

Should We Trust Automated Vehicles?

Developing European Standards for Trustworthy Automated Vehicles

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Outlook

- 1. Project VERDI
- 2. Trust interdisciplinary perspectives
- 3. Criteria Catalogue for trustworthy highly-automated vehicles and driver assistance systems (SAE L3)
- 4. Wrap up

VERDI

- "Trust in digitisation using the example of systems for (partially) automated driving and driver assistance"
- SAE L3
- Development of interdisciplinary Criteria Catalogue to assess AV's trustworthiness



vehicle

virtual 🜔

What is trust?

- central concept in both interpersonal relationships and for the adequate use of automated systems
- Trust \neq acceptance
- Why the concept of trust is important for research on humanmachine-interaction?
 - Reliability insufficient
 - Perspective on vulnerability, uncertainty and social shaping of trust

Trust – interdisciplinary perspectives

"Trust as an attitude of the trustor comes with risks and uncertainties as well as with certain expectations and confidence towards the trustee and her behaviour. Trustworthiness presents a quality ascribed to the trustee which usually comes before trust as it signals when it is justified to trust someone (on some objective scale)."

- Hristina Veljanova, Uni Graz, Ethics

"Law, as a mechanism within complex social systems, is intended to reduce uncertainties and ensure coexistence. There is a reciprocal relationship between trust and law: There must be trust in the functioning of the legal system, and legal frameworks provide a basis for building trust within complex societies."

- Anna Haselbacher, Uni Graz, Law

Trust – interdisciplinary perspectives

"Trust in automation is defined as an attitude towards an automated system which becomes relevant in situations characterized by uncertainty and an element of risk. "

- Norah Neuhuber, ViF, Ps<mark>ychology</mark>

"Trust is a collective attribution, negotiated within societal discourses that – in the case of AVs - include manifold voices, from manufacturers to road users"

- Thomas Zenkl, Uni Graz, Sociology

Empirical Approach

Psychology: Simulator Study Trust calibration Sociology: Survey Expectations & Concerns



www.v2c2.at

How can we trust AVs?

- Uniting disciplinary approaches to consider ethical, legal, psychological and societal challenges
- Going "beyond the law"
- Going "beyond the end-user"
- Going "beyond immediacy"

VERDI Criteria Catalogue for trustworthy highly-automated vehicles and driver assistance systems (SAE L3)

Approach







Transparency	The Core Area 'Transparency' encompasses provider's information
	duties towards the user regarding the system's functionality and
	limitations as well as the data that is processed by the system.
	Additionally, it also focuses on information representation .
Privacy and good data	This Core Area entails two aspects: (1) any personal data processed
governance	as part of the interaction with the system should be protected , and
	(2) the user should have the possibility to contro l that data.
Autonomy	Autonomy refers to the ADS providing the user with the possibility
	to choose and make decisions regarding the (non-)use of certain
	automation aspects and services as well as acknowledging other
	parties' rights and freedoms.
Fairness	Fairness stands for preventing cases of discrimination due to
	algorithmic biases and societal factors (e.g. socio-economic status)
	and considering effects and contributions towards social in- and
	exclusion.
Responsibility and	Respect and clear information about the stipulation of roles and
accountability	liabilities. It furthermore addresses the legitimate and reasonable
	expectations of the user and society in relation to the system's
	functionality and reliability.
Protection	This core area refers to the protection of users, other road users and
	the surrounding from any harms and risks that might be caused by
	the ADS, including physical harm (safety) and protection of software
	errors and data (security).



Information Representation

This criterion relates to how information is communicated to those interacting with the automated driving system directly or indirectly, which includes the driver and vehicle passengers as well as all other road users. It has the goal to ensure that the information is represented in a way that is user-friendly, relevant, easily accessible, visible, and free of charge.

VERDI Indicators

- 1) Any information exchange or act of communication between the FRU/ driver and the ADS meets the following requirements. It is
 - a) provided in a user-friendly manner, e.g.
 - i) in a plain language (understandable to lay persons)
 - ii) with the possibility to choose from several widely used languages
 - iii) as long as necessary and as short as possible (depending on the situation and context)
 - b) relevant to the context (no information overload)
 - c) easily visible and accessible
- 2) ADS-relevant information is provided without extra costs.
- Information about the currently operating level of automation is also given to other road users, while especially considering vulnerable road users, by using standardized ways of communication (e.g. audio signals or visible icons).
- 4) All kind of information is easily perceivable by elderly and persons with disabilities.
- 5) The ADS applies recent accessibility guidelines (e.g. from W3C in operation manuals, requirements related towards the vehicle users) to represent information.

VERDI Criteria & Indicators

VERDI Recommendations

Recommendations (in a nutshell)

- Continuation of the VERDI Criteria Catalogue
- Societal level
- SAE L3 of automation and beyond (SAE L5 full driving automation)
- Stakeholders: manufacturers, vehicle users, label providers, civil society/NGOs, policy-makers



https://verdi.uni-graz.at/en/

Wrap up



Final conference 28 May 2021



Follow-up project on standardisation and certification

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