Chapter 13
Conclusion

Maxime Audouin and Matthias Finger

Technology is the answer. But what was the question?
Eric Price (1966)

Abstract In this concluding chapter, we summarize the three key insights drawn from the different contributions of this book. We then reflect on our notion of smart transport by highlighting that, although it might be a necessary condition, it might unfortunately not be sufficient to go toward the post-car system. Thus, we propose leads for more research to be conducted in order to ensure that smart mobility solutions are not only "smart," but are also aligned with a sustainability paradigm. In particular, we highlight the need to conduct empirical research on the impacts of existing smart mobility solutions so as to eventually better understand if those are able to keep their promises in terms of sustainability, which should ultimately enable researchers to establish the missing link between the governance of smart transportation systems and the impacts of such governance approaches on the overall performance of transportation systems.

Keywords Smart and sustainable mobility · Paradigms alignment
Framing · Multi-level governance

13.1 Introduction

By looking specifically through a series of case studies, at the institutional mechanisms through which smart transport solutions have developed, this book has aimed to offer a comprehensive overview of the various research endeavors that focus on the governance of smart transportation systems. It has conceptualized smart transportation systems as transportation systems comprised of one or more of the following smart transport "pillars": shared, automated, electric, or integrated mobility solutions. In this concluding chapter, we present the three main insights

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that we have taken from the different contributions exposed in this book. The first insight is that the current regulatory responses of governments to the development of smart transportation solutions deals are largely inappropriate. Public authorities need to urgently define new regulatory answers to better integrate new transport solutions to their existing transportation systems. The second insight is the confirmation of the assumption that the way governance takes place is basically shaped by how problems are framed. The third and final insight is the increasingly importance of the local level in the development of innovative mobility solutions, and consequently the need to consider that governance should be multilevel to guarantee a successful development of smart transportation systems.

13.2 The Inappropriateness of Current Regulatory Response to Smart Transportation Solutions

As we have seen in the book, most smart transport solutions are actually being proposed by the private sector, usually overcoming the capacity of the public sector to react. As an answer, the public sector usually develops regulations for smart transport solutions based on traditional regulatory approaches. For example, Puche (Chap. 3) showed that public authorities in Latin America regulated TNCs using regulatory frameworks building on traditional taxi regulation, but that such approaches were ineffective, as smart transport solutions providers often found ways to circumvent the proposed regulations, claiming their foundational differences with incumbent actors. Similarly, Voege (Chap. 5) showed that most of the regulations being developed for SDVs actually pertained to the safety of automated vehicles and that not enough regulation was being developed to access the operations data of shared automated vehicles. Where public authorities appear to have the opportunity to take a step ahead and kill two birds with one stone by developing data-driven regulations, they appear to have failed in doing so, either because of a lack of vision or because of the slowness of the administrative apparel. Ultimately, Montero (Chap. 2) proposed a new way of looking at shared mobility services providers, paving the way for the development of a new regulatory approach, which could be a solution to the successful inclusion of shared mobility services in urban transportation systems.

13.3 The Way Governance Happens Depends on How Problems Are Framed

According to Dowling (2018: 51), "*governance solutions are influenced by how problems are framed.*" In other words, and applied to transport, the way smart transportation solutions develop actually depends largely on the narratives associated with those and the reasons given to promote their uptake. Throughout this

book, different chapters seem to have confirmed this stance. For example, Ryghaug and Skøsvold (Chap. 8) showed that the way in which electric mobility developed in Norway was clearly dependent on the reason why public authorities wanted it to takeoff. Electric mobility was not originally part of an environmentally friendly narrative, but clearly part of an economic development at the country level. This emphasizes the importance of choosing the "right" narrative for a smart transport solution to develop. The choice of developing a DRT service in Nijmegen as a way of reducing both carbon emission and the use of fossil fuel can also be seen as having had an impact on the way it developed (Sharmeen and Meurs, Chap. 12). Faivre d'Arcier and Lecler (Chap. 4) found similar results when looking at the development of carsharing in France and Japan. In the case of France, carsharing was developed by public authorities in order to specifically tackle private motorized travel modal share, resulting in its development as a subsidized service. In Japan, by contrast, the framing of carsharing services as commercial activities resulted in different outputs in terms of usage by citizens and involvement for public authorities. Similarly, Mladenović (Chap. 6) showed that the future of SDVs will basically depend on how their developments are framed and that, in order to frame things correctly, a phase of participatory expansion of the technological horizons of desirable futures needs to be developed.

13.4 Need to Develop a Multilevel Approach to the Governance of Smart Transportation Systems

Last but not least, an element that has emerged from most of the chapters pertains to the need to consider different jurisdictional and geographical levels when studying the governance of smart transport solutions. In most of the chapters that look at past cases of smart transport developments, the authors have indeed emphasized the importance of coordination mechanisms between actors operating at different jurisdictional levels. For example, Smith et al. (Chap. 9) and Li (Chap. 11) showcased that successful development of MaaS schemes was actually dependent on the coordination of actions between governing actors at the national, regional, and local levels. Audouin and Finger (Chap. 10) came to the same conclusion regarding the successful unfolding of smart ticketing schemes and added that actors lying at the supra-national level (EU level, for example) also had roles to play in the development of smart transport solutions. Looking at electric mobility, and more particularly at the Netherlands and Brazil, Rietmann and Lieven (Chap. 7) also showed that the development of incentives and regulations by public bodies at the local, regional, and national levels was determinant for electric vehicles to take off. Ryghaug and Skøsvold (Chap. 8) showed that it was crucial to consider both scales (local and national) in order to have a full understanding of how EVs developed in Norway. In order to better consider the different territorial and jurisdictional levels involved in the development of smart transport solutions, we argue that other approaches, such as the multilevel governance (MLG) framework, might be useful. The MLG is indeed acknowledged as providing

researchers with a robust analytical tool to look at "*'arrangement' of policy-making activity performed within and across politico-administrative institutions located at different territorial levels*" (Stephenson 2013: 817). MLG has already been used to look at the governance of sustainable transport policy (Marsden and Rye 2010), but, to our knowledge, has not been widely used to look at the development of smart transport solutions. By bringing territorial and jurisdictional dimensions into the analysis, the MLG can be understood as being complementary to the Multi-level Perspective (MLP) on sustainability transitions framework, which is often criticized for lacking a geographical dimension (Coenen et al. 2012). While attempts to conciliate both frameworks have been limited (see for example Hoffmann et al. 2017), academics have been calling for the development of such approaches for quite some time (Whitmarsh 2012).

Having summarized the three main learnings that one can withdraw from the contributions gathered in this book, we will now offer some recommendations for future research related to the governance of smart transportation systems.

13.5 The Way Forward

This book was built on the assumption that smart transportation systems will help pave the way out of the incumbent automobility regime. But there is actually an urgent need to validate (or refute) this hypothesis through empirical research. Indeed, a growing body of literature has criticized smart transport solutions for not being able to keep their promises in terms of sustainability and for potentially not improving transport conditions compared to the status quo. According to Docherty et al. (2017), private actors proposing smart mobility services are, because of the business models adopted, actually more interested in creating a market where there is more and not less mobility. Consequently, if smart transportation systems unfold without any public intervention, there is a real risk that transportation systems will function worse than they do today (Currie 2018; Hensher 2018). In a similar fashion, Ryghaug and Skøsvold (Chap. 8) warned of some unclear aspects of road transport electrification impacts in Norway. Although the increasing share of EVs in the total number of vehicles in circulation on Norway's road might be beneficial from an environmental perspective (less greenhouse gases emitted), the possibility of entering in the future an "electric-automobility system" must not be ignored. Puche (Chap. 3) also questioned the real ability of e-hailing services to significantly tackle urban congestion due to their low-occupancy capacity and the fact that they often circulate "empty" of any passengers from the end of one ride to the beginning of the next one. Smith et al. (Chap. 9) and Li (Chap. 12) also highlighted the possibility of having unsustainable MaaS schemes come to life, relying more on low-occupancy vehicle than on public transit. Similarly, Audouin and Finger (Chap. 10) questioned the capacity of a smart ticketing solution to, by itself, induce modal shift and impact private vehicle ownership. To understand the real impact that new transport solutions (branded "smart" in this book) are producing on existing transport systems, we argue that much more empirical research needs to be

conducted on such solutions. For example, it is currently unclear what impact smart transportation solutions might have on existing transport systems if taken separately. For example, if all vehicles were to become electric tomorrow, we would tackle an important part of the pollution problem linked to road transport. But the system would not be more integrated, and there would probably be as many people owning cars as is the case today (which would mean a limited impact on congestion, for example), which would have to be human-driven (hence having a limited impact on road safety). Similarly, if all cars were to become automated tomorrow, this would probably have an impact on the efficiency of road transport and perhaps on road safety, but it is unclear what the impact on the environment would be. Indeed, if the only difference compared to today would be to have cars driving themselves, but still running on fossil fuel, still owned by individuals and still part of an un-integrated transport system, one might be concerned about the energy that would be required to allow those to circulate. One could also ask the same questions with all vehicles becoming shared, but still being driven by individuals, powered by fossil fuel and not being integrated with other transport solutions (such as public transit), and with the transportation system becoming completely integrated, but with vehicles not being more shared than today, running on fossil fuel and being driven by humans. Although there is limited data available to show the impact of smart transport solutions (due to the very young age of those solutions), there are increasing cases developing around the world, which should allow for the development of more evidences related to the impact of such solutions on cities, which should ultimately allow researchers to link governance structures with performance of (smart) transportation systems.

In order for smart transport solutions to become sustainable (Lyons 2016), there is also a need to develop more travel demand management schemes. It is only by managing the travel demand that public authorities might prevent it from exploding as a result of the introduction of smart transport solutions. In particular, the use of measures such as congestion charging schemes or transit-oriented development still appear relevant to guarantee a sustainable future for transportation systems. Those might be categorized as transport policies, which are necessary according to Urry (2004), along with new propulsion technologies, smart cards, new consumption patterns, and the ICTs, to go toward the post-car system. Transport demand management approaches might not be as "smart" as the different transport solutions presented in this book, but they are probably less likely to produce unanticipated consequences than technology-driven (smart) transport options unfolding nowadays. Thus, we also believe that more research focusing on the efficiency of dedicated schemes to manage travel demand must be conducted in order to give public authorities all the cards they need to enhance the transition towards sustainable transport systems.

Although things might be a little bit more advanced in the area of electric mobility, smart transport solutions are still in their infancy. Thus, their uptake depends on how individuals react and receive them. While we have seen that, from a sustainability perspective, it would be far better for SDVs to develop as shared vehicles (rather than as personally owned ones), it is currently far from clear whether this will be the case, or if SDVs will be owned as much as conventional human-driven cars are nowadays. Similarly, it is unclear what impact integrated mobility schemes, such as MaaS,

will have on people's travel behaviors. According to Pangbourne et al. (2018), using taxi-like services might become so cheap and convenient in the future that there is a real rebound effect threat associated to MaaS. We believe that research must be conducted to predict those rebound effects, either using agent-based modeling [as done by the ITF (2017)] or randomized control experiments. Similarly, research on existing cases must be conducted to see how individuals change their behaviors when they embrace a smart transport solution. In particular, the use of practice theory [see, e.g., Watson (2012)] might be relevant to do so.

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