PHOEBE Project

Welcoming Words

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Department of Transportation Planning and Engineering,
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This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101076963

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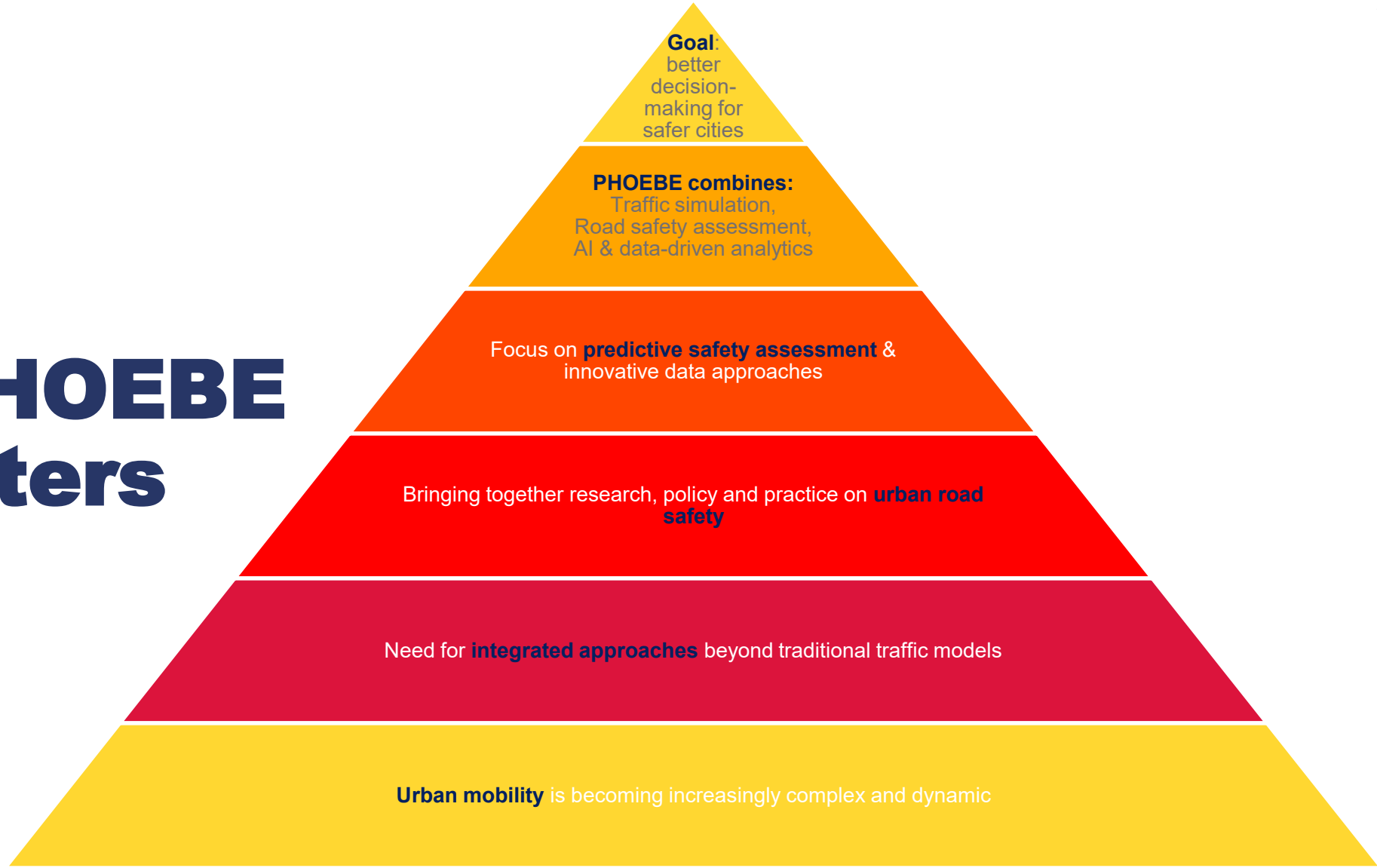
Why PHOEBE Matters



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What This Workshop Will Cover?

- Overview of the **PHOEBE framework & methodology**

- Insights from **real-world use cases**:
  - Athens
  - Valencia
  - West Midlands

- **Discussion** on:
  - Predictive safety tools
  - Data integration (telematics, video, AI)
  - Policy & implementation perspectives

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PHOEBE Project

Overview, Use cases & methodology

The PHOEBE consortium

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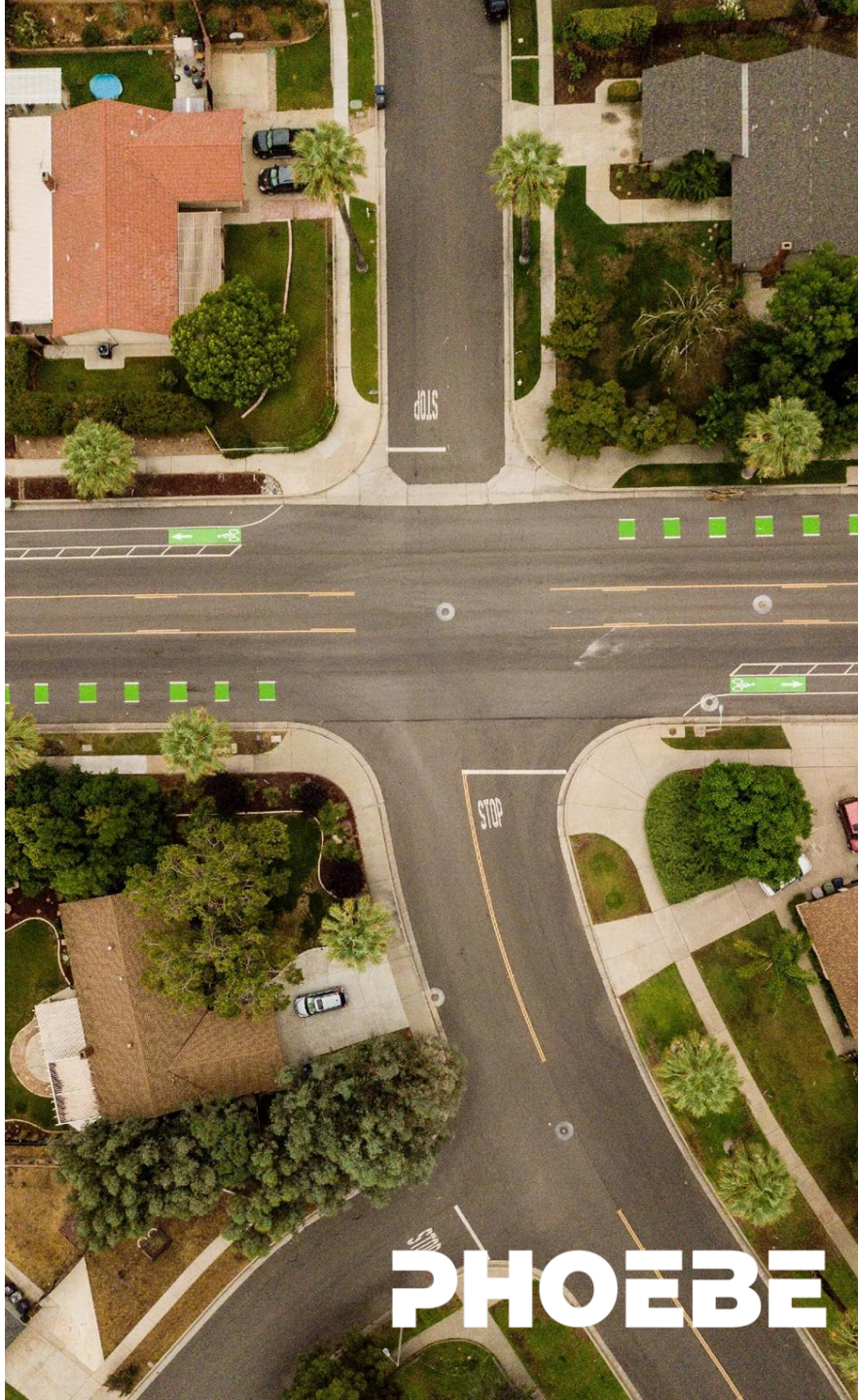
The need

Urban traffic systems are experiencing an increasing array of dynamic factors

Models strongly focused on vehicular traffic

Lack of integration with systems and tools used to manage and develop road networks



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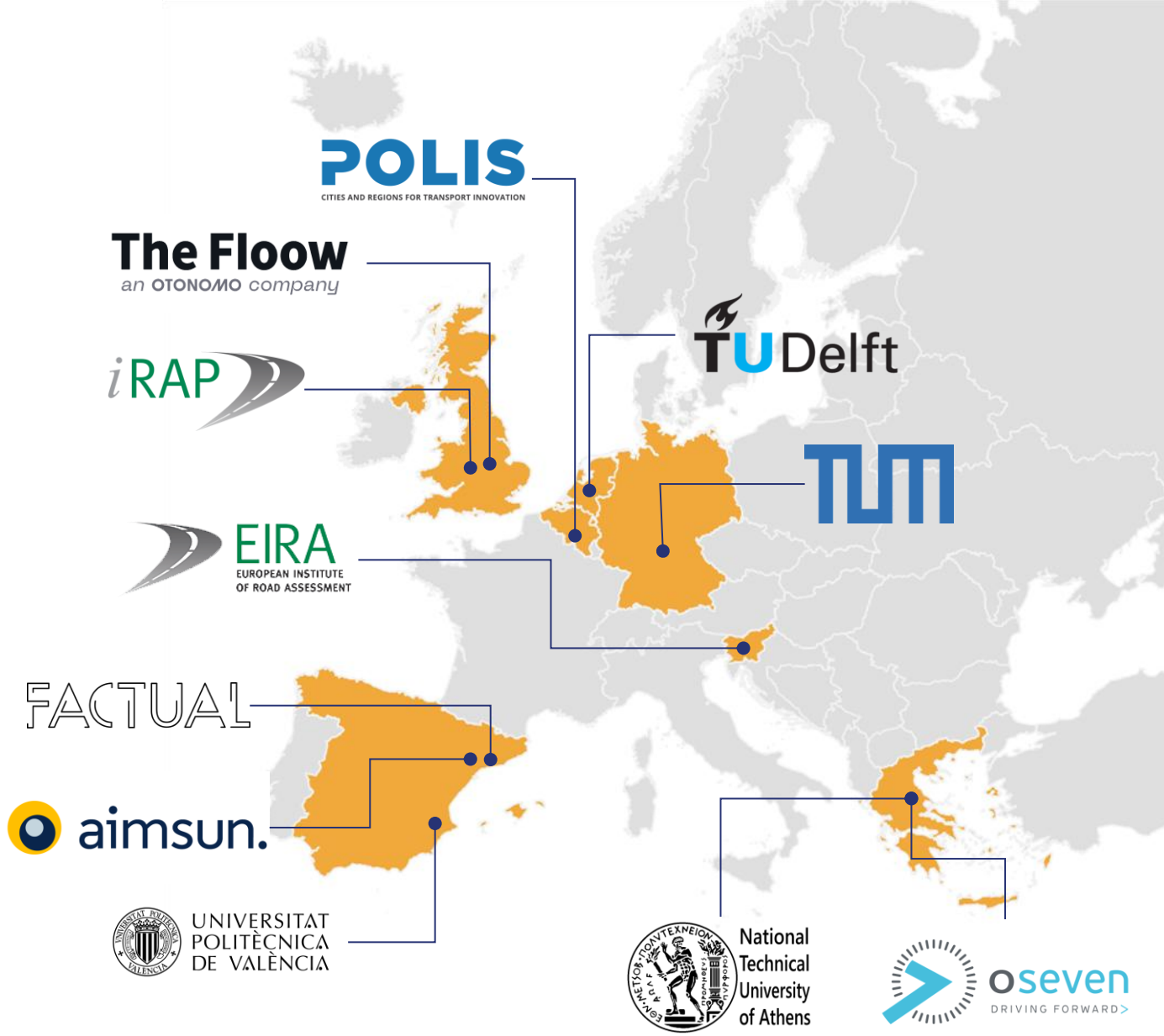
The team

seven COUNTRIES

eleven PARTNERS



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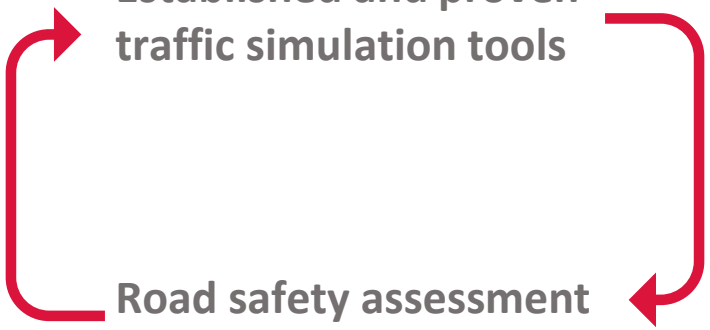
The PHOEBE framework (1)



NEW

Dedicated road safety module in the traffic simulation tools

- (i) infrastructure safety, speed, modal shift, and induced demand models and performance metrics
- (ii) human behaviour models
- (iii) application of new and traditional data sources and analytics using artificial intelligence (AI) and machine learning (ML) techniques.

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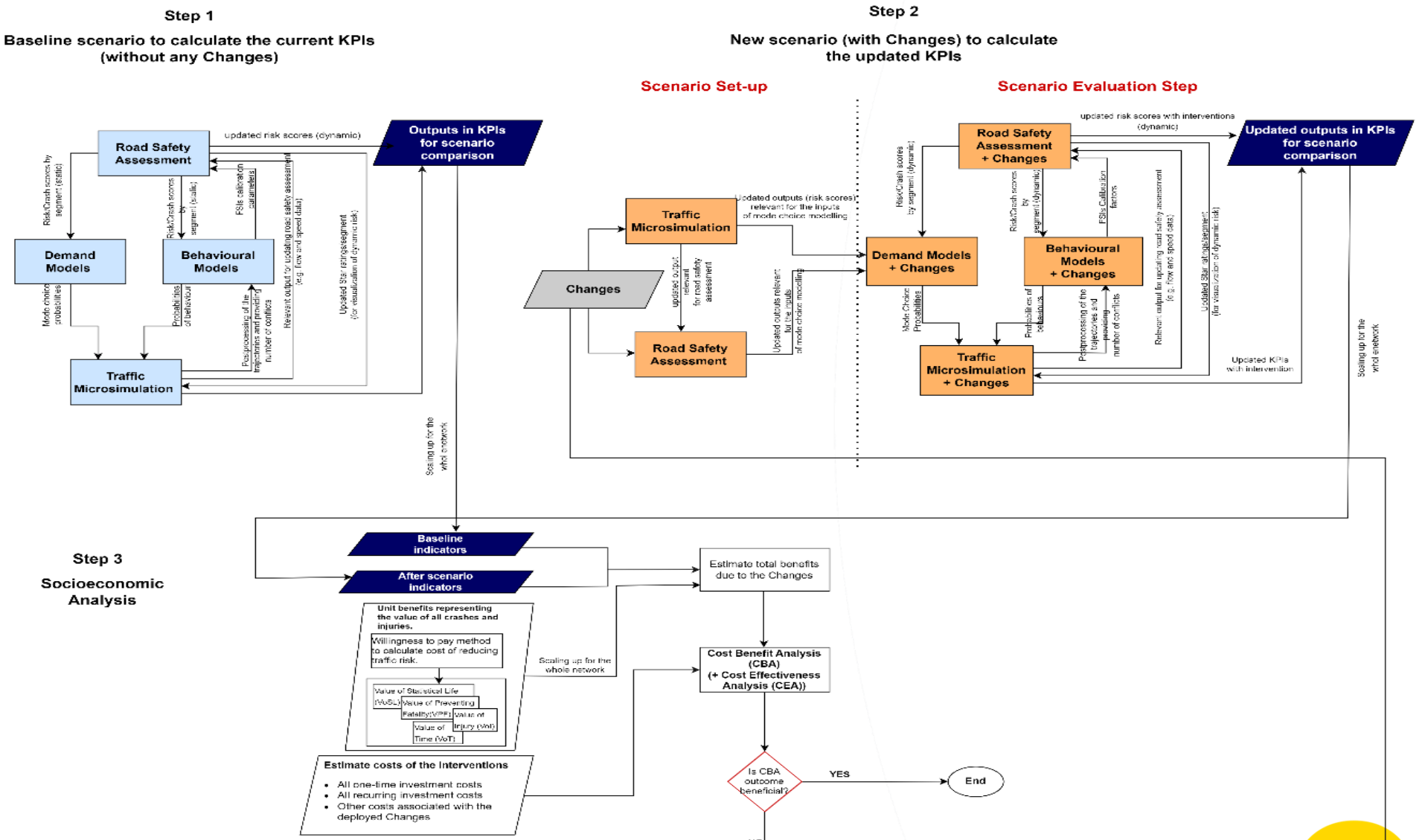
The Phoebe Framework (2)



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The ambition (1)

network-wide (macro) level

Individual (micro) level

SAFETY & SOCIOECONOMIC OUTCOMES

- New forms of transport
- New technologies
- Regulatory and behavioural changes

=

focused on both vulnerable road users and vehicle occupants

significant game-changer for urban stakeholders

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The ambition (2)

PHOEBE's methodological framework will be a **"blue-print"** for how cities can establish and apply the predictive safety assessment framework in an efficient and cost-effective way, providing a theoretical guide on how it works, and how to implement it.

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Project Objectives

1. To develop a new, replicable methodology for **dynamic safety prediction and socio-economic evaluation**
2. To **harmonise safety definitions** in traffic simulation models
3. To develop **enhanced and integrated urban risk assessment models and tools**
4. To **embody social components into risk assessments** to take into account changes in human behaviour, and mode and trip choices
5. To **exploit big data and telematics** through AI and ML data analysis techniques that are innovative and efficient
6. To apply the proposed methodological framework and enhanced and integrated predictive modelling tools in an **experimental multi-use-case**

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The Methodology

Locations would be selected for simulation to understand how the changes the city is planning will work in the context of other trends.

The results are then extrapolated to the network-wide level to estimate the overall impact of the forecast changes and impacts are calculated.

Data gathered to establish baseline conditions and then simulate the expected changes to the road environment

The outputs would then be evaluated to produce dynamic safety scores. The results can be used to rerun and refine simulated scenarios and validate the results

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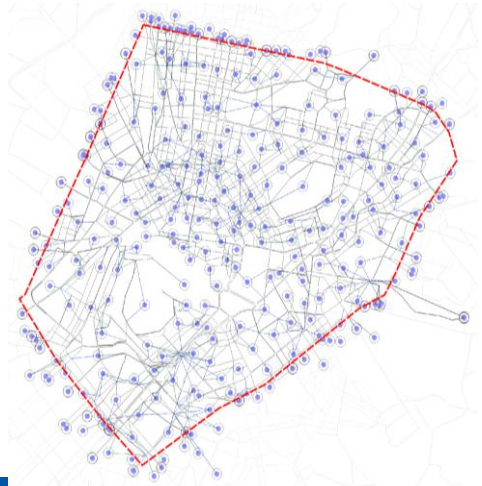
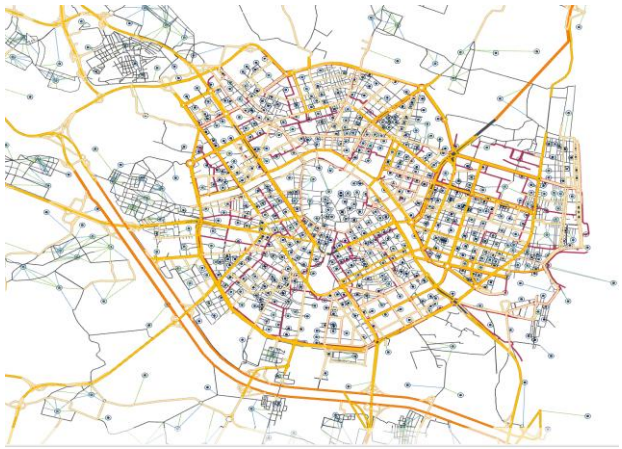
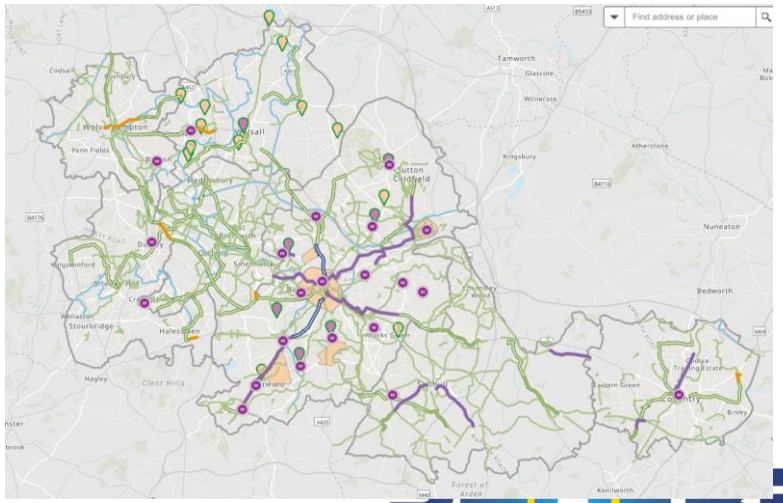
Use cases







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Athens Use Case

- The focus of the Athens pilot is **pedestrian road safety.**
- In order to measure it, **profiles** and example travel patterns are defined.
- The analysis place critical emphasis on **VRU KPIs**, such as speed measurements and modal share of pedestrians, cyclists and similar modes, such as e-scooters.
- Different **parameters** are taken into consideration, such as disability rate, gender or age.
- **Scenarios** are also be created for different times of the day, such as day- or night time, as well as during peak or off-peak hours.

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Involvement of Local Stakeholders

- The City of Athens participates and will engages through the organization responsible for all infrastructure interventions, **Athens Anaplasis**.

- The Athens stakeholders provide insights **on the implementation process** of the designed interventions, and regarding the measurements of their impacts.

- They incorporate the project outcomes as part of the **strategic planning for the City of Athens** and exploit the quantitative outcomes to reach informed decisions in order to prioritize future interventions.

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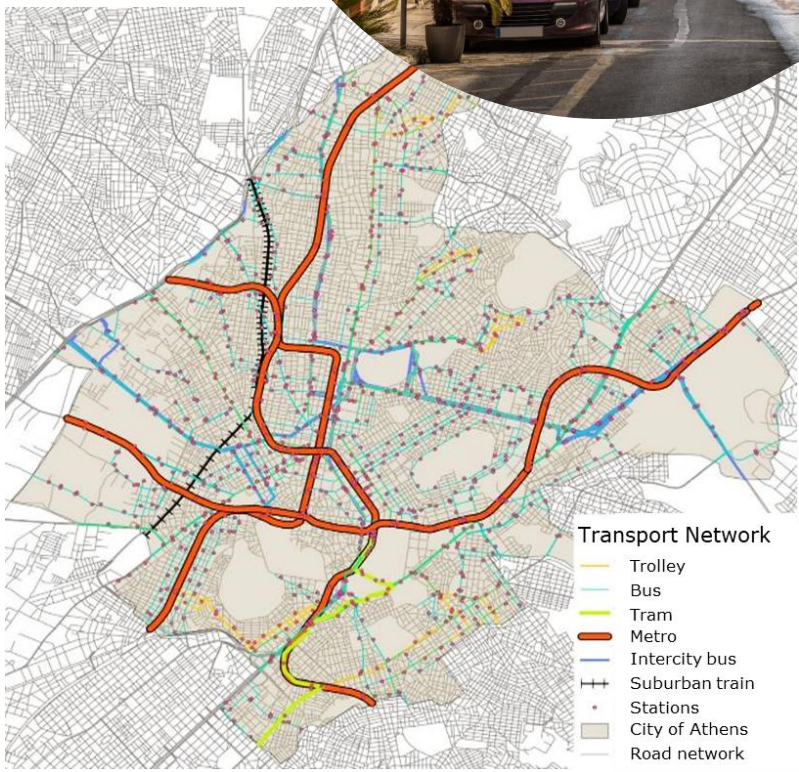
Athens Characteristics

- The **City of Athens** (pop. 664,000) is in the Attica metropolitan region (pop. 3.75 million).

- **Passenger vehicles** make up 69% of the total vehicle fleet in Attica, followed by motorcycles and mopeds at 24%, trucks at 6.7% and buses at 0.3%.

- The **public transport network** of Athens consists of buses, trolleybuses, trams and metro lines for urban transport, complemented by the network of Suburban bus and train services.



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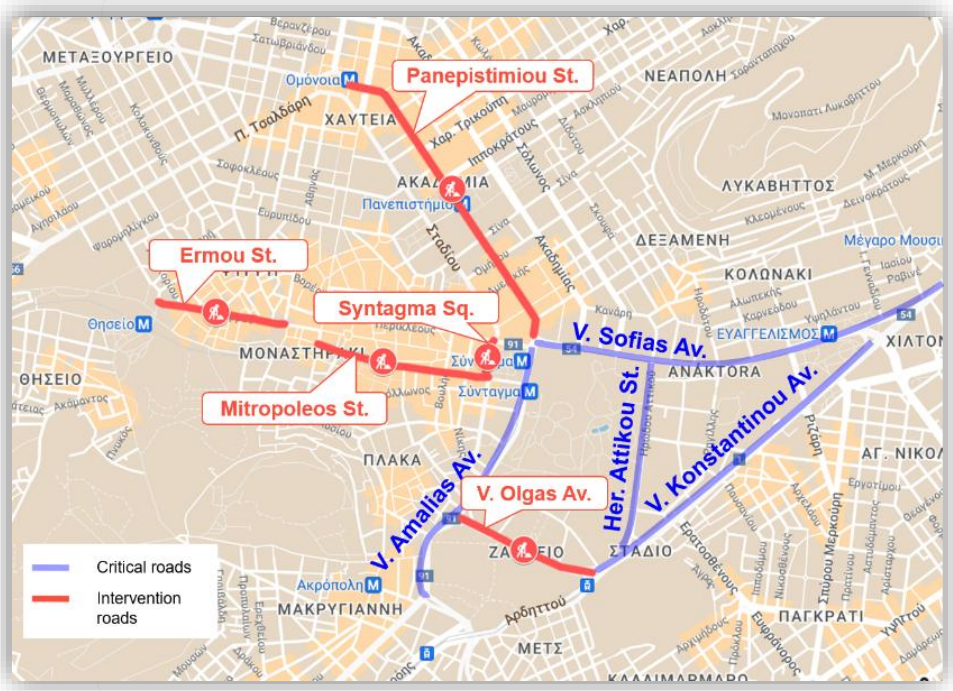
Use case Interventions

City of Athens intends to implement three **major interventions** to promote safety and sustainable mobility:

- a **30 km/h speed limit** across the network through several regulatory measures, from nominal enforcement to police presence to radars and speed cameras
- the establishment of an extensive network of **bicycle routes** within the existing road network (mixed traffic, bike/bus lanes and bike lanes on road shoulders)
- the promotion of **public transport** modes.



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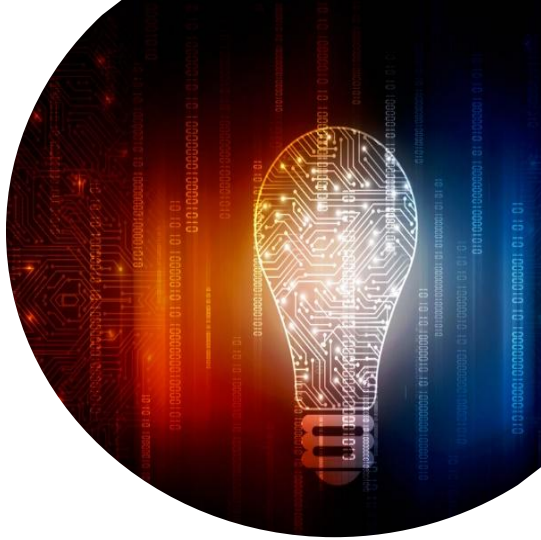
Data Requirements



- **Survey Data:** The requirements for the implementation of the Survey e.g. Demographics information, average cost of Public Transport, Motorised Individual Transport information etc. have been collected and provided.

- **User behavior Data:** Examination of the means for analyzing the information of existing cameras in order to evaluate patterns of behavior exhibited by drivers, pedestrians, cyclists, and other individuals using the roadways.

- **Identify High-risk areas:** Identify areas of concern by identifying and assessing traffic conflicts by integrating AIMSUN traffic simulation program.

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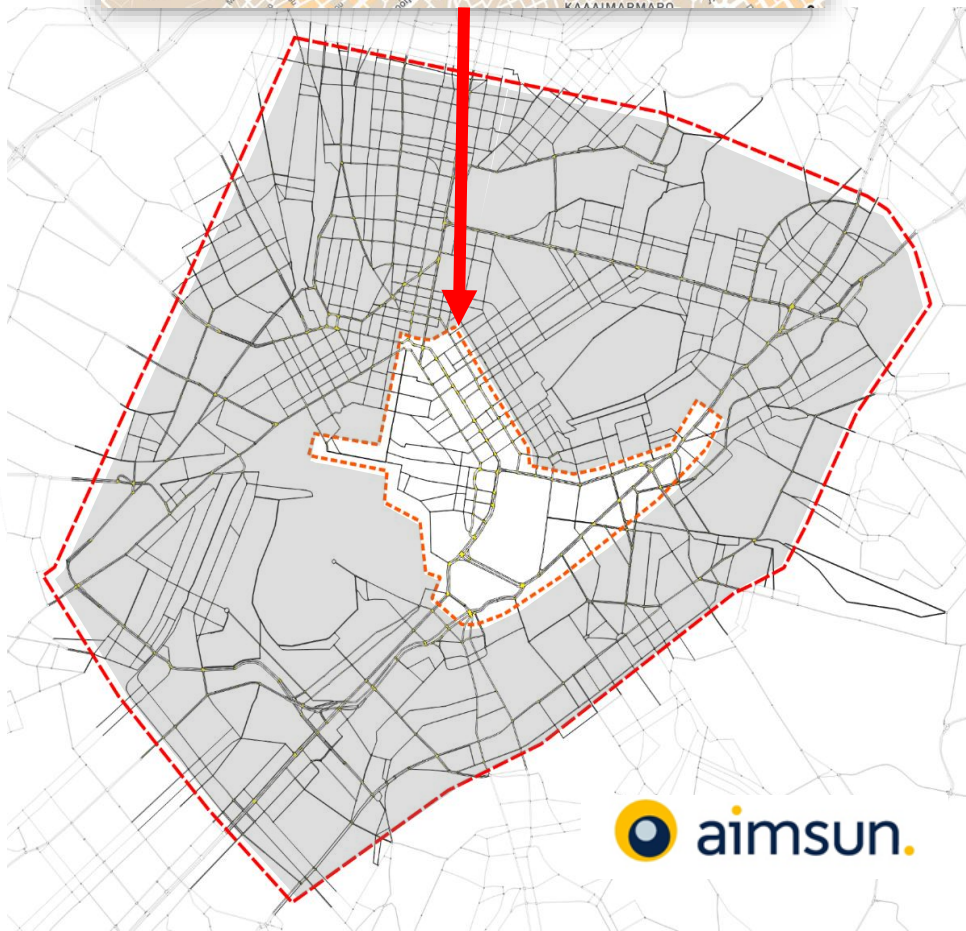
Traffic Simulation

- An integrated **traffic AIMSUN-based simulation model** for the Athens network of the NTUA Department of Transportation Planning and Engineering is available to be used.
- The Athens **simulation network** reaches approximately 20 km² and consists of 1,137 nodes and 2,580 road segments with a total length of 348 km.
- The model will be modified to cater specifically to the **intervention area requirements**.
- **Details of planned interventions will be integrated** into the simulation model (such as new traffic signals, lane changes, road closures, etc.).



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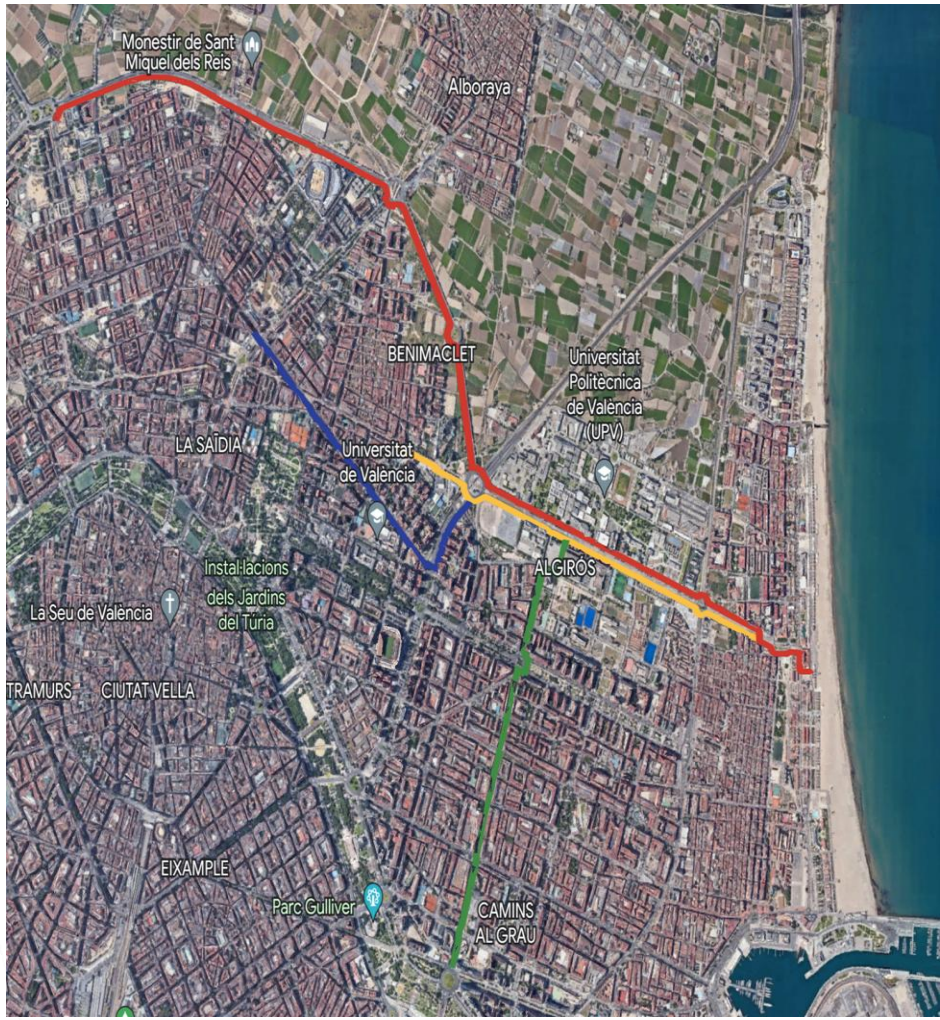
Valencia Use Case

- The Valencia pilot aims to assess and **improve cycling infrastructure** through LanePatrol technology, CycleRAP methodology, and **user behavior analysis**.

- **Context** and **Characteristics** of the Location:
  - 800.000 inhabitants
  - Important tourist destination
  - Pedestrian- and bike-friendly city
  - 8.3 urban road fatalities / 1 million inhabitants in Spain
  - Areas of Algirós, Camins al Grau, Benimaclet, Beteró and El Cabanyal districts
  - Proximity to UPV campus and tourist hotspots
  - Tram crossings



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Process and measurement of impacts

- User **behavior analysis** in various cycling segments to study factors like speed distributions and adherence to **traffic signals.**
- Measurement of impacts using **KPIs** such as road crash rates, user behavior changes, and increased usage of cycling facilities
- Integration of PHOEBE outcomes into **urban development plans**, mobility strategies, and infrastructure improvement programs.
- Prioritization of infrastructure investments and **targeted interventions** in high-risk areas.
- Revision of **traffic regulations** and policies.
- Integration of cycling infrastructure with **other modes** of transportation.
- Long-term **sustainability** and effectiveness through alignment with urban development vision of the city.

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Future Scenarios, their Scope & Future Analyses

- Valencia has developed the Urban Strategy 2030 as part of the **Missions Valencia 2030**, aiming to enhance the quality of life and sustainability of the city.
- Non-motorized mobility, particularly **walking and cycling**, is **prioritized**.
- Expansion and improvement of the **cycling lane network**.
- Creation of a "**green ring**" around the metropolitan area, connecting neighborhoods and municipalities with cycling and walking paths.
- The scope **integrates**:
  - Collection of Cycling Infrastructure Data
  - Assessment of Safety and Quality
  - Speed Limit Evaluation
  - Traffic Volume Assessment
  - Improve Cycling Safety
- **Analyze User Behaviours** in the following situations:
  Bike Lanes and Sidewalks, Traffic Conflict, Tram Crossings, Intersections, Touristic Areas

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West Midlands Characteristics & Interventions

- The **second-largest urban area in the UK** (pop. 3.34 million). Current road network includes 150 miles of arterial roads and 500 miles of secondary roads.
- **Use case interventions** include:
  - Reduced speed limits
  - Sprint bus project Phase 2, and cross-city bus priority package
  - Specific traffic management rules.
- **Area of intervention**: Birmingham city center, major corridors including A45, A34, A4540, and Solihull corridor.
- **Intervention timeline**:
  - Public consultation on speed limit changes to be conducted in Q1 2024.
  - Sprint bus Phase 2 to be operational by December 2024.
  - Cross-city bus priority package to be completed by March 2024.

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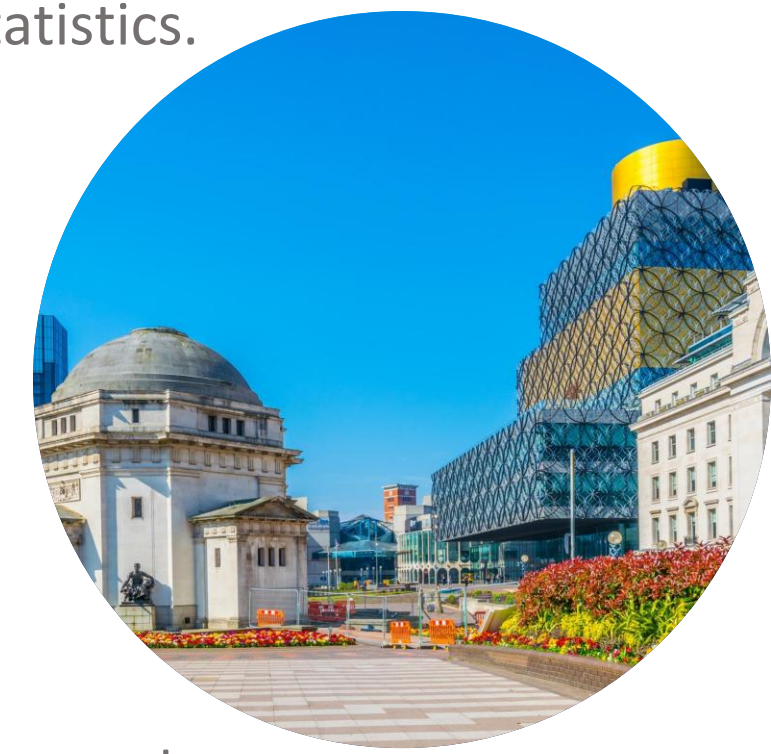
West Midlands Use Case

- **Scope** of the use case analyses:
  - Extensive computational analyses covering traffic flow metrics.
  - iRAP Star Ratings of routes, travel times, congestion levels measured in Vehicle Hours of Delay, air quality metrics and mode share statistics.
- **Infrastructure changes**:
  - Extension of light rail network.
  - Implementation of Sprint bus system equipped with zero-emission double-decker buses.
  - Six park-and-ride schemes linked to local train stations.
- **Behavioural components** to be assessed:
  - Assessment of public opinion on reduced speed limits via surveys and focus groups.
  - Changes in modal share towards active travel and public transport, user satisfaction measured via post-implementation surveys.



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Use Case Common Points

- Regular **monitoring and evaluation** will be conducted to assess the effectiveness of the interventions and behavior analysis insights.
- The **evaluation process** of successful and less successful **areas** will ensure that ongoing adaptations can be made to enhance the overall effectiveness of the interventions.
- These improvements will aim to **enhance the safety** of the cycling infrastructure and address any behavioral challenges that contribute to the risk of accidents.
- **Methodological improvements** in the existing models are critically required, especially for incorporating VRUs and introducing new modes of transport such as micro-mobility options into each component of the Framework.

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