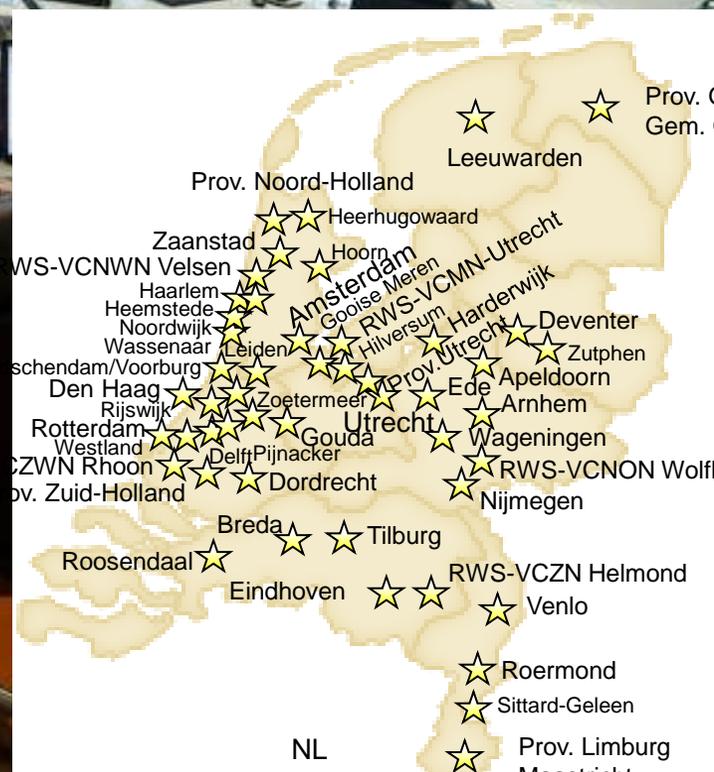




# TNL Mobility Overview

**Introduction and Service Overview**

**June 13, 2023**





# FlowCube: the sensor

## Provides:

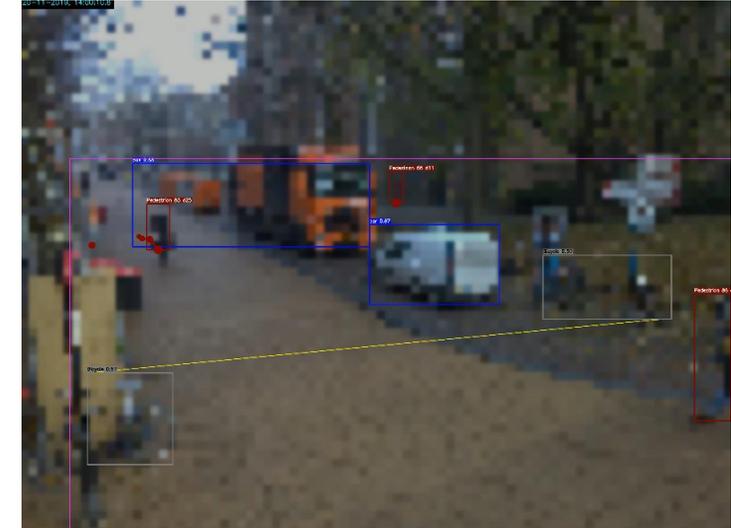
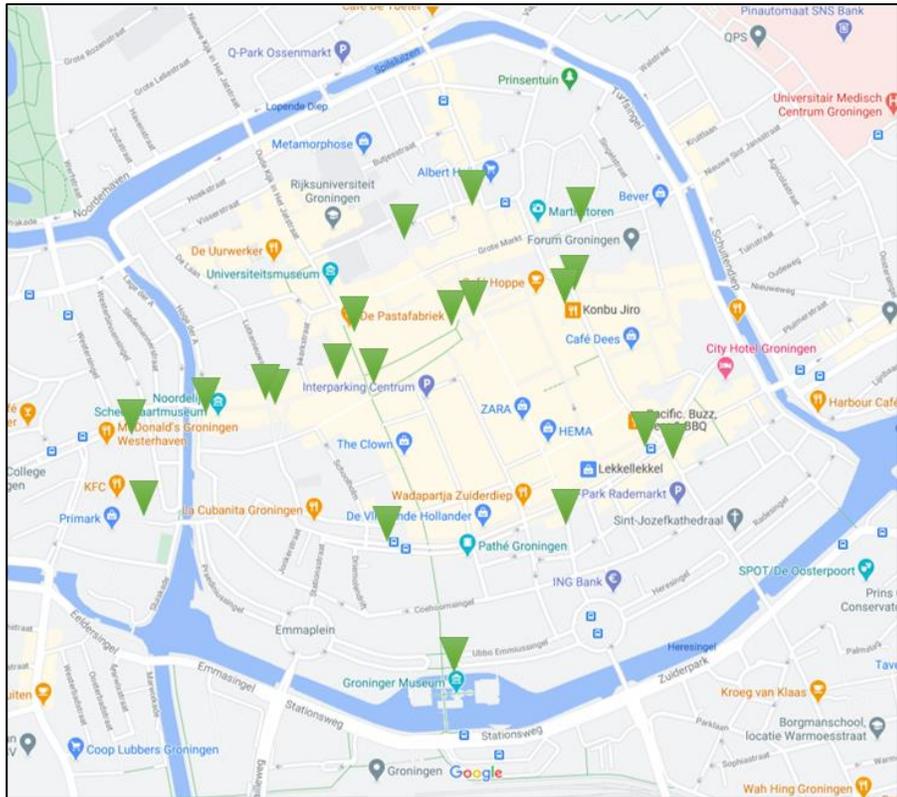
- **Insight in the traveled path of all modes**
- **Volume counts by mode, over time**
- **Travel time, origin and destination in corridor**
- **Anonymous, only text leaves the sensor**



# Case: City of Groningen

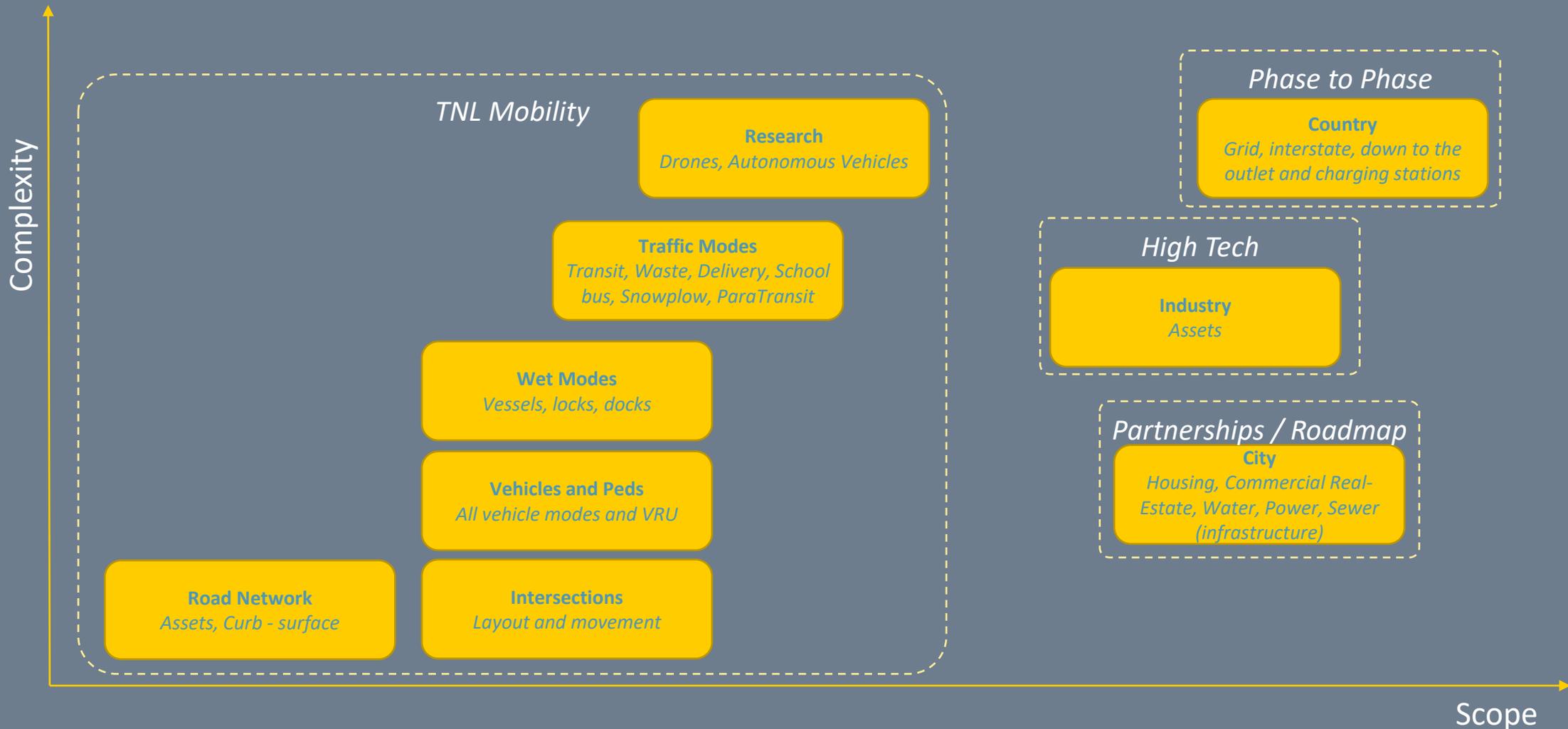
20 FlowCubes

1.2 M passage / week



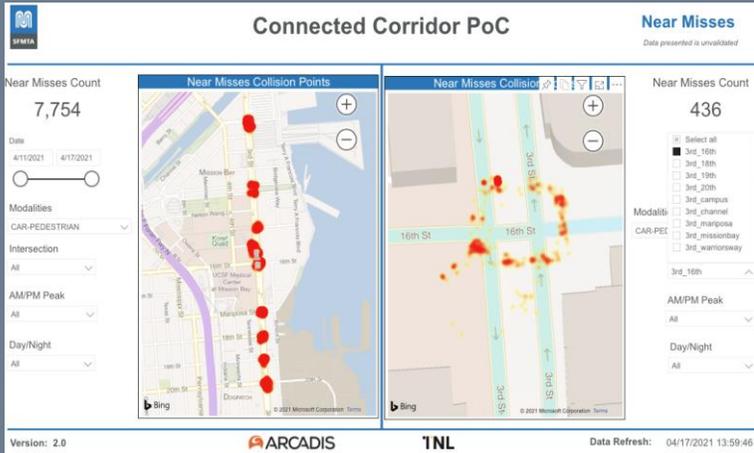


# Digital Twins has many Twins

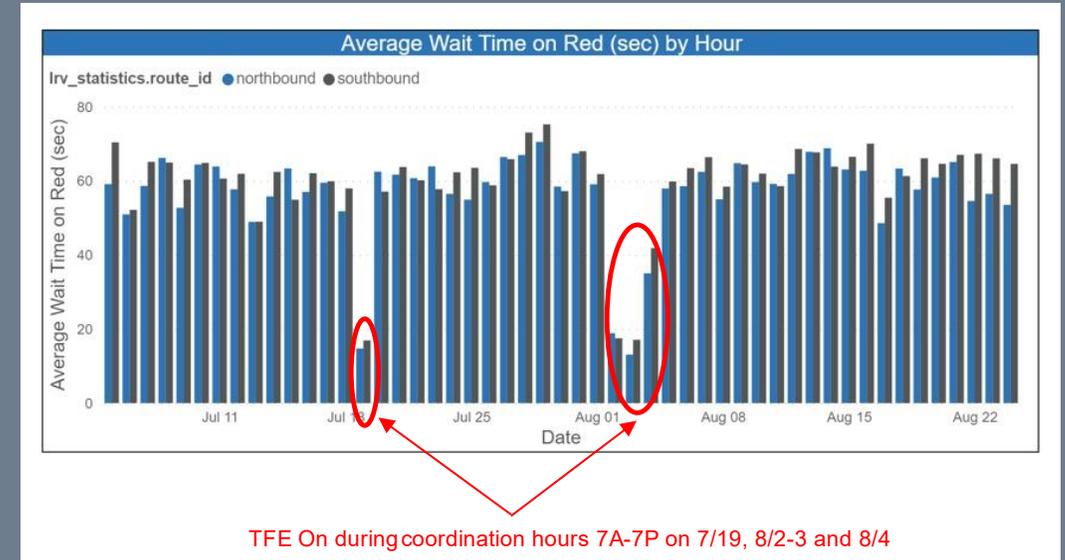
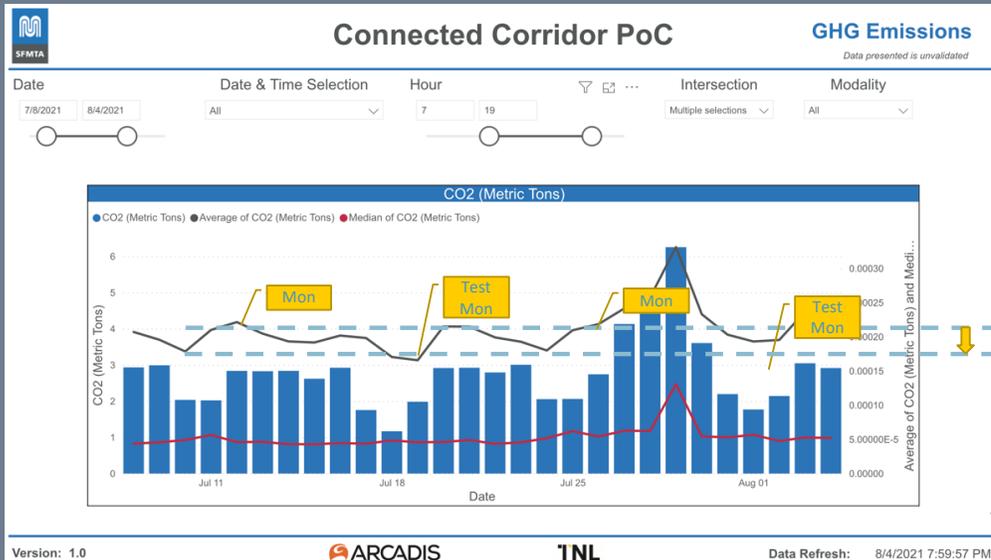


# Service was tested on 10 intersections

## Results

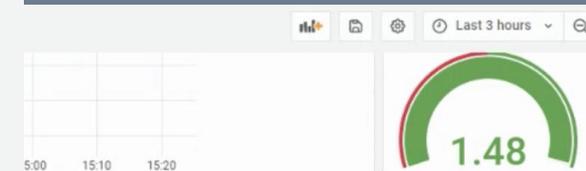
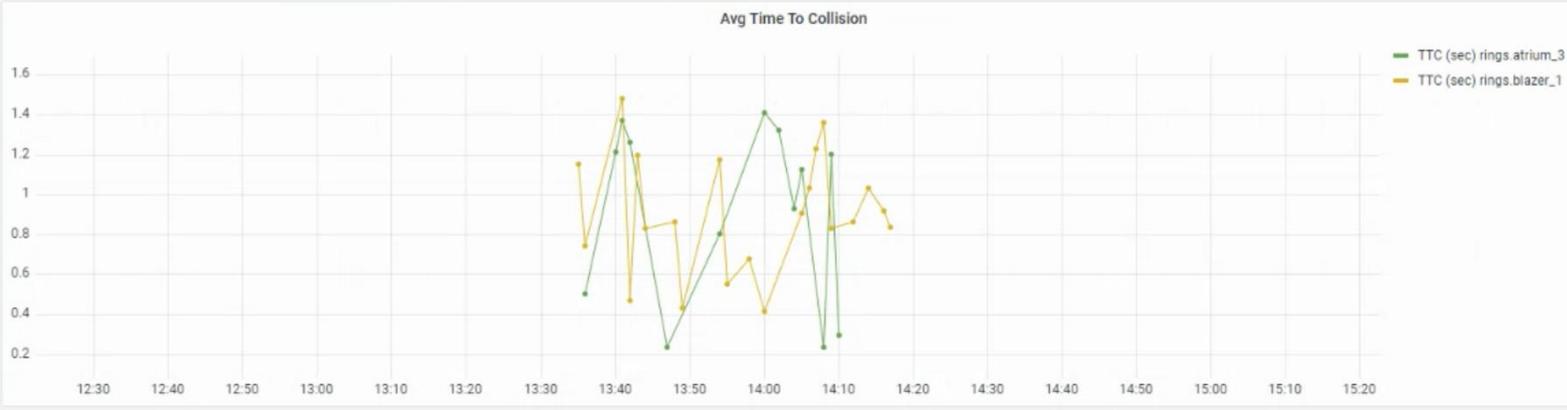
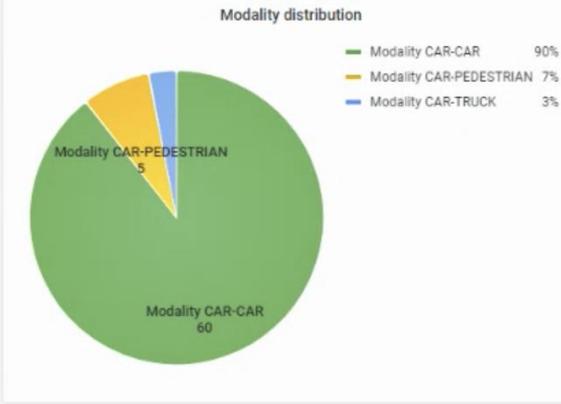
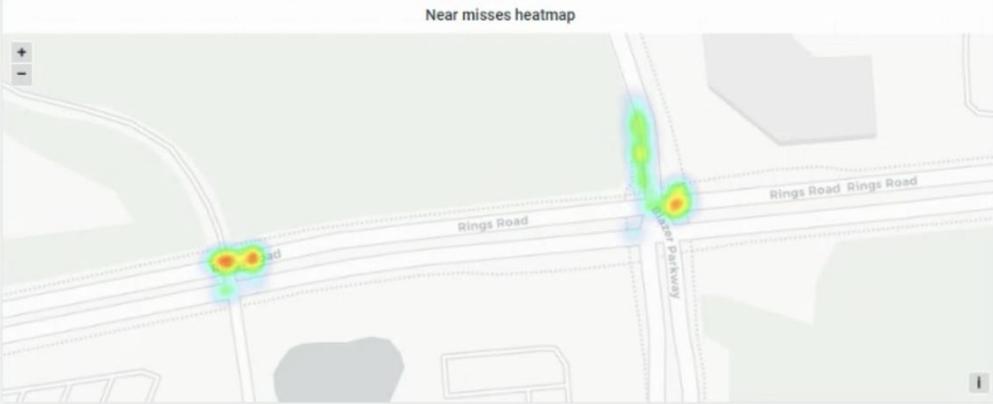


Mode	Metric	Before	After	Avg. Results
LRVs	Red Light Delay	60.3 sec	16.2 sec	73% reduced
	Travel Time	424.2 sec	358.2 sec	16% reduced
	Approach on Green	62.1%	85.8%	24% increased
Vehicles	Average Speed	8.2 mph	9.9 mph	21% increased
	Approach on Red	27.3%	26.3%	1% reduced
	CO <sub>2</sub> Emissions (Channel + WW)	2.79 tons	2.06 tons	26.1% reduced
Pedestrians	Approach on Walk Symbol	76.4%	75.5%	0.9% reduced





Intersection All ▼ TTC larger than 0 ▼ TTC smaller than 1.5 ▼



timestamp	Intersection	Modality	TTC sec	Object 1	Object 2	Speed object 1	Speed object 2	Lat	Lon	Entry zone 1	Ent
.01	rings.atrium_3	CAR-CAR	1.37	test405	test478					10.2	51
.01	rings.blazer_1	CAR-CAR	1.48	fc1419	fc1415					5.40	51
.01	rings.atrium_3	CAR-CAR	1.29	test471	test489					51	11.6
.01	rings.atrium_3	CAR-CAR	1.03	test489	test531					11.6	51
.01	rings.blazer_1	CAR-CAR	0.471	fc1510	fc1534					51	17
.01	rings.atrium_3	CAR-CAR	1.47	test462	test489					51	11.6
.01	rings.blazer_1	CAR-CAR	1.20	fc1586	fc1590					51	9.20
.01	rings.blazer_1	CAR-PEDESTRIAN	0.833	fc1656	fc1609					1.20	51
.01	rings.atrium_3	CAR-CAR	0.235	test768	test719					51	6

Lat	Lon	Entry zone 1	Entry zone 2
40.1	-83.1	i32	i12
40.1	-83.1	i32	i12
40.1	-83.1	i32	i12
40.1	-83.1	i32	i32
40.1	-83.1	i41	i41
40.1	-83.1	i12	i32
40.1	-83.1	i32	i12
40.1	-83.1	i31	i33
40.1	-83.1	i12	i12
40.1	-83.1	i12	i32
40.1	-83.1	i41	i41
40.1	-83.1	i32	i12
40.1	-83.1	i31	i33
40.1	-83.1	i12	i12
40.1	-83.1	w02	i42
40.1	-83.1	i33	i11

# Redefining **solutions**

TNL