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10th Transport Research Arena Conference
Advancing Sustainable and Inclusive Mobility
Dublin, Ireland, April 15-18, 2024

Artificial Intelligence for Vision Zero in Road Safety - IVORY

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IVORY

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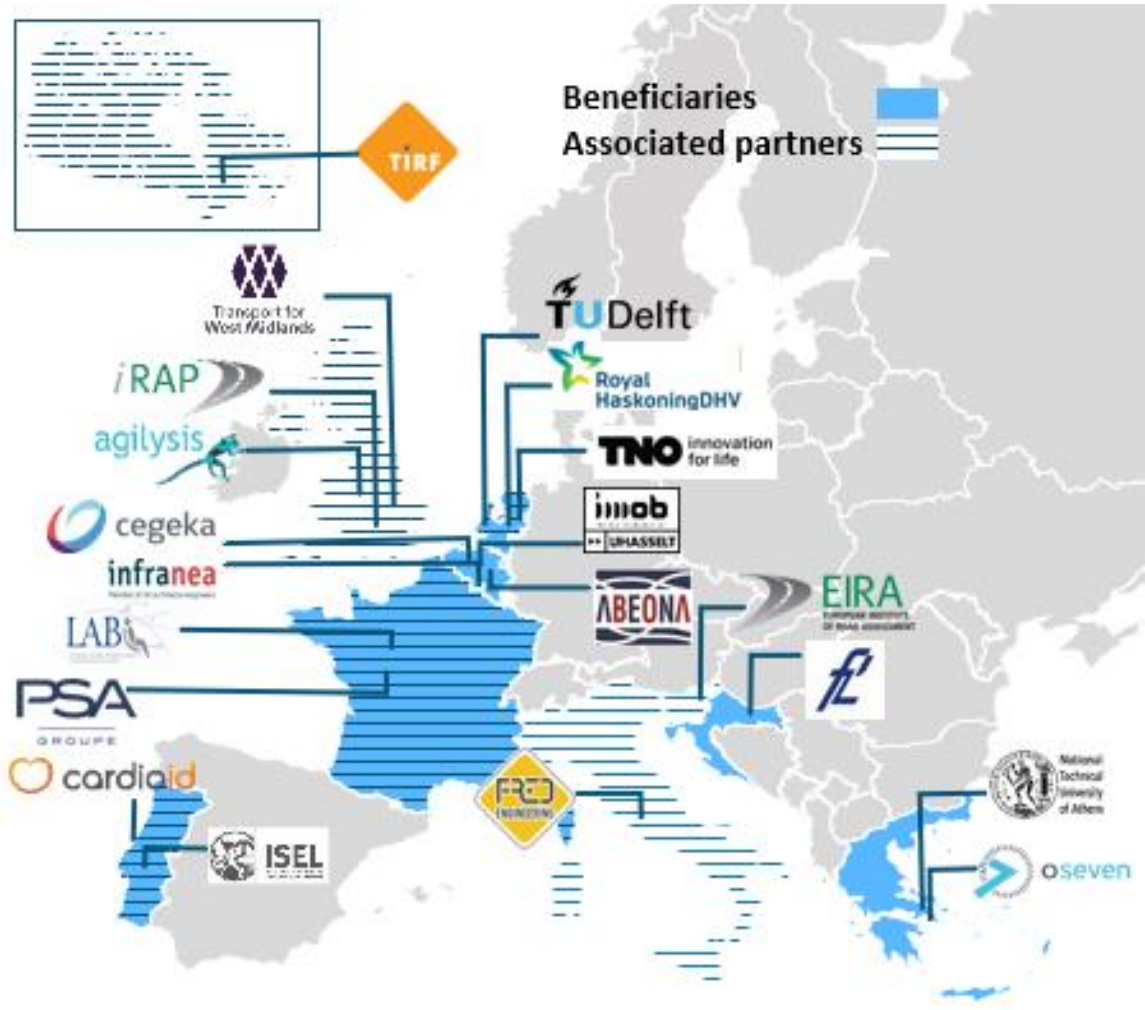
The IVORY project

- 13 IVORY Project partners:
  - Delft University of Technology,
    National Technical University of Athens,
    Universiteit Hasselt,
    Faculty of Transport and Traffic Sciences,
    OSeven Telematics, CardioID Technologies,
    PSA Automobiles S.A., Cegeka, ABEONA consult,
    Royal HaskoningDHV, AGILYSIS Limited,
    iRAP – International Road Assessment Programme
    …and 9 additional Secondary Partners.

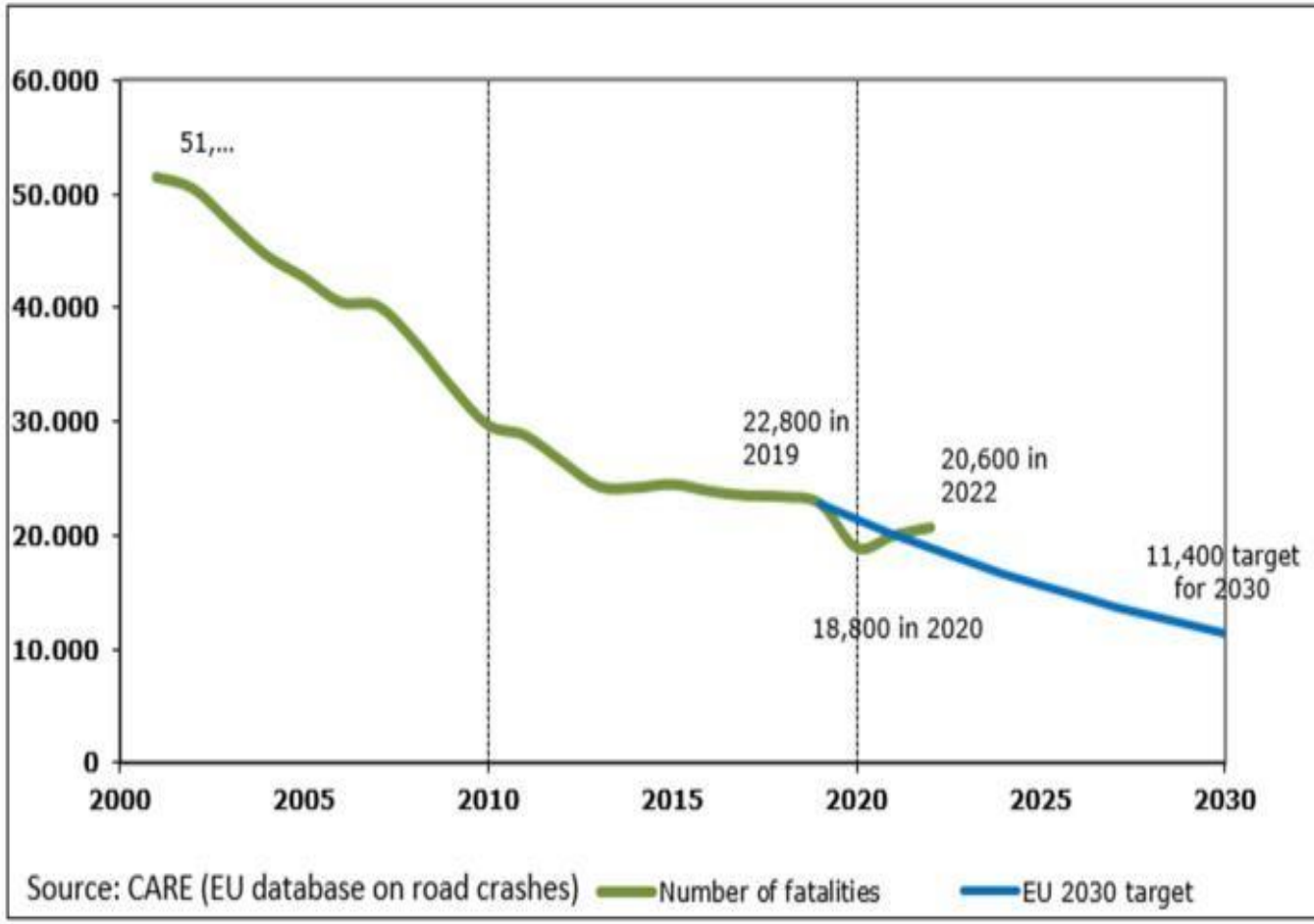


- Duration of the project:
  - 48 months (November 2023 – November 2027)

- Framework Program:
  - EC-MSCA Industrial Doctorates Network

The Vision of IVORY

- AI creates opportunities for new ways of addressing the persistent road crash global epidemic.
- However, AI is relatively underdeveloped in road safety:
- Gaps between engineering, technology & society
- Unequal opportunities for many countries around the globe
- A 'silo' effect between sectors (academia, industry and policy) and disciplines involving AI

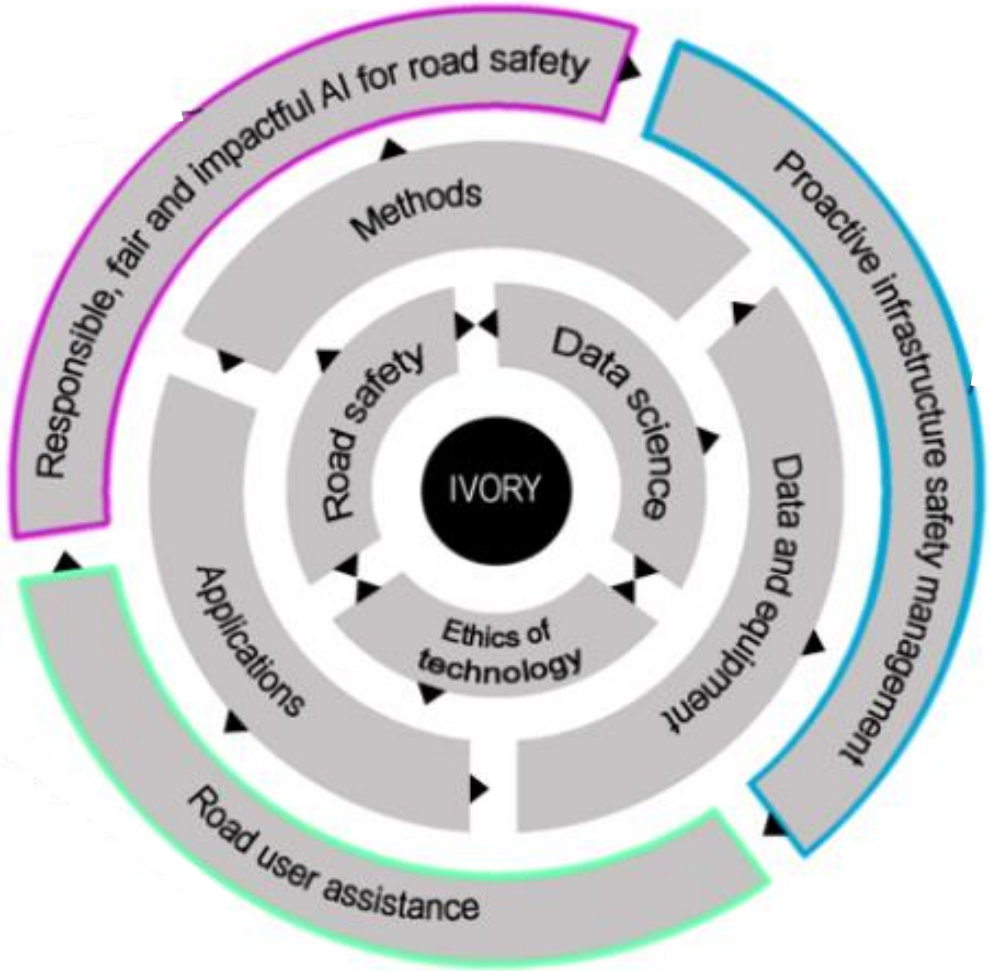


The Scope of IVORY

- The IVORY Industrial Doctoral Network aims to develop a new framework for the integration of AI in road safety
- The project aspires to create a new generation of leading researchers in the field
- 15 Doctoral Candidates (4 at NTUA) will be recruited across the project fully funded for 3 years
- They will receive high-level doctoral education, industrial exposure, local training, and network-wide training on key advanced, core and transferable skills.

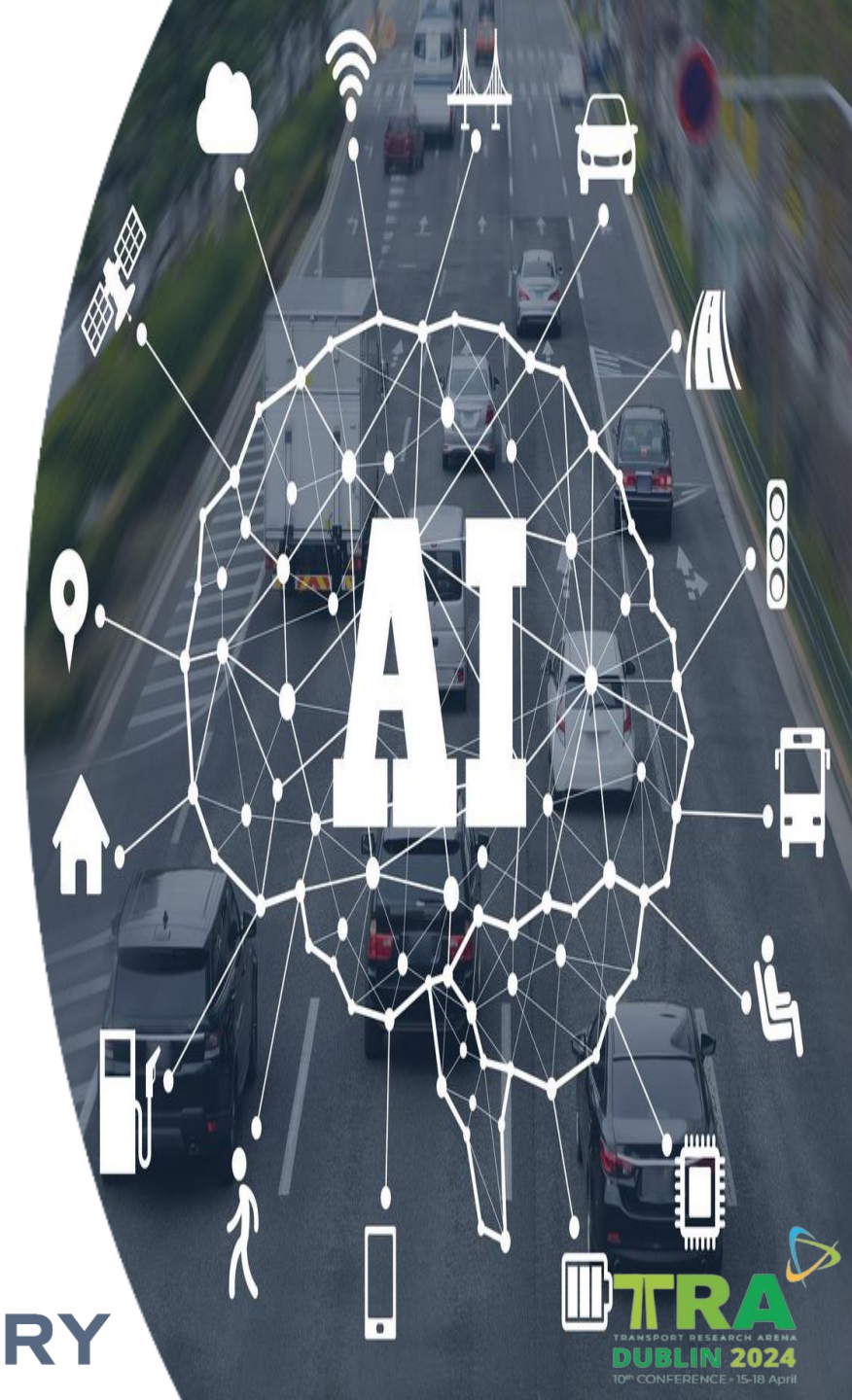
The Objectives of IVORY

- Responsible, fair and impactful AI for road safety
- New ways of supporting road users and human-vehicle-environment interaction by means of AI
- New scalable and equitable AI technologies for proactive infrastructure safety management
- A sustainable learning, knowledge sharing and networking framework on AI for road safety



The Contributions of IVORY

- IVORY outputs will provide more robust user support through AI in vehicle automation
- Responsibly and proactively manage the persistent problems of existing conventional, low-automation transport systems
- Moreover, IVORY takes a design-for-values approach for AI in road safety
- The project entails operationalizing the ethical principles of justice and explainability
- IVORY provides efficient AI solutions also for disadvantaged groups (e.g. vulnerable road users, low-to-middle-income countries).



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Doctoral Research #7 [NTUA 1/4]

Title: Data fusion of traffic, behaviour & infrastructure for holistic driver assistance (hosts: NTUA & OSeven)

Objectives:

- Exploit multi-parametric data for the creation of a holistic AI framework for road safety-related driver evaluations

Expected Results:

- New knowledge on integration and harmonisation of traffic, behaviour and infrastructure big data parameters
- A functional AI framework incorporating these elements based on driver telematics with transferability evaluations
- This will lead to the development of new and seamless road safety feedback solutions

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Doctoral Research #8 [NTUA 2/4]

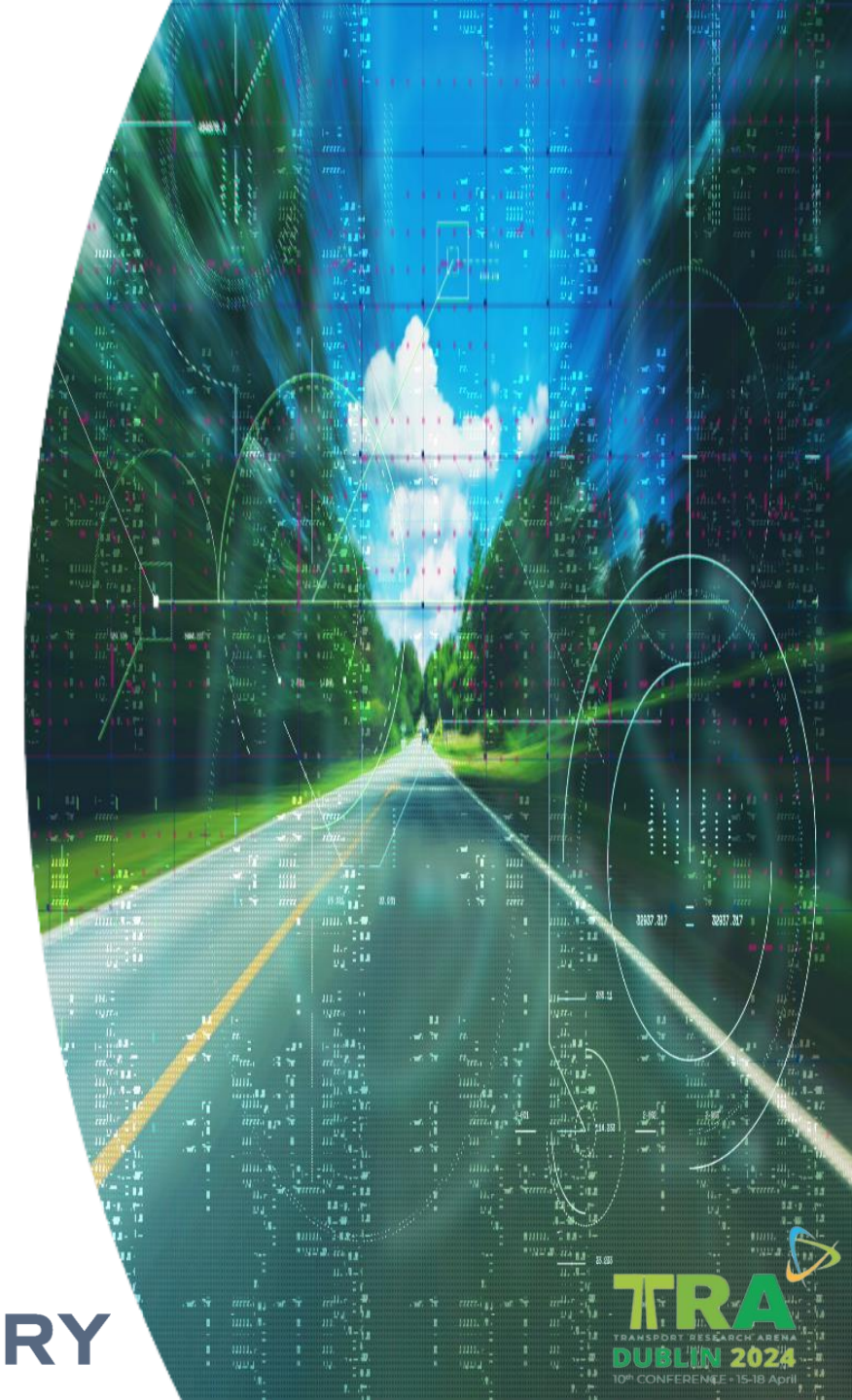
Title: Proactive risk mapping and infrastructure safety management (hosts: NTUA & iRAP)

Objectives:

- Develop new AI algorithms for road attribute collection and methodologies to assess their accuracy, suitable for network applications and including hybrid data

Expected Results:

- A functional framework with the use of AI to meaningfully exploit road risk information, transferable between networks
- Influence quantification of each examined factor on the output of AI algorithms for safety management
- Network evaluation and area transferability quantification



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Doctoral Research #9 [NTUA 3/4]

Title: AI for road safety monitoring and crash prediction from micro to macro levels (hosts: NTUA & OSeven)

Objectives:

- Develop a new AI framework to analyze road safety KPIs and predict crashes by achieving transition from smaller scales (e.g. segment) to larger ones (e.g. municipality)

Expected Results:

- Evaluation of several scaling combinations while featuring capabilities of shifting study areas using different levels of telematics (e.g., trip-based, driver-based or network-based)

- Knowledge on comparable advantages and disadvantages for each analysis scale and their impacts and biases

Doctoral Research #14 [NTUA 4/4]

Title: Road safety prediction on the basis of ethically sound physiological measurements (hosts: NTUA & CardioID)

Objectives:

- Exploit physiological measures obtained from naturalistic driving (e.g. engagement of steering wheel, blood pressure, other physical KPIs) to create reliable real-time safety models.

Expected Results:

- Innovative algorithms for physiological real-time prediction of surrogate safety measures with ethical considerations.
- Empirical knowledge from naturalistic experiments on physiological KPI variation per examined scenario.
- Creation of assessment frameworks exploring how the ethical aspect of biometrics can be considered in road safety

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The Outputs of IVORY

- 15 highly skilled researchers meeting industry and policy stakeholders' needs
- An online learning and networking platform on AI for road safety, as well as a 'social network' of researchers
- New applications of AI for road safety, including data protocols and cutting-edge analytical models, scalable
- Recommendations/taxonomies for designing responsible, equitable and efficient AI for road safety and its applications

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