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Unobtrusive, Seductive and Profound? The Silent Transformation of Mobility in the Region of Stuttgart

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1 ABSTRACT

Information and communication technologies are increasingly transforming our urban lives, giving rise to what is commonly referred to as the 'smart city'. Understood as technologically enhanced urban services (i.e. metered, networked, monitored and computed, mostly and preferably in real-time), the ICT industry showcases a full range of perfectly integrated 'smart city' technologies in pilot projects around the world. While still focusing on the technological understanding of 'smart', this paper, however, explores the less advertised and seemingly more trivial transformations happening in our existing cities. By doing so, three aspects of the process of becoming 'smart' are identified, highlighted and exemplified by a case in Stuttgart, Germany. First, the sector and often company connected and incremental approach make it unobtrusive and hardly noticeable as an integrated 'smart city' concept. Second, democratic and public debate is absent, as the promised or envisioned results are on the one hand seductive and desired and consequently (rightly) assumed to be a priori supported by majorities and on the other hand often designed and implemented by the private sector. Third, although individual transformations may not seem radical, their combined implications and potential for urban governance and planning can be profound, especially in combination with the renewed idea of rational, non-ideological decision making through algorithmic data analysis. This paper describes these aspects on the basis of the case polygo in Stuttgart, a recent effort to further digitalise and network public transport and private e-mobility services, effectively and incrementally implementing a 'smart mobility' concept throughout the Region of Stuttgart.

2 INTRODUCTION

Increased computational power and networking, wide-spread data collection and automatic and algorithmic data processing rapidly change the way we interact with and make sense of the world. Data becomes big data, which is often spatially and temporally attributed and analysed in real-time (Kitchin 2013, 2014). At the same time the city—despite earlier doubts—proves to be still the single most important form of human settlement, as Graham and Marvin (1999) already pointed out. In fact, a rising urban worldview attributes cities a much greater ability and efficiency in solving today's problems than nation states (see for instance Barber (2013) for a discussion about cities' advantages). The 'smart city' seeks to combine these two developments—ubiquitous computing and the city—and promises urban governments and businesses the necessary technological infrastructure to become—or stay—sustainable, resilient, innovative, competitive, attractive, safe, transparent and responsive to social needs like healthcare and education (Kitchin 2014, see also the IBM Smarter Cities website). In the 'digital age' urban areas are no longer just home to a new industry and culture (Graham and Marvin 1999), but increasingly also a recipient of transformational forces towards what Kitchin (2014) calls "technocratic governance and city development". The vision of internationally operating technology firms, that digitalise and network urban services and process the collected data in real-time, is to support what is envisioned to be non-ideological, smarter and more effective decision-making (IBM 2011a; Kitchin 2015). The proclaimed 'Internet age' is also, it seems, an age of quick technological solutions to all (urban) problems. Pilot-projects of the Global North tech industry showcase and promote the 'digital urban age' around the world, while often at the same time evading real problems in existing cities by constructing new districts or entire cities.

Although these 'smart cities' are receiving a torrent of advertisement and media attention, the author argues in this essay that most transformations in developed countries happen on the one hand in existing and over centuries grown cities, and on the other hand much more silently and pragmatically than suggested. Although not necessarily called 'smart', the changes nevertheless seem to qualify as 'smart city' concepts. A closer look reveals the reason for the initial modesty: the deployed solutions seem hardly new or profoundly impacting the respective cities. However, the author argues that profound changes do indeed happen, yet not in expected or envisioned ways. For instance, when separately looking at the upgrading of urban services into 'smart' ones, these may not reveal anything profound, but the combination of various such efforts, their networking, technological potential and underlying ideologies suggest a profound change in urban

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development, planning and governance. Important to note here is that "history shows that [technology] more generally reflects and mirrors the culture in which it evolves rather than guiding and directing it" (Barber 1998). In other words: to understand the 'smart city' it is vital to also understand the culture of the very technologies it is built on, i.e. "The Culture of the Internet" (Breton 2011).

Hidden in their unobtrusiveness and allure, it is difficult to notice the 'smart city' transformations and their potentially profound impacts. But even when aware of them, "solutionism" (Morozov 2014) and the prevailing ideas of and values attributed to "the Internet" (cf. Breton 2011) seem to silence a critical debate and hinder questioning the very ideas and values. Tech solutions, it seems, transcend questions of whether we actually need them (i.e. whether they actually solve a real problem) and whether we want them (i.e. in preference to "old age" responses). Thus, much of our cities' future is determined by and dependent on unquestioned beliefs and assumptions and the private companies transforming them into world-wide deployable tech solutions.

Understanding how 'smart city' concepts (especially when not labelled as such) and underlying "Internet values" and "solutionism" transform cities can help to become aware of their potential profoundness and start a political debate, similar to the ones we already have for example about privacy and data collection. When aiming at becoming or staying 'smart', we need to ask questions such as: do we want these levels of interconnectedness, centrality and automation? Do we want to deploy 'smartness' on this scale and with that reach? Do we want what Pasquale (2015) calls "black boxes"? Are we confident markets, private partners and entrepreneurs can solve the problems at hand best? The case of Stuttgart shows that it is possible to design a 'smart city' concept while still answering at least some of these questions negatively— although, it seems, solely motivated by and on the basis of privacy and data protection regulations.

By describing and looking at the inconspicuous case of polygo the author identifies three aspects of 'smart city' transformations in existing and grown cities: unobtrusiveness, seductiveness and (ostensible) profoundness. After a brief overview of the term 'smart city', the essay is structured in two parts, discussing the three aspects first on a general and later on a specific level of the case of polygo in Stuttgart.

3 UNAMBIGUOUS AND UNPRECEDENTED?

The term "smart" seems to be as ambiguous as it is used in both academia and the public and private sector. Moreover, depending on their perspective and intentions, scholars, politicians and industry spokesmen stress or highlight specific aspects of what is commonly understood as the 'smart city'.

Vanolo, for instance, states that "the term smart city is basically an evocative slogan lacking a well defined conceptual core" (2014:884). An international team of scholars with technological and e-government foci agrees that despite the term's frequent use, "there is still not a clear and consistent understanding of the concept among practitioners and academia" (Chourabi et al. 2012:2289). Giffinger et al., in their effort to rank European medium-sized cities, propose a holistic understanding, in contrast to its current use "for various [single] aspects which range from Smart City as an IT-district to a Smart City regarding education (or smartness) of its inhabitants" (2007:10). Their definition encompasses the performance and progressiveness of cities in six different sectors (economy, people, governance, mobility, environment and living) and stresses the aspect of 'smart citizens', who act independently and decide for themselves. Kitchin gives a similar definition: "'Smart cities' is a term [...] to describe cities that, on the one hand, are increasingly composed of and monitored by pervasive and ubiquitous computing and, on the other, whose economy and governance is being driven by innovation, creativity and entrepreneurship, enacted by smart people" (2014:1). In this essay, the 'smart city' is understood in Kitchin's way, i.e. with its two sides.

3.1 Contextualising the 'smart city'

Both concepts, the pervasive computing and monitoring as well as the entrepreneurial, 'smart' citizenship (and urban governance respectively) build on ideas much older than the 'smart city' discourse. It is thus important to put the 'smart city' into context to understand its history, origin and overall ideas shaping it. Two main influences stand out: first, neoliberalism and a shift from managerialism to entrepreneurialism in urban governance in the 1980s and second, the visions of cybernetics, born in the 1940s.

The fundamental idea of liberalism is an economic, political and societal organisation based on free choice, taken rationally and in self-interest. The implications are, in sum, economically the proliferation of the

market economy and politically a stripped down, minimal state. Neoliberalism extends these ideas globally, promoting privatisation and discouraging state intervention. Or, as Jessop (2002) writes, "the state can retreat to its proper, minimal role, acting only to secure the conditions for the continued expansion of the liberal market economy and a self-organizing civil society". Urban areas are hereby increasingly relevant for their role as competitive nodes of the self-organising society, especially on the path to the 'information society' as innovation and learning hubs (cf. Jessop 2002).

Another development rises at around the same time as a response to the inflation crisis under the Keynesian welfare state in the 1970s. In the 1980s a change in urban governance takes place: a shift from managerialism to entrepreneurialism. Rising mobility of capital, goods, services and people, as well as the nation state's declining control over them, increasingly forces cities to negotiate directly with international capital to attract capitalist development. In turn, cities found themselves in competition with one another, resulting in various efforts of place making either by actual construction or by enhancing conditions. Harvey describes three developments of importance here: first, the efforts to create a competitive environment to attract global labour, consumption and command-and-control functions, but also a larger share in national redistribution surpluses; second, the rise of external forces affecting cities through the inter-urban competition (see also Vanolo 2014); and third, the preference of isolated developments over comprehensive urban planning (cf. Harvey 1989).

About three decades earlier, in the 1940s, another influential idea emerged: cybernetics, an effort to understand and design systems of communicating nodes, self-stabilised through the feedback of information. But cybernetics was not limited to technical systems alone (cf. Breton 2011). Rather, it was a vision of a 'new society', a society of a new man and a new intelligent machine, 'living' peacefully next to each other. And as cybernetics considered everything information, the 'new society' was, unsurprisingly, a "global information society", where communication "between man and machines, between machines and man, and between machine and machine, [...] play an ever-increasing part." (Wiener in: Breton 2011:44) Underlying this vision is the belief that politics is incapable of governing on a global scale, which the machine would not only be capable of, but could also do so rationally. It "is a society without a State, founded upon small communities of life and on a global communication system" (Breton 2011:44). In the words of poet Richard Brautigan, it is a society—or rather everything—"[...] watched over by machines of loving grace" (1967).

However, the initial dream of artificial intelligence within a decade proved to be greatly too optimistic. Furthermore, in the 1960s and 1970s the cybernetic understanding of the society was strongly criticised for the ideological promotion of technology. But by the 1980s and 1990s, the necessary technology—computers and computer networks—were fully developed and powerful enough to rekindle cybernetic ideas: 'the Internet' set out to reorganise all spheres of society, our thinking and culture (cf. Breton 2011; Morozov 2014).

4 TECHNOPHILE OR TECHNOPHOBE?

The ambiguity of the term 'smart city' results in a multiplicity of understandings and critiques of the concept. A binary view of technophiles versus technophobes is thus far too limited and mainly reflects the former's dominance in the public discourse. In fact, scholars have scrutinised and criticised the 'smart city' on many different levels.

The overarching vision of advocates, mostly technologists and what Morozov calls "solutionists", much in line with neoliberal and entrepreneurial ideas, is a more competitive and efficient economy and administration of cities while at the same time improving their sustainability and resilience (Hollands 2008; IBM 2010, 2011a, 2015). Equally fundamental is the cybernetic notion of rational, non-ideological decision-making through the use of data analytics: big data, collected through monitoring networked infrastructure and tapping of social media, is either used for algorithmic governance or analysed and visualised to inform and aid decision-making (IBM 2011a; Kitchin 2015). The cybernetic idea is further stressed by IBM's new advertisement effort to promote the 'cognitive city'.

The critique to this technological and entrepreneurial understanding of the city addresses a range of problems and false claims. Both Kitchin (2015) and Shelton et al. (2014) see nothing new about the 'smart city'. Moreover, Kitchin (2013) regards the notion of non-ideological, apolitical decision-making and the idea of self-speaking big data an illusion and Shelton et al. point to a long history of the seemingly new approaches

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like computational data analysis or rational planning. In addition, they highlight the fact that 'smart cities' are rarely built from scratch and as perfect as envisioned or advertised. Thus, they promote the idea of "The 'actually existing smart city'".

A rising critique is related to the neutrality and ethics of algorithms or, more precisely, their authors. Naughton (2015) thus calls for a code of conduct for algorithm writers and Pasquale (2015), in his analysis of the "black box society", for new regulations and more auditing. Sadowski and Pasquale (2015) further argue that the 'smart city's' data collection and subsequent processing in the private 'cloud' (IBM 2011b) through little known algorithms, combined with the transition to entrepreneurialism, give rise to "corporatized governance". Consequently, they ask who is ultimately in charge. Hollands (2008) further "explores to what extent labelled smart cities can be understood as a high-tech variation of the 'entrepreneurial city'" (2008:303).

A related point of critique are rising inequalities. Graham (2002) argues that ICT increases polarisation both at a global (among cities) and local (within cities) scale, favouring and strengthening groups already in power and control and more generally whoever is connected and "digitally literate". Castells 1989 highlighted the move from an industrial to an informational economy and society with its implication of the "rise of the dual city" 25 years ago and argued that decision-making becomes increasingly centralised. Furthermore, Vanolo calls attention to the use of 'smart city' concepts as a disciplinary strategy of national governments or intergovernmental organisations in how they "impress a new moral order on the city [...] to distinguish between the 'good' and 'bad' city" (2014:883). Finally, Schneier (2014, 2015), a prominent security expert, argues that the 'Internet of Things' is "widely insecure" and that these vulnerabilities are not easy to fix.

5 THE TRAITS OF BECOMING 'SMART'

To add to the understanding and critique of 'smart cities', this article explores how the restructuring process of existing and grown cities takes place and identifies and outlines three characteristics: unobtrusiveness, seductiveness and profoundness. This section describes these aspects in a general way; the next section exemplifies them by the case of polygo in the Region of Stuttgart.

5.1 Hidden in plain sight

Forty years into the era of personal computing, the 'black box' (Pasquale 2015) is ubiquitous and ironically a well established normality expected by consumers and vigorously worked on by producers. As 'black' suggests, the inner mechanisms are hard, if not impossible to understand and access. Both is seldom possible, as access is often restricted (on trade secret grounds) and skilled auditors rare (Kitchin 2015; Pasquale 2015; Sadowski and Pasquale 2015). Consequently, crucial components of the 'smart city' are hidden and worked out inconspicuously, predominately by private tech companies.

In contrast to pilot projects that are built from scratch, existing cities are upgraded incrementally and assembled piecemeal. The fragmented nature makes it much harder to see an actual 'smart city' being implemented instead of isolated efforts to improve particular services or parts of the city. Often that also means that these projects are not only commissioned by the public sector and implemented by private firms, but, as a legacy of neoliberal privatisation efforts, often also both commissioned and implemented by them, as contracted or privatised service providers constantly improve their services to reduce costs and respond to customer demands.

The latter point is vital in itself: in an "Internet-centric" (Morozov 2014) world abundant of 'smart' devices that are deeply embedded into our everyday lives, citizens notice rather the absence of information and communication technology (ICT) than their presence. It is not seeing the wood for the trees.

5.2 Smart is the new sexy

But it is not only about noticing. ICT is highly seductive, both on the theoretical level of its promises and the practical level of everyday life, both for citizens and local governments. Whether managing or using urban services, governing a city or participating in it, the 'smart city' offerings seem irresistible (Hollands 2008:304f). Technological solutions are envisioned for a whole range of urban challenges: IBM (2010, 2011a, 2012a) for instance promises long-term smarter growth and improved services without increasing

costs. To add to that, the 'smart city' is at the same time advertised as a vital response to environmental issues and citizen involvement (Giffinger et al. 2007; IBM 2012a).

The visions for consumers and citizens are similarly hard to resist: better integrated and running services that are also more easily and more comfortably accessible from anywhere (given one is part of the 'digitally literates') promise a streamlined urban experience, freed from constraints of time and space where possible. 'Hack your city' events and platforms, combined with 'open data' efforts, speak directly to the 21st century entrepreneur—the hacker—aiming at nothing less than the cybernetic dream of "Reinventing City Hall" (Townsend 2013) and ultimately society. As Morozov (2014) and Breton (2011) point out, 'the Internet' is not seen as pure ICT, that is a collection of wires and devices connecting them, but became a "cult" with a particular "spirit" of an open, transparent, bright, peaceful and, of course, smart future. Who would not desire that?

As a consequence of the seductiveness of the 'smart city' and its implementation and sometimes also commissioning by private companies, public debate is often absent or is predominantly and one-dimensionally concerned with data protection and privacy issues.

5.3 Big data, big scope

The unobtrusive and seductive transformations in existing cities are seldom profound, at least when seen isolated and individually. Although advertisement campaigns and 'Internet' advocates may disagree, an improved service that now also comes with an App is nothing radical or far-reaching. In fact, Morozov argues that nothing about 'the Internet' is and points to a long technological history (see also Shelton et al. 2014 and Townsend 2013).

However, the 'smart city' idea comprises more than improved services. Embedded and borrowing from more overall ideas like the cybernetic, neoliberal and entrepreneurial ideas, it affects and targets essentially all urban sectors and services: government, safety, planning, healthcare, education, energy, water and transportation (IBM 2012b). Control and power become increasingly centralised, on the one hand locally at the public sector in so called "urban control rooms" (Kitchin 2015), like IBM's "Intelligent Operations Center" (IBM 2011a), and on the other hand globally at private ICT corporations and algorithm developers, often locked behind trade secrets (Pasquale 2015). Furthermore, Sadowski and Pasquale (2015) argue that 'smart cities' exercise power not only in Foucaultian forms of sovereign power ("to take life or let live") and disciplinary biopower ("to administer and manage bodies and populations"), but also in the Deleuzian notion of "societies in control" (cf. Deleuze 1992). Sadowski and Pasquale (2015) describe a "spectrum of control" that ranges from subtle to aggressive, from an "operation of power that does not immediately affect what humans can do—their potentiality—but rather their 'impotentiality,' that is, what they cannot do, or better, can not do" (Agamben 2010, in: Sadowski and Pasquale 2015) to a "severe and militarized" (Balko 2013, in: Sadowski and Pasquale 2015) and increasingly automated execution of power (see also Morozov 2014:181).

The scale and scope at which the 'Internet of Things', of which 'smart cities' are a part, is deployed, Schneier (2016) argues, also mark a change in kind: "None of these technologies are new, but they're all becoming more prevalent. I believe that we're at the brink of a phase change around information and networks. The difference in degree will become a difference in kind." (Schneier 2016)

Moreover, favouring particular societal groups, especially 'hackers' and the educated, informed and affluent, intensifies existing polarisation. Take 'smart' efforts to improve street conditions as an example: while driving, sensors of mobile devices collect data about the street condition without any human interaction. While this is certainly a clever use of technology to collect data, using this data, or collecting it in the first place, might not be so 'smart', as the data tends not to reflect general societal needs and fixing the streets cannibalises other projects.

In general, the 'smart city' has a great potential in easing and thus changing the planning and governance of urban areas. However, falling into technophile/technophobe extremes in its understanding or seeing it as something completely new and segregated from other ideas can lead to profound impacts on fundamental issues for the democratic city, like social justice, cohesion and inclusion. Especially combined with the unobtrusiveness and seductiveness, the transformations can be profound in the way they transform our societies without citizens noticing or deliberating on it.

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6 POLYGO—THE MODEST 'SMART CITY'

polygo initially started in 2012 as 'Suttgart Service Card'. From 2013 to 2015 it was researched and developed as 'Stuttgart Services' and partly funded by the German government as one of its "Schaufenster Elekromobilität" (showcase e-mobility) projects. Although its main goal, motivated by traffic condition and air quality in Stuttgart, is to promote e-mobility and car-sharing as one of the showcase projects, an SSB (2012) presentation suggests the project aimed to be a 'smart city' concept early on. As such, the project was envisioned to be more than "only a mobility card" (SSB 2012) by integrating not only mobility services, but also targeting citizens as well as businesses and tourists more broadly. However, it is very seldom particularly labelled as a 'smart city' project.

The implementation happened incrementally: by the end of 2012, interested customers were able to use the so-called "Mobilpass" and in 2014, Verkehrsverbund Stuttgart GmbH[1] (VVS) ran a "friendly user field test" (VVS 2014). In 2015 the public facing brand polygo was created, which is operated by VVS. Currently, the existing paper-based subscription passes are phased out and replaced by the new chip cards. VVS wants to complete the transition throughout 2016.

Key development partners, both from the public and private sector, are technology companies and research institutions (see stuttgart-services.de/projektpartner.html). Operating and service partners are currently mostly mobility related, like VVS as public transport provider and private car- and bike-sharing providers. Other services already connected to polygo include the provision of parking spaces and e-mobility charging stations as well as (limited) payment services. The goal is to further extend the scope of the card by also making public services like the library, sport and leisure facilities and potentially also museums accessible through it.

6.1 Unobtrusiveness: smartening up behind the scenes

polygo was initiated by the public sector as a showcase project for e-mobility. However, one declared goal was to gain "vital know-how" (Recklies 2013) in the region through its development. Consequently, the project is a public/private partnership.

The polygo card and platform is developed in a way to include various services easily. However, apart from public transport subscriptions, the card is always an additional possibility next to the existing one to access services of other partners, which, moreover, have to be explicitly enabled first and are billed separately. In other words: polygo is currently not only mostly connected to the mobility sector, but also limited in its ways to attract attention (car2go, the free-floating car-sharing service, for instance, so far does not mention it on its site).

This is also due to the strategy of an incremental introduction. Just like for instance an automatic update of applications on modern mobile devices, the transition is meant to be as frictionless and unobtrusive as possible. After all, the connected services are nothing particularly new, neither is the effort to digitalise mobility services. Private partners were mostly accessible via mobile phone apps for years, and also VVS and public transport received various ICT improvements over the last decade, most notably EFA, the electronic journey planner. The changes are hardly noticed, especially when (deliberately) implemented at a slow pace, or, like the new control devices at the entrance to busses, seen as 'yet another electronic device' that hardly strikes as unusual. In the end, all that changes noticeably is the transition of subscriptions to a 'card with a chip', a change many customers are very much familiar with from other parts of their lives. A considerable number of VVS customers even trashed the letter with the new card, as they were unaware that it is their renewed subscription.

The other part invisible to the public are the technological changes. Key infrastructure and software is developed and implemented by private partners. Data protection and privacy concerns played a strong role in the design of the card, yet the precise implementation is unknown and for security reasons not disclosed. However, the operating company is mostly publicly owned and thus subject to democratic control.

[1] VVS is a limited liability company (LLC, German GmbH), located in Stuttgart. Shareholders come mostly from the public, but also private sector: Stuttgarter Straßenbahnen AG, Stuttgart; DB Regio AG, Frankfurt am Main/Berlin; Gesellschaft bürgerlichen Rechts der Kooperationspartner des VRS, Stuttgart, VerbandRegionStuttgart (VRS); Land Baden-Württemberg; Landeshauptstadt Stuttgart; Landkreis Böblingen; Landkreis Esslingen; Landkreis Ludwigsburg and Rems-Murr-Kreis (VVS 2014)

6.2 Seductiveness: the allure of 'smartness'

The vision presented in 2012 is certainly hard to resist for citizens, the public and private sector. While key goals are mainly the improvement of environmental sustainability by strengthening environment friendly mobility, stimulating growth and competitiveness of the local economy, improving the "image of the city and region" (SSB 2012) and economic feasibility (including lower costs for the public sector), a variety of alluring "side effects" are envisioned (SSB 2012). Among them are the improvement of the quality of life and more streamlined and networked mobility services with various discounts.

One of the key benefits advertised (and considered necessary for the acceptance of the concept) is the "one card for everything", or, as Fritz Kuhn, the mayor of Stuttgart, put it, getting rid of the "Kartensalat" (Recklies 2013) (card tangle). It is the alluring comfort of accessing all urban functions at one place with a single "password" (cf. Deleuze 1992), i.e. the polygo card and platform—from everywhere with just a few finger taps. Although for the time being mainly mobility services are available, this comfort is envisioned to be extended to services like access to leisure and sport facilities and the library, as well as to some city hall functions.

Public debate, however, is missing. The project is implemented 'top-down', by private companies, without public deliberation. While 'top-down' may not be per se problematic—although 'the Internet' and Silicon Valley entrepreneurs may try to convince us otherwise—, the potentially profound implications call for public deliberation. However, due to the project's seductiveness, politicians can rightly assume broad support from citizens for becoming 'smart'. Ironically, this fact seems to be in turn exploited by politicians to lure citizens into environment friendly mobility, to lessen the particulate matter and dust pollution in Stuttgart.

For the local government another aspect is vital: the competition of the Region of Stuttgart with other regions and cities. It is thus not surprising that the mayor sees polygo as a "product of innovation" (Recklies 2013) and the SSB presentation explicitly mentions place-making goals like image improvements, flagship project status and "Smart Business" efforts, i.e. placing the Region as a strong economic location. In addition to the inter-city competition, private online services offering for instance electronic journey planning and booking increasingly enter the market. The 'smart city' with its promises seems to be not only an alluring solution for cities to stay competitive, but also an imperative to keep the 'smart city' at least partially public.

6.3 Profoundness: a "milestone" towards a new culture of mobility?

The unobtrusiveness and absence of public debate suggest a lack of profoundness of the polygo project—despite claims of politicians of being a "milestone" (Recklies 2013). In fact, a cooperation on the marketing level between public transport and car-sharing services existed previously for two decades. The new model extends this cooperation to other service providers and to the sales level, a joint tariff however is not intended. Moreover, compared with public transport the capacity of car-sharing is minuscule and in the case of free-floating services also comes without any guarantee of availability. As such, the tighter integration of public transport and private car-sharing may rather benefit existing public transport users in edge cases (like, for instance, at times of less frequent public transport or when being late) than profoundly changing mobility patterns, like giving up a second car. Yet, luring citizens into switching modalities or at least to e-mobility is, of course, the long-term vision. As this step is motivated by seduction rather conviction, its profoundness in changing behavioural patterns is questionable. Furthermore, although e-mobility may lessen the environmental impact, it still produces particulate matter and may even have rebound impacts due to increased usage as it is supposed to be environment friendly (cf. Graham and Marvin 1999 about the rebound effect of teleworking). And although bike-sharing services are part of polygo: how safe and comfortable is it in Stuttgart to use the bike or walk to work? polygo, it seems, takes the easy way and avoids touching areas that could make a profound impact.

The project at its current state still lacks the overall 'smart city' idea of connecting various sectors. However, the platform and card are developed in a way that various other services can be integrated. In fact, this is already planned or even partially implemented, effectively using the existing spread of public transport subscriptions to push forward the transition to one card for all services. Consequently, polygo centralises various scales and sectors in one place (SSB 2012) and makes opting out difficult as it involves hurdles or financial disadvantages, or is even impossible for subscription users. Yet, as the cooperation of partners stays on a marketing and sales level, the power that comes with this centralisation is limited.

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Other profound changes may happen in unexpected and unintended ways. Especially in combination with the unobtrusiveness and seductiveness, urban planning and governance is changed without much public deliberation. The 'quick fix', for instance, replaces struggles to make more streets bike- and pedestrian-friendly—or even -only. Similarly, technical ticket control devices in busses replace human (self) control. While this is certainly alluring to the operator, Morozov 2014 argues that technology replaces morality through so called situational crime prevention (SCP, that is making crimes impossible by design). The case in Stuttgart is not clear-cut, trains for instance lack the ticket control system, instead still relying on random human ticket inspection. However, the risk of the underlying point of "moral disability" (Kerr, in: Morozov 2014:195) still remains. These risks are rarely discussed, most public debate or concerns focuses around privacy and data protection. In fact, privacy regulation seems to be the only limiting factor—and in case of polygo a strong one.

7 CONCLUSION: STAYING DUMB, THE SMART THING TO DO?

The case of polygo in Stuttgart shows three aspects of the transition of mobility into 'smart mobility'. Firstly, the transformations are alluring and seductive, as they promise improved services at lower costs, environmental benefits, a more direct access to urban politics and management, and thus increased participation possibilities for citizens as well as a higher quality of life. Secondly, they are unobtrusive: ICT is hardly noticed anymore and large parts of the deployed technologies are developed in closed and opaque ways by private tech companies, predominantly from the Global North. Thirdly, the restructuring is profound, affecting multiple sectors and scales and also increasingly centralising power and control, which limit not only the potentiality, but also the 'impotentiality' of citizens.

It is important to note that the technological aspect of the 'smart city' is not only shaped by overall ideas it is embedded in, but also seems to magnify them. 'Internet values', 'solutionism', and greater '-isms' like neoliberalism, entrepreneurialism, or cybernetics in turn play a stronger role in urban planning and governance. The rise of the 'smart city' thus calls for a debate beyond the extremes of a technophile or technophobe perception. This is particularly vital as the 'Internet' rapidly becomes the 'Internet of Things' and as such extends its reach substantially, spreading its "cult" (cf. Breton 2011) as well as culture of "amelioration" (cf. Morozov 2014) and quick technological fixes.

Undoubtedly, 'smartness' has its rightful place and benefits citizens in many vital ways, for instance in forecasting and responding to crises. Yet, its alleviation to a pervasive cult is risky. The pursuit of 'smart' order and certainties by replacing democratic conflict, struggle and debate with seductive technology may be alluring, but ultimately also leading to dumb citizens (cf. Sennett 2012). Paradoxically, especially the city has the potential to be a home for democratic struggles and a place for "cultivating a common citizenship" (cf. Sandel 2012). A not completely 'smartened up city' with its occasionally chaotic and messy urban experience and random encounters of differences (e.g. different opinions) may seem 'dumb', but may ultimately also turn out to be a smart thing to be for a democratic society.

8 REFERENCES

Barber, Benjamin R. (1998). "Which technology and which democracy". In: MIT Communications Forum.
Barber, Benjamin R. (2013). If mayors ruled the world: Dysfunctional nations, rising cities. Yale University Press. Breton, Philippe (2011). The Culture of the Internet and the Internet as Cult. Duluth, Minnesota: Litwin Books.
Castells, Manuel (1989). The informational city: Information technology, economic restructuring, and the urban-regional process. Blackwell Oxford.
Chourabi, Hafedh et al. (2012). "Understanding smart cities: An integrative framework". In: System Science (HICSS), 2012 45th Hawaii International Conference on. IEEE, pp. 2289–2297.
Deleuze, Gilles (1992). "Postscript on the Societies of Control". In: October 59, pp. 3–7.
Giffinger, Rudolf et al. (2007). Smart cities: Ranking of European medium-sized cities. Centre of Regional Science, Vienna University of Technology.
Graham, Stephen (2002). "Bridging urban digital divides? Urban polarisation and information and communications technologies (ICTs)". In: Urban studies 39.1, pp. 33–56.
Graham, Stephen and Simon Marvin (1999). "Planning cybercities: Integrating telecommunications into urban planning". In: Town Planning Review 70.1, pp. 89–114.
Harvey, David (1989). "From managerialism to entrepreneurialism: the transformation in urban governance in late capitalism". In: Geografiska Annaler. Series B. Human Geography, pp. 3–17.
Hollands, Robert G (2008). "Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?" In: City 12.3, pp. 303–320.
IBM (2010). Smarter cities for smarter growth. Tech. rep. IBM Corporation.
IBM (2011a). IBM Intelligent Operations Center for Smarter Cities. Tech. rep. IBM Corporation.

IBM (2011b). IBM Smarter City Solutions on Cloud. Tech. rep. IBM Corporation.
IBM (2012a). How to Transform a City. Tech. rep. IBM Corporation.
IBM (2012b). IBM Smarter Cities. Tech. rep. IBM Corporation.
IBM (2015). Economic Vitality. Tech. rep. IBM Corporation.
Jessop, Bob (2002). "Liberalism, Neo-Liberalism and Urban Governance: A State Theoretical Perspective." In: Antipode 34.3, pp. 452–472.
Kitchin, Rob (2013). "Big data and human geography Opportunities, challenges and risks". In: Dialogues in human geography 3.3, pp. 262–267.
Kitchin, Rob (2014). "The real-time city? Big data and smart urbanism". In: GeoJournal 79.1, pp. 1– 14.
— (2015). "Data-driven, networked urbanism". In: The Programmable City.
Morozov, Evgeny (2014). To save everything, click here: The folly of technological solutionism. PublicAffairs.
Naughton, John (2015). "Algorithm writers need a code of conduct". In: The Guardian. http://www.theguardian.com/commentisfree/2015/dec/06/algorithm-writers-should-have-code-of-conduct.
Pasquale, Frank (2015). The black box society: The secret algorithms that control money and information. Harvard University Press.
Recklies, Ralf (2013). "Das Ziel ist 'eine Karte für alles'". In: Stuttgarter Zeitung. http://www.stuttgarter-zeitung.de/inhalt.elektromobilitaet-in-stuttgart-das-ziel-ist-eine-karte-fuer-alles.1cb3b1d9-5b2b-4353-81df-1f05fa175bd1.html.
Sadowski, Jathan and Frank Pasquale (2015). "The spectrum of control: A social theory of the smart city". In: First Monday 20.7.
Sandel, Michael J (2012). What money can't buy: the moral limits of markets. Macmillan.
Schneier, Bruce (2014). The Internet of Things Is Wildly Insecure—And Often Unpatchable. https://www.schneier.com/essays/archives/2014/01/the_internet_of_thin.html.
— (2015). Data and Goliath: The hidden battles to collect your data and control your world. WW Norton & Company.
— (2016). The Internet of Things Will Be the World's Biggest Robot. url: https://www.schneier.com/blog/archives/2016/02/the_internet_of_1.html.
Sennett, Richard (2012). "No one likes a city that's too smart". In: The Guardian. url: http://www.theguardian.com/commentisfree/2012/dec/04/smart-city-rio-songdo-masdar.
Shelton, Taylor, Matthew Zook, and Alan Wiig (2014). "The 'actually existing smart city'". In: Cambridge Journal of Regions, Economy and Society.
SSB (2012). Stuttgart Services. Tech. rep. SSB.
Townsend, Anthony M (2013). Smart cities: Big data, civic hackers, and the quest for a new utopia. WW Norton & Company.
Vanolo, Alberto (2014). "Smartmentality: The smart city as disciplinary strategy". In: Urban Studies 51(5), pp. 883–898.
VVS (2014). Der Verbundbericht 2014: Vernetzte Mobilität in einer Wachstumsregion. Tech. rep. VVS.

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