Preface

Disruptive innovations, in contrast to just revolutionary ones, not only substitute existing solutions, but they also create new markets and change society. It was not the revolutionary invention of the automobile alone but rather it is a cheap mass manufacturing platform that replaced the carriage a century ago. Today, none of the much discussed revolutions in transportation, be it electric cars or self-driving pods, alone has a truly disruptive potential. Each of them faces high financial and legal hurdles for mass adoption. However, if these innovations are combined with each other into a vs. system approach with game-changing business and operational models, true synergies can be unlocked. The sharing economy, which includes models such as ridesourcing, carsharing, and pooled rides, offers the opportunity to unlock the potential of other technologies. Combined, an innovative mobility system could arise that makes travel cheaper, cleaner, and more accessible, particularly in cities.

At times when society is deeply divided over the impacts of globalization and digitization and doubts are voiced about opportunities for individuals, it is not sufficient to extol and sell novel solutions. The needs of users cannot only be anticipated but also have to be heard and taken into account in the design and engineering process from the start so that societal ownership of the results can manifest. Otherwise, disruptive solutions may fail, as citizens rely on conventional mobility in response to global concerns regarding exclusion, depreciation, labor supply, and safety. An integrated and sustainable urban mobility system that is developed in a participatory way, however, can acknowledge the various potentials and interdependencies for a more equitable, resilient, and transparent transportation system. A community and customer-centered approach could help to balance out the root causes of reservations against this disruption but also actively foster the disruptive process, readying the transportation infrastructure and the built environment for a transition to shared electric connected and automated mobility.

Choosing the right technologies, service concepts, and policy measures requires a dialogue among regional and city planners, public transit operators, engineers, entrepreneurs, and scholars of all fields. The Disrupting Mobility Summit held in Cambridge, MA (USA), in November 2015, was the first global occasion that

brought together notable thought leaders from across the globe for this critical exchange. Organizers included leading academics from the City Science Initiative at MIT Media Lab; the Transportation Sustainability Research Center at the University of California, Berkeley; LSE Cities at the London School of Economics and Politics; and the Innovation Center for Mobility and Societal Change (InnoZ) in Berlin.

We invited speakers and poster presenters from the Disrupting Mobility Summit to submit chapters for this book to continue this dialogue. The chapters were peer-reviewed prior to publication. This process helped us to identify some the best pieces from the vast amount of knowledge shared at the Disrupting Mobility Summit and to make these contributions available to key stakeholders, including cities, to facilitate informed decision making on how to best prepare and plan for future disruption.

This book is divided into three parts: public sector activities (I), sharing economy and multimodal mobility (II), and innovative transportation technologies and city design (III).

In the first chapter in Part I, titled "Beyond Traffic: Trends and Choices 2045—A National DialogueAbout Future Transportation Opportunities and Challenges," Deputy Secretary Victor M. Mendez and his colleagues from the US Department of Transportation analyze trends that shape the mobility of people and goods, and they describe options for public policy. This is followed by a chapter written by Dewan M. Karim, a city planner from Toronto (Canada), on a comprehensive mobility ecosystem model that combines technology development and public transit planning in light of shared mobility.

In Part II, Francesco Ciari and Henrik Becker from the Swiss Federal Institute of Technology ETH Zurich present results from a study that simulates the costs and benefits of bikesharing, carsharing, and shared-ride services, indicating that the latter mode can fill a gap between the other two. Next, Joseph Iacobucci and colleagues from the US-based Sam Schwarz Consulting firm report on the outcomes of a study commissioned by the civic foundation TransitCenter on the relationship between conventional public transit and shared mobility systems that lead to a set of tangible recommendations for policy makers and city governments. Referring to traditional and innovative, digital shared-ride schemes in the city of Manila, Philippines, Katja Schechtner from MIT and the Vienna Technical University in Austria and Melinda Hanson from the Urban Project Collective in New York City conclude that Transportation Network Companies (TNC) or ridesourcing services in Asian megacities only serve the mid- to high-class income market, whereas traditional sharing schemes reach a far larger part of the population, mainly due to lower costs. In their chapter, Christopher Lisson from the Karlsruhe Institute of Technology in Germany and his colleagues summarize findings regarding behavioral response to Intelligent Traveler Information Systems; they find that usage decisions for such devices are determined less by cost and time savings but by pleasant design and convenient interaction. Mark-Philipp Wilhelms and his colleagues from the EBS University of Business and Law in Germany are also concerned with customer acceptance issues, as they analyze what motivates

customers to use peer-to-peer carsharing, namely economic rather than environmental considerations. In their paper on multimodal transportation payments, Michael Dinning and Timothy Weisenberger from the US Department of Transportation's Volpe National Transportation Research Center argue that people expect easy-to-use apps for mobility planning and booking. Wolfgang Gruel and Joseph Stanford from MIT discuss the role of carsharing in mitigating the undesired long-term effects of self-driving cars as price transparency may discourage unnecessary tripmaking due to the ease and convenience of privately owned automated vehicles. This is followed by a chapter on smartphone applications in transportation written by Susan Shaheen and her colleagues from the University of California, Berkeley in the USA. According to the study findings, mobility aggregators can lead to more public transport use and less driving. In the second chapter on the influence of smartphone apps on travel behavior, Adam Davidson from the City University of New York in the USA explains that apps provide users with an elevated level of reliability that allows them to reach more active and better controlled mobility decisions. Next, Susan Shaheen and her colleagues from UC Berkeley and France report on the results of a survey among the users of a carpooling platform in France that indicates that individuals from lower-income groups tend to use the system as passengers, whereas higher-income users act as drivers, implying an equity balancing effect. Finally, Alejandro Henao and Wesley Marshall from the University of Colorado in Denver in the USA explore the impacts of ridesourcing on travel behavior.

In the first chapter of Part III, Florian Lennert and Robert Schönduwe from the Innovation Center for Mobility and Societal Change in Berlin, Germany, present an extensive comparison of scenario studies on the mitigation potential for greenhouse gas emissions when they noticed that modal shift, demand, and land-use management are not sufficiently covered. They see great potential, however, from the convergence of electric propulsion, automated and connected vehicle technology, and on-demand mobility services. In addition, Philipp Rode and colleagues from the London School of Economics and Politics in the UK review the pathways that cities can take to become more accessible; they conclude that cities either choose more sprawling, car-intense developments or more dense, public transit-related options that result in a ten-fold less in fuel consumption. Furthermore, Nicole Ronald from the Swinburne University of Technology and colleagues from the University of Melbourne, Australia, predict human behavioral shifts toward shared, connected, and automated vehicle services in the urban mobility system. Bern Grush and John Niles from the USA introduce a deployment concept for shared self-driving vehicles that could help avoid disruption failures. Victoria Adams and her colleagues from Booz Allen Hamilton in the USA discuss the role of electric, connected, and smart bicycles in encouraging more biking, and they explain how transportation agencies can support this. Luis E. Ferreras from the Parsons Transportation Group in the USA presents a concept for a drone-based ITS that could enable the observation of a city's traffic from the sky. Finally, Lino Vital García-Verdugo, an independent design researcher from Spain, introduces the

concept of mobilescapes where automated vehicles transform into meaningful dynamic environments.

We hope that the readers of these chapters gain many new and useful insights from this volume of the Lecture Notes in Mobility series. We also wish that the contents stimulate fruitful discussions, proactive choices, and informed decision making around the future of mobility that yields more sustainable, equitable, and accessible transportation choices for all citizens across the globe. We invite scholars, managers, planners, and engineers to continue the academic discourse in light of upcoming challenges and opportunities for mobility disruption in the areas of aviation, goods movement, and suburban and rural transport at both national and international levels.

Finally, we thank the authors for their notable efforts to write the chapters of this book. We also acknowledge the many of contributions of our peer reviewers. Thanks also go to the organizers of the Disrupting Mobility Summit, Ryan Chin and Wolfgang Gruel of MIT's Media Lab, Susan Shaheen and Adam Cohen of the Transportation Sustainability Research Center at UC Berkeley, Florian Lennert of InnoZ, and Philipp Rode and Pia Laube of LSE Cities of the London School of Economics. Special thanks also go to Diana Tobias from VDI/VDE-IT for back office support during the editorial process and to Jan-Philip Schmidt from Springer for the accelerated publication timeline for this volume.

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