Smart Mobility: Technologies and Daily Routines

Carolin Schröder, Gabriele Wendorf

(Dr.-Ing. Carolin Schröder, Zentrum Technik & Gesellschaft, TU Berlin, Hardenbergstraße 16-18, 10623 Berlin/ Germany, c.schroeder@ztg.tu-berlin.de)
(Dr. Gabriele Wendorf, Zentrum Technik & Gesellschaft, TU Berlin, Hardenbergstraße 16-18, 10623 Berlin/ Germany, wendorf@ztg.tu-berlin.de)

1 ABSTRACT

The (rapid) growth of cities and city populations in many regions of the world puts a focus on the question on how people's mobility can be organized in a smarter and more sustainable way. This paper argues that technologies can only be defined as 'smart' if they are demand-oriented, and if innovative political, legal and economic frameworks can be created. In the context of urban mobility, questions to be answered are: In which way(s) do innovative technologies meet the demand of different population groups? What kind of knowledge do providers and users of mobility need in order to create responsable use of such technologies?

The transdisciplinary project 'Neue Mobilität Berlin' (New Mobility Berlin, http://neue-mobilitaet.berlin/) addresses these questions: place-based approaches promoting smarter and more sustainable forms of local mobility are being combined with iterative bottom-up approaches of discussion, information and playful education for civil society, stakeholders, administrators and politicians.

Three years into the project, the team has developed several approaches to promote smarter and more sustainable forms of urban mobility and to deal with a highly contested and emotionalized topic (individual mobility) where fear of loss (of the individually possessed car and it's parking space) clashes with misinformation, non-reflection of individual mobility behaviour and demand. Intermediary results can be summarized as follows: 1) Smartness in the mobility sector is not merely the introduction of innovative technical solutions but needs to be understood as a process of multilateral information, discussion, and exchange. 2) In order to develop a truly different, and less emotional, approach to (smart and sustainable) mobility, intensive communication with different groups and across these groups is necessary.

Our contribution will present results from a four-week trial when 16 people abstained from their personal car and started using 'smart technologies' during their daily routines.

Keywords: urban space, sustainability, smart mobility, daily routines, transdisciplinarity

2 INTRODUCTION

The (rapid) growth of cities and city populations in many regions of the world puts a focus on the question on how people's mobilities can be organized in a more sustainable and smarter way. In both sustainability research and practice, a shift from expert-generated to more co-productive approaches can be identified: This manifests for one in the growing number of inter- and transdisciplinary research and projects on sustainability where production, exchange and diffusion of different forms of "socially robust knowledge" (Walter et al. 2007) become a crucial prerequisite for generating and implementing effective, sustainable solutions "for highly complex real-world problems" (Zscheischler, Rogga and Weith 2014) and where greater flexibility and openness towards (the governance of local) experiments and processes complements or replaces supply-led solutions. In this context, awareness is growing that radical, large-scale and integrated approaches are urgently needed, reaching beyond short-termed, small-scale policy approaches (Markard et al. 2012; van den Bergh et al. 2011). Consequently, such a transformative appproach to exisiting systems is conceived as a complex, long-term and ressource intensive process (Krellenberg 2016).

Recent discussions on the paradigm of 'smartness' deal with a similar difficulty of answering the question how to transform a system – from existing analogue, un-networked structures to new ways of ressource-efficient urban development. Similar to developments in sustainability research and practice, the last decade has seen a shift from technologically-focussed solutions on smartness with unreflected transfer of private-sector logics of economic competition to more society-oriented perspectives where deliberated expectations, demands and objectives are being integrated in a variety of processes (ZTG 2017; Nam/ Pardo 2012). Such concepts of smartness often try to combine (specific) aspects of sustainability (as in 'green cities' of 'knowledge cities') with new (digital) technologies (Benevolo et al. 2016). And in consequence, the idea that supply-led smart solutions (asking what can be done technologically) is more and more complemented by

demand-oriented solutions that encompass ecologial, economic and societal challenges (asking what technologies would be needed to target a specific problem).

The mobility system, consequently, aims to deal with these two challenges of becoming more sustainable and of becoming smarter: Paralleling the discussions sketched above, the concepts of ‚sustainable mobility' and ‚smart mobility' initially focussed on supply-led and infrastructure-centered solutions (Blechschmidt et al. 2015): An early focus of smart mobility concepts was consequently the provision and optimization of energy efficient, safe, comfortable and inexpensive public mobility and eco-modes of transport through information and communication technologies (Wolter 2012; Ilarri et al. 2015). In more recent concepts of smart mobility, different ecological, economic and socio-cultural aspects of sustainability are being considered such as "reducing pollution; reducing traffic congestion; increasing people's safety; reducing noise pollution; improving transfer speed; reducing transfer costs." (Benevolo et al. 2016). Paralleling developments in sustainability research and practice, a turn to more demand-oriented, behaviour-based and sometimes co-created solutions can be noticed too (ibid; Blechschmidt et al. 2015). With growing ambitions, it becomes obvious that such a transformation can only be achieved by profound changes of structures, and by the involvement of large parts of the society (civil society, politics, mobility providers, administration). This again, put the focus on the role of individual and collective knowledge and governance. But the main problem is: there is not sufficent knowledge yet on individual mobility behaviour, demand-based services and transformation of the mobility system as such (ref.). In consequence, for the context of urban mobility, questions to be answered are: In which way(s) do innovative technologies meet the demand of different population groups? What kind of knowledge do providers and users of mobility need in order to create resp. use such technologies?

3 THE PROJECT

The transdisciplinary project 'Neue Mobilität Berlin' (New Mobility Berlin, http://neue-mobilitaet.berlin/) addresses these questions: Since June 2016, the project researches, tests and implements potentials and challenges of local smart and sustainable mobility. The team consists of a member each of the local government, a local marketing agency, an international car manufacturer, a sustainability research institution – and most importantly, a local initiative.

The urban area selected is Mierendorff neighbourhood in the Berlin district of Charlottenburg-Wilmersdorf: Approximately two thirds oft the area are occupied by housing, with only few retail, places for cultural and social events, restaurants or bars. And the rest of the area are allotment gardens. Because of it's rather central location, several transport and mobility-related problems emerged during the last decades: transit traffic from/ to Tegel airport, one of Berlins wholesale markets and the motorway causes large parts of local emissions (particulate matter and nitrogen oxide) and noise (Grobcheck zum Stadtumbau Mierendorff-INSEL 2017). In addition, the neighbourhood is characterised by insufficient parking space for cars and bikes, roads that are difficult to cross as cars are parking everywhere, and by a lack of public space in general (Wendorf/ Schröder 2018). Rather recently, the neighbourhood became more popular which manifests in an increase of people moving to the area. In consequence, several plans for major housing development have been set up – which will add to the densification of urban space (Amt für Statistik Berlin Brandenburg 2018).

In this neighbourhood, the project team aims to collectively develop and implement ideas for a smart and sustainable local mobility system. But under the prerequisite that local actors - especially members of civil society, politics and administration – take an active part in the development process. In consequence, several place-based approaches promoting smarter and more sustainable forms of local mobility were co-created, starting with different discussion formats with different participant structures. Soon after the project started, it became obvious that individual and collective mobility is a highly contested and emotional topic: Public reactions to meetings, presentations, and temporary installations where either very positive – or very negative. This seems to be based in the notion that, for one, individual awareness for mobility behaviour is rarely being reflected so far. And, for another, individuals seem to have quite different knowledge, experiences and demands when it comes to alternative mobility. In consequence, we combined iterative bottom-up approaches of discussion with different forms of information and playful education for civil society, stakeholders, administrators and politicians which proved successful on the longer run as will be shown later.

In accordance with the aims of the project, the team started discussions with members of various parties and members of administrative units about the potentials and challenges of alternative local mobility, sometimes together with residents and other experts. Unsurprisingly, opinions on objectives of mobility policies, on measures to be taken as well as different knowledge, experiences and political and administrative demands were – and in many cases still are - quite diverse. But over the three years of the project, various strategies were discussed in different settings and with different stakeholders and members of civil society, and various forms of ideally or financially supporting the idea of the project were conceived. In consequence, several actions were taken together with the district which explored different approaches to discuss or experience alternative mobility (Wendorf/ Schröder 2018: Some actions taken were: 1. Activity days when people could test new smart solutions for alternative mobility, 2. Temporary Gartenlounge/Parklet for discussions on local mobility and as a neighbourhood meeting space, 3. Public symposium in the district hall with local stakeholders, members of civil society, mobility providers, scientists, politics and administration. As each of these approaches seemed successful by themselves, we tried to intensify the network and combine different elements (ibid).

One of these collectively developed approaches was named 'Sommerflotte' (summer fleet): The summer fleet campaign was mainly conceived as an experiment to tackle the lack of both parking and public space in the city: If people have the opportunity to experience smart and sustainable forms of mobility and would find that it suits their (daily) mobility demands, they might decide to abolish their individually possessed car for good – and there would be more urban space for all to use. The campaign was not only conceived as a temporary experiment with an intentionally small group of car-owners but also to facilitate real change on the political and administrative side: After many discussions, the governing political parties decided to start implementing specific parking space for car sharing and additional bike parking facilities close to the residence of each citizen who abolishes their car for good – and the campaign was inaugurated by a local politician.

4 INTERMEDIARY RESULTS

Many people we met during the first three years of the project were positive in general towards alternative mobility, but only a small fraction had already tried existing offers – or even tried to reduce the use of their car by taking their own bikes or walking on foot. The ever-growing number of mobility providers in Berlin, especially in the car sharing, but also in (transport) bike and roller sharing sectors and the similarly growing number of internet-based services and mobility platforms in consequence promises a big potential for alternative mobility, both regarding sustainability and smartness.

In the summer of 2018, we launched the campaign 'Sommerflotte' as a way to experience different forms of smart and sustainable mobility. During four weeks in June, 15 households abstained from their personal car and started using 'smart' and 'sustainable' forms of mobility during their daily routines. This was based on the project finding that many people we talked to would be curious to test mobility alternatives, but for various reasons hadn't done so yet. Ten different mobility providers took part (three free-floating car sharing, three station-based car sharing, two e-scooter sharing, one bike sharing, one ride sharing, and the public transport company) – and the voluntary participants, aged 30 to 67, parked their cars on a guarded parking lot, and in turn received digital vouchers for public transport and the participating mobility service providers.

Before (online interview) and after (personal interview) the campaign, the participants were interviewed about their general mobility preferences and demands, their (different) daily mobility routines and about the usefulness of new forms of 'smart and sustainable mobility' for their daily lives. From these interviews, we hoped to conclude further steps for an improved mobility system and to get answers to the questions mentioned above: In which way(s) do innovative technologies meet the demand of different population groups? What kind of knowledge do providers and users of mobility need in order to create resp. use such technologies?

Accordingly, every participant was eager to test mobility alternatives, and the majority already knew at the beginning of the campaign about existing alternatives to using their own car. In that context, having sponsored access to a comparativly large number of (private) mobility providers as well as the local public transport provider, seemed very attractive to the majority of the participants. But out of 16 volunteers, only three had tried services of alternative mobility before the campaign, giving various reasons: The main perceived challenge when using new mobility services was objective or subjective respect for the new

technologies as such. This prejudice was affirmed when interviewed after the campaign: quite challenging for a large part of the participants was the unfamiliarity with different types of cars and scooters (where to put the ignition key, on which side of the car is the fuel tank?). In addition, registration for the services was considered uncomfortable as everyone had to register seperately for each platform and app of the participating mobility providers. The project team tried to overcome various practical challenges that occurred during the four weeks: the initial respect for the technology was met by preparatory meetings, by individal tutorials with some participants, and by being available every day via telephone and e-mail to sort all kinds of questions such as: How to bring the online vouchers to work? How to sign in for a service with a fourty years old driving licence?

When initial problems had been overcome, the usefulness and the variety of the services in general was considered quite good when people started moving through the inner city on their way to work or leisure activities. But the lack of parking space for cars in the neighbourhood - which was one motivating factor whan deciding to participate in the campaign - effected the participants: it wasn't always easy to either find a car that was parked nearby or to find a parking space for the (free-floating) shared car, especially in the evenings. Stationary car sharing, for contrast, was considered uncomfortable by some as stations were located too far away from their homes or work places. Over the four weeks, (shared) cars were used less often on a daily basis than before the campaign. But it is also interesting to see that the once-a-week use of shared cars is slightly higher than it used to be when they used their own car – this might be out of individual curiosity for the new (e-)models. In addition, a slight growth in using scooter and bike sharing services could be noticed as well as a more frequent use of privately owned bikes (see figure 1).
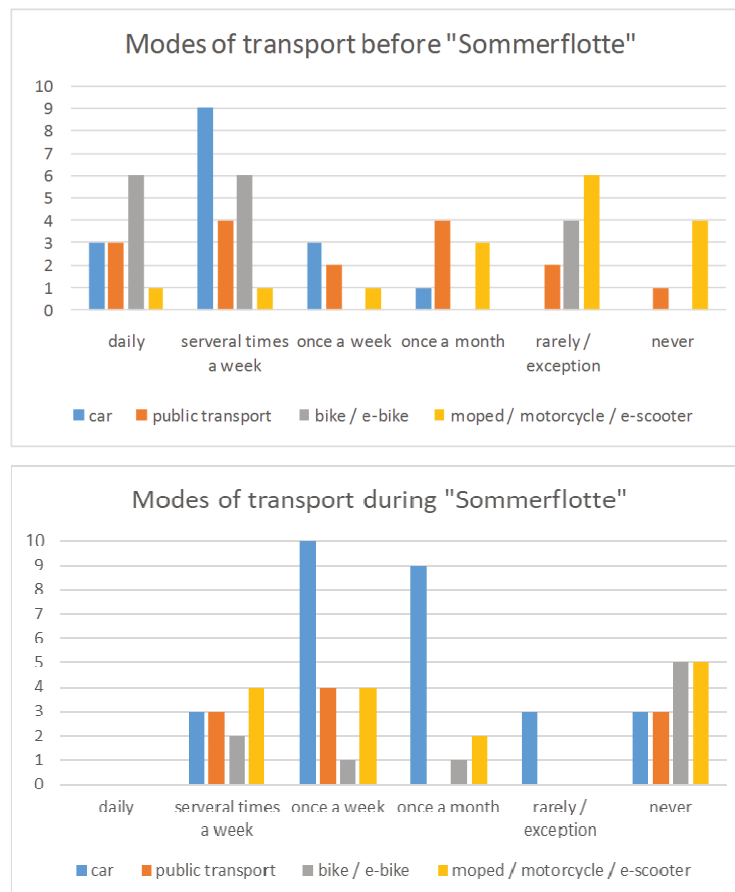

Fig. 1: Modes of transport before and during the campaign.

Nonetheless, participants were only inclined to go multimodal if the shared car they intended to use was too far away to walk, but instead used an e-scooter to get there. Instead, they would rather opt to replace their usual car trips with either public transport, or scooter. For special leisure activities, in contrast, the participants rather opted for carsharing than public transport, bike or scooter, be it visiting parents or a pet horse in the countryside, or a weekend trip. Transporting goods larger than the trunk of a usual car (shared or not) was considered a major problem and in many cases reinforced the feeling that a privately-owned car is necessary in order to master their daily lives.

In a wider context, concerns were expressed before the campaign that their daily lifes would be affected: using alternative modes of transport were considered (more) time-consuming and difficult to organise, especially when it comes to spontaneous activities or activities with children. This proved to be true with most participants – but they reacted quite differently: half of them took it as a positive challenge in order to change their lifestyle, the other half experienced it as reinstatement of their initial assumptions and decided that alternative mobility does not suit their needs to a sufficient degree. Thus, when we asked whether the participation in the four-week campaign had changed anything in their mind towards the possession and use of a private car, a majority stated that they now know that it is possible to move through the city without their own car, but only three of them considered abolishing it altogether (two of them abolished their cars already though).

5 DISCUSSION

Three years into the project, the team has developed and tested several approaches to promoting smarter and more sustainable forms of urban mobility. The 'Sommerflotte' campaign was one of them – and provided insight into the practical and ideological challenges of everyday mobility. In addition, it showed how different the demands of the small number of participants are – especially when it comes to finding ways to overcome perceived challenges of smart and sustainable mobility. Existing business models can only provide answers to some of the practical problems the participants experienced without their own car. Nonetheless, a shift towards the use of public transport (and individually owned bikes) could be noticed. And the participants gained a much better idea on how to (not) use different forms of alternative mobility and what their actual demands are. Most challenging for the participants was their unfamiliarity with new technologies – regardless of their age, and to understand the potentials of each mobility service fully: e.g. Can I leave the business area with my car or scooter when I bring it back? How can I combine different forms of mobility so it would suit my needs?. Regarding the potentials of changed mobility behaviour it has to be stated that only a smaller fraction of the participants did use the full spectrum of alternatives offered and that not everyone is now convinced to abolish their car. It has to be stated though that some of the effects perceived might be due to the small number of participants as well as the short period of the campaign which did not allow for any real changes in individual mindsets.

Half a year later, two households sold or scrapped their car, the inauguration of the first mobility spots are planned for mid-2019, the team plans to relaunch the campaign on a much bigger scale and again with the support of local politicians. Our approach of intensifying and stabilising multi-lateral communication proved as a successful, and resourceful, path to boost local awareness and knowledge on smart and sustainable mobility. Nonetheless, the complexity of existing legal frameworks and political decision-making structures was – and still is - a major challenge for everyone involved, with the consequence that (temporary) experiments have to undergo multidious assessments and to meet many different guidelines from different administrative departments.

Regarding the transformation of a mobility system, our experiment and research provided insights into ideological and practical challenges of smart and sustainable mobility on the local level. In addition, we gained better insight into how to design a larger campaign. Due to the small number of participants, the results of the research only indicate specific individual and collective challenges but they certainly serve as a starting point for further discussions with different stakeholders as well as for further research in the relations of smart and sustainable mobility and indidual daily routines.

6 CONCLUSION

This paper argued that technologies can only be defined as 'smart' if they are demand-oriented, and if supporting political, legal and economic frameworks can be created. The paper also provided intermediary results from an experiment in Berlin where the research team tried to answer the questions: In which way(s) do innovative technologies meet the demand of different population groups? What kind of knowledge do providers and users of mobility need in order to create resp. use such technologies?

According to our results, there is still a gap between theory and practice of smart and sustainable mobility: A larger, and longer, campaign – with accompagnying research – will hopefully provide further insight and knowledge for generating and implementing effective, sustainable solutions for complex problems. And it

may bring more people and stakeholders to reflect on individual and collective local mobility and to help to come up with demand-oriented and feasible smart and sustainable local solutions.

7 REFERENCES

AMT FÜR STATISTIK BERLIN BRANDENBURG, press release no. 6, 11th January, 2018.

BENEVOLO, C., R. P. Dameri, and Beatrice D'Auria. "Smart mobility in smart city." Empowering Organizations. Springer, Cham, 2016. 13-28.

BEZIRKSAMT CHARLOTTENBURG-WILMERSDORF VON BERLIN 2017: Grobcheck Stadtumbau Mierendorff-INSEL Charlottenburg-Wilmersdorf, Berlin, April 2017.

BLECHSCHMIDT, A., Lanzendorf, M., & Wilde, M. (2015). Integrierte Stadtentwicklung und die Gestaltung nachhaltiger Mobilität – Zum Stand der Planungspraxis am Beispiel der Stadt Leipzig. Raumforschung und Raumordnung, 73(6), 423-437. FARLA, Jacco, Floortje Alkemade, and Roald AA Suurs. 2010: "Analysis of barriers in the transition toward sustainable mobility in the Netherlands." Technological Forecasting and Social Change 77.8 (2010): 1260-1269.

ILARRI, S., D. Stojanovic, and C. Ray. "Semantic management of moving objects: A vision towards smart mobility." Expert Systems with Applications 42.3 (2015): 1418-1435.

KRELLENBERG K., F. Koch, S. Kabisch: Urban Sustainability Transformations (UST) in lights of resource efficiency and resilient city concepts, 2016.

MARKARD, J., R. Raven, and B. Truffer. Sustainability transitions: An emerging field of research and its prospects. Research policy 41.6, 2012: 955-967.

NAM, T., and T. A. Pardo. "Conceptualizing smart city with dimensions of technology, people, and institutions." Proceedings of the 12th annual international digital government research conference: digital government innovation in challenging times. ACM, 2011.

STOLLMANN, J., Wolf, K., Brück, A., Frank, S., Million, A., Misselwitz, P., ... & Schröder, C. (Eds.). (2016). Beware of smart people! Redefining the smart city paradigm towards inclusive urbanism: Proceedings of the 2015 "Beware of Smart People!" symposium. Universitätsverlag der TU Berlin.

VAN DEN BERGH, J. CJM, B. Truffer, and G. Kallis. Environmental innovation and societal transitions: Introduction and overview. Environmental innovation and societal transitions 1.1 (2011): 1-23.

WEISER, P., Scheider, S., Bucher, D., Kiefer, P., & Raubal, M. (2016). Towards sustainable mobility behavior: Research challenges for location-aware information and communication technology. GeoInformatica, 20(2), 213-239.

WENDORF, G., & Schröder, C. (2018). The Challenging Path to a Redistribution of Space–Renegotiating Urban Mobility. In REAL CORP 2018–EXPANDING CITIES–DIMINISHING SPACE. Are "Smart Cities" the solution or part of the problem of continuous urbanisation around the globe? Proceedings of 23rd International Conference on Urban Planning, Regional Development and Information (pp. 453-459). CORP–Compentence Center of Urban and Regional Planning.WOLTER, Stefan. "Smart Mobility-Intelligente Vernetzung der Verkehrsangebote in Großstädten." Zukünftige Entwicklungen in der Mobilität. Gabler Verlag, 2012. 527-548.

ZSCHEISCHLER, J., Rogga, S., & Weith, T. (2014). Experiences with Transdisciplinary Research: Sustainable Land Management Third Year Status Conference. Systems Research and Behavioral Science, 31(6), 751-756.

ZTG 2017: Smart City: Zur Bedeutung des aktuellen Diskurses für die Arbeit am Zentrum Technik und Gesellschaft. Available from: https://www.researchgate.net/publication/316005095_Smart_City_Zur_Bedeutung_des_aktuellen_Diskurses_fur_die_ Arbeit_am_Zentrum_Technik_und_Gesellschaft [accessed Jan 11 2019].

684

REAL CORP

REAL CORP 2019: IS THIS THE REAL WORLD?
Perfect Smart Cities vs. Real Emotional Cities – Karlsruhe, Germany