Driver-vehicle-environment interactions and the safety tolerance zone

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Together with:
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The i-DREAMS project

- **13 Project partners:**
  - National Technical University of Athens
  - Universiteit Hasselt, Loughborough University, Technische Universität München, Kuratorium für Verkehrssicherheit, Delft University of Technology, University of Maribor, OSeven Telematics, DriveSimSolutions, CardiolD Technologies, European Transport Safety Council, POLIS Network, Barraqueiro Transportes S.A.

- **Duration of the project:**
  - 36 months (May 2019 – May 2022)

- **Framework Program:**
  - Horizon 2020 - The EU Union Framework Programme for Research and Innovation - Mobility for Growth
The i-DREAMS great team

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Background

Definition, development, testing and validation of a context-aware ‘Safety Tolerance Zone’:

- raw time-series sensor data and driver background data are transformed into indicators

- operator capacity and task complexity variables are used for a multi-dimensional assessment of driving context and crash risk prediction

- appropriate driver comfort related interventions take place in real-time to recall driver back into a safe area if needed and guidance is given post-trip to improve driving behavior
Concept Overview

- Technical specifications
- Actuators & admitted actions
- Vehicle current status

- Mental state
- Behaviour
- Competencies
- Personality
- Soc. Dem. Profile
- Health status

- Road layout
- Time & location
- Traffic
- Weather

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**VEHICLE STATE**

**OPERATOR STATE**

**COPING CAPACITY**

**TASK COMPLEXITY**

**RISK**

- Danger phase events
- Avoidable accident events
The i-DREAMS Experiment

A 600-operator experiment
- 10 months
- 5 countries (BE, EL, DE, UK, PT)
- 4 transport modes (car, bus, truck, train)

Simulator
- 30 drivers, 8 weeks (in Greece)
- test, calibrate and further refine the accuracy of the Safety Tolerance Zone

Field trial
- 70 drivers (in Greece)
- 3 stages (pilot field trial, baseline field trial, field trial with interventions)

Intervention selection and testing
- real-time effectiveness on driving behavior (safety critical events, near misses etc.) and driver state
- personalized in-vehicle interventions and post-trip feedback
Technical Equipment

DashCAM

Wearable PulseOn

CardioGateway

GPS Location

FMS

Smartphone

video

Live demo

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Mapping Methodological Approaches

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Scientific and Social Impact

- **Enhanced road safety** for a diverse demographic by increasing consideration of human factors within designs and transport operation means

- Improved operator’s **driving performance and skills** through the close and interactive monitoring and assessment of their driving behavior

- Enhanced **international cooperation** concerning human factors in traffic safety

- Policy **recommendations for Authorities** on how to exploit the i-DREAMS platform to improve safety
Future Challenges

- **Expansion of the Safety Tolerance Zone** to other modes and users (Powered Two Wheelers, Cyclists, Pedestrians)

- **Real-time investigation** of the significant risk factors (e.g. weather, distraction and impairment)

- **Modification of Safety Tolerance Zone** to ensure safer automated vehicles
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