

Contents

<i>Contributors</i>	ix
<i>Preface</i>	xiii
1. Factors affecting traffic flow efficiency implications of connected and autonomous vehicles: A review and policy recommendations	1
Santhanakrishnan Narayanan, Emmanouil Chaniotakis, and Constantinos Antoniou	
1. Introduction	2
2. Road capacity changes expected to be caused by (C)AVs	4
3. Effect of connectivity and automation on traffic flow stability and safety	7
4. Impacts of (C)AVs on congestion and travel time	11
5. Vehicular requirements for (C)AVs to serve the mobility demand and consequent changes in VKT	18
6. Factors identified and related policy recommendations	37
7. Conclusions	43
Acknowledgments	45
References	45
2. Automated bus systems in Europe: A systematic review of passenger experience and road user interaction	51
Daniël D. Heikoop, J. Pablo Nuñez Velasco, Reanne Boersma, Torkel Bjørnskau, and Marjan P. Hagenzieker	
1. Introduction	52
2. Method	53
3. Results	55
4. Discussion and conclusions	63
5. Policy implications	66
Acknowledgments	68
References	68
3. Cyber security and its impact on CAV safety: Overview, policy needs and challenges	73
Christos Katrakazas, Athanasios Theofilatos, George Papastefanatos, Jérôme Härrä, and Constantinos Antoniou	
1. Introduction	74
2. Safety and CAVs	76

3. Cyber-security and CAVs	79
4. Policy implications and challenges	86
5. Conclusions	90
Acknowledgments	90
References	90
4. Cybersecurity certification and auditing of automotive industry	95
Tomás de J. Mateo Sanguino, José M. Lozano Domínguez, and Patrícia de Carvalho Baptista	
1. Introduction	97
2. State of the art	100
3. Bibliographic analysis	108
4. Discussion on challenges and future trends	116
5. Conclusions	120
Acknowledgments	121
References	121
Further reading	124
5. The wider use of autonomous vehicles in non-commuting journeys	125
Simon Kimber, Lauren Siegel, Scott Cohen, and Nikolas Thomopoulos	
1. Introduction	126
2. Background	127
3. Methods	129
4. Findings	134
5. Conclusion	143
Acknowledgment	145
References	145
6. Policy implications of the potential carbon dioxide (CO₂) emission and energy impacts of highly automated vehicles	149
Jan Anne Annema	
1. Introduction	150
2. Approach	151
3. Energy use and CO ₂ emission per kilometer driven	152
4. Life Cycle Assessment	153
5. Electrification	155
6. AVs impact on vehicle kilometer traveled	158
7. Conclusion and policy implications	159
References	161

7. Potential health and well-being implications of autonomous vehicles	163
Patrick A. Singleton, Jonas De Vos, Eva Heinen, and Baiba Pudāne	
1. Introduction	164
2. How transportation influences health and well-being	165
3. Expected effects of autonomous vehicles on travel behavior	171
4. Potential effects of autonomous vehicles on health and well-being	176
5. Conclusions	182
References	185
8. Autonomous vehicles in a GDPR era: An international comparison	191
Federico Costantini, Nikolas Thomopoulos, Fabro Steibel, Angela Curl, Giuseppe Lugano, and Tatiana Kováčiková	
1. AVs as disruptive technologies: A brief overview about transport policy challenges	192
2. Data protection and AVs: Implementing GDPR in the EU and cooperating with other countries	195
3. Method	199
4. Findings	201
5. Discussion and policy implications	207
6. Conclusion and recommendations	210
Acknowledgments	211
References	211
9. Ethical issues concerning automated vehicles and their implications for transport	215
Ebru Dogan, Federico Costantini, and Rémy Le Boennec	
1. Introduction	216
2. Method	217
3. Overview of the current discussion concerning AV in critical situations	217
4. Ethical reflections on the automated vehicle in transport	226
5. Conclusions and directions for future research	228
Acknowledgment	231
References	231
10. Governance cultures and sociotechnical imaginaries of self-driving vehicle technology: Comparative analysis of Finland, UK and Germany	235
Miloš N. Mladenović, Dominic Stead, Dimitris Milakis, Kate Pangbourne, and Moshe Givoni	
1. Introduction	236
2. Methodology	238



3. What are the presumed roles of SDV technology in society?	244
4. What are the domains and mechanisms of governance?	246
5. Who are the governance actants?	249
6. Discussion and conclusion	252
Acknowledgments	258
References	258
11. Wider implications of autonomous vessels for the maritime industry: Mapping the unprecedented challenges	263
Hadi Ghaderi	
1. Introduction	264
2. E-Navigation: A paradigm for adopting unmanned shipping	266
3. Recent developments in autonomous maritime systems	268
4. Cost implications and challenges for asset management	272
5. Shipbuilding, repair and maintenance	274
6. Autonomous vessel and impacts on the port sector	277
7. Technology adoption, maturity lookout and impacts on market structure	279
8. Conclusion	285
References	286
12. The potential for automation to transform urban deliveries: Drivers, barriers and policy priorities	291
Daniela Paddeu and Graham Parkhurst	
1. Introduction	292
2. Methodology	293
3. Emerging concepts for higher-technology urban freight systems	295
4. Evolution of stakeholders roles in the urban freight system of the future	301
5. Factors enabling and preventing the adoption of new technologies for urban freight transport	305
6. Policy implications and conclusions	308
Acknowledgments	311
References	311
Further reading	314
13. Overall synthesis and conclusions	315
Bert van Wee, Dimitris Milakis, and Nikolas Thomopoulos	
1. Introduction	316
2. Overall synthesis and conclusions	323
References	327