

IVORY: AI for Vision Zero in Road Safety

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Together with:
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The IVORY project

➤ 12 Project partners:

National Technical University of Athens

Delft University of Technology, Universiteit Hasselt,

University of Zagreb, Agilysis, International Road Assessment Programme (iRAP), PSA Groupe, OSeven Telematics, Abeona Consult, Cegeka, Royal HaskoningDHV, CardioID Technologies

➤ Duration of the project:

48 months (October 2023 – October 2027)

➤ Framework Program:

The IVORY project has received funding from the European Union's Doctoral Networks - Marie Skłodowska-Curie Actions - HORIZON-MSCA-2022-DN-01-01



Project aims

IVORY is an Industrial Doctorates Network, aiming to:

- Promote the **integration of AI in road safety**
- Create a **new generation of leading researchers** in the field
- Address the UN SDG target 3.6 (**-50% traffic fatalities** by 2030)
- Address the EC 'Vision Zero' strategy (**zero traffic fatalities** by 2050).



Research background & objectives

Despite its potential, **AI is relatively underdeveloped** in road safety compared to other domains.

A **'silo' effect** in the training of researchers between academia, industry and policy sectors involving AI (engineering, data science and ethics of technology).

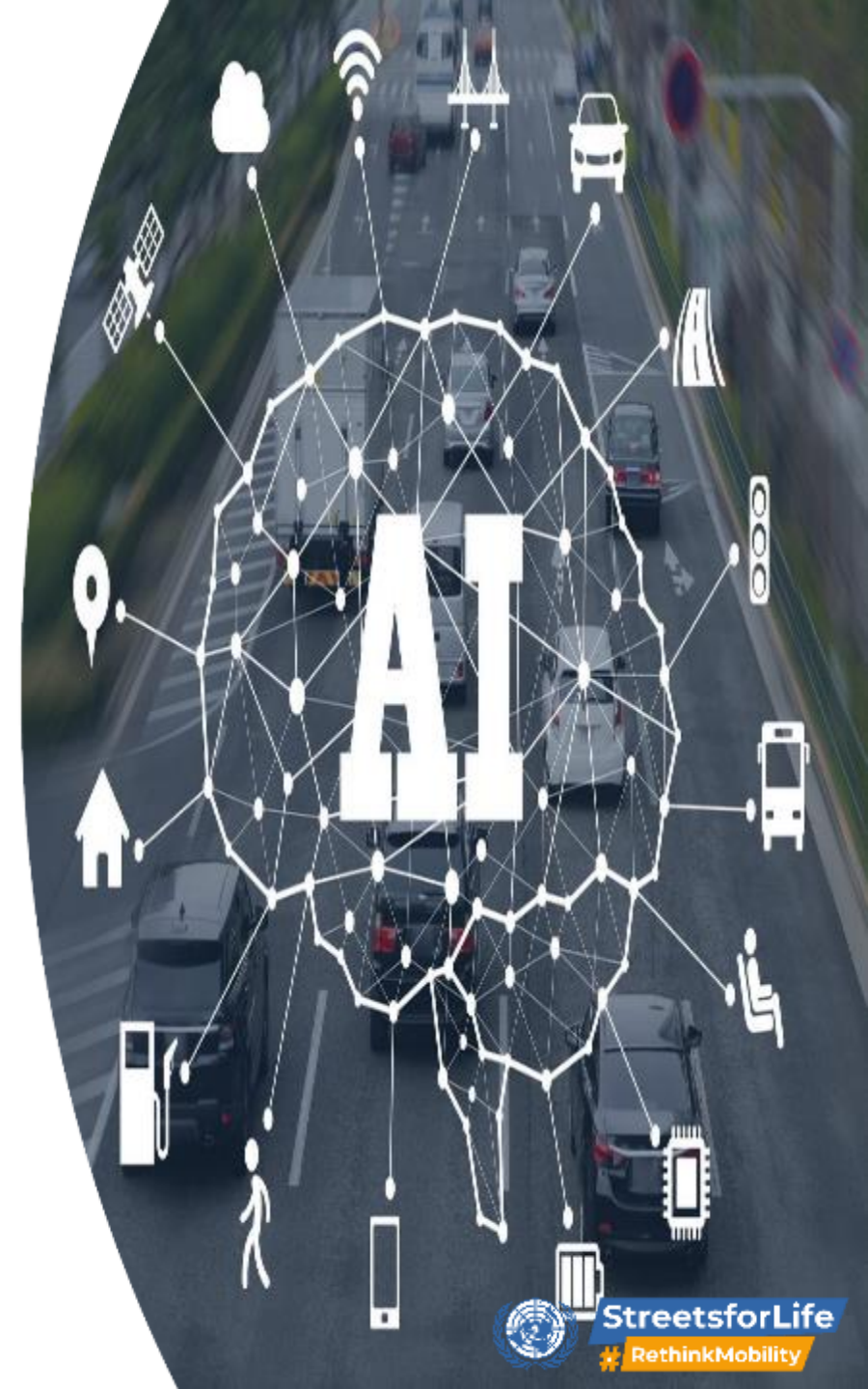
Resulting **lack of common understanding** of the broader challenges of AI for road safety.



Research Goals

To address these gaps, IVORY features the following **research goals** (RG):

- RG1: To develop **responsible, fair and impactful** AI for road safety
- RG2: To develop new ways of **supporting road users** and **human-vehicle-environment interaction** by means of AI
- RG3: To develop new **scalable and equitable** AI technologies for proactive infrastructure safety management
- RG4: To create a **sustainable learning, knowledge sharing and networking framework** on AI for road safety



IVORY innovative aspects

IVORY will unlock the full potential of road safety AI by adopting:

- **An inclusive and just** data collection approach in technologies & methodologies
- Good practices in **integrating ML algorithms** with econometric models
- **Model-agnostic interrogation** methods for explainability
- Definition of risk as a spectrum and novel data mining techniques for analyzing driver behaviour
- Assessment tools for driver behaviour in **different levels of automation**
- **Multi-scale AI-aided** Building-Information-Modelling-based tools for road infrastructure design and safety analysis
- A **'privacy-by-design' approach** in AI data collection



IVORY Research Structure

Ivory will house **13 Doctoral Candidate** projects within **6 Work Packages**, directly related to the RGs:

- **WP1** – Coordination and management
- **WP2** – Training and career development
- **WP3** – Dissemination, communication and exploitation
- **WP4** – Responsible, fair and impactful AI for road safety
- **WP5** – Road user assistance
- **WP6** – Proactive infrastructure safety management



Open Science Practices

The core areas/pillars of the **European Open Science policy** have been taken into account when designing the IVORY network

- Early sharing of information
- Publishing open access
- Archiving
- Open education
- Public engagement



IVORY skills analysis

A skills analysis was carried out by the consortium, as shown below:
The required **research and transferable skills** for leading researchers on AI for road safety are outlined.

Advanced interdisciplinary research skills (all DCs)		
Engineering and human factors	Data science	Ethics of technology
<ul style="list-style-type: none">• Road safety• Risk prediction and evaluation	<ul style="list-style-type: none">• Big data processing, storage and management• Statistical and econometric models• ML techniques	<ul style="list-style-type: none">• Responsible innovation• Ethical issues in road safety
Core research skills (per research goal /work package)		
Responsible AI (RG1/WP4)	Road user support (RG2/WP5)	Proactive infrastructure safety management (RG3/WP6)
<ul style="list-style-type: none">• Biases related to AI• AI challenges for LMICs	<ul style="list-style-type: none">• Sensors and device recording data• Naturalistic driving data• Human factors• Automated vehicles	<ul style="list-style-type: none">• Traffic management• Risk prediction and evaluation
Transferable skills (all DCs)		
<ul style="list-style-type: none">• Communication and networking• Entrepreneurship (from PhD to SME) and business-oriented leadership		<ul style="list-style-type: none">• Diversity and inclusivity• Data privacy (GDPR) and intellectual property rights• Open science and public engagement



Streets for Life connection

- New generations of **road safety experts** will be trained
- New proactive and reactive **road safety tools** will be explored
- The gap between **technological and business** domains will be bridged for road safety
- IVORY promotes **life-long learning** during the project and well after the project lifecycle
- IVORY addresses **critical road safety gaps** found in **real transport networks** (inclusion, scalability, transferability, ethics, proactivity etc.)



Scientific and social impact

- The open science practices & data management and dissemination KPIs will ensure **knowledge transfer** and training also for future researchers.
- The Industrial Doctorate format will enable **best practice osmosis** with the industrial sector that will accelerate best practice uptakes.
- **Continued sustainability** will be retained around the AI for road safety topics by exploiting the IVORY experiences and networking platform.
- The outputs of IVORY **directly target the societal goals** of reducing road crash fatalities and injuries in the EU, supporting the UN SDG Target 3.6 and the Vision Zero targets for road crashes



Future challenges

- Correctly design the research and training activities in line with the **MSCE-DN funding model**.
- Details with the **learning management system** will be considered.
- Some **barriers in data access**, liability and privacy concerns will have to be addressed.
- Pilot **testing phases** of the PhD projects, using **alternative data sources** (e.g. external naturalistic driving studies for real-time data) to be established.





National Technical University of Athens
Road Safety Observatory

Friday
19 May
2023
13:00-17:00

Workshop
in the framework of
7th UN Global Road Safety Week

StreetsforLife
#RethinkMobility

WE DEMAND
SAFE AND SUSTAINABLE
MOBILITY

Road Safety Research Challenges

DECADE OF ACTION FOR
ROAD SAFETY
2011-2020

unroadsafetyweek.org

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