

Terms of Reference

Commission Expert Group to advise on specific ethical issues raised by driverless mobility

1. Context and Background Information

Technological progress will lead to an increasing level of automation of transport, which could partially and/or fully replace human drivers. Automated driving functionalities of a specific level of technological development (i.e. Society of Automotive Engineers (SAE) level 4 and level 5), when being active, do not need a human being as a fall back to ensure road safety. Vehicles that are fully automated in some or all conditions will have to make value judgements.

At the same time, vehicles will be increasingly connected allowing the exchange of huge amounts and new types of data. These data are used to improve traffic and vehicle safety, environmental outcomes, and accessibility; streamline the movement of people and goods; and bring direct commercial benefits through provision of innovative customised mobility services. This raises concerns related to the access to data, data privacy protection and cybersecurity.

With more of these advanced connected and automated vehicles on the road, it is important to reflect upon emerging societal changes and, in particular ethical challenges.

To what extent will people be willing to accept that robots, or other autonomous systems, take control of their cars, taxis and buses in order to achieve more safety, convenience or better mobility? How to create a trustful environment to allow for a fast deployment? Highly or fully automated vehicles are expected to reduce traffic accidents, but these vehicles will sometimes have to choose between the lesser of two evils. For example, if an automated vehicle finds itself in a situation where it will either hit a person on the road or an oncoming car, which will it choose? Alternatively, if one or the other were inevitable, would it rather hit another car full of passengers, or crash itself into a wall, potentially hurting its occupants?

Defining the principles for the algorithms that are assisting these vehicles in making such moral decisions is a challenging task. What should be the main ethical requirements to ensure that safety, human dignity, personal freedom of choice and data protection rights of users are fulfilled before putting driverless mobility on the market? These are ethical questions that need an extensive debate at European level.

The European Commission has recently set up the European Artificial Intelligence (AI) Alliance¹ tasked to develop ethical guidelines for artificial intelligence, which provide a

¹ The European AI Alliance is a broad multi-stakeholder forum that was set up by the Commission in 2018 to discuss the future of AI in Europe. COM(2018) 237 final, 25.04.18. The European AI Alliance will work in cooperation with the European Group on Ethics in Science and New Technologies.

horizontal approach on ethical issues of autonomous systems with relevance also for driverless mobility. However, a complementary sectorial approach to automated mobility is necessary, given the specificities of the transport system (e.g. road safety).

The need for a European approach to discuss ethical issues related to automated and connected mobility has been stated by the Member States. At the second High Level Meeting of EU Transport Ministers on Connected and Automated Driving in Frankfurt in September 2017, Member States agreed to establish a Task Force to highlight ethical issues related to connected and automated driving (Ethics Task Force). This Task Force produced a report gathering ethical issues that should be jointly addressed at European level.² The report also recommends to set up a new group of experts to advise on specific ethical issues raised by driverless mobility at European level to continue feeding these discussions.

As such, in its Communication “On the road to automated mobility: An EU strategy for mobility of the future”³, the European Commission has announced the creation of a dedicated Expert Group to address specific ethical issues raised by driverless mobility. This group of experts is expected to work in liaison with the European Group on Ethics in Science and New Technologies (EGE)⁴, the European AI Alliance and the Ethics Task Force in order to stimulate a discussion at both cross-sectoral and supranational levels. Cooperation between all these groups is necessary in order to avoid overlapping or duplication of work.

The appointment of the *Commission Expert Group to advise on specific ethical issues raised by driverless mobility* will be financed according to the provisions of the Horizon 2020 Work Programme 2019, SC4, “Other Actions: external expertise”.⁵

2. Purpose, Objectives and Scope

The main responsibility of the Expert Group will be to analyse and discuss at European level major ethical issues related to driverless mobility, and specifically to road transport. The report of the Ethics Task Force has raised a number of ethical issues (including e.g. public acceptability and participation, cybersecurity and data protection, socio-economic implications, liability systems, Human-Machine-Interface) and recommendations for further action. These issues should be addressed by the Expert Group. In particular, the Ethics Task Force recommends that the Expert Group develops a harmonised European and international approach to handle dilemma-based situations that would include guidelines and/or recommendations.

² Report of the Task Force on Ethical Aspects of Connected and Automated Driving (Ethics Task Force), established by the 2nd High Level Structural Dialogue in Frankfurt/M. on 14 and 15 September 2017, June 2018: [https://www.bmvi.de/SharedDocs/EN/publications/report-ethics-task-force-automated-driving.pdf? blob=publicationFile](https://www.bmvi.de/SharedDocs/EN/publications/report-ethics-task-force-automated-driving.pdf?blob=publicationFile)

³ COM(2018) 283 final, 17.05.2018

⁴ The European Group on Ethics in Science and New Technologies is an advisory group of the European Commission established by Commission Decision (EU)2016/835.

⁵ European Commission Decision C(2019)1849

Germany is the only country where a report including 20 ethical guidelines for automated vehicles was released. The results of the report, which has been prepared by the German ethics committee for automated and connected driving, should be taken into account by the Expert Group.

As such, the Expert Group shall take into account the following studies and reports in its activities:

- TU Delft's White Paper on the ethics of self-driving cars;⁵
- EGE's statement on Artificial Intelligence, Robotics and Autonomous Systems;⁶
- The ethics guidelines for trustworthy AI prepared by the High-level group on AI;⁷
- The report of the Task Force on Ethical Aspects of Connected and Automated Driving;⁸
- The report of the Ethics Commission on Automated and Connected Driving appointed by the German Minister of Transport and Digital Infrastructure.⁹

The aim of the Expert Group is to provide guidance on how ethical considerations linked to the protection of human life and integrity, freedom of choice and the right to privacy, among others, should be taken into account when developing and deploying automated mobility systems and services in Europe. Specifically, the Expert Group should consider ways of allowing meaningful human control within the entire automation spectrum to ensure accountability and responsibility, guarantee users the right to data sovereignty, protect individual freedom and human life above all, and facilitate the economic and technical accessibility of connected and automated driving technologies to vulnerable groups.

The Expert Group will help to address legitimate societal and ethical concerns that are essential for securing public acceptance and trust, by assisting policymakers and designers in the safe, sustainable and efficient transition to connected and automated mobility. To do so, the Expert Group is expected to take into account the latest studies in the field of ethics and connected and automated driving, in order to establish specific and realistic guidelines of its own and provide practical support to relevant stakeholders.

The Expert Group experts who are appointed in their personal capacity should work independently and in the public interest, and should remain sensitive to ongoing contextual and implementation details. The main tasks of the Expert Group are thus the following:

- Analyse the state-of-the-art research related to ethical questions of connected and automated mobility at international level; analyse the contribution of a portfolio of

⁵https://www.dropbox.com/s/enp35hpyvgfiz6b/Santoni_White%20Paper%20Ethics%20ADS%20SEPT%2016.pdf?dl=0

⁶https://ec.europa.eu/info/publications/ege-statements_en

⁷<https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai>

⁸https://www.bmvi.de/SharedDocs/EN/publications/report-ethics-task-force-automated-driving.pdf?__blob=publicationFile

⁹<https://www.bmvi.de/SharedDocs/EN/PressRelease/2017/084-ethic-commission-report-automated-driving.html>

EU and national R&I projects relevant to ethical questions of connected and automated mobility.

- Define ethical guidelines for the design, development, demonstration (including real world experimentation such as field-tests and pilots) and deployment of innovative driverless mobility for all user groups in Europe.
- Attend meetings with the European Commission services and contribute with remote drafting and possible preparatory work.

3. Working Approach and Methodology

The Expert Group will consist of 14 highly qualified experts, appointed in a personal capacity, acting independently and expressing their own personal views. They will be specialised in the field of ethics and connected and automated driving from all over Europe.

The Expert Group will reflect as much as possible a balanced composition in terms of skills, experience, knowledge, geographical diversity and gender.

The European Commission will nominate a Chairperson and a Rapporteur and will ensure the Secretariat of the Expert Group. As such, it will be responsible for the practical organisation of the meetings and the administrative tasks related to the experts.

The Chairperson will decide the Expert Group's working methods in close collaboration with the Rapporteur and the other members. Together, they will produce both a draft (by April 2020) and final report (by June 2020) with recommendations and possibly ethical guidelines for the development of driverless mobility in the European Union. The Chairperson and the Rapporteur will have joint editorial responsibility for the final report (maximum 60 pages, including annexes). The final report shall be jointly endorsed by the Expert Group.

The European Commission services in charge of the different aspects of connected and automated driving will be in regular contact with the members of the Expert Group, in particular with the Chairperson and the Rapporteur to ensure the smooth execution of the work. Where appropriate, the European Commission will provide information on and from EC funded research and other relevant evidence (policy papers, recommendations, etc.). The work of the Expert Group will be designed and carried out in line with the relevant Commission standards.

4. Distribution of the work among the Experts

Building-up on the work already undertaken by the European Group on Ethics in Science and New Technologies, the European AI Alliance and other relevant stakeholders, the Expert Group will analyse evidence and documents relating to ethical issues of driverless mobility. Each Expert Group member will take an active part in deliberations and drafting activities. The division of the work among the experts is as follows:

- The **Chairperson** will act as moderator and facilitator to the Group. She/he will coordinate the work of the Expert Group, organise the meetings ('with the support of the European Commission) and draft the minutes of the meetings together with the Rapporteur. The Chairperson will oversee the work of the group, set reporting requirements and quality control procedures. She/he will prepare the agenda of the meetings together with the European Commission, direct the meetings, and organise the work of each member (including discussion of work done, to be done, and written contributions). The Chairperson will summarise the main conclusions and actions arising before closing each meeting. The Chairperson, in agreement with the Rapporteur (and the relevant Commission services), will draw up the structure of the final report.

- The **Rapporteur** will work closely with the Chairperson and prepare the draft and final report, based on the contribution of the other members (and if needed the relevant Commission services) and the evidence they will identify during their work. The Rapporteur will be responsible for writing draft summaries/conclusions of the meetings and other supporting documents. The Rapporteur will be responsible for writing the draft and the final reports.

- **Each expert** will be in charge of contributing effectively to the delivery of the expected outcomes by virtue of expertise, discussions and written contributions according to the Chairperson's guidance and based on the agreed methodologies. Experts will be asked to take part in specific working groups and write contributions to the draft and final report. Each expert will take an active part in the work through deliberations, presentations, and comments on drafts of the expected outcomes.

5. Meetings, reporting and deadlines

The Expert Group will carry out both collective and individual works, starting in the second quarter of 2019 and ending in June 2020. During this period, the Expert Group will meet physically at least four times in Brussels. Up to two of these meetings will be two-day meetings allowing for consultation of stakeholders (such as developers of Connected and Automated Mobility technologies and services) to improve the quality and practical applicability of the final report. All meetings will take place in Brussels in the premises of the European Commission.

In order to be able to consider feedback from the relevant Commission services and stakeholders, the Expert Group should produce a preliminary final report by April 2020.

The final report is expected by June 2020.

The following planning for meetings is foreseen (exact meeting dates will be determined with the Commission):

- June 2019;

- September 2019;

- December 2019;

- February 2020.

Before the first meeting, the experts will be invited to remotely interact with the Commission for the detailed planning of their work.

6. Experts Profiles

The experts have been selected from the database of experts on the Funding & Tenders Portal, on the basis of the open call for applications published in OJ C342/03 of 22 November 2013 "Call addressed to individuals for the establishment of a database of prospective independent experts to assist Commission services with tasks in connection with Horizon 2020 - the Framework programme for Research and innovation".¹⁰

The independent experts will be appointed on the basis of the following criteria:

- appropriate range of skills in the field of urban mobility, more precisely connected and automated mobility, combined with the ability to examine questions related but not limited to: public acceptability and participation, cybersecurity and data protection, socio-economic implications, liability systems, Human-Machine-Interface, dilemma-based situations, artificial intelligence. In addition, expertise on understanding AI systems from a technical point is also required;
- expertise in the field of ethics (applied, normative and meta-ethics), in particular related to the design, development and deployment of connected and automated mobility systems and services;
- appropriate language skills.

Once the above three conditions are satisfied, other criteria will also be taken into consideration:

- an appropriate balance between academia, industry and technological expertise;
- a fair gender balance; and
- a reasonable geographical balance.

¹⁰ (http://ec.europa.eu/research/participants/data/support/h2020_call-individual_experts_oj_c342_03.pdf)

7. Short Biography of Experts

Jean-François Bonnefon

Jean-François Bonnefon is a visiting scientist at Massachusetts Institute of Technology at Cambridge, Massachusetts. He is also a Senior CNRS Research Scientist at Toulouse School of Economics, Institute for Advanced Study in Toulouse and Toulouse School of Management Research. He is a leader of the AI & Society research program, TSE Digital Center, Chair of the TSE-IAST review board for ethical standards in research, member of steering committee at Toulouse Institute for Complex Systems Studies, member of French National Committee for Scientific Psychology (CNFPS), member of scientific board, TULIP Excellence Center, Toulouse, member of steering committee, Institute for Advanced Study in Toulouse, member of AERES/HCERES external review committees.

David Černý

David Černý is a research fellow at the Institute of State and Law of the Czech Academy of Sciences in Prague, Czech Republic. He is a co-founder of an interdisciplinary international group of experts called “The Karel Capek Center for Values in Science and Technology” (www.cevast.org), a co-editor of a book titled “Autonomous Vehicle Ethics: Beyond the Trolley Problem” and the principal investigator of a grant project of the Technology Agency of the Czech Republic titled “Ethics of Autonomous Vehicles”. He works in close collaboration with the Czech Ministry of Transport, which will use the results of his grant in implementing autonomous vehicles in the Czech Republic.

John Danaher

John Danaher is a Senior Lecturer in Law, School of Law, NUI Galway, Ireland. He is an expert in ethics and law of robotics and AI. John has published widely on both the legal and ethical aspects of these topics, with a specific focus on the ethical, legal and social of automation; issues of political and legal legitimacy/acceptance of automating technologies, and criminal and other forms of legal liability arising from human-robot interactions.

Eric Hilgendorf

Eric Hilgendorf is a Professor of Law Chairman of the Department of Criminal Law, Criminal Justice, Legal Theory, Information and Computer Science Law at the University of Wuerzburg, Germany. Prof. Hilgendorf is a founder of the Robot Law Research Centre at the University of Wuerzburg and has lead numerous projects in this field. Mr Hilgendorf was member of the Ethics Commission of the Federal Government of Germany on Automated and Connected Driving and is member of the EU High Level Expert Group on Artificial Intelligence.

Veronica Johansson

Veronica Johansson is a senior lecturer at the University of Borås, Sweden. Her interests concern data and visualisations as information resources, and data related ethical issues including politics, strategies, privacy, data protection legislation, power relations, AI and algorithms.

Tatiana Kováčiková

Tatiana Kováčiková is an ERA Chair holder in intelligent Transport Systems at the University of Zilina, Slovakia. She has 10 years' experience in ETSI of ETSI TC ITS (Automotive Intelligent Transport Systems), TISPAN (next Generation Networks), CLOUD and Human Factors. She is currently representing Slovakia in CEN TC 278 on ITS.

Marieke Martens

Marieke Martens is a Director of Science at TNO unit Traffic & Transport, Senior Scientist Human Factors at TNO (department Intelligent Vehicle Safety), Professor ITS and Human at the University of Twente, Centre for Transport Studies Factors. Marieke Martens has 22 years of research experience in the area of Human Factors in traffic. In her research she focuses on driving behaviour, traffic safety, driver state (fatigue, workload, attention, expectations), road design, Human Machine Interaction (HMI), driver support systems and automated driving.

Milos Mladenovic

Milos Mladenovic is an Assistant Professor at Spatial Planning and Transportation Engineering, Department of Built Environment, School of Engineering, Aalto University, Finland. He has been working on connected and automated vehicle technology since 2010. He has been conducting research in several areas, including development of control algorithms on the vehicle and traffic management level, development of constructive-assessment design processes to account for societal values, and development of policy and governance strategies and mechanisms, to account for uncertainty and anticipated effects.

Paula Palade

Paula Palade is a Digital Technologist at Jaguar Land Rover. She holds a Phd in Electrical Engineering and worked as a research scientist and design engineer in using state of the art EM simulation tools to deliver commercial solutions to industry. Ms Palade also holds an M.A. in Education Management and have managed the organisation and peer reviewing of technical and educational training and strategy. She has experience as a technology and knowledge transfer facilitator and AMP qualified project manager.

Nick Reed

Nick Reed is a Head of Mobility R&D at Bosch, responsible for exploring how Bosch can provide urban mobility services, including by automated vehicles, in an equitable and ethical manner. He has a over 10 years' experience at UK's Transport Research laboratory as principal human factors researcher and as TRL Academy Director, UK representative to EU-US-JP Trilateral Meetings on automated vehicles.

Filippo Santoni de Sio

Filippo Santoni de Sio is Assistant Professor in Ethics and Philosophy of Technology at the Department Values, Technology and Innovation of Delft University of Technology, where he teaches, among others, a master level course in Ethics of Transportation; he is also adjunct Professor in Ethics of Transportation at Milan Polytechnic (Italy). He is in the Management Team of the 4TU.Centre for Ethics and Technology, a member of the Delft Design for Values Institute (DDfV) and Delft Robotics Institute (DRI), and a member of the work council (OdC) at the faculty TBM of TU Delft. He is co-director of the interdisciplinary research project "Meaningful Human Control over Automated Driving Systems" funded by the Dutch Research Council (NWO).

Stavroula Tsinorema

Stavroula Tsinorema is Professor of Modern & Contemporary Philosophy and Bioethics, Director of Studies of the Joint Graduate Programme "Bioethics" of the University of Crete. She is also Director of the Centre for Bioethics of the same University. She currently chairs the Research Ethics Committee of the University of Crete and that of Institut Pasteur Hellenique. She is Vice-Chair of the Research Ethics Committee of the Institute for Research & Technology (ITE) and also of the National Centre for Social Research (EKKE)- Greece. She is a deputy member of the Sectorial Scientific Council of Arts and Humanities of the National Council for Research and Innovation (N.C.R.I.) of the Greek Ministry of Education.

Sandra Wachter

Sandra Wachter is a lawyer and Senior Research Fellow (Associate Professor) in Data Ethics, AI, robotics and Internet Regulation/cyber-security at the Oxford Internet Institute at the University of Oxford. She is specialising in technology, IP, and data protection law as well as European, International, human rights and medical law. She also serves as a policy advisor for governments, companies, and NGO's around the world on regulatory and ethical questions concerning emerging technologies. She researches the legal and ethical aspects of robotics and autonomous systems, including liability, accountability, and privacy issues as well as international policies and regulatory responses to the social and ethical consequences of automation.

Karolina Zawieska

Karolina Zawieska is a Postdoctoral Researcher in Ethics and Cultural Learning of Robotics Centre for Computing and Social Responsibility. She is currently part of the EU-funded project REELER: ‘Responsible Ethical Learning with Robotics’. She has also been employed at a public robotics institute, namely Industrial Research Institute for Automation and Measurements PIAP, Warsaw, Poland. She has been engaged in various initiatives aimed at developing guidelines or rules for ethical robot design, deployment and use.