HUMANIST is an international association of research organisations, created in 2007 in Lyon, France and labelled as a Virtual Center of Excellence. It is composed by universities, research institutes and research intensive companies. HUMANIST aims to bring knowledge and expertise together to federate research through Europe in four main areas:

- HMI – Human Machine Interaction
- Human behaviour in Traffic
- ITS – Intelligent Transport Systems
- Vehicle automation

The Humanist members undertake research in these areas and in the interaction between them. The current list of Humanist members is included at the end of this paper. More information on Humanist and its activities can be found on the Humanist website www.humanist-vce.eu.
There is a lot of transport research going on, funded by public authorities, companies, foundations and international organisations such as the European Commission via its HORIZON Europe programme. However, in many research programmes, the human factor is neglected or does not get the attention it deserves, due to its importance for acceptability and usability of technology design in addition to its impact on safety. Based on a broad consultation within its members, Humanist therefore puts forward in this paper a number of research topics and areas that are considered as playing an important part for Research & Development of future mobility.

Why a Position Paper?

In many Research Programmes, the Human Factor is neglected or does not get the attention it deserves.

The following are covered:

- Human behaviour in transport
- Sustainable transport
- Vehicle automation
- Transport safety
Over the last decades, human behaviour in traffic has been investigated and several efficient methodologies have been developed. But the transport environment is changing quite quickly due to implementation of innovative technologies. It remains therefore of paramount important to improve our understanding of human behaviour when moving around, in order to improve safety of to avoid misuse and negative side effects of new transport developments.

**SPECIFICATION**
- of inappropriate behaviours in relation to specific characteristics of the environment (e.g. several types of road users using the same road)

**DEVELOPMENT**
- of innovative methodologies allowing to predict human reactions in complex contexts (e.g. complex traffic situations with semi-automated vehicles)

**IDENTIFICATION**
- of users needs and expectations to particular transport mode (e.g. cars, public transport, e-steps, etc)

**EFFECTIVENESS**
- of approaches for changing road users’ behaviour (e.g. switch to a more ecological transport mode)

**PROTECTION**
- of people during road works
Safety in transport has always been a priority for the societies. Air, waterborne and rail transport of passengers is already very safe in Europe, and much progress has been made in road safety in terms of reducing road traffic injuries and deaths.

Nevertheless, the number of people injured and killed in road crashes is still unacceptably high. Moreover, in an evolving context new challenges are emerging.

More research is needed on the following:

- Improvement of the safety of people using light and unprotected vehicles such as Personal Travel Vehicles, e-riders, e-steps, e-bikes, e-scooters, quads,…

- Effectiveness of vehicle automation in improving road safety, with a specific focus on transition phases with back to manual control and the issue of driver’s situation awareness.

- Safety effects of innovative modes of communication such as Head Up Display and Augmented Reality.

- Evaluation of acceptability and efficiency of safety technological solutions implemented in the vehicles for driver’s diagnostic and monitoring to prevent impairment linked to alcohol, drugs and medicines, fatigues,…

- Better communication and conflict-free interaction between different transport modes and types of road users - autonomous and manual controlled vehicles, pedestrians, cyclists, motorcyclists, users of personal mobile devices.
Sustainable Transport

Making transport more sustainable is a major challenge for our societies, requiring a range of complementary approaches. These include:

- **INCLUSION**: in transport, including in the area of mobility as a service

- **MODELISATION**: of sustainable transport systems for urban resilience, including traffic management for sustainability

- **BALANCING**: the benefits for society (environment, health, economic costs, ...) and human risks (injuries, deaths, ...) of new or emerging transport modes and vehicles, such as e-personal mobile devices

- **NEW APPROACHES**: for improving the accessibility of mobility for senior and impaired people in the light of new transport services and possibilities

- **EVALUATION**: of the beneficial impact of electric mobility deployment, especially in urban areas
Vehicle automation

Vehicle automation is a promising development for the mobility of the future, in particular given its potential to reduce road crashes that are due to human errors. However, given the novelty of the technology there is a risk that new types of road crashes may emerge, based on unforeseen interactions between vehicles and drivers.

Research on vehicle automation should therefore pay more attention to the following topics:

### Understanding
- Behaviour and behavioural adaptation of drivers and other road users with different levels of automation, in particular in relation to acceptability, over-trust, mistrust and handover.

### Optimisation
- Specification of the human-vehicle communication through human centred design, especially during the transition phases, based on analysis and monitoring of users behaviour. Specification of normalized symbols based upon human perception and understanding.

### Risk assessment
- including interactions between autonomous vehicle and vulnerable road users, negative side effects such as new types of road crashes, caused by vehicle automation, and potential safety impact related to cybersecurity attacks.

### Mobility
- Improvement for persons without a driver license such as impaired users, seniors, young people or even traffic offenders.

### Assessment
- of cost-effectiveness and overall societal benefits, such as environmental gains, sustainability of transport and integration in new mobility concepts such as Mobility As A Service.

### Analysis
- of ethical issues, in relation to privacy, responsibility and inequality.
HUMANIST MEMBERS

Ben Gurion University of the Negev, Israel  
CDV, Czech Republic  
CTAG, Spain  
DeepBlue, Italy  
DLR, Germany  
DTU, Denmark  
Fraunhofer IAO, Germany  
HIT, Greece  
KfV, Austria  
Loughborough University, UK  

RE:Lab, Italy  
SWOV, The Netherlands  
TUC, Germany  
Université Gustave Eiffel, France  
University of Lisbon, Portugal  
University of Porto, Portugal  
VIAS Institute, Belgium  
VTI, Sweden  
VTT, Finland