



National Technical University of Athens
Road Safety Observatory

Online
workshop
in the framework of

6TH UN GLOBAL ROAD SAFETY WEEK
17 - 23 May 2021



Streets for Life

Love30



Thursday
20 May
2021

Innovation in Road Safety Research

Holistic Approach for Driver Role Integration and Automation Allocation

Marios Sekadakis

Transportation Engineer, Research Associate

Together with:

Christos Katrakazas and George Yannis

The HADRIAN project

- **HADRIAN**: “Holistic Approach for Driver Role Integration and Automation Allocation for European Mobility Needs”
- **16 project partners** from 9 EU countries
- **Duration**: 42 months
(December 2019 - May 2023)
- **Framework Programme**: Horizon 2020 -
The EU Framework Programme for
Research and Innovation - Mobility for
Growth

HADRIAN

Holistic Approach for Driver Role Integration and
Automation Allocation for European Mobility Needs

virtual  vehicle



VDI|VDE|IT



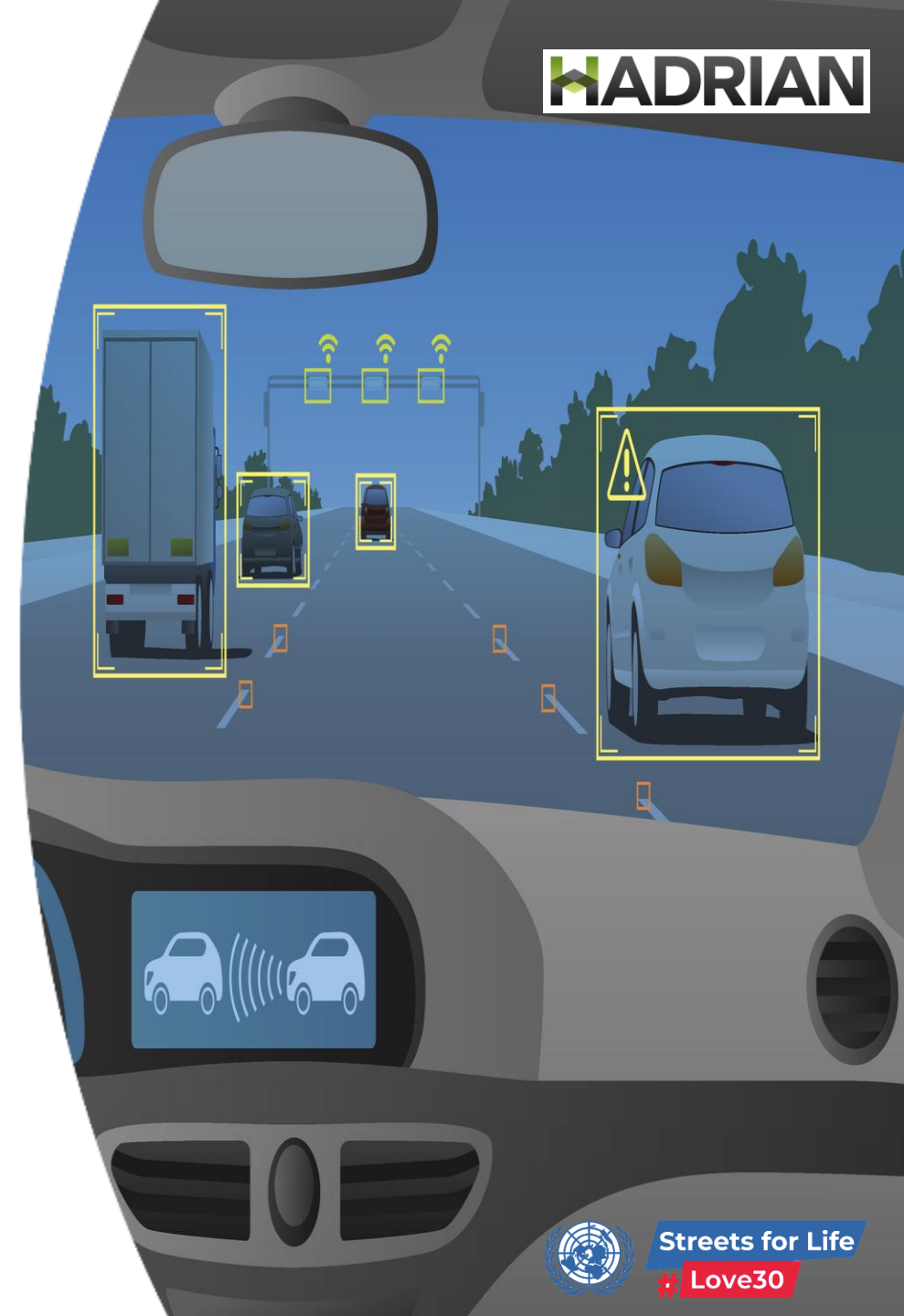
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Background

- **Driving on highly automated levels** offers improved safety by reducing human error together with the reduction of stress.
- Realistic AD (i.e., Automated Driving) systems lead to **novel driver roles** in which the driver needs to cope with unfamiliar transitions.
- An unfamiliar transition (e.g., AD level transitions) requires **well-designed human-machine interfaces (HMIs)** to allow the increase of driver awareness.
- HMIs require a **"fluid" interaction between driver, vehicle and environment/infrastructure**, which guide all types of drivers through different levels of AD.



HADRIAN Objectives

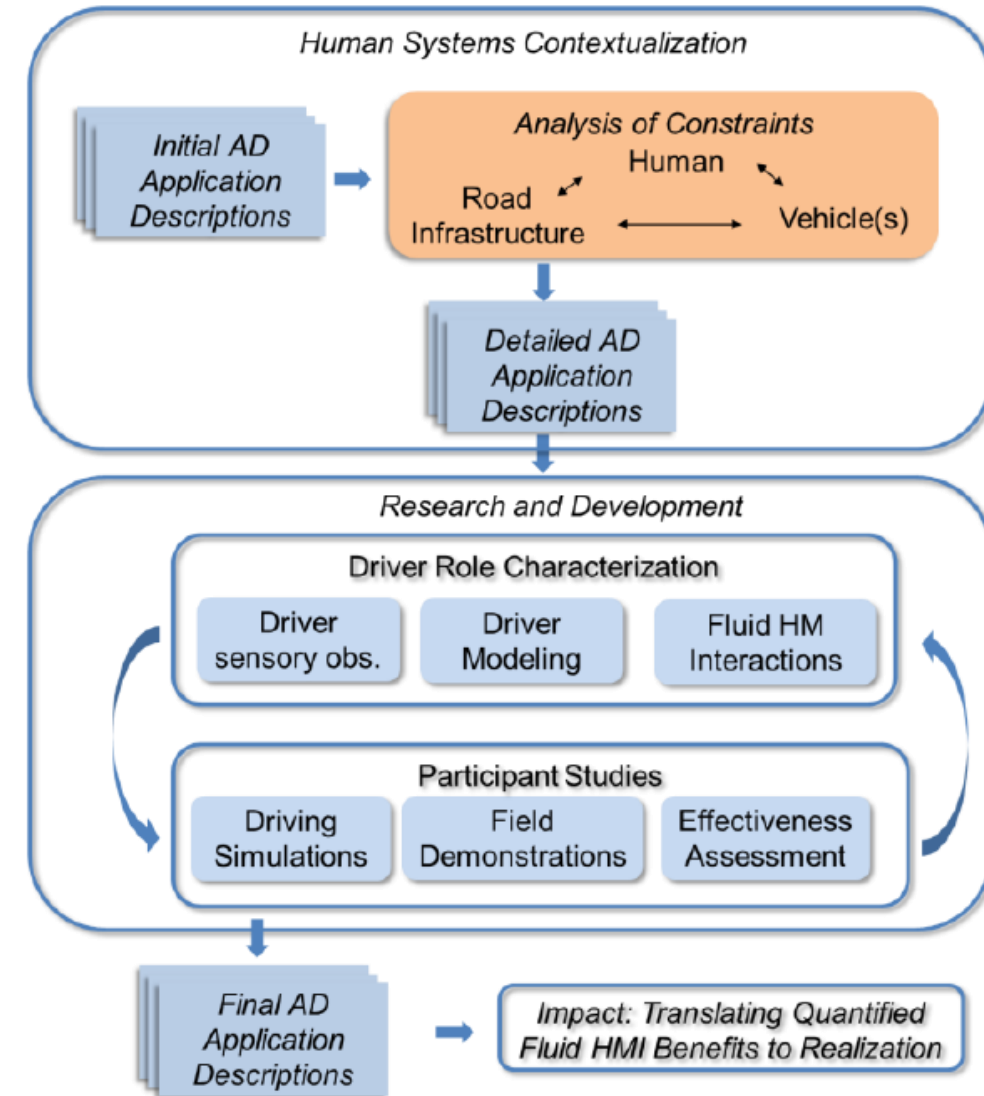
- Development and demonstration of **safe and acceptable AD transitions** via fluid-HMI
- Demonstration of **calibrated trust** in AD and AD level transitions
- **Recommendations and guidelines** for Human-Systems Integration for AD system development

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HADRIAN Methodology

- Define a concrete and balanced field of **human-system contextualization** by reviewing the current mobility needs and expectations.
- Analyze the **constraints** related to the initial AD applications in order to formulate detailed AD applications with realistic implementation assumptions and human factors limitations.
- Explore the **driver role concepts** that are facilitated by novel HMI concepts such as fluid HM interactions.
- Conduct the selected **field demonstrations** and test the developed solutions.



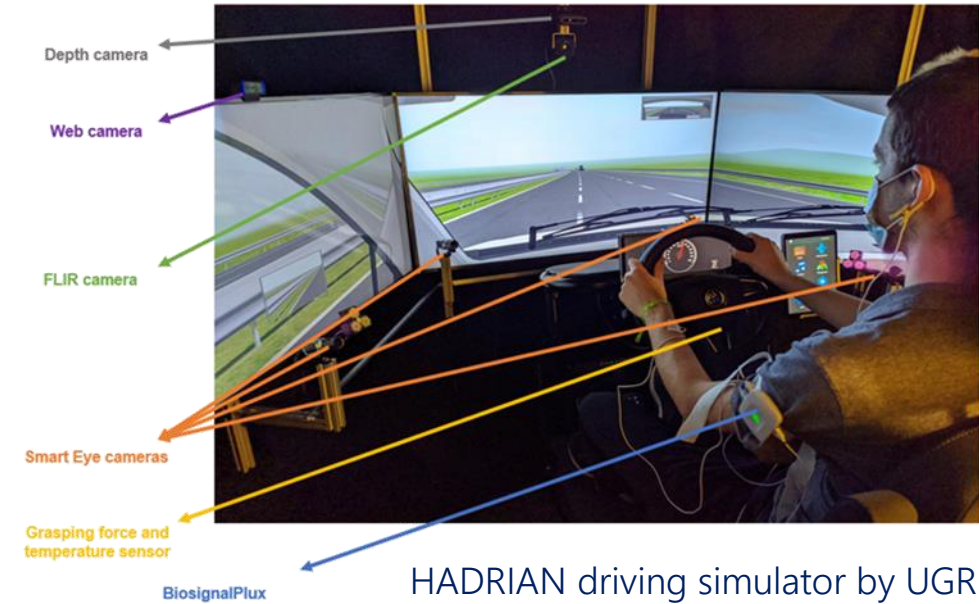
Safety and Impact Assessment

- NTUA contributes to several Work Packages and leads the Work Package of **Safety and Impact Assessment**.
 - **Safety** focuses mainly on the operator and passengers' active safety by measuring traffic conflicts and deviations from normal driving.
 - **Impact** refers to subjective beliefs and attitudes of the driver that potentially affect driving performance
- A **holistic methodology** based on KPIs was designed in order to enable the assessment of the enhancement offered by the HADRIAN innovations.



Assessment Methodology

- At the first stage, a list of KPIs was created based on the literature review along with a hazard identification procedure in the driving scenarios.
- Focus is given on Safety:
 - Accident and Safety Risk, Driver's Emotions, Driver's Perception, Driving Conditions, and Driver's Healthand Impact:
 - Comfort, Acceptance & Usability, Trust, Reliability, and Accuracy
- A virtual assessment was conducted at a later stage by exploiting videos from the driving simulator.



Scientific and Social Impact

- Creation of innovative solutions, concepts and algorithms for **a safe human-machine interface** of highly automated driving functions and for safe and controlled transitions between automation levels.
- Reduction of the risk of **driver behaviour related incidents** by ensuring that driver is adequately alerted and engaged when the highly automated vehicle meets unexpected situations.
- Support of the "**Vision Zero**" objective by preventing road accidents and human errors.
- HADRIAN also addresses issues related to **the environment** by enabling car-sharing and last-mile solutions with AD vehicles.

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Future Challenges

- Concrete **guidelines** for introducing Human-centered designs into autonomous vehicles to strengthen safety during driving.
- The creation of sufficiently safe smart vehicles that can respond to the complexity and dynamics of the **road traffic environment**.
- Special focus is required to be given regarding **planned or unplanned transitions** (e.g., takeovers) between AD levels.
- Investigation and support of smart **road infrastructure** to assist the drivers during the AD level transitions.





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