



RelyMap Connect ESA NAVISP Element 2





Successful UK Collaboration
NAVISP Element 2:



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Professor Ivan Petrunin

PNT Innovation for micromobility



Micromobility innovation

Aims for today:

Benefits of UK Space Agency and ESA NAVISP support for activity

Micromobility background

Some examples of RelyMap functionality

A look at some PNT innovation involved with this activity

Next steps





Key NAVISP benefits

Market Interaction

Legislators

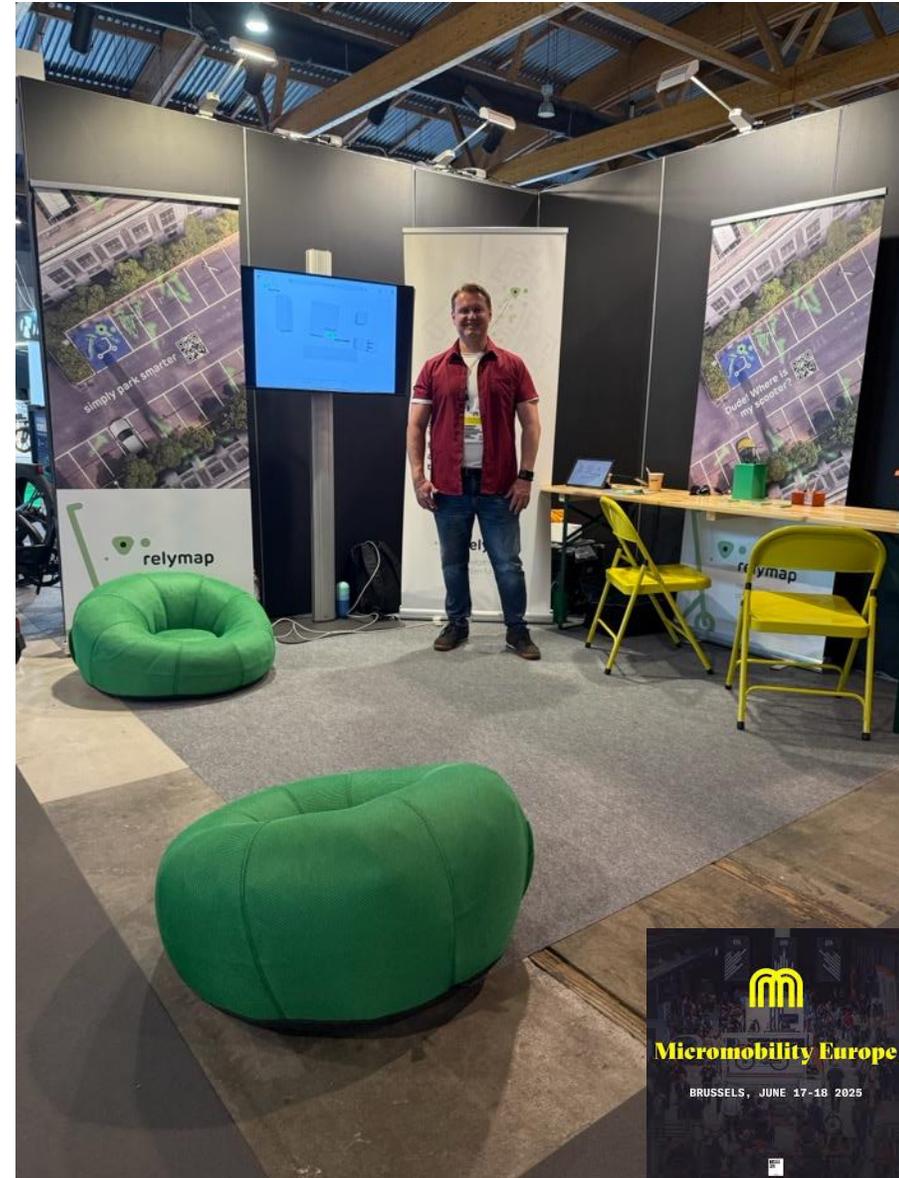
Regulators

Operators

Suppliers



Collaborative
innovation

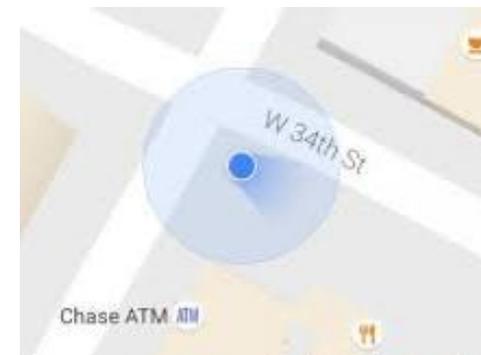


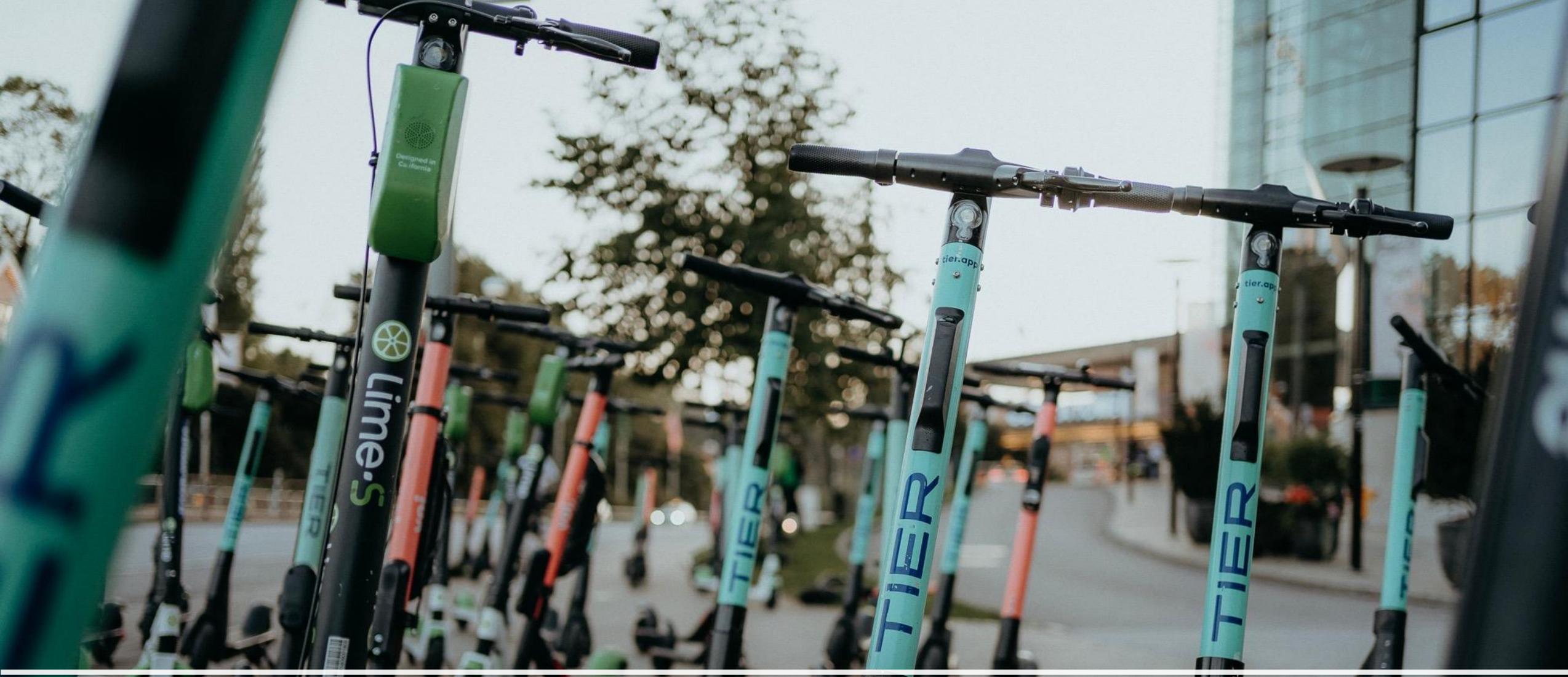


The Urban Positioning Challenge

Traditional GNSS systems struggle in complex urban environments where tall buildings, narrow streets, and signal reflections create positioning uncertainty.

This fundamental challenge impacts the safe and compliant operation of micromobility services.





Street Clutter

Rideshare operator challenges



Transport

Voi and Lime 'in limbo' as UK trials of e-scooter rentals extended again

Rental firms welcome extension until 2028 but urge government to bring forward legislation

Lime must withdraw scooters from Brussels 'immediately' following ruling

Thursday, 3 July 2025

By **Katie Westwood**



Lime's rivals are calling for the company to remove all its scooters and bikes from Brussels. Credit: Vince Jacob.

Bike and scooter-sharing service Lime has been told by its rivals to 'cease operating' in Brussels after the Council of State brought an end to the company's stay of execution in the city.

In 2023, Brussels authorities decided to limit the number of bike and scooter-sharing services operating in Brussels, claiming this would improve service quality, safety and parking options for users.

Paris says au revoir to rental e-scooters

1 September 2023 · 1198 Comments



REUTERS

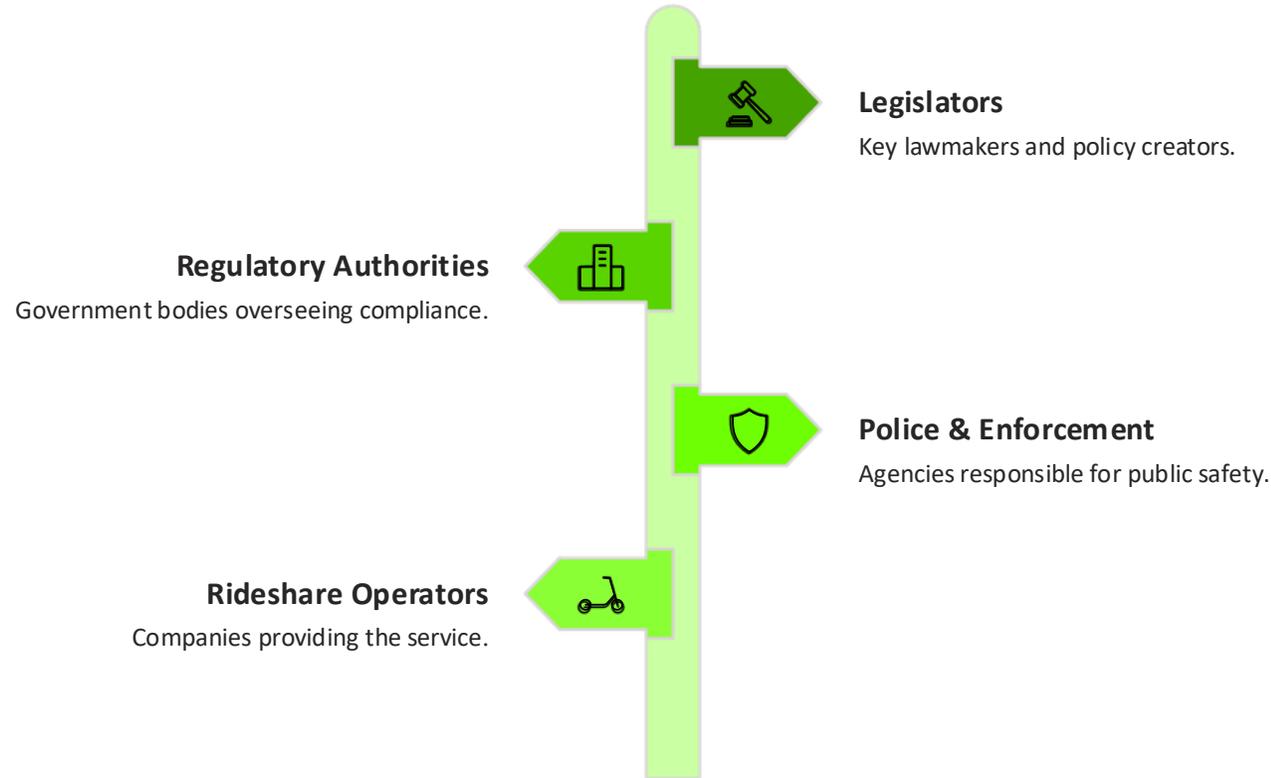
Parisians in April voted to ban rental e-scooters but turnout was low

By **Hugh Schofield**

BBC News, Paris

A ban on rental electric scooters has come into effect in Paris in response to a rising number of people being injured and killed in the French capital.

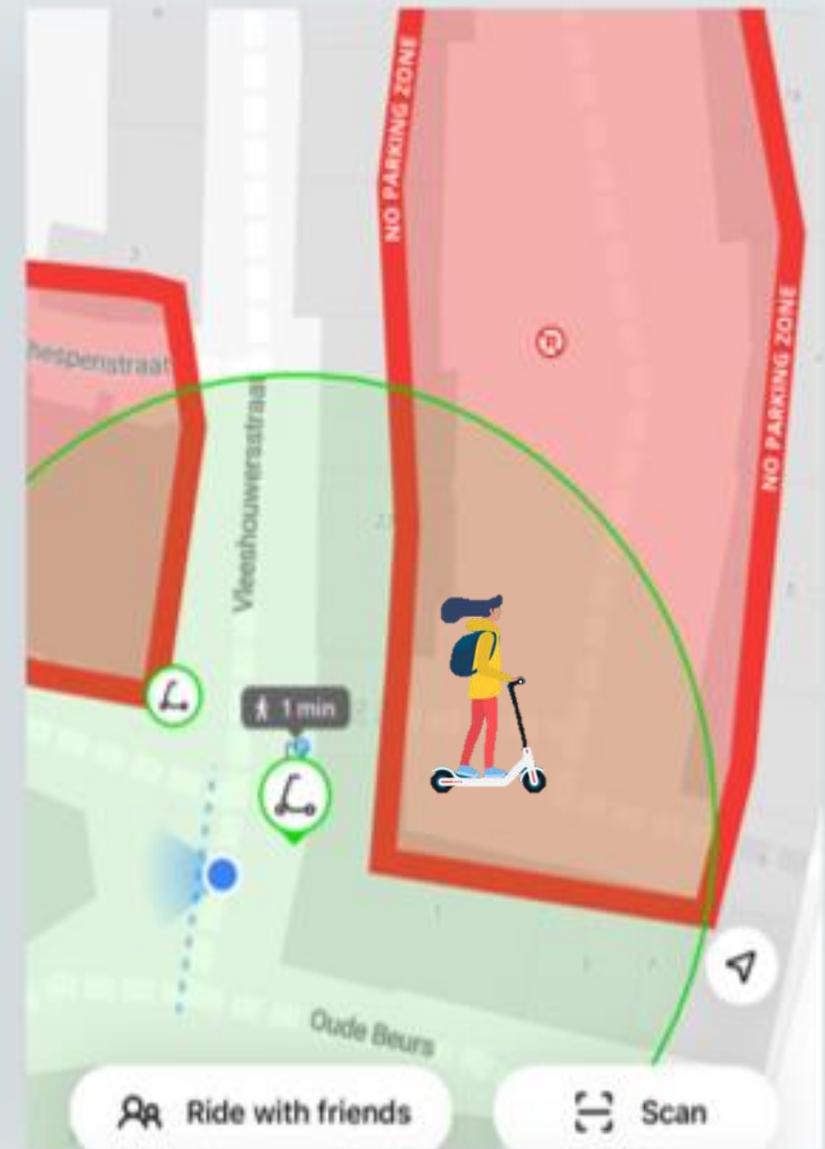
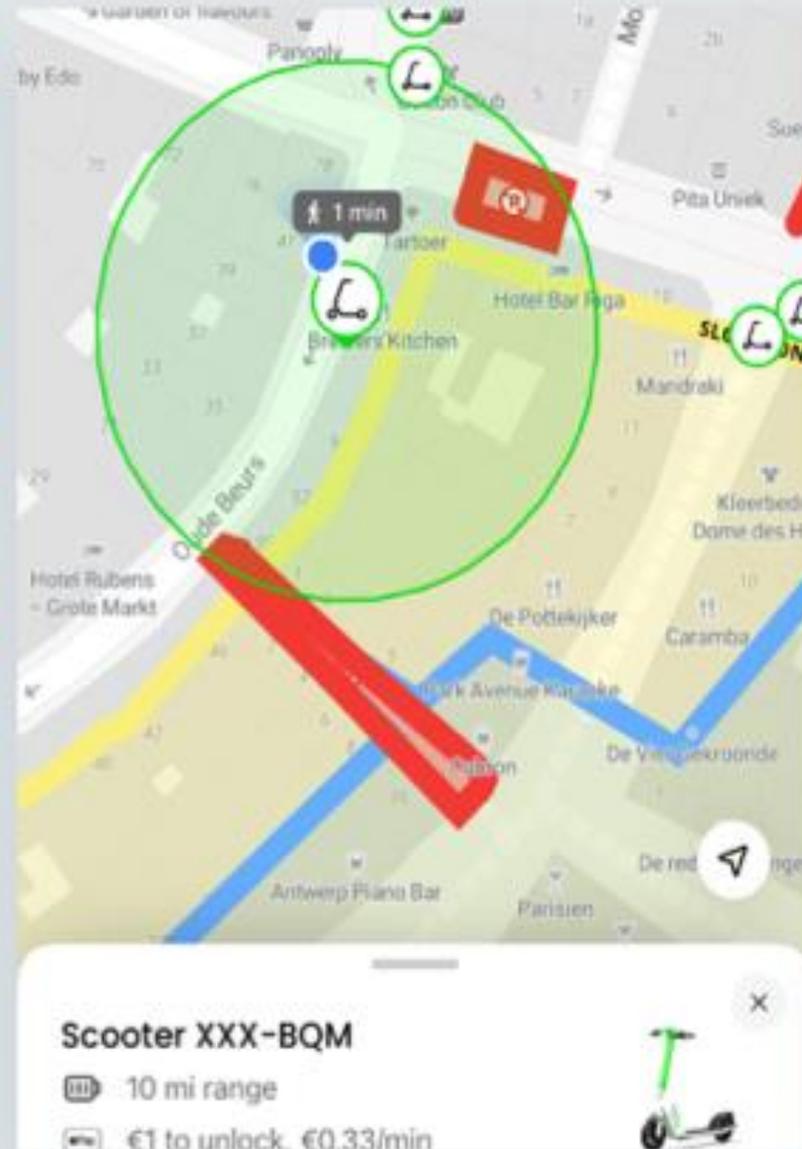
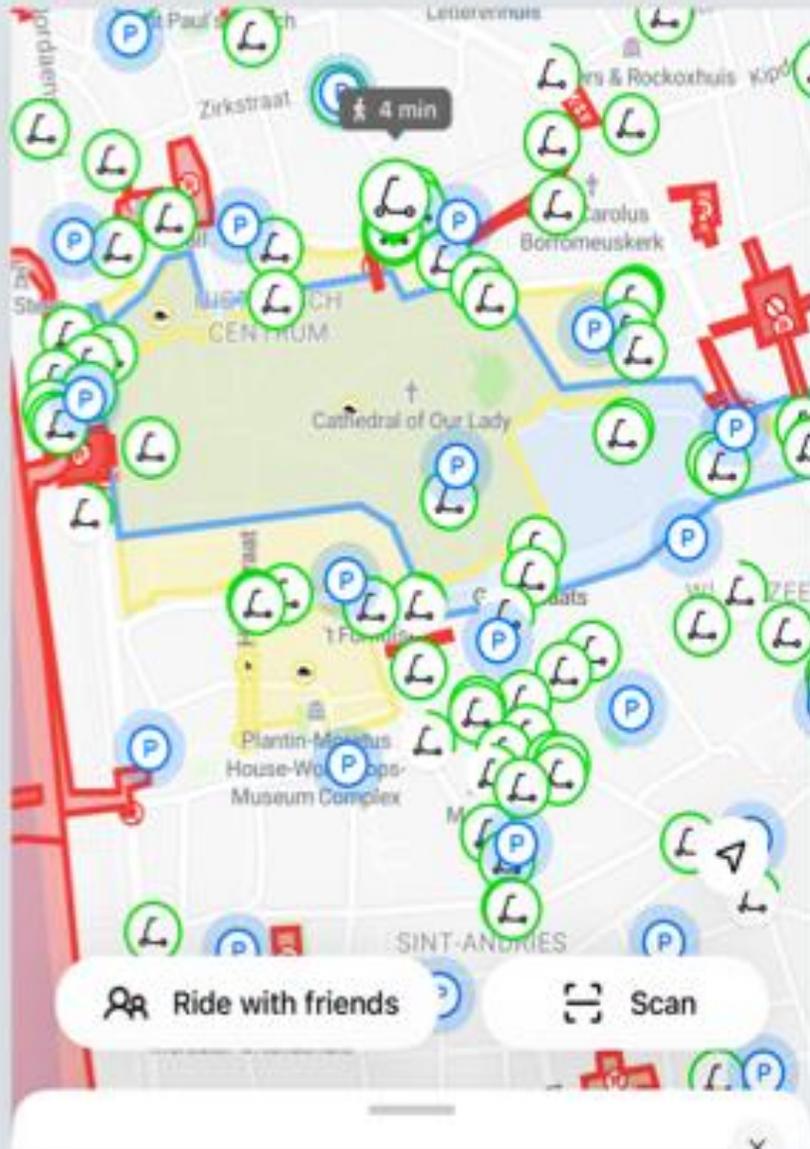
Micromobility Stakeholders: A Public-Centred Ecosystem

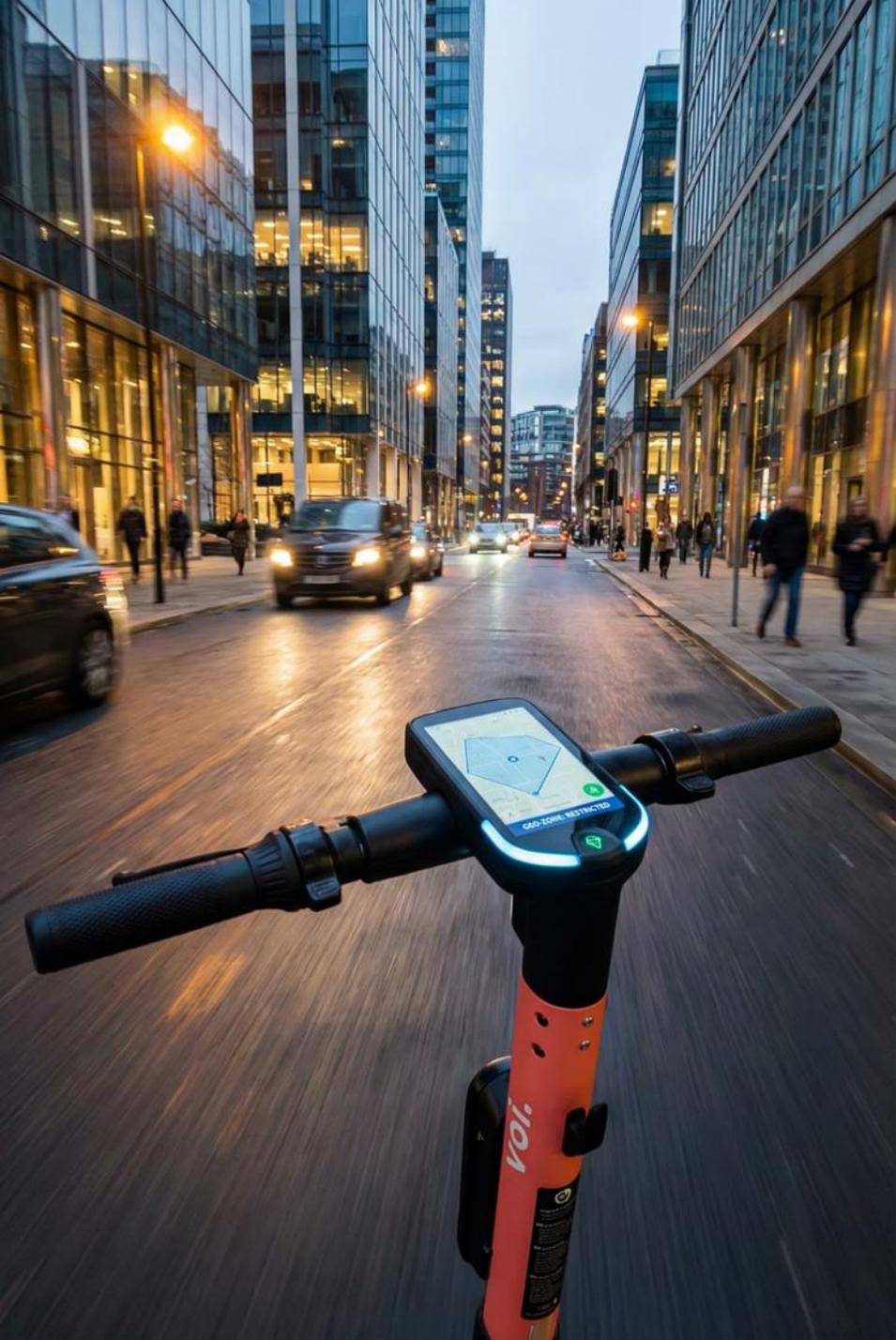


All stakeholders exist to serve the public—the ultimate users whose safety, accessibility, and experience drive micromobility governance and innovation.

<p>Legislators</p> <p>Create overarching laws balancing innovation with public interest and environmental goals</p>	<p>Local Authorities</p> <p>Implement permits, parking zones, geofencing, and data-sharing mandates</p>	<p>Police & Enforcement</p> <p>Ensure compliance, address illegal parking, and respond to safety incidents</p>	<p>Rideshare Operators</p> <p>Provide fleets, innovate pricing, and optimise distribution via data analytics</p>
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Understanding Rideshare Operations





Micromobility Problem Areas



Geofence Management

Planning, integration and performance of geo-ringfences (Virtual parking bays, no go areas, boundaries of operation)



Parking

Location accuracy in cities around these geo-ringfences – virtual parking bays – can be up to 10s metres



In motion

Location accuracy as scooters move through the complex city, particularly when they interact with these geo-ringfences – pavement riding, etc

- ❑ **Top-level user needs:** optimised geofencing capabilities to help ensure safe, compliant e-scooter operation in complex urban environments

RedBox development test kit



Cloud based solution

RelyMap: Predictive GNSS Analytics for Urban Operations



Error prediction

RelyMap core uses 3D city data and analytics to predict GNSS performance on the ground in complex environments



Live Data Fusion

Combines live GNSS data with machine learning models using on-board sensor telemetry



Confidence Factor

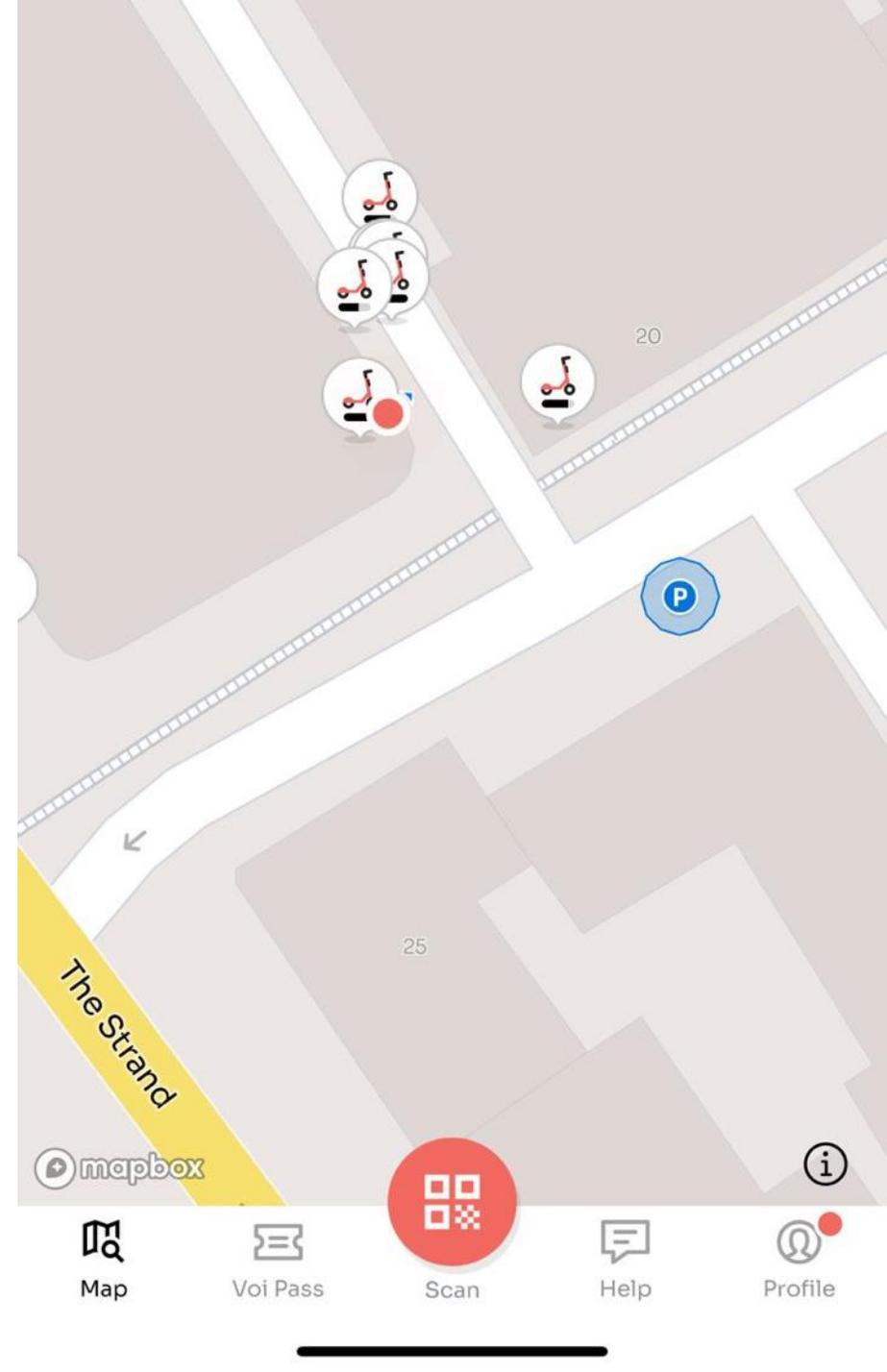
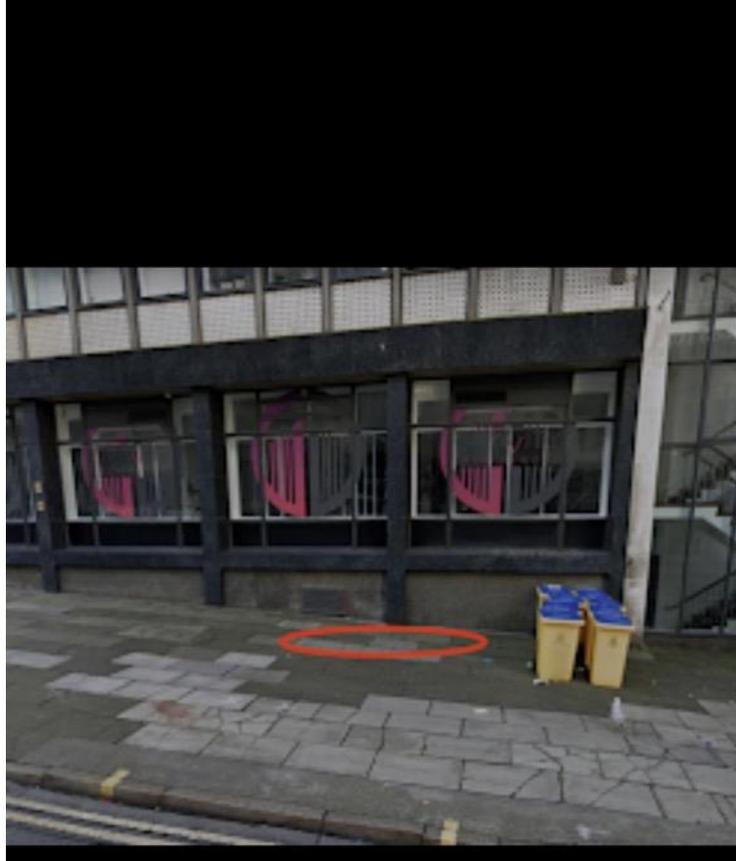
Unique confidence scoring for location position and geo-ringfence ringfence optimisation





Liverpool

Virtual parking bay



Parking Confidence factor

lon: -2.9936925, lat: 53.4055248333

2025-05-29T13:59:34Z

Galileo | GLONASS | GPS | Beidou

Nearest Zones Analytics

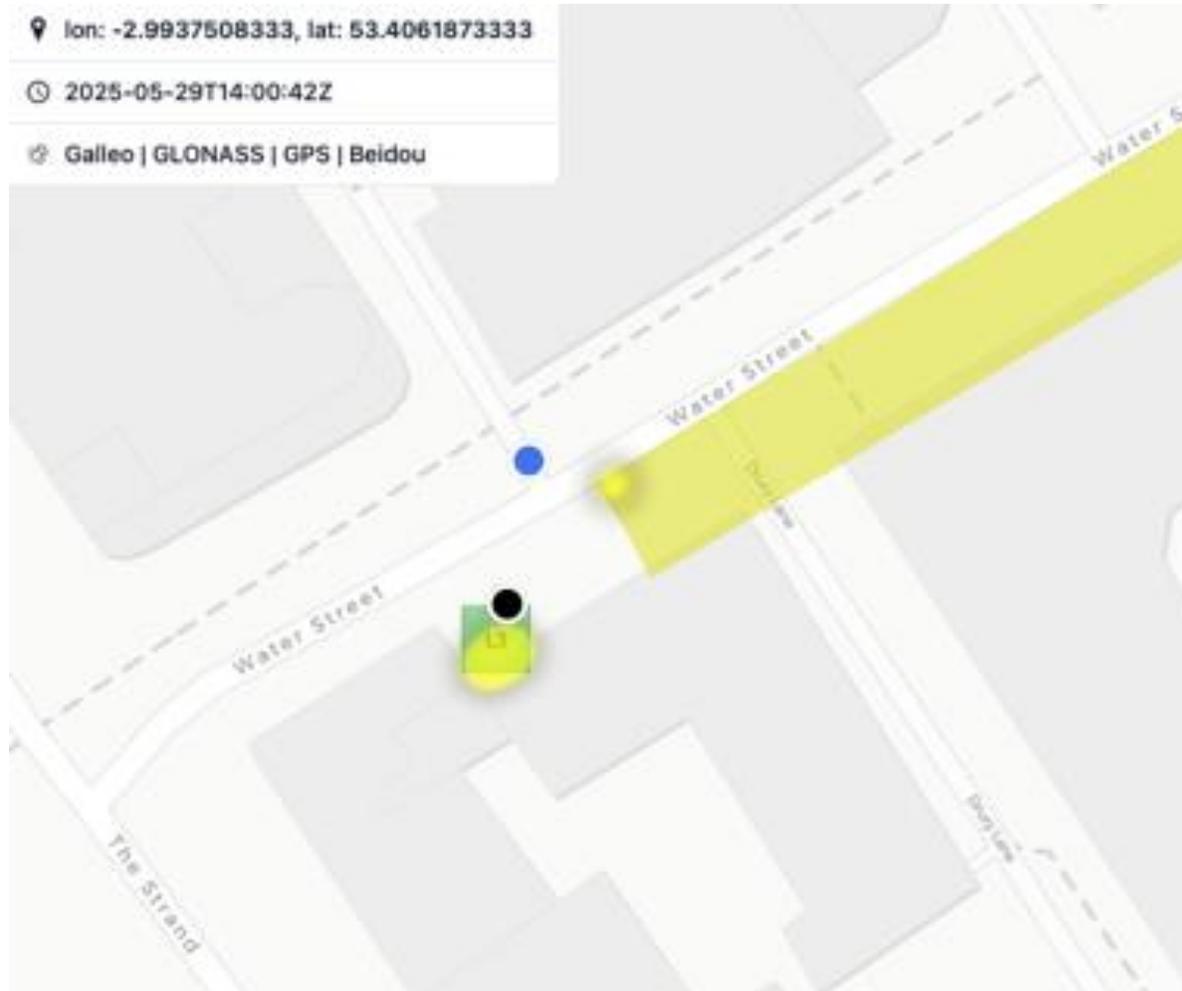
Zone	Confidence	Status
L2 parking	good	Currently no GNSS related issues detected for this zone
L3 parking	poor	Currently no GNSS related issues detected for this zone
Slow go zone slow-zone	moderate	Currently no GNSS related issues detected for this zone

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Parking Confidence factor



ML Fusion model in motion Confidence factor

lon: -2.9937748333, lat: 53.4062895

2025-05-29T14:01:25Z

Galleo | GLONASS | GPS | Beidou

Nearest Zones Analytics

- L3** parking **poor**
Currently no GNSS related issues detected for this zone
- Slow go zone** slow-zone **moderate**
Currently no GNSS related issues detected for this zone
- L2** parking **good**
Currently no GNSS related issues detected for this zone

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ML Fusion model in motion Confidence factor

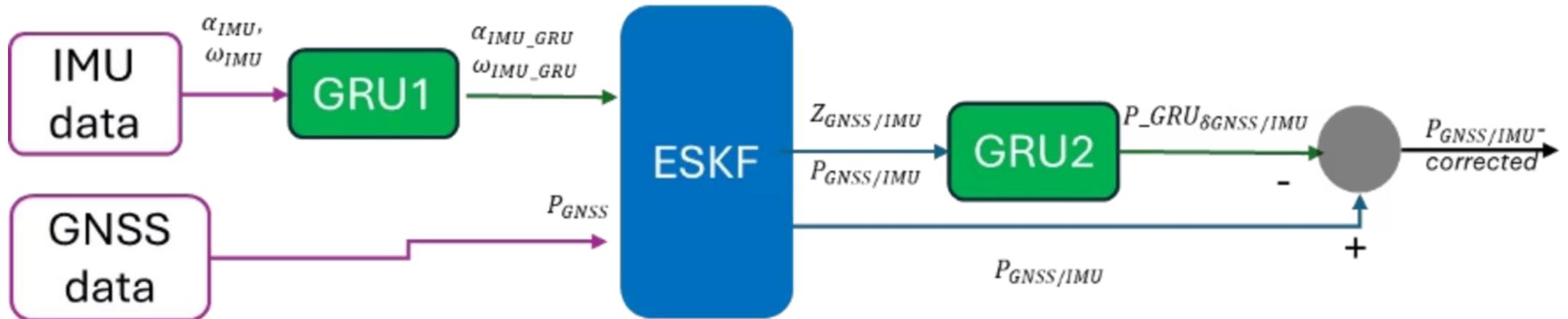
lon: -2.991273, lat: 53.4072771667
2025-07-22T14:14:45Z
GLONASS | GPS | Beidou | Galileo

Nearest Zones Analytics

- L6 parking** good
Currently no GNSS related issues detected for this zone
[events log](#)
last update 2025-07-22T14:14:24Z
- Restricted area** poor
restricted
Currently no GNSS related issues detected for this zone
- Slow go zone** moderate
slow-zone



ML Sensor Fusion – Innovation



ML model training & development – case study

E-scooter Dynamics Open Sky

Open sky data for e-scooter dynamics - acceleration, turning, smooth and rougher surface type, jumping off kerbs - Cranfield university.

1**2**

Introduce complex sites

introducing multipath - Cranfield University using using static survey points.

3

Complex sites in Milton Keynes

Real-world testing on rideshare e-scooters.

4

Complex sites in Glasgow

Using static survey points in Glasgow.

5

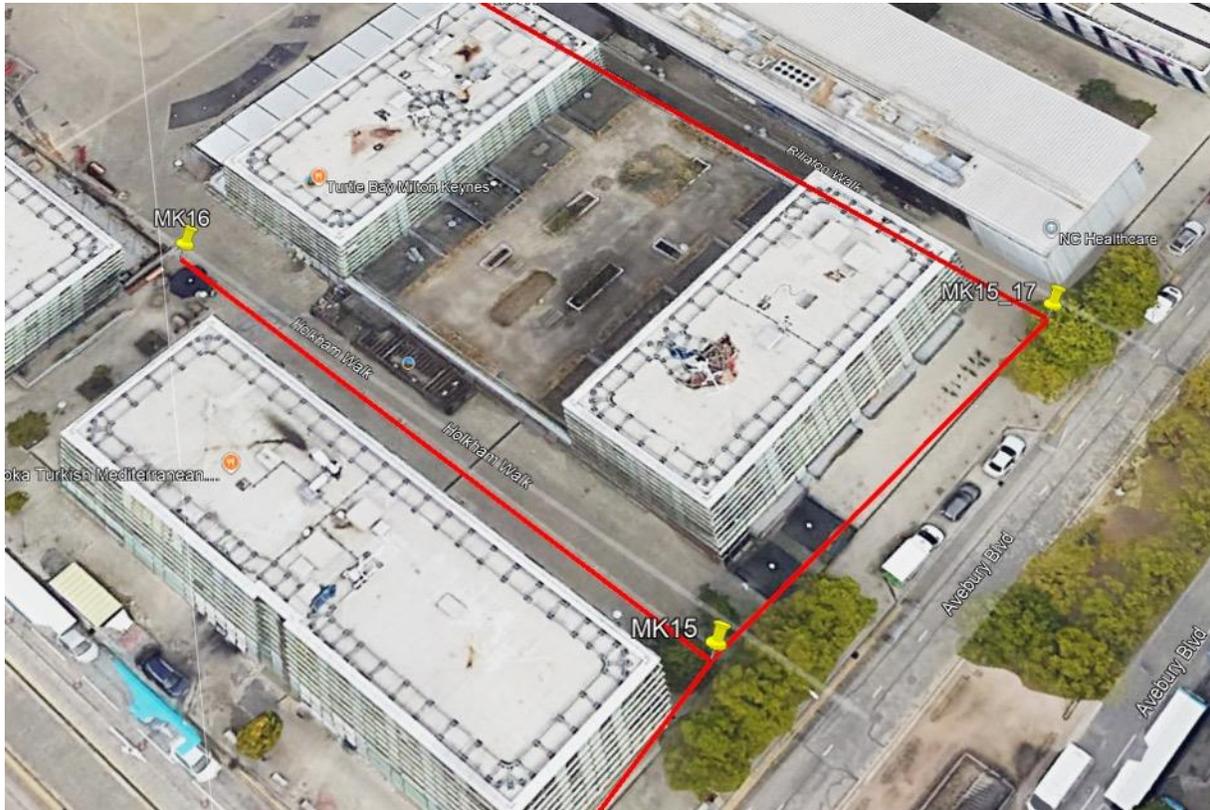
Complex sites in other cities

Notably Liverpool

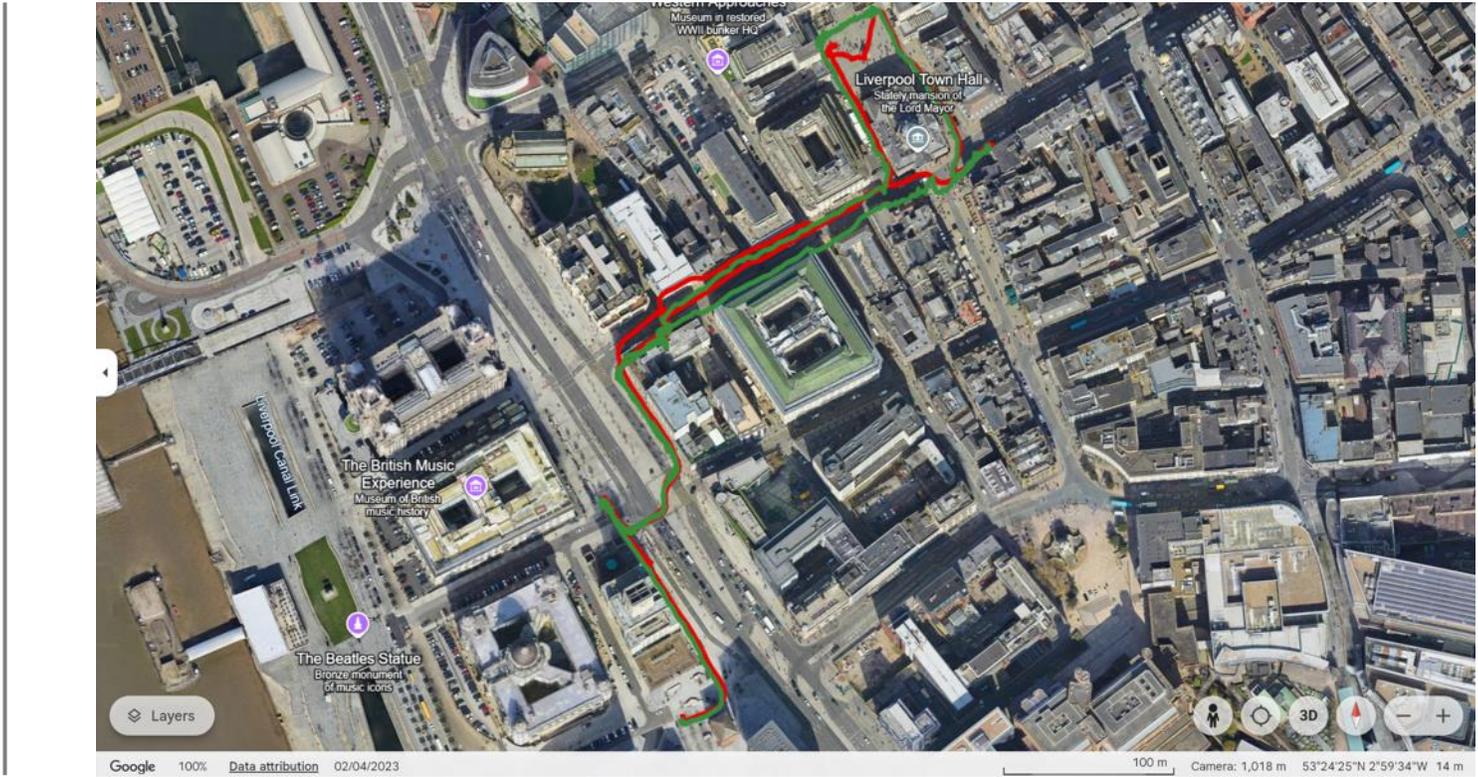
Complex sites in Milton Keynes



Milton Keynes



Liverpool





The Path Forward



Working with Regulators

Working with key regulator partners who provide market pull



Working with operators

Working with operators to deploy and test system



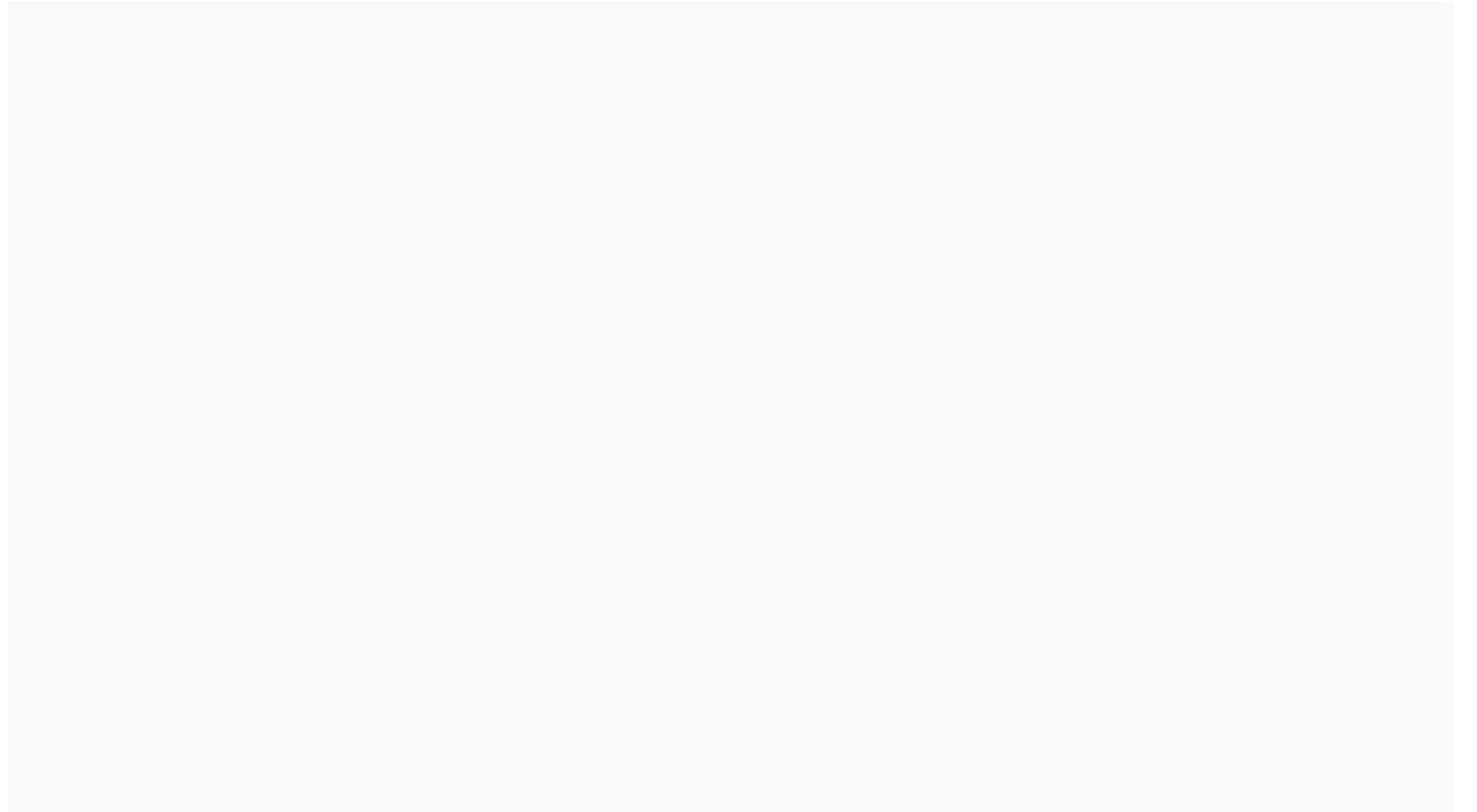
Validation

Market Validation

RelyMap Connect – ESA NAVISP Element 2



Questions



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