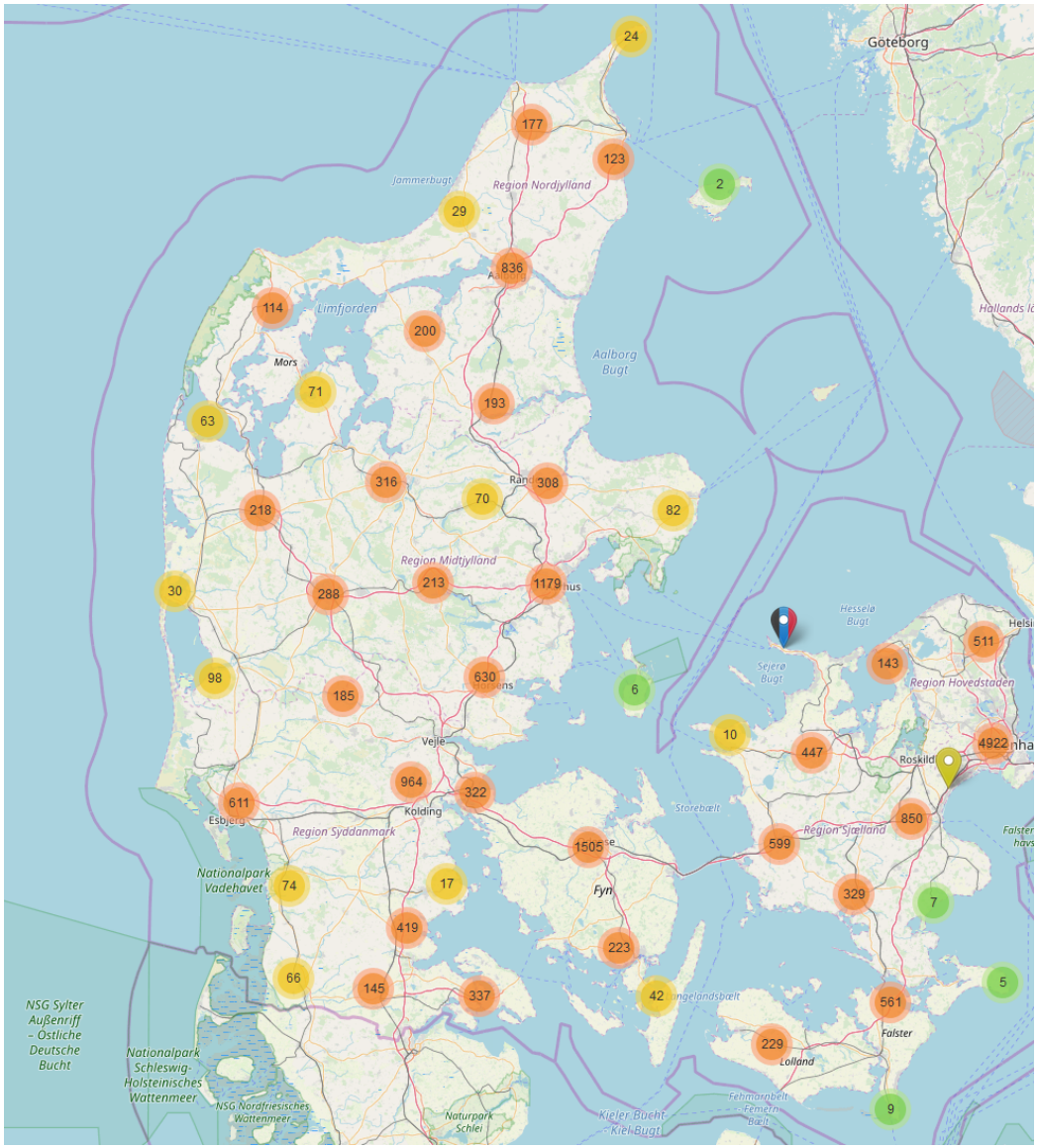
Collaboration/Feedback Partners

FlexDanmark

LB Forsikring

NORDJYLLANDS POLITI

Traffic Accidents, DK 2013-2017



- ~16,000 accidents
- Only when police
- Extract from VD
  - Newer data source
- Not available online
  - GDPR issues

Background, Questions, and Goals

- Background
  - Estimated that 50% of delay in traffic is due to “unplanned events”
  - Major issue for traffic planning, price goes up

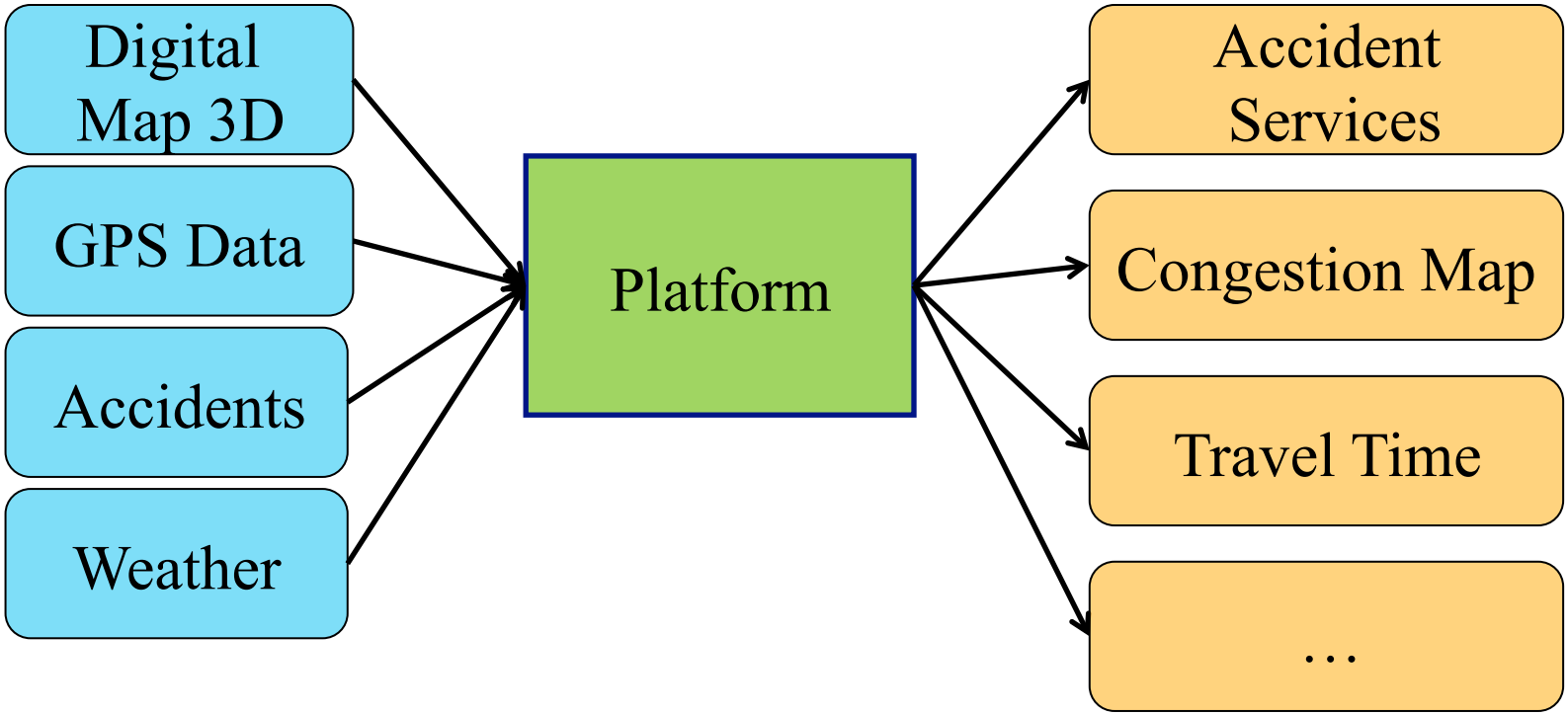
- Questions
  - Can GPS data be used to **detect** the impact on traffic when there is an accident?
  - Can we quantify for **how long** an accident has an impact?
  - Can we determine the **area** in which an accident has an impact?

- Goals
  - Explain why late
  - Early warning for traffic planners

Data Foundation

- Accident data
  - ~16,000 accidents in Denmark 2013-2017
  - Data from Danish Road Directorate (VD)
- GPS data
  - ~53 billion GPS rows
  - 28,000-130,000 vehicles/day
  - Data from various sources including FlexDanmark
- Weather data
  - 77 official weather stations in Denmark
  - Data downloaded from NOAA
- Digital road network
  - Uses OpenStreetMap

Overall Software Architecture

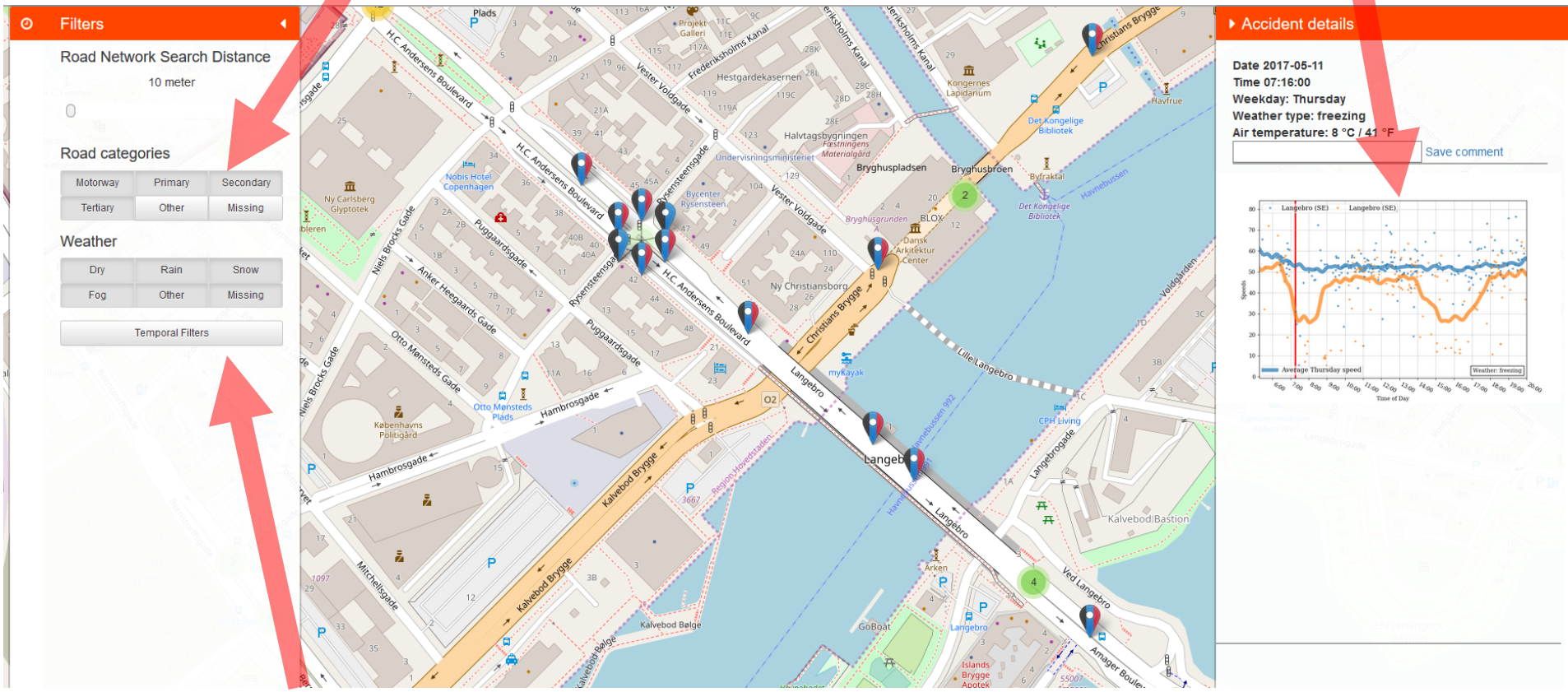


- Platform is a classic data warehouse solution
  - PostgreSQL, PostGIS (data management)
  - Python for data processing (ETL)
  - JavaScript (web)
- New data loaded in nightly batches

Overview Copenhagen

Road-Category Filter

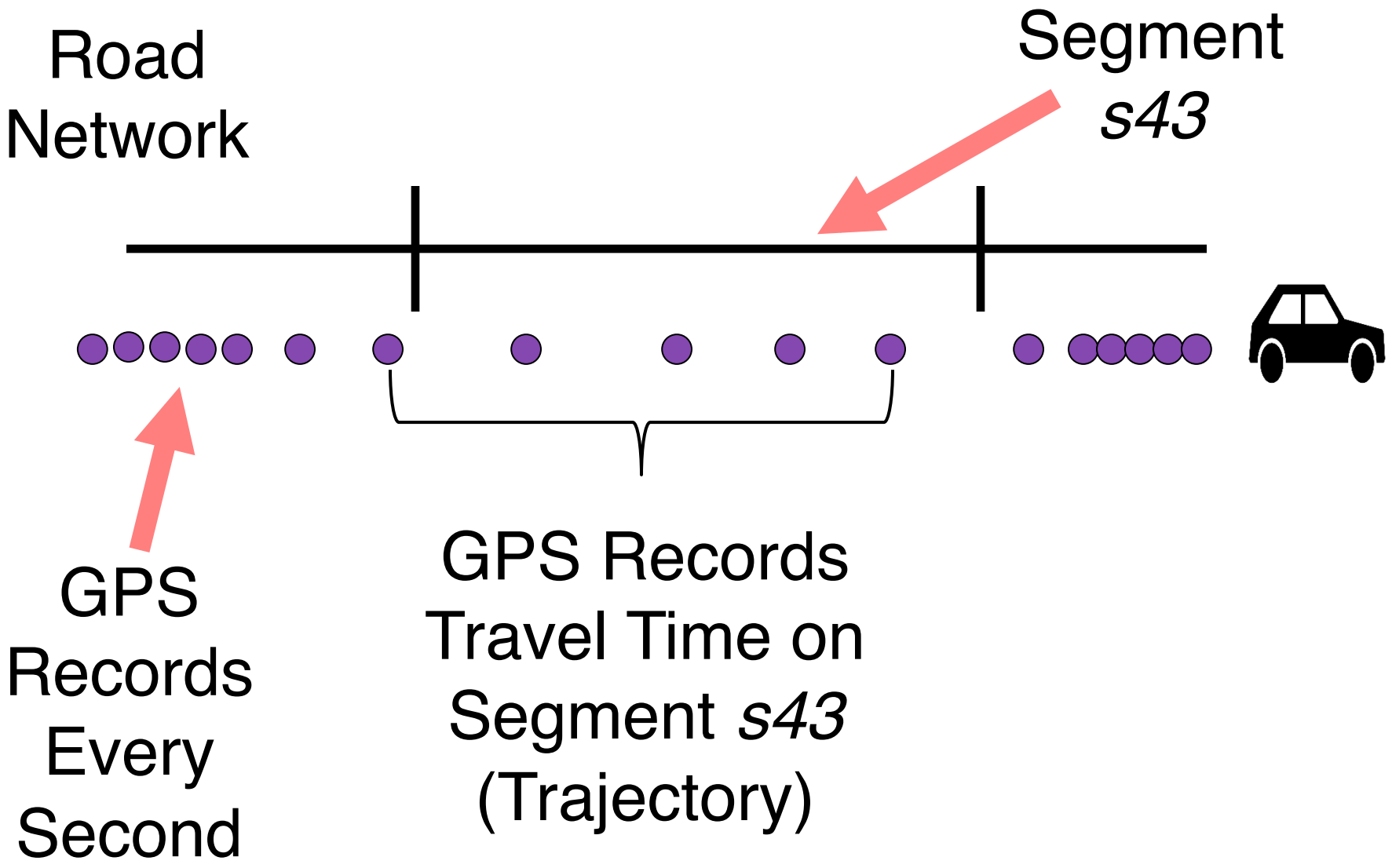
Result Single



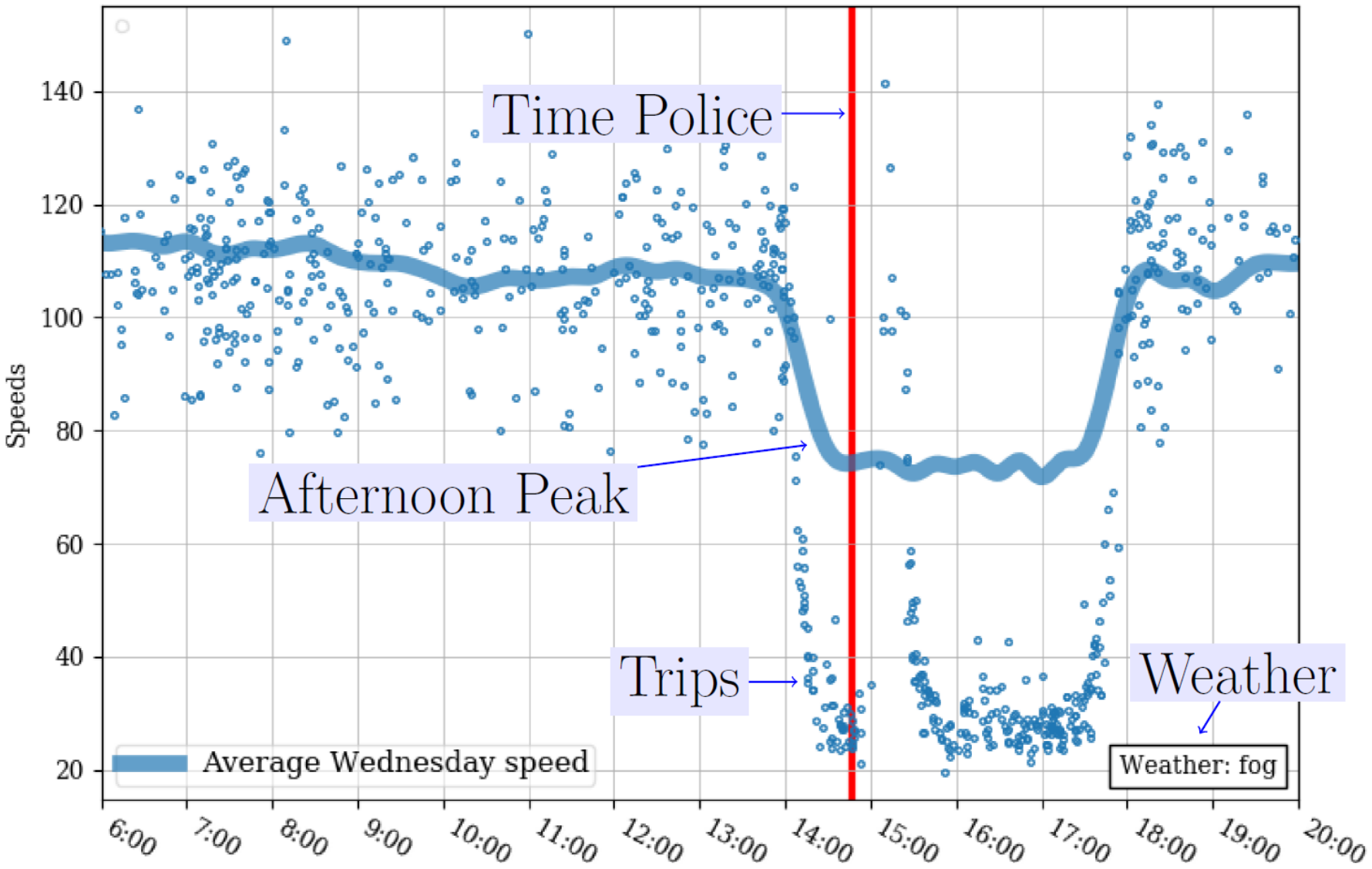
Weather Filter

Integration of Traffic Accident Data

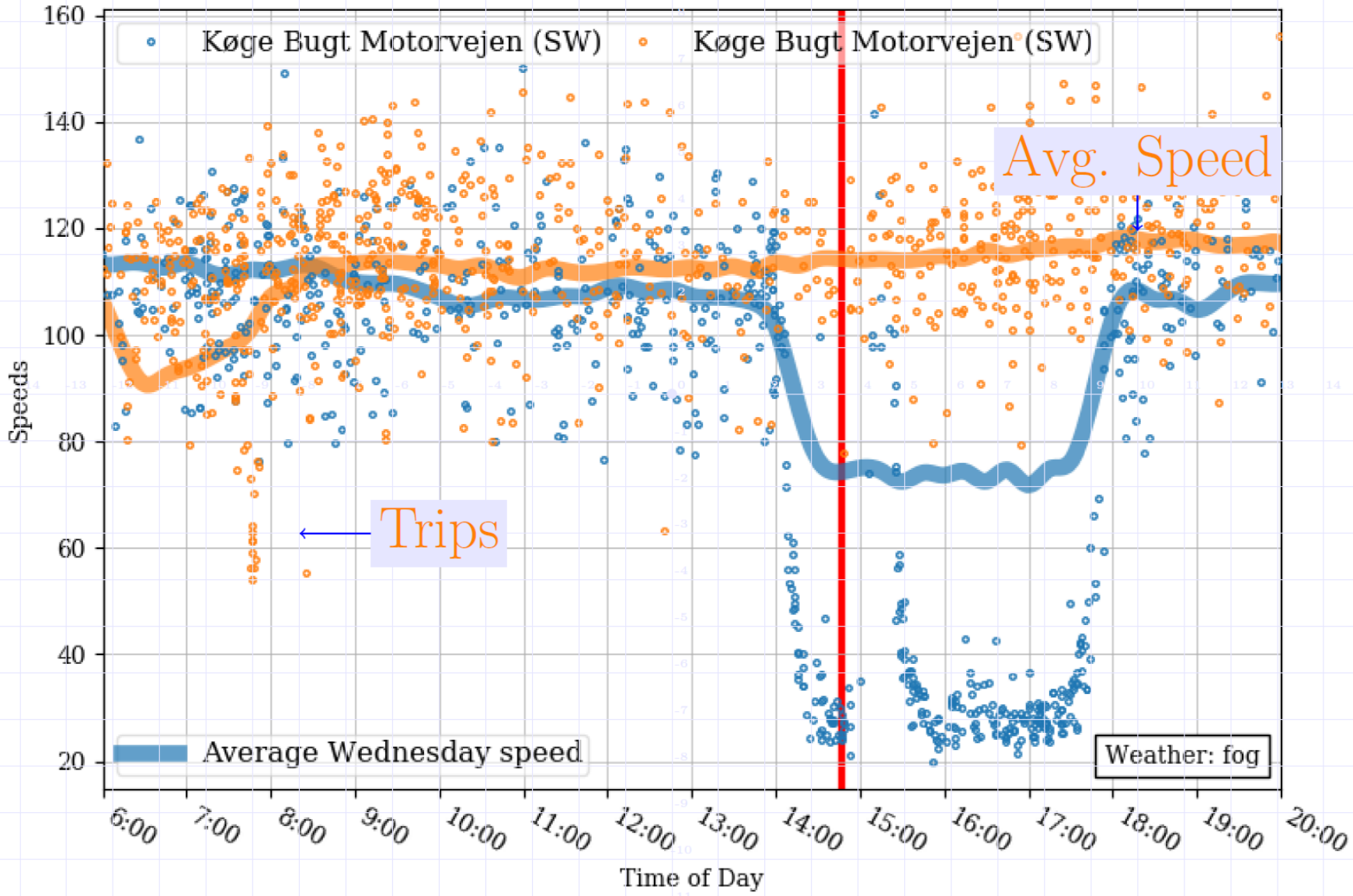
GPS Data to Travel Time



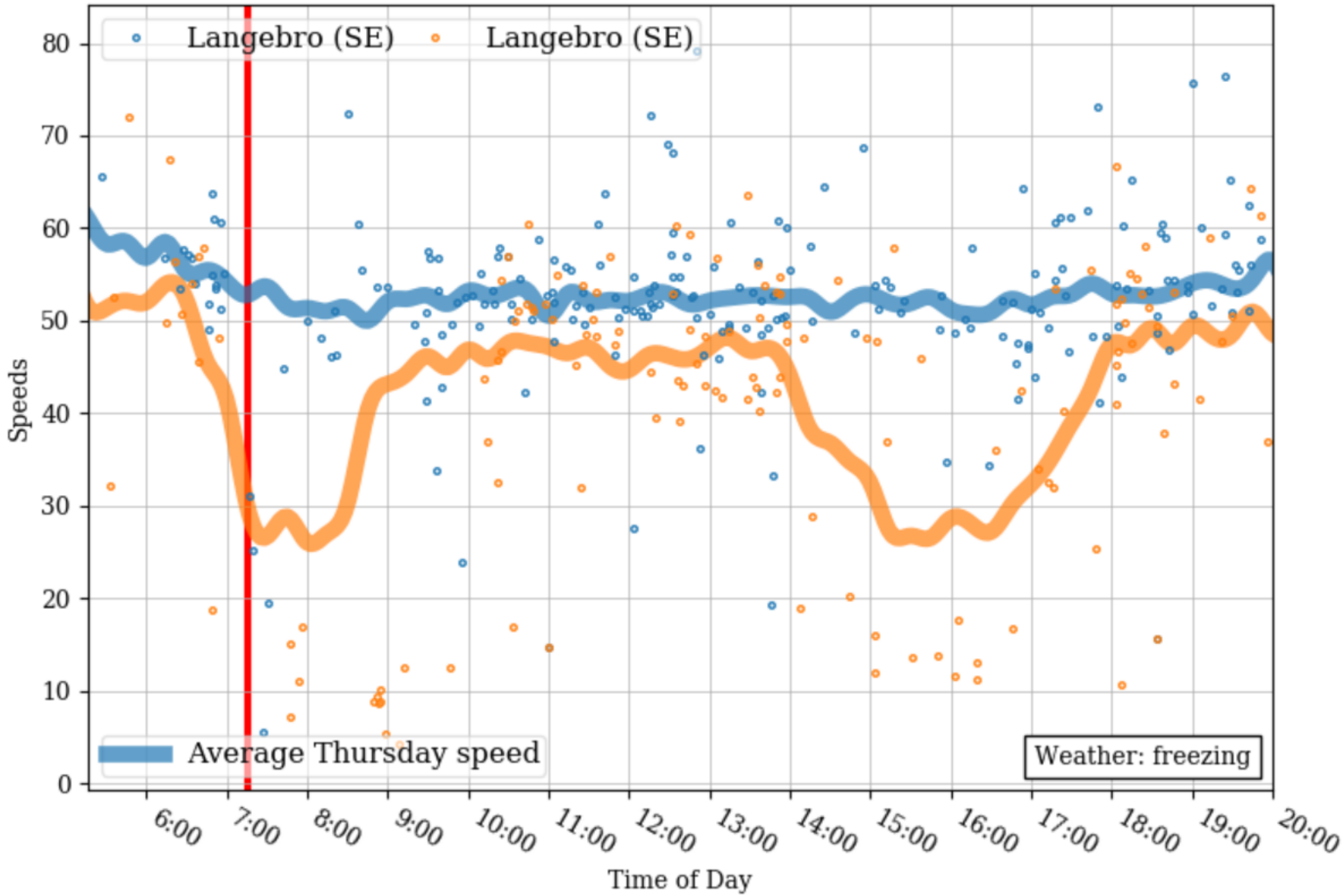
Motorway, Accident Wednesday



Accident Wednesday, Two



Langebro, Accident Thursday



Summary

- *Can GPS data be used to detect the impact on traffic when there is an accident?*
  - Yes, but need a very large set of vehicles
  - Works best on the major road network
- *Can we quantify for how long an accident has an impact?*
  - Yes, quite clearly on main roads, less on smaller roads
- *Can we determine the area in which an accident has an impact?*
  - Maybe, very hard to determine accurately!
- Working on
  - Real-time assessment
  - Spatial/temporal impact assessment in a more generic fashion
    - Key Performance Indicators (KPIs)
  - Opening up to the world

Thank you for your attention