European Commission

ETHICS of Connected and Automated Vehicles

The European Commission's strategy on Cooperative, Connected and Automated Mobility (CCAM) aims to make Europe a world leader in the development and deployment of Connected and Automated Vehicles (CAVs).

Expectations are high. These vehicles can:

- bring down road fatalities to near zero
- increase accessibility of mobility services
- help to reduce harmful emissions from transport by making traffic more efficient

To reap the full benefits of these vehicles, many challenges have to be addressed: societal, technical, regulatory, economic, environmental and ethical.

New technologies do not appear out of nowhere: they are imagined by people and built with purpose.

EU values and principles need to be integrated at the core of these new technologies to ensure their ethical use and positive impact. Our ability to reach a just, sustainable and inclusive society depends on them.

To tackle ethical issues, the Commission formed in 2019 an independent Expert Group to advise on specific ethical issues raised by driverless mobility. The Expert Group focused on three themes:

ROAD SAFETY, RISK, DILEMMAS:

- Safety benefits and improvements of CAVs should comply with basic ethical and legal principles: they should be publicly **demonstrable, monitored** and **updated** through **solid** and **shared scientific research,** and continuously adjusted to the needs of all road users.

DATA AND ALGORITHM ETHICS: PRIVACY, FAIRNESS, EXPLAINABILITY:

- Artificial Intelligence (AI) and automated systems used in CAVs should be **explainable** and **transparent** to empower users and to protect their data.
- This should be reflected through **rules and regulations** that take into account the fast-changing nature of CAV technologies (especially AI and big data) and favour **inclusive deliberation** at all levels.

RESPONSIBILITY:

- Responsibilities should be **clearly attributed** and **shared,** going beyond blame and compensation in case of a collision. No single person or system can be held solely accountable.
- From inception to use, best practices promoting **ethical responsibility** must be fostered and shared. This way, humans can remain **accountable to users,** instead of complex systems.

Research and Innovation

20 RECOMMENDATIONS are available to support researchers, policymakers, manufacturers and deployers in the safe and responsible transition towards CAVs.

1. Ensure that CAVs reduce physical harm to persons.
2. Prevent unsafe use by inherently safe design.
3. Define clear standards for responsible open road testing.
4. Consider revision of traffic rules to promote safety of CAVs and investigate exceptions to non-compliance with existing rules by CAVs.
5. Redress inequalities in vulnerability among road users.
6. Manage dilemmas by principles of risk distribution and shared ethical principles.
7. Safeguard informational privacy and informed consent.
8. Enable user choice, seek informed consent options and develop related best practice industry standards.
9. Develop measures to foster protection of individuals at group level.
10. Develop transparency strategies to inform users and pedestrians about data collection and associated rights.
11. Prevent discriminatory differential service provision.
12. Audit CAV algorithms.
13. Identify and protect CAV relevant high-value datasets as public and open infrastructural resources.
14. Reduce opacity in algorithmic decisions.
15. Promote data, algorithmic, AI literacy and public participation.
16. Identify the obligations of different agents involved in CAVs.
17. Promote a culture of responsibility with respect to the obligations associated with CAVs.
18. Ensure accountability for the behaviour of CAVs (duty to explain).
19. Promote a fair system for the attribution of moral and legal culpability for the behaviour of CAVs.
20. Create fair and effective mechanisms for granting compensation to victims of crashes or other accidents involving CAVs.

Research and innovation (R&I) on CCAM is already taking place at local, national and EU-level. From 2014 to 2020, around EUR **350 million** were allocated to support projects through Horizon 2020.

Under the next EU research and innovation framework programme, **Horizon Europe,** R&I on CCAM will remain a key priority. By leveraging the digitalisation of transport with smart, shared, connected and automated mobility systems and together with the European Green Deal, Europe is set to lead the twin digital and green transition towards becoming the world's first climate-neutral continent by 2050.

An upcoming **European Partnership** will bring together the actors of the complex cross-sectoral value chain of CCAM to develop and implement a shared, coherent and long-term European R&I policy that will benefit EU citizens and support EU industries.

The recommendations of this Expert Group report will be key in defining R&I priorities related to societal and ethical issues. Acceptance and trust, by users and society, will have to be nurtured every step of the way.

To read the Expert Group report on the Ethics of Connected and Automated Vehicles, visit https://europa.eu/!VV67my

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