

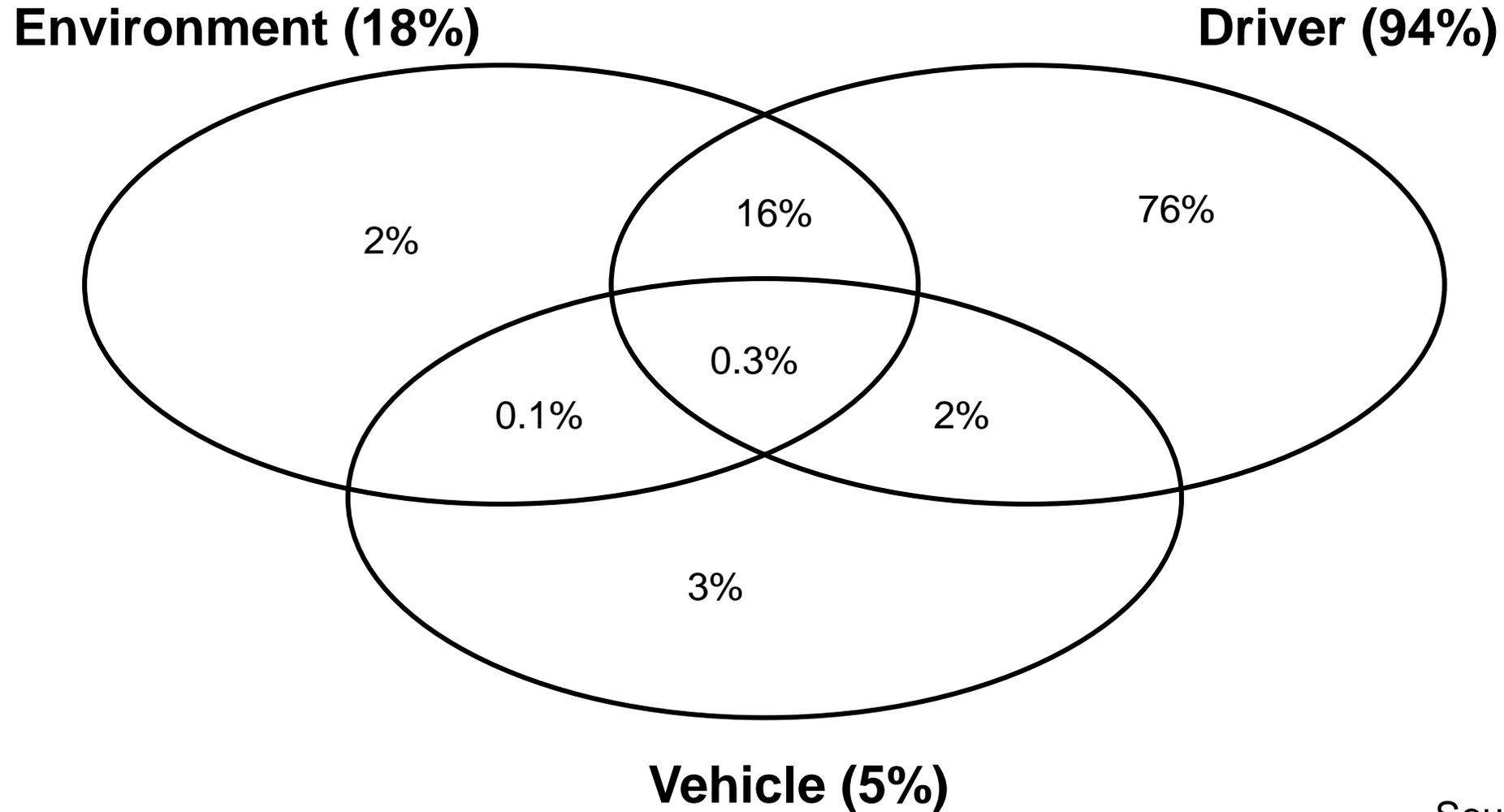


## **Innovations for safe driver behavior**

Innovation in Road Safety Research  
NTUA Road Safety Scientific Workshop 2021

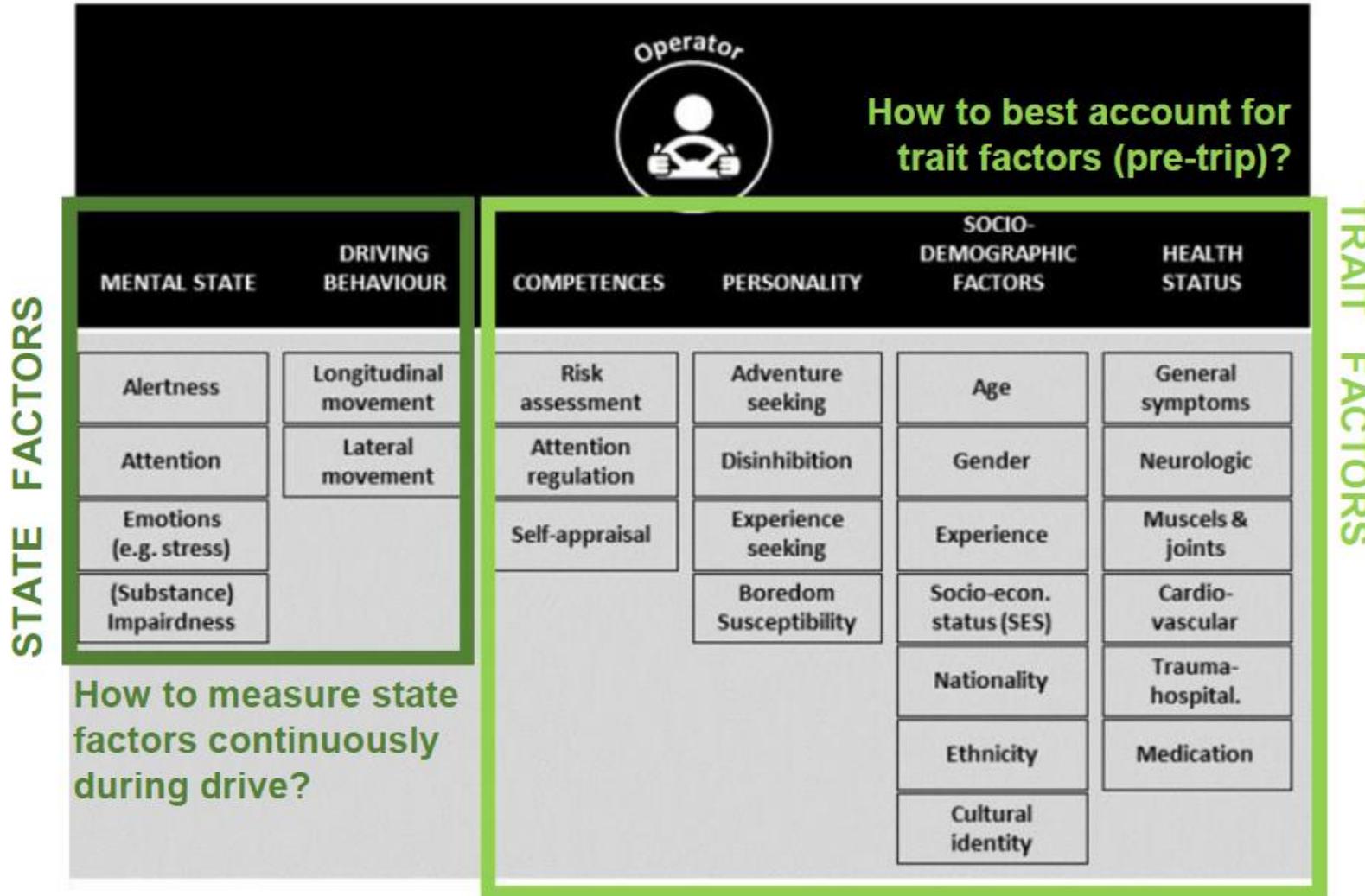
**Prof. dr. Tom BRIJS**

# Importance of driver behavior



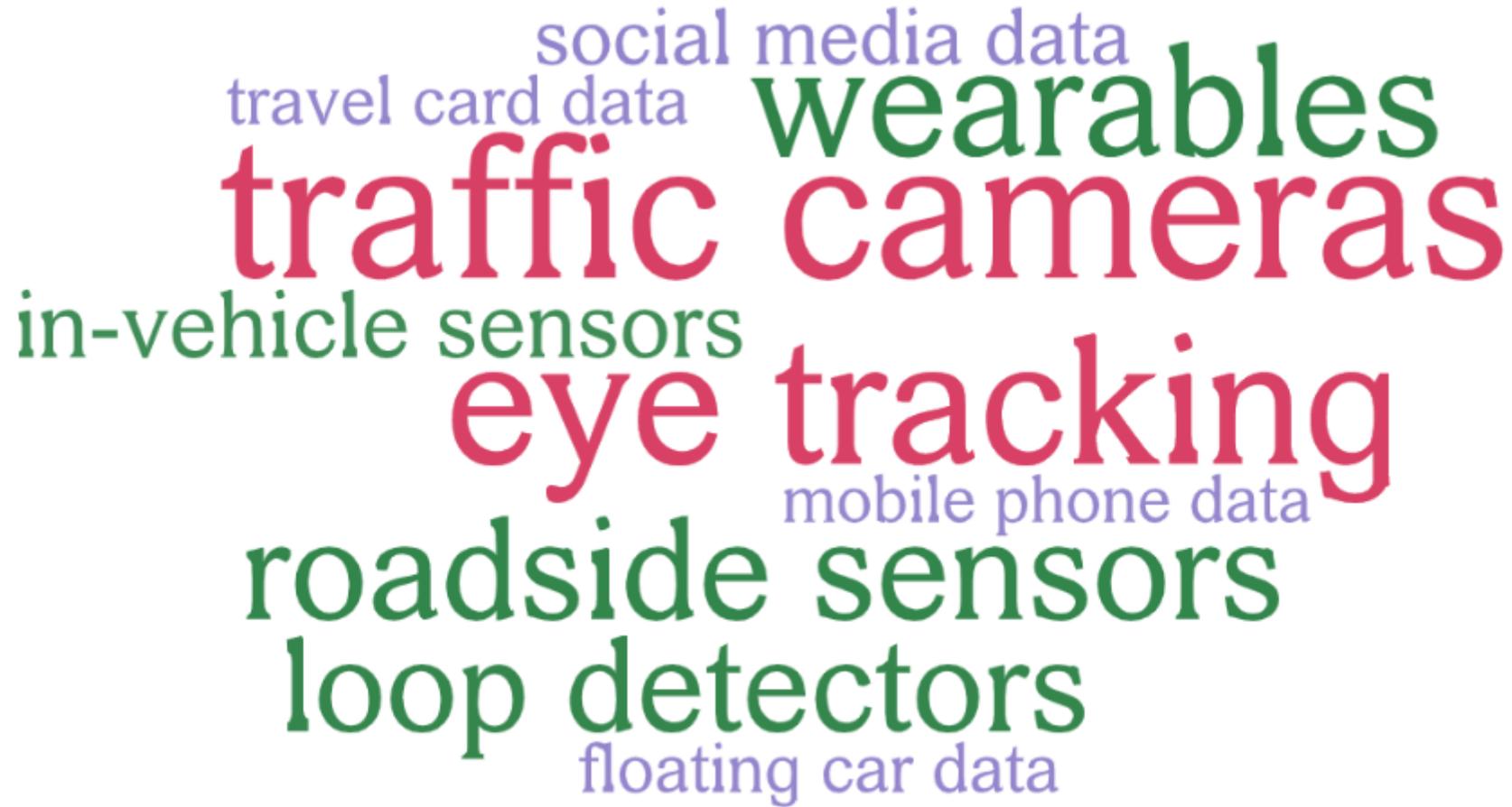
- Driver behavior is **complex** and influenced by
  - A variety of driver state and trait related factors
  - A variety of exogenous factors
  - A variety of vehicle related factors
- Focus on **normal** driving or **risky** driving behaviour?
- How to **measure** driver behavior?
  - Observational versus self-reported data
  - Naturalistic versus simulated environment
  - Behavioural outcomes versus behavioural predictors & physiological indicators
- How to **understand** and **model** driver behavior?
  - Driver psychology models
  - Modelling techniques (static, dynamic, explanation, prediction)
- How to **influence** driver behavior (in a sustainable way)?

# State versus trait factors



- **Exogenous** factors
  - Road layout
  - Traffic conditions
  - Weather
  - Time of day
- **Vehicle related** factors
  - Type of vehicle (light, heavy, ...)
  - Vehicle characteristics (engine, actuator status, system status)
  - Safety systems on board (ADAS)

- **Instantaneous** versus **past** behavior
- Outcome measures (e.g. speed, acceleration, tailgating, ...)
- Self-reported measures (e.g. violations, accident involvement)
- Underlying **predictors** of behavior (e.g. Theory of Planned Behavior)
  - Attitudes and opinions
  - Subjective norms
  - Perceived behavioral control
  - Behavioral intentions
- **Physiological** indicators (EDA, EEG, HRV, blood pressure, skin temperature, ocular variables...) of driver state (e.g. arousal, fatigue, sleepiness, stress, emotions)

A word cloud of various measurement technologies. The words are arranged in a roughly circular shape. The largest words are 'cameras', 'tracking', and 'wearables'. Other prominent words include 'traffic', 'roadside sensors', 'loop detectors', 'eye', and 'social media data'. Smaller words include 'travel card data', 'in-vehicle sensors', 'mobile phone data', and 'floating car data'. The colors used are red, green, and purple.

social media data  
travel card data  
wearables  
traffic cameras  
in-vehicle sensors  
eye tracking  
mobile phone data  
roadside sensors  
loop detectors  
floating car data

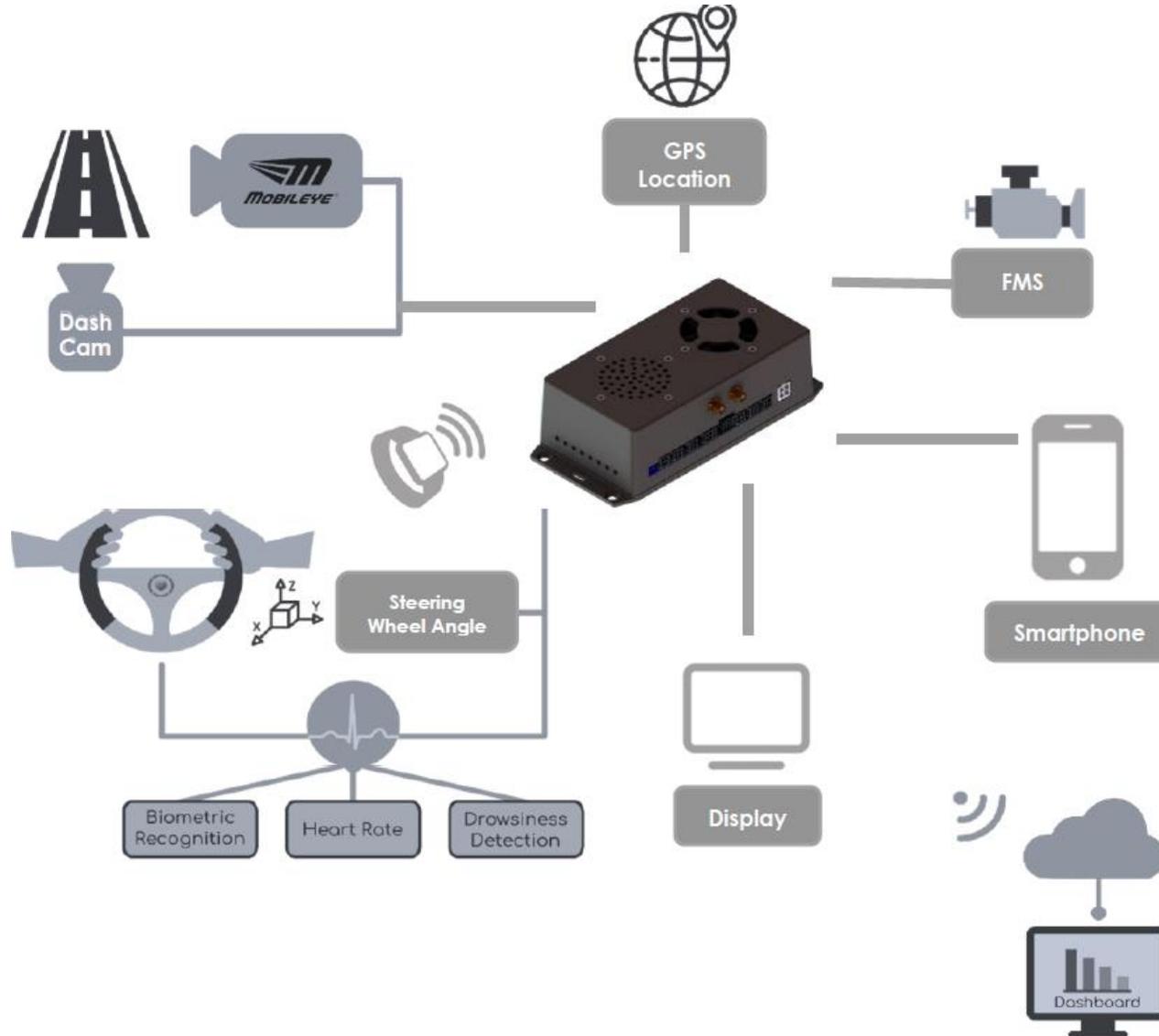
# i-DREAMS measurement technologies

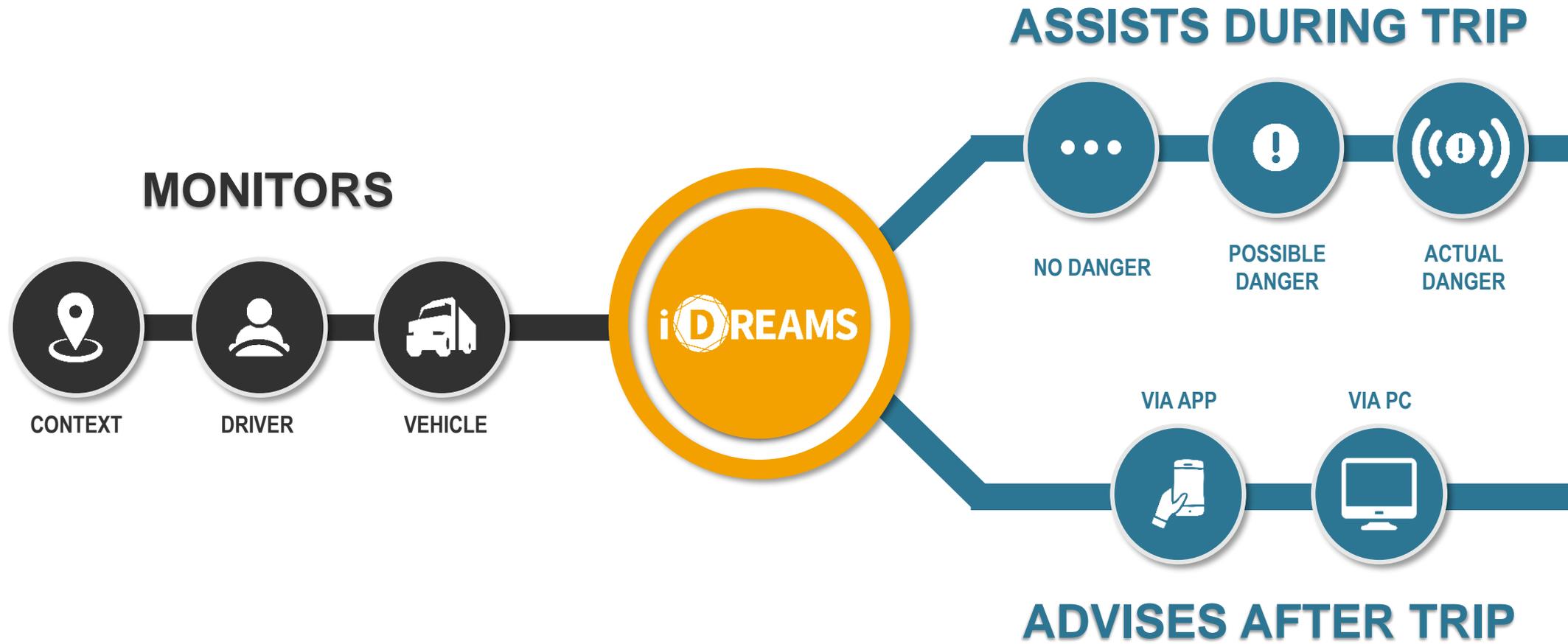


# i-DREAMS measurement technologies

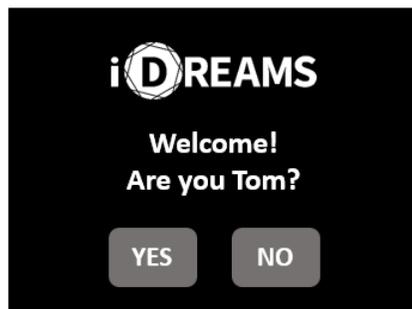


# i-DREAMS data fusion & interpretation





# i-DREAMS in-vehicle interventions



Driver identification



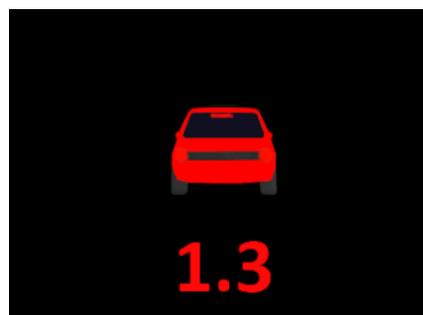
Handheld mobile phone use



Illegal overtaking



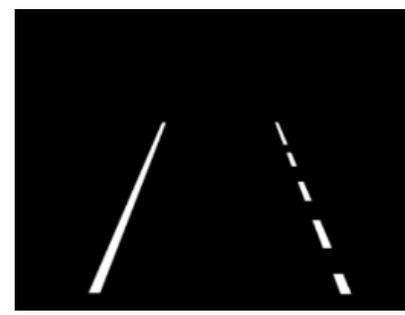
Fatigue monitoring



Tailgating



Vulnerable road users collision warning

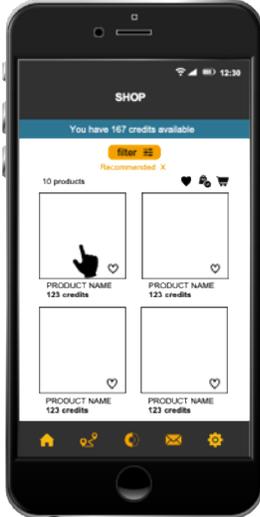
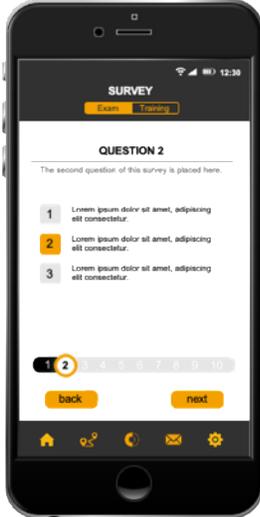
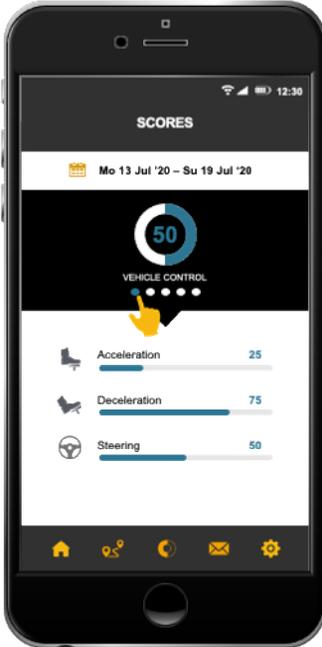
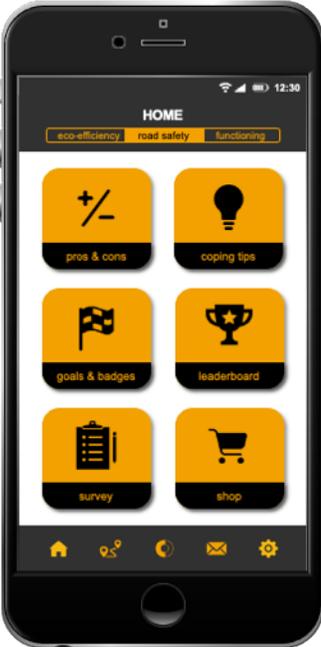


Lane departure warning



Over speeding

# i-DREAMS post-trip intervention app



# i-DREAMS web dashboard



DRIVERS LEADERBOARDS RESULTS GAMIFICATION FORUM CONTACT US

Welcome, idreamsadmin@

[Trips](#) | [Scores](#) | [Reports](#)

## Trips

Safety 7/4/2021 7/5/2021 ghswc

Category	Item	Score
Health	<input type="checkbox"/> 0 Fatigue	100
	<input type="checkbox"/> 0 Distraction	100
Vehicle Control	<input type="checkbox"/> 13 Acceleration	25
	<input type="checkbox"/> 2 Deceleration	90
	<input type="checkbox"/> 27 Steering	0
Road Sharing	<input checked="" type="checkbox"/> 39 Tailgating	96
	<input type="checkbox"/> 0 Lane discipline	100
	<input type="checkbox"/> 0 Overtaking	100
	<input checked="" type="checkbox"/> 5 Collision avoidance	35
	<input checked="" type="checkbox"/> 1 Vulnerable road user collision avoidance	0
Speed Management	<input checked="" type="checkbox"/> 10 Speeding	90
Safety Devices	<input type="checkbox"/> 0 I-DREAMS device	0
	<input type="checkbox"/> 0 App usage	0

27/04/2021 13:38 14:24 46:43 38.4  
DATE START END DURATION KM

**VULNERABLE\_ROAD\_USER\_COLLISION\_AVOIDANCE**

0:11 / 0:20

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