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Wider Impacts and Scenarios Evaluation of Autonomous and Connected Transport: the WISE-ACT COST Action

Bernard Gyergyay^{a*}, Emmanouil Chaniotakis^b, Conny Louen^c, Wolfram Klar^d,
Constantinos Antoniou^b

^a*Rupprecht Consult, Cleverstr. 13-15, Cologne 50668, Germany*

^b*Technical University of Munich, Arcisstraße 21, Munich 80333, Germany*

^c*RWTH Aachen University, Mies-van-der-Rohe-Straße 1, Aachen 52074, Germany*

^d*AustriaTech, Raimundgasse 1, Vienna 1020, Austria*

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1. Introduction

Connected and automated driving (CAD) trials are currently taking place worldwide and Europe has a key role in the development of relevant technology. Yet, limited research exists regarding the wider implications of the deployment of such vehicles on existing road infrastructure, since it is unclear if and when the transition period will start and conclude. It is anticipated that improved accessibility and road safety will constitute the primary benefits of the widespread use of Connected and Automated Vehicles (CAVs), whilst co-benefits may also include reduced energy consumption, improved air quality or better use of urban space. Milakis et al (2015), Smith et al (2015) and Innamaa et al (2017) provide an overview of potential impacts of CAVs and methodologies to assess them. Towards this direction a recently launched Wider Impacts and Scenarios Evaluation of Autonomous and Connected Transport (WISE-ACT) COST Action is focusing on observed and anticipated future mobility trends and implications on travel behavior, namely car usage, travel time use or residential location choice to name a few. Other important issues to be explored under different deployment scenarios are social, ethical, institutional and business impacts. To achieve this, it is essential to culminate co-operation between a wide range of stakeholders at a local, national and international level, including academics and practitioners.

* Bernard Gyergyay. Tel.: +49 221 60 60 55 22; fax: +49 221 60 60 55 29
 E-mail address: b.gyergyay@rupprecht-consult.eu

COST Actions are bottom-up science and technology networks, open to researchers and stakeholders with a duration of four years. They are active through a range of networking tools, such as workshops, conferences, training schools, short-term scientific missions (STSMs), and dissemination activities. Consequently, this COST Action will facilitate collaboration within Europe and beyond about this emerging topic of global interest. COST does not fund research itself, but it tries to bring together researchers working on the same topic to create synergies.

This paper presents the key findings from the first phase of the COST action project and intends to open the discussion on the following related to CAV deployment challenges:

1. **Institutional:** What are the institutional challenges posed by the widespread deployment of CAVs This includes macro-economic, fiscal and ethical challenges, as well as reviewing options for the role of the local and national governments.
2. **Societal:** How can governments ensure that CAD will not exacerbate the digital divide and instead increase accessibility and transport equity? Aligning CAD with wider existing policies is a crucial requirement and this is an identified gap currently.
3. **Business:** How can business benefits through CAD be augmented and dispersed across diverse stakeholders and geographies? Ensuring that benefits are diffused locally, nationally and internationally taking into account employment implications is a key objective of European policy, thus it is an important aim.
4. **Transport:** How will CAD co-benefits influence transport appraisal practice? This includes travel behavior and travel time.
5. **Scenarios:** Which are the key scenarios required to assist the deployment of CAD across diverse European localities with diverse transport and ICT infrastructure?

2. Methodology and Research Objectives

To develop a comprehensive and transdisciplinary solution to the above challenges it is imperative to create a network of experts with diverse backgrounds. This gap in CAD practice and research has been identified mainly due to the silos of the automotive industry. Therefore, it has been established that COST is the appropriate scheme to surpass those silos and make a constructive contribution about this rapidly evolving challenge. The objective is to offer active networking opportunities to early career and established academics with local, national and EU level policy makers, as well as with practitioners. Moreover, by networking and collaborating with experts from different countries, this Action aims at contributing at the development of common terminology which is crucial when developing common international frameworks and regulations. Furthermore, the high participation from inclusiveness target countries (ITCs) allows participants from those countries to familiarize with the latest technological developments from other COST and international partner countries (IPCs) in a rapidly evolving field and explore future collaborations which can expand their research capacity. The latter can lead to long lasting relationships and benefits e.g. joint research projects, common standards fora.

Within this scope the WISE ACT COST project acts as a platform in order to develop a common terminology about CAD across Europe which will be facilitated through an online glossary. It has been observed that language and culture across countries and industries play a vital role in understanding key transport notions, so it is useful to develop and use such a glossary to establish common vocabulary.

Additionally, the coordination of trials and share know-how across diverse localities (megacity, medium sized city, small city) takes place to highlight best practice in Europe and beyond (e.g. Australia, Brazil, Canada, US). Given that a series of CAV trials will take place during the forthcoming years, it is important to coordinate activities and generate comparable outputs based on common research design features. Additionally, the comparison of simulation results and end user preferences from diverse settings (megacity, medium sized city, small city) is taking place to develop plausible scenarios for CAV deployment. The above, will lead to the definition of a roadmap about the

wider impacts of CAV deployment which will inform policy makers and regulators about the current and future requirements regarding the formulation of relevant standards. This output will align diverse policy targets and may be also used by the automotive industry or local authorities hosting CAV trials.

Finally, the identification and evaluation of viable business models for the passenger and freight transport industry is going to take place including collaboration with local and national authorities for value creation activities as well as the assessment of user acceptability and inform the general public (in at least three COST countries) and key stakeholders (road transport authority, local authority, Civil Society Organisation) about the opportunities and risks of CAVs. This will facilitate formal and informal debates to take place and can increase acceptability of CAVs.

3. Project Expected results

The expected results of this project can be categorized in three axes Scientific, Technological and Socioeconomic. First, it is expected to devise a unified interdisciplinary conceptual framework to evaluate the wider impacts of CAD and allow the consolidation and comparison of simulation and user acceptance findings of various research projects to develop scenario inputs for diverse alternatives (localities, users, societal aspects). This would enable the development of robust methodological approaches for data collection and analysis prior to CAD deployment, enhance ECI skills in evaluating wider impacts of CAD deployment, and finally, break silos which hinder collaboration currently between stakeholders e.g. academics and the CAV industry, to facilitate interdisciplinary research by establishing a European network to share relevant scientific knowledge.

On the Technological side, it will allow the development of an online glossary including common terminology to be used across countries and disciplines and the creation of a database of CAV trials across COST member countries and participating IPCs. Given the high interdisciplinary of the partners expertise, it would foster the development of a White Paper for local/national authorities which will contribute in the development of technical standards and regulations, the definition of the data visualisation formats, the communication of key information regarding the deployment of CAV and finally, the realization, in several European languages, of a series of short videos by different stakeholders explaining the opportunities and risks of CAVs as well as risk mitigation measures

On the Socioeconomic side, it is expected that the collaboration among experts from different countries would bridge distinct scientific fields and facilitate consolidation of existing research strands building a collaborative ACT community that would allow the identification of essential CAV related skills currently missing in academia, industry, policy making, thus identify fields for investments and jobs opportunities for the transportation scientists of the future. Additionally, it will provide information to the general public about wider impacts of CAV deployment taking into account aspects such as equity, liability, privacy. Finally the creation and dissemination of best-practice guides for local authorities and practitioners will foster the solutions on institutional and regulatory issues.

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