

EDITORIAL

BRAVE aims at supporting a fast introduction of automated driving by ensuring the acceptance of all relevant users, other road users affected and stakeholders. The project has received funding from the European Commission (Horizon 2020 framework programme) and has been launched in June 2017.

Released twice a year, this newsletter aims at providing an overview of the work done during the past six months. This first edition focuses specifically on the BRAVE methodology and core structure. Some major events are further detailed, and a report is provided of the first results released after a wide state-of-the-art study on acceptance, of automated vehicles and ethical, legal, social, economic and road safety implications.

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BRAVE working methodology: a user-centric approach

Technical progress in the development of automated vehicles (AVs) has been making rapid progress for several years now. However, BRAVE approach assumes that the launch of automated vehicles on public roads will only be successful if a user-centric methodology is followed in the development of automated vehicles. This is perceived as a key to obtaining viable and market-ready products. Consequently, based on existing prototypes of automated vehicles provided by the consortium and partners, BRAVE will perform multidisciplinary research to meet the needs of users (drivers), other road users (other drivers and Vulnerable Road Users) and the perspectives of stakeholders (driving instructors, insurance companies, authorities, certifiers, policymakers and regulators). This main objective is achieved using the following methodology:

BRAVE partners will first conduct a multidisciplinary study (taking into account human, social, economic, road safety, legal and ethical considerations) of the requirements and expectations of the drivers, Vulnerable Road Users (VRUs) and stakeholders regarding safety and adoption of automated vehicles. The results of this multidisciplinary study will be then turned into innovative interaction and monitoring concepts (Human Machine Interfaces) for driver-vehicle interaction, as well as innovative monitoring concepts regarding vehicle-environment interaction. The idea here is to enhance the existing ADAS (Advanced Driver Assistance Systems) through the inclusion of predictive capabilities for better and faster ADAS reactions (both in non-critical and in emergency situations).

Those systems will be validated through realistic user-centric testing of several different scenarios under demanding conditions. This iterative testing will allow BRAVE partners to validate requirements, user acceptance and the impact of the newly developed prototypes. Finally, to pave the way for further



adoption of the technology by the automation industry, BRAVE will work on pre-validation protocols and propose advancements regarding regulation and consumerist assessment.

Signing ceremony at the ITS congress and kick-off meeting



Signing ceremony during ITS Congress in Strasbourg

BRAVE was officially launched in June 2017. The signing ceremony was organized by the European Commission during the Intelligent Transport Systems (ITS) congress in Strasbourg (France) on the 20th. Then the project Kick-off took place in Madrid on June 28-29 2017. The event gathered all the partners composing BRAVE consortium, as well as a representative of the European Commission.

This was a great opportunity for all BRAVE partners to meet, get to know each other and plan the next steps in cooperation. Each entity represented at the meeting further detailed its respective involvement in the project and described the Work Packages and tasks they are responsible of. The participants especially

focussed on how the specific tasks will be implemented. Discussions were held between partners about the activities due to take place during the first months of the project. Those elements have been further detailed, and the action plan defined. The Project Officer also described the specific requirements of the European Commission. This meeting was the starting point of 3 years of high impact international cooperation. Additionally, partners from the University of Alcalá showcased their ongoing projects and the results already achieved regarding the detection of pedestrians.

BRAVE Advisory board: Purpose and composition

The purpose behind the creation of an advisory board within BRAVE is to organize a structured two-ways dialogue between the consortium partners and a number of stakeholders, in order to maximize the outreach of the project. The committee members will meet once every six months to provide feedback and guide the project development with their requirements. They will comment on the project objectives, work plan and ongoing activities. Moreover, members of BRAVE advisory board will help disseminate the projects objectives and results while participating in various conferences, workshops and events.

This strategic committee is now set up, composed of experts representing BRAVE's different fields of work (human machine interfaces, automated driving, pedestrians' detection, etc.) and the various stakeholders that will be involved throughout the project. The advisory board include representatives of large companies (Ferrovial servicios, Renault S.A., PSA Group), public authorities (Swedish Transport Administration, German



Ministry of Transport and Digital Infrastructure), research centres (Laboratory of Accidentology and Biomechanics PSA-Renault, Fiat Research Centre CRF), insurance companies (MAPFRE Insurance), clusters (Automotive Cluster of Slovenia) and SMEs (TT Sistemas, Idneo) and more.

In particular, BRAVE has sought the involvement of stakeholders from all the EU and further away. Representatives from the University of Sydney (Australia) and the University of Berkeley (USA) will provide a wider view and enrich the discussions. Leaders of related H2020 funded projects will also join this advisory board to help create synergies between projects sharing common interests and research topics. The feedback provided by those “sister projects” will increase the efficiency of work made in BRAVE, and will provide valuable input.

User Acceptance of AVs: a state of the art study

The launch of automated vehicles (AVs) on public roads will only be successful if you are aware of possible concerns about automated cars and if the requirements and expectations of the public will be fulfilled. In order to learn more about possible concerns, expectations and implications of automated cars, the first six months of the project have been dedicated to a state of the art study. The results of the literature review on definitions and theoretical approaches to acceptance as well as on ethical, social, legal, economic and road safety implications of automated cars are briefly presented in the following.

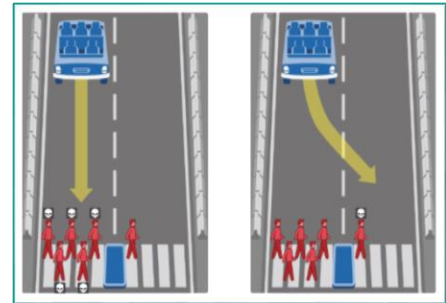
The literature review especially shows that the general level of trust in automated or autonomous driving is limited. Within the reviewed studies the majority of participants were concerned that self-driving vehicles cannot drive as well as human drivers. Worries regarding system failure can also be related to trust problems. The comfort that passengers of highly or fully automated vehicles expect or what secondary task they engage in might depend on their tendency to trust the vehicles. Research findings clearly illustrate that males and females have distinct perceptions, expectations and concerns towards automated vehicles. The finding of the described surveys suggest that men generally have more positive expectations regarding automated features and driver assistance systems in cars and seem to be slightly more willing to buy such systems than females and that the attitude of females towards automated vehicles is rather reserved. Other implications important for the focus of BRAVE can be related to worries about data privacy and liability. As it is not clear yet who will be liable in what situation and who will have the right to access the data gathered with the introduction of automated driving on European roads, the uncertainty was found to be a concern to European citizens.

Organized stakeholders are, either directly or indirectly, likely to be affected by AVs. It is important to include their perspective so that automated vehicle technology is widely adopted in a safe and effective manner. There are different expectations on automated transport logistics between different stakeholders and different views regarding the timing of widespread implementation and adoption of automated vehicles. A common issue that is addressed concerns legal aspects.



The review of studies concerning human-machine-interaction (HMI), transfer of control (TOC), mental workload (MWL), situational Awareness (SA) and trust indicates that cars on SAE level 2 and level 3 of automation are shadowed by several issues that are problematic from a road safety perspective. Studies show that humans are not well suited for supervision tasks and therefore easily lose track of the situation at hand and intervene less well compared to when they are required to be in control at all times. The road safety literature suggests several issues which will need to be considered and handled well if potential increases in road safety from AVs are to be realized. There is a potential for improved road safety, as long as driver behavioral adaptation – such as drivers engaging in non-related driving tasks – can be mitigated.

There has been a discussion about the ethical implications of autonomous driving for some years now, mainly about ethical issues in unavoidable accident situations where at least one road user gets harmed. The literature review only allows limited conclusions, so it cannot be decided what would be the most appropriate ethical approaches for the programming of autonomous cars – there is no consensus on this in the literature – and whether there should be the possibility of individual Personal Ethics Settings (PES) for the users of automated cars. The few empirical studies on how the public thinks about the ethics settings of autonomous cars also show no clear result. There seems to be an acceptance that a car should be programmed in such a way that, in the event of a crash, as little human harm as possible occurs, but it is not clear whether many people would be willing to purchase or use a car, which sacrifices the car occupant to save someone else's life. In the future autonomous cars must make decisions that touch on ethical issues and these ethical issues have not yet been sufficiently and transparently discussed in the public. Such a discussion would be important because rules must be drawn up here, which must balance between the two socially important ethical principles of self-determination and safety. And the way automated / autonomous vehicles are ethically programmed will also determine their societal acceptance.



Ethical implications of autonomous driving. Picture credits:
<http://moralmachine.mit.edu/>

The brief overview of the legal implications of autonomous cars shows that in many countries legislation is now reacting to the new technology. Nevertheless, many aspects and topics are not yet regulated by law; at least this could be the impression for the legal layman. The issues of liability – who is liable in which case for a crash – and privacy – who has access to the data collected by the automated car – should be regulated comprehensibly and transparently for the ordinary consumer in order to make the market launch of automated cars a success.

Regarding the social and economic impacts, many studies predict that on the one hand the deployment of automated cars will have the potential to reduce crashes, increase fuel efficiency, reduce parking demand, improve road capacity, ease congestion, and increase mobility for non-drivers. On the other hand, there could be negative externalities such as increased congestion and environmental degradation and negative effects



on employment. The great uncertainty regarding how people will change their travel behavior makes it hard to draw any clear conclusions regarding the social and economic impacts of automated vehicles. Thus, it is important to further investigate the possible behavioral changes that might come from the implementation of autonomous vehicles, since they will play an important role for the societal acceptance of automated vehicles.

To investigate the acceptance of the European population regarding AVs referring to level 3 of vehicle automation, a stakeholder survey and a representative public opinion survey will be performed within BRAVE. To reach a high level of acceptance in the public, it can be assumed that further research is required in order to learn more about the expectations and concerns of European citizens. Within the survey (to be held during the upcoming months), the gender perspective should be included and questions about the ethical preferences of the population should also be asked.

Test-track studies of close to market ADAS concepts

BRAVE partners will conduct test-track studies in December and January in Slovenia. The automobile association of Slovenia (AMZS) will study both the use and user's requirements of market and close to market ADAS systems. BRAVE focuses on user's requirements, and therefore the studies performed will encompass drivers as well as other road users, Vulnerable Road Users (VRUs) and various stakeholders.

KEY FIGURES

Consortium: 11 partners from 7 countries (Spain, France, Germany, Slovenia, Sweden, U.S.A, Australia)

Project duration: 36 months

7 work packages

24 experts involved in the Advisory Board

The studies will be carried out at the AMZS Safe Driving Center in Vransko (Slovenia). It will include 24 drivers, using the systems and 24 other drivers in fully manual vehicles interacting with vehicles equipped with automated systems. In addition, 70 stakeholders from the seven countries involved in BRAVE will be interviewed while testing vehicles with these systems. Stakeholders will represent authorities, the police and users' organizations. The results of those studies will be further detailed in the next edition of our newsletter. More information about research and project activities will be released frequently on our website www.brave-project.eu. Stay tuned!

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