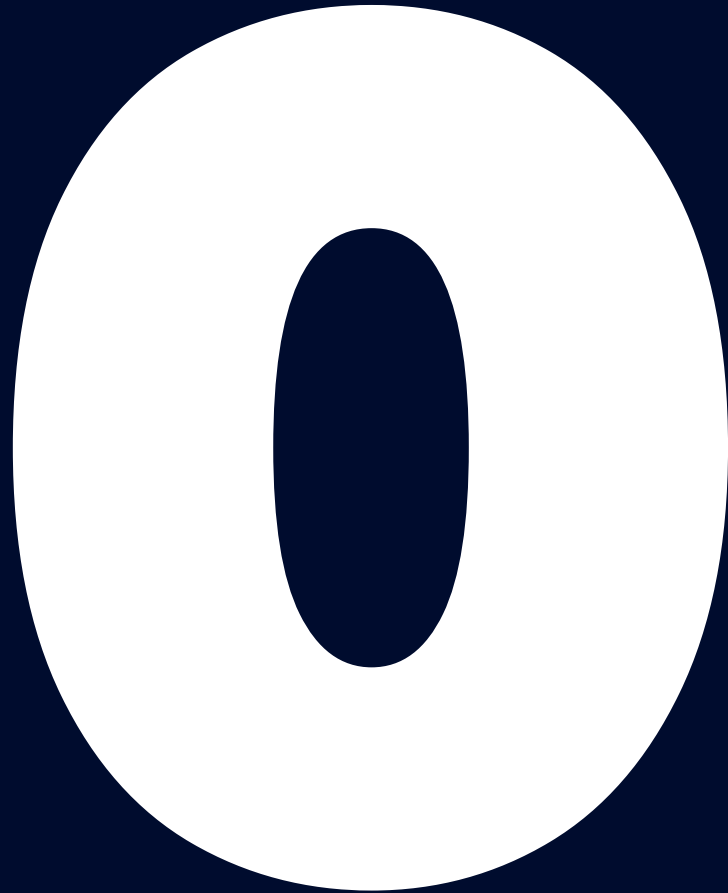Emil Tin, ITS Program
City of Copenhagen

# Cycling Data for Active Traffic Management in CPH

**Innovative ways of collecting cycling data in Copenhagen**

KØBENHAVNS KOMMUNE

0

CPH 2025 CLIMATE PLAN

Copenhagen Carbon Neutral by 2025

A GREEN, SMART AND CARBON NEUTRAL CITY

# Service goals

- Reduce travel time for cyclists by 10% on specific corridors

- Reduce number of stops for cyclists by 10% on specific corridors

- .. as well as goals for busses, pedestrians and cars

# 10%

# Active Traffic Management

- Ability to monitor and manage traffic as it happens

- Data within minutes, not days/weeks/months

- Many data sources are fine for analysis, but not fit for operational use

- Yes, data and active traffic management should also be for bicycle traffic

# Key Metrics

- Volume
- Travel time
- Number of stops

# Volume?

- Loops
  - often destroyed
- Radars
  - can't count groups
- Apps
  - no absolute counts

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# ViSense

- Camera sensors mounted in traffic light poles

- Images analysed on the device, only simple counts are transmitted

- Need to improve performance in some low-light situations

| Hour  | Detected | Truth | Missed |
|-------|----------|-------|--------|
| 8:00  | 445      | 434   | 2.3%   |
| 16:00 | 359      | 352   | 2.0%   |
| 23:00 | 47       | 46    | 2.2%   |

# ViSense installations

# Automatic traffic optimization

- Scenarios are configured in MobiMaestro, and can use volumes, e.g:
  - IF service goals is met on the corridor
  - AND more than 300 cyclist / min for at least 15 minutes on side street
  - THEN change signal programs to prioritize side street
- Not just local traffic control – can consider the big picture
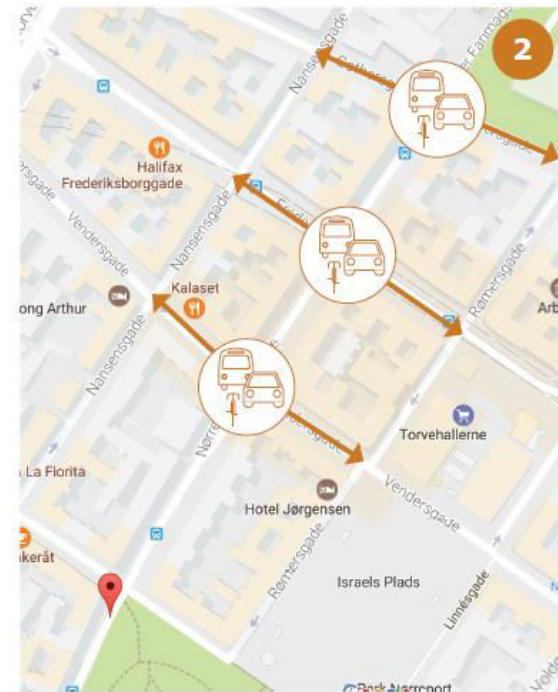
# ViSense data
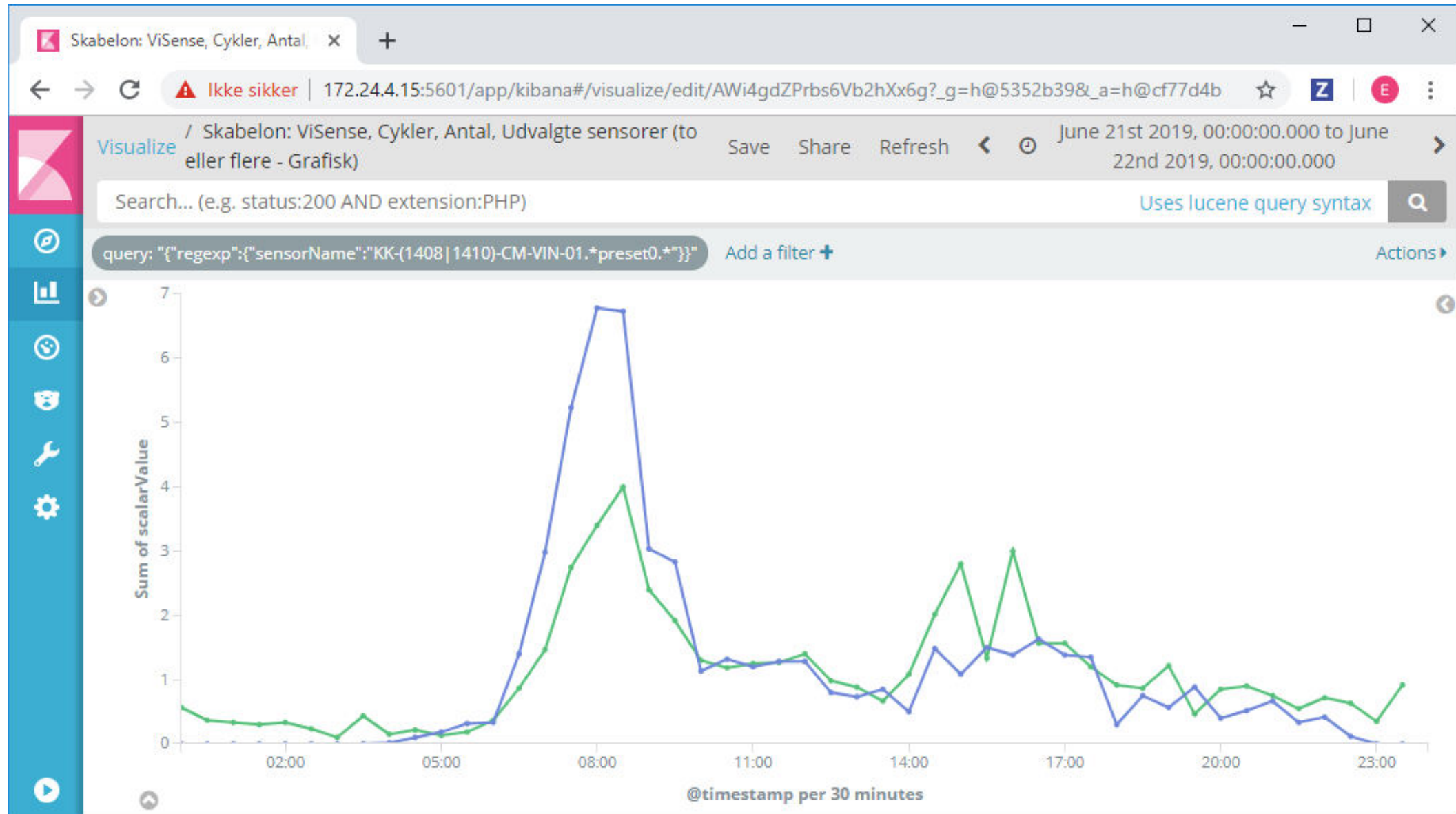
# Travel time / number of stops?

- Hard to find existing solutions that deliver <u>operational</u> travel times or number of stops for cyclists

- Need to track individual cyclists?

- Need to install a lot of equipment?

# Shared City Bikes?

- All bikes have GPS
- 1.5 million trips per year

- But not <u>operational</u> data
- Ex: Bredgade/Grønningen
  - 440 trips / day
  - Only 15 travel times / day



**Measured travel times 11-08-2016**
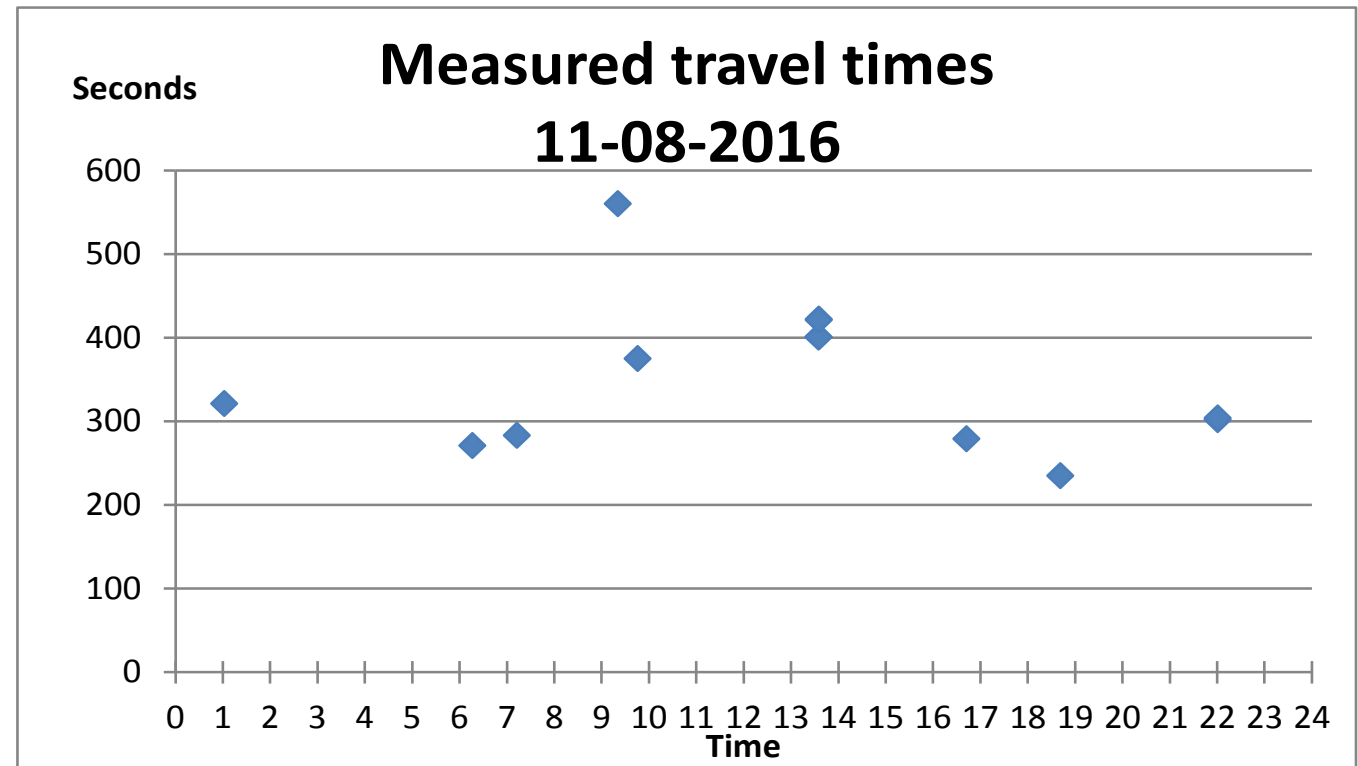
# Apps?

- Its' the future! But still hard because:
  - Single apps provide too little data
  - User group too narrow, leading to biased data
  - Uncertainty about quality of data

- A few big players probably have enough data, but don't (yet) have a business model for selling it
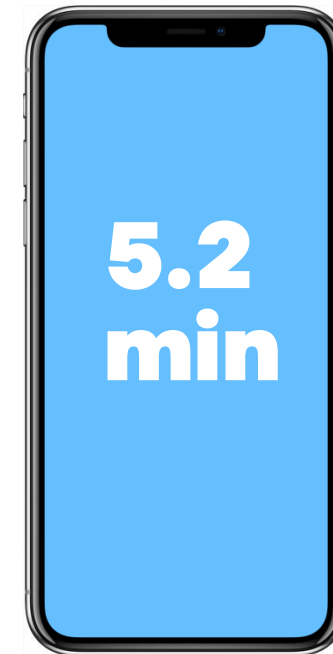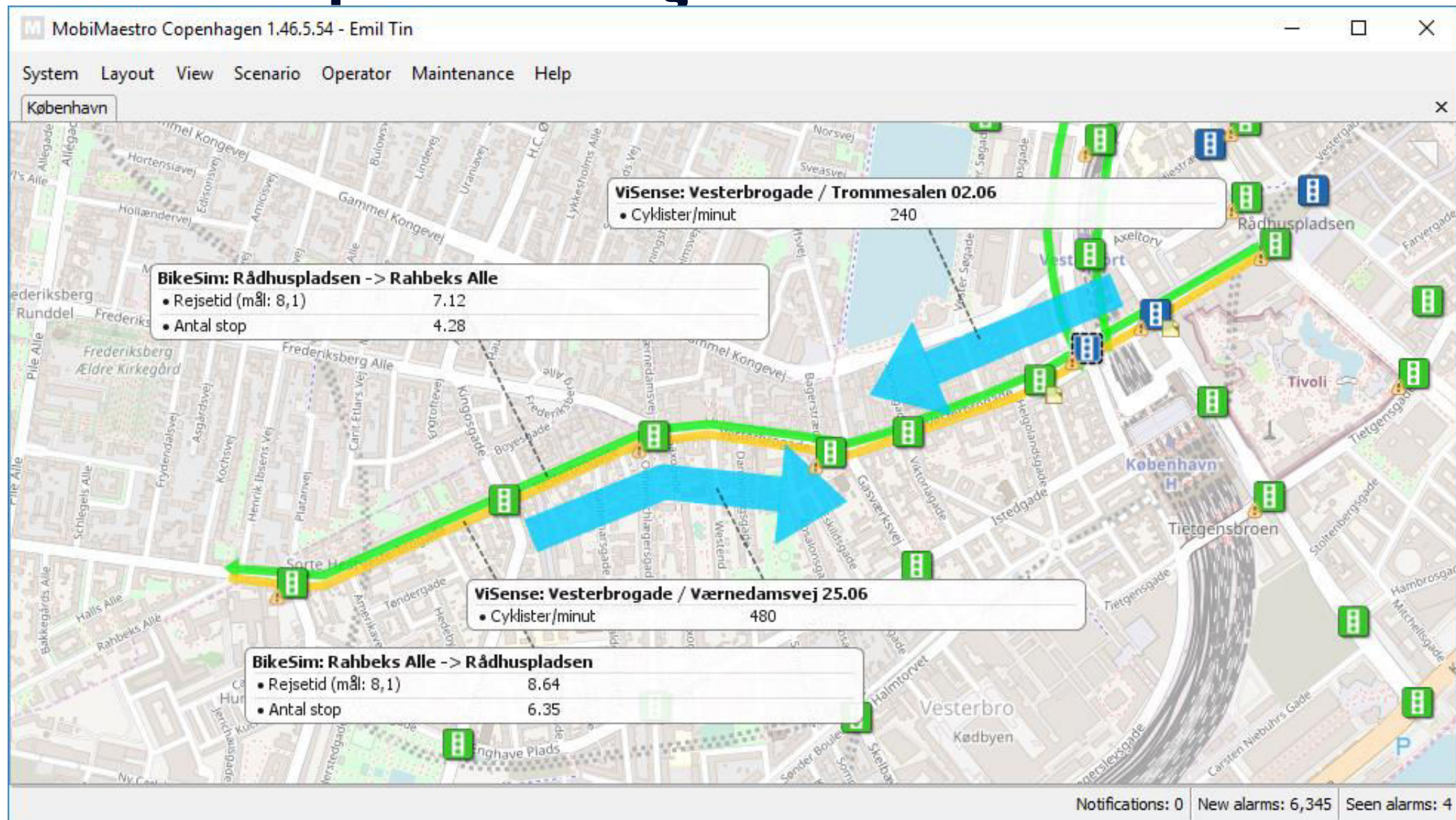
# BikeSim

- Smart reuse of existing equipment and systems
- We can already fetch real-time data from all traffic lights!
- Part of our MobiMaestro traffic management system

- BikeSim computes estimated travel times and number of stops based  on:
  - Actual signal state of traffic lights
  - Distance between intersections

- Monte Carlo simulation of cyclist moving along a corridor
- Optionally use of volume sensors for estimating the effect of crowding
- Data fetched from traffic lights using the open RSMP protocol

# BikeSim example: Vesterbrogade

# BikeSim concept
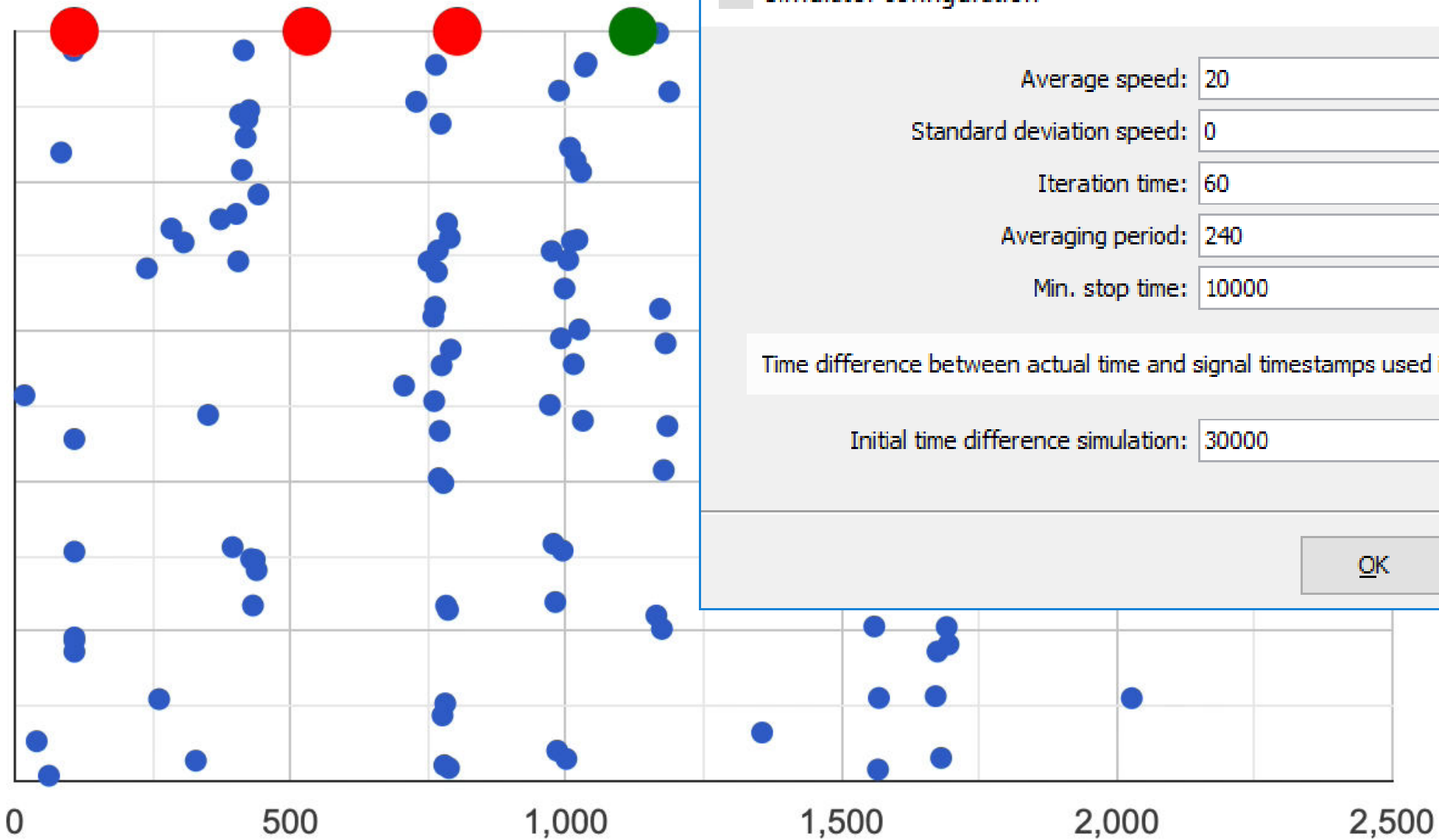


**Simulator configuration**                                                                ✕

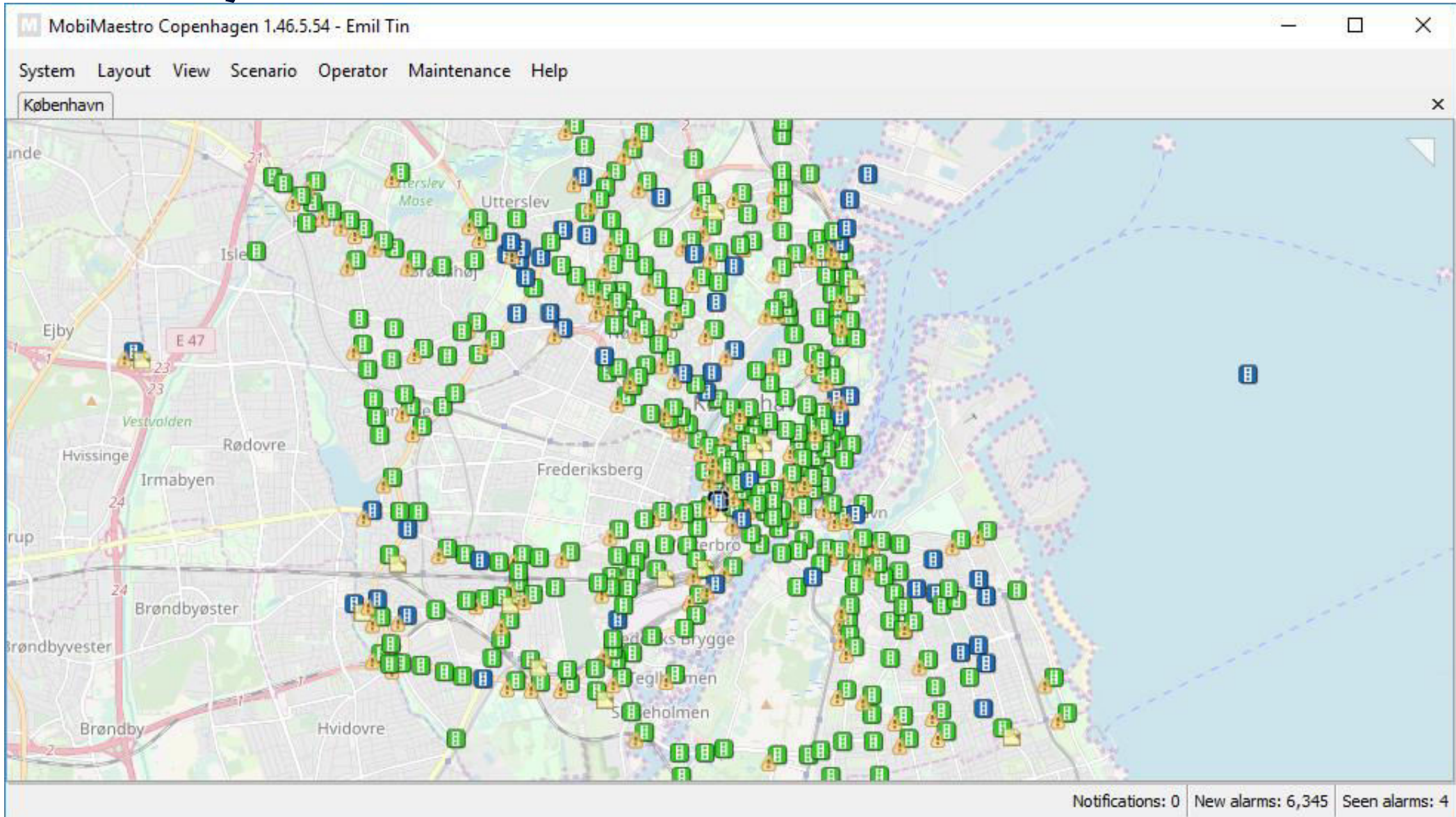| | |
|---|---|
| Average speed: | 20 | km/h |
| Standard deviation speed: | 0 | km/h |
| Iteration time: | 60 | sec |
| Averaging period: | 240 | sec |
| Min. stop time: | 10000 | ms |

Time difference between actual time and signal timestamps used in the simulation

Initial time difference simulation: 30000 ms

OK        Cancel
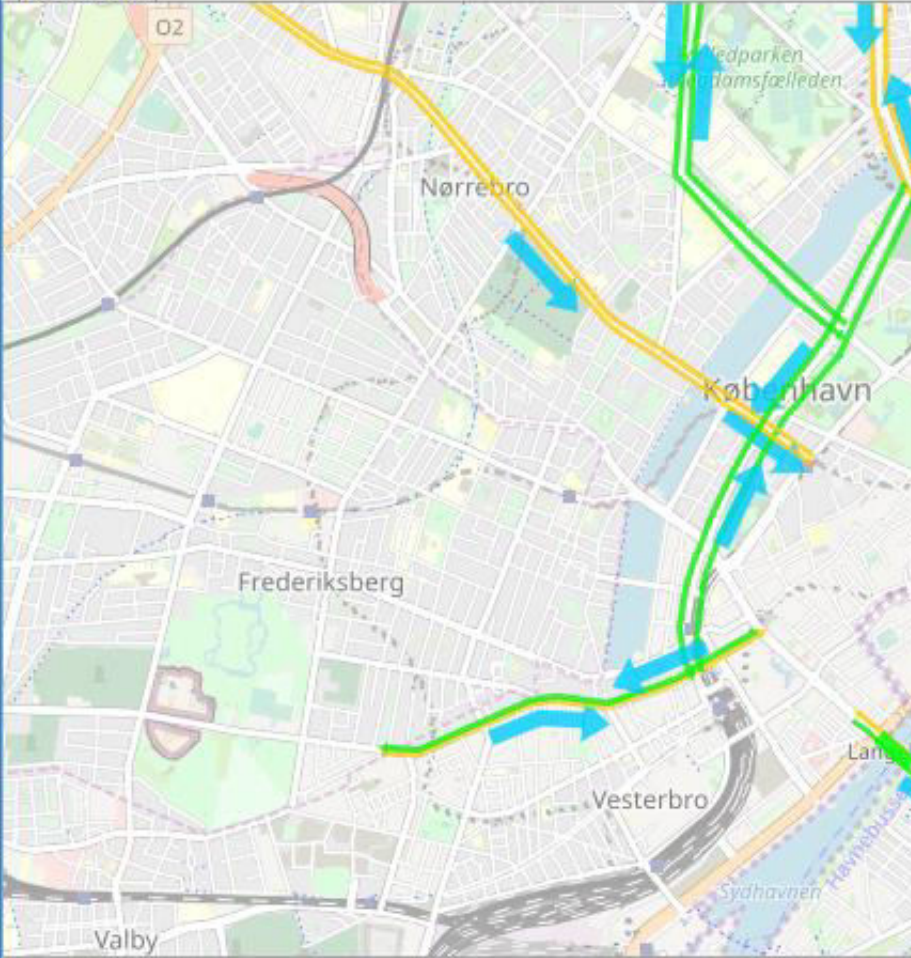
# Traffic Lights: our travel time sensor network

# BikeSim operational views

# Automatic selection of VMS content based on travel times

# BikeSim data

# BikeSim data

BikeSim servicemål - Kibana

△ Ikke sikker | 172.24.4.15:5601/app/kibana#/dashboard/AWoGP4XCNqB0xc9HGQpU?_g=h@89915fc&_a=h@5338243
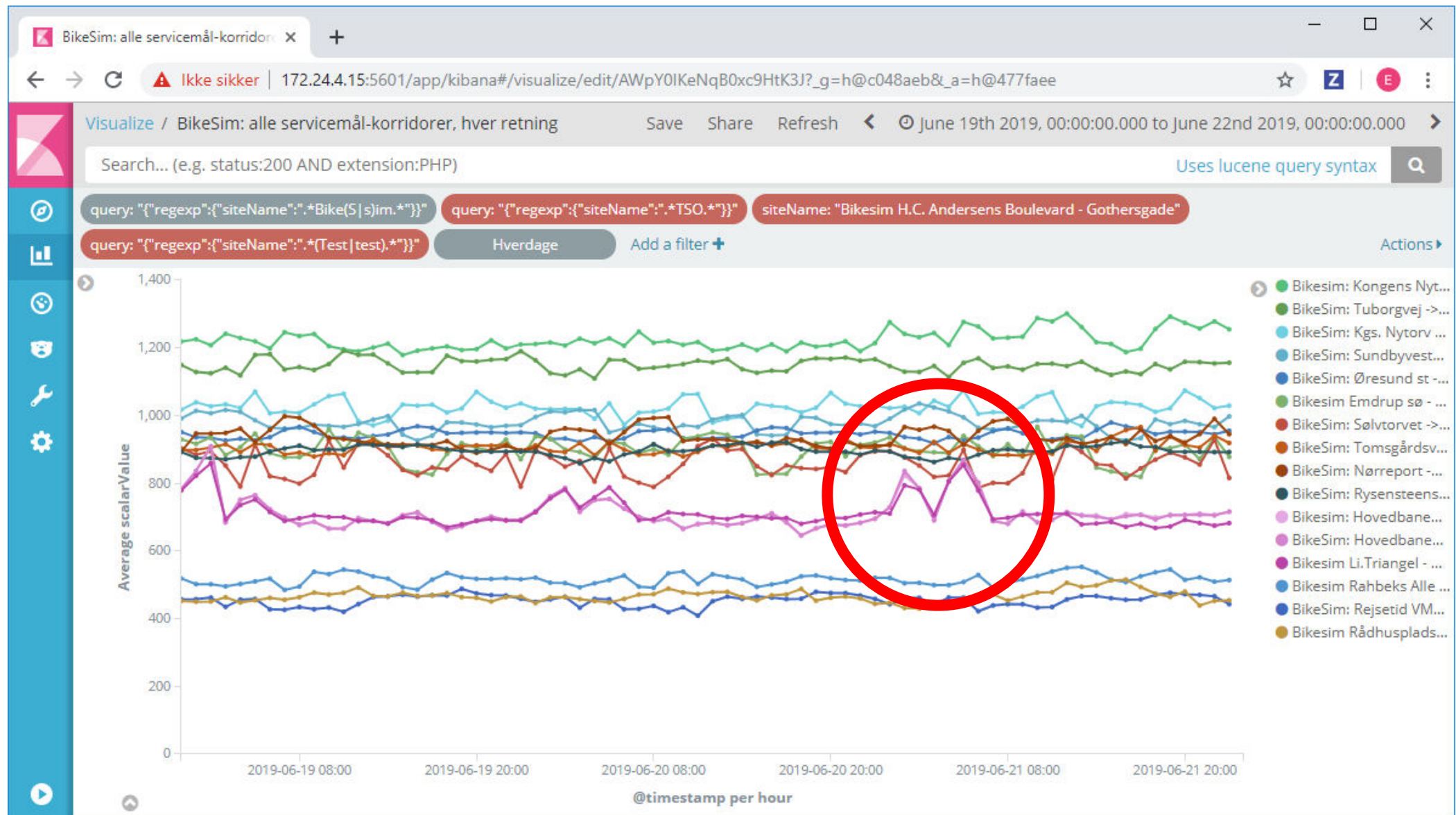
Dashboard / BikeSim servicemål　　　　　Share　Clone　Edit　‹　⊙ June 6th 2019, 23:59:59.994 to June 8th 2019, 23:59:59.994　›

Search... (e.g. status:200 AND extension:PHP)　　　　　　　　　Uses lucene query syntax

Add a filter +

BikeSim: Rejsetid, alle korridorer, som tabel

| filters | Rejsetid (minutter) |
| --- | --- |
| 1 Tuborgvej - Kongens Nytorv | 19.92 |
| 2 Emdrup Sø - Sølvtorvet | 14.612 |
| 3 Tomsgårdsvej - Nørreport | 15.571 |
| 4 Rahbeks Allé - Rådhuspladsen | 8.307 |
| 5 Øresund Station - Rysenstensgade | 15.528 |
| 6 Sundbyvester Plads - Kongens Nytorv | 16.865 |
| 7 Lille Triangel - Hovedbanegården | 12.371 |

BikeSim: Antal stop, alle korridorer, som tabel

| filters | Antal stop |
| --- | --- |
| 1 Tuborgvej - Kongens Nytorv | 8.491 |
| 2 Emdrup Sø - Sølvtorvet | 7.454 |
| 3 Tomsgårdsvej - Nørreport | 8.831 |
| 4 Rahbeks Allé - Rådhuspladsen | 5.132 |
| 5 Øresund Station - Rysenstensgade | 3.596 |
| 6 Sundbyvester Plads - Kongens Nytorv | 8.113 |
| 7 Lille Triangel - Hovedbanegården | 6.29 |

# Combining data
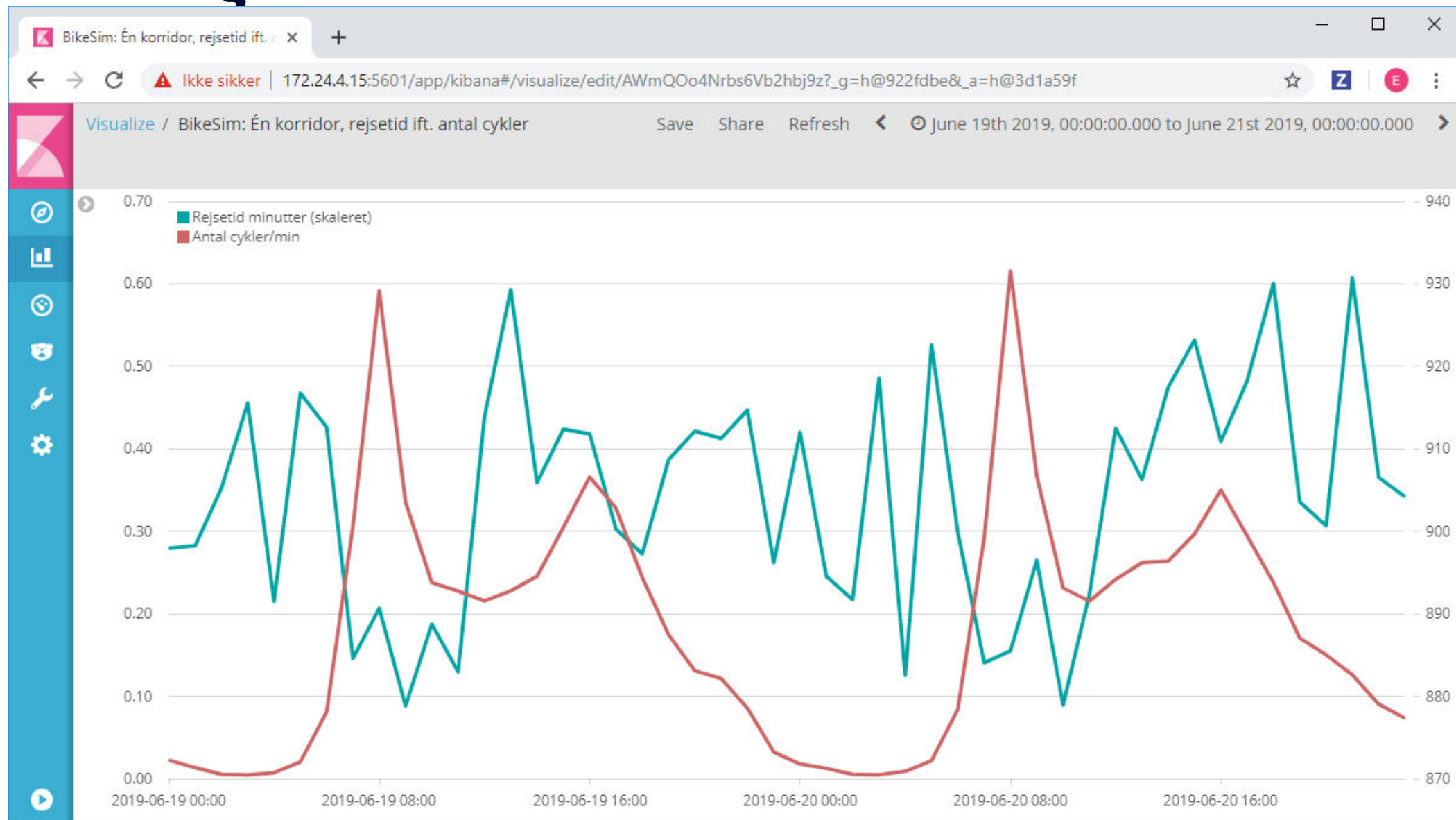
# Challenges

- Maintaining a stable system involving multiple suppliers
- Validating data quality and establishing ground truth
- Privacy and GDPR
- Cost of equipment and maintenance
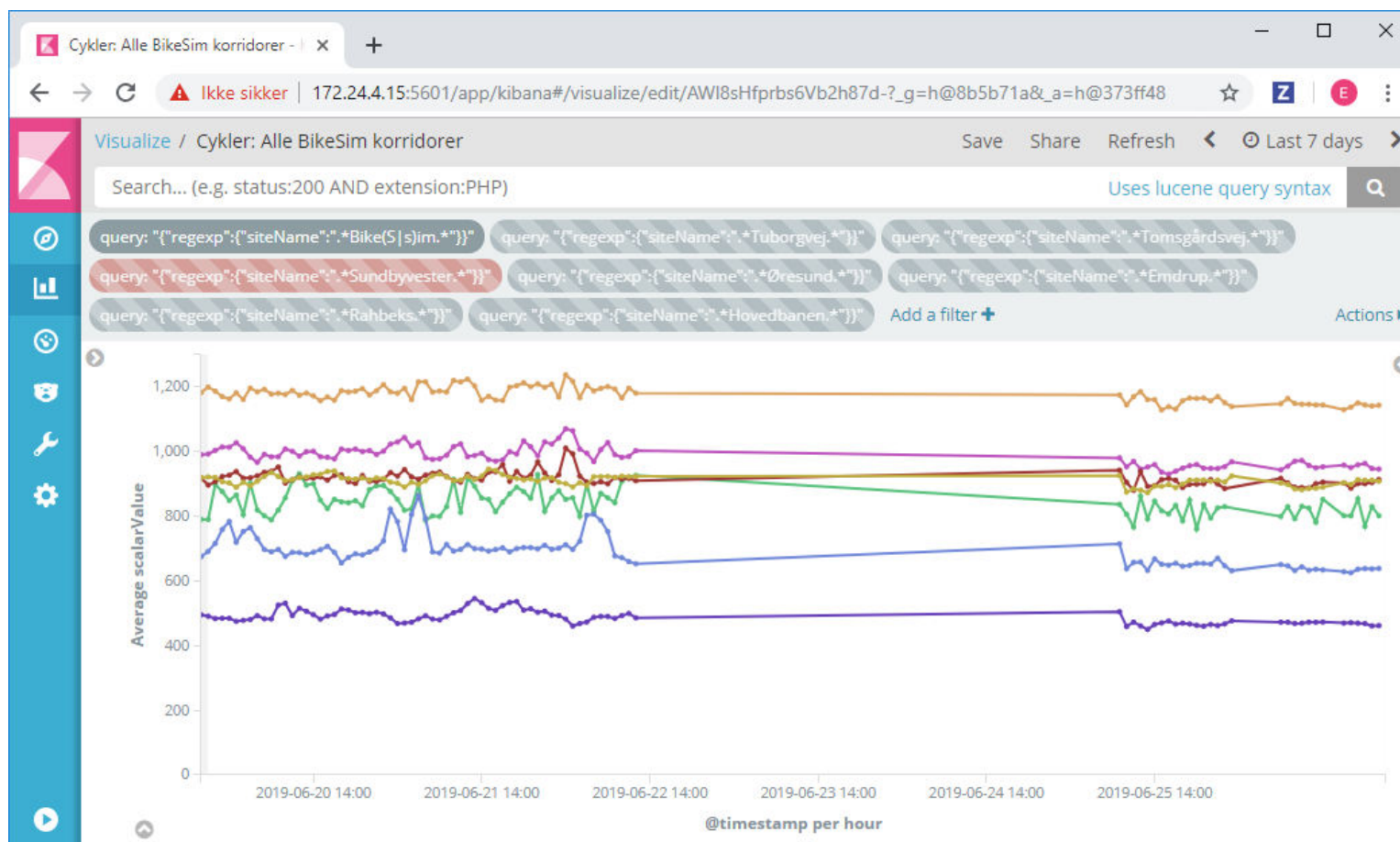
# Why can't we just buy this bicycle data?

- We would rather just buy the data
- Most people already bike around with a powerful computer packed with sensors
- For cars, we can buy operational data from e.g. INRIX or TomTom – they collect from mulitple sources and merge into a single uniform data set
- When will somebody grab this business opportunity?

# Thank you

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