Session: Planning for accessibility and sustainable mobilities

Classifying governance initiatives for an effective integration of car sharing with urban planning and transport systems

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Abstract: Car sharing is a service in which members can access a car without having to own it. It is a relatively mature car-based component of the 'mobility as a service' (MaaS) system that has potential to work as sustainable transport when effectively integrated with urban systems and used as a complement to the transport network. Initiatives to integrate car sharing are relatively recent and not yet widely practiced, but they have been successfully implemented by some cities and there is an increasing interest in adopting them worldwide. However, this topic remains widely unexplored in transport studies and policy debates. This paper aims to address governance for car sharing integration by clarifying what this integration means, underlining its significances, and by classifying mechanisms and measures that can be adopted, mostly by local authorities, to achieve it. This work was based on literature reviews and on studies of practical examples focused on governance for car sharing developed by the author for her master and Ph.D. (ongoing) researches. The framework introduced here may provide insights on elements that should be considered while formulating strategies to incorporate car sharing into urban systems. It is also an opportunity to reflect on a significant, but relatively unexplored, topic in transport discourse.

Keywords: car sharing, governance, transport planning, integrated mobility.

Introduction

Overcoming car dependence still remains as a common global challenge faced by cities, especially the ones that are about to accommodate significant urban population growth in the next few years. At the same time, the disruptive emergence of the new mobilities, or 'mobility as a service' (MaaS) (Sochor et al., 2017), particularly car-based modes, is adding more pressure to an apparently defeated 'anti-car' urban planning system in most of the cities around the world. Meanwhile, "the real 'disruption' needed" (Stone and Kirk, 2017, p. 140), is to reshape cities with a new approach to transport planning and policy (Iacobucci et al., 2017; Marsden and Docherty, 2013) that "enables rather than frustrates" (Dodson and Mees, 2003, p. 33; Marsden and Docherty, 2013, p. 213) the achievement of more sustainable cities (Dodson and Mees, 2003; Legacy, 2017; Marsden and Reardon, 2017).

This change could begin by facing the disruption that is assailing the "current way of life" (Kent, 2013), and by confronting "orthodox tools, instruments, methods and framings" (Legacy, 2017, p. 180) of planning to reshape cities in the future accordingly. In this sense, Smolnicki and Sołtys (2016, p. 814) emphasize that, although the structural results of a "car-ownership-oriented-century" are widely recognized, the implications of a broad use of shared automobiles still need to be

understood. Hence, they suggest that a proper approach for that is to anticipate and prepare for the probable consequences of these disruptions, trying to avoid the potential negative ones (Smolnicki and Sołtys, 2016). However, this can only be achieved with political will, awareness of the new mobility systems, and the development of critical, strategic and proper governance systems (regulation, promotion and adoption) aimed at incorporating these new modes in a way that ensures local communities will receive the benefits (Banister, 2011; Bouton et al., 2016; Clauss and Döppe, 2016; De Gruyter et al., 2014; Firnkorn and Müller, 2011; Iacobucci et al., 2017; Kloth, 2018; Stone and Kirk, 2017; UN, 2016).

Car sharing

Car sharing is a service that allows members to access a car without having to own it (Paganelli, 2013a; Santos et al., 2010; Shaheen et al., 1998), giving users the benefits of an automobile without the "burdens" of ownership (Alessandrini et al., 2015a, p. 147). This transport mode is considered a successful example of 'access-based' mobility systems (Botsman and Rogers, 2010; Gansky, 2010). Car sharing has emerged in Europe (Switzerland and Germany), where the pioneer and most relevant experiences with commercial developments were implemented in the 1980s, followed by more limited, but also successful, North American experiences in the 1990s (Shaheen *et al.*, 1998). This transport option is a relatively mature car-based component of the 'mobility as a service' (MaaS) system, seen as a sustainable transport mode and as an alternative to the private car due to its potential to generate social, economic, environmental, transportation and land use benefits, consequently reducing car dependence (Alessandrini et al., 2015b; Correa, 2016; Enoch and Taylor, 2006a; Kaspi et al., 2016; Kent et al., 2017; Kent and Dowling, 2013; Martin and Shaheen, 2011; Millard-Ball et al., 2005; Paganelli, 2013a; Shaheen et al., 1998, 2004, 2010; Solman and Enoch, 2005; UITP, 2002a, 2016, 2017).

Because car sharing has been evolving "along with technological innovation" (Shaheen et al., 2009, p. 42) for approximately 30 years (Bouton et al., 2016; Shaheen and Cohen, 2016, 2007), these evolution allowed a significant improvement in the services offered and a growth of car sharing operators (CSOs), resulting in the current implementation of different types and operation models of car sharing (Correa, 2016; Firnkorn, 2012; Paganelli, 2013a, 2013b; Shaheen and Cohen, 2016). The types of services can be classified into two main categories that consider physical aspects, operation models and the nature of the trips made with the vehicles. The first one is more related to the physical and operational characteristics and divides car sharing into two types of services: 'round-trip'/'station-based', in which vehicles have to be returned to the same location (parking spot, area or charging station) where they were taken from - or to the vehicle owner's parking space in peer-to-peer (P2P) car sharing (Ballús-Armet et al., 2014; Hampshire and Gaites, 2011); and 'free-floating'/'one-way', in which vehicles can be picked up from and placed in any allowed parking space within a GPS delimitated area, hence do not require a return trip. And the second category classifies trips as "scheduled", when they can or need to be booked, and "spontaneous", when trips can be made 'on-demand' (Brook, 2013). Worldwide CSOs offer different types of services under these concepts, which are also classified differently by distinct authors in the literature (Brook, 2013; Firnkorn and Müller, 2011, 2011; Nourinejad and Roorda, 2015; Paganelli, 2013a; Shaheen and Cohen, 2007). These types of car sharing, particularly the division between station-based and free-floating, have distinct implications in urban environments and produce contrasting, sometimes divergent, impacts in car use that depend on the characteristics of the cities where they operate (Britton, 2011; Glotz-

Richter, 2016; Iacobucci et al., 2017). Finally, this topic is vastly and constantly explored in the literature about car sharing, with studies that use a variety of analytical methods for the investigations (Firnkorn, 2012; Firnkorn and Müller, 2011; Kortum et al., 2016; Nourinejad and Roorda, 2015; Ruhrort et al., 2014; Schreier et al., 2017).

Researchers claim that car sharing has to be integrated with urban systems to achieve its potential as a sustainable transport mode, under governance arrangements that allow it to be used for combined mobility and as a complement to the wider transport system (Enoch and Taylor, 2006a; Firnkorn and Müller, 2011; Glotz-Richter, 2016; Huwer, 2004; Kaspi et al., 2016; Kent and Dowling, 2016; Millard-Ball et al., 2005; MOMO, 2011; Paganelli, 2013a; Shaheen et al., 2010; Solman and Enoch, 2005; UITP, 2016). Initiatives to integrate car sharing are relatively recent and not yet widely practiced, but some cities have successfully implemented them using various mechanisms (Baptista et al., 2015; Britton, 2011; Dia, 2017; Glotz-Richter, 2016; Iacobucci et al., 2017; UITP, 2002a). Furthermore, there is an increasing focus on their adoption and research has concluded that municipal administrations can incorporate car sharing as a tool to promote sustainable mobility (Glotz-Richter, 2012; Solman and Enoch, 2004). However, car sharing governance and integration remain widely unexplored in transport studies and policy debates (Akyelken et al., 2018; Caputo, 2012; Dowling and Kent, 2015; Kent and Dowling, 2016; Terrien et al., 2016). Additionally, it is not clear to planners and decision-makers how to integrate car sharing in a strategic, effective and comprehensive way (Enoch and Taylor, 2006b; Paganelli, 2013a).

This paper addresses governance for car sharing integration by clarifying what it means, underlining its significance, and by classifying mechanisms and measures that can be adopted, mostly by local authorities, to achieve it.

Governance for an effective integration of car sharing with urban and transport systems

Governance is a broad and rich topic that can be defined in a myriad of ways, depending on the context of the analysis, and it is unlikely that the literature will provide a definition that suits appropriately all situations. Thus, in the context of this study, governance is understood as a system of practices, "rules", processes, legal tools, initiatives, actors (social and political, as well as public and private), interactions, partnerships, infrastructures and networks, that can be applied in different levels and scales (Gupta et al., 2015). Furthermore, integrating car sharing means recognizing it as an official transport mode, incorporating it in local urban planning schemes and allowing it to be used as a complement to the transport system. This conclusion was based on reviews of the literature (Enoch, 2002; Enoch and Taylor, 2006b; Millard-Ball et al., 2005; Paganelli, 2013b, 2013a; Solman and Enoch, 2004; UITP, 2002b) and on studies developed by the author until the moment.

For car sharing to work and generate the benefits mentioned previously, it is crucial that the system is effectively integrated with local urban planning and transport systems. In addition, to explore car sharing strategically and create appropriate governance arrangements for it, planners and decision makers need to understand how the system works and how to promote its integration. Previous works performed by the author (Paganelli, 2013a, 2013b) and a recent literature review pointed out that decision makers could benefit from guidelines that help to create initiatives aimed at recognizing car sharing and integrating it with urban systems. In this sense, it seems that an initial classification of possible mechanisms and arrangements of governance for car sharing could set a foundation for this "guide" and trigger an improvement of car sharing integration in practice. The

literature review also indicated that there is a profusion of information about car sharing governance distributed randomly in different documents or sources of related content, mostly in grey literature, with potential to be organized in distinct categories. However, to the author's knowledge, no organized document classifying these initiatives has emerged so far. Therefore, this study presents a preliminary classification scheme of governance for car sharing integration with urban planning and transport systems.

Methodology

The classification scheme proposed by this work was based on a review of scientific publications and grey literature, as well as on initiatives implemented in different cities that were identified by the author with a global study. The main goal of these tasks was to identify existing or possible arrangements and measures, which were then organized and categorized to develop the classification scheme.

According to Bailey (1994), three approaches can be applied to develop a classification scheme: conceptual, empirical, and operational. An operational approach means that the concepts represented in the categories are not arbitrary, but were found in empirical data and cases (Snowden, 2011). The process used to create this scheme was done in an operational level, from an empirical to a conceptual basis, because it followed a combination of empirical and conceptual approaches (Bailey, 1994).

Classification scheme - governance for car sharing

This classification scheme divides governance for car sharing in eight categories considering different features related to the system's development and implementation. These categories reflect characteristics of the places where car sharing operates, and indicate the natures of possible arrangements, initiatives, policies and regulations for its integration and management. The categories created are:

1. **Enablers of car sharing development:** basic conditions of cities required for car sharing's development and effective integration.
2. **Awareness and capacity building**: acknowledgement, understanding and recognition of car sharing, with the help from advocates and champions.
3. **Public support**: marketing, administrative and/or financial initiatives that support car sharing.
4. **Role of actors**: and their involvement in the implementation of car sharing - regulatory bodies, institutional arrangements, agreements, partnerships, civil society associations, coalitions, consortiums or taskforces, and fleets.
5. **Plans, policies and regulations**: implemented in national, regional and local levels, with strategies that formalize and incorporate car sharing as a transport mode into planning documents and procedures, encompassing all types of car sharing that operate locally.
6. **Public space and infrastructure:** parking spaces in public or private areas (on -street, off-street or on-site), the approach to allocate them, and car sharing vehicles' flow in the streets.
7. **Integration with the local transport system**: physical integration, combined mobility platforms, and possible gamification strategies.

8. **Performance and evaluation:** requirements for public support, data sharing, multimodal surveys and evaluation of effectiveness of the governance systems implemented.

This scheme is the first step toward a more detailed and comprehensive framework to depict the landscape of car sharing governance and integration. The content of the scheme is still under development and is not exhaustive, as more mechanisms may have been implemented but not publicized or may be outside of the author's current knowledge. Additionally, this framework will be updated and improved with results from a data collection that is under development for the author's Ph.D. research. Finally, besides the potential to be improved, this generalized scheme enables knowledge sharing (Smith, 2002) by providing a general terminology that can be used to further investigate, describe and discuss information about car sharing governance and integration measures.

Conclusion

Using a car instead of owning it can help reduce the number of vehicles and trips made with cars in cities, reduce costs and negative externalities of car use, encourage new forms of travel, free up parking spaces, as well as result in a more efficient use of resources, in particular urban space (Paganelli, 2013b).

Car sharing is not a "panacea" of urban mobility issues. However, it can be used by planners as a tool to create more sustainable urban areas (Glotz-Richter, 2012; Millard-Ball et al., 2005; Paganelli, 2013b, 2013a; Solman and Enoch, 2004). Moreover, most of the research done so far concluded that the positive effects of car sharing will only materialize if it is part of a larger system of adaptation in the cities, with integrated actions and a collective commitment to the pursuit of more sustainable life styles in terms of urban mobility (Paganelli, 2013b, 2013a).

The framework introduced by this work may inform and provide insights to policy makers, transport planners and operators on the elements that should be considered while formulating strategies or initiatives to integrate and manage car sharing in their cities. A more comprehensive and strategic approach to car sharing may lead to the creation of effective governance systems for it, maximizing its potential as sustainable transport and contributing to better outcomes in terms of sustainability in cities. Furthermore, this work brings an opportunity to reflect on a significant current topic that is relatively unexplored in transport discourse. Finally, the structure developed for this analysis can be adapted to other shared mobility services, perhaps impacting positively on how they are incorporated into urban systems.

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References

Akyelken, N., Banister, D., Givoni, M., 2018. The Sustainability of Shared Mobility in London: The Dilemma for Governance. Sustainability 10, 420. https://doi.org/10.3390/su10020420

Alessandrini, A., Campagna, A., Site, P.D., Filippi, F., Persia, L., 2015a. Automated Vehicles and the Rethinking of Mobility and Cities. Transportation Research Procedia 5, 145–160. https://doi.org/10.1016/j.trpro.2015.01.002

Alessandrini, A., Campagna, A., Site, P.D., Filippi, F., Persia, L., 2015b. Automated Vehicles and the Rethinking of Mobility and Cities. Transportation Research Procedia 5, 145–160. https://doi.org/10.1016/j.trpro.2015.01.002

Bailey, K., 1994. Classical Typology Construction (Precomputer), in: Typologies and Taxonomies. SAGE Publications, Inc., 2455 Teller Road, Thousand Oaks California 91320 United States of America. https://doi.org/10.4135/9781412986397

Ballús-Armet, I., Shaheen, S.A., Clonts, K., Weinzimmer, D., 2014. Peer-to-Peer Carsharing: Exploring Public Perception and Market Characteristics in the San Francisco Bay Area, California. Transportation Research Record: Journal of the Transportation Research Board 2416, 27–36. https://doi.org/10.3141/2416-04

Banister, D., 2011. Cities, mobility and climate change. Journal of Transport Geography 19, 1538–1546. https://doi.org/10.1016/j.jtrangeo.2011.03.009

Baptista, P., Melo, S., Rolim, C., 2015. Car Sharing Systems as a Sustainable Transport Policy: A Case Study from Lisbon, Portugal, in: Attard, M., Shiftan, Y. (Eds.), Transport and Sustainability. Emerald Group Publishing Limited, pp. 205–227. https://doi.org/10.1108/S2044-994120150000007020

Botsman, R., Rogers, Roo., 2010. What's mine is yours : the rise of collaborative consumption, 1st ed. ed. HarperBusiness, New York.

Bouton, S., Knupfer, S.M., Mihov, I., Swartz, S., 2016. Urban mobility at a tipping point. McKinsey and Company.

Britton, E., 2011. Peer reviews and comments on momo memorandum on carsharing, directed to the European Commission.

Brook, D., 2013. Taxonomy of Shared Vehicle New Mobility Options. URL http://carsharingus.blogspot.com.au/2013/12/taxonomy-of-shared-vehicle-new-mobility.html

Caputo, A., 2012. Insights on Italian car sharing: the case of Genoa. International Journal of Business and

Globalisation 9, 207. https://doi.org/10.1504/IJBG.2012.048961

Clauss, T., Döppe, S., 2016. Why do urban travelers select multimodal travel options: A repertory grid analysis. Transportation Research Part A: Policy and Practice 93, 93–116. https://doi.org/10.1016/j.tra.2016.08.021

Correa, J.L., 2016. University-Aged Millennials' Attitudes and Perceptions Toward Vehicle Ownership and Car-Sharing.pdf (Master thesis).

De Gruyter, C., Rose, G., Currie, G., 2014. Securing travel plans through the planning approvals process: A case study of practice from Victoria, Australia. Cities 41, 114–122. https://doi.org/10.1016/j.cities.2014.06.003

Dia, H., 2017. Policy principles for low carbon mobility. Low Carbon Mobility for Future Cities: Principles and Applications 41.

Dodson, J., Mees, P., 2003. Realistic sustainability? Urban transport planning in Wellington, New Zealand. New Zealand Geographer 59, 27–34.

Dowling, R., Kent, J., 2015. Practice and public-private partnerships in sustainable transport governance: The case of car sharing in Sydney, Australia. Transport Policy 40, 58–64. https://doi.org/10.1016/j.tranpol.2015.02.007

Enoch, M., 2002. Supporting car share clubs: A worldwide review - Integration into Urban Planning Work Package (Presented at the 3rd MOSES ESG Meeting - 20-22 February 2002 No. Final Report-MOSES (Mobility Services for Urban Sustainability) Project). Milton Keynes.

Enoch, M.P., Taylor, J., 2006a. A worldwide review of support mechanisms for car clubs. Transport Policy 13, 434–443. https://doi.org/10.1016/j.tranpol.2006.04.001

Enoch, M.P., Taylor, J., 2006b. A worldwide review of support mechanisms for car clubs. Transport Policy 13, 434–443. https://doi.org/10.1016/j.tranpol.2006.04.001

Firnkorn, J., 2012. Triangulation of two methods measuring the impacts of a free-floating carsharing system in Germany. Transportation Research Part A: Policy and Practice 46, 1654–1672. https://doi.org/10.1016/j.tra.2012.08.003

Firnkorn, J., Müller, M., 2011. What will be the environmental effects of new free-floating car-sharing systems? The case of car2go in Ulm. Ecological Economics 70, 1519–1528. https://doi.org/10.1016/j.ecolecon.2011.03.014

Gansky, L., 2010. The mesh : why the future of business is sharing. Portfolio Penguin, New York.

Glotz-Richter, M., 2016. Reclaim Street Space! – Exploit the European Potential of Car Sharing. Transportation Research Procedia 14, 1296–1304. https://doi.org/10.1016/j.trpro.2016.05.202

Gupta, J., Verrest, H., Jaffe, R., 2015. week 1 Theorizing Governance, in: Gupta, J., Pfeffer, K., Verrest, H., Ros-Tonen, M. (Eds.), Geographies of Urban Governance. Springer International Publishing, Cham, pp. 27–43. https://doi.org/10.1007/978-3-319-21272-2_2

Hampshire, R.C., Gaites, C., 2011. Peer-to-Peer Carsharing: Market Analysis and Potential Growth. Transportation Research Record: Journal of the Transportation Research Board 2217, 119–126. https://doi.org/10.3141/2217-15

Huwer, U., 2004. Public transport and csar-sharing—benefits and effects of combined services. Transport Policy 11, 77–87. https://doi.org/10.1016/j.tranpol.2003.08.002

Iacobucci, J., Hovenkotter, K., Anbinder, J., 2017. Transit Systems and the Impacts of Shared Mobility, in: Meyer, G., Shaheen, S. (Eds.), Disrupting Mobility. Springer International Publishing, Cham, pp. 65–76. https://doi.org/10.1007/978-3-319-51602-8_4

Kaspi, M., Raviv, T., Tzur, M., Galili, H., 2016. Regulating vehicle sharing systems through parking reservation policies: Analysis and performance bounds. European Journal of Operational Research 251, 969–987. https://doi.org/10.1016/j.ejor.2015.12.015

Kent, J., 2013. Secured by automobility: why does the private car continue to dominate transport practices? (A thesis presented to The University of New South Wales in fulfilment of the requirements for the degree of Doctor of Philosophy). The University of New South Wales Australia.

Kent, J., Dowling, R., Maalsen, S., 2017. Catalysts for transport transitions: Bridging the gap between disruptions and change. Journal of Transport Geography 60, 200–207. https://doi.org/10.1016/j.jtrangeo.2017.03.013

Kent, J.L., Dowling, R., 2016. "Over 1000 Cars and No Garage": How Urban Planning Supports Car(Park) Sharing. Urban Policy and Research 34, 256–268. https://doi.org/10.1080/08111146.2015.1077806

Kent, J.L., Dowling, R., 2013. Puncturing automobility? Carsharing practices. Journal of Transport Geography 32, 86–92. https://doi.org/10.1016/j.jtrangeo.2013.08.014

Kloth, H.M., 2018. How to end congestion without giving up the car. CityMetric.

Kortum, K., Schönduwe, R., Stolte, B., Bock, B., 2016. Free-Floating Carsharing: City-Specific Growth Rates and Success Factors. Transportation Research Procedia 19, 328–340. https://doi.org/10.1016/j.trpro.2016.12.092

Legacy, C., 2017. Transport planning in the urban age. Planning Theory & Practice 18, 177–180. https://doi.org/10.1080/14649357.2017.1309789

Marsden, G., Docherty, I., 2013. Insights on disruptions as opportunities for transport policy change. Transportation Research Part A: Policy and Practice 51, 46–55. https://doi.org/10.1016/j.tra.2013.03.004

Marsden, G., Reardon, L., 2017. Questions of governance: Rethinking the study of transportation policy. Transportation Research Part A: Policy and Practice 101, 238–251. https://doi.org/10.1016/j.tra.2017.05.008

Martin, E.W., Shaheen, S.A., 2011. Greenhouse Gas Emission Impacts of Carsharing in North America. IEEE Transactions on Intelligent Transportation Systems 12, 1074–1086. https://doi.org/10.1109/TITS.2011.2158539

Millard-Ball, A., MURRAY, G., SCHURE, J.T., FOX, C., 2005. Car-sharing: where and how it succeeds, TCRP report. Transportation Research Board of the National Academies, Washington, DC.

MOMO, C.S., 2011. Momorandum. MOMO Car-Sharing.

Nourinejad, M., Roorda, M.J., 2015. Carsharing operations policies: a comparison between one-way and two-way systems. Transportation 42, 497–518. https://doi.org/10.1007/s11116-015-9604-3

Paganelli, L., 2013a. Integração entre o sistema de carro compartilhado e políticas públicas de planejamento urbano: estudos de casos múltiplos: São Francisco, Portland, Seattle e Chicago. Pontifícia Universidade Católica

do Paraná, Curitiba.

Paganelli, L., 2013b. Integração entre o sistema de carro compartilhado e políticas públicas de planejamento urbano. Presented at the 19º Congresso Brasileiro de Transporte e Trânsito, ANTP Associação Nacional de Transportes Públicos.

Ruhrort, L., Steiner, J., Graff, A., Hinkeldein, D., Hoffmann, C., 2014. Carsharing with electric vehicles in the context of users' mobility needs - results from user-centred research from the BeMobility field trial (Berlin). International Journal of Automotive Technology and Management 14, 286. https://doi.org/10.1504/IJATM.2014.065294

Santos, G., Behrendt, H., Teytelboym, A., 2010. Part II: Policy instruments for sustainable road transport. Research in Transportation Economics 28, 46–91. https://doi.org/10.1016/j.retrec.2010.03.002

Schreier, H., Grimm, C., Kurz, U., Schwieger, B., Keßler, S., Möser, G., 2017. Analysis of the impacts of car-sharing in Bremen, Germany, SHARE-North project. Teamred.

Shaheen, S., Cohen, A., 2016. INNOVATIVE MOBILITY CARSHARING OUTLOOK CARSHARING - MARKET OVERVIEW, ANALYSIS, AND TRENDS Winter 2016.

Shaheen, S., Cohen, A., 2007. Growth in Worldwide Carsharing: An International Comparison. Transportation Research Record: Journal of the Transportation Research Board 1992, 81–89. https://doi.org/10.3141/1992-10

Shaheen, S., Cohen, A., Chung, M., 2009. North American Carsharing: 10-Year Retrospective. Transportation Research Record: Journal of the Transportation Research Board 2110, 35–44. https://doi.org/10.3141/2110-05

Shaheen, S., Cohen, A.P., Martin, E., 2010. Carsharing Parking Policy: A Review of North American Practices and San Francisco Bay. Transportation Research Board Annual Meeting.

Shaheen, S., Schwartz, A., Wipyewski, K., 2004. Policy considerations for carsharing and station cars: Monitoring growth, trends, and overall impacts. Transportation Research Record: Journal of the Transportation Research Board 128–136.

Shaheen, S., Sperling, D., Wagner, C., 1998. Carsharing in Europe and North America: Past, Present, and Future. Transportation Quarterly 52, 35–52.

Smith, K.B., 2002. Typologies, Taxonomies, and the Benefits of Policy Classification. Policy Studies Journal 30, 379–395. https://doi.org/10.1111/j.1541-0072.2002.tb02153.x

Smolnicki, P.M., Sołtys, J., 2016. CAR-SHARING: THE IMPACT ON METROPOLITAN SPATIAL STRUCTURES. CBU International Conference Proceedings 4, 814. https://doi.org/10.12955/cbup.v4.858

Snowden, D., 2011. Typology or Taxonomy? Cognitive Edge. URL http://cognitive-edge.com/blog/typology-or-taxonomy/

Sochor, J., Arby, H., Karlsson, I.C.M., 2017. The topology of Mobility as a Service: A tool for understanding effects on business and society, user behavior, and technical requirements, in: ITS World Congress 2017. Presented at the ITS World Congress, Montreal, p. 13.

Solman, D., Enoch, M., 2004. Integration of Car-sharing (City Car Clubs) into Urban Planning and Management (For integration into: Urban Planning Work Package 5 (WP5) MOSES (Mobility Services for Urban Sustainability) Project. No. Package 5), European Commission DG Research, 5th Framework Programme, City

of Tomorrow. UK MOSES consortium.

Solman, D., Enoch, M.P., 2005. Integration of car sharing (city car clubs) into urban planning and management.

Stone, J., Kirk, Y., 2017. The ‘disruption’we really need: public transport for the urban millennium. Low Carbon Mobility for Future Cities: Principles and Applications 139.

Terrien, C., Maniak, R., Chen, B., Shaheen, S., 2016. Good practices for advancing urban mobility innovation: A case study of one-way carsharing. Research in Transportation Business & Management 20, 20–32. https://doi.org/10.1016/j.rtbm.2016.08.001

UITP, 2017. NEW MOBILITY SERVICES: SHARED, ON-DEMAND, CONNECTED & AUTONOMOUS [WWW Document]. URL http://www.uitp.org/events/new-mobility-services

UITP, 2016. Public transport at the heart of the integrated urban mobility solution.

UITP, 2002a. Bremen Paper Public Transport and Car-Sharing: together for the better.

UITP, 2002b. Car-Sharing and PT Together for a Sustainable Mobility.

UN, 2016. Mobilizing Sustainable Transport for Development.