Safety Tolerance Zone calculation and interventions for driver-vehicle-environment interactions under challenging conditions

May 2019 – April 2022

Prof. dr. Tom BRIJS
Team

7 engineering universities & research centres

4 companies & ICT groups

2 partners with links to transport safety stakeholders

KFV
Kuratium für Verkehrssicherheit

mob
Transportation Research Institute

UHASSELT

TUM
Technische Universität München

Univerza v Mariboru

Loughborough University

National Technical University of Athens

TU Delft

DriveSimSolutions

Oseven

Cardioid

Barraqueiro Transportes SA

Polis
Cities and Regions for Transport Innovation

ETSC
European Transport Safety Council
Background

1. **HUMAN FACTORS**
   - largest cause of accidents across all transport modes

2. **TECHNICAL DEVELOPMENTS & AUTOMATION**
   - change how humans interact with road or rail vehicles

3. **EVOLVING TECHNOLOGIES**
   - change how humans perceive their immediate environment and traffic and how they interact with machines

4. **SUFFICIENT RELEVANT DATA**
   - on human factors needs to be secured

5. **BETTER METHODOLOGIES**
   - required to assess human factors

6. **BETTER UNDERSTAND AND ADDRESS**
   - bottlenecks in organisational acceptance of technological and social change and governance of complex integrated systems
Project overview

**Monitoring**

- **Context**
  - Road layout
  - Time & location
  - Traffic characteristics
  - Weather

- **Operator**
  - Mental state
  - Driving behaviour
  - Competences
  - Personality characteristics
  - Socio-demographic factors
  - Health status

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

**In-Vehicle Interventions**

- **Normal Driving**
  - No intervention

- **Danger Phase**
  - Warning signal

- **Avoidable Accident**
  - Instruction signal

**Post-Trip Interventions**

- **App Based Feedback**
- **App + Web Based Gamified Coaching Platform**
Explainer video

Project video - link youtube
In-vehicle interventions

**ULTIMATE GOAL**

- Keep driver in the safe zone of operation
- Based on monitoring the complex interaction between driver-vehicle-environment

**WARNINGS**

- Developed for: sleepiness/fatigue, illegal overtaking, speeding, tailgating

**LOGGING & MONITORING**

- Events are logged and reactions to warnings are monitored in detail to understand the contribution of different risk factors
- Timing not only based on road and vehicle conditions, but also on actual operator state
Post-trip interventions

Creating sustainable behavioural change through gamification and coaching via the app

Transport operators can follow up drivers using web platform
Technological platform
5-country cross-modal field trials
METHODOLOGY & TOOLS
for monitoring operator capacity & task complexity to determine safety tolerance zone while travelling

INTERVENTION & SUPPORT TOOLS
including in-vehicle assistance as well as feedback and notification tools and a gamified platform

HUMAN FACTORS DATABASE
(user-licensed) with anonymized data from the simulator and field experiments

EXPLOITATION PLANS
for commercial use of the i-DREAMS platform

POLICY RECOMMENDATIONS
for authorities on how to implement the i-DREAMS platform

Final output