



ECTRI Road Safety Thematic Group  
Webinar-Meeting, January 26, 2024

# Overview of the PHOEBE Project: Use cases and methodology

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**PHOEBE**



# The needs

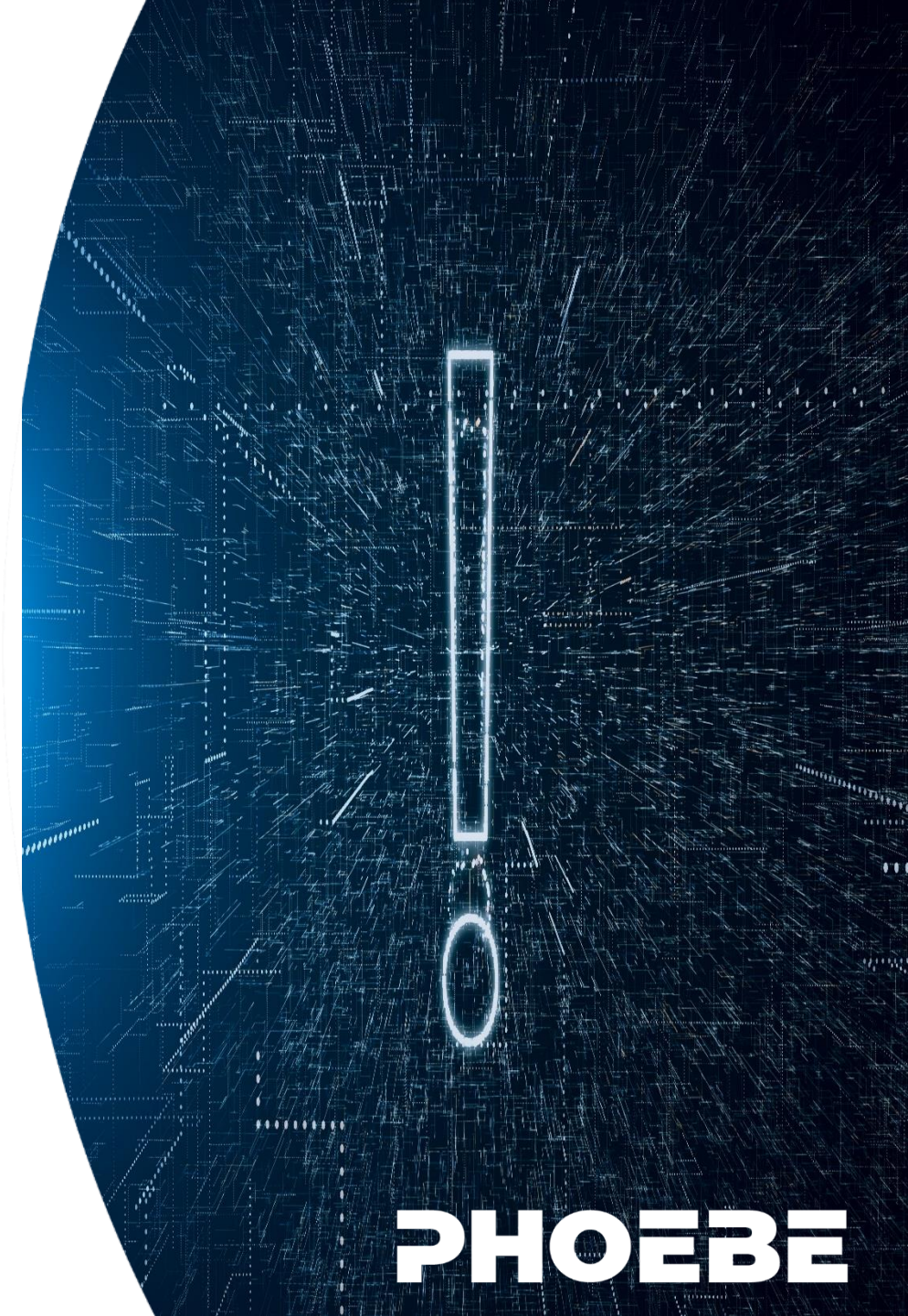
Urban traffic systems are experiencing an increasing array of **dynamic factors**



Models typically are isolated and strongly focused on **vehicular traffic**



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

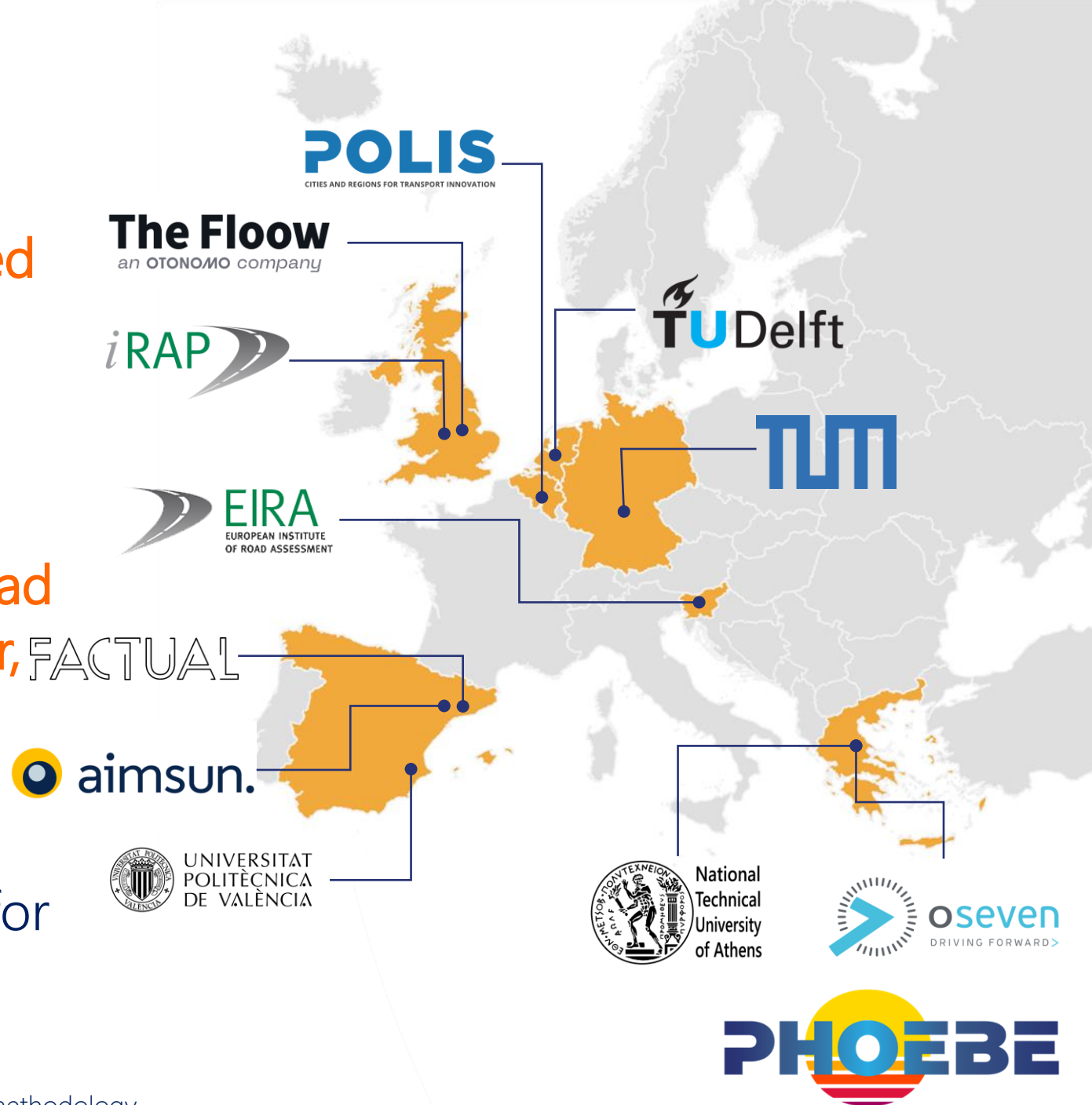


**PHOEBE**



# The PHOEBE Project

- Development of an **integrated, dynamic and scalable human-centred** predictive safety assessment framework for all road user types in urban areas.
- Brings together **traffic simulation, road safety assessment, human behaviour, mode shift and induced demand modelling** and **new and emerging mobility data** into a harmonised, prospective assessment framework for road safety.



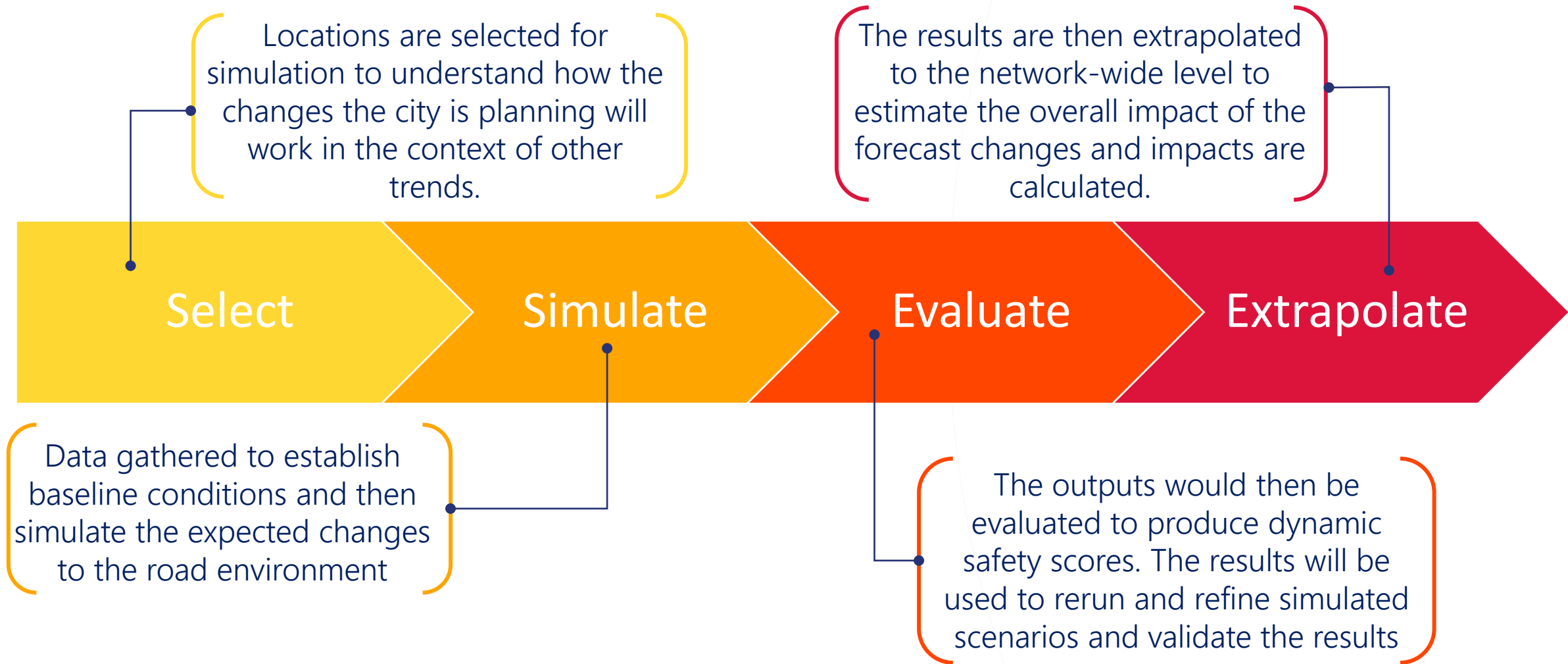


# Project Objectives

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



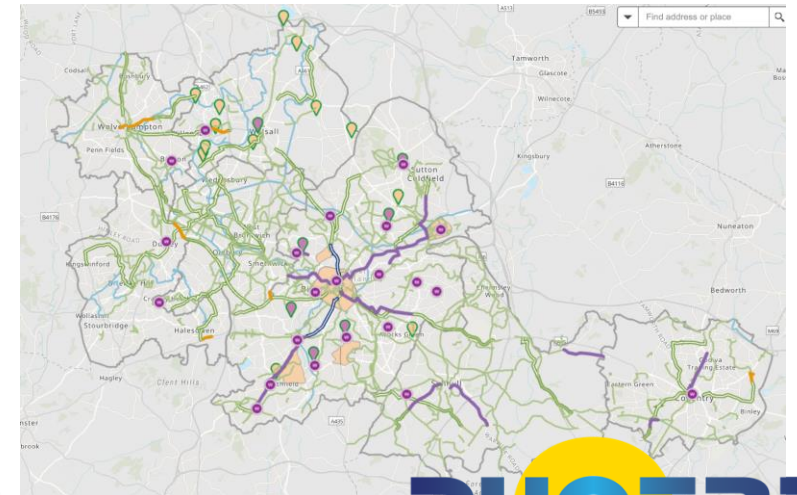
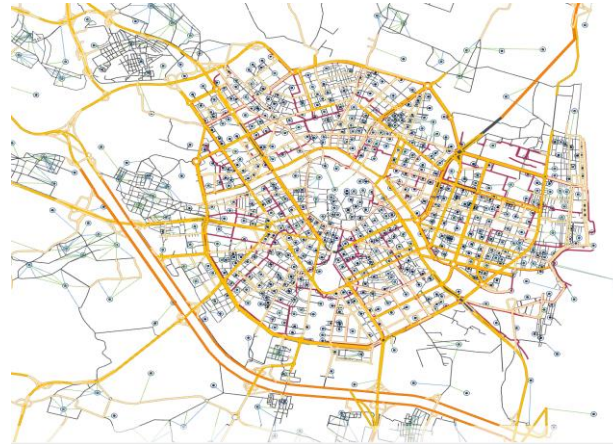
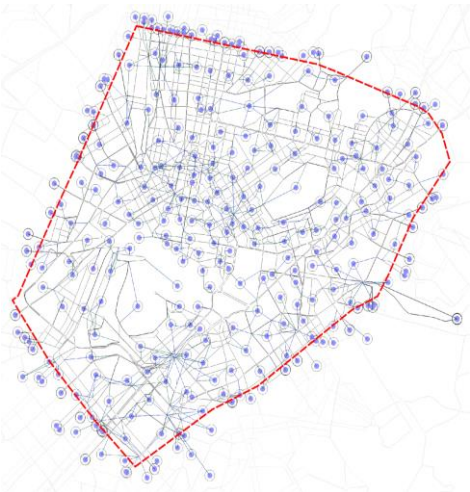
# The Methodology







# Phoebe Use Cases



# 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.





# Involvement of Local Stakeholders

- The City of Athens participates and will engage 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.



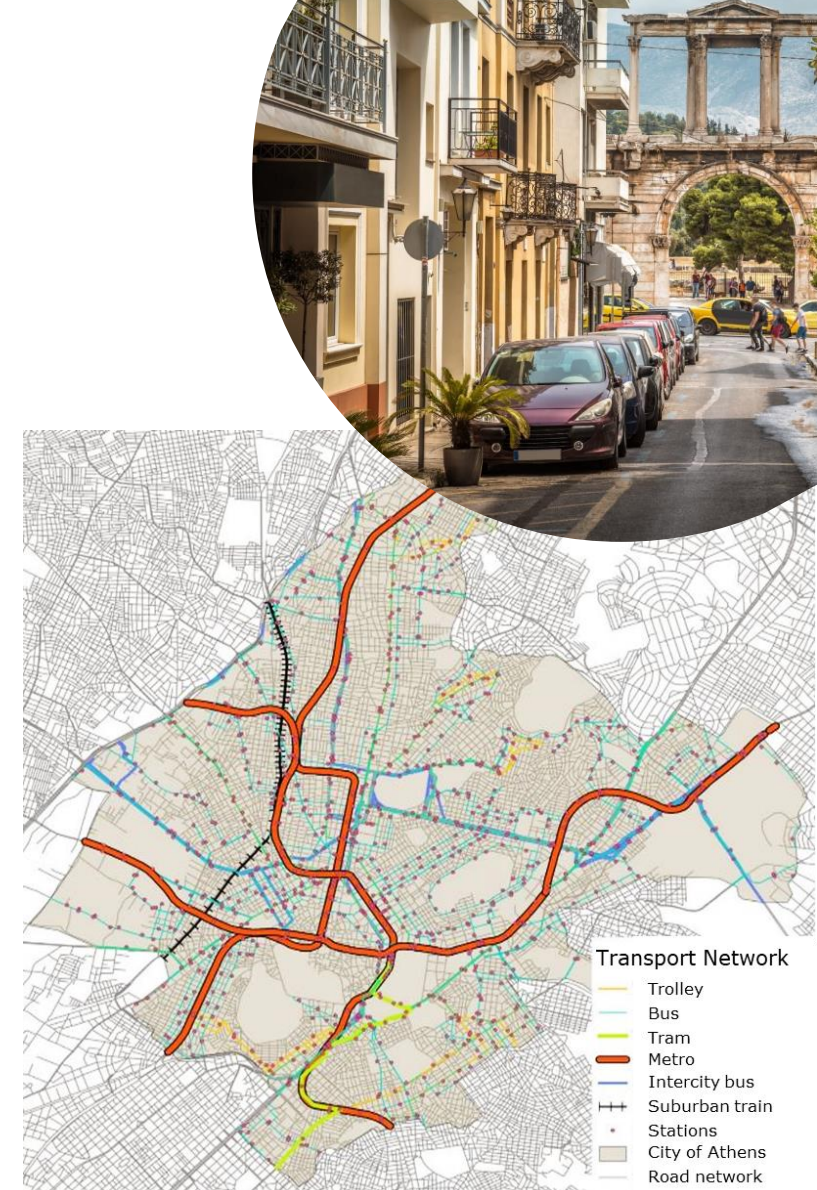
**PHOEBE**





# 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.

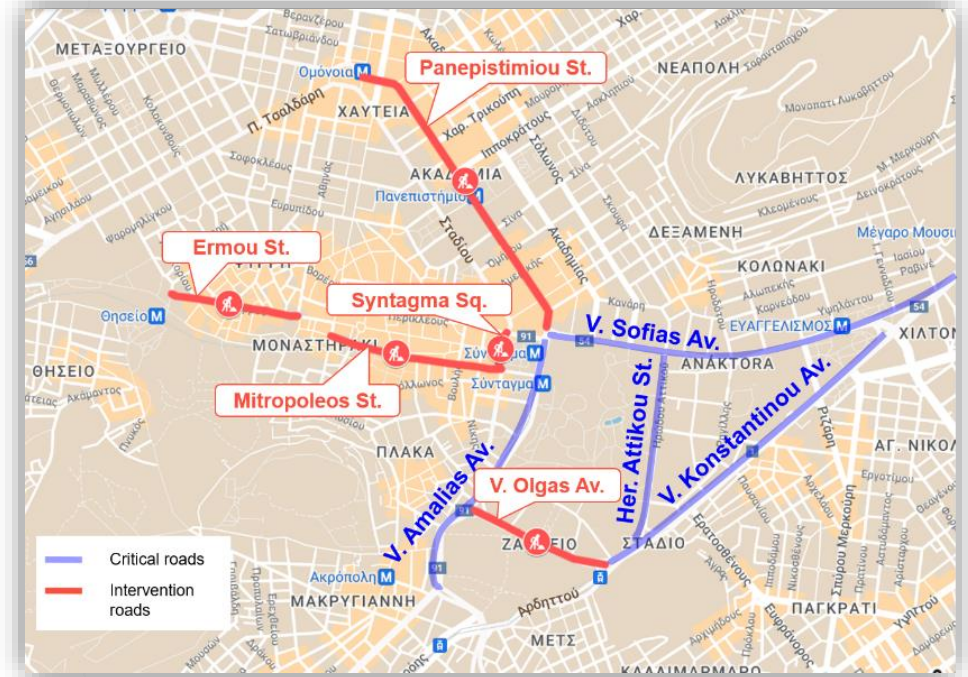




# Use case Interventions

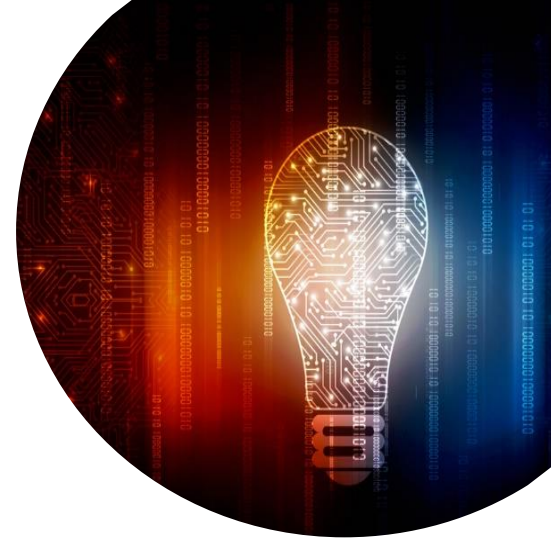
City of Athens intends to implement three **major interventions** to promote safety and sustainable mobility:

- 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.



# Data Requirements

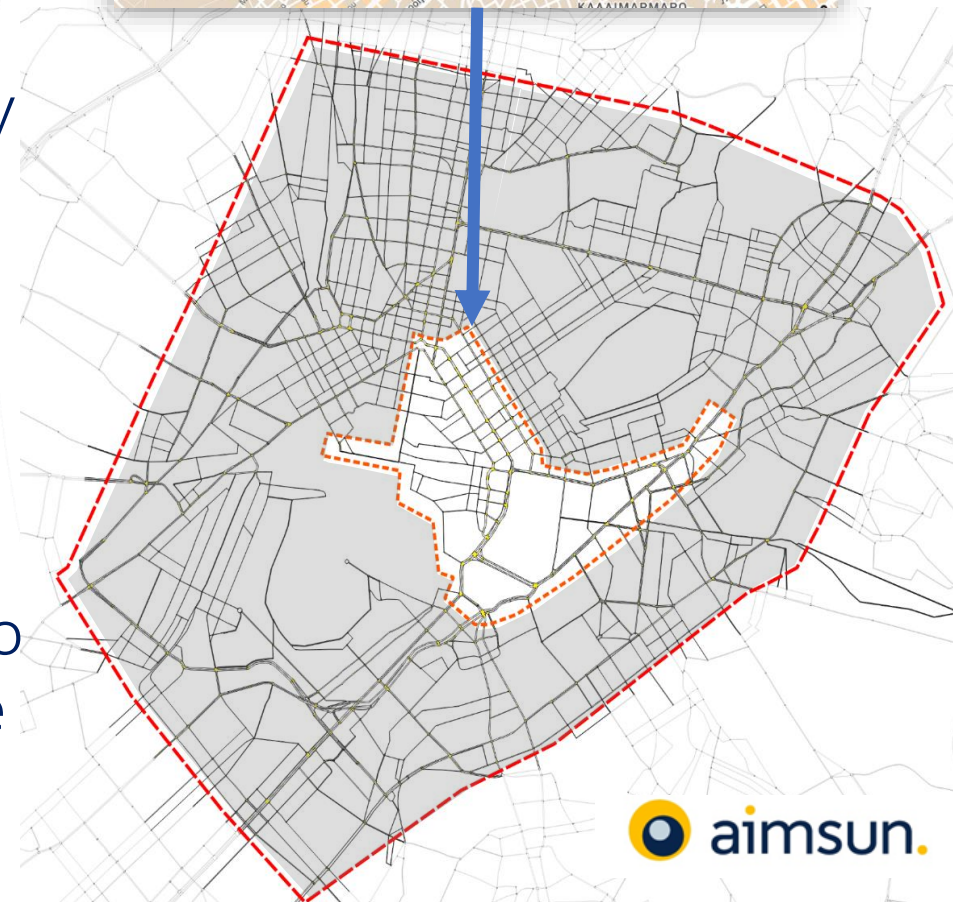
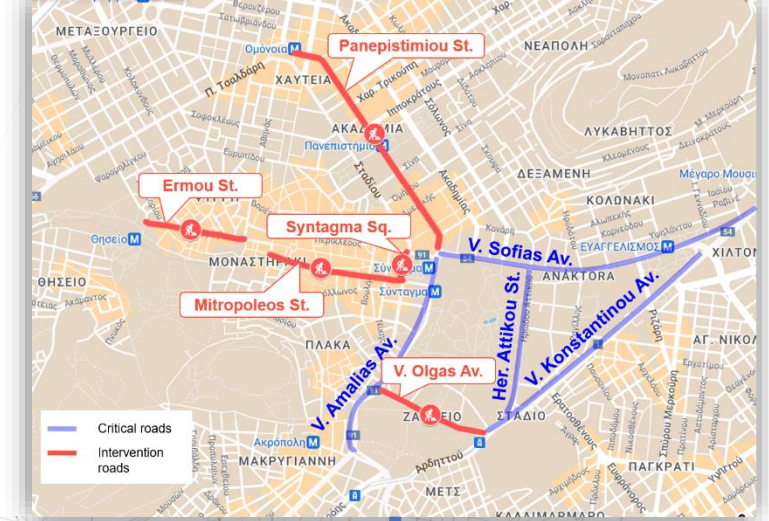
- **Survey Data:** The requirements for the implementation of the Survey e.g. Demographics information, average cost of Public Transport, Motorised Individual Transport information etc. have been collected and provided.
- **User behavior Data:** Examination of the means for analyzing the information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





# Traffic Simulation

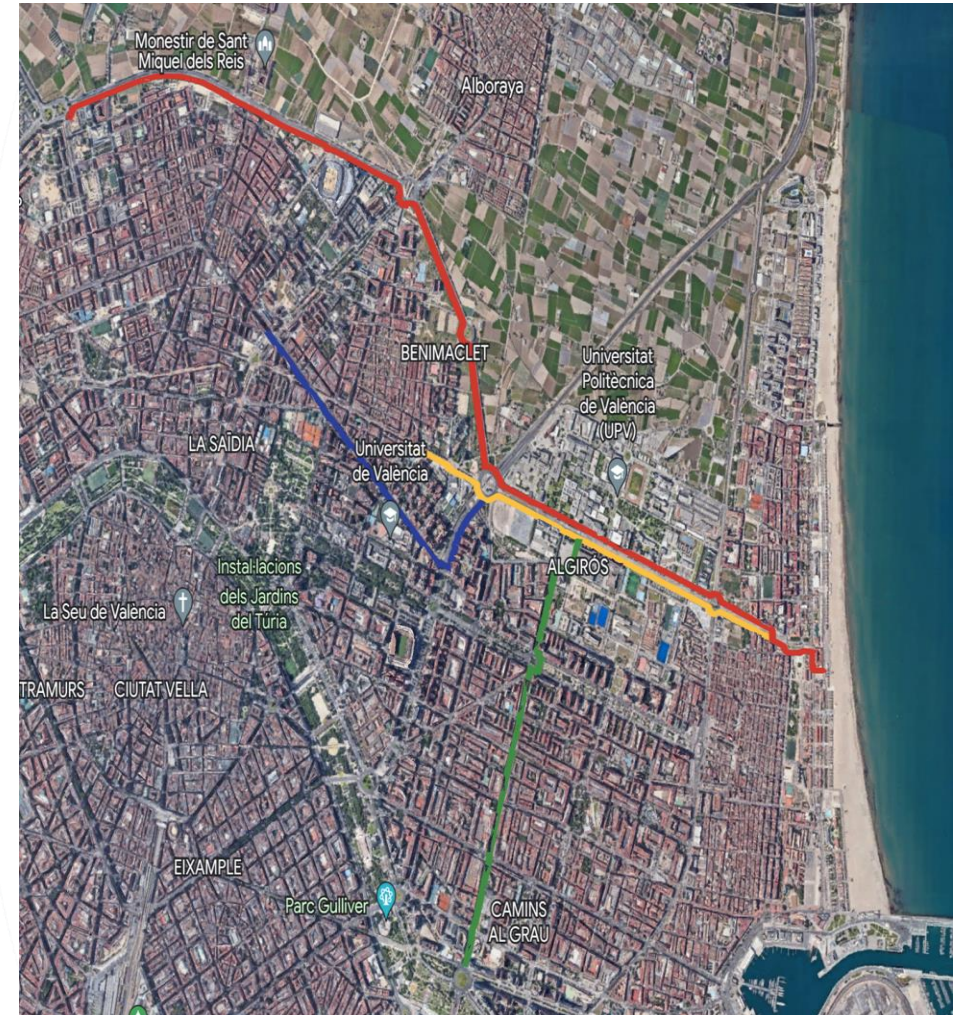
- An integrated **traffic AIMSUN-based simulation model** for the Athens network of the NTUA Department of Transportation Planning and Engineering is available to be used.
- The Athens **simulation network** reaches approximately 20 km<sup>2</sup> and consists of 1,137 nodes and 2,580 road segments with 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.).





# Valencia Use Case

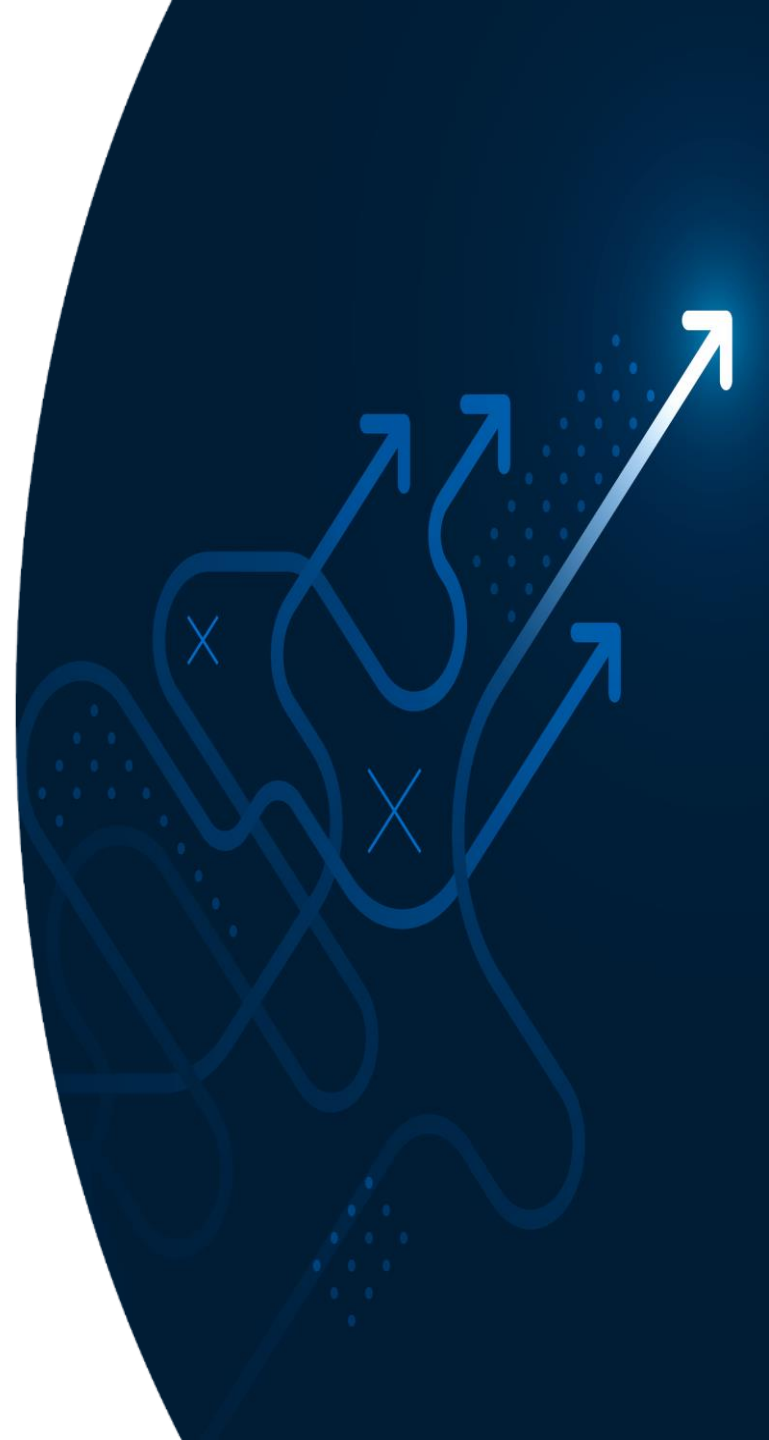
- The Valencia pilot aims to assess and **improve cycling infrastructure** through LanePatrol technology, CycleRAP methodology, and **user behavior analysis**.
- **Context** and **Characteristics** of the Location:
  - 800.000 inhabitants
  - Important tourist destination
  - Pedestrian- and bike-friendly 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





# 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.



# 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





# 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.



# West Midlands Use Case

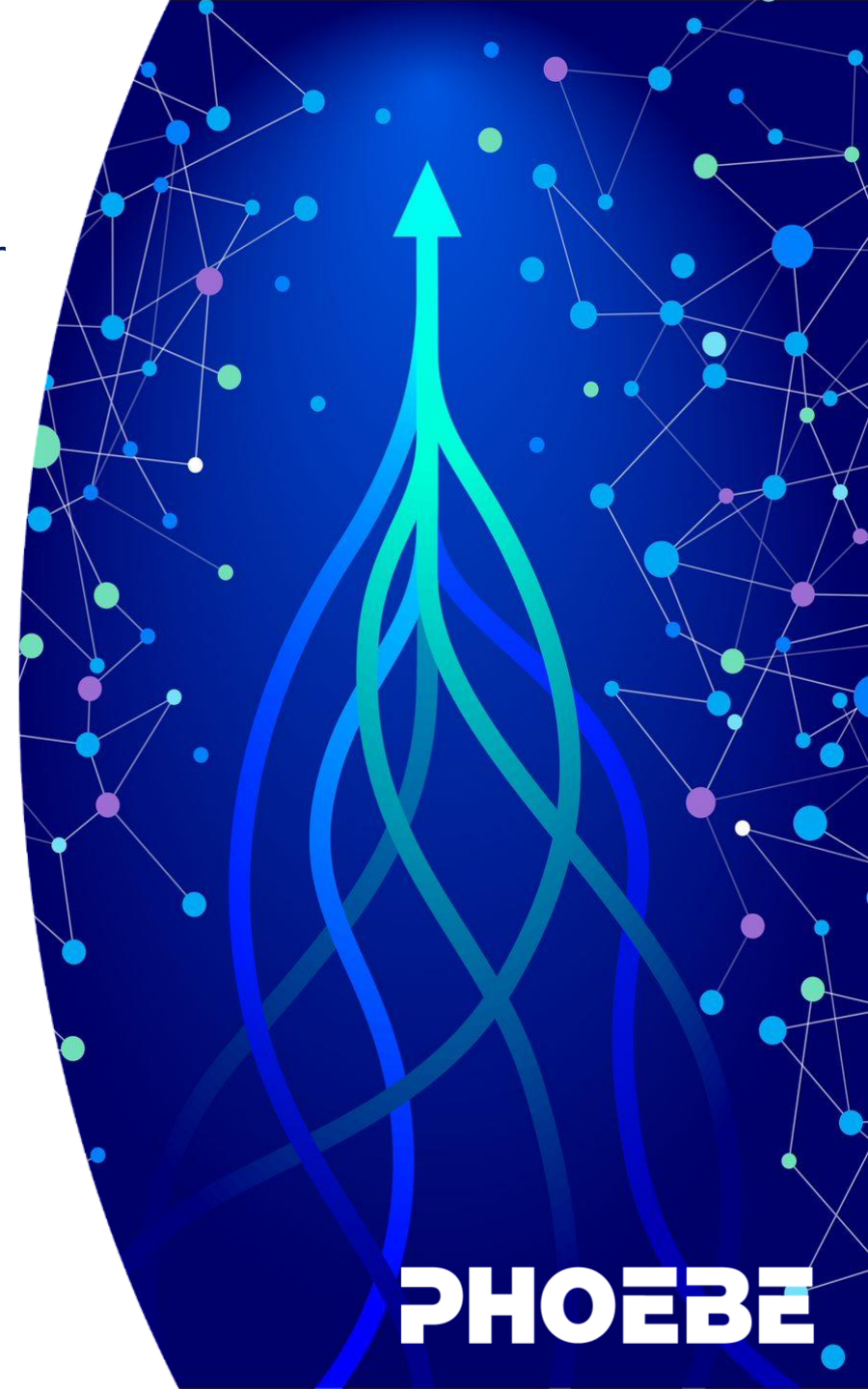
- **Scope** of the use case analyses:
  - Extensive computational analyses covering traffic flow metrics
  - iRAP Star Ratings of routes, travel times, congestion levels measured in Vehicle Hours of Delay, air quality metrics and mode share statistics.
- **Infrastructure changes:**
  - Extension of light 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.





# 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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