Autonomous Vehicles and Future Mobility

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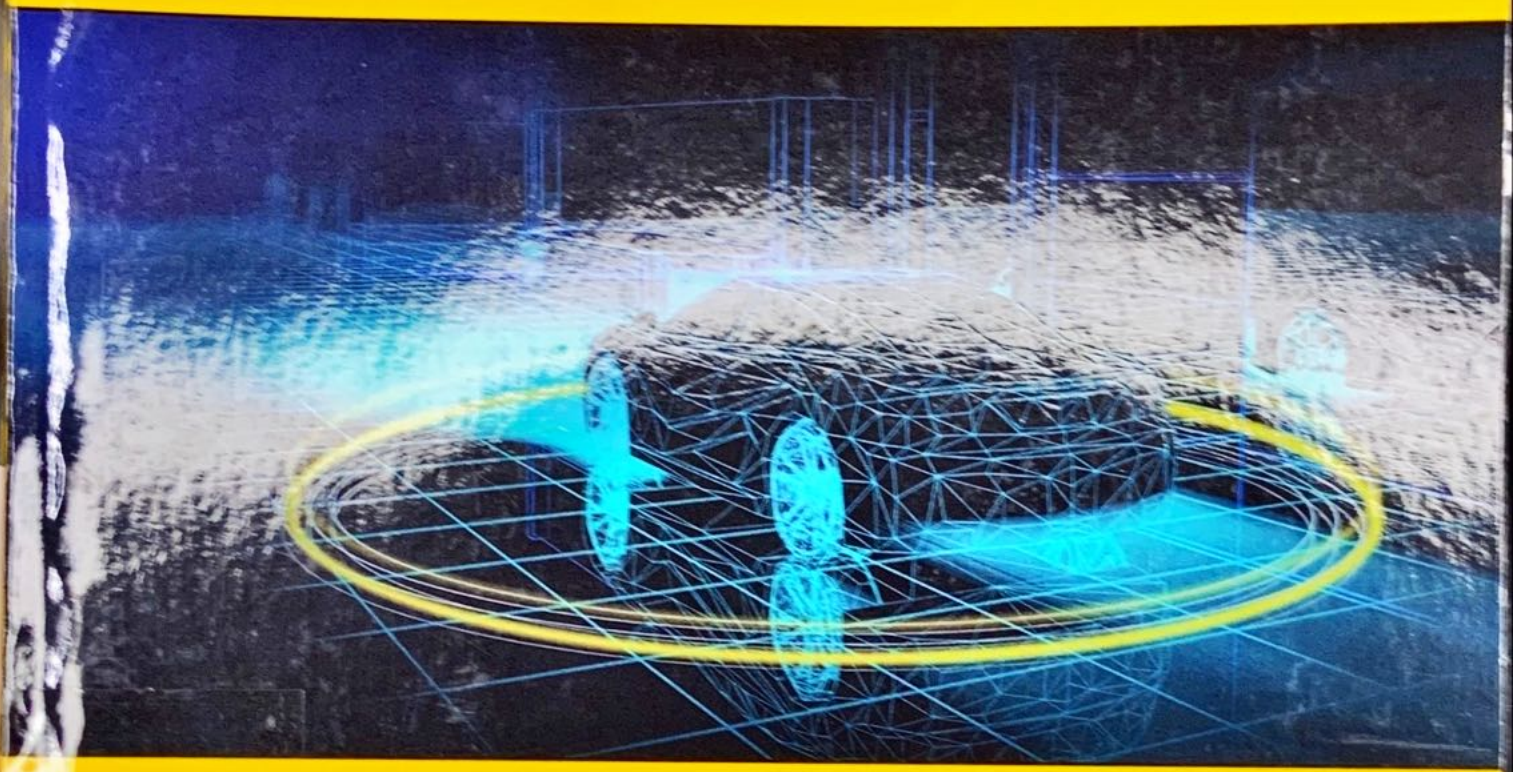

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Contents

Introduction

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This book includes a selection of scientific articles presented during the European Transport Conference (ETC) organized in 2017, by the Association for European Transport (AET) in Barcelona, Spain. ETC is an annual event where transport researchers and practitioners come together at a venue in Europe to discuss policy issues, research findings, and best practice across a broad spectrum of transport topics. Uniquely in Europe the conference provides a forum for those engaged in research, policy, and business in transport, bridging the gap that often arises between theory and practice. In this respect the book is not only oriented to researchers, but also to practitioners and public administrations.

The aim of the book is to present novel theories, working models, useful test cases, and possible paths for the future. Part I focuses on scenarios of autonomous driving related not only to development options and long-term planning, but also to the transition period, potential impacts, and liability issues. Part II deals with innovative mobility solutions, presenting new concepts and applications.

Chapter 1 presents the state of the art in the development of Connected and Automated Vehicles (CAVs) outlining the conditions for sustainable mobility solutions and new business models for transport services. The development of CAVs is fast, and the consequences for travelers, society, and the environment are still open questions. It is expected that they will allow better management of traffic flows on the network, increase infrastructure capacity, and promote the use of sustainable and seamless multimodal transport solutions. However, some researchers fear the risk of an overall increase in road congestion, higher energy consumption, polluting emissions, visual intrusion, and land-use expenditure. In Chapter 2 four plausible scenarios are discussed in terms of new policy measures, new legislation, infrastructure investments, and research and development gaps, giving a background for the ongoing governmental investigation about future regulations toward a sustainable use of CAVs.

Uncertainty about the future introduction of CAVs depends on supply-side, demand-side, and governance factors. In a few years the commercial release could take place, but only in those countries that have in the meantime legislated to allow circulation of CAVs in mixed or reserved lanes. In fact, a transition period will happen in the near future, where self-driving vehicles will share roads with traditional cars. Chapter 3 presents a study to assess how and to what extent road capacity will be affected by CAVs, comparing saturation flow rates with different mixes of self-driving and traditional cars.

[a] Guest Editors.

If correctly planned and integrated in Public Transport (PT) networks self-driving vehicles could lead to great benefits in terms of environmental, social, and economic sustainability. In particular they could be used as micro-transit, in order to extend PT lines in rural areas where conventional public transport is facing major difficulties due to low demand levels and dispersed urbanization. Chapter 4 investigates such opportunities for rural areas through a household mobility survey and modeling PT demand as served by new transport modes utilizing shared autonomous vehicles. Chapter 5 presents a comprehensive strategic study in the Netherlands, addressing challenges for the national infrastructure fund in a long-term scenario including deployment of CAVs.

Considering a more general perspective, advances in transportation solutions and data analysis will cause disruption to people's lifestyles and will most definitely contribute to an increase in information equality. In the foreseeable future, historic risk-calculation models will lose their relevance and insurance companies will lose the competitive advantage of risk assessment. In order to understand the impact of emerging technologies on the insurance industry, Chapter 6 analyzes the resulting threat to incumbent players and concludes that the current business paradigm will have to change, should insurance companies wish to be competing along other players.

Passengers appreciate multimodality; they prefer to use a wide range of complementary means of transport, but at the same time there is a growing demand for flexibility. Public transportation is currently experiencing a shift from the supply-oriented operation defined by schedules, route plans, and fixed stops to a flexible transport system, especially in the urban context. However, such a flexible transport system is usually unfamiliar to most passengers. Chapter 7 describes the results of a study on acceptance of Demand-Responsive Transport (DRT), to get insights on usability of flexible mobility concepts and on travelers' willingness to share a ride. The aim is to determine the framework conditions under which DRT could be used.

In order to serve these changing needs of passengers, intelligent mobility services require access to multi-sourced transport data. Therefore Chapter 8 focuses on the benefits of opening and sharing transport data through e-cloud platforms. Such benefits include direct benefits illustrated through the platforms' modeled revenue streams, and indirect (economic, environmental, and social) benefits. Some of the identified benefits are demonstrated through an initiative that aims to deliver intelligent mobility within and beyond large cities through an economical approach accessing transport data.

Having access to information about travel behavior and large datasets is beneficial, however, if considering long-term mobility solutions, especially for workplaces, it is still necessary to collect the requirements of stakeholders who are responsible for planning and realization of these options. In Chapter 9 a new approach is presented, where workplace mobility plans are established together with municipalities, so that they can implement recommendations for their institutions to promote the use of car-sharing, bike-sharing, e-mobility, and improved carpooling measures among their employees.

One of the possible outcomes of a mobility plan is to introduce flexible working hours. This measure has an effect on mobility patterns and road congestion and leads to more time and location independency for working. Chapter 10 demonstrates how

the development of flexible working has reduced the growth of car use and congestion, especially during peak hours, and has improved the use of PT services.

Finally, it is envisaged that there will be an intense use of automated systems also in freight transport, both for first and last mile delivery in urban areas through autonomous light commercial vehicles, for example, cargo bikes. Different geography, climate, regulations, and policy measures could affect the uptake of cargo bikes, hence increased knowledge on how design cargo bike systems is needed. Chapter 11 provides a knowledge platform for public sector facilitation of cargo bike operations, presenting the case of Oslo to get insights, experiences, and learning points with particular emphasis on how the public sector may facilitate cargo bike operations, related to both the micro depot and the bike operations themselves.

As editors, we are aware that technological development and research in the field of CAVs are rapidly evolving and novel solutions arise every day. However, while giving a snapshot of current issues and challenges related to self-driving vehicles from such a variety of perspectives, we believe the book may contribute to future research development and to the debate for the sustainable implementation of such innovative technologies. Special thanks go to AET, to all reviewers, to the publisher, and to those involved in the technical processes.