# Publishable Summary

## Description of the project context and objectives

UDRIVE is the first large-scale European Naturalistic Driving (meaning that the behaviour of road users is observed unobtrusively in a natural setting) Study on cars, trucks and powered-two wheelers. The acronym stands for "European naturalistic Driving and Riding for Infrastructure & Vehicle safety and Environment".

Road transport is indispensable for the exchange of goods and persons. However, at the same time it has severe negative consequences, among others related to road safety and the environment. In order to meet EU targets, both the number of crashes and vehicle emission levels need to be reduced substantially. Therefore, with the aim of identifying the next generation of measures that will enable us to effectively reach these targets, a far more in-depth understanding of actual road user behaviour is needed.

The UDRIVE project builds further on the experience of the PROLOGUE feasibility study and various Field Operational Tests (FOTs), and aims to contribute to developing this in-depth knowledge by conducting the first large-scale European Naturalistic Driving (ND) study.

Over a period of two years, UDRIVE will collect naturalistic data on passenger cars, trucks, and powered two-wheelers. All data - including video data showing the forward view of the vehicle and a view of the driver, as well as geographic information system (GIS) data - will be collected continuously to bring knowledge in the various research areas well beyond the current state-of-the-art.

**Facts & Figures**

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| Project acronym: | UDRIVE |
| Project name: | "European naturalistic Driving and Riding for Infrastructure & Vehicle safety and Environment" |
| Project type: | Collaborative project – Large-scale integrating project |
| Programme: | 7th EU Framework Programme |
| Project Coordinator: | Rob Eenink, SWOV |
| Start date: | 1 October 2012 |
| End date: | 30 September 2016 |
| Budget: | € 10.617 mio. |
| EU funding: | € 8 mio. |

**Objectives**

UDRIVE will increase our understanding of road user behaviour. Its objectives are two-fold: to identify well-founded and tailored measures to improve road safety up to the Horizon 2020 and beyond, and to identify approaches for reducing harmful emissions and fuel consumption in order to make road traffic more sustainable.

From a scientific and technical point of view, UDRIVE aims at:

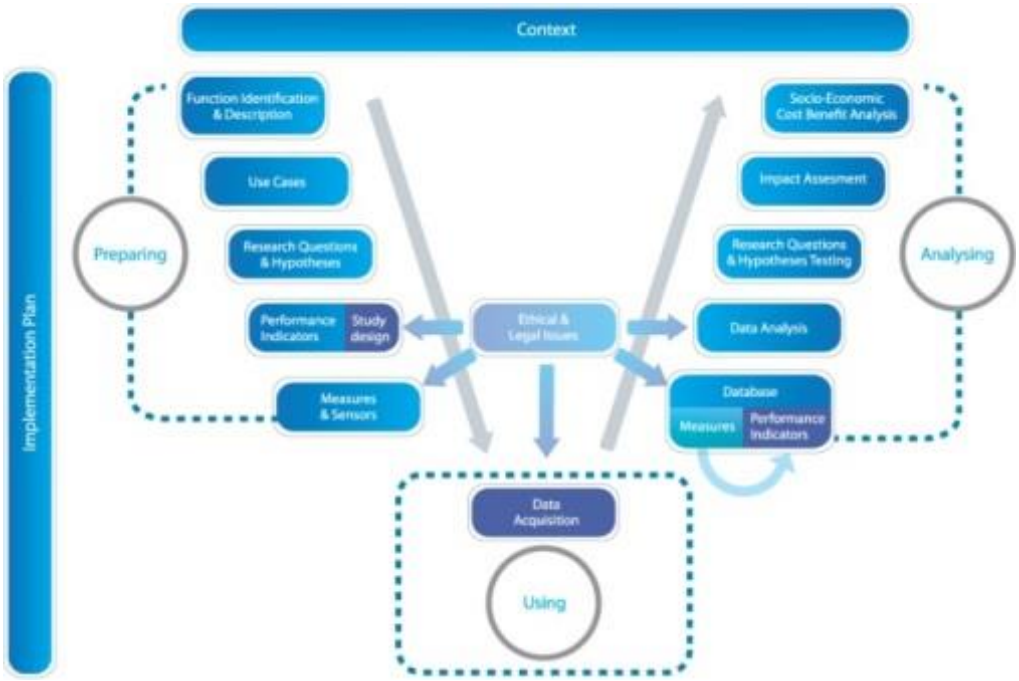
- Describing and quantifying road user behaviour in different European regions, in regular conditions and (near-)crashes, and provide a quantified estimate of the risk of particular safety-critical behaviours, focussing especially on
    - the prevalence and effects of driver/rider states, such as distraction and inattention
    - interactions between drivers/riders and high risk groups like pedestrians and cyclists
- Describing and quantifying road user behaviour in relation to emission levels and fuel consumption, focussing in particular on
    - the effects of driving style
    - road and road network characteristics
    - traffic conditions such as congestion, impaired visibility or adverse weather
- Identifying new approaches, measures and tools to make the traffic system safer and more sustainable, focussing especially on
    - the definition of measurable safety and environmental performance indicators for monitoring developments over time
    - improving existing models of driver behaviour to be used for e.g. predicting effect of safety and environmental measures, and traffic flow simulations
    - applications in commercial transport, including driver support systems and targeted training for safer and more fuel efficient driving

Finally, after it is concluded, the UDRIVE project will offer access (within the bounds of legal and ethical restrictions) to the collected data so that it can be consulted and used for subsequent analyses by road safety and environmental experts from all over the world. This will enable the exploitation of the data beyond the scope of the UDRIVE project.

**Methodology**

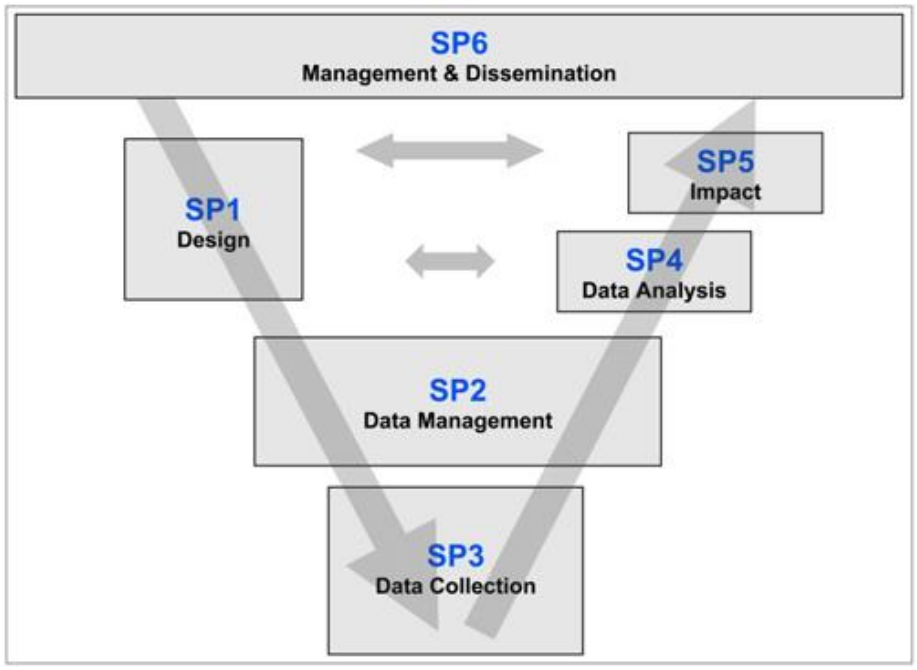
UDRIVE roughly follows the steps of the FESTA-V methodology:

- Study Design
- Data Management
- Data Collection
- Data Analysis
- Impact




## Work performed and main results

Though UDRIVE is certainly new it is not made from scratch. Besides the feasibility study PROLOGUE there are two main main inspirations: European Field Operational Tests and the Strategic Highway Research Program 2 (SHRP2) in the USA. In UDRIVE the standardised FoT-methodology FESTA "V" was adapted:




The UDRIVE methodology

An important adaptation is the link between design and data analysis, i.e. SP1 and SP4. This implies that in SP1 Design the definition of research questions has to be balanced against the technical and financial limitations in SP2's data management (data acquisition, data handling) and the analysis including e.g. video annotation. These discussions were fruitful but also time-consuming and showed that 'the devil is in the detail'.

Despite ample preparations in the proposal phase, including e.g. a data working group, it became clear that data needed to answer the large variety of research topics (eco-driving, crash contributing factors, vulnerable road users (VRU) etc.) would require a rather complicated DAS (data acquisition system) including many cameras and including a so-called smart camera, capable of measuring following distances and identifying VRU's. The need for this variety was confirmed in a stakeholders meeting in Brussels in March 2013. It was anticipated that such a DAS would be available within the budget constraints, but the time and effort to (de-)install it in the vehicle would be far more than assumed in the proposal. Therefore, instead of having two waves of vehicles for one year we had to decide for one wave of participants driving and riding for (almost) two years. This was discussed in the Advisory Board (AB) of renowned experts because this would –in principle- not affect the amount of vehicle years but would halve the number of subjects and the statistical power of the analyses. A compromise was found in the ambition to recruit (partly) family cars thus having two or more drivers (subjects) per car. For trucks and powered two-wheelers this was not an option.

Another issue was the amount of makes and models. Every vehicle would need an individual approach for mounting cameras, putting in cables, tapping into the CAN-bus data etc. Therefore, we decided to include two car types, one PTW and two trucks. Fortunately, Renault was willing to finance one extra car type extra, which will make recruitment easier.

A few months later than planned, the technical specifications of the DAS were ready and end of May 2013 a request for proposal was issued on the website and 5-10 potential suppliers were directly informed. Initially, we thought using the same DAS as SHRP2 was a promising solution, but the specifications and requirements brought about by UDRIVEs specific research topics and the apparent difference between USA traffic and the European situation, made this impossible. Nevertheless, 4 suppliers made a proposal that was scored against UDRIVE conditions. A preferred supplier was chosen and the AB –including SHRP2 experts- fully agreed that this supplier had –by far- the best offer, i.e. the only one that met all conditions. Because of the complicated DAS and many interdependencies, e.g. a maximum effort for (de-)installation, Dutch versus French law etc., the final contract was signed just before Christmas 2013. In April, a first version of the DAS was demonstrated to the consortium in Paris and it is expected that in Summer 2014 the first operation sites will start to install them, around 10 months delayed.

## Expected final results, impact and use

There is a lot of interest and ambition in the UDRIVE project, which is splendid. The downside of this is that we included a very ambitious variety of interests in the project, making it vulnerable for everything unexpected. Therefore, we are already almost a year behind schedule, many of us have overspent and 'large' proves to be a relative concept. As Ken Campbell, the leader of the USA SHRP2 NDS and member of the UDRIVE AB stated: every time you think the biggest hurdle has been taken, until the next one comes up. This may sound a bit depressing, but Ken is now leading a program that has 4 thousand vehicle years of data in store, actually more than planned! The UDRIVE consortium is aware we will face new hurdles but the progress so far makes us confident we can be as successful as our USA colleagues.

In the next 18 months the main anticipated results are:

- Finalising DAS development
- Production of 210 DASses: 120 for cars, 40 PTW and 50 for trucks
- Finalisation of the DOW amendment (sent in May 2014)
- Recruitment of participants at 7 operation sites
- Installing DASses at these sites and collecting the first year of data

In line with the mentioned objectives, the impact of UDRIVE is expected in three areas:

1. Road safety and environmental performance
   In the European Road Safety Observatory so-called safety performance indicators (SPI) are defined. An SPI is a measurable entity with a known relation to road safety. UDRIVE will develop and advise on ways to acquire data on SPI's in a feasible way, e.g. on speed, exposure, etc. It is likely these SPI's will also have an impact on emissions and fuel consumption.
2. Evaluations of measures
   UDRIVE results will make traffric models more valid and reliable and thus improve their value for (especially) ex-ante evaluations. This implies policy makers can make better decisions on which road safety or environmental measures to take.
3. Commercial applications
   UDRIVE will show which road user behaviour, i.e. not only the driver and rider but including pedestrians and cyclists in interacting with them, leads to risks or emissions and therefore shows a potential for (developing) advanced assistance systems. These systems will improve the competitativeness of the European industry.

**Website**

http://www.udrive.eu/

**Consortium**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