Leveraging the Athens Mobility Observatory for AI-supported Mobility-as-a-Service



Apostolos Ziakopoulos,
George Yannis

Department of Transportation Planning and Engineering
National Technical University of Athens

www.amob.ntua.gr

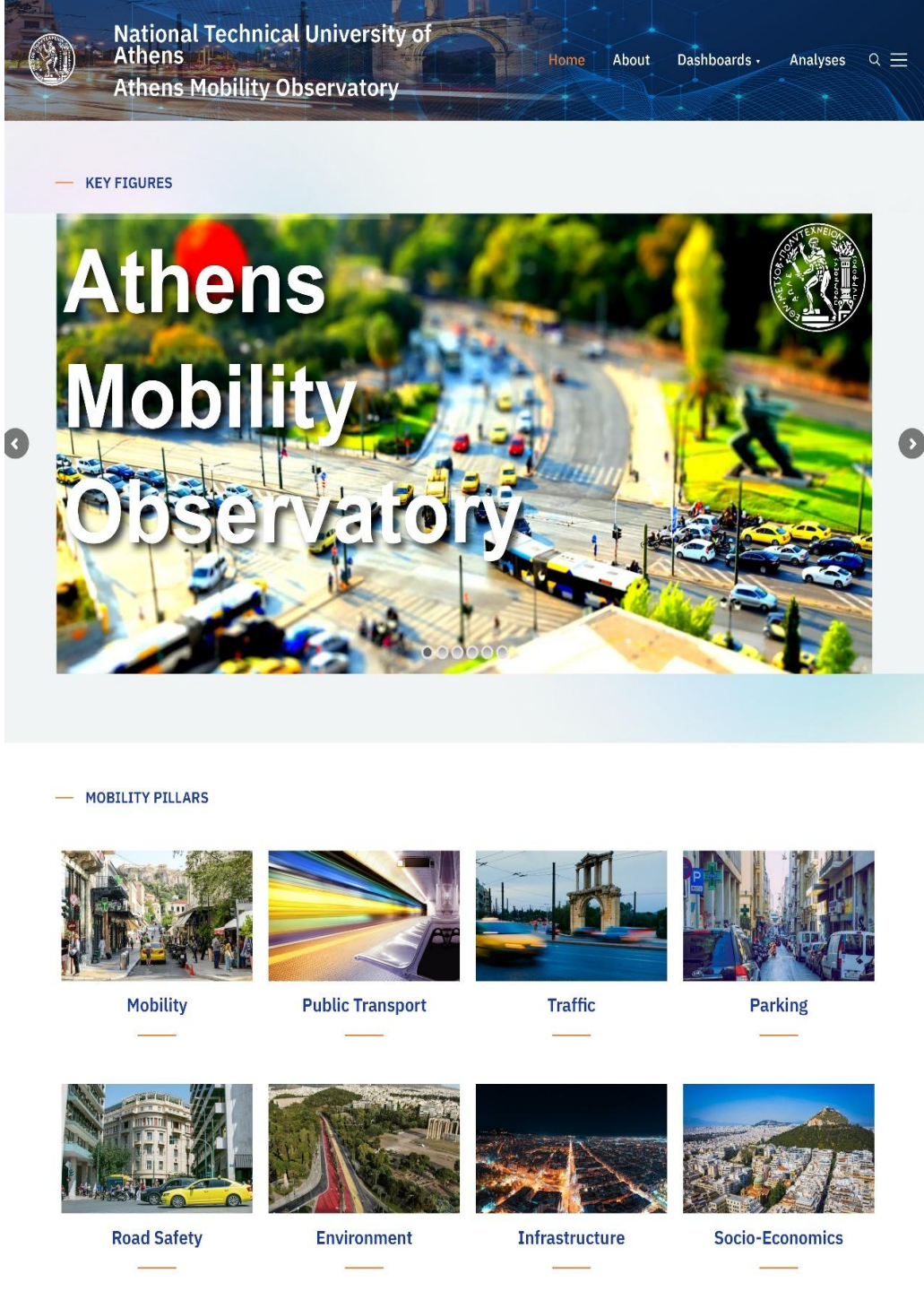
ECTRI Thematic Groups Annual Meeting
TG Mobility
Brussels, November 16-17, 2026

AMOB Mission

Safe, Green, Smart, and Efficient Mobility for All

The **Mission** of the NTUA Athens Mobility Observatory (www.amob.ntua.gr) is:

- The collection, processing, and open dissemination of statistics and analyses related to urban mobility in Athens
- The scientific support of data-driven decision-making for Public Authorities, Industry, and society as a whole
- The contribution to the implementation of a modern and sustainable urban mobility policy in Athens



AMOB Pillars



Mobility



Public Transport



Traffic



Parking



Road Safety



Environment



Infrastructure



Society
Economy

Multi-Level Operational Framework of AMOB

Mobility Data Collection

- Data from statistics providers, private companies, and Public Authorities
- Large-scale data mining using specialised interfaces (APIs)

Scientific Analysis

- Data Processing
  - Advanced data cleaning methodologies
  - Calculation of metrics and indicators
- Model Implementation
  - Descriptive statistics
  - Application of statistical models
  - Machine learning algorithms
- Creation of Interactive Dashboards



Indicative Data Sources

Hellenic Statistical Authority

NTUA – Field Measurements

OASA

Google Maps API

Region of Attica

OpenStreetMaps

Municipality of Athens

Strava

Association of Car Importers – Representatives

Data Providers
(OSeven, Cityzen, Uber, …)



Athens Mobility and Road Safety Analyses

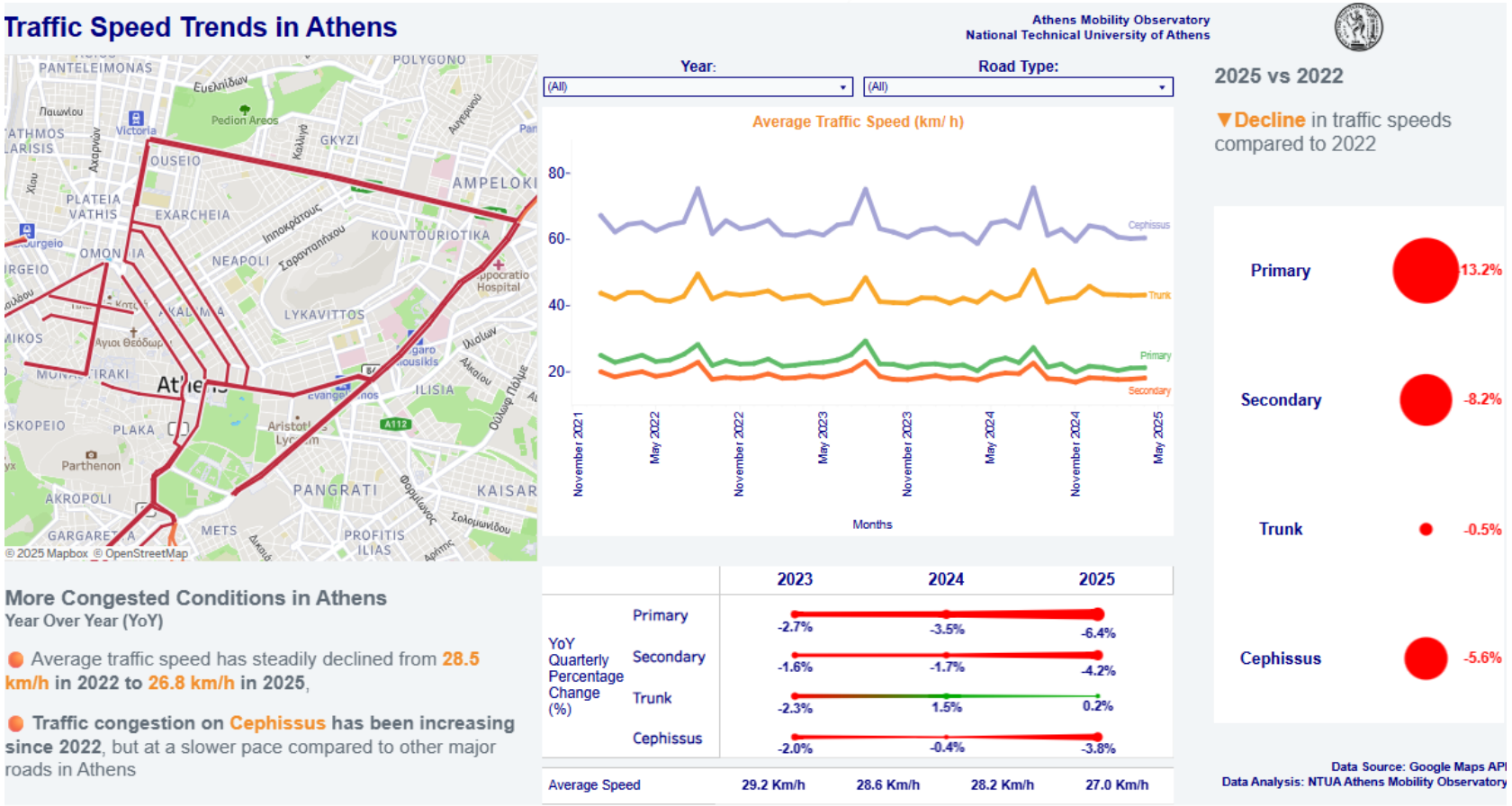
Traffic Speed Trends

Between the years
2022 - 2025 the
average traffic speed in
Athens **decreased**:

▼**13** % Primary roads

▼**8** % Secondary roads

▼**6** % Cephissus

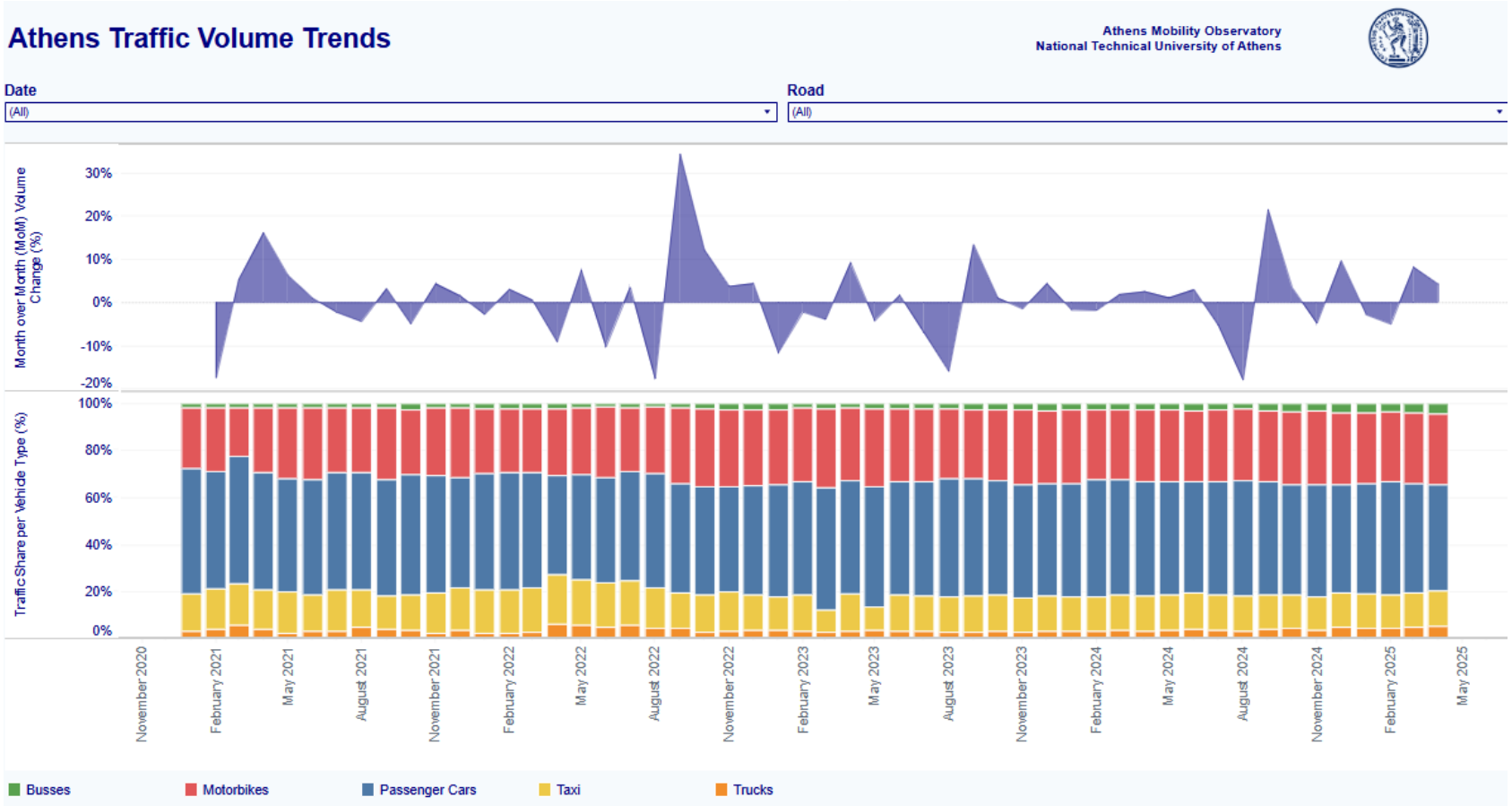


Traffic Volume Trends

Between the years
2022 - 2024
the **average hourly traffic volume** in Athens **increased**:

▲ **7** % Primary roads

▲ **3** % Secondary roads

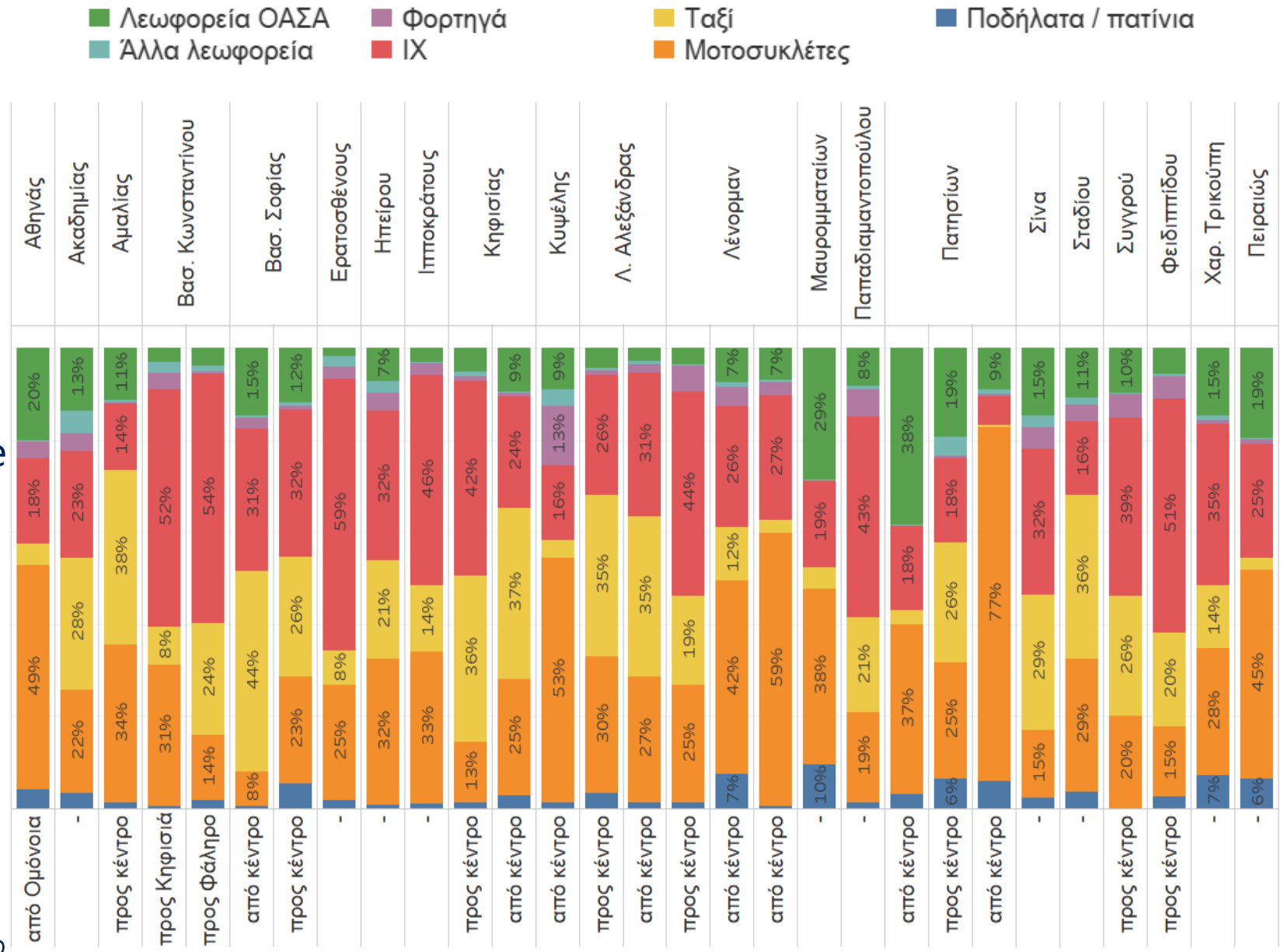


Bus Lane Violations

Only 5-15% of traffic on bus lanes is **actually** bus traffic due to illegal traffic and parking of passenger cars, taxis and motorcycles

When bus lanes are monitored, the **average speed** of buses increases by up to **50%**

Up to **1.5x** more trips

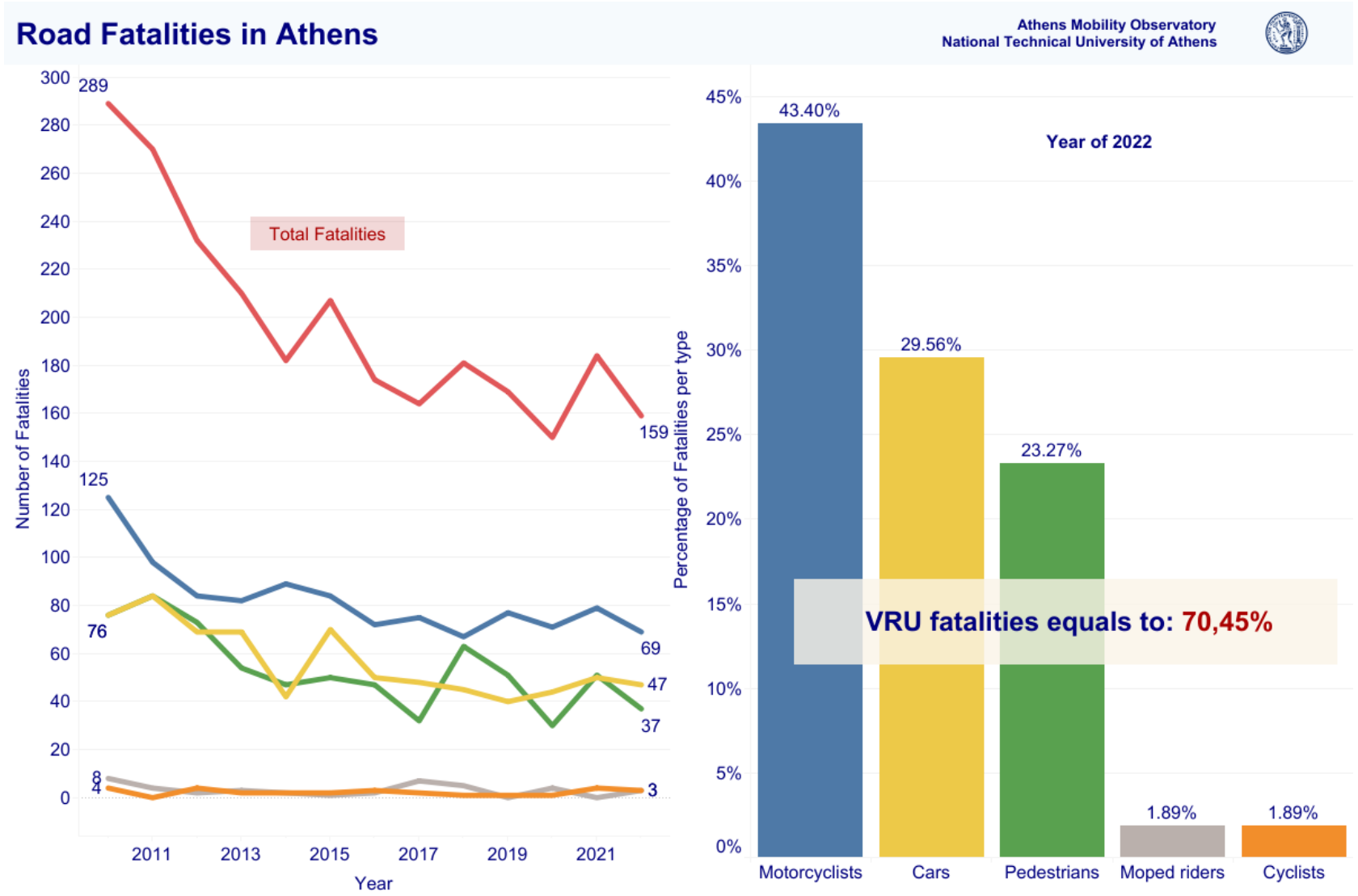


Road Fatalities in Attica

70% of fatalities in road crashes correspond to Vulnerable Road Users

The number of motorcyclist fatalities has **decreased** less than in other categories over the last 10 years

25% Increase in the number of elderly road deaths over the last 10 years



Mobility

- In an environment where travel demand is constantly increasing, we focus in vain, on reducing private car congestion rather than on serving the needs of travellers.
- Uncontrolled parking of cars and motorcycles leads to increasingly poor service levels.
- Bus service is ineffective, and the network of three metro lines covers only certain areas of Athens.
- The lack of an integrated system of peripheral road arteries results in through-traffic within central areas of all municipalities.



Road Safety

- The major road safety problems in Athens are motorcycle crashes and inappropriate speeds.
  - Low helmet usage rates
    - 81% among drivers (EU average: 97%)
    - 61% among passengers (EU average: 95%)
  - Low seatbelt usage rates
    - 83% among private car drivers (EU average: 92%)
    - 55% among private car passengers (EU average: 75%)
  - Excessively high speeds

    41% of total road fatalities concerned single-vehicle road crashes (EU average 31%), mainly due to inappropriate high vehicle speeds
  - The number of elderly fatalities has increased by 25% over the past decade



Streets for Life
#MakeCyclingSafe



Transitioning to AI-supported mobility

Smart Road Infrastructure

- Road infrastructure is constantly being updated to accommodate present and future road users (e.g., Connected & Automated Vehicles)
- Smart infrastructure examples: Smart road signs, Intelligent pedestrian crossings, Electric Roads
- Advanced Traffic Management Systems (ATMS)
  Real-time monitoring, communication and control Rapid detection and reaction to events
- Advanced Traveler Information Systems (ATIS)
  Crashes (location, severity, duration), Weather and traffic conditions, Delays and travel times, Optimal routes, Recommended speeds, Timetables



Additional AI Mobility applications

➢ Demand Management:

- Dynamic ridesharing & traveler information

➢ Smart Public Transport:

- Automated Vehicle Location (AVL) information
- Automated Passenger Counters
- Scheduling and dispatching response
- Traffic signal priority

➢ Intelligent Parking Systems:

- Intelligent on-street parking management
- Parking networking and demand management
- Dynamic pricing & automatic reservations and payments
- Integration of parking in door-to-door mobility solutions

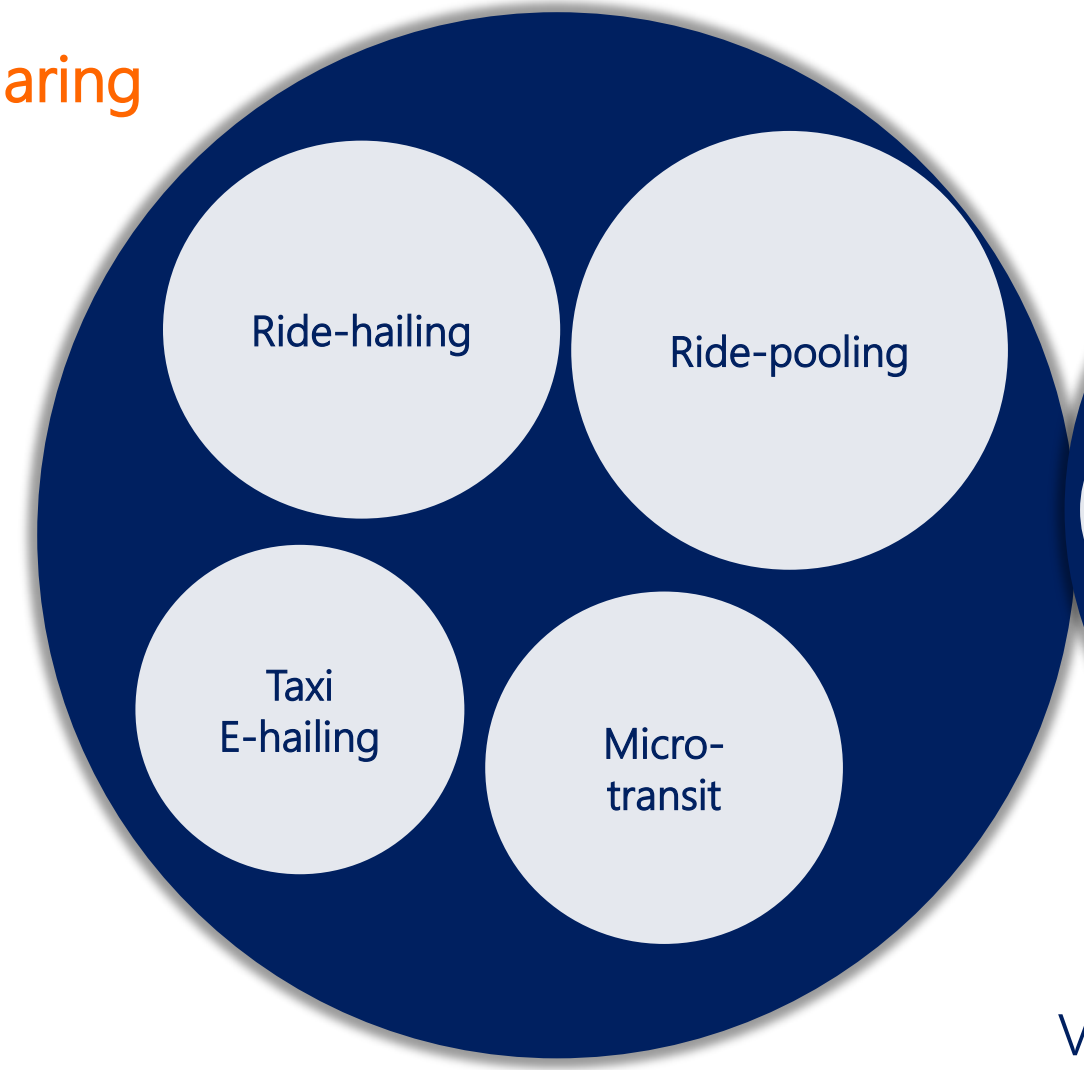
➢ Intelligent Freight Transport:

- Traffic Management System (ANPR cameras, radar, electromagnetic strips)
- Dynamic reservation of loading space
- Micro-distribution with small load bicycles or drones

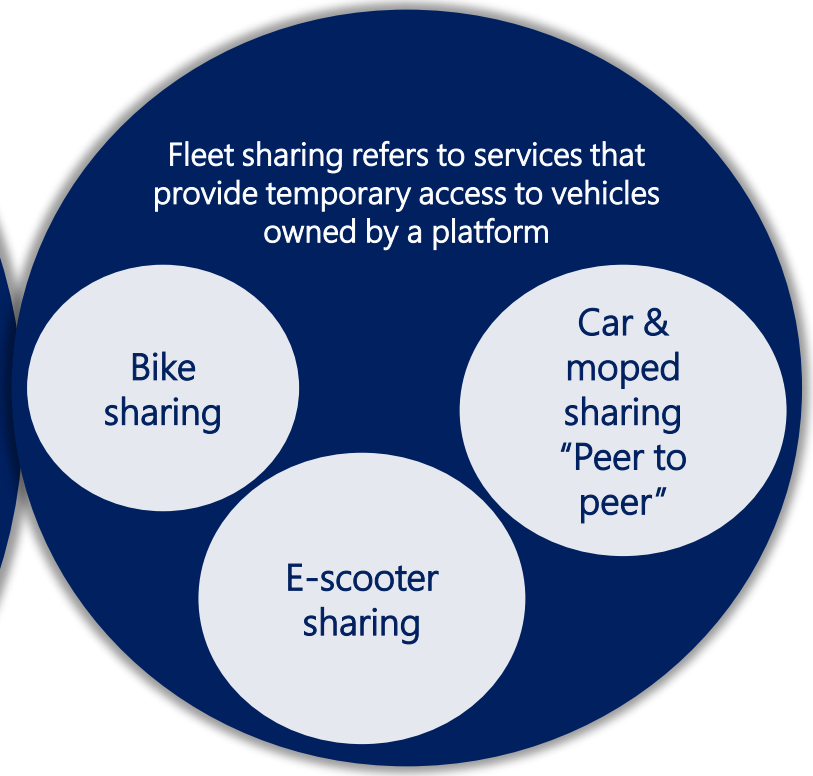


Mobility On Demand

Ridesharing



Fleet Sharing



Various opportunities for AI enhancement in both pillars culminating in MaaS

Mobility as a Service (MaaS) overview

- Mobility as a Service exemplifies the integration of multiple transport options into a seamless digital service
- It is based on the use of digital platforms (e.g. mobile app, planner/e-ticketing) to implement the full set of actions required to move a person (or good) from A to B, including:
  - Route planning
  - Mode combination (e.g. bus & metro) & parking
  - Availability control/Ticket booking
  - Payment
- ITF (2021):
  "MaaS uses a digital platform and a set of data to deliver a transport project".

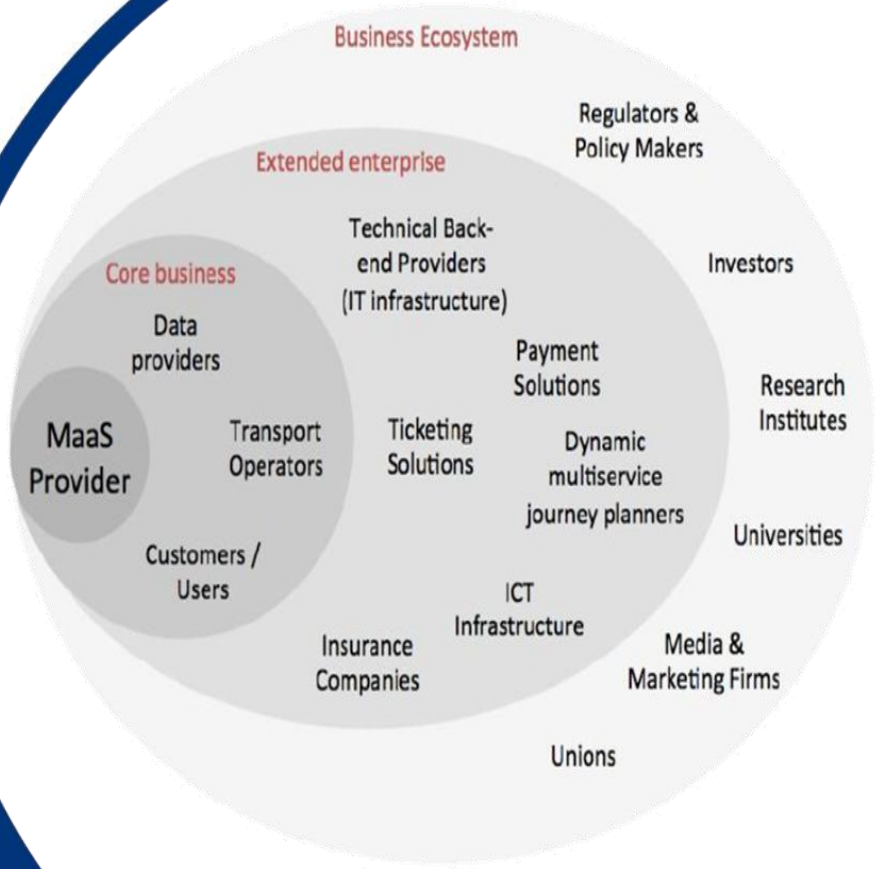


Figure 16. The MaaS ecosystem (Kamargianni & Matyas, 2017)

Exploring MaaS stages

- MaaS systems differ in the level of integration they provide (e.g., route planning and/or organization).

- The following stages of MaaS evolution are distinguished:
  Stage 0: MaaS does not exist
  Stage 1: Provision of information (e.g. telematics)
  Stage 2: Previous + booking/payment
  Stage 3: Previous + combination of modes
  Stage 4: Previous + Integration of long-term goals (e.g. emission reduction, increasing accessibility)

- They are affected by urbanization and congestion levels, but also by degrees of mobility digitalization and connectivity.



AI promoting MaaS development

Ongoing and projected AI enhancements across all MaaS stages:

- **Stage 1 (Information):**
  - AI-powered predictive analytics for real-time traffic & delays
  - Personalized route suggestions using machine learning
- **Stage 2 (Booking/Payment):**
  - AI chatbots for seamless ticketing & customer service
  - Fraud detection and dynamic pricing optimization
- **Stage 3 (Multimodal Integration):**
  - Intelligent mode selection (e.g. best cost–time–emission balance)
  - AI-based demand forecasting for shared mobility & fleet management
- **Stage 4 (Long-Term Goals):**
  - AI-driven optimization of network design to reduce emissions
  - Accessibility enhancement (e.g. tailored services for vulnerable users)



Leveraging the Athens Mobility Observatory for AI-supported Mobility-as-a-Service



www.amob.ntua.gr

Apostolos Ziakopoulos,
George Yannis

Department of Transportation Planning and Engineering
National Technical University of Athens

ECTRI Thematic Groups Annual Meeting
TG Mobility
Brussels, November 16-17, 2026