

## Hands on Sustainable Mobility

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### “Smart Mobility Baden-Württemberg”: Autonomous Driving – Opportunities and Risks (AutoRICH)

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#### Introduction

Our mobility will change fundamentally in the future. Enormous progress towards networked, autonomous, smart and electric mobility seems possible in the near future. The development of new mobility services based on autonomous driving can appeal to additional user groups and influence the modal choice. This is where the research project "Autonomous Driving - Opportunities and Risks" (AutoRICH) comes in. The risk that autonomous driving will generate more traffic, including deadheading transports, seems high.

The technical, economic and social opportunities and risks for cities are investigated. A special potential for the development of sustainable mobility is seen in the combination of autonomous driving and car sharing. Therefore, the extent to which this connection can contribute to a sustainable and life-friendly city will be examined in more detail. The AutoRICH project was launched in September 2018 and is due to run until August 2021. The research project is funded by the Ministry of Science, Research and the Arts of Baden-Württemberg.

#### Car sharing with autonomous driving vehicles

Various studies on car sharing have shown that a car sharing vehicle can replace several private cars. For cities, this means a small fleet of vehicles and the associated gain in space due to unneeded parking spaces. Shared autonomous vehicles can pay an additional amount, because the journeys do not take place from and to a fixed station, but can take place immediately to the next user. It would also be possible to combine journeys of different users with similar destinations.

The low access hurdle to the new mobility offer (booking the journey by app) could be so low that car use itself and the associated transport services increase. The autonomous vehicle could also develop into a competitor for local public transport. The intermodal use of several means of transport on one route, which is often necessary in public transport, would become obsolete if an autonomous vehicle would be used.

This must be taken into consideration if the ecology of future mobility is to be assessed. A current study [1] comes to the conclusion that CO<sub>2</sub> neutrality in Baden-Württemberg can only be achieved if, among other things, the number of car ownership and the vehicle kilometres traveled are drastically reduced.

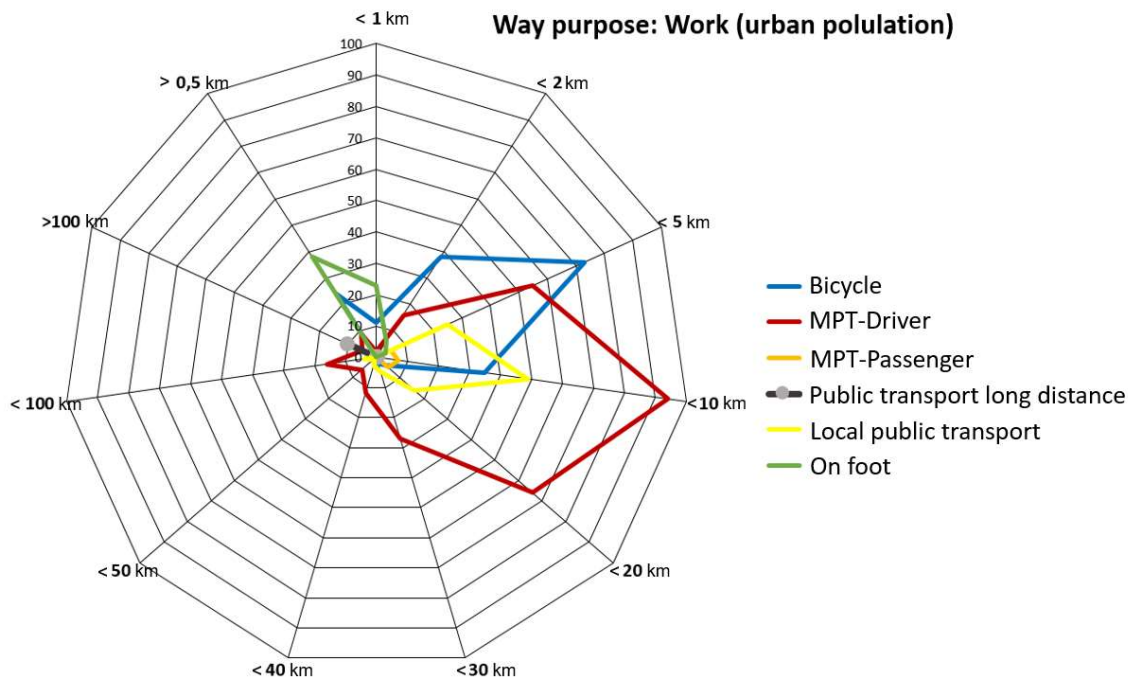
#### Use travel time differently

Due to the low occupancy rate, most people in a manually operated vehicle are drivers. For these people, driving time is now largely lost. This time could be used more sensibly by the use of autonomous vehicles. The time could be used for other activities such as working or relaxing. Isolated studies [2] are already dealing with the various new use cases of autonomous driving and their influence on people's mobility behaviour.

The AutoRICH project investigates the effects of changing mobility behaviour. The increase and decrease of traffic volumes in a road network are determined using the example of the city of Karlsruhe and compared with the urban development goals.

### Modelling and first Results

In order to model the influence of autonomous driving on the transport infrastructure, numerous internal and external factors of mobility are estimated. These include social influences and the change in values, the use of political control instruments and economic influences such as the emergence of alternative mobility providers. On the basis of existing mobility surveys, it will be investigated how different groups of people currently move in urban space. The next step is to analyse for which ways with which purpose the new mobility offers can offer an advantage for the user.



An initial analysis of the city of Karlsruhe shows which choice of mode is preferred for the journey to work depending on the distance to be covered. The graph shows the distances travelled by the interviewees in absolute figures. The knowledge that working distances of up to 5 km are increasingly travelled by bicycle and working distances of up to 10 km are more frequently travelled by car allows an estimation of the change in the choice of means of transport with the knowledge of parking availability at the place of work and other parameters. It is assumed that autonomous driving is available throughout the study area. The changed number of journeys including deadheadings by autonomous driving is modelled and the effects on the infrastructure quantified.

### References



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[1] Fraunhofer Institut for Industrial Engineering (IAO), IMU-Institute, Öko-Institut und Institut für sozial-ökologische Forschung, “Mobiles Baden-Württemberg – Wege der Transformation zu einer nachhaltigen Mobilität”, 2017.

[2] ifmo Institute for Mobility Research, “Autonomous Driving – The Impact of Vehicle Automation on Mobility Behaviour”, München, 2016.