FlowCube

Valuable data across all modes

Technolution

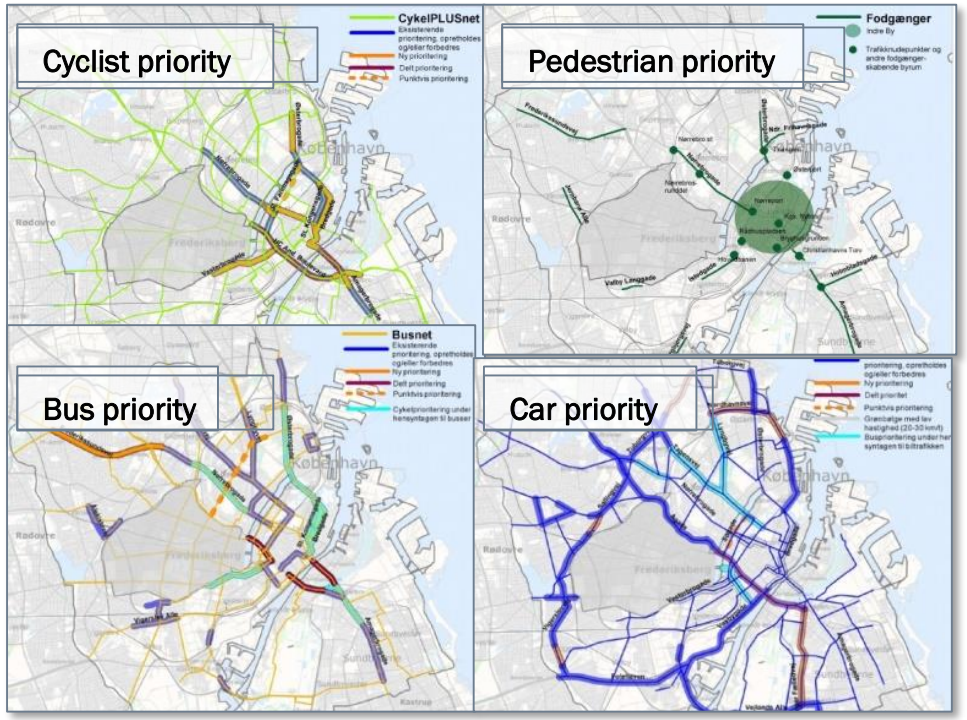
Redefining
solutions

People first, in the traffic mix

Redefining
solutions

Origin of FlowCube

Bicycle has its own priority / improving traffic flow



Dagens situation	Servicemål	Forbedring
20,0 min	18,0 min	2,0 min

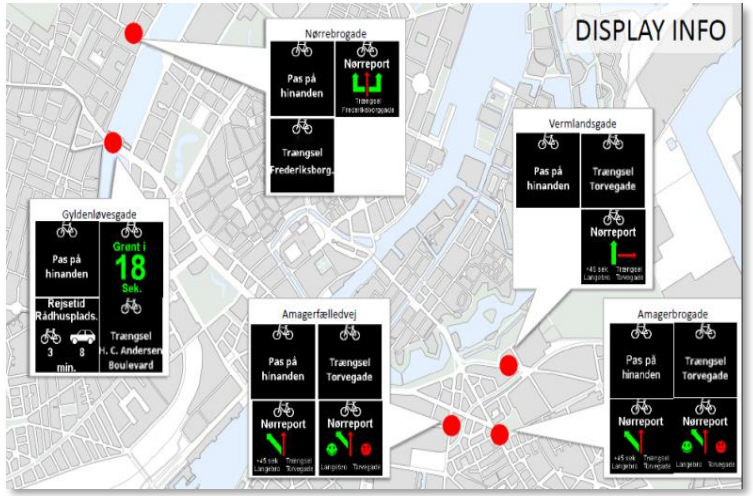
		Rejsetid i min		
		Begge retninger		
		Dagens situation	Servicemål	Forbedring
Tuborgvej	Kgs. Nytorv	20,0 min	18,0 min	2,0 min
Emdrupsø	Sølvtorvet	16,5 min	14,9 min	1,6 min
Tomsgårdsvej	Nørreport	15,8 min	14,2 min	1,6 min
Rahbeks Alle	Rådhuspladsen	9,0 min	8,1 min	0,9 min
Øresund St.	Rysensteensgade	16,7 min	15,0 min	1,7 min
Sundbyvester Plads	Kgs. Nytorv	19,8 min	17,8 min	2,0 min
Li.Triangel	Hovedbanen	12,2 min	10,9 min	1,3 min

Servicemål for cykeltrafik

(live) travel information cyclists need

Taylored advice to the public

Variable message signs



-> requires (live) accurate live information

Main functionalities of FlowCube

1. **Count all modalities**

   for Crowd management
   e.g. handling traffic and monitoring of volume

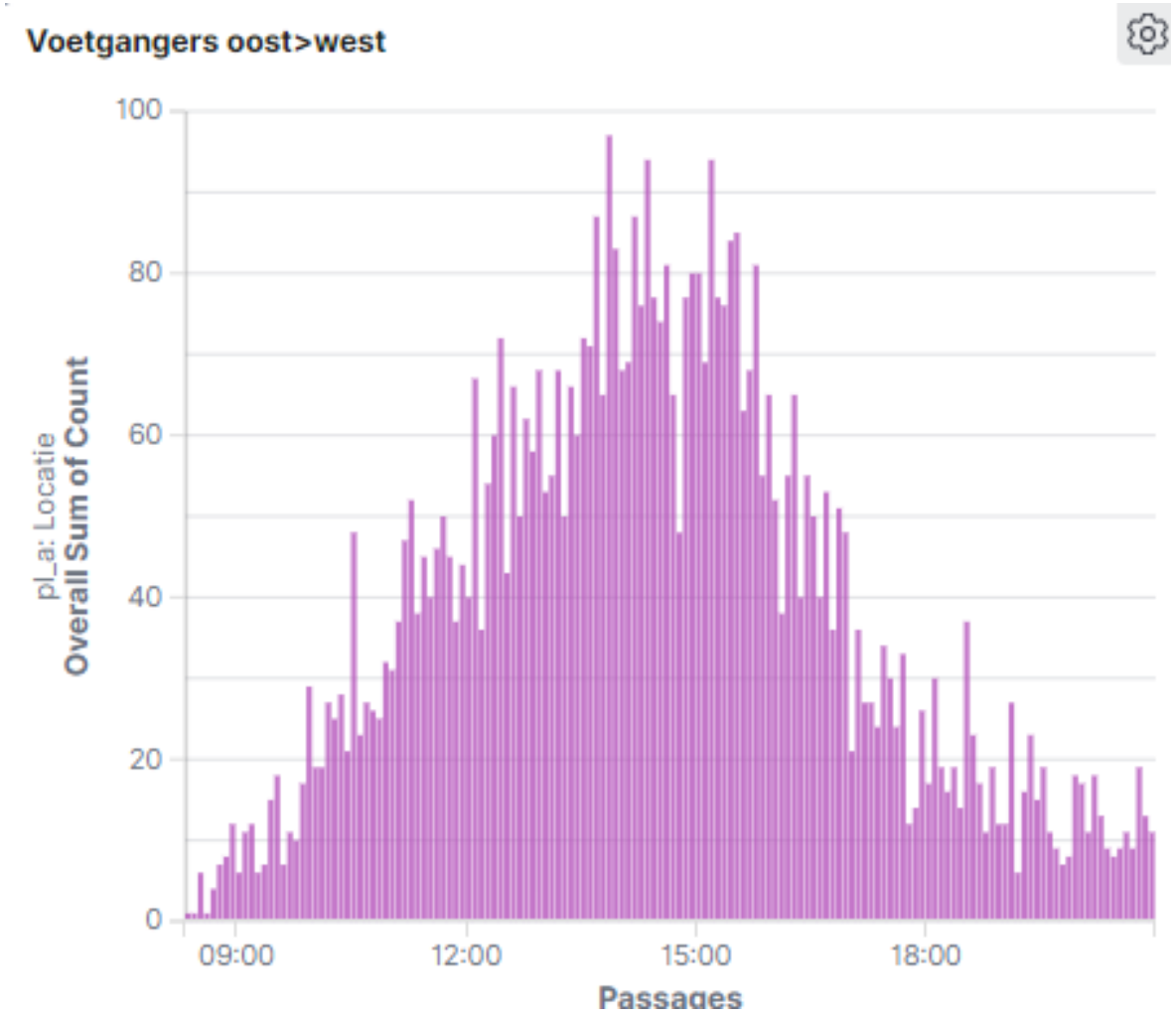
2. **Give insight for all modalities**

   for City planning
   e.g. origin/destination matrixes

3. **Detect all modalities**

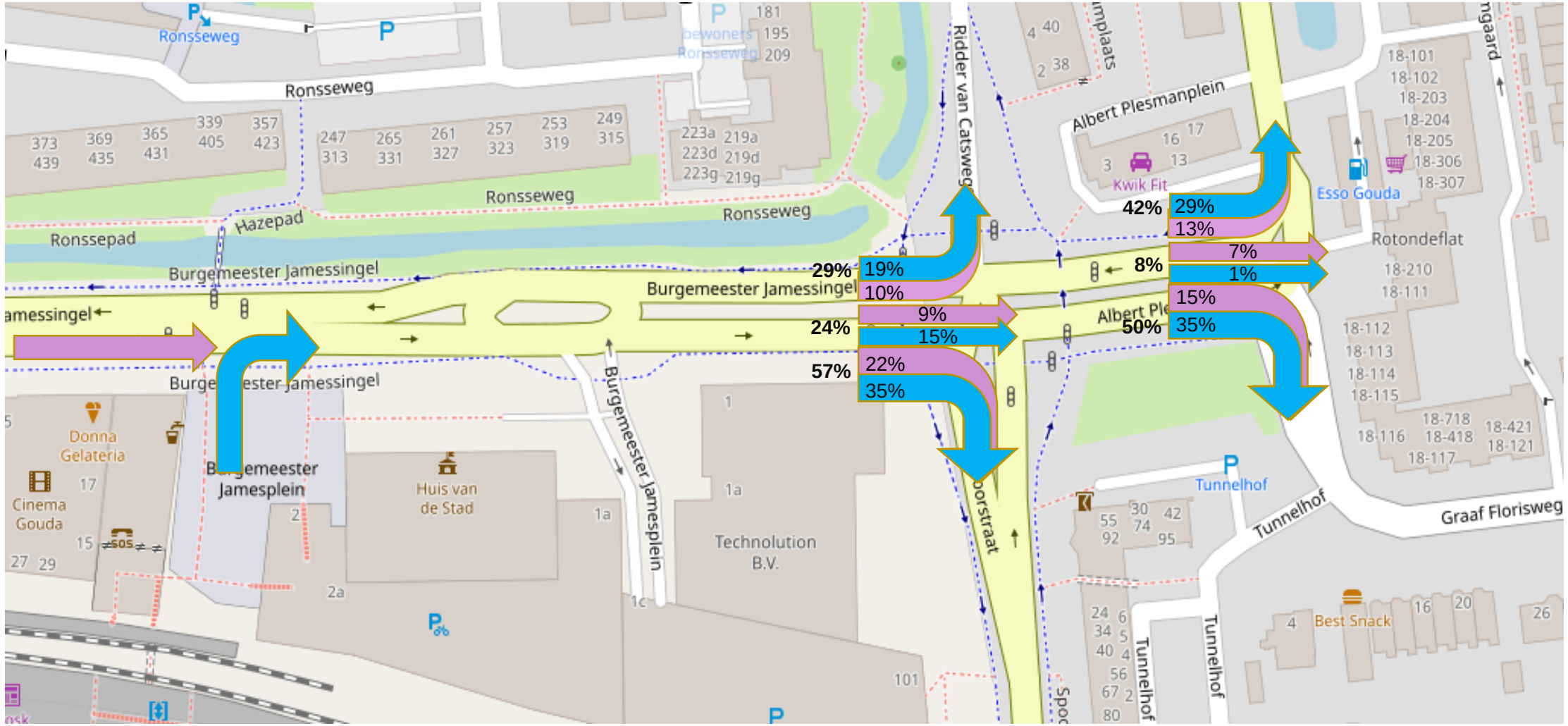
   Traffic management for all modalities
   e.g. traffic volume, travel times, optimise junctions

1. Data for crowd management



- Real-time counts
- Includes direction of road user (arriving or departing)
- Alerts
- Links to third-party systems

2. Data for planning



3. Data for traffic management

- Analyses
- Automatic route guidance
- Dynamic prioritization of cyclists and pedestrians

FlowCube: the sensor

Provides:

- **Presence detection (virtual loop)**
- **Traffic volume (counts)**
- **Speed**
- **Travel times**
- **Origin/Destination matrixes**

Objects:

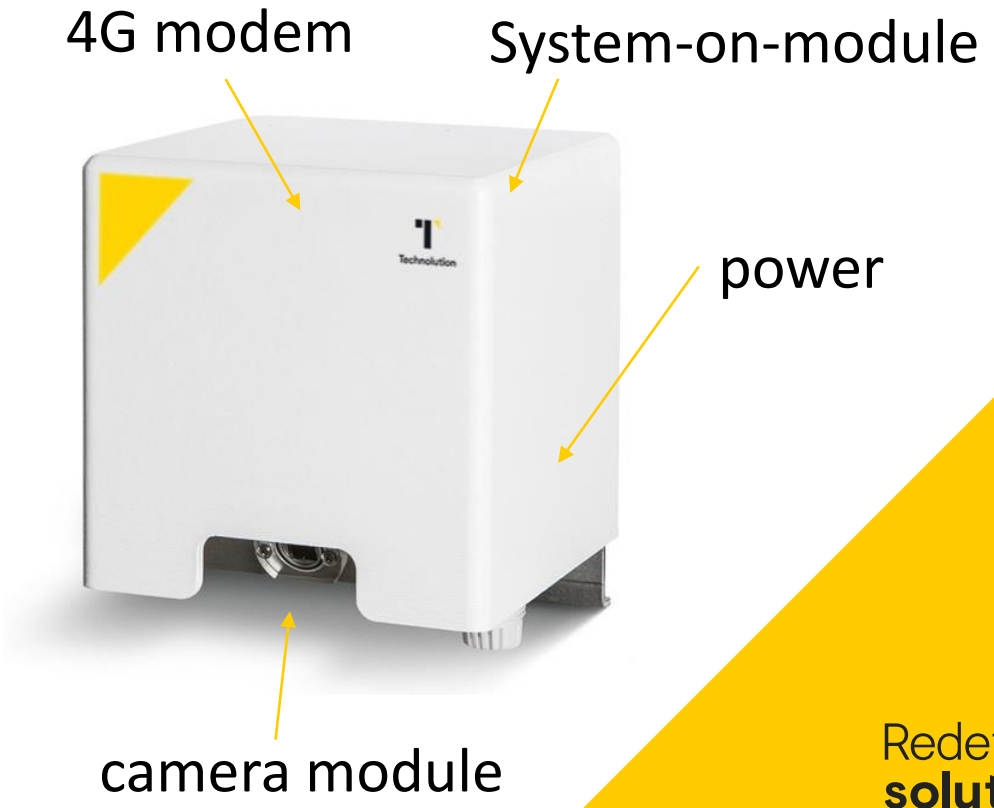
- **Cyclist**
- **Pedestrian**
- **Car**
- **Motorcyclist**
- **Truck**
- **Bus**

(*) More details see product description

Redefining
solutions

Properties “all-in-one box”

- **Only power supply required**
  - communication is arranged, no communication connection required
  - no cabinet or wiring needed
  - No external camera needed
- **Subtle design**
  - citizens do not feel watched
  - no questions from citizens
  - Dozens of intallations - no vandalism yet
- **Wide angle lens**
  - aiming is ‘level and rough direction’



Redefining
solutions

Subtle design blends in the city scape,

in line with the function as a traffic sensor.

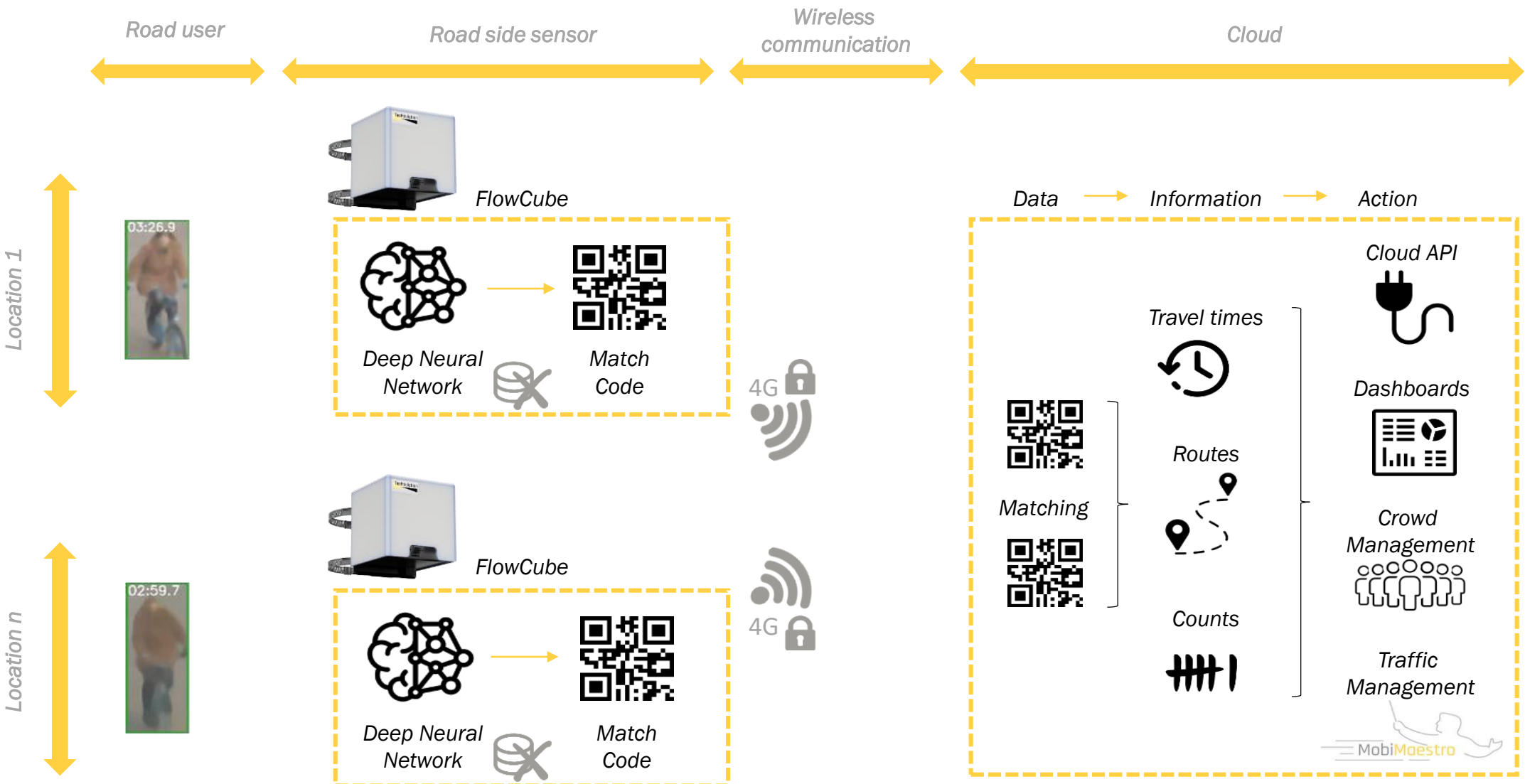
Privacy first

FlowCube does not store any images or video

- Developed according to Privacy by Design concept
- Nobody can view the images
- Only an anonymous match code will be sent
- Only aggregated traffic data is stored

GDPR compliance: successful Data Protection Impact Assessments (DPIA) in the municipalities of Groningen, Rotterdam and Amsterdam

FlowCube operation



FlowCube locations

In operation:

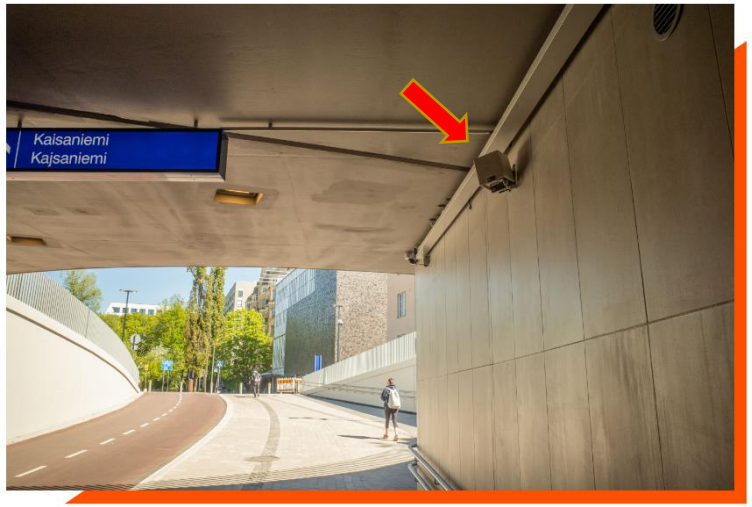
- Groningen (NL)
- Rotterdam (NL)
- Amsterdam (NL)
- Campus University Groningen (NL)
- San Francisco (USA)
- Ballerup (DK)
- Brugge / Gent (B)
- Portland (OR)
- Glostrup DOLL Living Lab (DK)
- Helsinki (FI)

In projects:

- Google Campus (CA)
- Marysville (OH)
- Dublin (OH)
- Google / Sunnyvale (CA)

Case: City of Helsinki / Kaisantunneli

New traffic sensor measures number and speed of pedestrians and cyclists in the Kaisantunneli tunnel



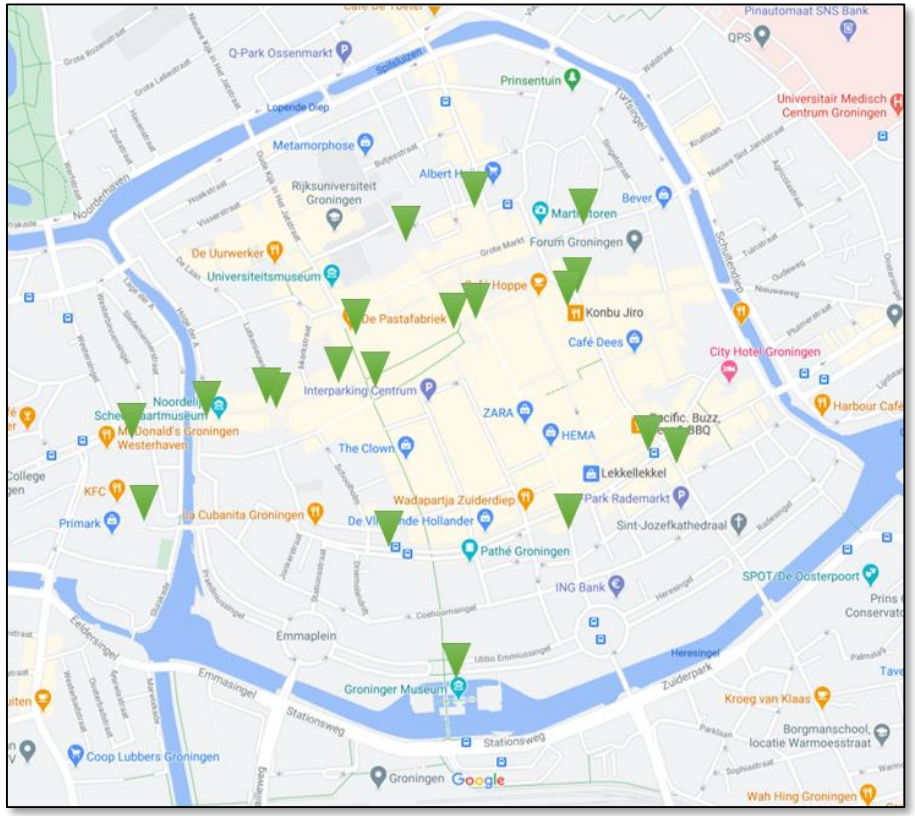
Case: City of Helsinki / Kaisantunneli

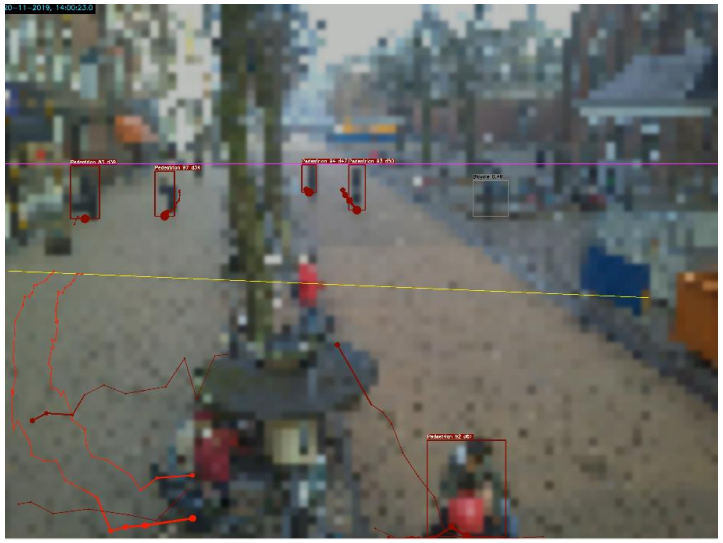
- Goal of the pilot is to gain accurate and real-time data of the number, routes and travel speed of cyclists and pedestrians in central Helsinki; volumes, object classification, speed, origin/destination matrixes, etc.
- The FlowCube sensors will be tested from May 2024 to May 2025

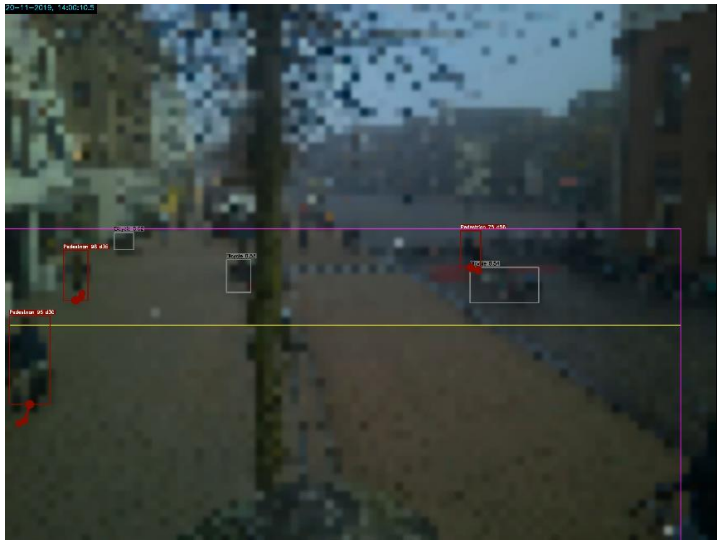
> Forum Virium Helsinki aims to make the planning of Helsinki cycling routes, in particular, more efficient. Traffic sensors help promote walking and cycling, reduce congestions and lower the risk of accidents.

Case: City of Groningen

- 20 FlowCubes
- 1.2 M passages / week



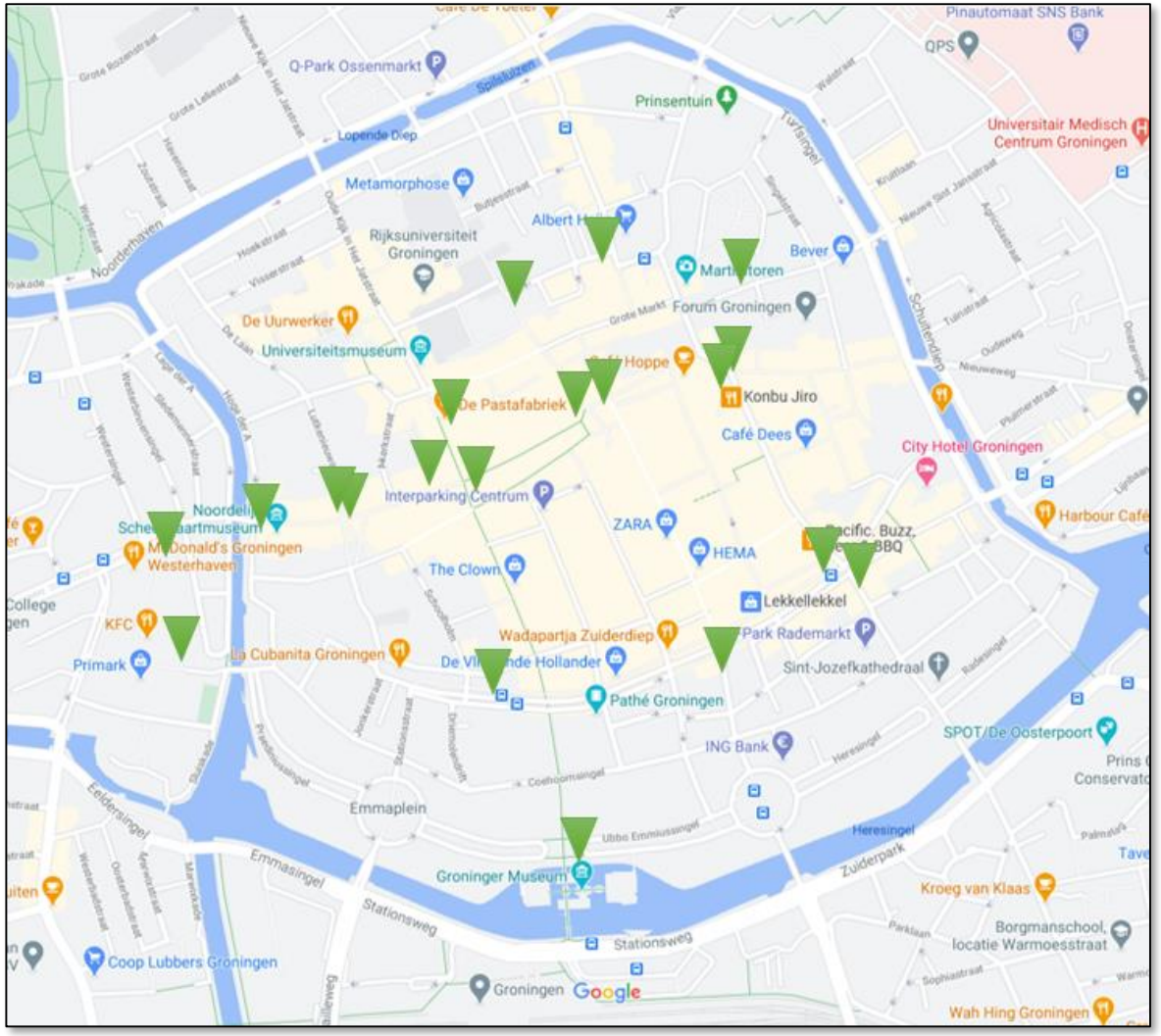




Unique, versatile and rich data

- 24 x 7 x 365 operation
- 20 locations
- > 1 passing line per location
- 2 directions
- multiple modalities
- > 20 routes

1,2M passages per week



Statistics

Focus Areas (ROI)

Passage line

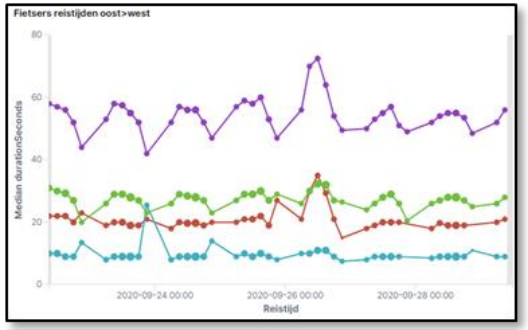
Detections:
Green: bicycle
Gray/white: Scooter
Red: Pedestrian
Blue: other

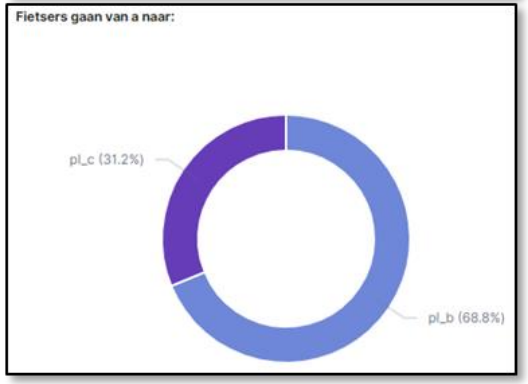
Tracking (Light up behind passage line)

Example detection City of Groningen #1

Example detection City of Groningen #2

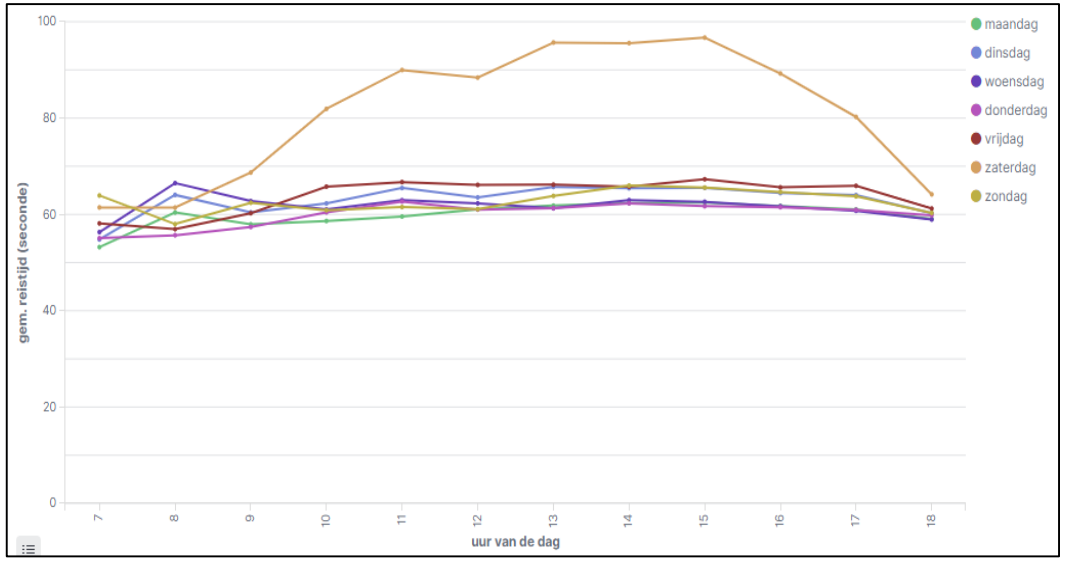
Dashboard example



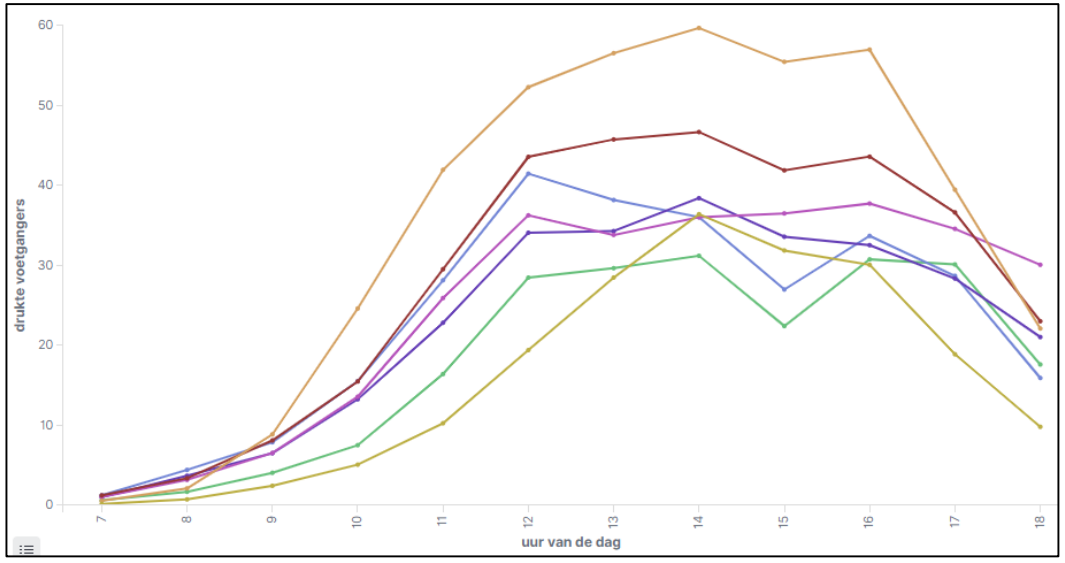


Analyses from Groningen

Journey times cyclists

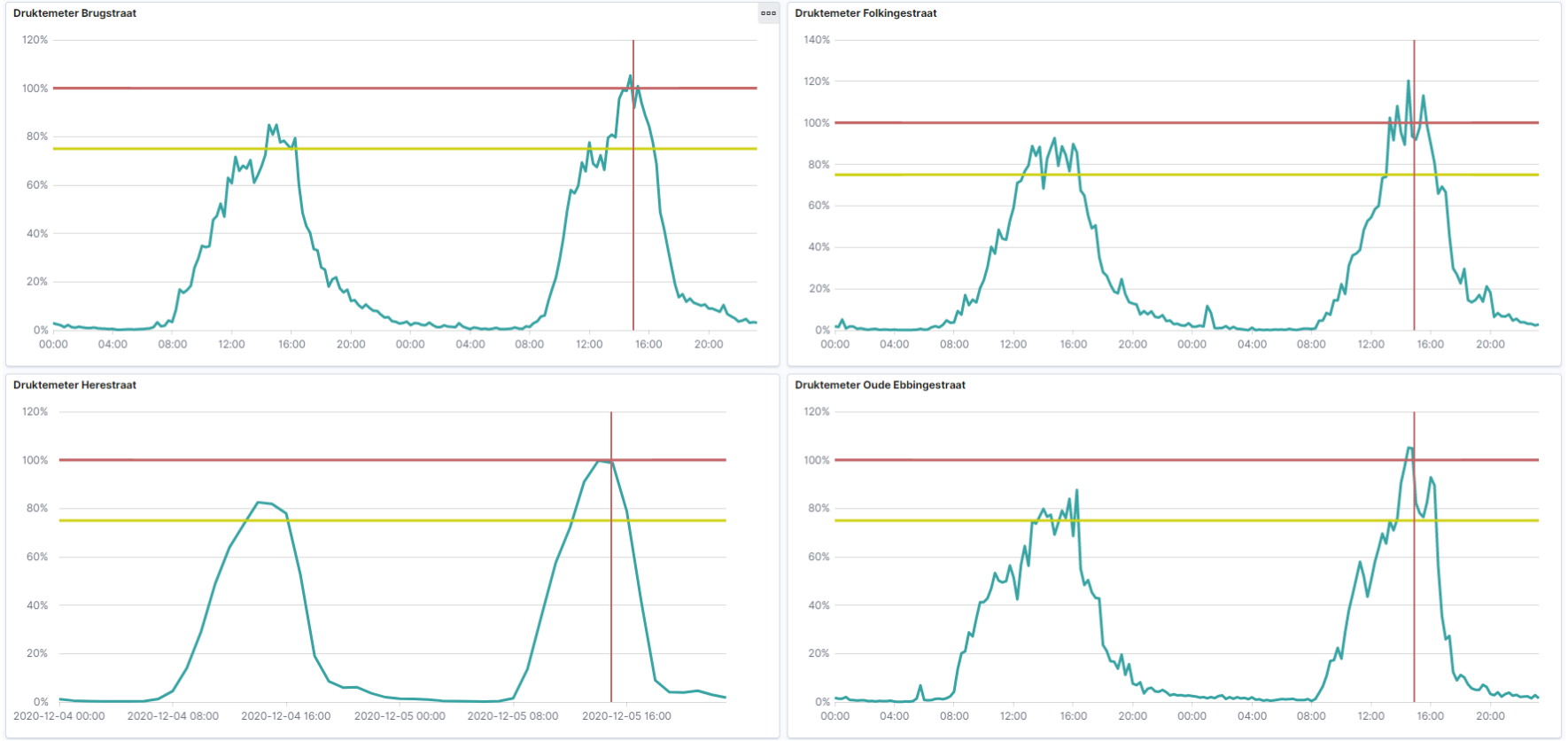


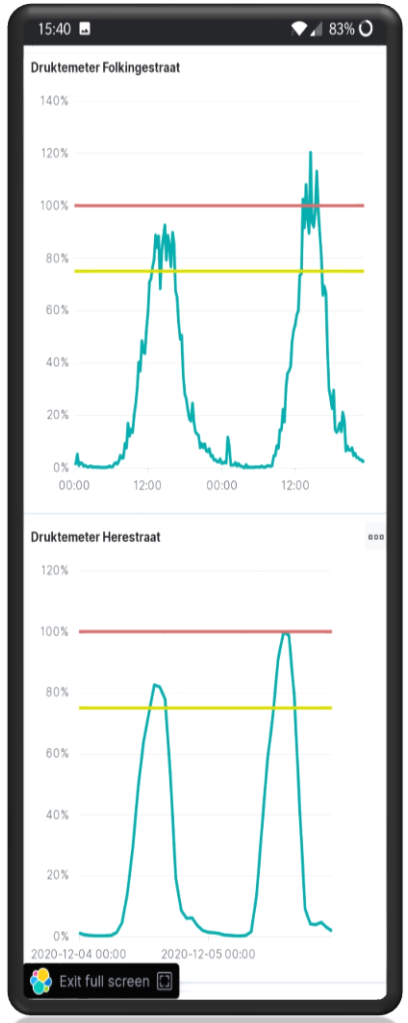
Correlated to pedestrians



➔ The number of pedestrians on Saturday leads to 50% longer journey times for bikes.

Live monitoring, also on mobile





Accuracy

- Pedestrians 94%*
- Cyclists 98%*
- Route Selection +/- 4 percentages point
- Journey time +/- 0.5 km/h

* Accuracy = 100% - $\frac{\text{(false positive + fals negative)}}{\text{counted}}$

Accuracy

Rotterdam

Measurement	Sample size	Precision	Recall	Avg. Deviation
Counting pedestrians	118	92%	97%	+6%
Counting cyclists	775	99%	98%	-1%
Matching cyclists	171	99%	92%	

Groningen

Measurement	Sample size	Precision	Recall	Avg. Deviation
Counting pedestrians	569	97%	95%	+2%
Counting cyclists	765	99%	97%	+2%
Matching cyclists	66	93%	92%	

Measurement	Minimum expected accuracy
Counting pedestrians	94%(1)
Counting cyclists	98%(1)
Cyclist route selection / split fraction	+/- 4 percentage point(2)
Cyclist travel time / average speed	< 0.5 km/h(2)

(1): 100% - deviation / total counts for 15 minutes with >15 passages/min
(2): Over 15 minutes with > 15 passages/min

In short

- We provide reliable data on pedestrians, cyclist, and other vehicles
- It is and stays ***your*** *data*
- Truly multimodal
- Cyclists and pedestrian policy quantifiable and assessable
- The future standard in traffic sensors

Redefining **solutions**