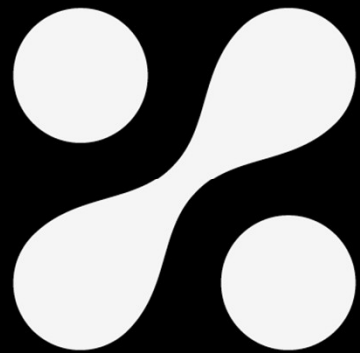




Telraam

The missing piece for better mobility insights



Mobility planning only becomes truly effective when it considers key areas, including overlooked local streets and actively involves communities in the process.

Telraam: a unique approach to traffic data



Telraam is a **citizen-powered** solution for collecting **multi-modal** traffic data with a purpose-built, **affordable**, and **user-friendly** device.

Our device continuously monitors a street from any window*, and is able to distinguish **multiple modes, direction** and **speed****.



Pedestrians



Bikes



Motorcycles



Cars



**Light
trucks**



Tractors



Trucks



Buses



Trailers

* that meets technical requirements

** speed for cars only

From experience to action: the team

A spin-off from



11 people team



3300 active
sensors



+70 projects



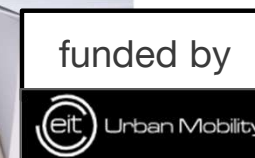
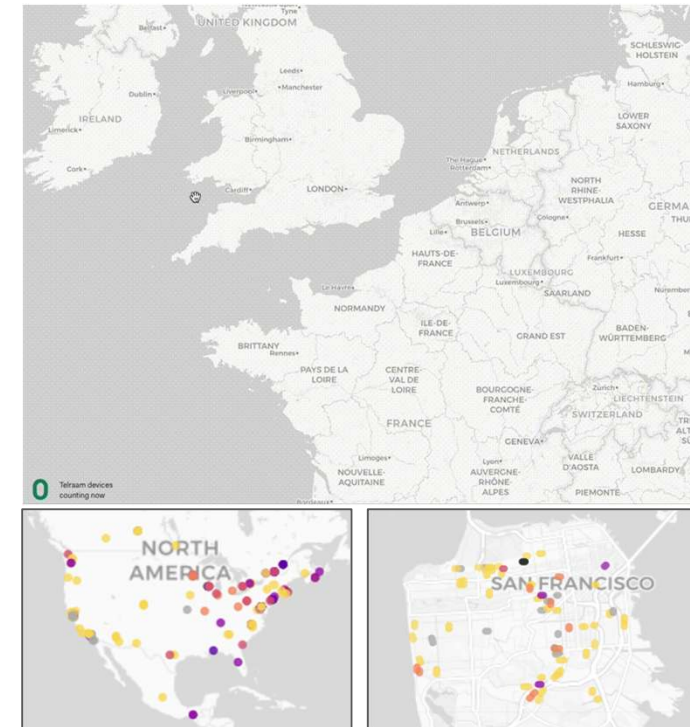
active in 40+
countries



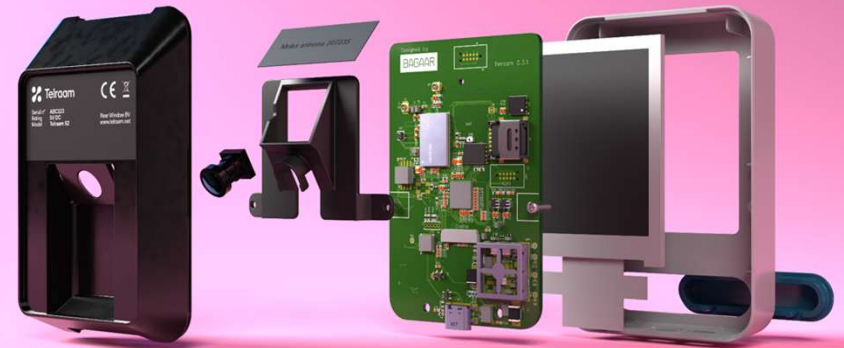
6 Million data points
collected daily

5 year of Telraam!

- Continuous sensor development
 - “V1”: Raspberry Pi-based (2020-2023)
 - “S2”: custom built AI-on-edge (2024-today)
 - “S2 Outdoor”: variant for outdoor placement (2025-today)
- Next gen sensor S3 (mid 2026-...) - key changes:
 - x10 compute performance
 - **Flexible hardware platform** (!)
 - Customizable, to address specific use cases
- Mostly EU, but also exporting to US (San Francisco!)



Inside the Telraam S2 device



Purpose-built Telraam

Custom PCB
Dedicated AI chip
IoT framework
USB C-powered

Built-in camera

Wide angle
camera
Auto region of
interest selection

LCD display

Interaction with device
Instant visualisation of
counting data

Data connection

AI counts on device
No images saved
No wifi needed

AWS server

Classification
Data aggregation/
reports
API



Privacy by design



Very low resolution camera

- no facial recognition
- no license plate recognition

All images processed on the edge

- no images or videos saved
- no images or video stream
- no route tracking

Camera legislation not applicable

Telraam is considered a sensor

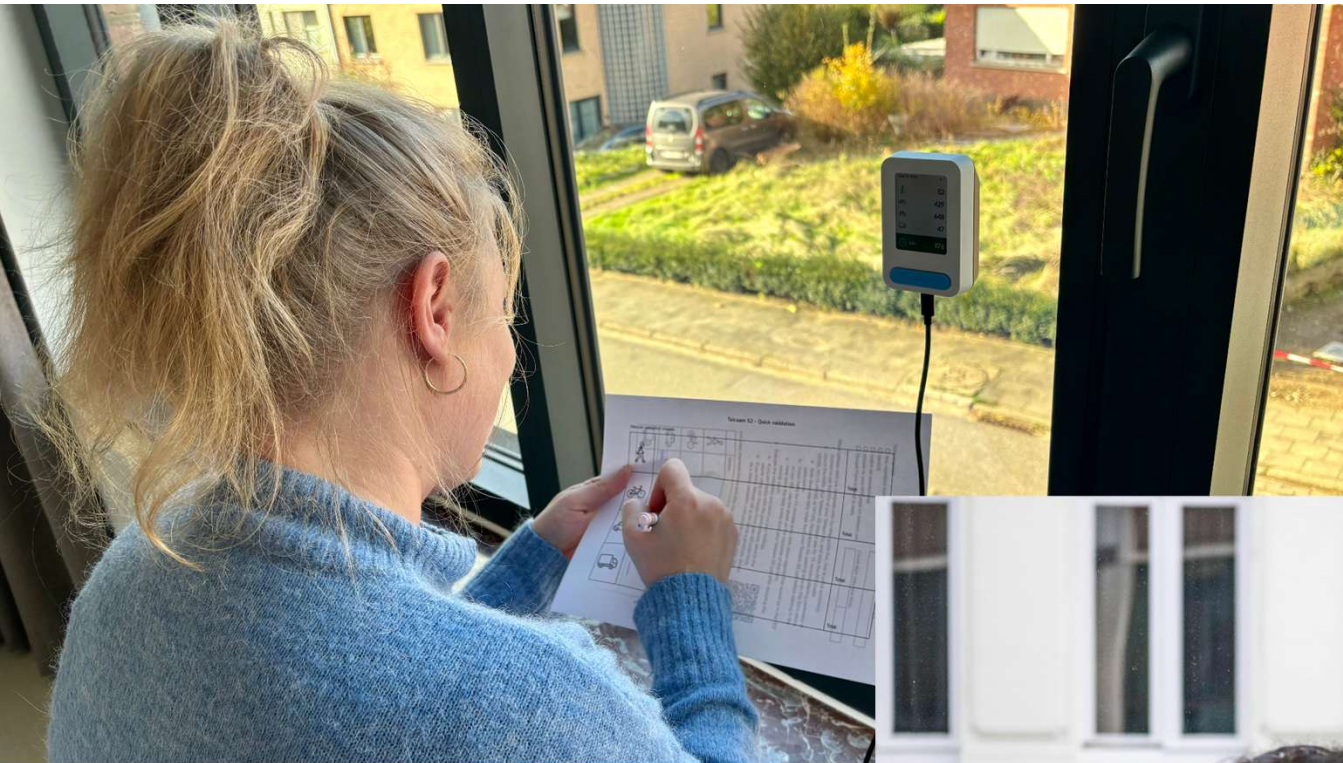
Empowering communities: citizens as partners

- Either through authority-led or community-driven approaches, Telraam connects citizens and authorities with data-driven insights.
- Anyone* can host a Telraam, empowering citizens to play a key role.
- Brings objective data to validate needs and perceptions.
- Enables continuous, long-term tracking of traffic trends across multiple locations to guide decisions.

**provided that the window meets technical requirements*



Empowering Communities: Citizens as partners



Introducing Telraam Outdoor



Telraam Outdoor

Stand alone device
Weatherproof casing sensor

Power supply*

Independent via PV panel
or via DC
Battery in support arm of PV
panel

Professional support

Detailed manual
Remote helpdesk

Availability

Available since Q2 2024

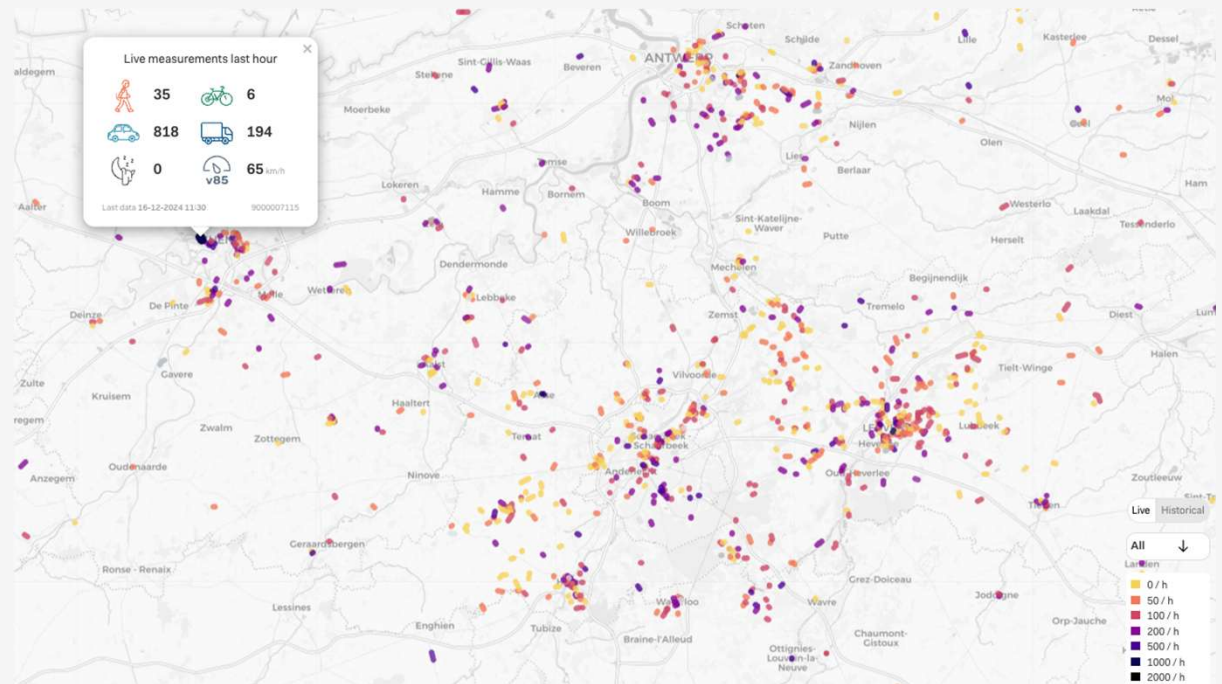


* solar/battery kit not shipped internationally for logistics reasons

Open data platform: transparency for all

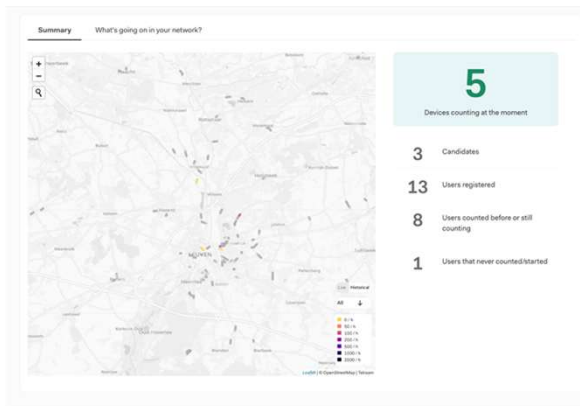
Basic traffic data accessible to the public through:

- interactive map,
- segment pages on Telraam website,
- directly via the public Telraam API (licensed for non-commercial use)



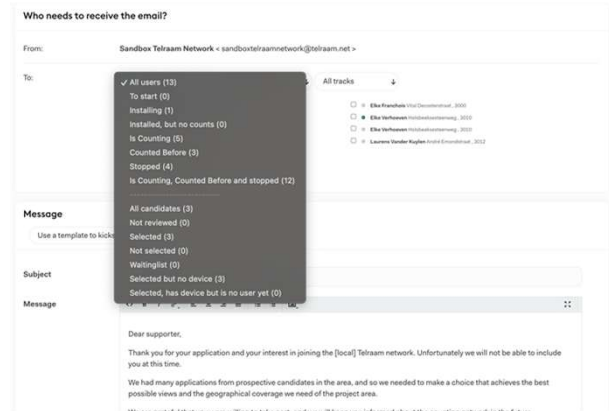
Monitor and manage with the Network Dashboard

Monitor your Network



Manage your fleet of devices, settings and project timeline.

Communicate with citizens



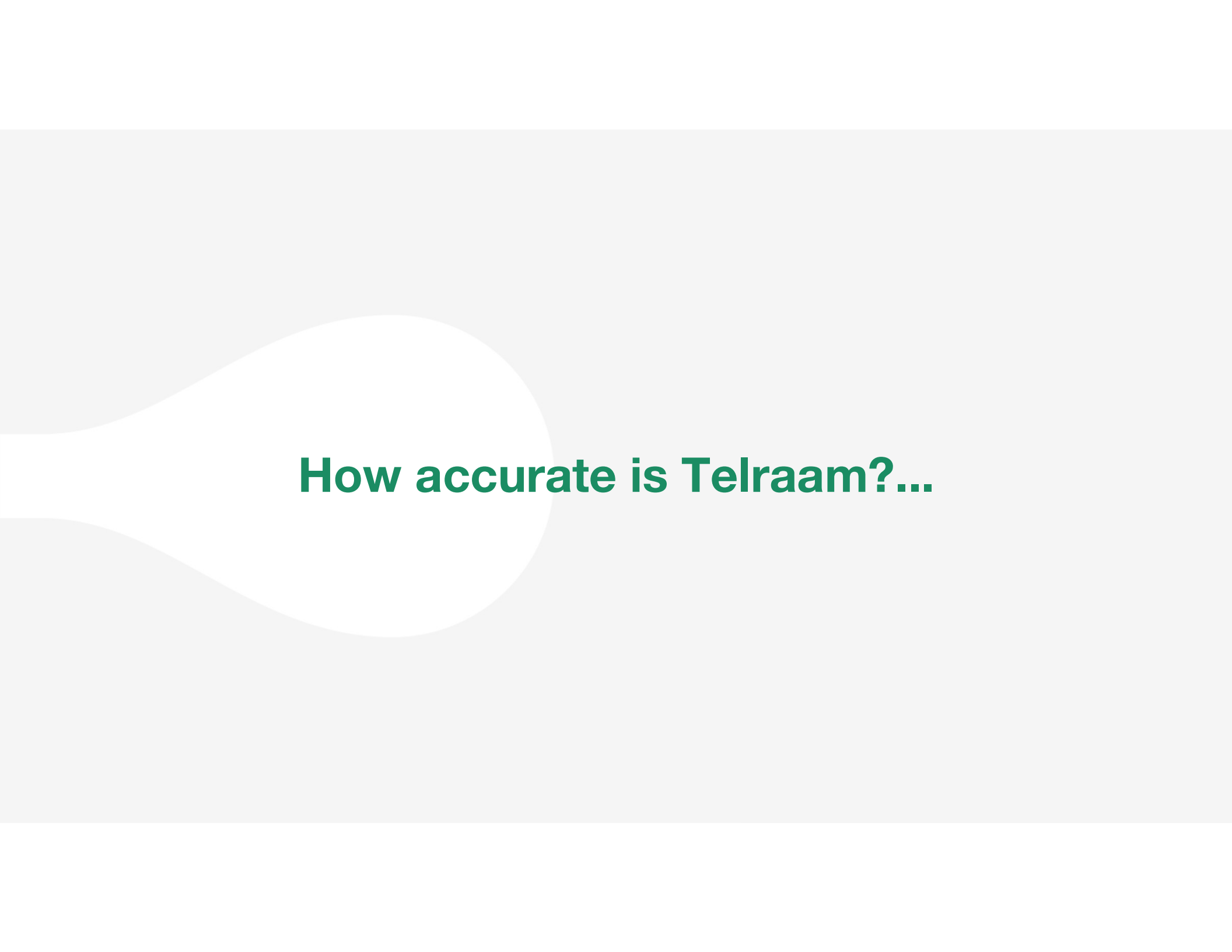
Engage citizens hosting Telraam devices and keep them informed.

Access advanced analytics



Access to real-time detailed data analytics tools, exports functions and advanced API.





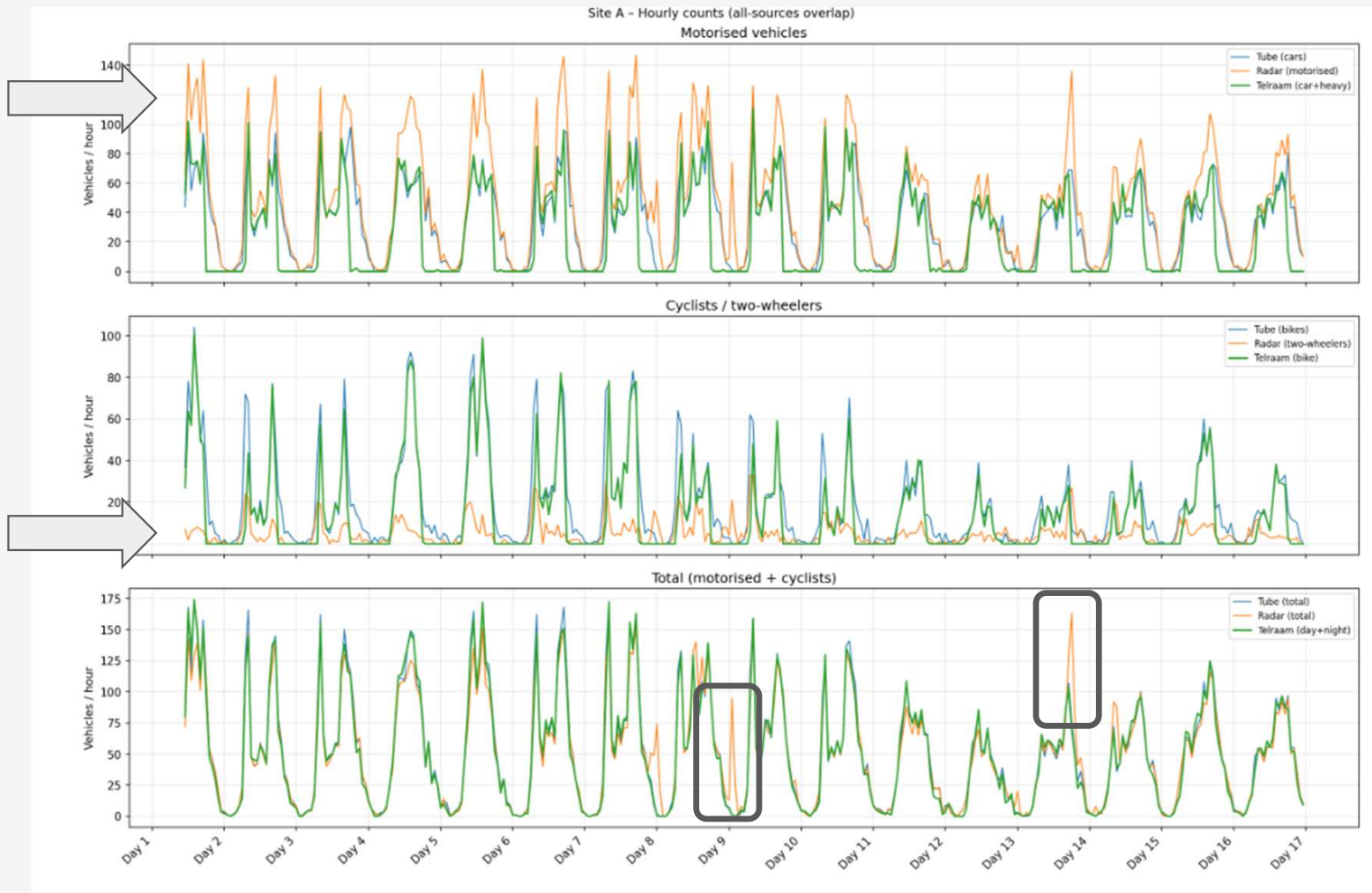
How accurate is Telraam?...

Telraam accuracy - external validation!

- Experiment 1:
 - In collaboration with a city (installed tubes & radar)
 - Collocation for 17 days
 - Typical Telraam street, typical installation (in this case outdoor). Excellent site.
- Experiment 2:
 - In collaboration with Cerema (FR)
 - In depth comparison of multiple solutions
 - Object-by-object verification (for Telraam grouped)
 - Challenging location (busy street with tramway)

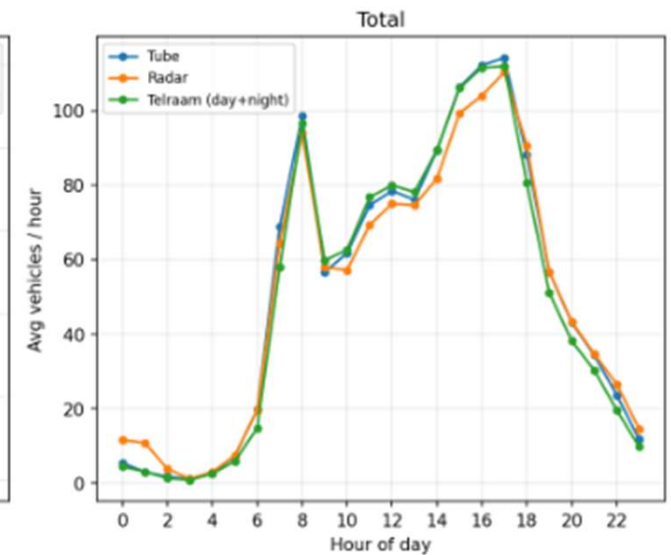
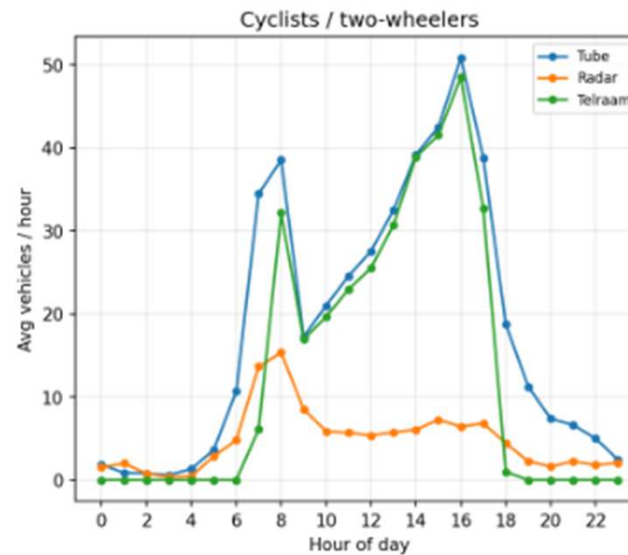
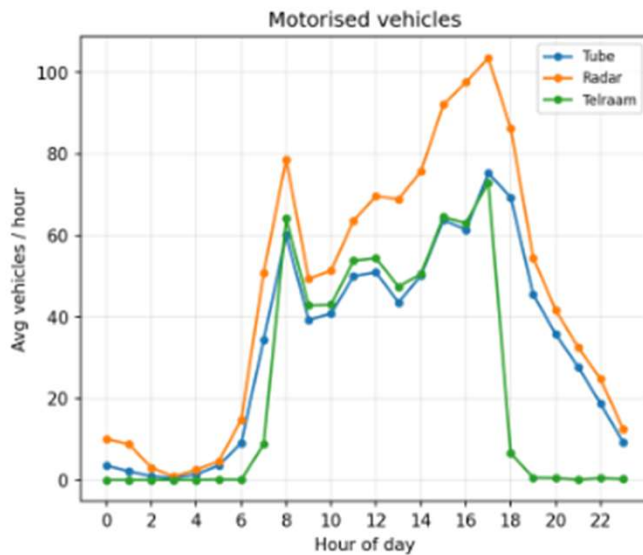


Telraam accuracy - experiment 1

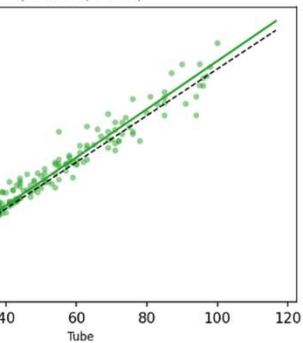


Telraam accuracy - experiment 1

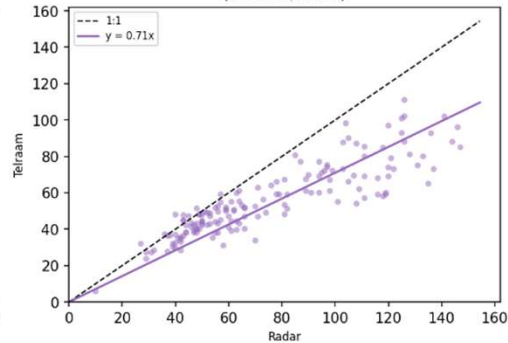
Site A - Average hourly profile (all-sources overlap)



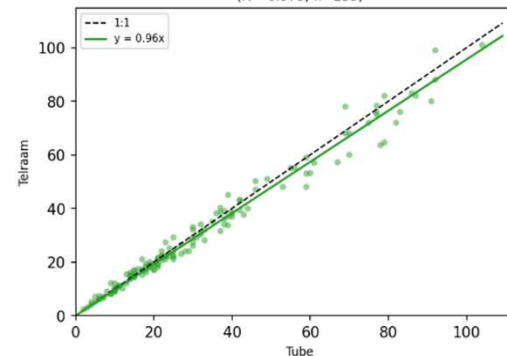
Cars: Tube vs Telraam
($R^2=0.943$, $n=157$)



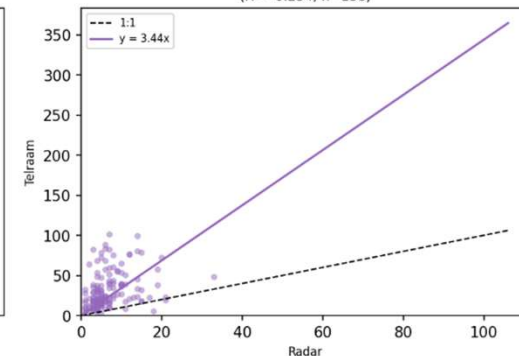
Cars: Radar vs Telraam
($R^2=0.674$, $n=157$)



Bikes: Tube vs Telraam
($R^2=0.979$, $n=139$)



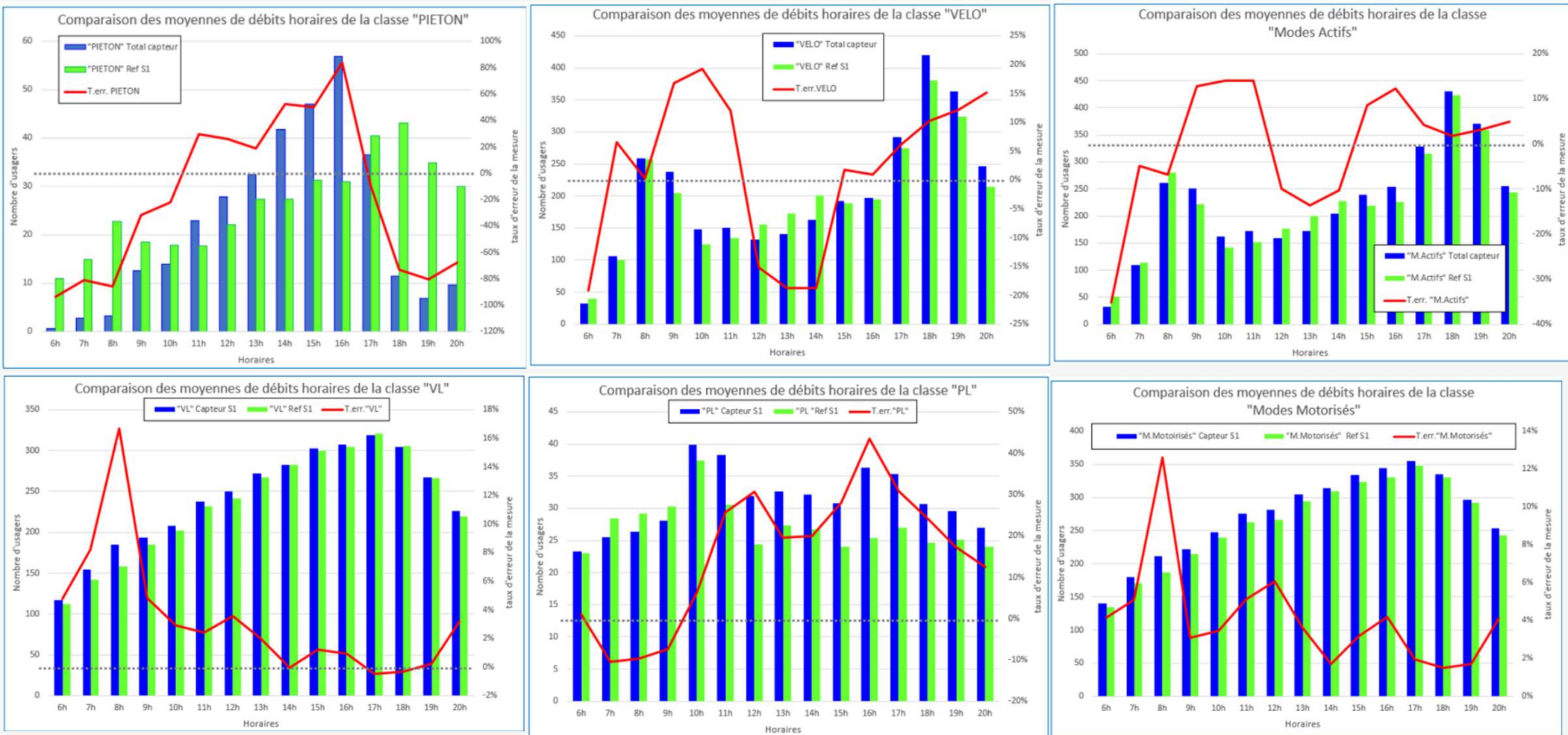
Bikes: Radar vs Telraam
($R^2=-0.254$, $n=138$)



Telraam accuracy - experiment 1

- Telraam & tubes match well
 - Cars: $R^2 = 0.943$, slope = 1.03
 - Bikes: $R^2 = 0.979$, slope = 0.96
- Total object - all 3 match well (except some weird outliers for radar...) (?)
- Evidence that night counts capture bikes in full (!)
- Radar suffer from class-mismatching

Telraam accuracy - experiment 2



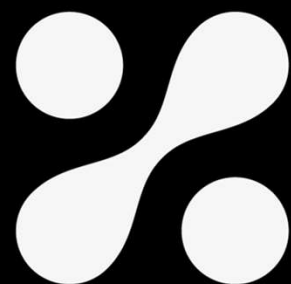
Telraam accuracy - experiment 2

- Close match, when looking over longer period (!)
- Some misclassification (bike/ped, large/car)
- uncertainty interval at finer temporal granularity is high for non-motorized modes
- *(challenging site, tram blocking view,...)*

		Moyenne des Err. Rel.	Ecart-type	Intervalle d'incertitude
	"PIETON"	-17%	60,98%	[- 172% ; + 139%]
	"VELO"	3%	17,69%	[- 36% ; + 42%]
	"VL"	3%	7,58%	[- 13% ; + 20%]
	"PL"	15%	24,96%	[- 47% ; + 77%]
	"Modes actifs"	1%	19,07%	[- 40% ; + 43%]
	"Modes Motorisés"	4%	6,31%	[- 10% ; + 18%]
	"Tous usagers"	18%	17,59%	[- 20% ; + 56%]

Telraam accuracy - conclusion

- On suitable sites, performs as good as tubes
- Motorized good also on challenging site
- Some misclassification risk (car/truck - ped/bike)
- Mostly use for long term monitoring; counting errors on short intervals are possible.



Telraam

NAME
TITLE

Diestsesteenweg 71
B-3010 Leuven

EMAIL
www.telraam.net