

User attitudes towards and acceptance of automated vehicles – how prospective use cases make a difference.

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Abstract (497 words)

While the technological progress regarding fully automated driving seems to have accelerated throughout the last years, the topic is also becoming part of more research agendas (cf. [1]; for recent developments worldwide see e.g. [2]). It is meanwhile acknowledged that besides technical issues and implications legal, economic, security-relevant as well as societal aspects also play a crucial role for a possible implementation of fully automated vehicles in the future (cf. [3], [4]). Nonetheless, user perspective-centered studies on implications of the technology are only slowly attracting more focus, and recent empirical work on automated driving usually focuses on general attitudinal and acceptance issues, experiences with driver assistance systems, desired assistance or convenience functions (cf. [5], [6], [7]). Also, studies rarely account for differentiation of possible heterogeneous variants of fully automated driving and are not aimed at providing insights on behavioral changes or prospective application situations.

Consequently, in the study presented here, analysis is based on four specific use cases that were identified as “*describe[ing] typical usage scenarios for autonomous driving*” ([8], p. 3) in a multi-disciplinary project on the future of fully automated driving. The selected use case functions range from valet parking, highway piloting to fully automated driving and on-demand vehicles.

A Germany-wide conducted and nearly representative online survey with 1000 respondents allows for a quantitative, use case differentiating analysis that take into account attitudes towards and anticipated usage forms of the presented variants of fully automated driving scenarios. The survey includes information on the socio-demographics of the participants, their level of knowledge and interest in the topic of automated driving and previous use of driver assistance systems. Subsequently, participants were asked detailed questions to one randomly selected use case. Questions addressed account for – amongst others - attitudes towards the described vehicle, anticipated use and deployment purposes, prospective substitute transport modes, perceived usefulness and expected changes in time use while travelling.

Results of the survey show a strong, general interest of the respondents in the topic. With respect to the prospective usage, clear differences in the willingness to use such a vehicle or even replace the momentarily favored mode of transport can be shown depending on the use case. Whereas the current use of or experience with specific driver assistance systems as well as socio-demographic factors did not seem to have a strong influence on more accepting attitudes towards fully automated driving functions, interest in the topic as well as the perceived awareness of respondents accounted for affirmative positions. Also, the empathy of possible benefits that would come along with the specific use cases significantly influenced positive attitudes towards the technology. The paper will shed light on these relations in more detail.

Overall, the results underline the necessity to differentiate prospective use cases in the discussion of social and mobility related implications that come along with fully automated

driving systems. Variants of specific fully automated driving functions implicate different perceptions on the users' side and therefore come along with different "will" to imagine using fully automated vehicles.

Acknowledgements

We gratefully acknowledge the work of Ingo Wolf from Freie Universität Berlin, with whom the survey was developed and carried out in cooperation. Also, the authors would like to thank the Daimler Benz Foundation for financial support of the project.

References

- [1] Milton Keynes Citizen: "Makers of Milton Keynes' driverless public transport pods unveiled", (2014). <http://www.miltonkeynes.co.uk/news/local/makers-of-milton-keynes-driverlesspublic-transport-pods-unveiled-1-6055974>, Accessed December 12, 2014
- [2] Vehicle and Road Automation, European Union Programme (VRA): VRA Catalogue (2014) http://vra-net.eu/wiki/index.php?title=VRA:Community_portal Accessed December 12, 2014
- [3] S. Le Vine, J. Polak: "Automated Cars: A smooth ride ahead?", Independent Transport Commission, London, (2014)
- [4] D.J. Fagnant, K. Kockelman: "Preparing a Nation for Autonomous Vehicles: Opportunities, Barriers and Policy Recommendations for Capitalizing on Self-Driven Vehicles", *Transportation Research Part A: Policy and Practice*, 1–20, (2013)
- [5] Continental AG: "Continental Mobilitätsstudie 2013", (2013). http://www.continental-corporation.com/www/download/pressportal_com_en/general/ov_automated_driving_en/ov_mobility_study_en/download_channel/pres_mobility_study_en.pdf. Accessed December 12, 2014
- [6] G. Silberg, M. Manassa, K. Everhart, D. Subramanian, M. Corley, H. Fraser, V. Sinha: "Self-Driving Cars: Are we Ready?", KPMG, (2013) <http://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/self-driving-cars-are-we-ready.pdf> Accessed December 12, 2014
- [7] Autoscout 24: „Unser Auto von morgen: Studie zu den Wünschen der Europäer an das Auto von morgen.“, München, (2012). http://about.autoscout24.com/de-de/au-press/2012_as24_studie_auto_v_morgen_en.pdf. Accessed December 12, 2014.
- [8] W. Wachenfeld, H. Winner: "Use Cases for Autonomous Driving", Villa Ladenburg Kolleg „Autonomes Fahren“, (2014). https://www.daimler-benz-stiftung.de/cms/images/dbs-bilder/foerderprojekte/villa-ladenburg/Villa_Ladenburg_Use_Cases_English_Release_2.pdf Accessed December 12, 2014