Uberising the Urban

Labour, Infrastructure and Big Data in the Actually Existing Smart City of Toronto

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Abstract

This thesis explores how Uber reformats the urban and vice versa. Rather than taking for granted Uber's success in remoulding the emerging 'smart city' in its own image, *Uberising the Urban* pays close attention to the contradictory, variegated and far from frictionless encounters between Uberisation and urbanisation. The thesis is particularly interested in those neuralgic points of contact where the abstract logics of Uber's business model – its vectors of *data extraction*, *labour exploitation* and *platform expansion* – hit the urban ground of existing social and physical geographies. The Uberisation of the urban – such is this thesis's main argument – does not take place in a material and social void; it unfolds in, with and against the dense social and material thickness of existing urban space.

This argument is deepened in three case studies. Zooming in from different angles, these case studies show how the vectors of Uberisation have come up against the multiscalar and variously uneven urban grounds of the actually existing smart city of Toronto. While the first case study provides a detailed discussion of the conflictive processes leading up to the legalisation of Uber in Toronto and the parallel 'regulated deregulation' of the city's taxi-cum-ridehail market, the second case study tackles the next subsequent 'stage' of Uberisation in Toronto: the proliferation of various public-private ridehail partnerships (PPRPs) between Uber and Lyft on the one hand and local and regional transit agencies in the GTA on the other. The third case study is concerned with Uber's self-driving car programme and, in particular, the invasive practices of data extraction that Uber has implemented in Toronto – turning the city into a real-life urban data reservoir for the development of its self-driving software. A conclusion, shedding light on a potential reconfiguration of Uber towards more socially emancipatory ends, rounds out the dissertation.

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Abbreviations

ADCU	App Drivers and Couriers Union (UK)
AI	Artificial Intelligence
ANN	Artificial Neural Network
AV	Automated Vehicle
AVIN	Autonomous Vehicle Innovation Network (Province of Ontario)
EULA	End User Licence Agreement
FMLM	First Mile/Last Mile
GTA	Greater Toronto Area
GTHA	Greater Toronto and Hamilton Area
ICT	Information and Communication Technologies
IWGAV	Interdivisional Working Group on Automated Vehicles (City of Toronto)
LIDAR	Light Detection and Ranging
MaaS	Mobility as a Service
ML	Machine Learning
MLS	Toronto Municipal Licencing and Standards
NAFTA	North American Free Trade Agreement
NYTWA	New York Taxi Workers Alliance
OPP	Obligatory Passage Point
PPP	Public-Private Partnership
PPRP	Public-Private Ridehail Partnership
PTC	Private Transportation Company (e.g. Uber)
RAR	Ride Acceptance Rate
RWDSU	Retail, Wholesale and Department Store Union
SDC	Self-Driving Car
Uber ATG	Uber Advanced Technologies Group
USW	United Steel Workers Union
TTC	Toronto Transit Commission
TWIC	Toronto-Waterloo Innovation Corridor

Chapter I

Uber and the Crisis
Introduction

It was a freezing Tuesday morning when, on 8 December 2015, some hundred Toronto taxi drivers decided that they've had enough.[1] "Shortly after sunrise," as a national news report had it,

> taxi and limousine drivers began to gather at four locations outside the city core before heading into downtown. By 9 a.m., long lines of cabs were rolling slowly through downtown streets, sounding their horns. Lines of cabs slowed traffic on highways outside the city (CBC News 2015: n.p.).

What started as an early-morning rally culminated into a close-to 12-hour blockade of parts of Toronto's inner-city roadways; an interruption of Toronto's daily downtown rhythms that could only be dissolved once Mayor John Tory promised the taxi drivers a meeting with the local police chief. While neither this meeting nor the protests that had initiated it had the effect of stopping Uber in Toronto, the blockade can be understood as a visible symptom of a transformation that has started to reformat not only Toronto's

[1] I would like to thank Sébastien Tremblay for his sharp and encouraging comments on an earlier draft of this introductory chapter.

urban fabric, but also that of hundreds of cities worldwide: a transformation that I shall refer to in this thesis as the *Uberisation of the urban*.

Anti-Uber taxi protests such as those witnessed in Toronto were far from a singular event. They were repeated – with varying degrees of intensity – in cities across the planet. What the often 'disruptive' arrival of Uber in local taxi markets worldwide has thrown into relief, time and again, is the simple, yet consequential fact that Uber's business model is far from politically neutral (Rosenblat 2018: 107-109). It is deeply rooted in the market-driven, technology-infatuated and anti-regulatory ideals of a globalised parochialism that Richard Barbrook and Andy Cameron once aptly characterised as the 'Californian ideology': "a contradictory mix of technological determinism and libertarian individualism" (1995: n.p.) that has come to new life in the wake of the 2008 economic crisis and the shift of large-scale venture capital funds towards a new generation of Silicon Valley startups, Uber among them (Sadowski 2020b).[2]

In many regards then, Uber is a product of the 2008 economic crisis.[3] Accompanied by a central banks politics of historically low interest rates, the crisis set loose vast amounts of surplus capital. Suddenly, billions of dollars were in frantic search of new fields of profitable investment (Srnicek 2017: 25-34). Founded as a startup in the San Francisco Bay Area in 2009, Uber profited immensely from the post-crisis situation. In 2010, with a company valuation of roughly $ 5 million, Uber gained a first round of seed funding of $1.25 million. In 2013, now with a company valuation of $3.7 billion, Uber accrued a staggering $258 million cash injection from Google's investment arm Google Ventures. From this point onwards, yearly investments in Uber exploded, with $2.4 billion in 2014, $2.6 billion in 2015, $6.6 billion in 2016 and another $9.3 billion in January 2018 (Blystone/Jackson 2021; Isaac 2019: 92-101; Olsen 2017).[4] Even before taking to Wall Street in its Initial Public Offer in May 2019, Uber had become the most valuable startup in the world.

The Great Recession, however, not only gave a boost to a new generation of Silicon Valley tech companies, it also prepared the ground for what has come to be known as the 'sharing economy' (Frenken/Schor 2017; Sundararajan 2016). Emerging in a climate of severe economic stagnation, urban austerity and widespread un(der)employment (Peck

[2] For a more extensive discussion of the Californian ideology and its Silicon Valley origins, see Dyer-Witheford (2015: Ch. 4).

[3] This holds true also for other 'corporate bearers' of Uberisation, for instance: Lyft in North America, Ola in India, Careem in the MENA region and others.

[4] All amounts are in US dollars.

2012), the sharing economy's beginnings, as Trebor Scholz notes, were defined by a widely non-commercial effort to create civic infrastructures of mutual help, support and exchange: "Emphasizing community, underutilized resources, and open data, the genuine sharing economy was initially presented as a challenge to corporate power. [...] [T]he pioneers of this economy proposed to split the use of lawn mowers, drills, and cars" (Scholz 2016: 20). What had started out as a sincere effort to share un(der)used resources and possessions was soon co-opted by venture-capital-backed Silicon Valley companies, turning a grassroots sharing economy into a multi-billion dollars commercial enterprise (Scholz/Schneider 2016). One of these companies was Uber. Adopting a language of tech-enabled mutual benefit and 'peer-to-peer' cooperation, early Uber promoted itself, in the words of Alex Rosenblat[5], as

> a new way to earn extra income through casual jobs as a driver. Meanwhile, anyone needing a ride could now benefit from an affordable, on-demand chauffeur service to get around. The Uber platform allows users to seamlessly connect passengers and drivers: it calculates the rates, transmits credit card information, and maintains quality ratings for drivers and riders alike (2018: 21).

Today, more than a decade later, the idea that Uber – a multi-billion dollar Silicon Valley enterprise – forms part of a *non*-commercial 'sharing economy' remains untenable, to say the least (Valverde 2016).

From a socio-technological vantage, meanwhile, Uber's globe-spanning expansion would not have been possible without the universalization of other, often state-provided high-tech infrastructures (Woodcock/Graham 2020: 38). Not least, and despite remaining digital divides of various localised extents, it is the smartphone that nowadays mediates almost all interactions between individualised users and corporatized platforms, including Uber's. As Adam Greenfield writes, our lives are now "strongly shaped by the detailed design of the smartphone handset [...] and by the strategies and business models adopted by the enterprises that produce them" (2017: 14). Following Keller Easterling (2014), we can even say that the smartphone has become the end-user actuator of a much vaster, largely invisible, network of infrastructure space that is held together by wireless broadband connections, subterranean and submarine high-speed cables as well as outer-space satellite networks for GPS navigation (Parks/Starosielski 2015). It is this broader network of infrastructure space – far from fully visible from the viewpoint of the Uber (driver or passenger) user – that Uber's platform relies on in almost any of its day-to-day operations: From the tracking of its users, via the matching of passengers and drivers to,

[5] It is one of the ironies of actually existing Uberisation that Alex Rosenblat, one of the most prominent early critics of Uber, started to work for the company in 2021 (Ford 2021).

finally, the handling of the credit card payment procedure, it is the technological protocols of existing high-technology infrastructures that have helped to create the material basis for Uber's today's success.

At the same time, Uber continues to depend on flesh-and-blood human labour. While there has been much talk about seemingly imminent waves of automation across all sectors of the economy (Srnicek/Williams 2016), it is crucial to understand that human labour – the exhaustion of physical and intellectual human energies – has remained fundamental to the business models of current Silicon Valley tech companies (Altenried 2022). Notwithstanding Uber's – very real – efforts at automation, the daily work of drivers is absolutely essential for Uber (Attoh et al. 2019). This is underlined by the impressive numbers of Uber drivers, both on a global and urban scale: By early 2021, there were 3.5 million Uber drivers worldwide, a decrease from even 5 million drivers before the Covid-19 pandemic (Dean 2021). Meanwhile, in Toronto, a city of 2.8 million inhabitants, the number of registered (if certainly not always active) Uber drivers spiralled from about 15,000 in 2016 to more than 70,000 in 2018 (City of Toronto 2016: 24). With good reason, then, the labour conditions of these global armadas of ridehail drivers – some of them casual part-time drivers, some of them professional full-timers – have attracted critical attention from scholars of various disciplinary backgrounds (Hua/Ray 2018; Rosenblat 2018; Valverde 2018). One of the upshots of such early research is that Uber builds on, and arguably pushes towards the extreme, longer standing trends of labour relations under neoliberalism (Minchin 2020). Such tendencies include a shift of economic risks from the side of capital to that of labour (Rosenblat 2018: 115-121), an increased flexibilisation of work (Woodcock/Graham 2020: 30-33) as well as the minute surveillance and control of workers via various, often opaque, techniques of algorithmic management (Wu et al. 2019).

Clearly, many of these practices have been part and parcel of 'the' North American taxi industry way before Uber. In an insightful study of the late pre-Uber taxi trade of New York City, Biju Mathew (2015) documents how New York's taxi industrialists were able to expand their control over drivers through growingly intrusive methods of surveillance, information gathering and data extraction: a managerial system that clearly prefigured many of the functions of algorithmic management fully integrated into Uber's platform today. Marking a further similarity between Uber and the taxi industry, both the former and the latter have been thriving on deeply gendered and racialised labour relations, with an overwhelming proportion of drivers in cities of the global North being Black and Brown immigrant men whose home-country job qualifications often fail to be recognised

in their new destinations (Sundar 2012). It is not surprising, therefore, that such similarities have invited repeated comparisons between pre-Uber taxi industries on the one hand and early Uberisation on the other (e.g. Tucker 2018).

However, and as the following chapters shall parse in detail, Uber is more than a technological upgrade of the taxicab. First of all, Uber differs from its taxi counterpart in terms of its platform-based business model. Platforms, as Nick Srnicek explains, are "digital infrastructures that enable two or more groups to interact" (2017: 43). The two groups of users that Uber's platform usually connects are drivers and passengers. As a platform, however, Uber can also quickly incorporate new app features; features that clearly transcend the boundaries of the 'classic' taxi trade and bring into play entirely new groups of users (think of UberEATS, for instance). In fact, Uber's platform-based business model brings the company closer to what could be called a globally operative, yet urban-scaled logistics enterprise that combines personal transport with many more functions of (potentially automated) just-in-time delivery and app-based navigation (Rossiter 2016: 1-20; Van Dijck et al. 2018: Ch. 4). Promising a globally scalable, logistically rationalised and aggressively union-averse new type of firm, Uber has been able to gather the full economic thrust of global finance capital behind it. It is not least via this financial backing that Uber has been able to execute what could be called an 'industrial scale jump' (Jessop et al. 2008: 390-391): a leap from the often locally bounded operative radiuses of former taxi-company (family-)businesses to the planetary horizons of a venture-capital-backed platform startup, whose current ridehail core business may turn out to be only one among many more logistical (sub-)functions in the future.

These game-changing potentials notwithstanding, it is one of the central wagers of *Uberising the Urban* that the transformative capacities of Uberisation must be balanced against those political resistances, social conflicts and physical inertiae that Uberisation may provoke, and has already come up against, in the course of its global expansion. It is principally for this reason that *Uberising the Urban* pays close attention not only to the driving logics of Uber's business model itself, but also that underside of the Uber phenomenon that is often forgotten, yet equally integral to its functionality: the urban grounds on which Uber is forced to intervene. Not dissimilar to Sandro Mezzadra and Brett Neilson's evocative image of the operations of capital 'hitting the ground' of "existing spatial and social realities" (2019: 3), I understand the Uberisation of the urban – or, in short: *Uberisation* – as a process in which the more abstract logics and rationales

of Uber's business model come into contact and start to conflict with those locally variegated urban grounds that are found in different cities and urban regions worldwide.

Such a temporally dynamic and spatially variegated understanding of Uberisation warrants special attention to the qualities of the urban ground. I take inspiration, therefore, from Mezzadra and Neilson's further insistence that

> established spatial formations are far from passive with respect to operations of capital, while those operations often have a disruptive effect on the production of space. Capital operates across places, territory, and scales, deploying a logic that is ultimately planetary but must continuously come to terms with resistances, frictions, and interruptions that crisscross the expansion of its frontiers and geographies (2019: 3).

Uber – like any other platform that hopes to weave its services into the dense and sometimes staunchly recalcitrant fabric of urban everyday life – must intervene in a global plenitude of locally variegated, scalarly hierarchized and unevenly developed and developing urban grounds (Brenner et al. 2010). Uberisation must grapple, that is, with social and physical geographies that – as suggested by the above example of protesting taxi drivers in Toronto – are not always fully welcoming to the changes it harbours.

This thesis contends that there is a co-evolving, yet contradictory relationship between Uberisation and urbanisation. It renders visible the arrival and sustained presence of Uber and other ridehailing platforms in cities worldwide as a deeply contested process that brings with it not only severe political conflicts and social 'disruptions', but also new dynamics of polarisation and spatialised unevenness. By tracing these transformations, *Uberising the Urban* puts forth three central arguments. First, it urges us to understand Uberisation as a distinctly *urban* phenomenon. Rather than taking for granted Uber's success in remoulding the urban ground in its own image, *Uberising the Urban* pays close attention to the contradictory, variegated and far from frictionless encounters between the forces of Uberisation on the one hand and the urban conditions of Uberisation on the other. Accordingly, the following chapters not only examine how Uberisation transforms urbanisation, but also – vice versa – how the social and physical inertiae of existing urban space can stand in the way of an allegedly all-encompassing restructuring of urban space in the image of Silicon Valley tech companies.

Secondly, based on empirical research and data I gathered during two field stays, Chapters IV, V and VI offer three in-depth case studies of Uber in Toronto. How has Uberisation, understood as a complex dynamic of data extraction, labour exploitation and

platform expansion, reshaped the urban ground of the actually existing smart city of Toronto? In response to this question, the case studies presented in this thesis identify three critical points of contact between Uberisation and urbanisation that open up broader fields of urban-political contestation: the socio-legal (re-)regulation of the platformised labour of Uber drivers and gig workers (Chapter IV); the rearrangement of urban and regional infrastructure space through what I call public-private ridehail partnerships (PPRPs) (Chapter V); and, finally, the creation of a new stratum of the urban tout court: the layer of big urban data, which is being produced, not least, by Uber's self-driving car programme and the extensive processes of data collection needed for its realisation (Chapter VI). As we shall see, Toronto's urban fabric has proven to be both receptive and recalcitrant vis-à-vis Uber's operations in town since its arrival in early 2012.

Finally, I argue that it is possible and even necessary to actively *imagine* a social reconfiguration of the Uber platform towards more emancipatory ends (Bernes 2013; Toscano 2014). Hence, an attempt is made, in Chapter VII, to think through some of the ways in which Uberisation, currently fully under the sway of venture-capitalist strivings to open up new fields of surplus value, can be harnessed towards socially more cooperative and, perhaps, even socialist or communist ends.

1 – Urbanisation in the Age of Uberisation

This thesis explores the conflictual relationship between Uberisation and urbanisation. As Jathan Sadowski notes, for "'disruptive' platforms, their strategy for domination is fought on the urban front: surge into cities, spread like wildfire, subvert any regulation, supplant all competition, and secure their position as an aspiring monopoly" (2020a: 450). Clearly, the increasing urban presence of platforms such as Uber, Google or Amazon poses the question of how tech capital has started to influence and partly recompose the broader process that is the production of space under capitalism (Harvey 1978; Lefebvre 1991; Massey 1994). There has been, of course, a long history in and beyond critical urban geography of bringing up to date with shifting historical conjunctures what Henri Lefebvre (2003 [1970]) once called the 'urban revolution' and what Manuel Castells (1977), shortly thereafter, referred to as the 'urban question'.[6]

[6] For overviews of the often Euro-centric, yet in fact deeply global history of Marxist and critical geography since the postwar period, see Goonewardena (2021); Kipfer (2018); Soja (1989: Ch. 2). For recent re-readings of Lefebvre's and Castell's respective approaches, see Merrifield (2002: Ch. 4, Ch. 6; 2014: Ch. 2) and Kipfer et al. (2008: 6).

In response to the rising urban presence of tech companies and platform startups after the 2008 financial meltdown, three distinct, yet variously connected strands of research have evolved within, or at least with a firm connection to, critical urban geography. Perhaps most prominently, critiques of the corporate 'smart city' have started to interrogate the smart city's increasingly dominant role as an imagined urban 'cure-all' that, in the words of an early IBM whitepaper, would enable city governments around the world 'to do more with less' (Shelton et al. 2015: 16). Very much in this sense, as Rob Kitchin outlines,

> the concept of smart cities has gained traction amongst businesses, governments, the media and academia to refer to, on the one hand, the use of information and communication technologies (ICTs) to stimulate economic development and, on the other, the extensive embedding of software-enabled technologies into the fabric of cities to augment urban management (2015: 131).[7]

Especially since the 2008 crisis, critical geographers have foregrounded many of the problematic and far from politically neutral values buried deeply within a proliferating smart city discourse and its elaborately rendered visions of future urbanity (Datta 2016; Wiig 2015b): "The smart city continues to be," as Roberts G. Hollands summarily put it, "a highly ideological concept, hiding certain issues and problems from view, while assuming that IT can automatically make cities more economically prosperous and equal, more efficiently governed and less environmentally wasteful" (2015: 62).

Such critical probings of a corporate 'smart urbanism' (Marvin et al. 2016) have been complemented, more recently, by a similarly oriented strain of research that has started to investigate the early contours of a newly emerging 'platform urbanism' (Barns 2020; Fields et al. 2020; Graham 2020; Richardson 2020). While variously converging with the research agenda of critical smart urbanism, the epistemological interest of platform urbanism also differs from the latter. "Compared to the systems associated with smart cities," as Sadowski notes, "platform urbanism is characterized by being more directly connected to consumers and interactive with users, more intent on rapid scaling-up via network effects and venture capital, and more antagonistic to government regulations and incumbent industries" (2020a: 449). A third related viewpoint comes from equally recent attempts to more fully understand the social and physical imprints on the urban fabric of logistics in the form of a newly calibrated 'logistics urbanism' (Altenried 2019; Cowen 2014: Ch. 5; Easterling 2005: 99-122; Lyster 2016; Rossiter 2012). In sum, what unites

[7] For an alternate definition of 'the' smart city, see, for instance, Glasmeier/Christopherson (2015: 6).

critical perspectives on smart urbanism, platform urbanism and logistical urbanism is their respective interest in the increasingly dominant role of global tech companies and platform startups as powerful new stakeholders within the broader process of the production of urban space.

Early on in the debate on smart cities, yet with equal and continuing relevance for platform urbanism and logistical urbanism, Taylor Shelton, Matthew Zook and Alan Wiig made an insightful observation that deserves to be quoted at some length. Contemplating the then existing critical literature on smart cities, they identify

> a tendency within these critical accounts to see the smart city as a kind of universal, rational and depoliticised project that largely plays out according to the terms of profit-maximising, multinational technology companies. Ironically, this account has a good deal in common with the celebratory marketing literature produced by the likes of IBM, Cisco and Siemens, among others, which in effect reifies the vision of the smart city they wish to promote (2015: 14).

What Shelton et al. hit upon here is a subtle, yet perceivable imbalance that has accompanied ongoing discussions about the smart city and alike debates. Across explorations of smart, platform and logistical urbanisms there has been a distinct tendency to foreground the agency – or, more precisely: the seemingly omnipotent space-producing powers – of big tech, while often presenting the urban ground on which these companies necessarily need to intervene as merely a passive receptacle ready to be elastically and almost instantly remoulded along the social, legal and physical needs of new platforms, technologies and logistics operations (see for instance, Altenried 2019: 118; Barns 2020: 185-187; Lyster 2016: 1-14).[8] Space, however, is more than a fixed stage for the play of historically changing social relations. Having formed, especially after World War II, a deeply contested precondition for the survival of capitalism itself (Harvey 2006 [1982]), the production of space, as Kanishka Goonewardena has recently put it, is "a decisive mediation of totality, the level of social reality at which the rubber of state and capital hits the road of everyday life, which also opens up the possibility of the former being mortally punctured and deflated by the latter" (2021: 523-524).[9]

[8] To be sure, giving attention to the space-producing powers of global tech is a methodological move that is more than understandable in the face of the recent urban 'disruptions' effected by Uber, AirBnB and the like (Ferreri/Sanyal 2018; Valverde 2018). However, and as the below chapters will explore in more detail, there is a dire need to go beyond alarmingly *undifferentiated* accounts of the urbanisation of 'smart' new technologies and their platformised business models (Van Doorn et al. 2021).

[9] For a welcome polemical rejoinder to the recent 'omnipresence' of the spatial turn across the social sciences and a critical reminder of the continued relevance of categories of time and history for critical theory, see Andreas Malm (2016: 6-11).

In light of these considerations and, in particular, the hard-won insight that urbanisation under capitalism entails a deeply anchored dialectical relationship between *fixity* and *motion*, 'moments' of reterritorialisation as much as deterritorialisation (Brenner 1998; 2019: Ch. 2; Harvey 1985), it seems to me that current debates on newly emerging 'tech urbanisms' have put their analytical weight much more on the space-producing powers of global tech companies than on the political frictions, social resistances and physical inertiae that have emerged from the confrontation of existing urban grounds with the new business models of Uber, Airbnb and others. This thesis aims to partly correct this imbalance. It does so in response to three crucial shortcomings that have delimited hitherto debates on the smart city and, almost in parallel, related discussions about platform urbanism and logistical urbanism.[10]

First, the broadly conceived signifier of the 'smart city' – even if used with critical intention – risks to renew and even intensify the ideological charge that its corporate inventors have given to this term (Shelton et al. 2015: 14). The idea – or, perhaps more fittingly: the ideological *imaginary* (Sadowski/Bendor 2019) – of the smart city suggests a somehow unified, even monolithic project of creating *'the'* smart city in lieu of its earlier, 'non-smart' urban predecessor (the latter usually conceived in equally monolithic, undifferentiated terms). Apart from the social frictions generated by it, such a seemingly all-encompassing smartification hides the apparent, yet often overlooked, fact that the operational and infrastructural urban needs of various (types of) platforms differ substantially (Plantin et al. 2018; Srnicek 2017: 49-78). To take an obvious example: Uber and AirBnB, while harnessing similar platform logics and even architectures, intervene in fairly distinct dimensions of the urban domain: Uber in transport, AirBnB in housing. There is a pressing need, then, to more clearly differentiate the urban interventions of diverse platform types and their distinct effects along various dimensions of the urban process.

Secondly, there has been a tendency within hitherto debates to deduce insights about the smart city from only a very limited number of examples (Kitchin 2015: 133-134; Shelton et al. 2015: 14; Wiig/Wyly 2016: 488-489).[11] Often, such seemingly paradigmatic cases turn out to be greenfield site developments where, indeed, big tech has been able to build entire neighbourhoods or even cities more or less from scratch and, as a result, very much according to its needs. Oft-quoted examples are Songdo in South Korea (Halpern et al.

[10] While I develop my argument in relation to the smart city only, similar observations could be made vis-à-vis related debates about platform urbanism and logistical urbanism.

[11] Within urban planning, 'greenfield' projects denote the development of hitherto undeveloped land, while 'brownfield' projects refer to the re-development of already built-up land.

2013), Living PlanIT Valley in Portugal (Carvalho 2015) or Masdar City in the United Arab Emirates (Cugurullo 2013). There are, however, as Kitchin notes, "marked differences between retrofitting existing cities and building brand new cities on green field sites" (2015: 133). Introducing 'smartness' into the brownfields of already existing, densely populated urban conglomerations presents big tech with a far more challenging task (Alvarez León/Rosen 2020: 498). While acknowledging the dire need to explore the smart city beyond the Global North (Datta/Odendaal 2019), this thesis shares Kitchin's scepticism as to the broader explanatory powers of rather exceptional greenfield-site developments, many of them located in the Global South.

Finally, and forming the methodological flipside of a noticeable overreliance on greenfield site cases, there remains a serious dearth of empirical engagement with geographically and historically situated smart city projects in determinate locales (Glasmeier/Christopherson 2015: 10; Kitchin 2015: 134). As Andrés Luque-Ayala and Simon Marvin write, understanding "the potential and implications of the transition to SU [smart urbanism] [...] requires the intensive examination of how SU is produced and reproduced in particular urban contexts" (2015: 2108). A critical engagement with smart city projects, both in the Global North *and* South, demands empirically grounded attention to those path dependencies, local variegations and historical contingencies that substantially complicate the realisation of 'the' smart city in already existing conurbations (Brenner et al. 2010; Harvey 2014 [1996]: 60-63).

This thesis addresses these lacunae head-on. Rather than confronting the smart city as that "idealised but unrealised vision that often dominates the social imaginary" (Shelton et al. 2015: 14), *Uberising the Urban* is interested in what Shelton et al. call the geographically grounded and historically situated *actually existing smart city* (see also, Brenner/Theodore 2002). Precisely, it is the multi-scalar actually existing smart city of Toronto and its contradictory transformation under Uberisation that is at the heart of *Uberising the Urban*. The three case studies presented in Chapters IV, V and VI will help me to explore this transformation.

2 – Uneven Uberisation: Toronto's Smart City in Context

The Uberisation of the urban is not a unilinear process. Notably, there are substantial variances of Uberisation worldwide. An imaginary world map of Uberisation would most

likely show two faint, yet distinctly visible demarcation lines reflecting some of the emerging local, regional and even supra-regional variegations of planetary Uberisation. The first of these lines runs vertically across the North Atlantic zone. It signals a split between Uberisation in North America and analogue processes in most European countries (Van Dijck et al. 2018: 3).[12] Notably, and despite a number of expectable exceptions (Sribaskaran/MacEachen 2018), Uber has faced substantially stronger state-regulatory pushback in Europe than in most of its US-American or Canadian markets (Valverde 2018: 204, 210-212). As Arto Lanamäki and Tauri Tuvikene observe,

> Uber's expansion into numerous North American cities was fast, aggressive, and generally successful [...] The expansion in Europe, nevertheless, followed a bumpier trajectory [...] Ridehailing platforms remain generally banned in Denmark and Germany. In Italy and France, these services are partially banned. In London, UK, Uber has faced numerous challenges ranging from outright illegality to discontinuation of the license renewal due to concerns with the operation of their business (2021: 4).[13]

In contrast to North American markets where drivers usually work as so-called independent contractors (Tucker 2018), stricter regulations in many European countries have forced Uber to restore to a partly modified business model that uses an intermediary layer of subcontracting firms (e.g. pre-existing local car rentals) in order to maintain – if often only in formal legal terms – the employee status of drivers (Ayata/Önay 2020; Brugière 2021: 814-815).

Apart from this first cross-Atlantic divide, a second demarcation runs between Uberisation in the Global North and Uberisation in countries and regions beyond the Euro-American heartlands of capitalism (Amorim/Moda 2020; Kashyap/Bhatia 2018; Surie/Koduganti 2016; Wu et al. 2019). Both in post-colonial and post-Soviet spaces, Uberisation has often been interpreted along the lines of a partial formalisation of once more widely informal taxi and minibus micro-businesses (Lanamäki/Tuvikene 2021; Rekhviashvili/Sgibnev 2018). In countries of the Global South, meanwhile, informality

[12] This is not to deny important internal differentiations within both of the two broad geographic markers of 'North America' on the one hand and 'Europe' on the other. With regard to differentiations between the United States and Canada, it should be noted that, generally speaking, Canadian urbanism can be characterised as approximating a 'middle position' between a more market-led US-American urbanism and more state-oriented forms of urban development in Europe (Keil et al. 2017: 15; Kipfer/Keil 2002: 230-231). Not least with regard to recent experiences with Uberisation and other interventions of big-tech capital, Toronto and the GTA, however, partly defy such an 'in-between' classification. With regard to recent tech investments, the GTA has shared a strong tendency towards market-led urban development with many US-American urban regions. It is for this reason that I find it justified – despite the undisputed existence of internal differentiations – to speak of (broadly conceived) forms of 'North American' and 'European' Uberisation.

[13] Note that regulatory pushback in London has been the result, not least, of organised worker resistance led by the Independent Workers Union of Great Britain (IWGB) and other grassroots labour organisations (Woodcock/Graham 2020: 97, 101-102).

has been used as an interpretative lens of Uberisation in the cities of Hyderabad in India (Samuel 2020) as well as in the African metropolises of Cape Town in South Africa (Pollio 2019) or Lagos in Nigeria (Arubayi 2021). It goes without saying that there is no overarching, unified experience of 'Uberisation beyond the Global North'. Even more so, we can note an urgent need for more critical, potentially comparative, scholarly work that could throw into sharper relief both the similarities and potential differences between various forms of Uberisation in various parts of the world.[14]

While such a task is clearly beyond the scope of this thesis, an acknowledgement of the deeply variegated character of planetary Uberisation allows one to critically situate the knowledge claims of this thesis. What *Uberising the Urban* mainly examines are the rough contours of what could be called – for want of a better term – North American 'laissez-faire Uberisation': a geographically and historically situated form of Uberisation that substantially differs from, for instance, more strictly regulated variants of Uberisation in Europe (Valverde 2018). I am confident, in other words, that the case of Uber in Toronto – explored in depth in Chapters IV, V and VI – provides a most insightful and perhaps even paradigmatic example of North American laissez-faire Uberisation. Equally importantly, however, the Toronto case may be of less value beyond the social and geographic limits of the North American continent.

Like many other North American city regions, Toronto has gone through various phases of neoliberal restructuring (Harvey 1989; Peck/Tickell 2002). Since at least the mid-1990s, the exceptionally business-oriented politics of the Province of Ontario have had a heavy influence on the socio-economic restructuring of the Toronto city region (Albo/Evans 2018), the latter often referred to as the Greater Toronto Area (GTA) or, more recently, the Greater Toronto and Hamilton Area (GTHA). In fact, it was in 1995 that the incisive social and economic caesura of the provincial Progressive Conservatives' so-called 'Common Sense Revolution' marked Toronto's final tipping point from an urban politics informed by Keynesian ideals (not necessarily *realities*) of universal state provision and social welfare to a neoliberal urbanism increasingly geared towards the market logics of a fully globalised economy and the resulting imperatives of urban and regional competitiveness (Fanelli 2018; Keil/Addie 2017; Peters 2018). Since then, Toronto has figured as a prominently discussed example not only of recurring moments of roll-back and roll-out neoliberalisms throughout the 1990s and early 2000s (Boudreau et al. 2009; Donald 2002; Kipfer/Keil 2002), but also as one of the exemplary sites of a

[14] For contributions to the wide ranging debate on urban comparison, see Peck (2015); Robinson (2011); Roy (2009; 2011); Tuvikene et al. (2017).

later normalisation of 'roll-with-it neoliberalism' (Keil 2009). Since the 2008 economic crisis, meanwhile, Toronto, while not hit as hard as some US-American cities (Donald et al. 2014), has strongly felt the effects of urban austerity politics that have followed the global financial meltdown both in Canada and many other countries worldwide (Albo/Fanelli 2019; Fanelli/Thomas 2011).

These neoliberal transformations prepared the ground for Toronto's more recent attempts to reinvent itself as one of North America's most visible smart cities (Valverde/Flynn 2020). Two 'flagship' projects shaped Toronto's early smart-city image. First, being the only non-US participant in the prominent challenge for Amazon's second headquarter – 'HQ2' – Toronto gained worldwide attention as one of the potential future sites of large investments by the US-American company. While Amazon eventually opted for New York City, Toronto's participation in the challenge gave a strong boost to the city's perception and visibility as a future site of global tech investment and innovation (Wachsmuth/Kilfoil 2021: 71-72). Toronto's 'smart' image campaign further accelerated when in 2017 Google's parent company Alphabet made global headlines with its so-called Quayside project: an ambitious, yet inchoate plan that foresaw to transform a patch of industrial wasteland at Toronto's Lake Ontario waterfront into a 'smart' urban neighbourhood packaged with ubiquitous sensing devices, self-driving cars and other high-end technologies (Haggart 2020). While the project was abandoned due to strong political resistance (articulated, not least, in terms of concerns about data privacy), it remains to be seen whether Quayside did more harm than good to Toronto's smart city image (Clement 2020; Murakami Wood 2020).

What is beyond doubt, however, is that over the last decade – and not least due to Uber's exceptionally strong presence following on the heels of Amazon and Alphabet – Toronto has been transformed into a real-life urban test ground for the development and gradual implementation of both new *technologies* of platformised data extraction and new *techniques* of labour management and worker surveillance (Woodcock/Graham 2020: 40). While Chapter IV will explore the labour-related side of Uber by showing how Uber's arrival in Toronto soon led to an impactful re-regulation of the city's taxi industry, Chapter VI will concentrate on the data-related side of Uber's presence in Toronto by exploring how Uber has digitally remodelled Toronto's entire cityscape as a virtual test ground used for the training of its self-driving-car software.

Uber entered Toronto in early 2012. After a tumultuous four-year period of unregulated operations, Toronto City Council legalised Uber in May 2016. From then on, Uber

rapidly extended its local presence. In May 2017, Uber announced the hiring of Raquel Urtasun, a professor for machine learning (ML) and computer vision at University of Toronto's computer science department and a renowned expert on self-driving car software. While, initially, Urtasun would merely lead the Toronto branch of Uber's R&D arm – the Uber Advanced Technologies Group (Uber ATG) – she would later become chief scientist of the entire Uber ATG group, overseeing the latter's foremost effort: the development of Uber's future automated vehicles (AVs). The Toronto-Uber nexus further tightened when, in September 2018, Uber ATG announced additional investments in its Torontonian R&D branch, including the hiring of 300 new tech and engineering staff (Deschamps 2018). Apart from these strategic alliances, Uber, alongside its North American competitor Lyft, started to initiate partnerships with local and regional transit authorities across the GTA. Chapter V will explore two of these local PPRPs in more detail. In fact, so tight-knit became the relationship between the Silicon Valley tech company and the Ontarian metropolis that, by October 2019, an article in the *Toronto Star* asked – not unreasonably: 'Why does Uber seem to love Toronto so much' (Deschamps 2019: n.p.)?

Overall, then, there are four principal reasons why Toronto became increasingly important for Uber and vice versa. First, since Uber's first arrival in the GTA in early 2012, Toronto has offered a well-functioning and, most importantly, a profitable market for Uber's ridehail core business. While the repercussions of the Covid-19 crisis have of course upended the local situation, it is fair to assume that, prior to lockdown conditions, Uber's ridehail business in Toronto was – in contrast to its money-haemorrhaging global operations – constantly in the black.[15] Secondly, and as Chapter IV will show, the City of Toronto sanctioned an exceptionally Uber-friendly legal framework for ridehailing, giving a further push to Uber's already strong local presence and creating a stable legal basis for the following gradual expansion of ridehailing in Toronto. Thirdly, and as explored both in Chapters IV and VI, Toronto's globally visible smart city ambitions opened the doors to tech investments of all kinds, with Uber becoming one of the most prominent flagships for local political and economic elites' project to establish the Toronto city region as a new 'Silicon Valley of the North' (Wachsmuth/Kilfoil 2021). Finally, Toronto and the GTA provide a strong presence and supply of highly qualified tech labour, especially in those fields of artificial intelligence (AI), ML and computer vision that are highly relevant for Uber's ambitions to develop self-driving cars. Chapter

[15] Such at least was the opinion of local taxi industry insiders who I had the chance to speak to. It should be noted, in this context, that up to the time of the hand-in of this thesis in early 2022 Uber was not able to turn a profit in any of its operational years or quarters. In 2019, for instance, Uber amassed a loss of US $8.51 billion, reducing this number to a still staggering $6.77 billion in 2020 (Wilhelm 2021).

VI will open up this thematic again, when examining Uber's AV development programme in Toronto.

Beyond Toronto, there are only two other cities, both located in the US, that have been of similar strategic import for Uber. On the one hand, San Francisco, where Uber was founded in 2009 and which has been home to Uber's global headquarters ever since, remains a most important strategic site for the company. Not least its proximity to Silicon Valley as the global hotspot of tech innovation makes San Francisco an essential site for Uber. At the same time, Uber has experienced severe regulatory difficulties in California, both in relation to its AV testing programme (Rosenblat 2018: 173-174) and, more recently, with regard to its ridehailing core business. While eventually stopped by a massive counter-campaign initiated by Uber and Lyft, Californian driver unions waged one of the most far reaching struggles for driver rights so far, struggling for the state-wide classification of drivers not as independent contractors but as full employees of Uber (Paul 2020).

On the other hand, the city of Pittsburgh marks another key strategic site for Uber. Not dissimilar to the situation in Toronto, political elites in Pittsburgh were exceptionally welcoming to Uber (Rosenblat 2018: 177). In 2014, two years before Uber became legal in Toronto, a provisional regulatory framework for ridehailing was sanctioned in Pittsburgh, allowing the company to develop its local presence. Most importantly, however, when in 2015 Uber partnered with Carnegie Mellon University only to hire away "nearly the entire robotics department of the school" (Rosenblat 2018: 177), Pittsburgh became Uber ATG's early central hub for AV development. It is beyond the scope of *Uberising the Urban* to engage in a comparative study of San Francisco, Pittsburgh and Toronto as probably the three most important nodes within Uber's global urban network. However, by zooming in on one of these city regions – Toronto and the GTA – this thesis makes a substantial contribution towards a deeper understanding of the urban politics of Uberisation. Future, potentially comparative, studies will hopefully expand on my – certainly far from exhaustive – explorations in the following pages.

As an urban region, Toronto and the GTA may well be seen, then, to exemplify not only many of the characteristic socio-spatial dynamics of North American *urbanisation* since World War II (Keil et al. 2017: 15-16; Kipfer/Keil 2002: 230-231), but also of North American laissez-faire Uberisation since the early 2010s (Tucker 2018; Valverde 2018). The Toronto city region, in other words, presents itself as a formidable node to study, in situ, the globally networked, yet locally variegated phenomenon of Uberisation (on the

troubles and benefits of studying globally distributed phenomena in place, see Cowen 2014: 17-18).

3 – Chapter Outline

This thesis investigates how Uberisation transforms urbanisation and vice versa. Chapter II provides a detailed insight into the empirical fieldwork that has informed this thesis. Starting with some retrospective reflections on my early motivations to start this PhD project, the chapter provides a detailed account of my two field stays in Toronto and the central qualitative research methods – mainly, participant observations, qualitative (expert) interviews and qualitative content analyses – that allowed me to examine the consolidation of the Toronto-Uber nexus with adequate precision. In doing so, the chapter reflects upon both the strengths and limitations of the methods used, including more artistic and experimental ones such as exploratory walks, photography and field diaries. Last but not least, in mapping out the temporal unfolding of my research from its early exploratory beginnings to its post-fieldwork endings, the chapter also sheds light on the shifting nature and foci of interest of my PhD project over time.

Chapter III develops the theoretical groundwork of this thesis. Through a comprehensive review of critical literatures, the chapter develops this thesis's central concept: the Uberisation of the urban. The process of Uberisation is theorised as the partly conflictive, partly complementary encounter between the worldwide fairly universal logics of Uber's business model – what I call the *forces of Uberisation* and their three main vectors of (i) data extraction, (ii) labour exploitation and (iii) platform expansion – and the various and necessarily variegated urban grounds that these forces come up against in different parts of the world and which I call the *urban conditions of Uberisation*. As the chapter further argues, the urban conditions of Uberisation, at least in the North American context in which this thesis is firmly anchored, have been strongly conditioned by a two-pronged response to the 2008 Great Recession: an inward-oriented austerity urbanism pressuring cities to seek cost reductions in local service provision on the one hand; and an outward-oriented smart urbanism geared towards the attraction of global tech capital on the other. As I conclude, it is the encounters and clashes between the more abstract logics of the forces of Uberisation and the locally more variegated urban conditions of Uberisation that produce those political and social frictions that Chapters IV, V and VI explore in three in-depth case studies of Uber in Toronto.

The first of these case studies, laid out in Chapter IV, examines the time period between Uber's first arrival in Toronto in early 2012 and the local legalisation of ridehailing in May 2016. It hones in on Uber's early efforts to re-regulate the city's existing taxi industry along the requirements of its platform-based business model. While comparable to other recent instances of 'regulated deregulation' effected by platform companies (Aalbers 2016; Ferreri/Sanyal 2018), the case of regulating Uber in Toronto provides valuable insight, as I argue, into the interplay of three specific socio-spatial dynamics that have enabled the legalisation of ridehailing in Toronto: First, a deeply neoliberalized state regulatory landscape, especially at the regional scale of the Province of Ontario whose laissez-faire approach towards Uber enabled the company to gain traction in the first place; secondly, the absence of institutionalised worker power in Toronto's taxi industry and, as a consequence, the inability of taxi drivers to seriously contest Uber's 'disruptive' entry into 'their' industry; and, finally, the remarkably strong ambitions of local political and economic elites in Toronto to establish the urban region as a world-renowned smart city, providing Uber with a powerful political lever in the battle for a favourable regulatory framework for its local business.

Chapter V shifts from the terrain of regulation to that of urban infrastructure and public transport. It explores a trend that has become increasingly visible after the legalisation of ridehailing in many jurisdictions across North America: the creation of various forms of partnerships – what I call PPRPs – between Uber and Lyft on the one hand and local and regional transport agencies on the other. Along a detailed discussion of two early PPRPs in the GTA – the Lyft-Metrolinx pilot and the Uber-Innisfil experiment – the chapter lays bare the contours of two deeper socio-spatial dynamics that, as I argue, have largely driven the proliferation of PPRPs across North America: a *winner-takes-it-all dynamic* that risks the concentration of PPRPs in already privileged areas of existing infrastructural investment; and a *short-term-benefits-over-long-term-use dynamic* that tends to pit public fiscal rebalancing and extrospective smart-city image creation against more sustainable infrastructural investment. It is in this double sense, then, that the growing urban presence of Uber and other ridehail companies is likely to continue and even intensify longer-standing dynamics of splintering urbanism and the uneven provision of urban infrastructure.

Chapter VI effects a further shift of terrain. It homes in on the data-driven side of Uber's business and, in particular, the processes of data collection that underlie Uber ATG's self-driving car programme. As I argue, such data collection unfolds along two separate, yet

closely intertwined levels. Driven by the modality of data extraction (Sadowski 2019), Uber's ridehailing core business provides access to individual driver and passenger profiles that can be aggregated into detailed data insights into key metrics of Uber's local ridehail markets such as overall profitability, consumer spending power or driver availability (Attoh et al. 2019). This *base layer* of Uberised data production serves as the foundation of a more exclusive data *top layer* installed in those hand-picked city regions – Dallas, Pittsburgh, San Francisco, Washington D.C. and, not least, Toronto – that have been home to a multiply more elaborate modality of data collection: 'processes of digital landscape production' (Alvarez León 2016) that entail the multi-sensory capturing and digital remodelling of Toronto's entire cityscape: a precondition for the creation of those virtual traffic scenarios needed for the training of Uber's self-driving-car software. Exploring some of the research progress that Uber ATG's team has made under the lead of Raquel Urtasun, the chapter presents close examinations of two of Uber's foremost processes of digital landscape production: Uber's LIDARsim and GEOsim systems.

In light of the likely entrenchment of multiple dynamics of socio-spatial unevenness and social polarisation, Chapter VII explores some of the starting points for a contestation and perhaps even full reconfiguration of Uberisation. I do so by, first, taking stock of and critically discussing currently existing contestations of Uber, both in relation to the forces of Uberisation and the urban conditions of Uberisation. Secondly, and taking up recent discussions about the potential reconfiguration of today's high-tech infrastructures (Bernes 2013; Toscano 2014), I turn to Situationist musings on the taxi as a proto-communist 'vehicle' of anti-instrumental dérive: a mode and ideal of moving through the city that aims to escape capitalism's frantic rhythms of "*métro-boulot-dodo* (commuting, working, sleeping)" (Stanek 2014: xxxix) and, as such, may remind us, in the age of Uber, of forms of mobility more in synch with those flashes of human jouissance utterly alien to capital's alienating drive for commodification (Lefebvre 2014). Reflections on the limitations and shortcomings of this thesis and potential avenues for future research round out the chapter.

It should be noted that, ultimately, this thesis is not about Uber. It is about Uberisation, an ongoing and politically deeply contested process that knows many corporate bearers worldwide: Uber and Lyft in and beyond North America, Cabify and Taxify in some European and South American countries, Yandex in Russia, Careem in the MENA region, Ola in India or Didi Chuxing in China (Carson 2018). If Uber will make recurrent appearance in the below pages as my most prominent empirical touch point, then this has to do not so much with my interest in Uber itself (yet that too), but with my fascination

with Uber as the currently dominant corporate bearer of that more far-flung process that I call Uberisation.

Chapter II

How I Studied Uber in Toronto
Methods

This chapter gives an account of how I studied Uber in Toronto. One of its aims is to bring into closer view the empirical groundwork that has informed this thesis. The below pages, then, are an attempt to provide an insight into the field research process that has undergirded the writing of the thematic chapters of *Uberising the Urban*.

I conducted my research during two field stays. The first one took place between 12 September and 16 December 2018, the second between 1 September and 5 November 2019. The research I conducted during these two time periods was of *qualitative* nature (Bryman 2012: Ch. 17; Denzin/Lincoln 2018) and was guided by a triangle of key methods: (i) *(brief) participant observations* (Kawulich 2005; Lüders 2004), (ii) *qualitative (expert) interviews* (Bogner et al. 2009; Schmidt 2004) and (iii) *qualitative content analyses* of text documents such as newspaper articles, planning documents, corporate white papers and PR material (Mayring 2004; Schreier 2014). At various points during my research, this combination of methods allowed me to triangulate my findings across different collected data (Denzin 2015; Flick 2004). Further, I complemented these three core methods with more experimental and artistic approaches such as exploratory

walks, photography and field diaries (see below). At last, I should clarify here that I do not use the term 'participant observation' as an equivalent of a full-scale, months-long ethnography (Bryman 2012: 432). In a narrower sense, I understand participant observations as a method that refers to 'silent', potentially repeated participation in group meetings and at events over a timeframe of, as in my case, several hours.

In what follows, I provide a detailed account of my empirical data collection. I proceed as follows: I will start by briefly elucidating the preparatory work prior to my two field stays, a process that included the decision for Toronto as my primary research site. The two subsequent sections will then follow the respective processes of completion of my first and second field stays, paying close attention to the participant observations, expert interviews and qualitative data analyses conducted during these two time periods. Next, I will discuss the three more experimental methods of exploratory walks, field diaries, note taking and photography, all of which enriched the quality and depth of my field work and, at the same time, opened up a more aesthetic-creative dimension for my research (Back 2012). A brief conclusion will round out the chapter.

1 – Preparing for the Field

When I began work on this dissertation in the late summer of 2016, discussions both within and beyond mainstream media were ripe with new technologies-cum-buzzwords such as the Internet of Things, smart homes, smart cities, self-driving cars and the like. Within critical social theory, Nick Srnicek and Alex Williams's (2016) widely read book *Inventing the Future* structured much of the debate (similarly, Laboria Cuboniks 2018; Mackay/Avanessian 2014; Mason 2015).

Much of this literature enthusiastically embraced emerging technological shifts around AI, self-learning algorithms and automation as a necessary springboard for emancipatory social change. It was within this ferment of early debate that I developed a strong urge to confront what, to my mind, were overtly speculative and rather uncritically technophile accounts with the on-the-ground realities of such prophesised technological revolutions. What I needed was an empirically accessible urban test ground that would allow me to more closely investigate the socio-technological changes underway: a concrete site of empirical engagement that would help me to put to test the idea of a virtually all-disruptive wave of technological revolutions. After weeks of online research, intense

discussions with my supervisors and repeated telephone calls with potential interviewees and local academics, I decided to situate my study in one of the most prominent North American smart-city aspirants at the time: the City of Toronto, Canada.

Early online research presented Toronto as a promising environment for my endeavours. First, the city was rapidly establishing itself as a globally visible smart city aspirant: a hotbed for big-tech investments; tech investments that were welcomed and actively sought after by local political elites, not least: Toronto's Mayor John Tory, who was elected in late 2014 (Keil 2017). Under Tory's lead, two large-scale tech projects put Toronto on the smart-city world map: Toronto's participation in Amazon's HQ2 competition on the one hand (Wachsmuth/Kilfoil 2021: 71), and, almost in parallel, Toronto's even more prominent 'Quayside' partnership with Google parent company Alphabet on the other (Valverde/Flynn 2020). This partnership foresaw the transformation of an abandoned patch of industrial wasteland into a smart-city urban laboratory full with smart housing, self-driving cars and ubiquitous data collection and cross-utilisation. While neither the Amazon HQ2 scheme nor the Quayside partnership were eventually realised,[16] both projects strongly pushed Toronto's global perception as a competitive participant in the new urban race for tech capital investments.

Secondly, and in line with the city's industrial heritage as a North American stronghold of automotive production and consumption (Young/Keil 2008), Torontonian city officials were very active in establishing the city as an early hotspot for self-driving car technology. The city's Interdivisional Working Group on Automated Vehicles (IWGAV), which brought together planners and officials from all of the city's divisions of staff, was an early flagship for exploring the potential impacts of AV technology in a concrete urban environment. The IWGAV was proudly presented on the city's official homepage – where I encountered it during my early online research. It was these two parallel developments of smart-city image creation on the one hand and the exploration of AV-technology by the city itself on the other that made me confident that Toronto was a fertile empirical ground for my scholarly aims.

In the spring of 2017, six months after the beginning of my PhD programme, I started more concrete preparations for my first field stay. Inspired by Clarke's method of 'situational mapping' (Both 2015; Clarke 2005), I conducted an exploratory mapping of

[16] Due to public and activist resistance, the Quayside project was abandoned in early 2020 (O'Neil 2020). Toronto's bid for Amazon's HQ2, meanwhile, was unsuccessful, as Amazon opted for New York City as its preferred locale.

the field of urban mobility and smart city development in Toronto and the Province of Ontario, with (groups of) actors in the narrower realm of self-driving technology forming the core of my early interest. Such mappings often took the form of hand-written notes combined into diagrams and graphs, providing helpful visual (re-)orientation during often confusing and overwhelming first months of empirical engagement with the field. Secondly, pre-field preparations included making first contact, mostly via email but also via telephone, with potential interviewees in Toronto. A specific focus was laid on local planners and city officials involved in matters of urban transportation, the regulation of Uber and the taxi industry and closely related matters. Through these early emails, six expert interviews could be arranged prior to the first field stay, with further seven in-person interviews being arranged during the field stay itself (see below). What is more, two online expert interviews with local academics working in the fields of urban geography and technological change as well as a first preparatory telephone conversation with a local transportation planner could be conducted before my first stay. The positive answers from a sufficient number of local experts, planners and academics strengthened my impression of Toronto as an apposite site for my research.

Furthermore, and providing me with valuable contacts in Toronto, in May 2018 I took part in the *Global Suburbanisms* summer school that, while taking place in the Italian cities of Florence and Milan, was organised by urban scholars both from Toronto's York and Ryerson Universities. These contacts proofed most valuable during my field research in terms of providing further contacts and valuable tips regarding my proceedings, one of which led to an interview with a local academic working closely with city officials on the questions of urban mobility and self-driving cars. Furthermore, I was able to arrange a visiting stay at University of Toronto's Planning and Geography department during my first field stay. My stay at University of Toronto's geography department turned out to be a most helpful catalyst for field access, especially vis-à-vis planners and other expert staff at Toronto City Hall, as many of these professionals had obtained their degrees at the same department. Moreover, bi-weekly seminar sessions at the school granted me access to a lively community of local scholars and graduate students, opening up a most valuable intellectual space of collegial support and discussion during my first field stay.

2 – First Field Stay: The Heights of City Hall

My first field stay took place between 12 September and 16 December 2018. During this time, I conducted 13 semi-structured, qualitative (expert) interviews as well as two brief participant observations of internal meetings of the IWGAV. Alongside both of these methods, I engaged in a more long-term qualitative analysis of relevant texts such as newspaper articles on Uber, the social and political conflicts surrounding local taxi industry (re-)regulation after the arrival of Uber, Torontonian 'smart city' politics and local transport politics.

Participant Observations

As indicated, I conducted two participant observations during my first research stay. Both of them examined meetings of the IWGAV. Brought into existence by Toronto City Council in the wake of Uber's tumultuous arrival in Toronto (see Chapter IV), the main goal and mandate of the IWGAV was to compile a 'Tactical Plan' outlining the city's strategies in dealing with the challenge of future AV implementation and the latter's potential consequences for the city in the broadest sense. After contacting the organisers of the IWGAV via email, I was invited to two two-hour meetings, taking place in a conference room in Toronto City Hall on 21 September 2018 and 30 November 2018, respectively. During these meetings, I was placed among the group members around a discussion table, able to follow the debate and take notes. In terms of data collection, these meetings provided me with important first-hand insights into ongoing internal discussions among city staff that had to do with the arrival and hitherto impacts of Uber, questions of taxi industry regulation as well as potential preparatory actions concerning the advent of self-driving cars on Toronto's streets. In terms of field access, on the other hand, these meetings opened up important possibilities for arranging further interviews with members of the IWGAV. Indeed, it was very helpful to observe some of my later interviewees in a context different from the interview situation, allowing me to triangulate data derived from participant observation with the data won through later interviews. Overall, I interviewed seven members of the IWGAV. Given my earlier participant observations, I was able during these interviews to follow up on issues discussed during the IWGAV group meetings, sometimes involving disagreements between the group's members. In sum, then, the two participant observations conducted

during the IWGAV meetings served as productive entry points into the field, opening up a multitude of avenues for further explorations.

Semi-structured Expert Interviews

Next to these participant observations, I conducted 13 semi-structured expert interviews during my first field stay (Bogner et al. 2009). Overall, my interviewees can be categorised into the three distinct, yet partly overlapping professional groups of (i) academic researchers, (ii) officials and transportation planners on the local state scale (first and foremost, the City of Toronto, with the exception of one planner from the small exurban town of Innisfil) and, finally, (iii) officials and transportation planners on the regional state scale of the Province of Ontario (for a more detailed overview, see Info Box 1). With the exception of one interview (lasting little more than half an hour), interviews were usually scheduled for one hour, with actual interview times sometimes extending up to one and a half hours, depending on the schedule of the interviewee. Again with the exception of one interview, I met all interviewees at their workplace – not seldom, Toronto City Hall – where they were interviewed during their paid working hours. I started every interview with a brief introduction of me and my research, while also providing time for interviewees to clarify questions about the interview situation, the handling of the data derived from it or any other matter of interest brought up by the interviewee. Relying on a prepared questionnaire that I adapted for each of the three groups mentioned above, I would start the conversation with some basic question about the professional background and current role of the interviewee, working my way to more specific questions in relation to the professional expertise of the interviewee.

Many of the interviews I conducted during my first stay led me to high-up office rooms in Toronto City Hall. These interviews took place in a professional work environment characterised by clean office spaces, clearly set timeframes and defined hierarchies. When entering City Hall, I routinely had to pass through a security checkpoint where my belongings were searched for susceptible items. Up on the office floors, I was welcomed, in some cases, by a receptionist who would welcome me and then guide me to my interviewee. I remember that, especially during the first interviews, the bureaucratic environment of City Hall and other state-administrative spaces made me feel uncomfortable. There was something inescapably intimidating about entering the political

engine room of a city that was still largely unknown to me. In this sense, I certainly felt like an 'outsider' to these spaces (Kern 2021: 19).

At the same time, there were a number of social characteristics within these spaces that I could connect to. The specialised language of planners that, while unfamiliar to me in many respects (I neither hold a geography nor a planning degree), was close enough to my own 'professional language' that I had acquired during ten years of social-scientific studies and work. Even more, my research stay at University of Toronto's geography and planning department created some ice-breaking common ground between me and many of the local planners, some of whom had obtained their graduate degrees at the same department. In this respect, and as I was growing in confidence over the length of my stay, there were also dimensions that made me feel like at least a partial 'insider' within the professional world of Toronto's planning department and other divisions of the city.

Interviews conducted during first field stay:

1. **Academic researchers**
    - Interview with scholar at Ryerson University, Toronto (3 October 2018)
2. **Transportation planners and officials on local level (City of Toronto and Innisfil)**
    - Interview with senior staff member of Transportation Planning division, City of Toronto (1 October 2018)
    - Interview with staff member of Transportation Services division, City of Toronto (10 October 2018)
    - Interview with staff member of Transportation Services division, City of Toronto (11 October 2018)
    - Interview with chief transportation planner, City of Toronto (11 October 2018)
    - Interview with staff member of Waterfront Toronto division, City of Toronto (15 October 2018)
    - Interview with senior staff member of Revenue Services division, City of Toronto (31 October 2018)
    - Interview with senior staff member of Transportation Services division, City of Toronto (2 November 2018)
    - Interview with senior staff member of Toronto Transit Commission (TTC) (29 November 2018)
    - Interview with senior staff member of Municipal Licensing & Standards division, City of Toronto (5 December 2018)
    - Interview with transportation planner, Town of Innisfil (7 December 2018)

3. **Transportation planners and officials on regional level (Province of Ontario)**

    - Interview with two senior staff members of Ontario Ministry of Transportation (18 October 2018)
    - Interview with staff member of Metrolinx (5 November 2018)

Info Box 1: Overview of interviews conducted during the first field research stay in Toronto. Overall, 13 semi-structured qualitative interviews were conducted.

Qualitative Content Analysis

The data won through participant observations and interviews was further complemented by the collection and qualitative content analysis of text documents such as, first and foremost, (i) newspaper articles, (ii) official planning documents and (iii) corporate brochures, PR material and webpages (Bryman 2012: 557-559; Mayring 2004; for a more detailed overview of the examined document types, see Info Box 2). Qualitative content analysis unfolded as a constantly evolving process during both my first and second field stays and partly even continued after both stays. There was no rigid distinction, therefore, between documents analysed during my first or second stay. Rather, documents collected during the first stay, might, due to new findings or other circumstances, gain new relevance during the second stay and vice versa. Principally, then, I used the collected documents to derive from them a broader (yet still largely local) context that I could relate to the more circumscribed data sources of participant observations and expert interviews. Constructing such a context involved the careful and repeated reading of the collected documents with a focus on recurring themes and issues guiding me to some of the neuralgic points within my research field such as, for instance, the re-regulation of Toronto's taxi industry after the arrival of Uber in town and the social and political conflicts that accompanied this key process. In this regard, newspaper articles played a central role as data sources, allowing me to construct what could be called a 'medium-range context' that was primarily focussed on the local scale of the City of Toronto and the regional scale of the GTA, yet also allowed for provisional comparison with other municipalities and their respective experiences with Uber.

Meanwhile, planning documents opened up more long-term timeframes. For instance continuous local and regional transport problems such as the chronic congestion of Toronto's roads and the GTA's highways recurrently figured as important topics of public debate. For me, planning documents were key to understand the 'urban ground' of transport politics in Toronto and the GTA. Hence, I used central planning documents such as Metrolinx's (2008) 'Big Move' transport plan as preparatory material for interviews with public officials and transport planners. Finally, documents such as Uber or Lyft's webpages, news blogs, PR material or whitepapers were crucial for understanding the viewpoint of involved corporate actors and their public strategies in managing controversial issues such as taxi industry re-regulation or in promoting new local partnerships.

The first field stay was followed by a two-month phase of transcription and analysis. During this period, the collected material was analysed in light of the first field stay's main insights. Ten out of 13 interviews were transcribed. Notably, this phase of data analysis and reflection led to a not insubstantial reorientation of my PhD project. As many of the insights gained during my first stay suggested, it was productive to slightly shift the focus of the dissertation from the topic of AV development and implementation in Toronto – a process that was set in the future and, as a consequence, was very speculative and hard to empirically gauge – to the already existing and therefore more easily observable transformations wrought on Toronto by the arrival of ridehail platforms such as Uber and Lyft. This didn't mean that I had to abandon the narrower topic of automated vehicles. Rather, a shift of focus towards the already present 'Uber phenomenon' allowed me to understand AV development not so much as an isolated technological shift vaguely set in the future, but as one of many elements forming part and parcel of the wider transformation of Uberisation in Toronto (see Chapter VI). As a consequence, my second field stay zoomed in much more closely on the corporate actors of Uber and Lyft and their actions on the urban ground of Toronto and the GTA.

Principal documents for qualitative content analysis during first field stay:

1. **Newspaper articles and local online magazines**
    - The main newspapers examined on a regular basis were *The Toronto Star* (more than 130 articles) and the *Globe and Mail* (more than 50 articles). Further important sources included local online news outlets such as *blogTO.com* and *torontoist.com*
2. **Planning documents** (selection)
    - **Local state scale**
        - City of Toronto, Official Plan (2015)
        - City of Toronto, Congestion Management Plan 2016-2020 (2016)
        - City of Toronto, Ground Transportation Review (2015)
        - City of Toronto, Automated Vehicles Tactical Plan (2019)
    - **Regional state scale**
        - Metrolinx, 2041 Regional Transportation Plan (2018)
        - Metrolinx, New Mobility Background Paper (2016)
        - Metrolinx, GO Rail Station Access Plan (2016)
        - Metrolinx, GO RER Initial Business Case (2015)
        - Province of Ontario, Places to Grow (2017)
    - **National state scale**
        - Government of Canada, Canada's Safety Framework for Automated and Connected Vehicles (2019)
        - Government of Canada, Innovation Superclusters. Program Guide (2017)
3. **Corporate documents (PR material, webpages, white papers)**
    - The main sources examined were the news blogs of Uber and Lyft (Uber Blog, Lyft Blog) and their various sub-'channels' such as the Uber Engineering Blog or Toronto-based blog entries.

Info Box 2: This box provides an overview of the main documents collected and qualitatively analysed during first field stay. Note that there was no rigid distinction between documents collected during the first and second field stay (see Info Box 3), with both informing the other and vice versa.

3 – Second Field Stay: Uber at Street Level

I undertook my second field stay between 1 September and 5 November 2019. It both expanded and deepened the insights gained during my first stay one year before. Overall, I was able to conduct three participant observations, seven semi-structured qualitative interviews as well as more than 20 'flash interviews' with Uber, Lyft and taxi drivers who I interviewed during rides. As during my first field stay, if now with a stronger focus on

Uber and Lyft themselves, I continued to engage in a qualitative document analysis of newspaper articles, planning documents and online PR material.

Participant Observations

One of the formative events of my research in Toronto took place early during my second field stay. On 24 September 2019, the Swift6 app was launched. Developed by local taxi industrialists, the Swift6 app was conceived as a challenge to Uber and Lyft's newly dominant market position in Toronto. During a day-long event at a suburban banquet hall, taxi drivers could drop in any time during their day shift and see presentations of the new app, with drinks and food served for free (Figure 1). Watching the presentations, taking notes and repeatedly engaging in conversations with drivers as well as the organisers of the event, I aroused substantial suspicion, with some of the drivers speculating that I might be a corporate spy sent by Uber. Clearly, it was during this event that my 'outsider' position as a researcher became most visible. My overall appearance – a young, white European male in casual street wear speaking with a German accent – contrasted rather starkly with the 'in-group' of taxi drivers: mostly, middle-aged, racialised men, many of them immigrants from East African, Eastern-European, South-East Asian or Middle-Eastern countries. During the whole event, I took handwritten notes, which I later transcribed on my laptop. Further, I engaged in numerous conversations that I transcribed by heart both during and shortly after the event.

While the Swift6 app never put a real challenge to Uber's dominant market position, its presentation event was paramount to my second field stay and even my research as a whole. For the event brought me in contact with some of the key drivers and organisers of decade-long taxi industry struggles in Toronto. I conducted extensive interviews with some of these drivers (see below), some of whom had already switched to drive for Uber and Lyft at the time. These interviews, more than any other source, provided me with first-hand insights into the written (as well as unwritten) rules of Toronto's taxi industry. Many of the insights gained through these interviews particularly informed the arguments developed in Chapter IV.

Figure 1: This advertisement was placed in the September issue of TaxiNews, a local outlet of Toronto's taxi industry published by local taxi veteran John Duffy. It directed me to the Swift6 app presentation where I was able to make contact with taxi drivers long involved in industry struggles. I interviewed some of them during the further course of my stay.

Apart from this formative event, I conducted two further participatory observations during my second field stay. On the one hand, I participated in an informal 'meet and greet' organised by the City of Toronto's transport services division on the topic of future AV implementation. The event took place in a downtown Toronto pub and mostly attracted academics such as me, industry members from the transport and logistics sector, city staff as well as interested citizens. On the other hand, on 24 October, I visited a hearing of the City of Toronto's Licensing tribunal. Often, and also on this day, a taxi driver was under threat to lose his licence and it was informative to follow the hearing to gain a better understanding of the, oftentimes tense, relationship between drivers and city regulators (Valverde 2012: Ch. 7).

Expert Interviews and Driver 'Flash Interviews'

During my second field stay, I conducted seven semi-structured expert interviews with (former) taxi drivers, city officials, city councillors and their staff. Moreover, I was able

to engage in 21 ‘flash interviews’ with Uber and Lyft drivers conducted during rides that I arranged via the apps of these companies (for a detailed overview, see Info Box 3). These flash interviews were a reaction to one of the major research challenges that I encountered during my second field stay. Inspired by a study of Toronto’s taxi industry by Sara Abraham, Aparna Sundar and Dale Whitmore (2008), I first planned to rely on a survey-based method, in order to obtain a better understanding of Toronto’s taxi industry and its drivers. The survey was based on a questionnaire that I prepared and wanted to hand out to both taxi and ridehail drivers during their break times. The survey was slightly different for both types of drivers, yet covering the same overall themes such as driver income, motivation and hours of work. The range of topics produced a document that was several pages long and, as such, way too time-consuming for drivers to fill out during their rare and often only short work breaks. A first test run in the taxi queue of a downtown shopping mall turned out to be a total failure. Understandably, none of the drivers was ready to complete the survey during their unpaid break times. Feeling increasingly uncomfortable about my original idea and its unworldly assumptions, I abandoned the survey in favour of a more practicable ‘flash interview’ strategy.

Partly inspired by Rosenblat’s early research on Uber and her use of what she calls ‘flash ethnography’ (2018: 213), I started to arrange trips for myself via the Uber and Lyft apps, interviewing the driver during the trip. Usually, I would start the conversation by briefly introducing myself and my research and then ask the driver if they were ready to talk to me. Mostly, this was the case, with only a handful of drivers refusing a conversation. During all of these brief interviews I refrained from using a recording device and wrote down the key points of the conversation from memory, usually immediately after leaving the vehicle. While I didn’t have the financial resources to conduct this way of research on a grander scale, it allowed me to compensate drivers for their time via the trip fares and tips as well as, if certainly minor in import, a five-star rating on the app. While these flash interviews were too small in number to produce any insights not already brought to light in existing studies of the work life of Uber drivers (e.g. Lee et al. 2015; Rosenblat/Stark 2016; Wu et al. 2019), they were an important way for me to, on the one hand, gain first-hand insight into drivers’ routines and conduct during a ride and, on the other, obtain an impression of the ‘Uber experience’ from a passenger’s perspective. I applied the same flash method during three taxi rides. Apart from the flash interviews, I conducted a further interview with the general manager of a Torontonian taxi company via Skype.

Interviews conducted during second field stay:

1. **Semi-structured expert interviews**

    - Interview with two taxi drivers/union organisers (28 September 2019)
    - Interview with senior transportation planner (freight and goods movement), Region of Peel (1 October 2019)
    - Interview with further taxi driver/union organiser (7 October 2019)
    - Interview with chief of staff of a Toronto city councillor (9 October 2019)
    - Interview with taxi industry insider and publicist (23 October 2019)
    - Interview with Toronto city councillor (24 October 2019)
    - Interview with general manager of local taxi company (conducted after field stay via Skype on 11 March 2020)

2. **Flash interviews with Uber and Lyft drivers**

    - During my second field stay I conducted 21 flash interviews with Uber and Lyft drivers and three with taxi drivers.

Info Box 3: Overview of interviews conducted during second field stay.

Overall, the interviews conducted during my second field stay differed substantially from those during my first stay. The universe of Toronto's taxi and ridehail industry was clearly different from the work environment of Toronto City Hall. While the latter was marked by clean and ordered office spaces, the 'natural environment' of Toronto's taxi industry mostly consists of 'the street' and its adjacent infrastructures: fast food restaurants, parking lots and taxi queues outside transit stations and other urban hubs. As indicated above, it was the presentation of the Swift-6 taxi app that made me most aware of my outsider role within a taxi industry that for decades had been shaped by deeply racialised labour relations. It was apparent that I was new to a large, yet sometimes surprisingly close-knit community of drivers, plate owners, business owners and other industry insiders; an industry in which people had known each other for many years and decades and where, sometimes paradoxically, friendly personal contacts persisted beyond heavily opposed political interests. It was more than obvious that I was new to this world. Despite these difficulties, many drivers were extremely welcoming and open to talk to me. I was very lucky, in this sense, to be granted access to a world to which I have remained an outsider, yet which I was granted access to via the generosity of a handful of individuals who I am greatly indebted to.

Qualitative Content Analysis

As noted above, I did not draw a rigid boundary between documents collected and analysed during my first and second field stays. Nevertheless, and in line with the broader reorientation of my research after my first stay in Toronto, the thematic focus of the collected documents shifted towards more Uber-specific online sources such as driver forums and blogs – most of all, *uberpeople.net*, *ridesharingforum.com* and *therideshareguy.com* – as well as Facebook groups specifically geared towards Torontonian drivers such as *Uber Drivers Toronto* (Info Box 4). These sources allowed me to get an understanding of broader issues and problems that drivers encountered in their day-to-day work life; issues that I could then relate and critically align with what I had learnt from drivers during my flash interviews. As during my first field stay, there was a close reciprocal relationship between interview data on the one hand and content analysis on the other.

Principal documents for qualitative content analysis during second field stay:

1. **Driver forums and Facebook groups**
    - My principal sources were the driver forums *uberpeople.net* and *ridesharingforum.com*. Both the former and the latter provide Toronto-specific forums, which I frequented the most.
    - Furthermore, I regularly visited the Facebook driver group *Uber Drivers Toronto* in order to stay in touch with key issues discussed by drivers on a local basis.
2. **Ridehailing online blogs**
    - My principal source was the popular blog *therideshareguy.com*, which provides information, video tutorials and other resources for drivers covering a wide range of topics such as taxes, vehicle insurance and maintenance and many more.
3. **Local taxi news**
    - The local taxi news outlet TaxiNews was a further important source for the discussions and social conflicts surrounding the entry of Uber and Lyft into Toronto's taxi industry and the re-regulation of the latter.

Info Box 4: Overview of documents used for qualitative content analysis during second field stay.

4 – The Field in Walks, Notes and Photographs

Beyond the method triangle of participant research, semi-structured interviews and qualitative content analysis, there were a number of more exploratory and partly more artistic methods that played an important role during both of my field stays. First, and in particular during my first field stay, exploratory walks formed an essential method that I regularly engaged in (Bates/Rhys-Taylor 2017; O'Neill/Roberts 2019). In particular, walking was key for me to familiarise myself with my research environment: the everyday rhythms and spaces of Toronto as a city I had never visited before. One encounter during such an early city exploration remained particularly memorable to me. Tired from a day that I spent walking through Toronto's downtown streets, I decided to take the subway back to my home in the city's west end. It was during this subway ride that, more by chance than conscious interest, I caught a glimpse of a map of Toronto's public transit system. Having lived in European cities like London and Berlin before – both of them cities with particularly dense networks of public transportation – this look at Toronto's public transit map certainly opened my eyes to a situation that was quite different: Toronto – a city of almost three million inhabitants and the centre of a larger urban region that counts more than six million – possessed only four subway lines, with two of them operating as mere 'adjuncts' to one major north-south connection (the Yonge-University Line) and one major east-west connection (the Bloor-Danforth Line).

This is not to denigrate Toronto or North American urbanism in general as somehow 'lacking' or 'backward'. Rather, from this moment on, the picture of Toronto's public transit map (Figure 2) stayed with me as a constant reminder that context matters: that companies like Uber and Lyft may and in fact do encounter quite different systems of transportation, infrastructure and local or regional politics in different cities and, even more so, on different continents. There was no use to transpose my experience of living in large European cities to a Torontonian urban context that had developed along comparable, yet certainly not identical historical paths of urban development (Keil et al. 2017). I had to open myself up to a new situation. While I'm not sure whether I was very successful in doing so, it was my sincere aspiration to refrain from imposing my European urban biases onto Toronto as much as possible.

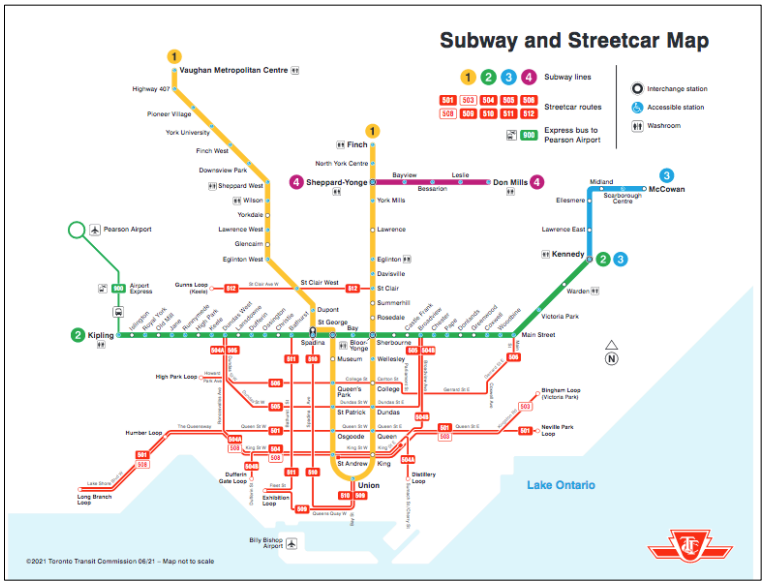

Figure 2: Map of Toronto's subway and streetcar system. The latter is depicted in red, the former in yellow (Yonge-University Line), green (Bloor-Danforth Line), blue (Scarborough Line) and purple (Sheppard Line). (Source: Toronto Transit Commission (TTC) 2021).

A digital photo camera was a constant companion during my exploratory walks (Harper 2004). Mostly, I used the camera as a mnemonic device that would allow me to visually capture relevant field sites without having to restore to time-consuming note taking. Clearly, the focus of my picture taking was on documenting the field by way of (more or less) quick and sometimes even hasty snapshots rather than any ambition of producing aesthetically appealing photographic work. Nevertheless, and as can be seen in some of the chapters below, some of these photographs have made their way into the main body of *Uberising the Urban* – be it as illustrative visual supplements, as data material in its own right or both.

Finally, I also made extensive use of both handwritten and digital notes in what could be called my constant companion of a 'field diary' (Burgess 1981; Punch 2012). Especially in situations that did not allow for audio recording or photographing – such as flash interviews with drivers or participant observations that usually did not allow for such intrusive methods – note taking, both during the event or later from memory, was essential to capture data that could not be collected in a more direct way. Not seldom, the transcription process from handwritten to digital notes entailed a rethinking of the experienced scene with substantial editing and 'cleaning' of the data from less important or even unnecessary parts.

5 – Conclusion: Used and Unused Data

This chapter presented the empirical groundwork that has informed this PhD dissertation. By providing a close, yet certainly far from all-encompassing, account of my field work – the methods I used, the dead ends I ran into, the 'field work joys' that I experienced when being at the right place at the right time (such as during the Swift6 app presentation) – I hope that the situated, context-specific dimension that has inescapably informed the written end product of this thesis became more visible.

Beyond a discussion of my empirical work itself, I would further see this chapter as a self-reflective comment upon the role of social scientific research vis-à-vis the newly emerging phenomenon of Uberisation; a phenomenon that, over the course of the last decade, has increasingly made its way into the thickness of urban everyday life in cities worldwide. Against the temptation to treat Uberisation as an isolated phenomenon driven by an 'inherent' logic of its own, I have tried in this chapter and in this work as a whole to understand Uberisation from within the broader process and context of urban politics itself: a context that necessarily forces ridehail companies like Uber and Lyft to grapple with a myriad of social dynamics, political interests and physical structures that may both hinder and accelerate the cause of a fuller Uberisation of the urban. In fact, it was my two field stays in Toronto that made me aware of those neuralgic points of contact between Uberisation and urbanisation that later became the key problematiques of the three case studies of this thesis: taxi industry re-regulation (Chapter IV), the proliferation of public-private ridehail partnerships (Chapter V) as well as processes of large-scale urban data collection for AV development (Chapter VI). In this sense, my field work in Toronto alerted me to the myriad of apparent contradictions, political resistances and social frictions that the process of Uberisation brought with it when examined not only in theory but also in actual time and place. Deviating, in part, from the theoretical literature that, very importantly, had sparked my interest in a new wave of high-end technologies and their social consequences in the first place (e.g. Laboria Cuboniks 2018; Mason 2015; Srnicek/Williams 2016), my fieldwork allowed me to zoom in more closely on Uberisation as a historically situated, locally variegated and politically deeply contested process.

It goes without saying that not all of the empirical material discussed here has made it to the chapters below in the form of quotes, excerpts or photos. However, even such seemingly 'unused data' has surely shaped my thinking in ways that I may not always be

fully conscious of. I leave it to the reader, therefore, to explore the below chapters in light of the elaborations given above.

Chapter III

The Uberisation of the Urban

Literature Review

How does Uber change the city? This, in simple terms, is the question at the heart of this PhD thesis. One of the answers to it comes from Uber itself. In a PR film from 2017, the Silicon Valley company envisions a near-future urban reality in which its mobility services have more fully sunk into the urban fabric (Uber 2017). The video follows the evening commute of a young female professional from her downtown office to her suburban home. Standing in front of her office building, the young woman orders a trip via the Uber app. Almost instantly, she is picked up by an Uber self-driving car delivering her to one of the company's nearby skyscraper air hubs (Figure 3). Within a couple of minutes, an Uber helicopter shuttle takes her out of the inner city and to another air hub located in the suburbs. Leaving the station, she is again awaited – just-in-time – by a self-driving Uber SUV that eventually delivers her home, with daughter and husband already awaiting her for dinner. What the video captures, in short, is a vision of a more fully Uberised, seemingly seamless system of urban transport devoid of the usual nuisances of the daily commute: a vision, at least for those who can afford it, of a city freed from friction.

It is one of the wagers of both this chapter and this thesis as a whole that elaborately rendered corporate imaginaries such as this one do not get us very far in answering the above question: *How does Uber change the city?* Any serious attempt to respond to this problematique, one that hopes to live up to the real-world political and social challenges that the arrival of Uber and its various competitors has posed in hundreds of cities worldwide, presupposes – I would argue – a serious theoretical engagement with and a thorough thinking through of its two central conceptual bearers: 'Uber' on the one hand, 'the city'[17] on the other. Both terms, if approached from a critical vantage, open up and refer us back to vast fields – some long established, some more recently developed – of critical social theorising.

Figure 3: Still from an Uber PR video. The short film follows the evening commute of a young female urban professional from her downtown office to her suburban home. Seamlessly integrating Uber's different mobility services, the journey combines legs travelled by self-driving car with an even more futuristic air-taxi flight. The overall promise is one of seamless, 'just-in-time' personal urban mobility. Source: Uber (2017: n.p.).

This chapter provides the theoretical groundwork for the rest of this thesis by putting forth its central concept: the Uberisation of the urban. I understand the Uberisation of the urban – or, in short: *Uberisation* – as a process in which the more abstract logics and rationales of Uber's business model – what I shall call the 'forces of Uberisation' – come into contact and potential conflict with those locally variegated qualities of the urban ground – what I shall call the 'urban conditions of Uberisation' – that are found in

[17] I am aware of recent discussions within critical urban geography problematizing the concept of 'the city' and its nowadays often more ideologically misleading than theoretically revealing uses (Brenner 2014; Goonewardena 2014; Merrifield 2014: x-xi). If, in this chapter and throughout this thesis, I use the signifier 'the city', I shall do so in the spirit of understanding it as a – sometimes necessary – shorthand for the both much broader and more abstract process of urbanisation; in David Harvey's concise formulation: "the 'thing' we call a 'city' is the outcome of a 'process' that we call 'urbanization'" (2014 [1996]: 61).

different cities and urban regions worldwide. First, via a review and critical discussion of the various strands of critical literature that have engaged with the 'Uber phenomenon' from multiple theoretical and empirical angles, the next section develops the concept of the forces of Uberisation. The latter, as I argue, can be understood as the variously elastic imbrication of three main vectors that define the contours of Uber's general business model: (i) data *extraction*, (ii) labour *exploitation* and (iii) platform *expansion*.

The subsequent section turns its attention to the urban conditions of Uberisation: those parts and dimensions of the urban fabric that Uber necessarily has to grapple with when inserting its services into the dense webwork of urban everyday life (Mezzadra/Neilson 2019: 2-3). Within the North American setting that broadly delimits the geographic context of this thesis, the urban conditions of Uberisation, as I argue, have largely been the product of a two-pronged, multi-scalar state-spatial response to the 2008 financial crisis: an inward-oriented politics of *austerity urbanism* on the one hand (Peck 2012) and an outward-oriented reaction of policy-boosterist *smart urbanism* on the other (Marvin et al. 2016; McCann 2013). As I argue in conclusion, it is encounters and clashes between these two dimensions of Uberisation – the abstract logics of the forces of Uberisation on the one hand and the concrete, local conditions of Uberisation on the other – that produce new political and social fault lines: frictions that Chapters IV, V and VI will explore in the concrete urban context of Toronto and the GTA.

1 – The Forces of Uberisation

The ridehail phenomenon is all around us. Uber, Lyft and their Chinese counterpart Didi Chuxing are only some of the most prominent corporate representatives of what are variously referred to as 'mobility platforms', 'private transportation companies', 'transit network companies', or – simply, yet rather misleadingly – 'ridesharing' (Piétron et al. 2021; Schwieterman et al. 2018; Shaheen/Chan 2016).[18] Even more often, the four-letter signifier 'Uber' has come to stand – in *pars-pro-toto* manner – for a broader techno-capitalist transformation in and beyond the realm of urban mobility whose exact outlines, I would argue, we have not even started to fully grasp (Wark 2019). As David Harvey reminds us, any seemingly static corporate entity – just like any other temporary institutional congealment of inherently *dynamic* social relations – is necessarily

[18] For critiques of the widespread sharing-economy language, including the widespread term 'ridesharing', see, Scholz (2016) and Valverde (2016).

"embedded in the continuous flow of the process of which it is a part and, like any other entity, it internalizes contradictions, is heterogeneous, and inherently unstable by virtue of the complex processes which support, reconstitute, or develop it" (1996: 66). All of the above companies – from Uber, via Lyft to Didi Chuxing – can be seen, then, not only as closed corporate 'black boxes' that have started to leave their imprint on the urban grounds of hundreds of cities worldwide, but also as corporate bearers – in the Marxian sense of the word (Marx 1976: 254) – of social relations that are both more abstract and wide-reaching than any of the networks of these companies themselves (Sayer 1981; Toscano 2008).

What in this chapter and throughout this thesis I shall call Uberisation should be understood then not so much as referring merely to the empirically observable actions in this world of a corporate unit called Uber, but rather as the locally variegated and historically dynamic confrontation of the forces of Uberisation on the one hand and the urban conditions of Uberisation on the other. Both of these terms demand close attention. While I will turn to the urban conditions of Uberisation in due course, it is the task of this section to provide us with a more detailed understanding of the forces of Uberisation – those defining principles, logics and rationales that underlie and drive Uber's business model. As I argue, the forces of Uberisation align themselves with and can be described by three main vectors that are central to Uber's operations: the vectors of data extraction, labour exploitation and platform expansion.

Vectors of Extraction: Data

The centrality of data to so many of tech capital's newly emerging business models has neither escaped radical social theorising in general (Dyer-Witheford et al. 2019; Mezzadra/Neilson 2019; Srnicek 2017; Wark 2019) nor the newly emerging field of critical data studies in particular (Dalton et al. 2016; Kitchin 2014a; Sadowski 2019; 2020b). Close critical scrutiny of big data as a new social force – one that, more often than not, comes with its own gendered and racialised biases (Apprich et al. 2019; Eubanks 2018) – has started to lay bare the social and political conflicts associated with the production, distribution and circulation of big tech's big data. Opposing widespread views of data as a naturally given, seemingly neutral "digital raw material" (Sadowski 2019: 4; Gitelman/Jackson 2013), a growing number of scholars have started to develop new conceptual vocabularies in order to bring to the fore, in Shannon Mattern's words,

"data's human, institutional, and technological creators" (2017a: n.p.). Sometimes formulated with explicit reference to Karl Marx's (1976: Ch. 26) account of primitive accumulation in *Capital Volume 1*, new conceptual coinages include metaphors such as 'data colonialism' (Thatcher et al. 2016), 'data dispossession' (Dean 2016), 'data grabbing' (Fraser 2018) or – as mostly used in this section – 'data extraction' (Sadowski 2019).

One of the most ambitious attempts so far to theorise the newly important role of data within platform capitalism comes from Jathan Sadowski (2019) and his conceptualisation of what he calls 'data capital'. Building on Pierre Bourdieu's (1986) categories of cultural and social capital, Sadowski proposes the concept of data capital as, in his words, "a form of capital that is distinct from, but has its roots in, economic capital" (2019: 4). By distinguishing data capital from, rather than equating it with, economic capital, Sadowski leaves important intellectual leeway for an understanding of datafication along its own specific logics: what Sadowski proposes, in short, is a political economy of data that, if certainly closely and variously interwoven with Marx's political economy of value, may also decidedly differ from it. Speaking with an Althusserian vocabulary derived from the latter's essay 'Contradiction and Overdetermination' (2005 [1969]: Ch. 3), one might say that Sadowski posits data capital as standing in *relative autonomy* to, yet as being *overdetermined* by economic capital. Data capital, as Sadowski writes,

> is more than knowledge about the world, it is discrete bits of information that are digitally recorded, machine processable, easily agglomerated, and highly mobile. Like social and cultural capital, data capital is convertible, in certain conditions, to economic capital. But [...] not all value derived from data is necessarily or primarily monetary (2019: 4).

There are instances, then, when data capital can be transformed into economic capital. Sadowski enlists six such pathways: Big data, he writes, can be used to (i) "*profile and target* people," (ii) "*optimise* systems," (iii) "*manage and control* things" (and, I would add, people), (iv) "*model* probabilities", (v) "*build* stuff" and, finally, (vi) "*grow* the value of assets" (2019: 5-6; emphases in original). While Sadowski, as mentioned, does not formulate these six points with explicit reference to Uber, they provide a productive theoretical grid for specifying big data's *various* functions within the Uber system. What I would like to do, then, based on Sadowski's account and with recourse to recent 'Uber scholarship', is to present five[19] distinct ways in which Uber harnesses big data, in order to drive and optimise its operations.

[19] While Sadowski's sixth item – the growth of the value of things via their data-enrichment – marks a plausible option in general, I do not see, at least not on the basis of the *existing* literature, a corresponding

First, data-enabled practices of targeting and profiling play a central within Uber's day-to-day operations. Uber overlooks a vast inventory of detailed and constantly updated passenger and driver user profiles, allowing for specific strategies of labour management and data cross-referencing (Calo/Rosenblat 2016; Lee et al. 2015; Rosenblat 2018; Wu et al. 2019). As Rosenblat notes, for instance, Uber was repeatedly suspected to experiment with what she calls processes of "dynamic price discrimination" (2018: 128) in which different passengers are charged different prices for the same trip. Similarly, Van Dijck et al. report that in "the spring of 2017, Uber started to experiment with 'route-based pricing' in a number of markets. Customers pay a flat rate that is set up at the start of each trip. This price is calculated by machine learning algorithms that try to figure out how much a given person in a given situation would be willing to pay for a ride" (2018: 81). Not only may Uber generate extra fare revenues through such practices, but also, as Rosenblat foregrounds, an even greater "wealth of data about passengers and their willingness to pay within a range of price tiers" (2018: 129). Not minor in import, detailed information about passengers and drivers further informs Uber's automated dispatching system – one of the central functions of Uber's existing ridehail system (Lee et al. 2015; Truong et al. 2017). As these examples illustrate, practices of targeting and profiling form one of the core elements of Uber's data strategy.

Secondly, procedures of data extraction and cross-referencing allow for more general vistas of *system optimisation*. Knowing the exact positions of all of its driver and passenger users at any point in time has allowed Uber to apply to its urban-scale operations an approach that is akin to what in the realm of global logistics has been described as a 'systems perspective': an approach in which "'attention is focused upon the total action of a function rather than upon its individual components'" (Smykay and LaLonde 1967, quoted in Cowen 2014: 35; Woodcock/Graham 2020: 50). Consider, in this context, Van Dijck et al.'s characterisation of Uber's operations as an algorithmic system managing the complex interactions between drivers, passengers and other traffic participants by way of abstracting them to a huge, yet finite number of discrete data points. "With digital technologies," they write, "available cars, drivers, their positions, and current traffic conditions and transportation needs can be turned into data points (datafied information). In turn, these datafied indications of demand and supply can be matched through (algorithmic) selection by transport platforms" (2018: 78). In comparison to the variously more splintered operations of former taxi industries (Tucker

use case vis-à-vis Uber or other mobility platforms. As a result, and partly deviating from Sadowski, I only include five vectors of data extraction below.

2018), Uber's unified systems approach opens up room for economic efficiencies in the form of, for instance, lowered transaction costs (Barns 2019: 5). Even more, Uber's data-enabled systems approach allows for higher levels of customer convenience, as all users are subsumed within a unified field of algorithmic calculations. Organising a ride via the Uber app is variously more convenient than ordering a taxi via phone: "What Uber has been able to do," as Woodcock and Graham observe,

> is provide a customer interface that is appealing to smartphone users. No longer waiting on the phone to order a cab, but a slick designed app that orders the Uber car to the customer's location, showing not only the time until arrival, but also details on the driver and number-plate. This means no longer needing phone numbers for different local taxi companies, and no need for the customer to explain where they are (2020: 47).

As the existing literature has shown, data-enabled system efficiencies allow for decisive competitive advantages of Uber over local taxi industries that, at least at the time of Uber's arrival in many North American cities, still mostly relied on computer-aided *human* dispatching (Mathew 2015).

Practices of management, surveillance and control open up a third important field of application for Uber's big data. As a growing number of studies have shown, and as I will explore in more detail below, Uber offers a textbook example of practices of management and surveillance in the form of the data-enabled algorithmic management of drivers (Aloisi 2016; Amorim/Moda 2020; De Stefano 2016; Lee et al. 2015; Rosenblat/Stark 2016; Wu et al. 2019). As particularly Rosenblat (2018) has shown in a book-length study informed by empirical research in more than 25 (largely US-American) cities, Uber's algorithmic management system leverages various information asymmetries between the narrowly restricted 'field of vision' of individual(ised) drivers on the one hand and, as seen above, Uber's virtually all-encompassing system-perspective on the other. Such information asymmetries allow Uber to exercise detailed control over drivers' working hours, their conduct vis-à-vis passengers and many more dimensions of drivers' day-to-day work routines. At the same time, Uber also allows for a substantial degree of nominal labour flexibility (Wu et al. 2019: 589-590). Hence, as Woodcock and Graham (2020: 30-33) argue, it is crucial to not only point to practices of heightened control and surveillance within the newly emerging gig economy, but also to account for the ways in which platforms like Uber have responded to earlier labour demands for enhanced work time flexibility. I will return to this issue, when examining Uber's elaborate system of algorithmic management in the next section.

Fourthly, *scenario building and modelling* form another important dimension of Uber's datafication strategy. "With enough data covering a wide range of variables over a period of the time," Sadowski writes, "companies promise they can predict the future. While these 'predictions' are actually probabilities, there is a growing market for data-driven forecasting tools" (2019: 6). In this respect, Attoh et al.'s (2019) recent study of the Uber Movement service provides the yet most extensive example of how Uber's amassed traffic data, extracted from the daily transport work of drivers, not only informs Uber's real-time operations, but also feeds into more long-term traffic pattern analyses and various forms of predictive scenario building. Such analytical efforts are bundled in Uber's Uber Movement service. As Attoh et al. show for the case of Washington D.C., Uber leveraged this service to foster partnerships with local authorities and planning agencies, promising "to help 'urban planners and civic communities' use data to 'crack their city's commute'" (2019: 1008; with reference to Newcomb 2017). While not necessarily translating into direct monetary revenues – Uber, for the most part, offers its Movement service for free – it is fair to assume that such partnerships might well pay off, both politically and monetarily, in the long term. I will come back to this important dimension in Chapter V, which examines the recent proliferation of what I call the public-private ridehail partnership (PPRP).

Finally, Uber deploys data to *build stuff*. Big data – derived both from Uber's daily ridehail business and more specialised data mining procedures – is used, quite literally, to *build* the virtual training scenarios for Uber's self-driving ML software (Uber ATG 2018; Urtasun 2021; Wang et al. 2017). While the issue of self-driving cars has attracted growing scholarly attention lately (Howe 2013; Jones et al. 2021; Marres 2020; Mattern 2017b; Moody 2018; Stilgoe 2018), and while Uber's AV ambitions are often alluded to in parts of the literature on Uber (e.g. Calo/Rosenblat 2017: 1669; Rosenblat 2018: 177-180; Woodcock/Graham 2020: 50), a detailed engagement with Uber's AV programme has been beyond the scope of most scholarly contributions so far. It is partly in response to this lacuna that Chapter VI zooms in on Uber ATG's AV ambitions and the data production procedures undertaken in its name in the City of Toronto.

Overall, it is possible to identify five main fields of application for Uber's data: (i) the profiling and individualised targeting of Uber driver and passenger users, (ii) the optimisation of Uber's overall platform system, (iii) the management and control of drivers via elaborate techniques of algorithmic management, (iv) the modelling of forecasts and future scenarios and, finally, (v) the building of training scenarios for Uber ATG's self-driving car software. While economic value may be derived from (some of)

these fields of application both now and in the future, they should also be seen – in accordance with Sadowski's (2019) theorisation of data capital – as important sites of experimentation where Uber's data is put to uses that may not always be motivated by the (immediate) generation of economic value. Nevertheless, and as we shall see next, Uber's vectors of data extraction variously crisscross with other vectors that are equally paramount to its business model: those of labour exploitation.

Vectors of Exploitation: Labour

Next to vectors of data, perspectives of labour control, working conditions and, if to a lesser degree, worker resistance have emerged as equally visible research agendas of early Uber scholarship (Amorim/Moda 2020; Calo/Rosenblat 2017; Hua/Ray 2018; Rosenblat 2018; Woodcock 2021). Notably, a growing number of labour scholars have started to situate their empirical findings on Uber within conceptual frameworks that make explicit use of key Marxian categories such as surplus value extraction, the (real and formal) subsumption of labour and, perhaps most of all, *exploitation* [20] (Amorim/Moda 2020; Diab 2019; Rekhviashvili/Sgibnev 2018; Woodcock/Graham 2020; Wu et al. 2019). What resurfaces in these analyses in various analytical forms, as Qingjun Wu, Hao Zhang, Zhen Li and Kai Liu observe, is the "classic Marxian premise that only labor produces value such that capital has to control the labor process in order to extract surplus value" (2019: 577). The exploitation of drivers, in short, presupposes a sufficient degree of control by Uber over its drivers. If that is so, then Uber clearly is confronted with a practical difficulty that long has occupied capitalist transport industries in general and the taxi trade in particular (on the former, see Cowen 2014: 100-102; Diab 2019: 133-135; Marx 1978: 135, 225-229; on the latter, see Mathew 2015; Tucker 2018): *the extraction of surplus value from transport workers*. One straightforward way of how Uber effects such exploitation, as Ramon Salim Diab (2019: 139) has shown, is via a piece-wage system that compensates drivers for direct production time – those limited time periods when they transport a passenger from A to B – not, however, for the rest of their working days, which they might spend circling city streets in wait for a 'ping'[21] or making their way to the pick-up location of their next customer. The majority of scholarly contributions, Marxian or otherwise, that have investigated the daily work experiences of

[20] For more extensive discussions of Marx's concept of exploitation, its historically changing character and its links to other Marxian and non-Marxian key categories, see Caire (1984) and Mezzadra/Neilson (2019: 201-208).

[21] A ping, in Uber driver language, is a ride request signalled by the Uber app's distinct 'ping sound'.

Uber drivers tend to come back, in one way or the other, to exactly that key dimension identified by Wu et al. (2019): capitalist *control* over the labour process.

There are two basic perspectives that have informed analyses of Uber's strategies of labour control so far. On the one hand, there is a – broadly conceived – *labour process perspective*[22], while on the other hand we find a *socio-legal perspective* focussed on matters such as labour and employment law in relation to the daily work experience of Uber drivers (Wu et al. 2019: 576-578). It is these two perspectives that structure my discussion of relevant literature in this section; literature that, in one way or another, sheds light on what I call Uber's *vectors of exploitation*. Making extensive use of the existing literature, this section brings to the fore, then, two separate, yet closely intertwined 'systems of power' that allow Uber to exercise control over its drivers: an intricate (yet globally fairly universal) system of algorithmic management on the one hand and a patchwork of (locally more variable) regimes of state regulation on the other (for a similar argument vis-à-vis the late pre-Uber US-American taxi industry, see Mathew 2015). I start with algorithmic management.

Uber's algorithmic management system stands in close relation to broader shifts of work under digital capitalism. Empirical and theoretical probings of the latter have shed light on new regimes of algorithmic labour control increasingly dominating the everyday work experiences of 'productive' and 'reproductive' (gig) workers worldwide (Dyer-Witheford 2015; Huws 2014; 2019; Moore/Woodcock 2021; Scholz 2017; Woodcock/Graham 2020). Partly in line with new conceptual coinages such as 'digital Taylorism' (Altenried 2017), some have referred to this shift as a logistification of labour enabled by the algorithmic architectures of protocols, standards and worker-machine interfaces (Cowen 2014: 105-113; Neilson/Rossiter 2010; Rosenblat/Stark 2016; Rossiter 2016: 1-20). In parallel with such shifts, Uber's algorithmic management system has rendered the role of the human taxi dispatcher largely obsolete. Understood, in short, as "software algorithms that assume managerial functions," Uber's algorithmic management system "allows a few human managers in each city to oversee hundreds and thousands of drivers on a global scale" (Lee et al. 2015: 1603). Studies investigating Uber's practices of labour control have usually distinguished three (closely intertwined) subdomains of Uber's algorithmic

[22] This does not mean at all that all scholars that I subsume here under the signifier 'labour process theory' would identify themselves with this perspective, heavily influenced as it is by Marxian social theorising (Braverman 1974; Burawoy 1979; Wu et al. 2019: 577-578). Nevertheless, the analytical and empirical insights produced by studies that could equally well be categorised as *labour ethnographies* – such as, most prominently perhaps, Rosenblat's extensive work on Uber (Calo/Rosenblat 2017; Rosenblat 2018; Rosenblat/Stark 2016) – can be said to largely fall in line with the overarching research agenda of a (broadly conceived, and not *necessarily* Marxian) labour process theory.

management system, each of them linked to a number of specific dynamics of control: (i) Uber's dispatching system, (ii) its pricing strategies and, finally, (iii) Uber's passenger rating system (Amorim/Moda 2020; Lee et al. 2015; Rosenblat/Stark 2016; Wu et al. 2019). I will discuss these – deeply intertwined – three sub-systems of algorithmic management one by one.

First of all, Uber exercises control over its drivers via its dispatch system. The Uber platform solves the age-old taxi problem of matching passenger demand with driver supply by way of a fully automated dispatching system able to process "one million rides per second" (Diab 2019: 144). Importantly, and against widespread perception, spatial proximity between a ride-requesting passenger and nearby drivers is far from the only variable that informs Uber's matching procedure (Lee et al. 2015: 1606). Relying on the company's driver and passenger profile database, Uber's dispatch system weighs a whole variety of so-called 'optimisation factors' including variables such as "user preferences, driver ratings history, reputation data, complaint history, punctuality history, etc." (Truong et al. 2017: 1; see Figure 4). If, for instance, a passenger had once complained about one of the proximate drivers, the system may not match the pair but opt for an alternate driver. Apart from such customer-oriented tweaks, access to drivers' profile data allows Uber to discipline drivers in various ways. A key factor in this regard is drivers' so-called ride acceptance rate (RAR) (Rosenblat/Stark 2016: 3761). In principle, a driver can always decline an incoming trip request. Too many declined trips, however, will decrease a driver's RAR, which may not only lead to less trip requests sent to that driver (Wu et al. 2019: 589), but also put the driver at risk of missing certain thresholds in Uber's important bonus payment system (see below). As Wu et al. observe, there is a direct link between Uber's driver profile data and trip dispatching, with "higher ranked drivers [...] receiv[ing] more ride calls with better, longer routes" (2019: 588). Rather than leaving trip assignment to mere chance (the closest driver getting the first request, etc.), Uber's dispatch system, in ways that are far from transparent to drivers, makes use of profile data in order to execute control over drivers.

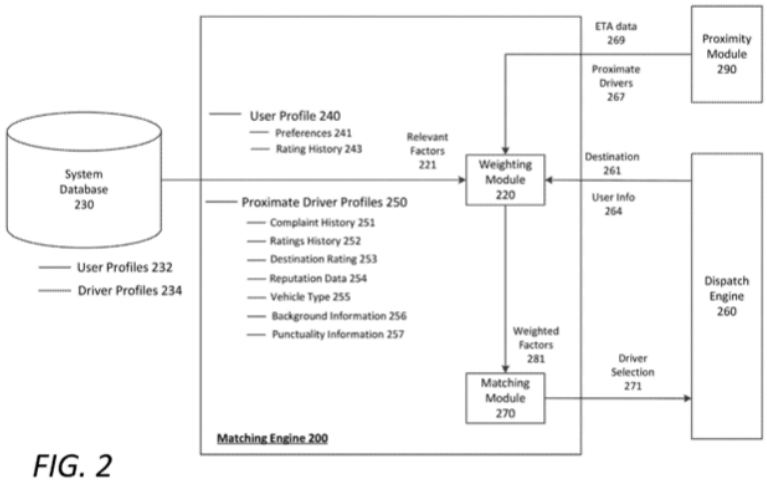

Figure 4: Schematic representation of Uber's automatic dispatch system derived from the patent application of Uber's dispatch system. While drivers must be within a certain range of an incoming trip request, there are a number of factors stemming from user profiles that further influence the system's choice for the 'optimal driver'. On the driver side, these include as the graphic enlists: 'complaint history', 'ratings history', 'destination rating', 'reputation data', 'vehicle type', 'background information' and 'punctuality information'. On the passenger side, 'preferences' and 'rating history' are critical. (Source: Truong et al. 2017: Sheet 2).

Secondly, Uber's algorithmic management system makes use of coordinated pricing strategies in order to further increase control over drivers. The basis of these strategies lies in Uber's piece-wage system (Diab 2019: 139, 143; Wu et al. 2019: 583). Uber drivers are not paid by the hour but by the individual 'pieces' of rides they complete. From a capitalist standpoint, the piece wage offers a number of advantages over its time-wage counterpart (Altenried 2017: 183-184; Marx 1976: 692-700). Most importantly, piece wages not only provide a strong incentive for the individual worker for higher productivity and longer working hours, they also increase, as Marx noted long ago, "the worker's sense of liberty, independence and self-control" (1976: 697).

Uber sets into motion the piece wage's both disciplining and consensus-creating dynamics in two important ways. On the one hand, Uber's so-called surge-pricing algorithm functions as a temporally limited and geographically bounded incentive strategy that attracts drivers to areas of high passenger demand, thereby dynamically rebalancing demand and supply during peak times such as the daily morning or evening commutes (Lee et al. 2015: 1604-1605, 1607-1608; Rosenblat/Stark: 2016: 3765-3771). Instances of surge pricing are prominently communicated to drivers through in-app heat maps indicating nearby surge areas and showing the so-called surge factor that multiplies the standard fare in these areas (Figure 5). While chasing the surge might pay off for

some drivers, it can also result in substantive economic risks for others. For instance, a driver who arrives at a surge area might receive ride requests from outside of it, or – and as often reported in driver forums on the Internet – the surge might simply have disappeared due to the simultaneous influx of other surge-chasing drivers (Rosenblat/Stark: 2016: 3766). As a result, "[m]any drivers express frustration and enthusiasm alike for surge pricing because its very dynamism is characteristically fickle and opaque" (Rosenblat/Stark 2016: 3766; similarly, Lee et al. 2015: 1607-1608).

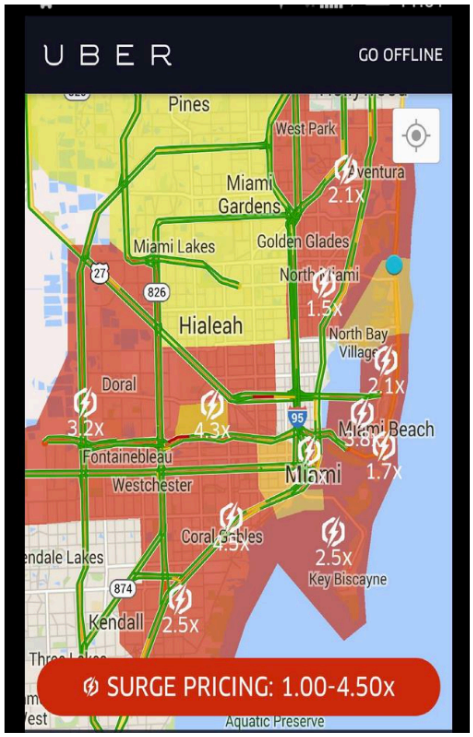

Figure 5: Example of a surge price map. Note the colour scheme: Red stands for surging, orange for rising and yellow for moderate demand (Source: Rosenblat/Stark 2016: 3767).

On the other hand, Uber's incentive pay system holds further potentials for disciplining drivers. If fulfilling certain quotas, drivers can obtain bonus payments from Uber that complement their standard income. Notably, as Wu et al. (2019: 583-588) observe in their study of Uber's (former) operations in China, the dependence of drivers on these bonuses was substantial, as normal fares alone could usually not sustain a sufficient level of income (Wu et al. 2019: 584). The study identifies four key conditional criteria that informs a driver's eligibility for certain bonuses: (i) regular peak-hour availability, (ii) a certain average score in passenger ratings (see below), (iii) a certain ride-completion rate and (iv) a certain quantum of trips per time period (for example, 15 completed trips per week). Often, bonuses would be subject to more than one of these factors, resulting in a

work schedule that – while nominally in the hands of drivers – is closely circumscribed by Uber's platform itself: Although "drivers had autonomy in determining their working time in principle," as Wu et al. conclude, "they often found themselves involved in some routine work schedule that was expected by the platform in order to ensure that bonuses could be made now and in the future" (2019: 584).[23] In light of these considerations, it is fair to assume that Uber's piece-wage system and the derived incentive strategies of surge pricing on the one hand and bonus payments on the other have opened up various possibilities for Uber to exercise control over the daily routines of its drivers.

Thirdly, Uber's passenger rating system has a strong impact on how drivers conduct their work. After a ride, passengers are encouraged to rate their driver on a scale from one to five stars. A driver's rating – calculated as the average of the last 500 trips – needs to remain above a certain threshold for the driver not to risk punishment in the form of fewer pings through the dispatch system or, most drastically, through what Uber calls a 'driver deactivation': a (temporary or permanent) suspension of the driver from the platform (Wu et al. 2019: 587-588). As empirical research has shown, drivers run the risk of being 'fired' at a rating of 4.6 (out of five starts) or lower (Lee et al. 2015: 1608; Rosenblat/Stark 2016: 3774). While there are other performance metrics that drivers are recurrently confronted with in weekly in-app feedback reports, studies suggest that it is the passenger rating system that has the strongest influence on drivers' conduct while performing their service (Rosenblat/Stark 2016: 3772). As Rosenblat and Stark (2016: 3775) have argued, systemic pressure to maintain customer satisfaction can result in additional driver expenses and forms of emotional labour (Hochschild 2003) that may show in seemingly trivial courtesies such as offering passengers free bottled water, paper tissues, in-car Wi-Fi or smartphone charging (similarly, Lee et al. 2015: 1608).

It goes without saying that a higher standard of customer service might be a welcomed improvement to the often suboptimal service level within former taxi industries run, not seldom, by corrupt industrial cartels (Tucker 2018). What is of prime importance here, however, is how Uber is able to exercise power over drivers via passengers themselves. Passengers "are empowered to act as middle managers over drivers, whose ratings directly impact their employment eligibility" (Rosenblat/Stark 2016: 3772). In this very sense, the passenger rating system affords a further important perspective on Uber's algorithmic management system and its techniques of driver control.

[23] As I learnt through conversations with drivers during my own research in Toronto, also the daily rhythm of morning and afternoon commutes was a prime factor structuring many drivers' daily working hours, casting doubt on narratives of unrestrained 'driver autonomy'.

Let me briefly summarise the discussion in this section so far. I started out from the observation that an increasing number of scholars have started to link their empirical investigations of Uber drivers' daily work experiences to a Marxian theoretical vocabulary involving, inter alia, the key category of exploitation and, as a consequence, that of labour control. While theoretical accounts of the exploitative character of Uber's business model provide us with a deeper understanding as to *why* Uber needs to activate, discipline and variously exercise control over its drivers (most of all, Diab 2019), more empirically oriented studies have provided valuable insights into the *how* of these strategies: the micro-strategies of power, mediated via Uber's app, that structure the everyday work experiences of drivers. Instead of more 'negative' forms of direct coercion (Wu et al. 2019: 577), control over drivers is often yielded by way of a 'positive' activation of the labouring subject through in-app challenges, bonus payments and other forms of gamification (Rosenblat/Stark 2016: 3766). No matter the exact method, however, it is fair to say that there is a virtual consensus across the existing critical scholarship on Uber that the company's algorithmic management system exercises substantial control over drivers.

As essential as Uber's threefold system of algorithmic management undoubtedly is in terms of driver control, it only gives us half of the equation. For Uber's practices of algorithmic management stand in reciprocal relationship to and even variously depend on a fitting state-regulatory environment that creates an indispensable legal basis for Uber's day-to-day operations. As a consequence, state regulation marks an equally important dimension of how the labour process of Uber drivers is being managed (Ayata/Önay 2020; Kim et al. 2019; Sribaskaran/MacEachen 2018; Tucker 2018; Valverde 2018). Importantly, and in contrast to Uber's system of algorithmic management, whose key parameters tend to remain fairly unchanged across the globe,[24] state regulation of Uber's business model is locally more variable, with various state-scales – often *urban* or *regional*, yet also *national* or even *supra-national* in scope – forming the main political arenas in which the regulation of Uber has been fought out across the globe so far (for a fuller discussion, see Valverde 2018).

[24] Note, however, how the recent case of Assembly Bill 5 (AB5) in California revealingly brought to the surface how Uber, if challenged by concerted labour-struggle resistance, may resort to an elastic adaptation of its algorithmic management system within certain jurisdictions. Challenged with the threat of having its driver workforce reclassified as employees (instead of independent contractors), Uber decided strategically to adapt its algorithmic management system in California: By contrast to their 'colleagues' beyond the state border, Californian Uber drivers were given the "ability to view passengers' destinations before accepting trips," including the opportunity "to see how much they will earn from rides and [...] to reject ones that [didn't] seem worthwhile" (Kerr 2020: n.p.). In this sense, the AB5 case throws a uniquely illuminating spotlight onto the irretrievable link between and mutual dependence of algorithmic management on the one hand and (the contestation of) state regulation on the other.

Studies concerned with the regulation of Uber have mostly focussed on one of two central aspects. A number of empirically informed investigations have turned to processes of taxi industry re-regulation (Borkholder et al. 2018; Kaplinsky 2018; Lanamäki/Tuvikene 2021; Rosenblat 2018: 171-177). A key intervention in this regard comes from Mariana Valverde (2018) who has argued that different regulatory regimes vis-à-vis Uber across the globe are a result of the different scales at which state regulators have intervened against (or also for) Uber. For instance, in the Canadian context, as Valverde suggests, "only provincial governments have the regulatory capacity, the fiscal tools, and the data-gathering resources" that are necessary to "develop and enforce proper regulations governing Uber" (2018: 200). Other studies, meanwhile, have more specifically zoomed in on the contested regulatory issue of worker classification in the gig economy, including the much embattled question whether Uber drivers should be seen as independent contractors or full employees of Uber (Aloisi 2016; Arthurs 2018; De Stefano 2016; Tucker 2018). Overall, scholarly attention to the state-regulatory side of Uber's business model falls short, however, of the more numerous studies that have engaged with Uber's system of algorithmic management. Partly in response to this imbalance, Chapter IV of this thesis represents an attempt to think more systematically through the nexus of Uberisation and state regulation by bringing to light Uber's 'disruptive' arrival in Toronto as a critical instance of what Manuel Aalbers (2016) has called 'regulated deregulation'.

This section explored scholarly contributions concerned with the labour aspects of Uberisation. As the existing debate shows, algorithmic management and state regulation figure as complementary, mutually dependent dimensions of Uber's overarching effort to maintain control over the labour process of its drivers. Uber's control over the labour process is made possible, in other words, by both regulatory and algorithmic vectors of exploitation. While I have discussed the two vectors of data extraction and labour exploitation, the next section will shed some light on a third key vector of Uberisation: that of platform expansion.

Vectors of Expansion: Platform

Long before Silicon Valley tech companies set out to spread their algorithm-powered mobility services across the globe, Marx famously noted capital's systemic drive for constant expansion – its tendency, in the well-known phrase of *Capital Volume 1*, to

pursue "accumulation for the sake of accumulation, production for the sake of production" (Marx 1976: 742).[25] It is neither my aim here to revisit Marx's argument nor do I wish to enter into more long-standing debates about capital's predatory-cum-parasitical relationship to and, as many have argued, systemic reliance on so-called non-capitalist 'outsides' (Fraser 2014; Gibson-Graham 2006; Harvey 2003; Luxemburg 1990; Mezzadra/Neilson 2019: Ch. 2). What I would like to draw attention to, however, are some of the ways in which the emergence of the platform as both a new type of firm and a new piece of digital infrastructure has started to mediate capital's compulsive drive for constant expansion. It is the affordances of the platform that enable, yet may also set certain limits to, the expansionary efforts of today's global tech capital – with Uber as one of its prime examples in the realm of urban mobility.

Beyond the vectors of data extraction and labour exploitation, Uber also emerges as part and parcel of a broader trend towards the platformisation of businesses and the specific growth potentials and economic imperatives associated with this shift (Barns 2019; Plantin et al. 2018; Sadowski 2020b). Generally speaking, platforms, as Srnicek explains,

> are digital infrastructures than enable two or more groups to interact. They therefore position themselves as intermediaries that bring together different users: customers, advertisers, service providers, producers, suppliers, and even physical objects. More often than not, these platforms also come with a series of tools that enable their users to build their own products, services, and marketplaces (2017: 43).

Starting from this basic definition (see also, Van Doorn 2017; Woodcock/Graham 2020: 42-46), Srnicek (2017: 49) goes on to distinguish five basic platform types: (i) *advertising platforms* (e.g. Google or Facebook), (ii) *cloud platforms* (e.g. AWS), (iii) *industrial platforms* (e.g. Siemens or GE), (iv) *product platforms* (e.g. Spotify) and, finally, (v) *lean platforms*. Uber, as Srnicek argues, is a lean platform par excellence.[26] Lean platforms harness a rationale of radical cost reduction afforded by the minimal ownership of fixed capital on the one hand and the maximal avoidance of labour costs on the other. In contrast to a limousine service that may own a fleet of vehicles and employ a steady number of professional drivers, Uber has thrived on the rationale of reducing its

[25] For a discussion of Marx's famous line and the chapter it belongs to, see de Angelis (2017: Ch. 5).

[26] Note, however, that Uber's long-term plans to deploy an increasingly large fleet of AVs may potentially shapeshift Uber's business model from that of a lean platform (in which individual drivers own their own cars) into that of a product platform (in which Uber commands a fleet of AVs of its own). While this potential shift is sometimes depicted in terms of a mutually exclusive dichotomy – Uber *either* as lean platform *or* as product platform (Srnicek 2017: 71) – there are two further possibilities that deserve equal attention: On the one hand, Uber may never (technologically) be able or (economically) willing to deploy AVs on a large scale. On the other hand, and put forward as a more realistic intermediate scenario by Uber itself, there may be a *mixed* model in which outsourced drivers share the road with Uber-owned AVs (Uber ATG 2018).

productive capital to a bare minimum: no fixed capital in the form of company-owned vehicles and hard infrastructures, no labour costs in the form of employed drivers (Srnicek 2017: 71; Woodcock/Graham 2020: 50-51). The fixed capital Uber does retain – its digital means of production, so to speak – are the server and software infrastructures of its digital platform.

Ramon Salim Diab has provided one of the most detailed accounts of Uber's platform architecture so far. By harnessing advanced information and communication technologies (ICTs), Uber's platform, as Diab writes,

> converges the multiple functions of previous information technologies found in the taxi industry into a massive, globally distributed, and mostly automated, big-data platform. As a form of fixed capital, the Uber platform consists of distributed, networked back-end 'tech stack' ICTs and the front-facing Uber application (2019: 136).

Zooming in even more closely, Diab (2019: 136-137) shows Uber's platform to consist of three distinct components: First, a platform 'core' that provides the basis for all further programming and app development and "which consists materially of a hybrid cloud model of several data centres and cloud providers" (2019: 136); secondly, a platform 'middle layer' that receives and processes the incoming big data from all of Uber's mobility transactions and, as such, marks the "entry-point for the big data that flows from real-world locations, transactions and requests into Uber's software logic" (2019: 137); finally, there is the 'top layer' that entails the front-end, visible interfaces of Uber's (driver and passenger) apps. Together, these three divisions of Uber's platform architecture form something like a 'platform tree', with "the 'bottom' as foundational to the 'middle trunk' and 'branches' at the top" (2019: 136).

The reduction of its capital assets to this digital, lean-platform architecture has allowed Uber rapidly to scale its operations. Exactly because it largely outsources capital-intense, long-term investments to other public and private participants – think of cars and their gradual depreciation in the case of drivers or road infrastructures and the need of their continual maintenance in the case of cities – the growth limits of Uber's platform are mostly determined by other, far more flexible factors: "In the case of Uber," as Woodcock and Graham write, "there is no need for the platform itself to buy new cars. Instead, expansion is limited by server capacity, effective advertising and available workers" (2020: 45). Such explosive platform growth is further facilitated by what has come to be known as 'network effects' (Barns 2020: 114-117; Srnicek 2017: 45-46): the potential of platforms to set into motion a virtuous cycle of rapid growth that is driven by

a dynamic in which an increase of *overall* platform users translates into heightened convenience and lower costs for each *individual* user. In the words of Woodcock and Graham:

> The more workers and users on the platform, the greater the benefits of participating [...] Conversely, if there is significant competition between platforms in any particular sector, those network effects are diminished. For instance, multiple taxi apps in a city will fragment both the driver and customer base, increasing wait times and reducing the ease of access (2020: 45)

While I will explore the Uber-specific dynamics of network effects in more detail in Chapter V, suffice it to note here that its lean-platform business model has made Uber a textbook example of platforms' high potential to "grow very big very quickly" (Srnicek 2017: 46).

Such rapid growth can have drastic real-world consequences in the realm of urban transport. Hence, as Van Dijck et al. (2018: Ch. 4) have argued, Uber's platform-mediated vectors of expansion have the potential substantially to shift the (traditionally porous) boundaries between public and private forms of urban transport. At the core of these platform-enabled transformations stands a wider trend towards what is usually referred to as 'mobility as a service' (MaaS): the integration of a whole multitude of mobility services, both public and private, under the digital roof of only one single platform (Ambrosino et al. 2016; Piétron et al. 2021: 17-24). Within a broader MaaS ecosystem, such a central platform *connector* – potentially, for instance, Uber's passenger app – would come to serve as the central relay station of various platform *complementors* such as local transit offerings, private car rentals or bike sharing services. One of the results of an increasing transformation towards MaaS is "that public and private transport offerings are increasingly organized and accessed through the same platforms, rendering them part of a single ecosystem" (2018: 78), and thereby contributing to a "shift which [...] resets the relations between private and public partners" (2018: 95). The dynamics of coming MaaS ecosystems describe one potential way in which Uberisation's vectors of expansion might restructure the urban fabric by shifting existing boundaries between public and private transportation and, as such, historically grown demarcations between commodified and non-commodified (or only partly commodified) areas of social life (Fraser 2014).

Taken together, the existing literature in and beyond the field of critical platform studies has started to lay bare many of the essential logics, rationales and principles of Uber's

digital platform: As an 'ecosystem of participation' (Barns 2019: 3-4), Uber's platform functions as a digital mediator between passenger and driver users; as a 'lean platform' (Srnicek 2017), Uber harnesses a logic of flexible adaptability, radical cost reduction and outsourcing in order to rapidly expand its business to new areas; as the potential central connector within a coming MaaS ecosystem (Van Dijck et al. 2018: Ch. 4), Uber's platform, meanwhile, may further blur the edges between public and private transportation. Despite these illuminating insights into Uber's platform-enabled vectors of expansion, there remains a lack of empirically informed studies that would connect these vectors to real-world phenomena in cities worldwide (for a notable exception, see Attoh et al. 2019). It is here that Chapter V will make an important contribution by examining more closely Uber and Lyft's respective expansions into Toronto's public transport system via what I call the PPRP.

In this section, I have explored the forces of Uberisation as one side of the process of Uberisation. By recourse to a wide variety of existing literature within intellectual fields such as critical data studies, labour studies and platform studies, I have argued that the forces of Uberisation – the abstract principles, rationales and logics that inform Uber's global business model – can be described along three main vectors: data extraction, labour exploitation and platform expansion. These three vectors combine to shape what I call the forces of Uberisation: forces that have been set loose, to various and often quite different effects, in many cities worldwide. It is time, then, to switch to Uberisation's second constituent element: its urban conditions.

2 – The Urban Conditions of Uberisation

Having defined the forces of Uberisation along the three vectors of extraction, exploitation and expansion, it is possible now to bring into closer view those urban grounds that Uber and Lyft have to necessarily grapple with. This section, then, provides an exploration of what I call the urban conditions of Uberisation: a global patchwork of locally bound 'market territories' that have served as Uber's basis of operations since establishing its business in city after city in the early 2010s. At least within its North American limits, this urban ground of Uberisation has been marked, as I argue, by a twofold reaction to the 2008 economic crisis – a doubly constituted urban politics of 'introspective' austerity urbanism (Peck 2012) on the one hand and 'extrospective' smart urbanism on the other (Wiig 2015b).

Managing the Crisis Outside-in: Austerity Urbanism

The beta version of Uber's app was launched in San Francisco in May 2010. One year later, in May 2011, Uber went live in New York City, with Chicago following in September and Paris, Uber's first non-American market, in December of the same year. Toronto, meanwhile, was integrated into the Uber network in March 2012.[27] What Uber hit during this phase of initial global expansion was a worldwide patchwork of local urban grounds that had been thoroughly restructured, if in variegated and uneven ways (Brenner et al. 2010), by those wide-ranging policy measures that have come to be known under the name of austerity urbanism (Donald et al. 2014; Tabb 2014). Forming an incisive, post-crisis 'moment' of the longer existing and variously recurring roll-back, roll-out and roll-with-it movements of urbanised neoliberalism (Harvey 1989; Keil 2009; Peck/Tickell 2002), austerity urbanism has surfaced as a multi-scalar state-spatial strategy that, first, helped to convert the liabilities of defaulting private banks and corporate financial actors into the public debts of (supra-)national governments and, secondly, then passed on these nationalised fiscal pressures 'down' the state-scalar hierarchy: from federal, via regional to local governments. Austerity, as Jamie Peck observed for the US context, is "something that Washington does to the states, the states do to cities and cities do to low-income neighborhoods" (2012: 632; for similar observations vis-à-vis the Canadian context, see Albo/Fanelli 2019; Broad 2011; Ross/Thomas 2019). While the implementation of austerity politics has unfolded along deeply uneven and variegated lines, it is possible to identify a set of key policies constituting something like a generalised policy playbook of early post-crisis austerity measures (Donald et al. 2014; Evans/Albo 2011; Peck 2012). Such measures have included, as Greg Albo and Carlo Fanelli outline,

> tax-shifting for competitiveness, reductions to social services provisioning, contracting-out and privatization of city assets, concessions from unionized and non-unionized municipal employees, new forms of marketization such as the use of public-private partnerships, and a shift away from commercial property taxes to consumption-based levies. New workplace arrangements have also proliferated, including the use of part-time and short-term contracts, as well as casual and seasonal forms of employment (2019: 280).

Within this context of economic instability, privatisation and precarisation, it is possible to identify three distinct dynamics that have dovetailed particularly well with the on-the-ground regulatory and labour-related requirements of early Uberisation (Woodcock/Graham 2020: 33-36).

[27] See the helpful timeline of Uber on Wikipedia: https://en.wikipedia.org/wiki/Timeline_of_Uber; last accessed: 3 October 2021.

First, fiscal gaps at the level of urban and regional governments have often translated into budget pressures on local transport agencies and, as a result, into cutbacks of public transit service levels (Davidson/Ward 2014; Fanelli 2018: 262-265; Peck 2012: 642; Warner/Clifton 2014). As a direct consequence of its dire financial situation after the Wall Street meltdown, the city of Detroit, for instance, substantially reduced its local bus services in order to rebalance its finances (Hall/Jonas 2014; Peck 2012: 637). In this context, a quip by a senior staff member of Toronto's local transit agency, the Toronto Transit Commission (TTC), can be seen as symptomatic of a broader situation across North American municipalities struggling with budget pressures that, more often than not, have been growing since the crisis: "Since I've been at the TTC and based on what I have known from the past, the last number of years, the pressures on the budget have been tremendous [...] At the TTC, were being constantly asked to do more with less" (Interview TTC staff member). Urban-scale fiscal pressures have further facilitated a turn towards increased – or at least not further reduced – user fees and service charges (Fanelli 2018: 264), combined with hardened attacks on public-sector service unions in general and transport unions in particular (Ross/Thomas 2019; Smith 2018; Sweeney/Treat 2020: 220-221). What local fiscal gaps have often resulted in, at the level of urban everyday life, are conditions that are far from favourable for public transit providers and, as such, have helped to open up those local service gaps that private providers like Uber have started to fill in since the crisis (Filion/Keil 2016; Sweeney/Treat 2020).

Secondly, and in quasi-complementary relation to fiscal restraints on the public side, the partial or full privatisation of transport services has presented itself as an effective short-term fiscal remedy for cash-strapped urban governments. As Peck observes, "privatisation schemes and public-private partnerships have allowed some cities to fill budget holes and to tap corporate capacity" (2012: 645; similarly, Loxley 2012). In fact, the recent trend towards partnerships between transit agencies and ridehail platforms has clearly been facilitated by the widespread consolidation of regimes of urban austerity and the fiscal gaps they have left in the budgets of many regional and local governments across North America (Fanelli/Thomas 2011; Schwieterman et al. 2018). To turn to a particularly telling example: During the Covid-19 pandemic, which in many ways further entrenched existing politics of urban austerity, the provincial government of Ontario made headlines with a rather outstanding privatisation scheme. While announcing a first phase of relief funding of more than CAN $404 million for Toronto's struggling public transport system and the losses it had incurred during the first six months of the pandemic, Ontario's Minister of Transportation, Caroline Mulroney, also gave an outlook

of the Ministry of Transportation's second round of funding. To be eligible for the latter, the city of Toronto, as Mulroney stated, "will be required to [...] [r]eview the lowest performing bus routes and consider whether they may be better serviced by microtransit" (Ontario Ministry of Transportation 2020: 4).[28] The idea, in short, was to replace public buses in low-income Torontonian neighbourhoods with private services by Uber and Lyft (Spurr 2020). While Mulroney's scheme never realised, the recent proliferation of PPRPs across the North American continent speaks to austerity urbanism's enabling role as a catalyst for newly emerging forms of privatised urban transport.

Finally, rising unemployment rates after the crisis further played into the hands of Uber and Lyft (Rosenblat 2018: 22; Srnicek 2017: 33-34; Woodcock/Graham 2020: 34-35). Carlo Fanelli and Mark P. Thomas provide a helpful insight into the rather grim (un)employment situation during and immediately after the crisis in Canada:

> In fact, between October 2008 and October 2010, national unemployment remained at 7.8 percent, above the pre-recession rate of 6.2 percent but below its 2009 (8.7 percent) peak [...] When considering discouraged workers and involuntary part-timers, Canada's 'underutilization' rate rises to 10 percent. Nevertheless, since the recession, the quality of work has continued to degrade with most new positions being part-time, temporary or self-employed. This has hit youth (15-24), the elderly (55 and over), women and racialized persons especially hard as long-term unemployment has surged from 15 percent before the downturn to nearly a quarter of jobless people ever since (2011: 159).

Rising unemployment went hand in hand with longer-standing trends of 'flexible employment' and labour precarisation, especially for those at the lower end of the social spectrum: racialised and migrant communities, women and the elderly. Similar observations could be made for unemployment rates and labour trends in the USA (Evans/Albo 2011: 9; Mayer 2013: 7; Warner/Clifton 2014: 53). Notwithstanding the fact that Canada was not hit as hard by the 2008 economic downturn as the US (Evans/Albo 2011), the Great Recession registered in Canada as "the worst economic downturn in more than seventy years, with record numbers of layoffs and job losses" (Peters 2018: 68). What the crisis produced, in short, were masses of un(der)employed workers who would use Uber as a comparatively accessible way to better their personal financial situation in a context of severe economic instability.

[28] Microtransit usually refers to partnerships between private ridehail platforms such as Uber or Lyft on the one hand and public transport agencies on the other. In such partnerships the former provide on-demand mobility services, often at transport hubs such as rail stations (Schwieterman et al. 2018; Shaheen/Chan 2016).

In North America and beyond, it was the Great Recession of 2008 and the resultant turn towards regimes of urban austerity that have produced those on-the-ground urban conditions – of rising unemployment, weakened social spending, labour insecurity and precarisation – on which the gig economy has been able to thrive ever since (Rosenblat 2018: 23, 37-38; Sadowski 2020b: 562-565; Srnicek 2017: 25-34; Woodcock/Graham 2020: 35). What Uber and Lyft encountered when entering many North American cities was a climate of severe economic instability, expanding fiscal gaps and, as a result, a tendency towards faltering transit service levels, swelling pressures of transport privatisation as well as rising unemployment. What the forces of Uberisation made contact with in the early 2010s was a North American urban ground fully under the weight of austerity measures, often imposed by governments on 'higher' state scales (Peck 2012). While an inward-oriented austerity urbanism opened up important possibilities for Uber to establish its business in record time, the largely parallel trend of cities promoting themselves as smart cities played an equally important role. In fact, and as the next section shall discuss in more detail, the widespread rise of an aggressively extrospective smart urbanism in many ways complemented the more inward-oriented measures of austerity urbanism (for some of the strongest arguments in that direction, see Pollio 2016; Rossi 2017: 8-12).

Managing the Crisis Inside-out: Smart Urbanism

Almost in parallel with the austere city the smart city arose. It was at the height of the global financial meltdown that IBM and Cisco, the two most forceful early proponents of a new smart urbanism, redirected their business strategies towards the multiple urban crises of the time and started to actively propagate the smart city as a new planning ideal (Söderström et al. 2014). Related to earlier corporate visions of the city – most of all, Richard Florida's 'creative city', whose catchphrase of *talent*, *tolerance* and *technology* the smart city took over with a particular emphasis on the last of these three 'Ts' (Florida 2002; Florida/Hathaway 2018; Hollands 2008: 309) – the new smart city ideal soon caught the attention of politicians, business advisors, planners and citizens alike. As Robert G. Hollands summarised the post-crisis rise of the smart city: "With the global banking crisis of 2008, followed by a nearly worldwide politics of austerity, this governance trend has continued with an increased emphasis on efficiency savings, privatisation and the promise of a high-tech future" (2015: 68; similarly, Alvarez León/Rosen 2020; Sadowski/Bendor 2019). From now on, the smart city was

everywhere, with the number of worldwide smart city proposals, white papers and urban development projects proliferating at mind-boggling pace.

Both in and beyond the field of urban geography, critical scholarship concerned with the smart city has also expanded rapidly (Marvin et al. 2016). Overall, it is possible to single out three general strands of critical research that have approached the rise of the smart city from various, both theoretical and empirical, angles (for more extensive literature reviews, see Glasmeier/Christopherson 2015; Kitchin 2015; Wiig/Wyly 2016). *Socio-technical perspectives* have tended, first, to focus on aspects such as ubiquitous sensing and surveillance (Greenfield 2013; Kitchin 2014b; Rabari/Storper 2015; Zuboff 2019), the proliferation of corporate smart-city discourses and imaginaries (Rose 2017; Sadowski/Bendor 2019; Söderström et al. 2014) as well as the smart city as a real-world urban laboratory (Cugurullo 2013; Halpern et al. 2013). Secondly, perspectives grounded in *critical political economy* have characterised the smart city as a technologically turbocharged reboot of existing capitalist planning ideals such as Harvey's (1989) 'urban entrepreneurialism' (Hollands 2008; 2015; Wiig 2015a; 2015b) or what Logan and Molotch (1987) once theorised as the politics of the urban growth machine (Glasmeier/Christopherson 2015; Alvarez León/Rosen 2020; McNeill 2016; Shearmur/Wachsmuth 2019). Finally, contributions inspired by a more *micro-scale, sometimes Foucauldian perspective* have approached the smart city in terms of the normalisation of everyday interactions with digital devices (Gabrys 2016; Marquardt 2018; Strüver 2018), the creation of 'smart mentalities' (Vanolo 2014) and the proliferation of new forms of 'smart citizenship' (Hill 2013; Powells et al. 2016).

Across these three perspectives, the self-branding of cities worldwide *as* smart cities was soon identified by critical scholars as a key driving force of the new urban ideal of smartness. Which city, as Alan Wiig and Elvin Wyly asked, "would not want to be 'smart'" (2016: 488)? Accordingly, many have argued that the local attraction of global tech capital and tech labour – preferably in boom sectors such as AI, machine learning or advanced robotics – has been paramount to virtually any local smart city project (Alvarez León/Rosen 2020; Hollands 2015; Sadowski/Bendor 2019; Shearmur/Wachsmuth 2019). Forming a techno-utopian version of what Eugene McCann (2013) once aptly described as 'extrospective policy boosterism' (Wiig 2015b), the smart city ideal started to set into motion a myriad of concerted efforts on behalf of local entrepreneurial and political elites to attract to their cities not only those big-tech companies that have come to embody the 'smart paradigm' but also those highly skilled and globally scarce workforces that these

tech firms need in order to sustain local branches (Dyer-Witheford et al. 2019: 75-79; Hollands 2008: 311, 314).

Uber, as we shall see in the three case studies below, profited immensely from this trend. Most of all, the smart-city aspirations of municipalities and even whole urban regions opened up important political leverage for Uber in terms of safeguarding favourable conditions of operation within local jurisdictions. As Rosenblat observes:

> In its ascent to global heights, Uber has become a shibboleth for technology optimists. For many cities, having Uber is the mark of being on the cutting edge, or at least being part of the global technology-business marketplace. When Uber and Lyft turned swiftly on their heels and left Austin, Texas, in May 2016, in a show of protest against regulatory efforts to impose requirements on them (like data-sharing and fingerprint-based background checks for drivers), the moment was captioned in the press by disdainful headlines such as 'By Losing Uber, Austin Is No Longer a Tech Capital' (2018: 205).

Clearly, the degree to which cities have adopted an outward-oriented, 'smart' self-branding plays an important role with regard to how these cities relate to Uber and its high tech business model. In particular, local smart city aspirations can become a heavy influence on matters of regulation – that domain where Uber is most dependent on local states (Brail 2018; Lanamäki/Tuvikene 2021; Valverde 2018). I will explore the nexus of smart city aspirations and platform regulation in Chapter IV when I explore the re-regulation of Toronto's taxi industry after the arrival of Uber in 2012.

This section outlined the contours of what I call the urban conditions of Uberisation. As I argued, two dominant forms of urban politics prepared the ground for and made possible in the first place the rapid rise of Uber in North America after the Great Recession. On the one hand, the virtually ubiquitous adoption of inward-oriented urban austerity facilitated Uber's early success after the crisis. Hence, the post-crisis explosion of public debt and the ensuing offloading of these debts onto the local state scale led to operational difficulties for public transport providers, which often had to reduce service levels in order to rebalance their finances. Furthermore, impending dangers of illiquidity across state scales propelled new rounds of the privatisation of public infrastructure, not least via new forms of public-private partnerships. Finally, rising unemployment across large sections of the working population created a pool of easily available, cheap labour for a rising gig economy, with Uber as one of its main profiteers.

On the other hand, the widespread adoption of an outward-oriented *smart urbanism* additionally played into the hands of Uber, as more and more cities pinned their hopes on a new generation of Silicon Valley tech companies and their sought-after local investments. This, in short, were the urban conditions that Uber encountered when entering city after city in the early 2010s. As much as Uber touched down on an urban ground that, by and large, was welcoming to its operations, it should not be forgotten that Uberisation has turned out to be a deeply conflictive process. Hence, and as I will discuss in conclusion, the encounter between what I have described in this chapter as the forces of Uberisation on the one hand and the urban conditions of Uberisation on the other creates social and political frictions that deserve close scrutiny and detailed empirical attention.

3 – Conclusion: The Lasting Inertiae of Urban Space

Both the 'introspective' state-spatial restructurings of austerity urbanism and the extrospective policy boosterism of smart urbanism have clearly facilitated the rapid emergence and lasting persistence of Uberisation. These enabling structural factors notwithstanding, it is also paramount to account for the social, political and spatial frictions that have arisen as a consequence of the myriad of clashes between the forces of Uberisation on the one hand and the urban conditions of Uberisation on the other.

The urban – as that social ground that the forces of Uberisation necessarily have to grapple with in order to take root in it – represents a domain of social life that, while politically malleable and underlying constant dynamic change, preserves substantial degrees of both material inertness and social recalcitrance (Merrifield 2014: 5). Think of, in this regard, the persisting fixity of the (various historical layers of the) urban built environment, which necessarily restrict or at least slow down ambitions of tabula-rasa creative destruction (Brenner 1998; 2019: Ch. 2). It is "one of the oddities of cities," Harvey writes, "that they become more and more fixed with time, more and more sclerotic, exactly because of the way they incrementally add things on rather than totally shedding their skins and beginning all over again" (Harvey 2014 [1996]: 61). Or, on the other hand, consider the various political resistances, both already existing and potential, of progressive or even radical urban activism (Mayer 2013; Tonkiss 2013).

An insistence on the various inertiae of urban space and the contingent, localised frictions that might arise from them stands in considerable contrast to some of the contributions in ongoing scholarly discussions concerned with not only newly emerging 'smart urbanisms' but also, and closely related, pervasive forms of platform urbanism (Sadowski 2020a) or a newly emerging logistics urbanism (Altenried 2019). As discussed in Chapter I, a considerable number of contributions in these debates have tended to turn their eyes to the quite exceptional urban spaces of tech-powered greenfield-site developments.[29] As a consequence, some of these contributions are ripe with rather hyperbolic formulations suggesting that big-tech behemoths like Uber (or, alternatively, Amazon, Cisco, Google, IBM and so forth) are poised to fully reshape the city in their own image (e.g. Altenried 2019: 118; Barns 2020: 185-187; Lyster 2016: 1-14; critically, Shelton et al. 2015). The city, however, in Shannon Mattern's (2017a) formidably succinct formulation, is *not a computer*; it is not, as some corporate pundits at Google would have it, being built 'from the Internet up' (Doctoroff 2016).

Lefebvre probably had something similar in mind when in his landmark work *The Production of Space* he alerted his readers to the necessarily mediated – that is: *indirect, historically contingent and spatially refracted* – relationship between technological change on the one hand and an according restructuring of urban space on the other (Goonewardena 2005: 62-67). As Lefebvre writes:

> Nor does the growth of the forces of production give rise in any direct causal fashion to a particular space or a particular time. Mediations, and mediators, have to be taken into consideration: the action of groups, factors within knowledge, within ideology, or within the domain of representations (1991: 77).

We should hardly expect then an unmediated impact of the forces of Uberisation – their three main vectors of extraction, exploitation and expansion – on the urban grounds on which they intervene. Rather, we may benefit from looking for and taking seriously those empirically observable *frictions* – of various social forms and political functions (Lowenhaupt Tsing 2005) – that are likely to arise from the confrontations between the forces of Uberisation on the one hand and local urban grounds on the other (Mezzadra/Neilson 2019: 2-3).

Against the grain of an overtly quick acceptance of the allegedly omnipotent space-producing powers of Silicon Valley tech companies, the next three chapters explore how

[29] Paradigmatic examples of such (both realised and unrealised) 'smart' greenfield-site developments include Songdo in South Korea (Halpern et al. 2013), Masdar in the United Arab Emirates (Cugurullo 2013) or Google's abandoned Quayside project in Toronto (Valverde/Flynn 2020).

the forces of Uberisation – or, rather, certain vectors thereof – come up against the multiscalar and variously uneven urban grounds of what I call, following Shelton et al. (2015), the *actually existing smart city of Toronto*. While Chapter IV draws out a detailed discussion of the re-regulatory skirmishes following the entry of Uber into Toronto's taxi market, Chapter V tackles the next subsequent 'stage' of Uberisation in Toronto: the local proliferation of various partnerships between Uber and Lyft on the one hand and local and regional transit agencies on the other. Lastly, Chapter VI is concerned with Uber's self-driving car programme and the concerted efforts of massive data collection that this endeavour necessitates and that have been locally implemented in Toronto. What unites all three case studies is that they follow, to various places and concrete sites, the social and political frictions that arise from the confrontation between the forces of Uberisation and their urban conditions.

Chapter IV

Enter Uber

The Regulated Deregulation of Toronto's Taxi Industry

The sheer speed with which Uber has traversed, in many jurisdictions worldwide, the void between illegality and legality, leaping – in Shauna Brail's (2018) formulation – from 'renegade to regulated', has perplexed admirers and critics alike (Sribaskaran/MacEachen 2018). Some scholars, in response, have been keen to foreground the sheer ruthlessness and supreme chutzpah of Uber's notoriously hard-nosed launch procedure as the company's quasi-universal key to legalisation. Building on a report by the US-based National Employment Law Project (Borkholder et al. 2018), Rosenblat, for instance, writes that

> Uber and Lyft deploy a two-stage 'shock-doctrine' to get their way. In the first stage, they manufacture a crisis with a municipal regulator [...], and in the second stage they appeal to the state legislature for relief. [...] In forty-one states, Uber and Lyft have successfully lobbied politicians to pass laws that erase or mitigate how localities regulate these companies (2018: 176).

While rightfully drawing attention to Uber's documented practices of powerful lobbying, unrepentant law evasion and breaking, Rosenblat's account is most interesting for another

reason. It gives some helpful indication of a now widely popularised, yet simplistically binary 'disruption narrative' in which market forces (in this case, Uber) and state regulation figure as two largely *separate* powers. These two powers are usually being charged with opposite normative valences. There is a notion, as Shelton et al. write, that "large technology companies are inherently 'bad' actors who have despoiled [...] 'good', righteous cities" (2015: 14). According to widespread disruption narratives, then, Silicon Valley ruthlessness impinges upon (supposed) state helplessness. Uber acts, the state reacts. In reality, as I argue, something much more complex is going on.

In light of such 'disruptions', the regulation of platform businesses has started to become a growingly important site of discussion in broader debates about platform capitalism (Ayata/Önay 2020; McKee et al. 2018). A small, yet expanding body of literature has produced a number of empirical investigations of platform regulation in specific places and locales (Brail 2018; Lanamäki/Tuvikene 2021; Sribaskaran/MacEachen 2018), while also starting to shed light on the various lines of connection that run between earlier rounds of neoliberal urban governance on the one hand and the growing urban presence of digital platforms on the other (Ferreri/Sanyal 2018; Woodcock/Graham 2020: 33-36).

In this context, Manuel B. Aalbers's notion of 'regulated deregulation' has emerged as a critical lens for a closer inspection of platform regulation (Ferreri/Sanyal 2018; Lanamäki/Tuvikene 2021). Lamenting an often implicit equation of neoliberalism with processes of mere *de*-regulation, Aalbers develops regulated deregulation as a more nuanced, double-sided concept denoting a conflictive process in which "some economic actors are given greater freedom from state control, but the market framework itself is regulated" (Aalbers 2016: 565-566; see also, Standing 1992; Thomas 2009). While neither novel in its critique of neoliberal "regulation in denial" (Peck 2010: xiii) nor in its insistence on the deeply variegated unfolding of (various forms of) global neoliberalism (Brenner et al. 2010; Peck/Tickell 2002), the concept of regulated deregulation effectively subverts the simplistic juxtaposition of market forces versus state regulation, or for that matter: Silicon Valley against cities. It puts into doubt the idea that platform companies like Uber or Airbnb aim for complete 'deregulation' in the sense of an intended removal of state regulation tout court. Rather, and as recent empirical studies have argued (Ferreri/Sanyal 2018; Lanamäki/Tuvikene 2021), the 'disruptive' re-regulatory efforts of Uber and other platforms can be seen as a corporate struggle for a maximum of legal freedom (the 'deregulation side' of regulated deregulation) within newly consolidated markets created and firmly upheld by the state itself (the 'regulation side' of regulated deregulation).

Despite the fact that the notion of regulated deregulation provides a helpful theoretical tool for placing platform regulation within broader horizons of neoliberal urban governance (Harvey 1989), it should not be mistaken, as Aalbers himself warns (2016: 571), as a quasi-universal logic that prescribes – a priori – how the regulation of digital platforms (or other businesses) might unfold in different places and at different times. Very much in this vein, this chapter insists on a *situated* understanding of platform regulation. This presupposes, lending from Neil Brenner and Nik Theodore, to pay specific attention to the "inherited institutional frameworks, policy regimes, regulatory practices, and political struggles" (2002: 349) that platforms such as Uber have to work *with* and *against* in specific locales.

This chapter, then, engages in a detailed analysis of the variegated processes that enabled Uber's rapid, if certainly not conflict-free, conversion from illegal to legal in the City of Toronto – its local path towards regulated deregulation. How was it possible for Uber to make this key transition in the astonishingly short time-span of four years, between its initial launch in Toronto in March 2012 and its eventual legalisation by Toronto City Council in May 2016? Driven by this question, the chapter continues, yet also complicates the analytical trajectory begun in Chapter III. While the latter developed the concept of the Uberisation of the urban as the variously conflictual encounter between the forces of Uberisation and the urban conditions of Uberisation, the following pages take up these insights and confront them with the complex realities of Toronto's taxi industry and the state regulatory nexus that has governed it for many years and decades. This is a chapter, in other words, about the conflict-laden 'touchdown' of the forces of Uberisation – and, perhaps most prominently, the vector of labour exploitation – on the existing, yet shifting ground of taxi regulation in Toronto.

In Toronto, as I argue, Uber encountered an urban ground that was, if certainly not devoid of obstacles, strongly conducive of the company's operations – and this in three key respects: First, in Toronto Uber hit upon a deeply neoliberalized regulatory landscape (particularly at the provincial state scale) whose laissez-faire politics of non-interventionism helped Uber to gain local traction in the first place. Secondly, the long-lasting crisis of Toronto's taxi industry and the resulting absence of firmly institutionalised worker power further accelerated Uber's rise in the region. Finally, the ambitions of local economic and political elites to position Toronto as a world-leading smart city – the 'Silicon Valley of the North', as one slogan had it – provided Uber with a strong political lever to present itself as a vital driver of a newly emerging smart urban

agenda in Toronto and, as a consequence, to successfully lobby for outstandingly favourable local regulations. It was the combination of these three locally specific and longer-term conditions that propelled and eventually produced a constellation of regulated deregulation in Toronto: the creation of a new local ridehail market that accorded extraordinary legal freedoms to Uber and other ridehail platforms, while disadvantaging other actors such as local taxi businesses and, most of all, drivers.

1 – Neoliberalism, Worker Power and the Smart City

Invoking a concept as broadly defined as neoliberalism (Harvey 2007) puts one at the immediate risk of unhelpful overgeneralisations. Warning of such dangers, Peck has insisted that citing "the process of neoliberalization must not be a substitute for explanation; it should be an occasion for explanation" (2013: 152-153). Similarly, as Aalbers writes, regulated deregulation opens up (rather than closes down) "questions related to how a select number of agents have been able to shift regulation both ideologically and practically in their direction" (2016: 571). Mere reference to the idea of regulated deregulation, in other words, cannot replace in-depth empirical engagement with those dynamics and locally variegated path dependencies that may enable or restrict such re-regulatory processes in specific locales at certain times. This section, then, zooms in on three socio-spatial dynamics that have facilitated regulated deregulation in the context of the Uberisation of Toronto's taxi industry: (i) the deep entrenchment of a longer existing neoliberal urban agenda across Toronto and the GTA, particularly anchored at the level of the Province of Ontario; (ii) a long unresolved regulatory crisis of Toronto's taxi industry itself; (iii) and, finally, the particularly pronounced ambitions of local political and economic elites to transform the GTA into a hotspot for urban tech investment and smart-city boosterism.

In the Shadow of Neoliberal Urbanism: Uber Touches Ground

Contrary to accounts of instant 'disruption', Uber's entry into Toronto's taxi market unfolded gradually – in two main stages. The first one started with Uber's initial launch in Toronto in March 2012. At that point of time, Uber still restricted its local operations to its UberTaxi and UberBlack app variants. Only licensed taxi or limousine drivers were able to sign up for the Uber app. While violating local taxi regulations and refusing to

apply for a taxi brokerage licence, Uber's law infringements at this point were still comparatively modest. This changed with the introduction of UberX in September 2014, the starting point of Uber's second phase of operations in Toronto (lasting until the company's eventual legalisation in May 2016). UberX gave private, non-professional drivers access to Uber's platform and thereby created a severe regulatory dilemma for the city: Given that these drivers didn't have commercial insurances (not to speak of defensive driver training and other safety precautions), who would account for the costs in the case of an accident or even the potential death of a driver or passenger? On 18 November 2014, two months after the local release of UberX, the City of Toronto's Municipal Licencing and Standards division (MLS) decided to take action. Seeking an immediate stop to all of Uber's operations in Toronto, it launched an injunction against the company with Ontario's Superior Court of Justice. Publicly announcing the step at a press conference at City Hall, the director of MLS, Tracey Cook, referred to Uber's actions as being "in flagrant disregard of the laws of both the city and the province" (Cook quoted in Pagliaro 2014: n.p.). Further emphasising "the city's opinion that Uber is jeopardizing public safety, including that of individuals they are recruiting as drivers" (Cook quoted in Pagliaro 2014: n.p.), Cook set the city on a collision course with Uber (Mashingaidze 2014).

For many, Cook's announcement was an unmistakable sign that the city had stepped up its regulatory game. Toronto, it seemed, had found its regulatory muscles. Seen from another angle, however, the city's court injunction could also be seen as a sign of deep-seated regulatory weakness. As Jennifer Pagliaro insightfully commented in the *Toronto Star*: With "Uber [...] already settled into the taxi landscape, the city's only recourse is to fight the company in court" (Pagliaro 2014: n.p.). Less a sign of the city's regulatory strength, the court injunction was a tacit acknowledgement that city officials, even if they wanted to confront Uber, fatefully lacked the regulatory powers to do so. Valverde (2018), offering an in-depth analysis of Uber's early years in Toronto, expands on this point. Steering attention away from Uber's much-noticed law breaking and towards the grave limitations of Canadian municipal regulation, she writes: "[E]ven if Uber's civic behaviour is unusual, cities' regulatory dilemmas in regard to Uber clearly expose the underlying systemic weaknesses of regulatory approaches that municipalities have long taken for granted" (2018: 197; similarly, Sribaskaran/MacEachen 2018: 11-13). It is these systemic weaknesses that go a long way towards explaining Uber's rapid rise in Toronto. They have their root cause in the incisive neoliberal state reforms that have shaped the Province of Ontario's broader regulatory landscape – and with it Toronto's taxi industry – for more than two and a half decades.

As noted above, the adoption of neoliberal policies worldwide has unfolded along deeply variegated historical paths (Peck 2013). As critical geographers have emphasised, neoliberalism has produced a splintered and deeply uneven global landscape of various "actually existing neoliberalisms" moulded by "path-dependent, contextually specific interactions [...] at a broad range of geographical scales" (Brenner/Theodore 2002: 349; similarly, Harvey 2007: 87-119; Keil 2002: 581-582). In Canada, neoliberalism has crucially hinged on the provincial state scale. Despite its deeply *multi*-scalar character and the key involvement of both the federal and municipal state scales in consolidating (various sub-versions of) Canadian neoliberalism (Keil 2002: 588, 594; Thomas 2009: 112), it was provincial governments that "have been at the forefront of neoliberal restructuring in Canada" (Keil 2002: 588). This is due to Canada's constitutional system, which prohibits federal intervention in what is codified as 'local matters' and, at the same time, provides provincial governments with virtually unlimited legislative powers over 'their' municipalities, making Canadian cities, if to varying degrees, the "'creatures' of provincial governments" (Fanelli 2018: 250; Boudreau et al. 2009: 60-61; Keil 2002: 578; Valverde 2018: 200). It is necessary, therefore, to examine in more detail the heritage of neoliberalism at the level of the Province of Ontario and its delimiting effects on the regulatory powers of the City of Toronto when Uber arrived.

Not dissimilar to the archetype neoliberal governments of Ronald Reagan in the US and Margaret Thatcher in the UK (Keil 2002: 588), it was the Conservative government of Ontario Prime Minister Mike Harris (1995-2003) whose incisive state reforms initiated a lasting swing towards neoliberal urbanism in the Toronto region (Albo/Evans 2018; Evans/Albo 2011; Evans/Fanelli 2018; Fanelli/Thomas 2011). After rolling back many of the institutional and regulatory frameworks that had marked the postwar Keynesian 'class consensus', Harris's so-called 'Common Sense Revolution' initiated a fast-paced roll-out of neoliberal policies across Ontario that entailed the shift from a state model based on welfare, (limited) social security and (partial) solidarity to a workfare-oriented Ontario "competition state" (Albo 2018: 16). The Harris administration promoted the privatisation of public goods and services, issued various deregulatory and pro-market reforms and advanced the overall downscaling of social services (across domains such as education, public transit and housing). Furthermore, the new government pushed for a normalisation of precarious labour regimes in conjunction with incisive anti-union reforms (Albo 2018; Boudreau et al. 2009: 58-65; Ibbitson 1997; Thomas 2009: 109-137). In sum, the neoliberal reform project of the Harris years – widely unchallenged and variously continued by all Ontarian governments ever since (Albo 2018: 30-31) – has fed

into a broadly accepted, if sometimes bitterly contested, neoliberalization of urban everyday life in the GTHA: the gradual consolidation of what Stefan Kipfer and Roger Keil have called a 'common sense' or even 'roll-with-it' neoliberalism in the region (Keil 2009; Kipfer/Keil 2002).

The pro-business, deregulatory common sense at the level of the Ontario competition state has had crucial implications for Toronto's taxi industry even before Uber's entry. For it is the province, not the municipal government that is responsible for overseeing labour relations in the industry. As Aparna Sundar explains: "[D]espite the fact that all other aspects of the industry are regulated by the municipality, classification of labour and conditions of work are under provincial jurisdiction" (2012: 111). In practice, however, Ontarian governments have long abandoned their role of overseeing and enforcing labour laws in Toronto's taxi industry. Even more, given that under the Harris government's reforms the Ministry of Labour lost about half of its budget as well as a quarter of its employment standards officers (Thomas 2009: 130), provincial regulatory oversight was downscaled to such a low level that the city's MLS division remained the only (itself chronically understaffed) state body of intervention (Vosko/Thomas 2014). An article in *Taxinews*, the local journalistic mouthpiece of Toronto's taxi industry, puts this regulatory malaise into palpable proportions: The "City of Toronto has 14,125 taxi drivers and 71,680 PTC[30] drivers regulated by only 10 to 12 enforcement officers" (Beggs 2019b: 3).

The detrimental effects of provincial non-interventionism resurfaced prominently once Uber entered Toronto's taxi market in 2012. In the face of the company's amassing law infringements, the provincial Liberal government of PM Kathleen Wynne (2013-2018) retreated to what had been the established regulatory approach of the province long before: a hands-off, laissez-faire strategy that left regulatory responsibility fully in the hands of the City of Toronto's MLS division. When asked about a potential provincial intervention after one and half years of unapologetic law breaking by Uber in Toronto, Wynne curtly stated: "At some point, (the Ontario government) will bring forward a provisional framework. *But I do think it is important to recognize that the municipalities need to take the lead on this*" (Wynne quoted in Rider 2016: n.p.; emphasis added).[31] Wynne's statement came close to a free ride ticket for Uber in Ontario. It is here, then, that a first puzzle piece of the broader picture of Uber's rapid rise in Toronto comes into

[30] PTC stands for Private Transportation Company and, used mostly in the Canadian context, refers to companies such as Uber or Lyft. The US-American equivalent is TNC: Transport Network Company.

[31] Contrary to Wynne's announcement, this 'provisional framework' never took shape.

sight: the almost total absence of any regulatory intervention by the provincial government of Ontario (Valverde 2018), which left the city few regulatory options beyond handing over the Uber question to Ontario's Superior Court of Justice.

On 3 July 2015, eight months after Cook's initial press conference, the court's decision was due. The key question, as Judge Sean F. Dunphy posed it, was the following:

> Have the City's regulations, crafted in a different era, with different technologies in mind created a flexible regulatory firewall around the taxi industry sufficient to resist the Uber challenge, or have they instead created the equivalent of a regulatory Maginot Line behind which it has retreated, neither confronting nor embracing the challenge of the new world of internet-enabled mobile communications? (Ontario Superior Court of Justice 2015: 3)

Dunphy opted for the latter and, in short, confirmed Uber's key argument that its operations did not fall under the city's existing taxi bylaw. With the court case falling flat, MLS had exhausted its regulatory possibilities. As an MLS staff member remembered in hindsight, the court's decision established the fact "that we could no longer continue to operate with the licence categories that we had [...] and how we, as a government, regulate the industry would also have to change" (Interview MLS staff member). A new regulatory framework was the only practicable next step for the city at this point.

In sum, the deeply entrenched political culture of laissez-faire neoliberalism in Ontario marks a first contributing factor to the re-regulatory success of Uber in Toronto. It found its starkest expression in the lack of any noteworthy regulatory intervention by the three Ontarian governments that have been in power since Uber's arrival in Toronto in 2012. Neither Dalton McGuinty's (2003-2013) or Kathleen Wynne's (2013-2018) Liberal governments nor the administration of Doug Ford's Conservatives (in power since 2018) have shown the slightest inclination towards reining in on Uber. On the contrary, it was these governments' decided inaction that forced the city, indirectly at least, to put the Uber question in the hands of Ontario's Supreme Court, making the Uber question a regulatory gamble that the Silicon Valley company could decide for itself. What looms large behind Uber's rapid rise in Toronto, then, is a deeper structural problem: the strict adherence of the Province of Ontario to a globally pervasive neoliberal paradigm that forbade more decided regulatory intervention (Valverde 2015).

As goes without saying, neoliberal state policies have formed a basic precondition for the rise of Uber in countless jurisdictions worldwide (Srnicek 2017: 9-35;

Woodcock/Graham 2020: 33-37). Still, the non-interventionism of Ontario's provincial government forms an important distinguishing earmark of the Toronto case and sets the city apart from other jurisdictions, both in Canada and beyond. Within Canada, the provincial governments of British Columbia (BC) and Quebec seized full regulatory oversight when Uber started operating in the cities of Vancouver and Montréal, respectively. This contrasts sharply with Ontario's hands-off approach (for an overview see Valverde 2018: 207-210). While neither of the two governments acted strictly against Uber (particularly in BC provincial interventions were, at times, clearly Uber-friendly), the political friction that resulted from provincial interference significantly slowed down the respective processes of legalisation in both jurisdictions. By way of comparison: When the Uber system was already smoothly running on fully legal grounds in Toronto by July 2016, it still took another three years until Uber became legal in Quebec in October 2019 (Lapierre 2019). Yet another four months later, in January 2020, Uber finally obtained its licence in Vancouver (Bula 2020; Ligeti 2020). Compared to BC and Quebec, then, Ontario's non-interventionism clearly facilitated the rapid rise of Uber in Toronto.

On the Ruins of the Taxi System: Uber versus Worker Power

The above section surveyed the deeply neoliberalized regulatory landscape of the Ontario provincial state and how the latter's laissez-faire politics facilitated Uber's rise in Toronto. This section explores the struggles of local taxi drivers and their attempts to resist Uber's gradual takeover of Toronto's taxi market. While fighting a billion-dollar global tech company poses an exceptional challenge for any taxi driver cohort worldwide, the situation for Toronto's drivers was particularly precarious. To understand why, it is necessary to gain an idea of the shape – and, in fact, deep crisis – of the taxi system as it existed in Toronto prior to Uber's arrival.

For many decades, the fate of Toronto's taxi industry has hinged on the postcard-sized piece of sheet metal that is attached to the rear bumper of every cab in the city: the so-called 'plate'.[32] Issued by the city with the quantity strictly capped, each plate shows a

[32] While the history of Toronto's taxi industry, especially in the pre-WWII era, has not received much scholarly attention, there are important accounts that provide much more detail than I am able to offer in the limited space available here. See, in particular: Beattie (1998), Berry (2006),Tucker (2018) and Valverde (2012: Ch. 7). Peter McSherry's (1998) *Mean Streets: Confessions of a Nighttime Taxi Driver* is equally informative. Beyond written scholarly work, Berry Greenwald's film documentary *Taxi!* provides a well researched and fairly entertaining glimpse into Toronto's early 1980s taxi industry. It is available here: https://www.nfb.ca/film/taxi/; accessed 20 May 2020.

unique combination of letters and numbers – for instance, '544' or 'A 303' – and has a value attached to it that has fluctuated, over the past few decades, from a few hundred dollars after WWII to up to CAN $300,000 in the early 2000s and, as a consequence of Uber's entry, back to about CAN $25,000 more recently (Berry 2006: 229-230). Currently, there are about 5,000 taxi plates (of different subcategories) in Toronto.[33] The more recent case of Uber and other ridehail platforms aside, possession of a plate remains the indispensable precondition for putting a taxicab onto Toronto's streets. Two incisive bylaw reforms marked the beginning of Toronto's plate system (Abraham et al. 2008: 4).[34] Following a tumultuous post-WWII era of repeated labour unrest in a taxi industry that, unlike today, still recognised drivers as full employees (Tucker 2018: 370), the first of these reforms came in 1963 and allowed the trading of licences on the open market. Licences (read: 'plates') could now be traded for any price provided the seller was paid in cash (Berry 2006: 229-230). A second reform, issued in 1974, further loosened the regulations, allowing the long-term leasing of licences from owners to drivers as well as the possession of multiple plates by a single owner. These two reforms, together with the city's strict cap policy, left their marks on the industry. They not only exploded plate prices well beyond the financial means of any ordinary driver, but they also initiated a major swing from owner-operated taxicabs towards a leasing model in which drivers would rent their licences from owners – either on a permanent or a shift-by-shift basis (Kaplinsky 2018: 265; Tucker 2018: 369). On the owner side, this new system allowed for the concentration of wealth and power into the hands of a few (Abraham et al. 2008: 5). On the driver side, the rise of the plate system marked the end of the taxi driver as employee and ushered in a new era of the taxi driver lessee.

Importantly, the industry-wide departure from a more direct employer-employee relationship opened up space for intermediary levels of managerial control and rent extraction. This gap was filled by what has come to be known as the peculiar entity of the taxi brokerage (cf. Mathew 2008: 64-68, 92-104; Sundar 2012: 120). Brokerages, occupying a central position within the newly emerging plate system, soon established themselves as an indispensable conduit between drivers and owners (cf. Mathew 2008: 94). While mostly known for their dispatch services, the power of brokerages derived

[33] Aparna Sundar provides the following numbers: "As of October 2006 there were 3,480 Standard Taxicab Owner Licences, 1,403 Ambassador Taxicab Owner Licences, and 85 Accessible Taxicab Owner Licences" (2018). At the time of writing in March 2020, a search of the City of Toronto's Business Licence Lookup showed 4,070 results for the category of "Taxicab Owner", which combines Standard and Ambassador plates, and 559 results for the category of "Toronto Taxicab Owner", another name for the Accessible plate. See: http://app.toronto.ca/LicenceStatus/setup.do?action=init; accessed 15 March 2020.

[34] While Tucker (2018) uses the term "Medallion system", I resort to the perhaps more uncommon term of the "plate system" in order to reflect the fact that in Toronto licences are widely referred to as "plates", not – as in New York City – as "medallions" (cf. Mathew 2008; Sundar 2012: 119).

from their privileged access to information in a deeply and confusingly splintered taxi industry. Brokers, as Mathew explains, "emerged as all-powerful just by knowing the industry. They knew who owned medallions, what the owners wished to do with their medallions, and who was ready to buy them" (2008: 66). Crucially, for a plate holder, brokerages opened up the alluring prospect of retreating to the comfortable position of an 'absentee owner': Having no fixed costs and hardly any economic risks to bear, absentee owners would hand over the day-to-day management of their plate(s) to a brokerage of their choice (making it their 'designated agent'). They then lived off the constant flow of lease money flowing from drivers – via brokerages and their deductions – back to them (Abraham et al. 2008: 6-7; City of Toronto 2014: 26-27; 2016: 36-37). This, in short, was a system of double rent extraction: first by owners, then by brokerages.

This new industry structure had lasting effects on drivers' work lives. If not part of the small minority able to get hold of a plate, drivers now largely depended on brokerages and the two basic lease models they offered. As lease drivers, they could rent a plate on a long-term basis (usually a year) and would remain responsible for the car, including costs for maintenance, repairs, gas and all other expenses. As shift drivers, on the other hand, drivers would rent a plate-cum-vehicle package on a short-term basis (either daily or weekly). In this scenario, car maintenance and repairs would remain with the brokerage, while operating costs such as gas and tickets were the driver's responsibility (Abraham et al. 2008: 8; Sundar 2012: 119-120). Either of these two scenarios left drivers in a precarious position: Largely dispossessed of access to plate ownership, they were forced into lease contracts that syphoned off ever greater shares of their already meagre incomes.[35]

The economic burdens of the plate system, although experienced by drivers long before, became most visible to the public eye during Toronto's taxi crisis of the 1990s. While absentee owners continued to reap immense profits, drivers struggled with ever-smaller incomes spread out over ever-longer hours.[36] In 1998, Royson James, a journalist writing for the *Toronto Star*, characterised the economic imbalances of the plate system as follows:

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[35] In 2008, in a study that gathered data from 78 local taxi drivers in Toronto and the neighbouring municipality of Mississauga, Abraham et al. (2018) found that drivers' average hourly income ranged between $8.81 and $2.83, depending on the status of the driver (ambassador driver, lease driver, lease driver with a second driver, shift driver). Ontario's minimum wage in 2008 was at $8.75 (CBC News 2008), which means that most drivers worked well below the minimum wage threshold.

[36] The condition of Toronto's taxi industry in the 1990s was most prominently documented in a series of articles by journalist Peter Cheney in the *Toronto Star* in early 1998. It is available here: http://torontotaxiprices.blogspot.com/2010/05/toronto-star-taxi-plateleasing.html; accessed 18 March 2020.

> More than three-quarters of the city's taxi licences are held by people who don't use them personally. Instead, licence holders rent them out to working drivers, some of whom pay an average of $1,000 a month to use them. This practice puts more than $30 million a year in the hands of plate holders and middlemen, while draining money from drivers who must work ever longer hours to pay the exorbitant fees (quoted in James 2011: n.p.).

The crisis of the plate system, most visible in the dilapidated state of taxicabs and the low quality of service provided by overworked drivers, had made it into the spotlight of the city's political stage, where it clashed with Toronto's newly awakened 'global city' ambitions (Sundar 2012). The city's response, following resurging strike action by drivers (Tucker 2018: 375), was the 1998 bylaw reform, whose main outcome was the introduction of a new, complimentary licence category: the Ambassador plate. In contrast to the standard plate, the Ambassador licence was strictly owner-operated and allowed neither licence lease nor car transference. While the reform helped to raise the income of Ambassador drivers compared to their shift-driver colleagues (Tucker 2018: 377), the new licence caused severe problems of its own: Unable to rent out their cars to other (shift) drivers during times of idleness – such as prolonged periods of sickness – Ambassador drivers were unable to share their fixed costs with a second driver. As a consequence, Ambassador drivers found themselves forced to work excessive hours in order to meet their recurring costs (Abraham et al. 2008: 13-15; Berry 2006: 232-242; Dale 2011; iTaxiworkers 2012: 27; Valverde 2012: Ch. 7; 2015). Even more importantly, the grafting of a new licence arrangement onto the already deeply splintered lease system fragmented Toronto's taxi industry even further. A victim of an increasingly fractured industry and the many power imbalances it brought forth, driver labour unions – then under the roof of the Retail, Wholesale and Department Store Union (RWDSU) – collapsed entirely by the end of the 1990s (Tucker 2018: 376). While the entry of Uber was still more than ten years away at this point, the failure of the 1998 reform had a lasting impact on Toronto's taxi industry. It facilitated Uber's rise in three decisive ways.

First, it took drivers more than ten years to rebuild collective strength. As it became clear that the 1998 reform had given rise to more problems than it could solve, a small group of drivers came together to rebuild an organisation of collective representation: the iTaxiworkers association. Founded in 2009 and led and supported by many of the drivers who had been part of the earlier cycle of struggles of the 1990s, the organisation developed quickly. By 2012 it had grown to almost 1,000 members (iTaxiworkers 2012: 1). During the entire course of its existence, however, the iTaxiworkers group struggled with rebuilding the organisational strength that drivers had once possessed under the RWDSU. While iTaxiworkers were initially supported – organisationally and financially

– by the local branch of the Canadian United Steel Workers Union (USW), these ties were never fully institutionalised. Rather, they hinged on personal relationships and informal contacts. When a key contact person tragically passed away and was substituted by a less sympathetic successor at USW, the semi-official bond between the iTaxiworkers and the USW fell into crisis and eventually came to a halt (Interview Taxi Driver 2). In the absence of institutional backing from an established and financially robust union, iTaxiworkers – while popular with drivers and still gaining unexpected successes – remained a strongly precarious undertaking that rested on the time, energy and often private funds of a handful of its key members. Many of them were drawn into serious debt. Obviously, this was not the level of worker power needed to confront a global behemoth like Uber.

Secondly, the ten years that it took drivers to partly regain collective strength postponed any attempt to reform the industry in a more driver-friendly manner. Hence, when the gradual consolidation of the iTaxiworkers finally allowed drivers to push the city to a renewed industry review in late 2011, Uber was already at the brink of entering Toronto's taxi market. For the iTaxiworkers, the advent of Uber came at the worst possible time, as it engaged the driver group in a complex industrial two-front war between (the ongoing reform of) the existing taxi industry on the one hand and Uber on the other. Nevertheless, the group was surprisingly successful on the first of the two sides of this conflict. In February 2014, Toronto City Council – following many of the iTaxiworkers' demands – sanctioned a new taxi bylaw that prohibited multiple plate ownership and thereby pulled the carpet from under the plate system. Although the bylaw foresaw a dangerously long transition period of ten years before the plate system would eventually be fully prohibited, Sajid Mughal, president of the iTaxiworkers at the time, called the reform a "historic moment, when the industry is back in the hands of the people who are working 12 hours a day. The drivers have the industry back in their hands" (quoted in Dale 2014: n.p.). The taxi industry in their hands, the ground beneath drivers' feet was already shifting, however. Operating in the slipstream of the ongoing industry review, Uber was able to enter Toronto's taxi market in a comparatively unobtrusive manner. The Silicon Valley startup, in other words, clearly profited from the fact that the respective energies of both drivers and city officials were absorbed in the parallel industry review.

The coincidence of Uber's entry with the 2014 taxi reform allowed Uber to substantially delay the introduction of its UberX variant in Toronto. Only in September 2014, seven months after the new taxi bylaw had passed and more than two and a half years after

Uber's first arrival in Toronto, Uber launched UberX in Toronto.[37] From this point onwards, the explosive growth of Uber's non-professional driver base made it infinitely more difficult for the iTaxiworkers to make their demands heard among a local driver cohort that was growing explosively due to the steady influx of non-professional, often part-time drivers (Rosenblat 2018: 49-72). Obviously, part-time drivers – often working only a couple of hours per week – shared neither the professional ethos nor the same interest in entrenched labour struggles against Uber. The window of opportunity that had existed between March 2012 (Uber's first arrival) and September 2014 (the launch of UberX) had closed.[38] The efforts of the iTaxiworkers came to an abrupt halt. As one of the iTaxiworkers' frontline driver-organisers despondently summarised the short-lived success of the 2014 taxi reform: "Unfortunately when we achieved our goal, that big hammer of Uber came and that killed the entire movement, the entire achievement of our ten, 15 years" (Interview Taxi Driver 1). Drivers had won a battle against local taxi capital, yet it became increasingly clear that they would lose the war against Uber. In sum, chances for more coordinated driver resistance would have been substantially better in Toronto, had the arrival of Uber not coincided with the delayed reform of the existing plate system.

Yet, the failed 1998 reform aided Uber's rise in Toronto in even a third way. For the protracted crisis of the plate system and its disastrous effects on drivers' work lives made the – very real – benefits of app-based ridehail platforms stand out starkly. In particular, it was Uber's early competitor Hailo (Shaheen/Chan 2016: 582) that quickly won the support of drivers. Just like Uber, UK-based Hailo launched in Toronto in early 2012. Having spent years behind the wheels of taxicabs that had often been left in dreadful conditions by owners and garages (McSherry 2002: Ch. 1), no small number of drivers welcomed Hailo and the superior quality of service that the app allowed them to offer. As one driver reported: "In Toronto, Hailo was going so fast. Drivers were supporting Hailo. All the cars were excellent, the service was excellent" (Interview Taxi Driver 2). Also in economic terms Hailo offered drivers a low-cost alternative to established brokerages like Beck Taxi, which charged drivers up to CAN $500 per month for their dispatch services. Charging customers the standard taxi rate and taking a 15 per cent commission from drivers for each ride (while still allowing drivers' favourite fare: the fully non-commissioned 'street hail'), Hailo's Toronto branch, according to one of its former

[37] By comparison, in New York City Uber launched its UberX variant only little more than a year after its first arrival in the city.

[38] Of course, Uber may have launched its UberX variant earlier in Toronto, had there been more fightback from drivers. In this sense, too, the delay of the UberX launch may reflect the fact that there was not the same level of worker resistance in Toronto as in many other North American jurisdictions such as, for instance, New York City (see below).

employees, was profitable after only eight months and, at one point, had signed up more than a third of Toronto's entire taxi driver cohort (Interview Taxi Driver 3). At least among the more engaged drivers, years of struggle against the plate system had diminished identification with local taxi corporations. As one driver, who had switched from taxi to Hailo and later to Uber, snapped: "I don't care about Beck Taxi. Why should I? I came fighting these guys, I went to every union, every strike" (Interview Taxi Driver 2).

Better quality of service, steadfast economic benefits and deeply engrained frustration with the traditional taxi industry help to explain why Toronto's professional drivers had good reasons, at least in the early days, to greet the advent of Hailo – and, if to a lesser extent, Uber – not with complete ill will but with genuine interest (Ballingall 2012). Hailo, however, could not withstand the pressure of its financially vastly superior Silicon Valley counterpart for long. In a move that saw Hailo shut down its entire North American arm, the UK-based company – still profitable in Toronto at the time, yet accruing severe losses in other US-American cities – left Toronto in October 2014 (Campbell 2014; Etherington 2014; Flack 2014). With Hailo gone, taxi drivers faced two options: a return to the unloved plate system or a switch to Uber. Many opted for the latter.

It would be illusory to assume that a successful taxi reform in 1998 could have halted Uber's triumph march in Toronto. Nevertheless, a side-glance to New York City demonstrates that somewhat more favourable circumstances could have made a difference. In NYC, Uber has faced heavy resistance from the battle-tested New York Taxi Workers Alliance (NYTWA) (Brooks 2018; Mathew 2008; 2015; Wolf 2019). Counting more than 10,000 members (as opposed to the 1,000 members of the iTaxiworkers), the NYTWA was not only able to force through a local minimum wage for Uber and Lyft drivers, it also successfully pushed for a cap that limits the number of PTC drivers in the city. Especially the latter measure has had important implications for Uber's business in NYC. On the one hand, a driver cap diminishes Uber's ability to guarantee a constant (over-)supply of drivers on the road and thereby can considerably affect the sensitive factor of (longer) average wait times for customers (Woodcock/Graham 2020: 45). On the other hand, a driver cap makes it easier for local unions to organise drivers; a process that becomes exponentially more difficult, if the number of drivers is left to grow unrestrictedly – as is the case in Toronto. Taken together, the comparison to NYC puts into even starker relief the lack of worker power in Toronto.

In sum, it must be noted that Toronto's taxi drivers never possessed the organisational power to substantially confront Uber. First, the failure of the 1998 reform and the ensuing collapse of driver representation under the RWDSU meant that drivers had to start from scratch to rebuild worker power in their industry; a step that was only accomplished more than a decade later with the founding of the iTaxiworkers unit. This postponement, secondly, led to a situation in which the overdue reform of the plate system – protracted for more than a decade – coincided with Uber's entry into Toronto's taxi market. This double burden not only exceeded the iTaxiworkers' modest financial resources, but also their organisational strength. Thirdly, the prolonged crisis of Toronto's taxi system resulted in the continuing and oftentimes growing dissatisfaction of taxi drivers, who – most visibly in the local popularity of Hailo – eagerly registered for the newly arrived platforms of Hailo and, once the latter was gone, Uber. The protracted crisis of Toronto's taxi system and the either failed (1998) or belated (2014) attempts to reorganise it in a more equitable manner widely opened the door for Uber in Toronto.

In Anticipation of the Smart City: Uber as Local Tech Figurehead

Beyond provincial non-interventionism and lacking worker power, the regulated deregulation of Toronto's taxi industry was further shaped by the city's emerging ambitions to transform itself from a second-tier global city (Brenner/Keil 2006: 3-4; Friedmann 1986: 72) to that of a first-order smart city (Brail 2018: 59-60). In fact, the smart city ambitions of local political and economic elites emerged as a powerful lever for Uber in its fight for favourable regulations in Toronto. Such tendencies first surfaced on the same day that MLS director Tracey Cook announced the city's court injunction against Uber – on 18 November 2014. It was only a few hours after Cook's press conference that designated Mayor John Tory – elected on 27 October, but not taking office before 1 December – took to the microphones himself. In a remarkable rebuke of his own staff, Tory – former chief executive of Canadian media giant Rogers' broadband division (Boudreau et al. 2009: 201; Nowak 2015a) – made a statement that left little doubt as to the decided pro-Uber stance of his coming legislature:

> I just think we use what I'll call old-fashioned methods like court cases [...] when in fact these kinds of technological changes are here to stay [...]. We have to work something out that protects public safety and makes sure we have fair competition but also doesn't try to pretend something like Uber is just going to go away because it's not (Tory quoted in CBC News 2014: n.p.; cf. Pagliaro 2014).

The compressed version of Tory's announcement – the essential message that kept ringing in the ears of Torontonians for the next two years – was as simple in its rhetoric as it was momentous in its politics: *Uber is here to stay*. It was in terms of this motto that Tory, only days after the city had lost its injunction case against Uber, proclaimed the start of a new round of taxi regulation reform. In contrast to the 2014 reform, this reform was to include Uber (Lu 2015; Pagliaro 2015).

Tory's pro-Uber intervention dovetailed neatly with the open secret of his early administration. Tory's ambition, as the former entrepreneur turned politician liked to stress, was to "establish Toronto as a leader in running a truly smart city" (Tory quoted in Hardy 2015b: n.p.). Similarly tech-prone statements by the new Toronto Mayor were no rarity and could be witnessed in recurring regularity: "I am pushing the city to be smarter because if you have a city that looks like it's in the 1960s you won't attract anything new [...] I want this place to be the most friendly place in North America for startups and I think it can be" (Tory quoted in Hardy 2015a: n.p.). As Roger Keil observed in an analysis-cum-polemic penned during Tory's first legislature, the city "now has a chief executive who has made the question of technologies a major plank of his still evolving platform" (2017: 195). Greeting Uber's barefaced law evasion with acquiescent indulgence and declaring, in numerous statements and interviews (Hardy 2015a; 2015b; Nowak 2015a; 2015b; Tory/Vrbanovic 2016), his determination to provide footloose tech capital – preferably of the 'smart' and 'disruptive' Silicon Valley kind – with a welcoming homestead in soon-to-be-realised 'Smart City TO', Tory made the question of how Uber should be regulated one of the early test cases of his urban agenda (Keil 2017; Valverde 2016).

Tory's new urban regime not only awakened the smart city ambitions of Toronto itself, but also coincided with a broader, even regional shift in the economic development strategy of the GTHA (Wachsmuth/Kilfoil 2021). Starting in mid-2015, various local and supra-local advocates, describing themselves as "an informal group of technology entrepreneurs, thought leaders, and academics" (McKinsey 2016: 1), launched a series of articles in Canada's biggest national newspaper, *The Globe and Mail,* that – under the label of the Toronto-Waterloo Innovation Corridor (TWIC) – aggressively promoted the GTHA as a newly emerging hotspot for global tech investment (Kelleher/McGee 2016; Klugman/Lynch 2015a; 2015b; Macklem et al. 2015). Among this group were John Kelleher, business advisor at McKinsey and co-chair of the start-up accelerator NextCanada, Ian Klugman, CEO of the region of Waterloo's public-private start-up hub Communitech, and Kevin Lynch, vice-chair of the Bank of Montreal (Communitech

2016). As one of the group's early publications put it: "The Toronto-Waterloo Innovation Corridor has the population and potential to become [...] an innovation 'super-cluster,' nurturing the growth of future billion-dollar firms, attracting and retaining the globally mobile capital and talent necessary to build these companies, and in the process, reinventing our own future" (Klugman/Lynch 2015a: n.p.). In all of their articles, the promoters of the TWIC presented the creation of a technology and innovation supercluster between Toronto and the Kitchener-Waterloo area – the latter located about 100km west of downtown Toronto (Nelles et al. 2005) – as a powerful driver of future economic growth and foreign investment (Figure 6). Uber, as goes without saying, was a perfect fit for such an endeavour.

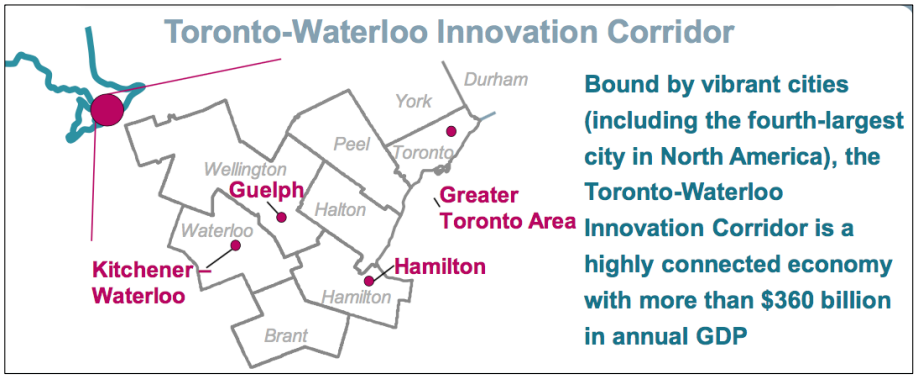

Figure 6: An early cartographic representation of the TWIC. Note how the urban nodes of Kitchener-Waterloo, Guelph, Hamilton and the Greater Toronto Area feature as isolated nodes on the map, while the explanatory note invokes the corridor as a "highly connected economy". Source: McKinsey (2016: 1).

Tory strongly supported the TWIC agenda. In a piece co-authored with the Mayor of Kitchener, Berry Vrbanovic, Tory not only praised the TWIC as the key to the region's future economic development, but also made it clear that regulatory red tape would not be allowed to hamper its future success: "[W]e must start talking about regulatory reform as economic innovation. We can't claim to be innovation-friendly while banning technology companies that are disrupting transportation" (Tory/Vrbanovic 2016: n.p.). While avoiding explicit reference to Uber, the statement – made only weeks before Toronto City Council would give its decisive vote on Uber in May 2016 – was indicative of how the smart city aspirations of Tory provided Uber with a powerful political lever in the midst of the re-regulatory process.

Uber made use of this lever in two distinct ways. First, by forcefully underscoring its image as one, if not *the* epitome of Silicon Valley tech entrepreneurialism, Uber repeatedly foregrounded its beneficial role for urban investment and economic growth in Toronto (cf. Alvarez León/Rosen 2020; Rosenblat 2018: 73-106; Shearmur/Wachsmuth

2019). Couched in a language of technological progress, innovation and urban smartification (Schafer 2015a; Uber 2015; 2016a; 2016b; 2016c; 2016d), Uber's image campaign in Toronto aimed to link the question of regulatory reform to Toronto's broader smart city aspirations. Nowhere was this more visible than in the repeated deployment of the two-word neologism 'smart regulations', which made frequent appearances in Uber's local image campaign (cf. Schafer 2015a; Uber 2015; 2016a; 2016b; 2016e). As Ian Black, then head of Uber Canada, put it: "This is a positive campaign about what can be achieved with smart, progressive regulations for this new industry" (Uber 2016a: n.p.). Another publication – tellingly entitled "Moving Toronto Forward" – similarly contextualised regulatory reform in terms of a dualistic choice between technological progress and regulatory regress: "Is Toronto a city that has embraced innovation to solve our biggest transportation challenges? Or have we fallen further behind because of regulatory inflexibility and political indecision?" (Uber 2015: n.p.) Regulation, according to Uber, had to follow innovation, not vice versa.

Secondly, the smart city ambitions of local elites and the apparent tech-infatuation of Mayor Tory allowed Uber to effectively leverage yet another vital ingredient of corporate smart city thinking: tech-powered solutionism. A vital ingredient of the broader smart city discourse (Glasmeier/Christopherson 2015; Hollands 2008; 2015; Söderström et al. 2014), solutionism can be defined, in the words of Evgeny Morozov, as a technology-driven "will to improve" that recasts "all complex social situations [...] as neatly defined problems with definite, computable solutions" (2013: 5; similarly, Alvarez León/Rosen 2020; Sadowski/Bendor 2019). In line with this ideal, Uber presented itself in Toronto as the globally acknowledged, tech-powered problem solver of local urban malaises – most of all: Toronto and the GTHA's chronic problem of road congestion (Addie 2017a; Keil/Young 2008). UberPOOL, a sub-variant of UberX that allows passengers to share their trips with strangers headed to a similar direction, provided a particularly effective vehicle in this regard. Released in Toronto in January 2016 (Uber 2016a), UberPOOL was not only used to set Uber apart from the taxi industry and its 'old ways' anchored in 20th-century pollution, traffic jams and individual car ownership (cf. Rider 2015), but also to present Uber's business model as the 21st-century answer to such evils. "The future of Toronto," as an Uber Newsroom publication boldly stated, "threatens to be one of constant congestion and gridlock as the city continues to grow up and out. As a technology company, we are developing a solution that can solve this: on-demand carpooling" (Uber 2015: n.p.). Another statement echoed such optimism: "With uberPOOL, technology is finally addressing the decades-old problem of how to encourage carpooling and tackle congestion" (Uber 2016a: n.p.). The message was clear:

Uber in general and UberPOOL in particular set the city on a path to a more sustainable future in which individual car ownership would gradually give way to on-demand, algorithm-coordinated ridehail shuttles and, as a result, lead to less congestion on Toronto's streets and highways (cf. Uber 2016c: 12). Whatever the actual substance of such promises,[39] Uber's solutionist rhetoric – in the context of tech-enthusiastic programmes such as the TWIC initiative – could justifiably hope to fall on sympathetic ears among Toronto's political elites.

And even if it did not, Uber knew how to make its message heard. Launching one of the most massive lobbying campaigns ever witnessed at Toronto City Hall (cf. Valverde 2018: 202), Uber arranged myriad personal meetings, calls and emails between Uber officials on the one hand and city councillors and their staff on the other. The overall numbers of Uber's lobby engagements are revealing. They show a steep increase from the year of 2014 (89 entries in the registry) to the record years of 2015 (921 entries) and 2016 (1683 entries). During these two decisive years, which led up to city council's final decision on 3 May 2016, Uber made contact – usually repeatedly – with virtually all of city council's 44 members. By contrast, in the next busiest year of 2017, Uber's entries in the lobby registry plummeted back to the comparatively modest number of 294.[40] Beyond sheer quantities, it was also the quality of contacts that mattered. In early 2015 Uber hired Nick Kouvalis and John Duffy, two former members of Mayor Tory's 2014 campaign team (Hui 2015; Jepson 2016). Mastermind behind a whole number of successful mayoral campaigns of the Progressive Conservative Party – including those of Tory (both in 2014 and 2018) and his mayoral predecessor Rob Ford (in 2010) – Kouvalis was hired, according to Uber, to conduct research on Toronto's transportation system to be provided, at request, to city councillors (Hui 2015). John Duffy, meanwhile, one of the key architects behind the SmartTrack transit plan of Tory's 2014 campaign, was hired as an officially listed lobbyist for Uber. While there were city councillors who remained strictly opposed to Uber's legalisation in Toronto, the company's close ties to the Mayor's office, combined with massive lobbying of councillors, made sure that its message of tech-powered economic growth and solutionism was finding its receivers at city hall.

As studies have shown, corporate storytelling and extensive lobbying have been part and parcel of Uber's launch procedures in many jurisdictions worldwide (Borkholder et al.

[39] A first empirical study has in fact shown strong traffic increases through PTCs, particularly in Toronto's downtown core (City of Toronto 2019b).

[40] All of these numbers are derived from a search on the City of Toronto's lobbyist registry conducted on 7 April 2020. See: https://www.toronto.ca/city-government/accountability-operations-customer-service/accountability-officers/lobbyist-registrar/ (last accessed 7 April 2020).

2018: 18-20; Rosenblat 2018: 175-176; Sribaskaran/MacEachen 2018). It is important, however, to differentiate this observation in terms of the varying degree of effectiveness that Uber's strategy has had in different places. As Rosenblat has argued, a ban on Uber can come at great reputational cost for cities that are particularly invested in the global race for tech investment: "For many cities, having Uber is the mark of being on the cutting edge, or at least being part of the global technology-business marketplace" (2018: 205; cf. Shearmur/Wachsmuth 2019). While other cities – including London in the UK, Vancouver in Canada or Austin in the US – have taken the risk of a retreat of Uber due to unfavourable regulations or have even actively banned the company from their jurisdictions for varying periods of time (Borkholder et al. 2018: 17; Butler/Topham 2017; Rosenblat 2018: 205; Sribaskaran/MacEachen 2018: 23-25, 36-37, 85-87), Toronto's pronounced smart city ambitions made a potential retreat of Uber a much more serious threat for Tory's strongly tech-based urban agenda (Keil 2017). Moreover, it is worth noting that in May 2017, one year after its legalisation in Toronto, Uber started to intensify its local investments by making Toronto a central node of the small urban network – comprising also the US cities of Pittsburgh, San Francisco, Dallas and Washington D.C. – that hosts the self-driving car programme of Uber ATG (Silcoff 2017; Uber 2020). While it remains unclear whether such future investments formed part of the conversation between Tory's team and Uber prior to the company's legalisation, the timing at least was striking.

Taken together, Uber's early years in Toronto were conditioned by three overarching dynamics that facilitated the rapid rise of its ridehail services. An existing neoliberal regulatory ground and, in particular, the laissez-faire approach of the Province of Ontario allowed Uber to gain traction in Toronto in the first place. The absence of coordinated worker power and the long-standing crisis of the city's taxi system further accelerated the local popularity of the Uber app, both with customers and (after the demise of ridehail alternative Hailo) with drivers. Finally, the election of John Tory as the city's new mayor gave a strong push to local smart city ambitions and, as such, brought Uber into a most favourable position in terms of the outstanding regulation of its business model. While I have explored these dynamics above, the below section will follow their consolidation into a new regulatory framework; a framework that has favoured Uber's business model at the expense of the interests of local taxi capital and, even more, Toronto's taxi drivers.

2 – Crafting a Legal Framework for Uber

As indicated above, the City of Toronto lost its injunction case against Uber in July 2015. This resulted in the almost immediate start of a new round of taxi industry re-regulation in an effort to include Uber within the new framework. The first palpable results of this process came two months later in the form of a city staff report prepared under the lead of MLS director Tracey Cook (City of Toronto 2015a; 2015b). While listing a number of outstanding issues (such as Uber's unresolved problem of lacking insurance coverage), the document clearly showed the influence of the three broader dynamics and policy directions outlined above: (i) an overarching impetus of hands-off regulation, (ii) an almost complete absence of driver interests and (iii) a strong gravitation towards tech-powered 'solutionism' (Valverde 2018). As one of the document's key passages stated: "This report recommends that City Council [...] direct staff to undertake the development of regulation that would permit private vehicles-for-hire, including UberX, to operate" (City of Toronto 2015b: 3). Applauded by Uber (Schafer 2015b: 1), the report marked a notable turnaround from MLS's earlier position and the court injunction it had initiated against Uber less than a year earlier. Unmistakably, the report clearly gravitated towards what Uber had aggressively advocated for in the foregoing months.

Three further reports – one prepared by MLS itself (City of Toronto 2016), one commissioned to local think tank MaRS Solutions Lab (Van den Steenhoven et al. 2016; critically, Valverde 2018: 200-201) and one delivered by the Federal Competition Bureau[41] (Pecman 2015a; 2015b) – concretised what had already surfaced in MLS's initial document: an overarching pro-Uber impetus that embraced keywords such as competition, innovation and smartness (City of Toronto 2016: 1-2, 3; Pecman 2015a; 2015b; Van den Steenhoven et al. 2016: 1, 11). Most importantly, these reports made Uber's platform-based business model the ideal type after whose image the new regulatory framework was to be modelled. Firstly, MLS now suggested that there was no need for Uber or taxi drivers to undergo the time-consuming driver training to which taxi drivers had so far been subjected: a costly 17-day course to be refreshed every four years: "[R]ecognizing that consumer protection can be achieved through competition and the adoption of technology (features such as GPS, driver or company reviews, etc.), it is being recommended that taxicab driver and owner training be eliminated" (City of Toronto 2016: 42). Secondly, the report proposed a two-tier licencing process in which it

[41] In contrast to MLS's two reports and the MaRS report, the report of the federal Competition Bureau was not part of the official material for Toronto City Council's decisive meeting on 3 May 2016. Still, it featured prominently in the debate through various newspaper articles that accompanied its publication (City of City of Toronto 2014: 12-14, 16).

was the company (Uber), not its thousands of drivers themselves, that had to go through a one-off, annually refreshed licencing process. Once Uber had attained its licence from the city, in other words, the company would be free to sign up drivers at will as long as they were able to: (i) show proof of their driver's licence, (ii) pass a criminal background check and (iii) provide confirmation of adequate insurance. Thirdly, and in contrast to the ensuing limitation on taxicab licences, MLS foresaw no cap on Uber drivers. "It is recommended," the report stated, "that the City not impose a limit on the number of [...] vehicles affiliated with a PTC" (City of Toronto 2016: 3).[42] It was these staff recommendations that formed the basis for Toronto City Council's decisive debate.

The latter was due on 3 May 2016. Importantly, it is one of the peculiarities of Toronto municipal politics that the mayor cannot rely on party allegiance at City Council. As Boudreau et al. explain, given "that Toronto municipal elections are non-partisan, he [the mayor] cannot count on the automatic vote of his party at Council in order to push his ideas" (2009: 209). Tory, unable to rely on a safe majority for the framework proposed by MLS, was forced to negotiate a deal – and this he did. In the days before city council's meeting, a number of left-leaning councillors, under the lead of NDP-members Gord Perks and Janet Davis, cooperated with Tory's office and worked out an alternative regulatory framework that proposed (i) to abolish the taxi plate system and (ii) to set up a regulatory framework that put stricter limitations on Uber than the original MLS report proposed. This alternate framework included city-mandated driver training and the prohibition of Uber's surge pricing feature.[43] Overall, this regulatory package was Tory's first potential path towards a majority at City Council.

A second path came from a faction that was much more conservative in its political orientation. Councillors Jim Karygiannis and Giorgio Mammoliti, both known for their close ties to some of Toronto's taxi industrialists, led a second faction that represented the taxi industry's dual interest of (i) saving the plate system and (ii) installing a single-tier regulatory framework that would, if not fully ban Uber, subsume it under the same licence requirements as taxis. Decisively, and in contrast to their left-wing counterparts, Karygiannis and Mammoliti were ready to enter into a fateful game of quid pro quo with Tory. The two councillors traded in the abandonment of their second demand – strict(er) regulations on Uber – against the safeguarding of their first one – the full re-instalment of

[42] Unsurprisingly, Uber welcomed the report as "a positive step forward, providing a progressive framework for ridesharing regulations in Toronto" (Uber 2016c: 1).

[43] One of Kristyn Wong-Tam's statements (ca. video time 9:19:30) gives perhaps the deepest insight into what this alternative regulatory framework might have looked like. https://www.youtube.com/watch?v=ZI9PXIAJwfQ; accessed 30 April 2020.

the taxi plate system. This deal, presumably worked out in the backrooms of City Hall, paved the way for a new regulatory regime in Toronto that not only allowed Uber to operate under regulations strongly favourable to its business model, but also reintroduced a taxi lease system that – after its ban in 2014 – many had deemed a relic of the past. Table 1 provides an overview of the 2016 bylaw and its most important regulations for both taxis and PTCs.

	Taxis	**Private Transportation Companies (PTCs)**
Number of vehicles permitted	• Restricted issuance of licences through city	• No limit on number of vehicles/drivers
Public access to service	• Street-hail, cabstand or booked through brokerage	• Must be booked through app (i.e. no street hails)
Fares	• Reduction of base fare from $4.25 to $3.25 • For street-hails and cabstand rides: Base fare plus metered fare • For rides booked through a brokerage dispatch system: Brokerage is free to charge at will (i.e. it can use "surge pricing) after base fare	• Increase of base fare from $2.50 to $3.25. • After the base fare, the PTC is free to charge at will (i.e. it can use "surge pricing")
Driver sign-up and screening procedure	• City-mandated licencing procedure	• Driver sign-up via app • Background check conducted by PTC itself
Driver Training	• Elimination of 17-day mandatory training (included: defensive driving, conflict management, anti-discrimination training) • Exception: Accessible taxicabs (retrofitted for wheelchair use)	• No mandatory training
Vehicle Age	• Maximum age of 7 model years	• Maximum age of 7 model years
Vehicle Requirements	• Vehicle must have roof light, taximeter, camera	• No requirements for roof light, taximeter or camera
Mechanical inspections	• Two inspections per year • Inspections conducted by the city itself	• One inspection per year • Inspection conducted by any workshop
Safety measures	• Elimination of required winter tires	•

	• Elimination of CPR course	
Vehicle insurance coverage	• $2 million coverage	• $2 million coverage

Table 1: Comparison between the City of Toronto's taxicab and PTC regulations in 2016 (adapted from City of Toronto 2016: 28-29; Sribaskaran/MacEachen 2018: 31-33; Valverde 2018: 214-215).

What Toronto City Council sanctioned in the late evening of 3 May 2016 was, in essence, a two-tier regulatory system (Phung et al. 2021: 1128-1129). On the one hand, it is marked by an overall deregulatory impetus that has lowered the regulatory standards for the *entire* industry. Instead of bringing Uber *up* to the existing regulatory level of taxis (the original intention behind the local taxi industry's much deployed motto of a 'level playing field'), the new regulations brought taxis *down* to a new regulatory minimum floor built around Uber and some of the key requirements of its platform. On the other hand, overall deregulation went hand in hand with internal gradation. Hence, the two licence categories for taxis and Uber were not on even ground, but steeply tilted towards Uber's side: Due to different insurance schemes, the absence of lease payments and upfront dispatch rates as much as laxer security precautions, the operational costs for UberX drivers were substantially lower than for taxi drivers. As one experienced driver soberly put it: "At the end of the day you make more money with Uber" (Interview Taxi Driver 3). Accordingly, the new framework had quite different consequences for Uber and taxis.

The taxi industry, facing lower regulatory standards than ever, remained within the long-established lease model. Although rental revenues for standard plates plummeted from about CAN $1,800–$2,000 per month to CAN $200–$400 and the overall market value of standard plates dropped from about CAN $350,000 to as low as CAN $20,000 (Beggs 2018b; 2019a; 2019c), the unexpected resurrection of the plate system was an undeniable win for plate owners, who could resume their long-established business model, although with decreased profits. For brokerages, the results were mixed. With drivers drifting towards Uber, some brokerages – especially those that owned plates themselves (as opposed to renting them from owners) – ran into serious trouble. As one manager stated: "We're losing cars, because we are getting nobody to drive, or they get their own car and drive for Uber [...]. The ones who stay, they're always negotiating" (Iordanidi quoted in Beggs 2018a: 12). Other brokerages, however, partially profited from the complex ramifications of the new regulations: The citywide and almost instant availability of Uber cars made street hails a rarity. As a result, remaining taxi drivers depended far more on brokerages and their dispatch services (cf. Porter 2015; Interview Taxi Driver 3). Overall, the idea that the city had simply 'killed' the taxi industry is rather overstated. The taxi

industry – far from a coherent entity in itself, it should be remembered (Tucker 2018) – was not well, but it was alive.

It was the drivers who had lost out. In the absence of stronger collective bargaining power, they not only had to accept Uber as the newly dominant force in their industry, but also had to swallow the full re-instalment of the taxi plate system, which they had fought against for decades. While some drivers welcomed Uber as an alternative to a taxi system experienced as alienating and exploitative (Tucker 2018), early euphoria soon gave way to more realistic assessments, as Uber scaled back initial driver bonuses and started to hike its fare deductions (Peticca-Harris et al. 2020: 51). Furthermore, the new regulations inflated the overall size of the driver labour force in Toronto and, as a result, diminished individual earnings. With no cap on drivers, the labour force of what used to be a pretty circumscribed circle of professional taxi and limousine drivers exploded. Compared to about 10,000 taxi drivers in Toronto prior to Uber (Sundar 2012: 110), the number of registered (if certainly not always active) Uber drivers spiralled from about 15,000 in 2016 to more than 70,000 in 2018 (City of Toronto 2016: 24). With many more drivers on the road, and the overall size of the market failing to grow at a comparable rate, individual driver earnings started to shrink substantially.[44]

In parallel, the Uberisation of Toronto's taxi industry has had palpable effects on the racialised class composition of the local driver workforce. The hard work of taxi driving in Toronto has long been associated with immigrant labour (Valverde 2012: Ch. 7). In fact, over 80 per cent of taxi drivers in Toronto are (male) immigrants, many of them highly qualified, with India and Pakistan as the most frequent countries of origin (Ha-Redeye 2020; Xu 2012). Issues of racial discrimination, both on an everyday and structural level, have long been felt by these drivers. As Sundar concluded in 2012, "the racialized taxicab driver, despite Canadian citizenship and years on the job, remains an outsider to the global city" (2012: 124). Interestingly, the racialization of drivers and the parallel material and symbolic debasing of taxi work does not pertain, at least not to the same degree, to the (almost identical) work of driving for Uber. While it is obvious that Toronto's ridehail gig workers are also largely from immigrant backgrounds (Jeon et al. 2019: 20; Peticca-Harris et al. 2020), their perception in the public eye is less racialized and, as a consequence, more positive. At the point of labour, then, Toronto's two-tier regulatory framework – one licence category for taxis, one for Uber – has translated into

[44] It can be argued, of course, that the entry of Uber (and later on Lyft) significantly expanded the size of Toronto's taxi market, potentially offsetting the fact that more drivers were now competing for fares. It can be assumed, however, that an observable growth in passenger demand was not enough to offset the explosive influx of drivers. There was, in short, a constant oversupply of drivers on Toronto's roads.

a newly emerging racialised 'fault line' between (stigmatised) taxi drivers on the one hand and a more positive perception of Uber drivers on the other (Phung et al. 2021). Overall, while some of the splintering characteristics of the old taxi system may have lost in importance (Tucker 2018), the Uberisation of Toronto's taxi industry has also created new dividing lines between drivers who, for the most part, do the same work.

Uber, meanwhile, can be seen as the clear profiteer of Toronto's new regulatory framework (Tucker 2018; Valverde 2016; 2018). While the new regulations entailed certain constraints on Uber's business – the basic fare of UberX was raised from CAN $2.50 to $3.25, one-off background checks of Uber drivers (conducted not by the city, but a third-party provider) became mandatory as did annual mechanical inspections of cars (cf. Valverde 2018: 214-215) – they also turbocharged the now fully legal development of Uber's business in Toronto. Most importantly, the new bylaw not only permitted Uber's controversial practice of classifying drivers as independent contractors rather than employees (Rosenblat/Stark 2016: 4-5), it also kept registration requirements for new drivers to a bare minimum. Compared to other cities, background checks on new drivers have been outspokenly light in Toronto (Valverde 2018). Further, the new bylaw did not require driver training and, crucially, permitted the registration of an unlimited number of drivers, which enabled Uber to maintain a fast-paced and uncapped turnover of drivers (Rosenblat 2018: 72, 177). This new set of regulations, in short, was an almost perfect fit for Uber (Valverde 2016).

Overall, the consolidation of Toronto's legal framework for ridehailing shows some clear signs of regulated deregulation (Aalbers 2016). This can be said insofar as, first, the city expanded the regulatory purview of its former taxi bylaw by including Uber and other ridehail companies within the law's legal perimeters. Clearly, then, the Toronto case confirms the crucial role that *regulation* does in fact play for Uber and its platformised business model. As such, the regulation of Uber in Toronto substantiates the longer-known finding that "regulation is not anathema to actually existing neoliberalism" (Aalbers 2016: 566). Secondly, the expanded regulatory ground of Toronto's taxi bylaw was further marked by an overall *deregulatory* impetus that, as discussed, was unevenly distributed across the industry and the two separate licence categories for taxis and ridehail services. Taxis, while facing less legal restrictions than ever before, have remained more strictly regulated than their ridehail counterparts, which have been granted even greater legal freedoms. Taken together, Toronto's new legal code for Uber and the taxi industry can well be seen as a case of regulated deregulation in which "some

economic actors are given greater freedom from state control, but the market framework itself is regulated" (Aalbers 2016: 565-566).

3 – Conclusion: Regulated Deregulation in Practice

This chapter started out from a problematisation of rather simplistic disruption narratives. In the context of the growing urban presence of Uber and other digital platforms, the typical disruption narrative purports a clear dividing line between market forces and state regulation, with 'disruptive' agency being portrayed as remaining clearly on the side of tech capital, and hardly ever on the side of state regulation. Against such rather simplistic accounts, this chapter brought into position the category of regulated deregulation (Aalbers 2016; Ferreri/Sanyal 2018). This was done in order to direct attention to the fact that Uber's (often overlooked) reliance on market regulation and the company's simultaneous search for a maximum of legal freedoms *within* such a state-guaranteed market structure are only seemingly contradictory. Both of these dynamics – overall *regulation* as much as selective *deregulation* – form part of the broader re-regulatory agenda of Uber and other platforms (Lanamäki/Tuvikene 2021).

Furthermore, this chapter provided a detailed account of how the forces of Uberisation – and, most of all, the vector of labour exploitation (see Chapter III) – collided with the real-existing, multi-scalar urban fabric of Toronto and the GTHA. The regulated deregulation of Toronto's taxi industry, as I argued, was not only driven by the – undeniably existent and patently aggressive – (il)legal manoeuvres of Uber, but was equally facilitated and accelerated by three key dynamics enabled by the urban ground that Uber landed on in Toronto. First, the Province of Ontario's long-established policy approach of neoliberal non-interventionism allowed Uber to spread its business in Toronto up to a point from which a reversal became increasingly difficult, if not impossible. Secondly, the unsuccessful reform of Toronto's taxi system in 1998 decisively played into the hands of Uber. It not only diminished worker power in the industry, but also prevented a long-overdue taxi reform, postponing it into the time period when Uber entered Toronto's market. Equally so, the taxi system's protracted crisis produced growing dissatisfaction among professional drivers searching for an alternative to the established taxi system, experienced as heavily unjust by drivers. This alternative was found, at first, in Uber's early local competitor Hailo and, after the latter's demise, in Uber itself. Finally, the smart city ambitions of Mayor Tory's urban regime allowed Uber

to present itself as the tech-driven embodiment of local economic growth and urban solutionism. This situation provided Uber with a powerful political lever to lobby for regulations strongly conducive of its business (Valverde 2016).

On a broader scale, Toronto's ridehailing regulations brought into existence a local legal regime rather typical of North American 'laissez-faire Uberisation' (see Chapter I). Even within North America, Toronto's regulatory framework stands out as being particularly Uber-friendly (Valverde 2016). While the city of Austin, for instance, made more detailed driver background checks a mandatory requirement and hence provoked a temporary exodus of both Uber and Lyft (Rosenblat 2018: 175-176), and while, furthermore, New York City implemented a strict cap on Uber drivers (Brooks 2018), Toronto sanctioned no such constraints. On the contrary, and partly driven by local ambitions to position the city region as a new 'Silicon Valley of the North' (Wachsmuth/Kilfoil 2021), Toronto rolled out the red carpet for Uber. An Uber-friendly regulatory framework in Toronto, therefore, became the basis for an expansion of Uber's local presence in Toronto. Chapters V and VI will examine these expansions in more detail.

Chapter V

Uber in Exurbia

The Lures and Limits of the Public-Private Ridehail Partnership

The diagram below (Figure 7) captures a phase shift in the operational logics of Uberisation.[45] Presenting four micro-scale maps of the railway stations of Exhibition, Oakville, Unionville and Bramalea, the diagram was used by Uber's closest North American competitor Lyft to showcase a six-month pilot partnership between the company and the Province of Ontario's regional transport agency Metrolinx (Lyft 2019).[46] Harnessing Lyft's ridehail services as an on-demand first and last-mile feeder for Metrolinx's regional GO rail network, the pilot was in operation between July and December 2019 in the GTHA. It offered Lyft customers a $4 discount for each of their next five rides to or from the four stations, all of which were fitted with designated Lyft drop-off/pick-up zones. Spread all across Toronto's urban fabric and the increasingly complex landscape of its downtown, in-between and (post-)suburban terrains (Filion et al.

[45] I thank Sinéad Petrasek and Christian Sowa for their very helpful and encouraging comments on an earlier draft of this chapter.

[46] Lyft entered Toronto in December 2017, i.e. after Uber had successfully pushed for the legalisation of ridehailing platforms in the city (O'Neil 2017). For a more extensive discussion of Lyft as 'Uber's 'younger twin', see Rosenblat (2018: 217-220).

2011; Keil/Addie 2015; Young/Keil 2014), the Lyft-Metrolinx pilot rendered visible, in much geographic concreteness, a new phase of Uber and Lyft's local operations in Toronto. Having gained legal status through the entry point of Toronto's taxi industry, the two Silicon Valley companies started to encroach on new territory, much wider in its extension: the vast network, reaching deep into Toronto's sub- and exurban hinterlands, of the city's regional transport system.

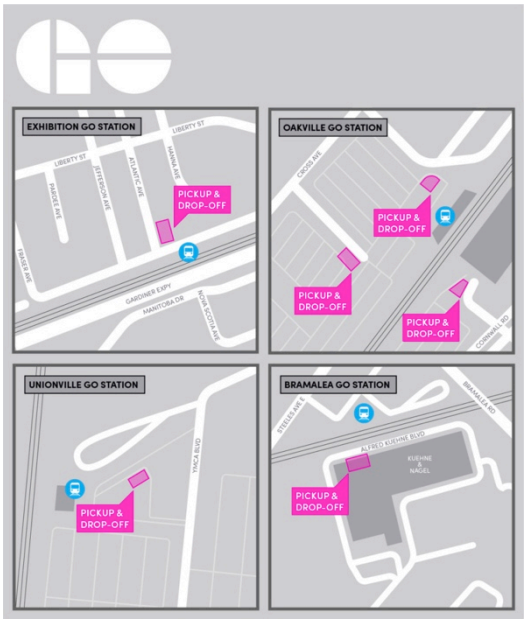

Figure 7: The graphic shows maps of Metrolinx's four GO railway stations of Exhibition, Oakville, Unionville and Bramalea that were part of the Lyft-Metrolinx ridehail pilot. The pink areas mark designated pick-up/drop-off zones for Lyft rides. Source: Lyft (2019).

Such expansionary politics have been far from restricted to Ontario alone. Since 2015, an ever-swelling number of partnerships between Uber and Lyft on the one hand and local and regional transit agencies on the other has swept over North American cities (Attoh et al. 2019; Curtis et al. 2019; Livingston Shurna/Schwieterman 2020; Shaheen/Chan 2016).[47] For the three-year period between October 2015 and August 2018, Schwieterman et al. (2018) document 29 partnerships between the two ridehail companies on the one hand and transit agencies across the United States and Canada on the other (Figure 8). In this sense, the GTHA and the various ridehail pilots, projects and partnerships that have taken place on its (sub-)urban ground – including the Lyft-Metrolinx one – do not form

[47] To my knowledge, most of these partnerships have taken place on the western side of the North Atlantic zone. One prominent European exception, however, is the French city of Nice where Uber, in 2018, entered into a one-year pilot programme with local transit agency Régie Ligne d'Azur (RLA) (Uber 2018).

an exception to the rule. They are the rule and, as such, deserve close scrutiny and acute critical attention.

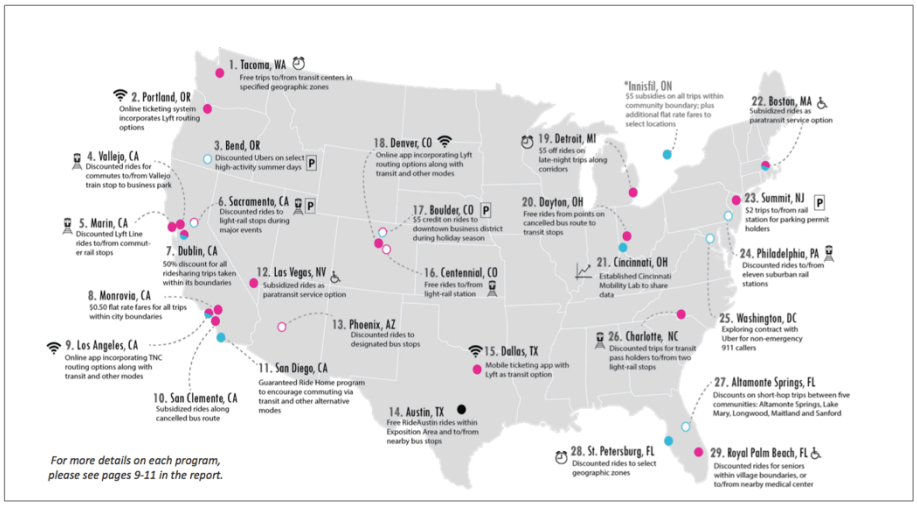

Figure 8: Map showing partnerships between ridehail companies Lyft and Uber and transit agencies across the United States for the time period between October 2015 and August 2018. Note that the only non-American example shown on the map is the town of Innisfil, 80 kilometres north of Toronto. Source: Schwieterman et al. (2018: n.p.).

This chapter conceptualises these newly emerging forms of cooperation as what I call the various forms of the public-private ridehail partnership (PPRP). The latter stands in close connection to a defining feature of the corporate vision of the 'smart city': its core promise to harness data-enabled ICTs in order to boost the efficiency of a wide array of urban infrastructures (Glasmeier/Christopherson 2015: 6; Rabari/Storper 2015: 30). While numerous commentators and critics have marked such visions of infrastructural optimisation as an essential part of the profit-driven 'corporate storytelling' of big-tech companies (Bauriedl/Strüver 2017; Halpern et al. 2013; Hollands 2008; 2015; Luque-Ayala/Marvin 2015; Söderström et al. 2014: 309), markedly less attention has been paid to the discrepancies between big tech's high-flying rhetorical promises on the one hand and the on-the-ground performances of its ICT-enabled soft and hard infrastructures on the other (Filion/Keil 2016: 2; Kitchin 2015; for notable exceptions, see: Shelton et al. 2015; Wiig 2015a; 2015b).[48] By closely examining Uber and Lyft's recent turn to (different types of) PPRPs and the infrastructural frictions deriving from it, this chapter adds to a more nuanced understanding of the smart city as a deeply splintered and uneven 'urban reality' (Graham/Marvin 2001).

In particular, a theoretical investigation of the private and public motivations driving the current trend towards ridehail partnerships and the in-depth empirical examination of two

[48] On the distinction between soft and hard infrastructures, see Filion/Keil (2016: 2-3).

early PPRPs in the GTHA allow me to draw attention to two socio-spatial dynamics that severely delimit the longer-term infrastructural benefits of PPRPs for cities: a 'winner-takes-it-all' tendency that leads to a concentration of PPRPs in areas of already existing growth and investment on the one hand; and a tendency of 'short-term benefits over long-term use' that risks putting fiscal rebalancing and smart-city image creation over the actually existing mobility needs of local communities (Harvey 1989; McCann 2013; Shelton et al. 2015). I render visible both of these two dynamics through, first, a theory-driven investigation of the motivations that mainly drive the current trend towards PPRPs. Secondly, I deepen these insights by closely examining two early ridehail partnerships in the GTHA: the six-month Lyft-Metrolinx pilot and the ongoing Uber experiment in the Ontarian town of Innisfil, located eighty kilometres north of downtown Toronto (Ruggles 2020).

Leaving behind the more downtown-centred operations of Toronto's taxi industry examined in Chapter IV, this chapter hones in on the subsequent phase of Uberisation and its unfolding across Toronto and the GTHA's increasingly complex (post-)suburban landscape (Keil/Addie 2015; Phelps/Wu 2011; Young et al. 2011). What are the motivations that drive PPRPs – both from the viewpoint of ridehail companies like Uber and Lyft and that of public authorities? And what do the deeper socio-spatial dynamics linked to these motivations tell us about the inherent infrastructural limitations of early PPRP arrangements? Driven by these two questions, this chapter resumes where Chapter IV ended. While the latter investigated the regulatory layer of Toronto's urban ground, here I proceed to the city region's infrastructural urban stratum and the early experimental attempts of Uber and Lyft to take root in it. As we will see, Toronto's multiscalar urban fabric has proven to be a viable testbed for the urban experiments of Uberisation.

1 – The Rise of the Public-private Ridehail Partnership

Since 2015, an ever-swelling number of partnerships between Uber and Lyft on the one hand and local and regional transit agencies on the other has swept over North American cities (Curtis et al. 2019; Livingston Shurna/Schwieterman 2020; Schwieterman et al. 2018; Shaheen/Chan 2016). By closely examining the motivations driving the recent rise of PPRPs – both from the angles of the private and public actors involved – this section sheds light on two deeper socio-spatial dynamics inherent, to varying degrees, to such

newly emerging micro-scale public-private partnerships (Loxley 2012; Siemiatycki 2013; Torrance 2008). The first sub-section sheds light on the reliance of PPRPs on so-called platform network effects (Srnicek 2017: 45-46). As a result of their inherent dependence on network effects, PPRPs are prone, as I argue, to propel a territorial winner-takes-it-all tendency that leads to a geographic concentration of PPRPs in areas of already existing growth and large-scale infrastructure investment. The second sub-section approaches the PPRP from the viewpoint of an equally forceful short-term-benefits-over-long-term-use dynamic through which local fiscal rebalancing as well as smart-city image creation may be prioritised over the actual infrastructural use of PPRPs: the serving of the mobility needs of local communities.

Winner-takes-it-all: Uber Goes Cherry Picking in the Suburbs

As explored in Chapter IV, Uber enters new cities via local taxi industries and the state-regulatory apparatuses that govern them. In Toronto, Uber started this phase in early 2012 with its appearance on the local taxi market and completed it in May 2016 with the city's sanctioning of a new, outspokenly Uber-friendly taxi bylaw (Valverde 2018). However, the successful finale of this key initial stage did not mark the end of Uber's activities – neither in Toronto nor in the many other cities that have legalised Uber's operations. To understand why, it is crucial to remind ourselves of one of the key imperatives pressuring enterprises operating under a capitalist economic system (Harvey 1975): the need to remain profitable – or, as in Uber and Lyft's respective cases: to become profitable in the first place. While, since its stock market launch in May 2019, Uber's market value has oscillated between US $30 and $100 billion (macrotrends 2021), the company has never turned a profit in any of its operating quarters. The same holds true for Lyft. Both corporations, therefore, find themselves under considerable pressure to open up new fields of value extraction (for a more extensive discussion, see Diab 2019: 146).

The geographic expansion of Uber's ridehail services from central downtown districts into more suburban and peripheral terrains marks one such frontier of extended Uberisation. The key relevance of this transition becomes clearer when taking into account recent arguments put forth by critical urban scholars pointing to the 'global suburb' as the foreseeable focal point of the greater part of future urban growth (Gururani 2013; Herzog 2015; Keil/Addie 2015): "[U]nder the conditions of current trends in technology, capital accumulation, land development and urban governance," as Keil

emphasises, "the expected global urbanization will necessarily be largely *sub*urbanization" (2018: 9). For Uber and Lyft, therefore, suburban growth nodes and 'boom towns' lend themselves as attractive zones for the expansion of their services beyond downtown districts.

It is this urban-suburban transition, however, that has confronted Silicon Valley ridehail companies with a major challenge. Consider, for instance, the below cartographic representation of Uber and Lyft's growth rates in Toronto between October 2016 and September 2018 (City of Toronto 2019b: 19; Figure 9). What presents itself as a stark visual contrast between a tiny, yet deeply red urban core and a much wider swath of pale-yellow inner-suburban surroundings can be translated into steadfast numbers: While Toronto's inner-suburban districts of Etobicoke, North York and Scarborough *together* reach a combined average of close to 60,000 ridehail trips per day, Toronto's much smaller downtown area *alone* registers more than 90,000 average daily trips (City of Toronto 2019b: 9). Unmistakably, and in line with similar trends in other North American cities (Gehrke 2020), Uberisation in Toronto has remained a strongly downtown-centred operation, with suburbs drawing only a fraction of overall activities.

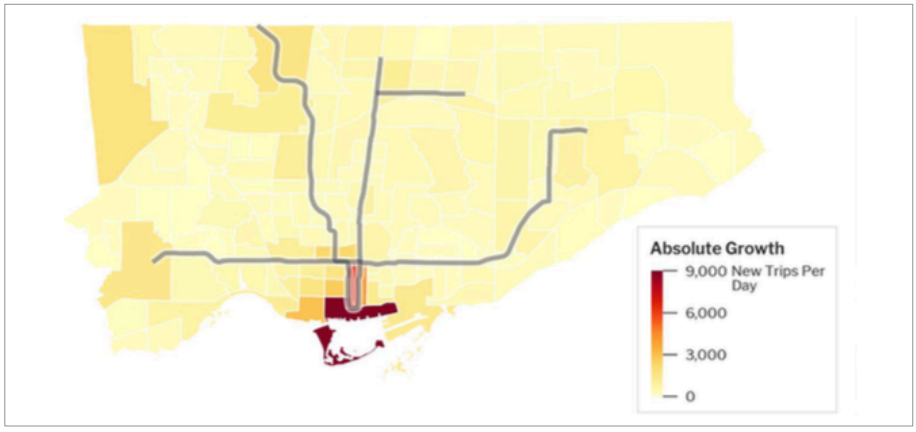

Figure 9: Cartographic representation of the absolute growth rates of Uber and Lyft in Toronto between October 2016 and September 2018. Clearly, the city's downtown core remains the main operational area of the two companies, with the surrounding inner suburbs only drawing a fractional share of overall activities. Source: City of Toronto (2019b: 19).

To understand the yawning gap between downtown and suburban Uberisation, it is crucial to remind ourselves of one of the essential principles that lies at the heart of Uber and Lyft's respective platform business models: their reliance on so-called network effects. Digital platforms, as Srnicek explains, "produce and are reliant on 'network effects': the more numerous the users who use a platform, the more valuable that

platform becomes for everyone else" (Srnicek 2017: 45).[49] In the case of ridehail platforms, the logic of network effects means that the platform with the most drivers (the latter often incentivised by early bonuses and giveaways such as free smartphones) can offer the shortest wait times for its customers and, as such, a high degree of convenience. As a consequence, even more customers are likely to start to use the platform, thereby increasing the demand for additional drivers and setting into motion what Uber calls a "liquidity network effect" (Uber 2019: 8; Figure 10): a virtuous cycle of constant platform growth and – optimally – virtual market monopolisation (Barns 2020: 115-117; Scholz 2017: 147; Srnicek 2017: 45-46; Woodcock/Graham 2020: 45, 48). It is this systemic dependence on network effects that helps to explain Uber and Lyft's 'natural' attraction towards busy downtown districts where the sheer density of urban everyday life translates into an overflowing demand for mobility that, despite the relative abundance of inner-city public transit, tends to multiply exceed supply.

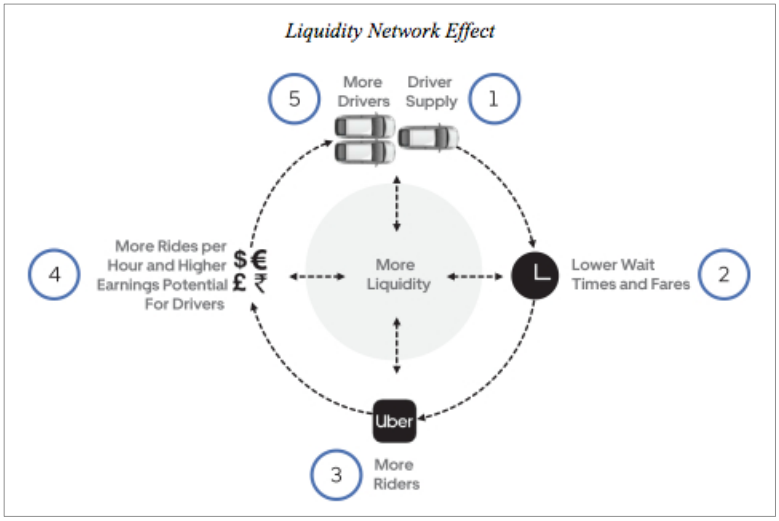

Figure 10: Visual representation of a network effect according to Uber, starting (1) with growing driver supply leading to (2) lower wait times and fares, attracting (3) more riders creating (4) higher earning potentials for drivers and attracting, finally, (5) even drivers. Source: Uber (2019: 8).

Vice versa, the dispersed, low-density built environment of many suburbs (Filion 2018) makes it difficult for Uber and Lyft to get the network-effect flywheel going in peripheral areas. Similarly, a recent study observes that the installation of ridehailing in suburban areas can "be tricky due to the fact that on-demand trips in these areas are often more

[49] In a more general sense, Donald MacKenzie describes a similar dynamic of "increasing returns to adoption" (MacKenzie 1996: 7) for newly emerging technologies in general: "The more they [technologies] are adopted, the more experience is gained in their use, the more research and development effort is gained in their use, and the better they become" (1996: 7).

expensive than those in urban areas on account of longer travel distances, lower density of service, and reduced predictability of customer demand" (Livingston Shurna/Schwieterman 2020: 13). Similarly, in a document filed with the US Security and Exchange Commission, Uber itself admits that it has faced "challenges increasing penetration in existing markets, including suburban and rural areas where our network is smaller and less liquid, the cost of personal vehicle ownership is lower, and personal vehicle ownership is more convenient" (Uber 2019: 93). The geographic dispersion of traffic flows across sprawling suburban landscapes, such is the upshot, is difficult to square with the deeply centralising logic of the platform and its reliance on network effects.

It is at this point that partnerships with local transit agencies emerge as a crucial instrument for Uber and Lyft to establish their services in the challenging terrain of dispersed suburban settlements. Network effects do not necessarily have to spring, as is usually the case in downtown areas, from Uber and Lyft's competitive advantages over local taxi companies or public transit offerings. Network effects – and, in their most extreme form, quasi-monopolies – can also be created on the basis of legal means, by way of the state-guaranteed right to provide exclusive ridehailing service at a particularly busy (suburban) rail station or at other premium network spaces such as shopping malls, universities or airports (City of Toronto 2019b: 10; Graham 2000; Graham/Marvin 2001). This doesn't mean, on the other hand, that PPRPs cannot exist in downtown areas. On the contrary, Schwieterman et al. (2018) document a number of downtown-centred partnerships.[50] Yet, it is in less densely populated peripheral parts of the urban fabric that PPRPs are of particular strategic importance for ridehail companies, as they allow Uber and Lyft to maintain network effects in the 'hostile environment' of suburban dispersion (Filion 2015).

Overall, it is possible to distinguish three types of PPRPs, each with their own strategy to create network effects. First, *area-based PPRPs* restrict operations to a closely circumscribed, geo-fenced zone in which the ridehailing services of a specific company can be used at a discounted, usually state-subsidised rate.[51] From the angle of Uber and Lyft, area restrictions help to keep dispersion effects in check, while allowing for some

[50] For instance, and as noted in the introductory example of this chapter, the Lyft-Metrolinx pilot in Toronto included the downtown-located Exhibition station, part of the pilot – presumably – for its close proximity to Toronto's busy Liberty Village district that houses many tech-related jobs in the creative industries (Catungal et al. 2009).

[51] Prominent examples of this type of PPRPs are partnerships between Uber and Lyft and local transit authorities in Monrovia, CA, Dublin, CA and the five communities of Altamonte Springs, Lake Mary, Longwood, Maitland and Sanford in Florida (for more extensive discussions of these examples, see Schwieterman et al. 2018: 4).

degree of territorial centralisation. Secondly, there are *hub-based PPRPs*.[52] In this scenario, only trips to or from certain strategic locales are discounted. These hubs can range from places of local community life (such as town halls, universities or recreation centres), via nodes of private enterprise (malls or employment zones) to local or regional transport hubs and higher-order transit stations. What unites these hub spaces is their concentration of everyday urban activities and, as a consequence, a stable demand for transportation. Hub spaces, in short, promise a level of daily passenger throughput that is hard, if not impossible, to gain elsewhere in the suburbs. As such, hub spaces are likely to produce those network effects that Uber and Lyft widely depend on in their daily operations. As I will show below, it is major suburban rail and transit stations, preferably located in close proximity to local or regional growth centres, that Uber and Lyft have targeted with particular preference in Toronto.

Finally, *app-based PPRPs* provide yet another avenue for Uber and Lyft towards potential network effects. In this case, the bundling of transportation activities does not take place so much in the urban-geographic 'outside' but rather in the digital 'inside' of Uber or Lyft's respective apps. Hence, it is one of the long-term strategies of Uber to integrate into its platform both the mobility services of private competitors as well as public transit offerings in a certain region. The idea, in short, is to position Uber's platform as central point of entry into a broader, both public and private, MaaS network (Van Dijck et al. 2018: 75-80). Relative to area-based and hub-based PPRPs, app-based PPRPs can be seen as the most advanced partnership type as they come closest to the ultimate aim of mobility platforms: to become the single digital node – the obligatory passage point (OPP), to borrow a concept from Michel Callon (1984) – that unites all other modes of transportation in one app, making it the central digital connector in a broader 'transportation ecosystem' (Van Dijck et al. 2018: 77).[53] Despite the typological distinctions introduced here, it is important to note that area-based, hub-based and app-based PPRPs tend to occur in various combinations of what should only be seen as ideal-type characterisations (Schwieterman et al. 2018).

I have argued in this section that PPRPs underlie platforms' systemic reliance on and recurrent search for network effects (Srnicek 2017: 45-46; Woodcock/Graham 2020: 45).

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[52] Examples of hub-based PPRPs include Sacramento, CA, Centennial, CO, Charlotte, NC and Philadelphia, PA (Schwieterman et al. 2018).

[53] In October 2015, for instance, Dallas's regional transit agency Dallas Area Rapid Transit (DART) added Lyft to its 'GoPass' transit app and, next to publically run buses, railways and streetcars, made the Silicon Valley mobility platform an official part of its app (for further examples, see Schwieterman et al. 2018: 5-6). Vice versa, there have also been instances in which Uber or Lyft have started to integrate public transit into their apps, creating a similar centralising effect (Uber 2021).

By mitigating the de-centralising effects of dispersed suburban settlement and transportation patterns (Filion 2015; Filion/Kramer 2011), area-based, hub-based and app-based PPRPs serve as legal-political tools for Uber and Lyft to strategically 'capture' those premium network spaces – such as (sub-)urban growth nodes, commercial hubs and higher-order transit stations – that promise sufficiently high passenger traffic to fuel the creation of network effects (Graham/Marvin 2001). Less prospering (sub-)urban areas, on the other hand, are likely to miss out on such newly emerging infrastructure opportunities, as they may neither provide sufficiently high concentrations of activities nor a clientele prosperous enough to use Uber on a regular basis. In this sense, PPRPs are likely to enhance existing patterns of geographic and infrastructural unevenness across urban and suburban areas. As Stephen Graham and Simon Marvin have argued, the postwar turn form a modern infrastructural ideal of publically universal infrastructure provision to one oriented towards increasingly more privatised, profit-driven provision went hand in hand with the gradual separation of lucrative spaces of investment – what Graham and Marvin call premium network spaces – from unprofitable sites and users, fuelling a trend towards infrastructural 'cherry picking' by private corporations and investors (Graham/Marvin 2001: 236, 242; Graham 2000).[54] As the above discussion has shown, PPRPs are driven by a very similar 'winner-takes-it-all' dynamic in which concentrated hotspots of (sub-)urban growth and (public) infrastructural investment are likely to attract PPRPs on the basis of their high potential to enable the sustained maintenance of platform network effects. I will deepen this insight below when examining the Lyft-Metrolinx PPRP that took place in Toronto between July and December 2019.

Short-term-benefits-over-long-term-use: The PPRP as Threefold Fix

While the above section examined Uber and Lyft's respective motivations to enter into PPRPs, the interest of local governments in PPRPs remains to be explained. What then happens if we flip the equation and examine the PPRP from the viewpoint of the state actors involved? What are the incentives for local governments and transit agencies to enter into partnerships with Uber and Lyft? From the viewpoint of local authorities, as I argue in this section, the adoption of PPRPs is driven by one or more of their three main functions as 'infrastructural', 'fiscal' or 'smart speculative fixes'. As such, the PPRP serves as a short-term stabiliser of the local state scale that has carried the brunt of the

[54] For critiques of Graham and Marvin's influential work on 'splintering urbanism', see Coutard (2002; 2008) as well as MacKillop and Boudreau (2008).

severe fiscal and infrastructural crises following the 2008 global financial meltdown and its austerity aftermath (Davidson/Ward 2014; Donald et al. 2014; Hall/Jonas 2014; Kirkpatrick/Smith 2011; Peck 2012).

First, as infrastructural fixes, PPRPs are of interest for local governments in their potential to address growingly acute difficulties in the provision of suburban transport infrastructure (Addie 2016: 274; Lo et al. 2015; Mees 2010). Drawing attention to the manifest disjuncture between the growing demand *for* and the stagnating (or sometimes even declining) supply *of* public transportation in suburban areas, Filion and Keil (2016) identify what they call a distinctively suburban infrastructure gap. It is, as they argue, in the urban peripheries – in the suburban, exurban and newly emerging in-between zones (Keil/Addie 2015; Sieverts 2003; Soja 2000; Young et al. 2011) – that pressures on local governments to come up with new, 'innovative', flexible and cost-saving infrastructure solutions are particularly high (Kirkpatrick/Smith 2011: 495-496).[55] As Filion and Keil put it:

> Powerful growth pressures, accompanied by insufficient and often ill-fitting infrastructures, make suburbs fertile spawning grounds for new infrastructure solutions. [...] Pressures for such innovation come from protest movements, attempts to reduce the financial burden of infrastructures and incompatibility of prevailing infrastructures with some suburban realities such as the difficulty to provide public transit in low density environments (2016: 11).

Within this broader context of suburban infrastructural difficulties and automotive dominance (Burchell et al. 2005; Mees 2010; Walks 2015), the problem of the first and last mile stands out as a particularly acute challenge. As Harvey J. Miller explains, the "first mile/last mile (FMLM) problem is the gap between origins/destinations (such as home, work) and public transit" (2019: 1135). Notably, the FMLM gap severely limits the reach and convenience of public transportation in suburban areas – as passengers need to rely on their own means of transportation, usually private cars, to close it. What is more, the FMLM problem also forms part of the reason why suburban areas, despite widespread efforts by local and regional policy makers to change this (Filion 2018), remain overwhelmingly car-centric (Addie 2016: 274; Filion 2015). In response to the FMLM problem, then, PPRPs promise to reduce individual car trips between suburban

[55] This is not the place to enter into ongoing debates about the present-day significance (or obsolescence) of inherited dichotomies of urban 'centre' and suburban 'periphery' (see for instance, Keil/Addie 2015; Harris 2010; Keil 2018; Moos/Walter-Joseph 2017; Phelps/Wu 2011; Soja 2000; Young et al. 2011). Suffice it to note that recent work of a substantial number of scholars – concerned, inter alia, with the endurance of dispersed suburban built forms and the resulting car-centric patterns of transportation and infrastructure provision – has lent credibility to the idea that the concept of 'the' suburb does retain a substantial degree of theoretical plausibility (Filion 2018; Filion/Kramer 2011; Kipfer/Saberi 2014; Walks 2015).

transit hubs on the one hand and nearby residential or employment areas on the other. As a consequence, PPRPs are of substantial interest to local governments aiming to reduce individual car traffic and the heightened levels of congestion and pollution that result from it.

To this end, PPRPs usually rely on Uber and Lyft's respective UberPOOL and Lyft Line ridehailing options. In contrast to Uber and Lyft's core products, which offer *individual* rides for single persons and groups, the cheaper UberPOOL and Lyft Line options allow passengers to share their trips with customers headed in similar directions, with new riders able to join the trip at any time. In order to make possible the coordination of several trips at a time, Uber and Lyft's algorithms calculate the most efficient route between all relevant departure and destination points, sometimes requesting riders to take a short walk to more suitable pick-up sites (Van Dijck et al. 2018: 79). The double promise of the PPRP as last-mile infrastructure fix, in other words, consists in the reduction of individual car traffic (with all the detrimental effects linked to it) and, at the same time, the improved reach and performance of public transit infrastructure in the challenging terrain of suburban dispersed settlement (Filion/Kramer 2011). As a recent report emphatically summarises Uber's double potential to address the problem of the last mile and with it the suburban infrastructure gap in a broader sense:

> Shared mobility has proliferated in global cities [...] as a potential solution to address first- and last-mile connectivity with public transit. It can extend the catchment area of public transportation, potentially playing a pivotal role in bridging gaps in the existing transportation network and encouraging multimodality for first- and last-mile trips rather than driving alone (Shaheen/Chan 2016: 573).

This, of course, is an alluring vision for cash-strapped local governments aiming to fill widening infrastructure gaps in their urban and suburban territories (Davidson/Ward 2014; Filion/Keil 2016; Kirkpatrick/Smith 2011; Peck 2012). Not without reason, then, PPRPs that address the notoriously complex legs of the first and the last mile have been a core focus of much testing by transport planning departments across North American cities (Livingston Shurna/Schwieterman 2020; Schwieterman et al. 2018; Shaheen/Chan 2016).[56]

Secondly, part of the attractiveness of PPRPs for local governments springs from the potential of such schemes to function as short-term fiscal fixes in the wake of widespread urban austerity (Albo/Fanelli 2019; Peck 2012). Most of all, it is the promise of public

[56] Last-mile partnerships have been tested, inter alia, in Philadelphia, PA, Vallejo, CA, Marin, CA, Centennial, CO, Charlotte, NC (Schwieterman et al. 2018).

labour cost reductions that plays a crucial role here. Unlike their Uber-driver counterparts, public transport workers usually enjoy the benefits of unionisation, paid sick leaves, pension payments, guaranteed hourly wages and similar basic labour rights (Sweeney/Treat 2020: 220-221; Van Dijck et al. 2018: 82). By contrast, Uber drivers have been legally classified in most North American jurisdictions as self-employed independent contractors ineligible for such entitlements (Rosenblat 2018: 4; Valverde 2018). The legal gap between these two labour forces, therefore, opens up possibilities for substantial savings of municipal labour costs. To provide an illustrative example from the Torontonian context: In the case of Toronto's public transport agency, the TTC, the difference in average hourly wages (not to mention further benefit payments) between a TTC bus driver and an Uber-driver gig worker is indicative of the potential cost savings that may be gained through a transition from a publically-provided transit service to a state-subsidised PPRP-arrangement: While a TTC bus driver's guaranteed minimum hourly wage starts at CAN $27 (Spurr 2020), Uber drivers are paid at piece rate and may average – under rather fortunate circumstances – around the Ontarian minimum wage of CAN $14.25 (Government of Ontario 2021).[57] As fiscal fixes, then, PPRPs function very much along the lines of what John Loxley has characterised as 'service-type PPPs', where "the government retains ownership of assets but hands over the operating budget to a private company and shares any savings. Since 'savings' usually means reduction in wages, this type of PPP represents a serious threat to organized labour" (2012: 28; similarly, Loxley/Loxley 2010: 5).

This, in short, is what the PPRP as fiscal fix can do for cash-strapped municipal governments. It reduces public labour costs through the outsourcing of parts of public transportation to Uber or Lyft. The decreased labour standards that go along with this shift mean that subsidies paid to the companies are usually substantially lower than what would have had to be paid to a cohort of public transport workers. Although it may not result in staggering amounts of savings, the PPRP as fiscal fix still helps to alleviate municipal budget constraints in the context of widespread urban austerity (Peck 2012).[58]

[57] This, it should be noted, is rather a generous estimation. While average wages of Uber drivers are hard to estimate (Rosenblat 2018: 45-46), an extensive study in the US carried out in late 2015 estimated that, after expenses, Uber drivers may take home hourly wages that, depending on the region, average around US $11 (Rosenblat 2018: 61). A more recent study, in turn, relying on survey data from more than 1,000 drivers in the US, concluded that the average hourly income of drivers was at only US $ 3.37 (Zoepf et al. 2018).

[58] It goes without saying that PPRPs might harbour potentials for cost-savings beyond the factor of labour cost alone. Schwieterman et al. (2018: 6), for instance, also identify the avoidance of parking lot expansions as another avenue for municipal cost savings through PPRPs. I found similar logics in the case of the Lyft-Metrolinx pilot in the GTA (see below).

Thirdly, PPRPs can be harnessed by local governments as 'smart' speculative fixes (cf. Hall/Jonas 2014: 190, 193; Hollands 2008; 2015; Sadowski/Bendor 2019). In this case, PPRPs serve as place-making instruments harnessed to enhance the territorial attractiveness, real or perceived, of a specific locale in the context of the accelerating hunt for global tech-sector investment and urban talent attraction (Rossi 2017: 8-10; Pollio 2016; Wiig 2015a). Within this newly emerging context of 'smart' interurban competition, PPRPs lend themselves as viable instruments for local governments to advance, or even create in the first place, an outward image of tech-centred urban entrepreneurialism and innovativeness (McCann 2013; Shearmur/Wachsmuth 2019). Partly independent of their performance as actual transport infrastructures, PPRPs as smart speculative fixes leverage the fact that Uber and Lyft not only transport passengers, but also a powerful outward image of innovation and technological progress (Rosenblat 2018: 205). This corporate image, such is usually the hope, may rub off on a partnership city and highlight it as an apposite site for future tech-capital investment. PPRPs as smart speculative fixes, in other words, act very much as what Jean-Paul Addie calls infrastructural 'place-makers' that "function as symbolic markers that codify representations of space" (2016: 275) – in this case: representations of space geared towards buzzwords such as AI, the Internet of Things and other tokens of urban smartness (Shearmur/Wachsmuth 2019). A recent report by the US-based National Academies of Sciences, Engineering and Medicine provides a worthwhile indication of the extent to which an outward perception of 'innovativeness' has influenced the adoption of PPRPs across US-American cities:

> Many transit agency staff [...] expressed that at least part of their motivation for engaging in a partnership was to demonstrate to the public or board that the transit agency could develop innovative service options. A few transit agencies initiated their pilots after board members, other governmental representatives, stakeholders, or constituents specifically requested that the transit agency partner with a TNC (Curtis et al. 2019: 68; similarly, Livingston Shurna/Schwieterman 2020: 10).

While partnering with a ridehail company may have the advantage of projecting a future-oriented, positive outward image, there is also a substantial risk for PPRPs to degenerate into (more or less) drastic cases of what Eugene McCann (2013) has called instances of 'extrospective policy boosterism': the implementation of new local policies not for the sake of their actual, on-the-ground benefits, but mainly for reasons of outward perception in the context of global urban competition (Harvey 1989). Such a dynamic of short-term-benefits-over-long-term-use played a crucial role, as I will discuss below, in the case of the partnership between the town of Innisfil and Uber.

Overall, this section has identified three ways in which PPRPs may be of major interest to local and regional state bodies. First, the PPRP may function as an infrastructural fix that helps to close or at least narrow existing suburban infrastructure gaps (Filion/Keil 2016), not least with regard to the widespread problem of the first and last mile (Miller 2019). Furthermore, the PPRP as fiscal fix promises to remedy municipal fiscal imbalances through a lowering of labour standards in local transportation effected by the partial replacement of public transport workers through Uber or Lyft gig workers (Sweeney/Treat 2020). Finally, PPRPs offer themselves to local authorities as a way to boost the outward perception of a locale in terms of its real and perceived innovativeness and attractiveness for global tech investment (Sadowski/Bendor 2019). In sum, then, there is the inherent danger that the long-term infrastructural uses of PPRPs might be pitted against their potential short-term benefits as fiscal and smart speculative fixes. It is this latent dynamic of the PPRP that I call its short-term-benefits-over-long-term-use tendency. I will explore the latter through an in-depth exploration of the Uber in Innisfil case study below.

2 – Early PPRPs in Toronto and the GTHA

As I argued in the above section, there are two major socio-spatial dynamics that drive the current trend towards PPRPs: a winner-takes-it-all dynamic that prioritises (sub-)urban areas of already existing economic growth and infrastructural investment and a short-term-benefits-over-long-term-use tendency that tends to pit the infrastructural uses of PPRPs against their potentials of fiscal rebalancing and smart-city image creation. Building on this double insight, this section focuses on two recent PPRPs in the GTHA. First, the Lyft-Metrolinx pilot, taking place between July and September 2019, richly illustrates and strongly underlines the winner-takes-it-all dynamic. For the choice of transit stations serving as test sites in this pilot is widely congruent with pre-existing patterns of major public infrastructural investment and concentrated urban growth. Secondly, Uber's PPRP experiment in the town of Innisfil, located about 80 kilometres north of downtown Toronto, presents a first-hand case of the short-term-benefits-over-long-term-use dynamic, as the key interest of local officials and planners was focussed more on local cost saving combined with global image creation and much less on the actual performance of the PPRP as local transport infrastructure (Ruggles 2020). While there have been further early PPRPs in the GTHA (see Table 2), the Lyft-Metrolinx pilot

and the Uber Innisfil experiment are doubtlessly the two most informative cases in terms of the analytical interests of this chapter.

	Downtown Areas	**Inner-Suburban Areas**	**Outer-Suburban Areas**	**Exurban Areas**
Hub-based PPRPs	• Lyft: Partnership with Eaton Shopping Centre • Lyft: Metrolinx pilot: *Exhibition station* • Uber: Pearson Express partnership: *Union Station* • Uber: Pearson Express partnership: *Bloor Station* • Uber: Pearson Express partnership: *Weston Station*		• Lyft: Metrolinx pilot: *Oakville station* (Regional Municipality of Halton) • Lyft: Metrolinx pilot: *Unionville station* (Regional Municipality of York) • Lyft: Metrolinx pilot: *Bramalea station* (Regional Municipality of Peel)	• Uber: 'Innisfil Transit' partnership (2017-ongoing)
Area-based PPRPs				• Uber: 'Innisfil Transit' partnership
App-based PPRPs				• Uber: 'Innisfil Transit' partnership

Table 2: This table presents an overview of all major PPRPs in the GTHA between 2016 and early 2021. The thickened line on the right marks the two PPRPs examined in this section: the Lyft-Metrolinx pilot and Uber's 'Innisfil Transit' experiment.

On the Way to Intensified Unevenness: The Lyft-Metrolinx Pilot

After a prolonged phase of infrastructural disinvestment in Ontario, it was PM Dalton McGuinty's Liberal provincial government (2003-2013) and its momentous 'Places to Grow' legislation that gave a decisive push to infrastructural investments in the GTHA (Addie 2017b: 125-126; Keil/Addie 2017: 105). Sanctioned between 2005 and 2006 and reacting to unabating growth pressures in the extended Toronto region, Places to Grow identified 23 urban growth nodes located across the GTHA region. In 2006, and as part of the Places to Grow agenda, the McGuinty government further founded the provincial transit agency Metrolinx and provided it with a mandate to develop the transport infrastructure needed to support the growth patterns identified by Places to Grow (Addie 2017: 126). This mandate resulted in the preparation of the equally influential 'The Big Move' regional transportation plan (Metrolinx 2008) and a revised update of it more recently (Metrolinx 2018). Since the Big Move, Metrolinx has not only been concerned with the increasing integration of the GTHA's transportation system, but also with the steady expansion of its region-wide GO Bus and GO Rail systems (Addie 2017b: 125-126; Mettke 2015: 135-136; Young/Keil 2014: 1601).

In 2015, Metrolinx started its GO Expansion programme (then still referred to as the 'GO Regional Express Rail' or 'GO RER' programme). The latter's main goal was the intensification of services across Metrolinx's GO Rail network (Metrolinx 2015), transforming it from a basic commuter-rail service (with trains available only in the morning and evening peak hours) to a comprehensive two-way, all-day service aimed at a minimum frequency of one train per fifteen minutes across large sections of the entire network (Metrolinx 2018: vii). These expansionary measures were based on forecasts that predicted rail ridership would "more than double from an average of close to 100,000 daily weekday riders in 2016 to 225,000-250,000 weekday riders in 2031 (Metrolinx 2016: 12). Crucially, with almost two thirds of current customers using their private cars for accessing Metrolinx's stations (Metrolinx 2016: 13), the predicted growth rates by far exceeded existing parking capacities at many of Metrolinx's stations. As one of Metrolinx's central documents frames the dilemma:

> If current station access patterns remain unchanged into 2031, GO rail stations would need approximately 75,000 to 80,000 additional parking spaces. [...] These levels of parking expansion would be financially unsustainable [...] and would significantly limit the ability to achieve provincial intensification targets around GO stations (Metrolinx 2016: 13).

Limited parking capacities at highly frequented stations, in short, posed a major threat to the entire GO rail expansion programme and, as a consequence, even to the Places to Grow agenda.

It was at this point that the Lyft-Metrolinx pilot came into play. As indicated above, the Lyft-Metrolinx pilot took place between July and December 2019 and used Lyft's ridehail services as an on-demand first- and last-mile feeder for the four regional rail stations of Exhibition, Oakville, Unionville and Bramalea (Lyft 2019; Metrolinx 2019). The scheme came at no direct cost to Metrolinx, as the agency only provided promotional support for the Silicon Valley company, both on its webpage and at its stations. The Lyft-Metrolinx pilot offered Lyft customers a $4 discount for each of their next five rides to or from the four stations, all of which were fitted with designated Lyft drop-off/pick-up areas (Figures 11 and 12). In fact, the Lyft-Metrolinx pilot can be seen as an attempt to test the potential of PPRPs to alleviate current and future parking shortages caused by higher-order investment in regional rail infrastructure. While not referring to the Lyft pilot as such, a Metrolinx planner foregrounds the promising potential of ridehail partnerships to alleviate local parking capacity shortages:

> If some of them [GO Rail passengers] could carpool, we're creating a lot more capacity without spending a dollar. [...] If we can get twice as many people to carpool to our station, instead of just driving, all of a sudden we've added a few thousand parking spaces. A few thousand new customers that wouldn't otherwise be able to get there (Interview Metrolinx planner, 5 November 2018).

From the perspective of Metrolinx, then, the pilot was a viable way to test Lyft's ridehail services as a potential solution to mounting capacity problems at particularly busy rail stations.

Figure 11: Lyft signpost at a platform at the Oakville GO regional train station. It guides incoming passengers to the pick-up/drop-off points at the station's parking lot. Source: Photo by the author.

Figure 12: Lyft signpost at Oakville GO rail station marking one of several designated pick-up/drop-off areas. Source: Photo by the author.

The Lyft-Metrolinx pilot both demonstrates and vividly illustrates the winner-takes-it-all logic of PPRPs. Uber and Lyft, in their search for network effects, are attracted by areas and hubs that already experience urban growth and infrastructural investment. From the viewpoint of public authorities, on the other hand, it is exactly those hotspots of growth where infrastructural capacity limits may create the need for PPRPs in the first place. As a consequence, highly frequented transit nodes, already the sites of major public infrastructure development may attract even further investment. Graham once remarked that "with the privatization and vertical disintegration of state infrastructure monopolies since the 1970s, private capital has tended only to be attracted by the low-risk elements of

infrastructure networks that can be [...] directly managed for private profit" (2000: 187). As the above discussion suggests, the Lyft-Metrolinx pilot – and with it the PPRP as a new form of transport infrastructure – are likely to intensify existing dynamics of uneven development and splintering urbanism in the context of declining state subsidies. I will return to this aspect in the conclusion of this chapter, which discusses the infrastructural future of the coming smart city as one of likely fragmentations, frictions and failures.

Short-term-benefits-over-long-term-use: Uber in Innisfil

Beyond the risk of accelerated spatial and infrastructural unevenness, the short-term-benefits-over-long-term-use dynamic discussed above forms another important driver of today's PPRP trend. The small town of Innisfil and its much-noted partnership with Uber provides a rich example in this regard (Ruggles 2020). At least at first sight, Innisfil – a semi-rural exurban town located 80 kilometres north of Toronto and counting some 37,000 inhabitants (Innisfil 2017a) – appears as the exact opposite of the bristling urban and suburban transit hubs that formed part of the Lyft-Metrolinx pilot (Figure 13). Nevertheless, a number of connection lines run between the Lyft-Metrolinx and the Innisfil-Uber PPRP. Not only is Innisfil located in immediate proximity to the town of Barrie that forms one of the 23 designated growth poles of Places to Grow, but Innisfil itself also forms part of Metrolinx's GO Rail Expansion plan, which foresees the construction of a regional rail station in Innisfil (see below). Partly as a consequence of these twin expansionary programmes, Innisfil has been expected to grow from 37,000 inhabitants in 2016 to a prospective 60,000 inhabitants in 2031 (Innisfil 2017a). As in the Lyft-Metrolinx pilot, then, acute growth pressures created an immediate need for local infrastructure expansion.

Confronted with substantive urban growth, Innisfil was under acute pressure to install its first local transport system. Two options were considered: A more standardised, fixed-route bus system on the one hand and a more flexible on-demand ridehail system on the other. The bus system was calculated to come at a prospective annual operational cost of CAN $270,000 (for one bus line) or $610,000 (for two lines). A fixed-route bus system, however, would be unable to serve the mobility needs of an adequate number of citizens across Innisfil's dispersed settlement areas and employment zones (Innisfil 2017b; 2017c: 1; 2020: 7). "Traditional bus transit," as an early official document put it, "has been ruled out at this time in order to avoid a challenging financial path with limited service

potential" (Innisfil 2017b: n.p.). Instead, local officials considered ridehailing a more effective as well as inexpensive alternative that would not only allow the town to avoid acquisition and maintenance costs for buses, bus shelters and other hard infrastructure, but also to proceed by way of a more incremental and flexible planning scheme in which partnerships with private ridehail companies could be recurrently evaluated and amended on a year-to-year basis (Innisfil 2017b). The initial case for a ridehail partnership was, in short, one of lower anticipated costs linked to higher expected transport efficiencies as well as heightened planning flexibility.

Figure 13: Bus stop of regional bus line 68 at Younge Street in Innisfil. Except for regional buses connecting the town to nearby rail and transit stations, there is no local bus transit in Innisfil. Source: Photo by the author.

Under these auspices, the town of Innisfil launched the 'Innisfil Transit' PPRP in May 2017: a publically subsidised, on-demand ridehail scheme fully provided by Uber (Cecco 2019). The parameters of the programme ran as follows: While trips to a number of key local sites – such as Innisfil's town hall, the town community centre (Figure 14), its library and the nearby rail station at the town of Barrie – came at fixed rates of between CAN $3 and $5 (depending on the site), all other trips within the town's boundaries were subsidised by the municipality through a general CAN $5-discount (Innisfil 2017b). User access to Innisfil Transit was granted through Uber's platform that automatically recognised customers opening the Uber app from within the town's geo-fenced boundaries. A combination of hub-based, area-based and app-based PPRP, Innisfil Transit became hugely popular within its first two years of operation. In December 2017, after eight months of operation, Innisfil Transit had reached more than 5,000 trips per

month. From there, numbers kept rising, with an average of more than 7,000 trips per month in 2018 and over 8,500 in early 2019 (Innisfil 2020: 3).

Figure 14: The Innisfil Recreational Complex forms one of 'Innisfil Transit's' local sites that guarantees a fixed fare of CAN $4 ($3 at the start of the partnership). Source: Photo by the author.

The programme's success, however, also caused severe problems. With growing ridership subsidy costs exploded. From CAN $150,000 in its first eight months of operation, Innisfil Transit cost the town more than $640,000 in the full year of 2018 and almost $850,000 in 2019 – more than the originally projected cost of a two-line bus system (Innisfil 2020: 3). What these numbers reveal, in short, is a problem that no ridehail matching algorithm is likely to solve very soon, as its ultimate source lies in the very material makeup of a privatised 'transit' system whose basic spatial unit remains the 20th-century car capsule with its strictly limited passenger capacity. This capacity limit basically fixes the per-capita cost of Innisfil Transit and, as a result, locks the programme into a spiral of directly proportional cost explosion. Simply put: the more trips Innisfil's citizens took, the more the city had to pay in subsidies (Bliss 2019; Mees 2010: 82-83).

In April 2019, two years after the programme's start, town officials had to react and amended some of the PPRP's key parameters. Fixed fares to all key destinations (formerly ranging between CAN $3 and $5) were hiked by CAN $1, while subsidies for all other trips were reduced from CAN $5 to $4. Most importantly, however, a strict monthly cap of 30 rides per user was introduced (Bliss 2019; Innisfil 2020: 2). As a direct result of these measures, monthly trips reclined from an all-time high of about 10,000

trips in March 2019 to about 8,400 trips per month during the rest of the year (Innisfil 2020).[59] At the same time, the new specifications meant that those of Innisfil's citizens relying on the programme most heavily – for instance, citizens using Uber to commute to work on a regular weekday basis – ran out of ride credits halfway through the month (Bliss 2019; Cecco 2019). Not only had the costs of Innisfil Transit exploded, the scheme had also undermined its initial key promise of on-demand, round-the-clock availability for Innisfil's 'transit' users. In place of a fixed-route bus system's *spatial* inflexibility, Innisfil Transit imposed a system of strict *temporal* rigidity: 30 trips per month.

Measured against the case that local planners initially made in favour of Innisfil Transit, it is notable that only one of the three main promises could withstand the test of three years of real-world implementation. Not only did costs escalate to a level equivalent to, or even higher than, what was projected for a two-line bus system, also the supposed superiority of a 'Uberised' transit system in terms of higher transport efficiency and flexibility largely vanished with the imposed monthly cap. It is mainly in terms of planning flexibility that Innisfil Transit retained an advantage over a 'traditional' bus transit solution. For the arrangement has allowed the town to circumvent upfront investments in hard infrastructure. At the same time, the PPRP helps city officials to retain a short-term, year-to-year planning model that can be more easily adapted to the vagaries of financial cutbacks in the context of urban austerity (Albo/Fanelli 2019) and, more recently, falling transport demand due to the Covid-19 pandemic (Sweeney/Treat 2020).

Despite the surfacing problems, town officials remained outspokenly positive about the project. Even after the overhaul of the programme in 2019, an official document stated that the town's staff was "very satisfied with the results of Innisfil Transit and looks forward to its continued implementation" (Innisfil 2020: 8). One explanation for the unabated official support for the PPRP can be found in the programme's power to showcase Innisfil as an ideal site for further 'smart' public and private investments. Partly independent of its performance as an actually existing transport infrastructure *inside* of Innisfil, a key aspect of the Uber-Innisfil PPRP has been the 'smart' image that it has allowed the town to project to the *outside* world. In fact, it is hard to escape the impression that, from the very beginning, Innisfil Transit has been linked to broader ambitions among Innisfil's local political elites to be perceived as exurban trendsetters in

[59] Average trip numbers plummeted even further in March 2020, when the Covid-19 pandemic reached Ontario and put a temporary halt to Innisfil's problem of escalating subsidy costs (Innisfil 2020).

the implementation of 'innovative' urban solutions and the adoption of 'smart' technologies (Alvarez León/Rosen 2020; Sadowski/Bendor 2019). The Uber partnership provided local officials with the opportunity to showcase Innisfil as a cosmopolitan, innovative and tech-friendly place of present and future investment. Hence, one of the town's early official documents characterised the town's incentive to enter into the PPRP as follows:

> Uber and the Town share a common desire to be 'disruptive' and to innovate in order to improve traditional services and solve traditional challenges [...] A partnership with Uber positions the Town as a national leader in adopting an approach that is proactive, flexible, innovative and collaborative to ensure that the benefits of shared mobility and technological advancements are secured for Innisfil residents (Innisfil 2017b: n.p.).

Similarly, some of Innisfil's town officials were very active to safeguard the highest possible attention for their partnership – and with it for the (ex-)urban 'trademark' of Innisfil itself. "Town Staff have [...] spoken," as an official document outlines, "at several conferences and events regarding Innisfil Transit and this has been helpful in networking and promoting Innisfil's brand on a regional, national and international scale" (Innisfil 2020: n.p.). Notably, such promotional speaking engagements were sometimes even supported by Uber's private sponsorship for conference fees, travel and accommodation costs (Innisfil 2020). As a result of the Innisfil Transit PPRP, then, the small town was not only able to attract an unprecedented level of national and international media attention (Cecco 2019; Innisfil 2020: 8; Vincent 2019), it has also become a recurrent addressee of outreach from other municipalities, planning institutions, NGOs, lobby groups and investment groups (Innisfil 2020; Interview planner Innisfil). In light of these activities and the rather ostentatious way they have been showcased, it is hard to avoid the impression that for some of the town's officials the implementation of Innisfil Transit had at least as much to do with the shiny image of a Silicon Valley tech company as with the real and pressing transport needs of a local community.

This impression can be further supported by more recent developments. For the Innisfil Transit experiment has recently turned out to be only one element in a broader and even more ambitious smart-city investment strategy (Vincent 2019). At the centre of such plans stands, once more, Metrolinx's GO Expansion programme and the prospective creation of a regional rail station in Innisfil that would connect the town more closely to downtown Toronto. In a futuristic planning vision circulated under the name of 'The Orbit: Innisfil Rural Re-Imagined' (Figure 15), the new rail station is shown to become the urban centre point of a broader development scheme that aims to transform Innisfil

from the semi-rural, scattered exurban town that it is to a bristling "digital and connected community" (Partisans 2019: 7). Such transformations, as the policy document emphasises, is foreseen to go along with staggering rates of population growth, boosting – in only a first growth phase – Innisfil's population from 37,000 to about 60,000 inhabitants and then later to an ultimate, yet rather farfetched number of 200,000 (Partisans 2019: 14-15). Partly reminiscent of Peck's characterisation of 'technoburbs' as major "greenfield site[s] [...] for the rollout of neoliberal growth politics" (2011: 892), the Innisfil Re-Imagined vision articulates such ambitions in the context of tech-induced urban growth (Hollands 2015). Innisfil Re-Imagined, as its vision blueprint explains, would be based on "technology, new tech agriculture, advanced manufacturing, artificial intelligence, combined with a vibrant 'start up' energy and culture" (Partisans 2019: 7). Whether the Orbit vision is ever to be realised – and if so under what exact circumstances – remains to be seen, especially given that local political resistance has started to rise (Javed 2020). Yet even in its unrealised form, the Innisfil's Orbit vision casts clearer light on the strongly tech-boosterist tendencies that had surfaced already earlier in connection with the Uber partnership.

Figure 15: Aerial rendering of the vision 'The Orbit: Innisfil Re-Imagined'. At the centre of the envisioned circular development stands Innisfil's future regional railway station, which connects the town to Toronto. Source: Partisans (2019: 8-9).

The Uber-Innisfil PPRP lends empirical substance to the short-term-benefits-over-long-term use dynamic laid out earlier in this chapter. As the above discussion suggests, the Innisfil Transit experiment has been driven by motivations that do not necessarily have to do with the actual mobility needs of local communities but more with the ambitions of local political elites to make the small town of Innisfil an exurban trademark for tech solutionism and, as such, an apposite site for further investments by global tech capital (Alvarez León/Rosen 2020).

While a comparison with other PPRPs in other North American cities is beyond the scope of this chapter, first empirical examinations suggest that similar dynamics of extrospective policy boosterism (McCann 2013) have played a prominent role in the adoption of early PPRPs. As Curtis et al. write in a study of more than 30 early ridehail partnerships across the USA, the will to "[d]emonstrate innovation" (2019: 68) was one of the key motivations for almost any of the participating transit agencies. Similarly, Mallory Livingston Shurna and Paul Schwieterman note that "the temptation for agencies to demonstrate 'innovation for innovation's sake' is strong" (2020: 10). It is to be expected, therefore, that strategies of economic investment, talent attraction and the creation of a tech-friendly outward image are far from a standalone feature of the Innisfil Transit case, but have also informed other PPRPs across the North American continent (Livingston Shurna/Schwieterman 2020: 10).

3 – Conclusion: Fragmentation, Friction, Failure

This chapter started out from an observable phase shift in the operational logics of Uberisation: the emergence of partnerships between Silicon Valley ridehail companies on the one hand and local governments and transit agencies on the other. As I argued, the trend towards PPRPs is primarily driven by the two socio-spatial dynamics of a winner-takes-it-all and a short-term-benefits-over-long-term-use tendency: With regard to the former, the dependence of digital platforms on network effects (Srnicek 2017) means that PPRPs are likely to intensify existing patterns of uneven spatial development and splintered infrastructural investment, as only those areas, urban nodes and suburban hubs guaranteeing sufficiently high passenger traffic – and, in consequence, profits – will be considered by Uber and Lyft as apposite PPRP sites (Graham/Marvin 2001). With regard to the dynamic of 'short-term benefits over long-term use', PPRPs further betray a risk to put (unguaranteed) economic success over the real, everyday transport needs of local communities (Wiig 2015a). These two socio-spatial dynamics were explored in case studies of two early PPRP arrangements in Toronto and the GTHA: the Lyft-Metrolinx pilot and the Uber 'Innisfil Transit' experiment.

Contrary to the corporate storytelling of Uber and its emphasis on cheap, ubiquitous and universally accessible urban mobility – think of former Uber CEO Travis Kalanick's motto of 'transportation as reliable as running water' (CNBC 2016) – this chapter is indicative of three main implications for how we understand the emerging infrastructural

reality of the actually existing smart city in North America (Shelton et al. 2015). First, the actually existing smart city promises to be a city of heightened infrastructural *fragmentation* (Graham 2000; Graham/Marvin 2001; MacKillop/Boudreau 2008). PPRPs, due to their dependence on platform network effects (Srnicek 2017; Woodcock/Graham 2020), will be concentrated in urban and suburban growth areas where a certain everyday 'density' of human activities (shopping, transportation, employment, amusement etc.) suggest profitable returns for Uber and Lyft. Undoubtedly, this will exclude large swaths of less advantaged urban and suburban areas – such as, for instance, 'the' postwar inner suburb (Filion et al. 2011; Hackworth 2007: Ch. 5; Parlette/Cowen 2011) – that neither fulfil the economic preconditions for the implementation of PPRPs nor house the mostly young, well educated and rather affluent customer clientele mostly using Uber and Lyft (Sweeney/Treat 2020).

Secondly, the smart city promises to be a city of heightened infrastructural *friction*. As the current trend towards PPRPs picks up pace, public transit infrastructures – and, most of all, suburban bus lines – are threatened to be replaced, partly or even fully, by Uber and Lyft's private services (Sweeney/Treat 2020). Such transformations inescapably conjure up fundamental questions about public transit as an essential citizen right (Sheller 2018) and, even beyond that, as part and parcel of more radical struggles towards what Lefebvre (1968) once called 'the right to the city' (Kębłowski et al. 2019). What is at stake in political contestations over transit as a public right are not only the labour conditions of public transport workers threatened to be replaced by (non-unionised, worse paid) Uber gig workers, but also the way in which urban transport comes to be seen and used as either a public good or a largely privatised refuge for the better off (Dellheim/Prince 2018; Sweeney/Treat 2020). The testing and implementation of PPRPs in various urban and suburban locales marks these areas as sites of heightened social and political friction in the gradually consolidating reality of the 'actually existing smart city'.

Finally, the actually existing smart city promises to be a city of recurring – partial or full, widespread or concentrated – infrastructural *failure*. While touted as all-round solutions of future (sub-)urban transportation, and as discussed in the context of the Innisfil Transit case, PPRPs rely on the long-present car capsule whose strict capacity limit locks such arrangements in a spiral of exploding subsidies directly proportional to growing use. In this sense, PPRPs are prone to infrastructural failures that make themselves felt as, for instance, the strict cap on individual rides per month that Innisfil's town officials had to impose on its local PPRP users. Such infrastructural failures of PPRPs, however, are unlikely to automatically slow down or even bring to a halt the accelerating trend towards

PPRPs. Rather, it is to be expected that PPRPs will largely conform to broader neoliberal dynamics (Brenner et al. 2010) in which earlier failures prepare the ground for the rise of new, partly adapted PPRP arrangements (Siemiatycki 2013; 2015). While such failures may slow down the PPRP trend in certain locales, then, it is not unlikely that it is exactly such sequential shortcomings that will propel the PPRP phenomenon in the longer term, potentially giving rise to new and even intensified fragmentations, frictions and failures.

Chapter VI

Automating Uber

The Self-Driving Car in the Age of Big Data

The below graphic (Figure 16) provides us with a glimpse of the City of Toronto seen through the Uber machine eye.[60] Showing parts of the Toronto cityscape captured through aerial RGB images, street-view camera panoramas as well as ground-level and airborne light detection and ranging sensors (LIDAR)[61], the image has been used by Uber's Advanced Technologies Group (ATG) as a visualisation of its recent TorontoCity benchmark: a data mining project whose essential aim was to capture and re-model the entirety of the GTA's built environment in fully three-dimensional virtual space (Wang et al. 2017). A product of the broader research and development programme of Uber ATG, the TorontoCity benchmark project powerfully brings to the fore one of the key critical operations that underlies Uber's automation efforts: the collection of vast amounts of data. Opening one of its ATG hubs in Toronto in May 2017 and sending its AV

[60] My warmest thanks to Sean Grisdale for his most helpful comments on an earlier draft of this chapter.

[61] LIDAR is one of the key technologies used by almost any big corporate player in the field of self-driving car development. Having originated in state-military research, LIDAR, as Antoine Bousquet explains, is "a remote sensing technology that measures the range to every point in a given field of view and generates detailed three-dimensional models of the scenes surveyed with a resolution superior to that afforded by radar" (2018: 74-75).

prototypes on data-capture test rides through the city, Uber has turned Toronto and the GTA into a real-life urban reservoir of big data.

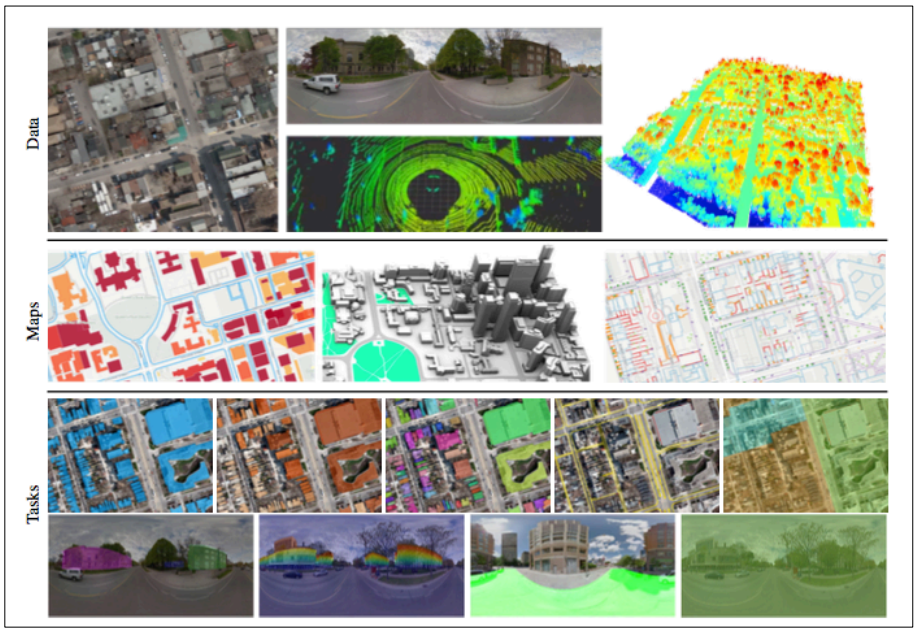

Figure 16: This graphic depicts the various data sources – aerial imaging, ground-view LIDAR and camera panoramas as well as airborne LIDAR – that Uber ATG has used to create the TorontoCity benchmark: a fully three-dimensional re-mapping of the entire GTA that includes meta data such as building heights or road centrelines. Source: Wang et al. (2017: 3010).

Toronto, however, is not the only city undergoing such transformations. Up to the point of selling its ATG division to competitor Aurora in December 2020, Uber had implemented such data-intense, city-wide mapping procedures in four other North American conurbations: Pittsburgh (since 2015), San Francisco (since 2016), Dallas (since late 2019) and Washington D.C. (since early 2020).[62] Notably, the mapping of these places has proven to be a complex, laborious and rather costly endeavour (Wang et al. 2017). Even for a Silicon Valley behemoth like Uber, it is too expensive to map the entirety of its global ridehail network at the level of granularity needed for autonomous driving (Mattern 2017b). It is for this reason that the development, testing and selective deployment of Uber's AVs has continued to be a highly localised procedure. It is largely for this reason that Uber ATG's five data-collection sites – Toronto among them – offer themselves as rich nodes for gaining a deeper understanding of Uber's current

[62] Uber sold its ATG division to self-driving vehicle company Aurora Innovation for an overall price of US $4 billion in December 2020. At the same time, Uber invested $400 million in Aurora, gaining a 26 per cent ownership stake. Since this complex transaction, it has not been entirely clear to what extent Aurora has continued Uber ATG's former development programme and the data collection efforts in the five former ATG hubs (Hu et al. 2020). Strictly speaking, therefore, this chapter mainly covers the time period between May 2017 (when Uber ATG first started its operations in Toronto) and December 2020 (when Uber ATG was sold to Aurora).

automation efforts. As I argue in this chapter, the systematic, large-scale mining of big urban data is one of the key formative processes underlying Uber's AV project. As a consequence, the realisation of Uber's dream of self-driving cars, in ways that will have to be shown below, depends on the collection of vast amounts of data.

In many respects, Uber's AV efforts testify to big tech's much-noted "data gluttony" (Dyer-Witheford et al. 2019: 121; Mezzadra/Neilson 2019: 144-147). Scholars working in and beyond the newly emerging field of critical data studies have started to reveal the fact that large-scale corporate projects of data collection operate through and profit from deeply asymmetrical power relations between data extractors and those they extract from (Apprich et al. 2019; Kitchin 2014a). Opposing widespread narratives of big data as a naturally given new "digital raw material" (Sadowski 2019: 4), new conceptual vocabularies have been developed in order to bring to the fore "data's human, institutional, and technological creators" (Mattern 2017a: n.p.). Such coinages include, sometimes with explicit reference to Marx's (1976: Ch. 26) account of primitive accumulation, metaphors such as 'data grabbing' (Fraser 2018), 'data enclosure' (Dean 2016) or 'data colonialism' (Thatcher et al. 2016). While these notions stand in close connection to my endeavours in the following pages, the two concepts particularly central to this chapter are those of 'data extraction' as put forth by Sadowski (2019) and, on the other hand, what Luis F Alvarez León (2016: 7) has called digital 'landscape production' through applications such as Google Street View. Particularly, Alvarez León's conceptualisation of Google Street View as a property regime of digital 'landscape production' holds important lessons for understanding Uber's not identical, yet variously similar practises of scanning, mapping and analysing entire cityscapes (Anguelov et al. 2010; Uber ATG 2018).

With specific regard to Uber, the company's practices of data collection have mostly been explored so far in terms of the data-enabled algorithmic management of drivers (Calo/Rosenblat 2017; Lee et al. 2015; Rosenblat/Stark 2016; Wu et al. 2019). Recently, Attoh et al. (2019) have taken the debate one step further by showing how the daily labour of Uber drivers not only produces the digital means for their own surveillance, but also provides Uber with hugely valuable data insights into local traffic patterns and other key metrics on a city-wide scale. While the centrality of data to Uber's business model is now widely acknowledged, the specific use of data in and through the tech giant's AV programme remains a theoretical and empirical blind spot (for a notable exception, see Diab 2019). The "Uber dream of autonomous vehicles," Woodcock and Graham write, is "only possible in a world in which multiple overlapping spaces, activities and processes

are highly digitally legible" (2020: 25). As true as this is, current critical scholarship has yet to explain the exact nature of these data mining procedures – these digital legibilities – that have enabled Uber's AV ambitions in the first place.

This chapter begins the work of filling this gap. By examining the informative case of Uber ATG in Toronto, it adds to a more granular understanding of Uber's AV efforts and the key role of large-scale, systematic data collection within this long-term project. The chapter proceeds in three basic steps. A first section develops a basic understanding of the deeply data-dependent machine learning (ML) procedures that have reawakened current industry ambitions – including Uber's – to gradually automate what John Urry (2004) once called the 'system of automobility'. Furthermore, I discuss Sadowski's (2019) account of 'data extraction' and Alvarez León's (2016) notion of 'digital landscape production'. Building on these considerations, the next section explores the dimension of data extraction on the level of Uber's ridehail core business. Data extraction from individual (driver and passenger) users allows Uber to gain a detailed understanding of the relative 'performances' of its hundreds of local ridehail markets across North America, providing an important knowledge foundation for identifying those nodes suitable for the more exclusive process of digital landscape production. Zooming in on the case of Uber ATG in Toronto, I bring into view how Uber exacts such processes of digital landscape production by assembling the geographic information collected by its AV prototypes into virtual, three-dimensional training scenarios for its self-driving software. Finally, in the conclusion, I briefly visit recent critical debates on automation. Instead of the rather hindering 'minimalist' and 'maximalist' positions that have dominated these debates so far (Dyer-Witheford et al. 2019: 3-8), I propose a four-fold front of 'data struggles' that might challenge the increasingly aggressive data collection practices of tech capital in general and Uber in particular.

The theoretical and empirical explorations of this chapter are inextricably linked to the transformative processes of Uberisation surveyed in Chapters IV and V above. While Chapter IV engaged with the transformative process of taxi-industry re-regulation, and Chapter V investigated the spatial expansionism of the forces of Uberisation via sub- and exurban PPRPs, this chapter starts from the idea of an expanded, re-regulated ridehail geography and explores its prospective future transformation in terms of the potential automation of selected parts of its overall terrain. Beyond the urban arenas of regulatory and infrastructural politics explored in the chapters above, this chapter brings into view yet another dimension of Toronto's urban fabric deeply affected – and even largely brought into existence in the first place – by the data-extractive vectors of Uberisation.

Situating the Uber automaton within the broader context of Uberisation allows for an important shift of perspective vis-à-vis the idea and reality of the self-driving car (cf. Harvey 1996: 50): one that approaches Uber's ATG programme not so much from the partly reified perspective of the self-driving car as a discrete, fully self-sufficient *thing* (Feenberg 2014: 62), but rather from the shifting viewpoint(s) of one of the formative social *processes* that enable the development of Uber's AV technology in the first place: the large-scale collection of big data.

1 – Between Data Extraction and Landscape Production

While recurring technological boosts and accompanying media hypes about self-driving cars are as old as the private automobile itself (Kröger 2012; Wetmore 2003), the technology underlying current automated driving efforts radically differs from earlier such attempts (Diab 2019: 148; Stilgoe 2018). The current phase of AV development was kicked off, as so many of capitalism's technological quantum leaps (Bousquet 2018; Noble 1984: Ch. 1), by a state-military research project: the DARPA[63] Grand Challenge (Nilsson 2010: 603-612). Originating in the immediate aftermath of 9/11, the Grand Challenge was initially driven by the aim to increase the automation rate of the US army's ground vehicle fleet. Holding out prize moneys of up to US $2 million for the winning teams, DARPA undertook three challenges between March 2004 and November 2007, with the first two taking place on a marked course in the Nevada desert and the third one – the DARPA Urban Challenge – taking place in a mock-up urban environment at a former Californian Air Base. It was the second challenge that largely foreshadowed many of the state-of-the-art technologies common in the field today. As such, the second DARPA challenge marked a turning point in the transition of the AV research field from a largely militarised to a progressively corporatized endeavour (Kaplan 2016: 41-42). What distinguished Stanford University's winning team from its competitors – coming, inter alia, from such illustrious academic places as Carnegie Mellon University and the Massachusetts Institute of Technology – was its realisation that "autonomous navigation was primarily a software problem" (Nilsson 2010: 607), thereby defining the contours of a problem that remains at the heart of today's corporate AV challenge: the development

[63] DARPA stands for Defence Advanced Research Projects Agency and practically functions as the research and development arm of the US Department of Defence.

of sufficiently powerful ML software that can effectively deal with the virtually infinite complexity of urban street life and the myriads of traffic scenarios it produces.

Against the background of the newly awakened AV ambitions of big-tech companies, this section develops a deeper, if certainly far from exhaustive, understanding of current work in AI research vis-à-vis the 'application' of automated driving. An important, yet often forgotten first step in this regard is the acknowledgement that what has historically been known under the label of 'AI' has often changed depending on the most advanced and, therefore, best funded technologies hiding behind the AI signifier (Kaplan 2016). While this is not the place to excavate a whole history of AI and the various scientific approaches that have ebbed and flowed under its name (Boden 2018; Nilsson 2010; Russell/Norvig 2016), it is important to understand that today AI usually refers to the particular research field of machine learning (Boden 2018: 39-43; Dyer-Witheford et al. 2019: 12-15).

The basic idea behind any ML process is the identification of (often unforeseen) patterns within huge amounts of data. In the case of self-driving technology, the challenge consists in the reliable interpretation of a vast and constantly changing input stream of data. The AV machine brain not only needs to distinguish various static objects (street infrastructure, houses, bridges, traffic lights and signs, etc.) from a constantly changing number of dynamic actors (cars, trucks, pedestrians, cyclists, etc.), it also is required to calculate the likely trajectories of the latter and, as a composite calculation of all of these variables, make an informed decision about the AV's own movements (Urtasun 2020; 2021). "The sensors and computer programs involved," as Dawn E. Holmes summarises the current AV challenge,

> have to process data in real-time to reliably navigate to your destination and control movement of the vehicle in relation to other road users. This involved prior creation of 3D maps of the routes to be used since the sensors cannot cope with non-mapped routes. Radar sensors are used to monitor other traffic, sending back data to an external central executive computer with controls of the car. Sensors have to be programmed to detect shapes and distinguish between, for example, a child running into the road and a newspaper blowing across it; or, to detect, say, an emergency traffic layout following an accident (2017: 10-11).

Given the sheer complexity of this task and, especially, the ever-changing, unpredictable nature of urban traffic, strictly symbolic algorithmic approaches that are based on the *pre*-programming of all thinkable traffic scenarios are unfeasible. Instead, AVs, like many other current applications of AI, rely on artificial neural networks (ANNs) as their basic

digital infrastructure (Dyer-Witheford et al. 2019: 13). Importantly, ANNs don't operate on the classical algorithmic logic of working through a predefined sequence of either/or (1 or 0) decisions. ANNs function on the basis of probabilities, covering a full range between 1 and 0. Broadly modelled after the human brain, "[n]eurons in an artificial neural network," as Jerry Kaplan outlines,

> are commonly organized into a series of layers. The neurons at each level are connected only to those at the level above and below them in the hierarchy, and the interconnections are usually modeled as numeric weights, with (for instance) 0 representing 'not connected' and 1 representing 'strongly connected.' The lowest level actually receives input from outside the network – for instance, each low-level neuron might process information about a specific dot (pixel) from a camera. The neurons at higher levels – in what are called the 'hidden layers' – receive input only from neurons below them (2016: 29-30).

The essential task then consists in calibrating the weights between all connected neurons in such a way that certain visual patterns – e.g. a pedestrian crossing the street – can be recognized with sufficient reliability, despite the unavoidable variations involved (obviously, different pedestrians might look and walk differently). This process of ANN fine-tuning is called *training*, and it is this – necessarily reiterative – procedure that is responsible for ML's notoriously insatiable data hunger (Dyer-Witheford et al. 2019: 121).

The development of self-driving car software forms no exception to this rule. It starts with the collection of vast amounts of data, which are needed for the training of the ANNs that will eventually control the AV (Dong 2017; Dyer-Witheford et al. 2019: 75-79). While there are a number of important external data sources that feed into Uber's ANN training data (Mattern 2017b; Wang et al. 2017), it is the company's AVs themselves, or rather their currently existing prototypes (Figure 17), that form one of the centrepieces of Uber's multi-modal data mining sensorium. While resembling conventional vehicles, these prototypes are made up of a rather complex technological assemblage that combines a full range of mutually complementary sensory devices including a LIDAR unit, a set of video cameras, sonar and radar sensors as well as a GPS device for basic orientation (Mattern 2017b; Nilsson 2010: 603-612; Uber ATG 2018: 19-22). Besides its function – in a potentially automated drive – to provide the vehicle with a basic real-time understanding of its (im)mediate surroundings, this sensory apparatus also functions as an elaborate data collection unit whose machine eyes are able to systemically scan not only the entirety of a city's *static* environment, but also the *dynamic* movements of any traffic participant found therein. Importantly, many of the AV test rides currently

undertaken by Uber ATG and other big corporate players in the field (such as Tesla or Google's autonomous vehicle sub-branch Waymo) are not only about testing the autonomous capacities of these vehicles as such; these manual test rides are about large-scale, systematic data capture.

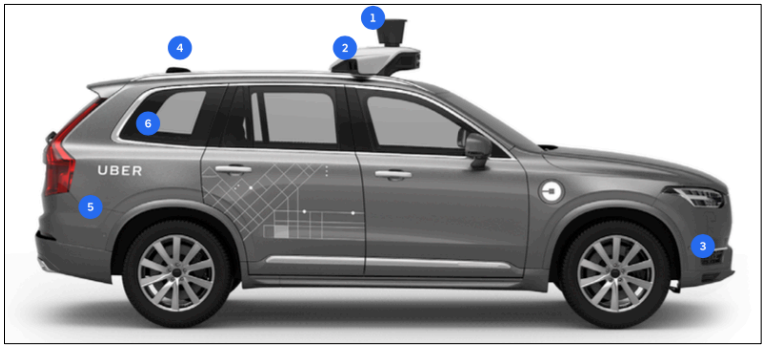

Figure 17: Side view of a Uber ATG vehicle as used in its self-driving car programme. The car is provided with a variety of sensory input sources: a light detection and ranging (LIDAR) unit on its roof (1); various cameras (2); a radar unit in its front bumper area (3); a global positioning system (GPS) (4); a central computer unit in the vehicle's trunk (5); and telematics software and hardware for communication with Uber's cloud tech stack (6). Source: (Uber ATG 2018: 20).

The data needed for the training of self-driving software cannot simply be invented (as, say, in a video game). Given that AV navigation demands levels of accuracy that multiply exceed existing standards such as GPS-based navigation and mapping (Mattern 2017a), training data for AV software must be based on the *real* urban world. Marking a major prerequisite for the eventual deployment of AVs, entire cityscapes are therefore remodelled in virtual space, serving as scenarios for the training of neuronal networks. Uber's self-driving algorithms, for instance, are trained on the basis of fully three-dimensional, virtual traffic scenarios that, while based on situations encountered during real-world test runs, can be variously augmented so as to form more complex scenarios that the ANN hasn't encountered before: For example, illegal manoeuvres by other vehicles can be added or jaywalking pedestrians can be inserted into a pre-existing scene (Urtasun 2021; Figure 18). Raquel Urtasun, former chief scientist at Uber ATG (see below), summarises the nexus between data collection, scenario modelling and ANN training at Uber as follows:

> Our approach is the following: We have driven millions of miles, we have all the sensor [incomprehensible] of how the world looks like. So, what we're going to do is we're going to reconstruct the world that we have observed with very high fidelity – in terms of the static part, in terms of the dynamic part – and then we're going to compose new scenarios by composing the static and the dynamic [parts] to create [...] new versions of the world (Urtasun 2021: n.p.; 48:40).

Obviously, one of the major advantages of *simulated* algorithm training (as opposed to test runs in a real vehicle on a real test ground) consists of the infinitely higher variability of test scenarios; scenarios that can be run through in much shorter time and, as a consequence, in a more cost-effective way. As such, the supply of adequate and maximally diverse scenario data forms an essential prerequisite for the development of self-driving software.

Yet, where does big tech's big data needed for ANN training come from? And, in particular: *Where does Uber's big data come from?* Harnessing, on the one hand, Sadowski's (2019) account of data extraction and, on the other hand, what Alvarez León (2016) has called digital landscape production, the remainder of this section identifies two origins of Uber's data used for the development of its self-driving software.

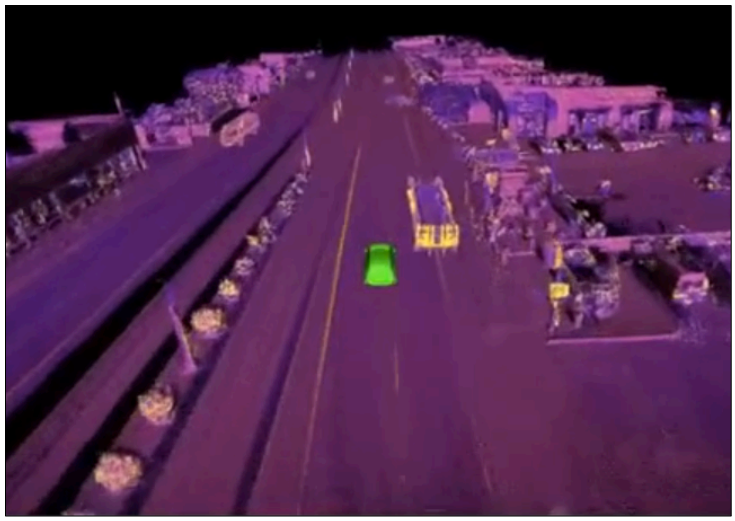

Figure 18: Simulated traffic scenario used to train Uber's self-driving algorithms. The green car represents the Uber AV. The truck on its right, which obscures a third vehicle coming out of a side street and entering into the AV's lane, was 'imported' into the scenario to make it more challenging for the ML engine. Source: (Urtasun 2021).

Following Sadowski, data extraction can be understood as "a forceful practice [...] wherein data is taken without *meaningful consent* and *fair compensation* for the producers and sources of that data" (2019: 7). In opposition to other modes of data generation, data extraction specifically targets data that can be collected from the activities of users on the digital ground of a platform. In the case of Uber, this might be the preferred destinations and times of travel of individual passengers or the working hours of drivers. In terms of the first side of the above definition – meaningful consent – it is important to note that the standard legal procedure of data extraction leads through

what one could call the obligatory legal passage point (Callon 1984) of virtually any process of data extraction: the so-called end-user license agreement (EULA). EULAs, as Sadowski explains, "are the pages on websites and applications that make you click 'agree' or 'accept' before you can use the service" (2019: 7). It is through this standard procedure that platform businesses appropriate, in often oblique ways, the right to collect, store and analyse user data produced during the consumption of their services (Thatcher et al. 2016: 996). Given the considerable length and dense legal language of many EULAs, it is clear that the overwhelming majority of users will never read these documents, not to speak of fully understanding them. EULAs, therefore, as Sadowski concludes, "are the ideal-type of *pro forma* 'consent'" (2019: 7); they purport consent in the absence of a viable alternative.

With regard to the second side of Sadowski's definition – fair compensation – we can simply note that monetary compensation for the data that consumers and workers provide for big-tech companies remains an absolute exception (Attoh et al. 2019).[64] It is in the next section that I will show in more detail how Uber ATG harnesses data extraction for its self-driving car programme.

Alvarez León's twofold conceptualisation of digital landscape production provides a further key to Uber ATG's AV ambitions. Placing his account in the context of newly emerging property regimes (Schlager/Ostrom 1992) in the so-called 'geoweb' (Leszczynski 2012), Alvarez León argues that Google Street View can be understood as a new way to commodify large-scale geographic information – one, as I want to suggest, that resembles Uber ATG's data capture procedures in Toronto and other cities of its five-city urban network. As Alvarez León argues, data commodification in the context of Google Street View entails two basic steps (see also, Elwood/Leszczynski 2011; Leszczynski 2012). First, there is the process of digital landscape production in the narrower sense[65]: Since the early 2000s, Google has effected such landscape production via its camera-equipped cars that digitally capture entire cityscapes (for a detailed account, see Anguelov et al. 2010): "Elements of the environment, such as buildings, streets and parks, are framed and captured as landscapes when they are fixed on a visual

[64] This has led theorists such as Christian Fuchs to argue that platform users should be seen as digital labourers who – uncompensated for the data extracted from their activities – "work completely for free and are therefore infinitely exploited" (2010: 191). While a thoroughgoing thinking through of Fuchs's approach vis-à-vis the specific case of Uber remains beyond the aims of this chapter, suffice it to note that the specific case of Uber works, at least to my mind, along quite different lines than that of a social media platform like Facebook. It remains an open question, therefore, whether Fuchs's account – based as it is on Dallas Smythe's idea of the so-called 'audience commodity' – can meaningfully be 'applied' to the case of Uber (for a critique of Fuchs's approach, see Huws 2014: 159-163).

[65] Alvarez León, it should be noted, bases his idea of digital landscape production on Denis Cosgrove's (1985) earlier important article 'Prospect, Perspective and the Landscape Idea'.

medium" (Alvarez León 2016: 7). Secondly, such individual landscape production is followed by a process of digital integration that combines all captured data into a coherent and fully navigable virtual world – the user-accessible 'world' of Google Street View:

> While Google Street View is a result of commodification through landscape creation, each individual landscape image has negligible value for Google. The value creation of Google Street View takes place through the massive integration of individual images into a navigable virtual environment. Google Street View is then made into a commodity through the accumulation of millions of infinitesimally valuable properties, which are assembled into a coherent, fully interactive virtual 'landscape of landscapes' (2016: 8).

While certainly not fully congruent with Uber's efforts to train its self-driving cars in virtual training scenarios, Alvarez León's account of Google Street View provides some helpful theoretical guidance for understanding Uber ATG's AV efforts. As in Alvarez León's discussion of Google Street View, Uber deploys elaborate sensory devices mounted to its AV prototypes, in order to capture and produce those digital urban landscapes that build the basis for its virtual training scenarios (Uber ATG 2018). Furthermore, and also in line with the schema laid out by Alvarez León, individual landscapes are then integrated into more encompassing, digital training scenarios. However, Uber's AV programme also differs from Google Street View in two important ways. On the one hand, Uber deploys a more elaborate data-capture sensorium that, as indicated above, includes much more than Google's main data source: cameras. Partly as a consequence of its more cost-intense data capture procedure, Uber has applied its programme of digital landscape production only in those five cities that form part of the Uber ATG urban network: Pittsburgh, San Francisco, Dallas, Washington D.C. and, as explored below, Toronto. Google Street View, meanwhile, is a (more or less) global endeavour. These differences notwithstanding, Alvarez León's account of digital landscape production forms a productive theoretical basis for understanding key elements of the data collection process of Uber ATG in Toronto.

As the following two sections will discuss one by one, both Sadowski's account of data extraction and Alvarez León's concept of digital landscape production help us to understand and gradually lay bare the data sources of Uber AV programme.

2 – Data Extraction: Building Uber ATG's Urban Network

In a recent publication, Diab (2019) has done much to expose how Uber's platform functions as a grand-scale data extractive device. Uber's platform, as Diab writes,

> converges the multiple functions of previous information technologies found in the taxi industry into a massive, globally distributed, and mostly automated, big-data platform. As a form of fixed capital, the Uber platform consists of distributed, networked back-end 'tech stack' ICTs and the front-facing Uber application (2019: 136).

Without going into the details of Uber's variously more elaborate platform architecture (see the more extensive discussion in Chapter III), suffice it to note that, from a data viewpoint, Uber's platform functions as a digital system driven by the constant extraction of massive amounts of real-time data flowing from front-facing Uber applications used by drivers and riders in thousands of local city markets worldwide to the company's back-end tech stacks where the incoming big data can be stored for both immediate and future use (Srnicek 2017: 44; Woodcock/Graham 2020: 23-25).

For each of its local ridehail markets, then, Uber is able to extract granular data at both an *individual* user level and at an *aggregate* city level. During a local driver's two-hour 'shift', for instance, Uber not only gains a commission from the driver's trip fares, but also "valuable information about city roads, about traffic patterns and about passengers themselves, specifically their pickup and drop off locations – be these locations restaurants, nightclubs, hotels, or job sites" (Attoh et al. 2019: 1012). First of all, such data, allows Uber to make important *intra-city predictions* about a local market's most profitable routes, its most popular destinations and areas that, as a result, may be specifically targeted. Note in this context, the following extract from an official Uber ATG document that outlines how data gained from Uber's ridehail core business, along with other factors such as local regulation, informs decisions about the targeted deployment of AV prototypes in an certain urban area or along certain routes:

> We begin by identifying specific geographies where we would like to ultimately deploy self-driving vehicles on the Uber network by taking into consideration a number of factors, including the regulatory environment, areas where we can extend our network's reach to better serve riders, and financial viability. Using the information layers of our high-definition maps, as well as data from Uber's core business, we convert the road geometries and static features of these geographies into a list of autonomy capability requirements for our self-driving vehicles (Uber ATG 2018: 29).

Secondly, the data extracted from all of Uber's local city markets opens up the possibility of detailed *inter-city comparisons* along key metrics such as overall profitability of a given market, local consumer demand and spending power, driver availability and many more such key parameters.

Data-extraction and both the intra-city predictions and inter-city comparisons it allows for have a crucial role to play vis-à-vis Uber's overarching AV strategy. They help Uber to identify those local markets where it may deploy its AV fleets and thereby start the more elaborate data collection process of digital landscape production needed for the training of its self-driving software. In comparison to data extraction at the level of Uber's ridehail core business, the digital landscape production of virtual training scenarios continues to be, even for a venture-capital-backed Silicon Valley behemoth like Uber, an excessively expensive endeavour.[66] In fact, the high costs associated with the granular mapping of entire urban areas have crucial consequences for the geographic deployment of this procedure: it is a process that, exactly because of the high expenditures associated with it, has remained deeply localised. Uber, in other words, needs to carefully decide where – that is: 'on top' of which city's UberX core business – it may start such a mission.

It is here that the data extracted from Uber's core business becomes a most valuable source of information and one factor, among a number of others, that has shaped the current form of Uber ATG's exclusive urban network, currently consisting of five urban hubs. On the one hand, there are three *major nodes* of the cities of Pittsburgh, San Francisco and Toronto. Together, these cities host Uber ATG's complete tech staff, consisting of more than 1,000 engineers, data scientists, robotics experts and other specialised tech workers (Uber 2019: 10).[67] One of the major factors informing Uber's choice for these sites clearly has to do with the presence of leading universities and broader tech ecosystems providing for a relatively big pool of highly qualified tech labour, in particular in the fields of machine learning, computer vision and advanced robotics. In Pittsburgh, for instance, Uber tapped into the local expertise of the computer science department of Carnegie Mellon University only to "hire away," as Rosenblat

[66] According to Uber itself (2019: 117), the costs for its Uber ATG R&D programme have risen from US $230 million in 2016 to $450 million in 2018. According to media reports, however, the costs of Uber ATG are estimated to be even higher, with some sources numbering them at up to US $200 per quarter (Reuters 2019).

[67] These numbers must be taken with a grain of salt. In January 2021, Uber sold its ATG branch to self-driving vehicle company Aurora Innovation for an overall price of $4 billion. At the same time, however, Uber invested $400 million into Aurora, gaining a 26 per cent ownership stake. Since this complex transaction, it has not been entirely clear how many of Uber ATG's former employees have kept their posts (Hu et al. 2020).

writes, “nearly the entire robotics department of the school” (2018: 177). Similar cases could be made for San Francisco with its close proximity to Silicon Valley (McNeill 2016) and Toronto where the concentration of leading AI expertise at University of Toronto’s computer science department promised a comparatively stable supply of local AI labour. I will return to this aspect below.

On the other hand, the cities of Dallas and Washington D.C. have complemented Uber ATG’s urban network as *minor nodes* more recently. In contrast to the core triangle of Pittsburgh, San Francisco and Toronto, the cities of Dallas and Washington D.C., however, do not host any major ATG offices. They ‘merely’ serve as sites of extensive data collection, including digital landscape production. In the respective cases of Dallas and Washington D.C. considerations of data variability – for instance, in terms of hot weather conditions in Dallas (contrasting with Toronto’s more extreme winters) or specific street layouts – presumably played a much bigger role than the local presence of tech labour (Geidt 2019; Korosec 2020). Dallas, as one of Uber’s official statements noted, “offers us the opportunity to explore a different type of road network for our self-driving technology. The city’s modern infrastructure, unique traffic patterns, road characteristics, and climate will offer new information that can inform our ongoing engineering efforts” (Geidt 2019: n.p.). Across all of the five sites of Uber ATG’s urban network, however, core-business viability – evaluated on the basis of data extraction – surely forms a key precondition for the establishment of a local ATG branch – be it *minor* (bar an office presence) or *major* (including an office presence).

It becomes increasingly clear, then, that Uber’s ridehail core business and its AV programme are not two separate entities; they go hand in hand, as the former informs the latter and vice versa. We may even imagine Uber’s North American data collection geography as consisting of two layers: the core-business *base layer* of this geography comprises Uber’s network of local ridehail markets spread across the US, Canada and Mexico. Superimposed on the latter, Uber’s much more exclusive data collection *top layer* comprises the five urban nodes of Pittsburgh, San Francisco, Toronto, Dallas and Washington D.C. At these sites, Uber not only pursues data extraction, but also the more elaborate process of digital landscape production via the deployment of its AVs and other data mining sensoria such as aerial imaging and LIDAR sensing (Wang et al. 2017). It is this latter procedure of digital landscape production that the case of Uber ATG in Toronto helps us to explore in more depth. *Where does the data used for the training of Uber’s ML algorithms come from?* In order to get a grip on this question, we now descend into the “data mill” (Attoh et al. 2019: 1012) of the City of Toronto.

3 – Digital Landscapes of Simulation: Uber ATG in Toronto

In May 2017, one year after Toronto City Council had officially legalised Uber's operations in town, the San Francisco-based start-up made headlines with the announcement of major investments in Toronto's growing tech startup scene. Uber announced the opening of a branch of its ATG division in Toronto, its first outside the US. As Uber's then CEO Travis Kalanick noted on the company's website:

> [W]e hope to draw from the region's impressive talent pool as we grow, helping the dozens of researchers we plan to hire stay connected to the Toronto-Waterloo Corridor. With support from the Ontario and federal governments, Toronto has emerged as an important hub of artificial intelligence research, which is critical to the future of transportation (Kalanick 2017).

The Toronto-Uber nexus further tightened one and a half years later when, on 13 September 2018, the company, now led by new CEO Dara Khosrowshahi, announced further investments in the company's research and development activities in Toronto (Deschamps 2018). These investments, it was stated, would amount to $200 million, creating 300 new tech and engineering jobs (in addition to 200 existing ones). Having sanctioned, as discussed in Chapter IV, an outspokenly Uber-friendly new taxi bylaw, and having served, as explored in Chapter V, as a viable test ground for some of Uber's globally most prominent public-private ridehail partnerships, Toronto further consolidated its role as a key hub for the company's urban experiments – in this case: the development, testing and potential future implementation of self-driving cars.

Next to the viability of Uber's core business in Toronto, there are two further factors that most likely influenced Uber ATG's decision to set up shop in Toronto. First, and as already indicated above, Toronto – not least since the consolidation, both real and imaginary, of the Toronto-Waterloo Innovation Corridor (Wachsmuth/Kilfoil 2021) – has emerged as a major site of AI research and expertise. The long-time presence of renowned AI researcher Geoffrey Hinton at University of Toronto's computer science department as well as a number of similarly well-known AI pioneers in Toronto at large has lured a considerable number of leading experts to the city (Dormehl 2017: 49-53). Among them was Raquel Urtasun, a former collaborator of Hinton's and now a professor at University of Toronto's computer science department (McBride et al. 2018). Known for her pioneering research on machine vision systems for driverless cars, Urtasun's work soon sparked the interest of Uber ATG. In early 2017, Uber approached Urtasun hoping to make her the head of one of its existing ATG hubs in the USA (Interview, Professor

University of Toronto; Urtasun 2018). At the time, however, Urtasun was in the midst of establishing, as one of its co-founders, the Vector Institute: a major AI research facility in downtown Toronto. Urtasun, such were the rumours at the time, insisted that she would only take the position, if she could stay in Toronto. Uber agreed and made Urtasun head of its new ATG branch in Toronto and, later on, even chief scientist of the entire Uber ATG division. As planned, Toronto's ATG branch opened in May 2017. It set up shop – just as the Vector Institute – in Toronto's downtown MaRS start-up hub, prominently located at the intersection of College Street and University Avenue (Boudreau et al. 2009: 186-187).

Secondly, it is important to note that the Province of Ontario has been one of the early adopters of a steadfast regulatory framework for the testing of AVs on its roads. On 1 January 2016, relegated under the province-wide Highway Traffic Act, Ontario Regulation 306/15 came into effect. It established the legal groundwork for real-life AV test runs on Toronto's city streets and, very much with it, a legal free ride ticket for the collection of big data *from* and elaborate mapping *of* Toronto's cityscape through the sensory devices mounted onto Uber's AVs. Crucially, the province's regulatory framework makes no reference whatsoever to the issue of data collection, rights and ownership or any related matter (Ontario 2016). In Ontario, industry-friendly regulation vis-à-vis the new big automotive players stands in close connection to the GTA's historical heritage as one of North America's largest car manufacturing regions (Boudreau et al. 2009: Ch. 9; Peters 2018: 54). Having lost many jobs as well as entire assembly plants to intra-NAFTA competitor regions (especially in Mexico), stakes are high in Ontario to retain, and potentially re-enliven, what is left of its local car industry by attracting its new high-tech players. Consequently, there have been concerted state-wide efforts – across federal, provincial and local scales – to making the GTA more attractive to the newly emerging amalgam of tech and automotive capital. Both the province's Autonomous Vehicle Innovation Network (AVIN) programme as well as the City of Toronto's (2019a) Automated Vehicles Tactical Plan have been at the forefront of these efforts. From this angle, then, the sanctioning of an industry-friendly, mostly underspecified AV testing framework falls largely in line with the official motto of Ontarian economic policies: 'open for business' (Albo 2018: 30). On the basis of these regulations, Uber ATG started data collection in Toronto by mid 2017 (Allen 2017).

While I discussed the basic outlines of the training process of self-driving software above, the 'Uber ATG in Toronto' case allows me to zoom in, in much more detail, on what goes into the digital re-modelling of both the static part (roads, housing, street

infrastructure, etc.) and dynamic elements (vehicles, pedestrians, cyclists and other road users) of the virtual training scenarios used by Uber ATG. With regard to the static part, Uber ATG has leveraged a whole host of data sources, creating a three-dimensional virtual model of the built environment of Toronto and the GTA. This model was captured, as a key publication by Urtasun and her team puts it, through "a million eyes" (Wang et al. 2017: 3009). Covering the entire territorial extent of the GTA, with its "712.5km^2 of land, 8339*km* of road and around 400,000 buildings" (Wang et al. 2017: 3009), the TorontoCity benchmark brought together

> a wide range of views of the city: from the overhead perspective, we have aerial images captured during four different years as well as LIDAR from airborne. From the ground, we have HD panoramas as well as imagery and LIDAR data captured from a moving vehicle driving around in the city. We are also augmenting the dataset with imagery captured from drones (Wang et al. 2017: 3009).

In their combination, these data sources provide the ground-truth raw material for the creation of the static backgrounds used in Uber ATG's virtual traffic scenarios.

This static background sets the scene, then, for the insertion of a variable number of dynamic actors. Vehicles as much as pedestrians are of particular importance in this regard. To create these virtual actors – or, to use Urtasun's (2021: n.p.) own vocabulary: these digital 'assets' – Uber relies on the two distinct, yet closely related procedures of what it calls its *GEOsim* and *LIDARsim* systems. As its name indicates, LIDARsim is based on the LIDAR data that an AV prototype automatically collects during a test run. This data, sometimes used in combination with the according camera footage, is rich enough to enable the reconstruction of a three-dimensional digital model of almost any object encountered during a real-world drive. Leveraging LIDARsim, Uber has compiled a digital inventory of more than 25,000 vehicles of various sizes and shapes (Figure 19), ready to be inserted into any virtual traffic scenario (Urtasun 2020).

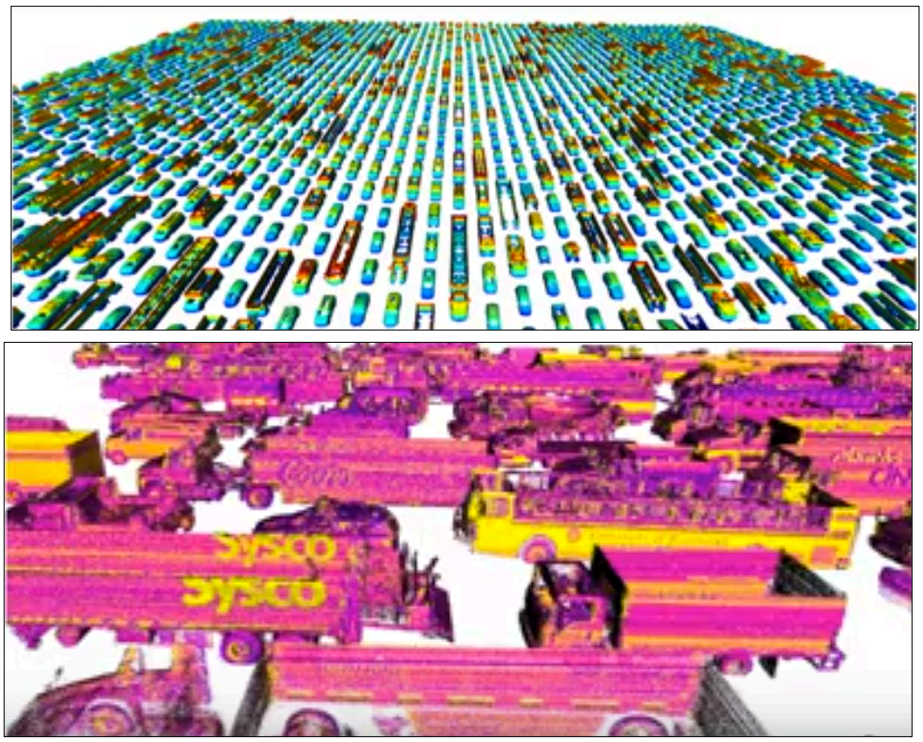

Figure 19: Having driven more than three million test miles with its SDCs, Uber ATG has created a digital inventory of more than 25,000 vehicles captured through the LIDAR unit mounted on top of its vehicles. These virtual vehicle models can then be used in various simulated traffic scenarios in order to train the neuronal networks eventually controlling Uber's SDCs. Source: Urtasun (2020).

If the vehicle-related side of LIDARsim already brings to the fore both the immense quantity and detailed quality of Uber's data collection project, the capturing and reconstruction of humans – pedestrians, passers-by, cyclists and many more – is equally instructive. Compared to vehicle scanning, the morphing of human bodies into Uber's data library is more challenging. Vehicles, as a research paper by Urtasun's team explains, "are larger and thus get much more evidence from LiDAR returns" (Luo et al. 2021: n.p.). In the case of pedestrians, therefore, data captured through the AV's LIDAR unit is synchronised with the according camera footage (Figure 20). On the basis of this dual input, LIDARsim first reconstructs a simple skeleton mimicking the movements of the recorded persona. This hierarchically structured set of bones is then overlaid with a detailed mesh giving a more fully human appearance to what was first only a 'naked' skeleton. Finally, in order to account for the different shapes of the mesh throughout bodily movements, so-called skinning weights are added. For every skeleton position, Uber's simulation software calculates the according mesh shifts occurring around each bone (Yang et al. 2020).

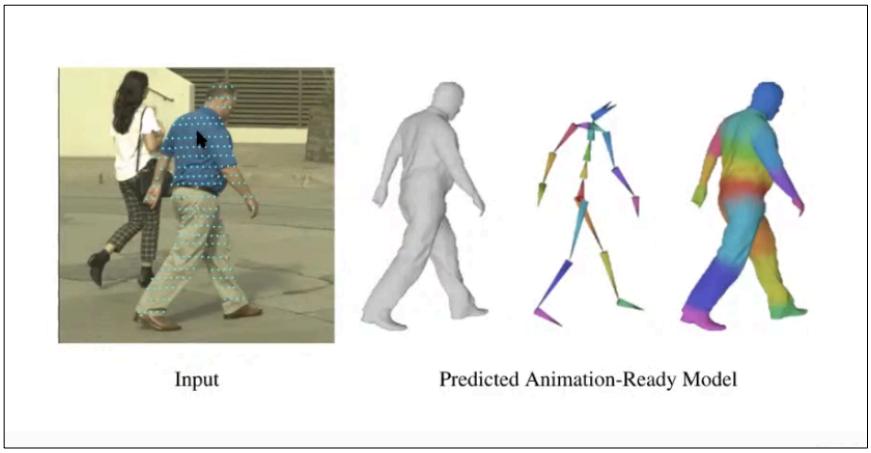

Figure 20: Schematic representation of a LIDARsim-based recreation of a 3D-model of a pedestrian passing by one of Uber ATG's AVs. The image on the left shows the scene as captured by camera and the LIDAR sweep (green dots). On the basis of this dual data source, a skeleton is created, which is then overlaid with a more realistic mesh. Importantly, once this process is completed, the virtual model can be reanimated in any kind of way (e.g. dance moves, boxing, etc.) that does not have to do with the originally captured scene such that the model can be most flexibly used in any number of newly created traffic scenario. Source: Urtasun (2021: n.p.).

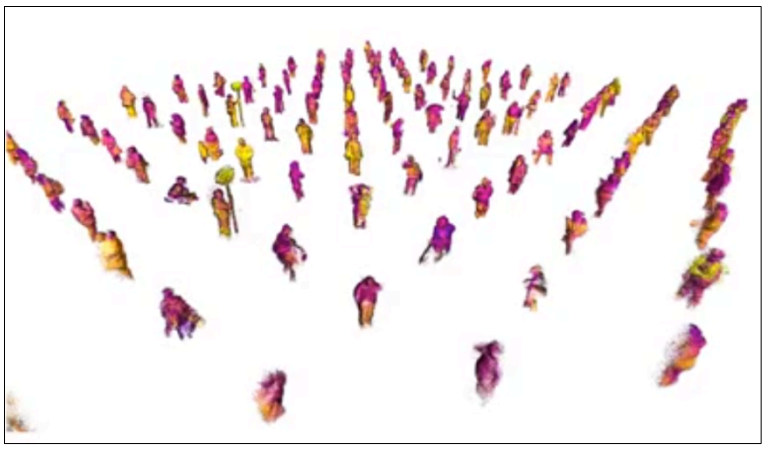

Figure 21: Visual representation of parts of Uber's digital inventory of pedestrian 3D-models. These are recreated from real-world persons encountered during AV test rides and then used in repeated virtual traffic simulations. Source: Urtasun (2020: n.p.).

As with Uber's vehicle data set, this procedure – obviously more elaborate in its mathematical complexity than I can account for here – enables Uber to not only capture a myriad of different persons of any kind of age, sex and gender, but also, and crucially, to reanimate these three-dimensional human models according to the requirements of any particular traffic scenario Uber's engineers want to test: "What we've obtained automatically," as Urtasun summarises the procedure, "is the full shape, the skeleton and the skinning weights such that we can basically [...] animate this particular person with our favourite [...] set of animations that we want" (Urtasun 2021: n.p.). And further: "Now we can reconstruct every single pedestrian we have observed in the world and use

it for simulation" (Urtasun 2021: n.p.). Next to its inventory of digital vehicles, Uber also commands control of a similarly vast digital human 'army' to be morphed into its virtual training grounds (Figure 21).

Closely related to this body-morphing procedure is the algorithmic prediction of the walking paths of pedestrians. Foreseeing the trajectories of pedestrians is more complicated than doing the same for vehicles, as the latter possess more circumscribed radiuses of action. The "erratic nature of pedestrian motion in urban settings," as Urtasun and her colleagues write in a recent publication, "makes it challenging to model" (Luo et al. 2021: n.p.). Even more so, a wide ranging and maximally diverse data set of pedestrian street movements is crucial in order to familiarise Uber's algorithms with the complexities as well as the myriad of contingencies of human behaviour in urban everyday life – or as Urtasun's team put it: "Having access to an accurate predictive model of pedestrian behaviors with quantified uncertainties is critical to provide safe solutions to autonomous driving" (Luo et al. 2021: n.p.). A vast set of virtual human-body replicas of Toronto's pedestrians, cyclists and other road users is crucial, then, to provide for the almost infinite ways in which these flesh-and-bone citizens turned digital personae may act in the real world. LIDARsim, in short, turns from the 'real' (data collection) to the digital (asset modelling) and, prospectively, back to the 'real': the eventual implementation (however distant in the future) of Uber's self-driving cars.

As indicated above, LIDARsim is only one of two ways that Uber ATG harnesses for data collection. Based on data derived from the 360-degree video camera unit mounted on each of Uber ATG's Volvo SUVs, the complementary process of GEOsim is mainly used to extract image-based vehicle assets that can then be inserted into video material derived from real-world test runs. Within this real-world video footage, the inserted 'fake' vehicle can be used to variously tweak the underlying real-world scenario such that the algorithms may be exposed to more complex or unusual situations (Figure 22). GEOsim, in this sense, "synthesizes novel urban driving scenarios by augmenting existing images with dynamic objects extracted from other scenes and rendered at novel poses" (Chen et al. 2021: 1). As with its LIDARsim counterpart, also GEOsim has been used by Uber ATG to build up the company's digital assets stock. While GEOsim's digital car assets may look somewhat less realistic than its LIDARsim-based equivalents – the human eye is usually capable, if with various degrees of difficulty, of telling apart GEOsim assets from the rest of the scene – it is important to bear in mind that the real threshold here is not the human perceptual apparatus but that of the ML algorithms for whose training GEOsim provides sufficiently realistic vehicle models (Chen et al. 2021; Urtasun 2021).

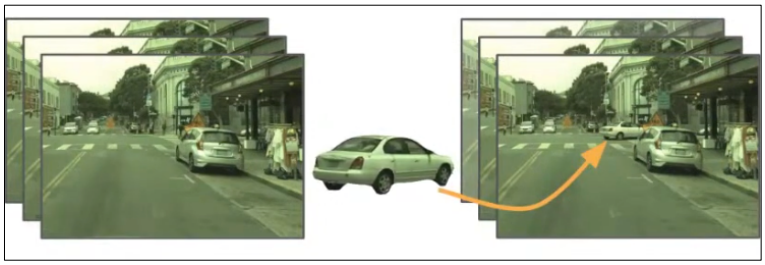

Figure 22: Schematic representation of the GEOsim simulation process. A recorded real-world traffic scene (left side) is augmented with a vehicle from Uber's GEOsim data base creating a new, more complex simulated traffic scenario (right side). Source: Urtasun (2021: n.p.).

In their combination, GEOsim and LIDARsim form the data basis for Uber ATG's virtual traffic scenarios. Simulation, in other words, forms the synthesis of all earlier efforts of data collection. As Urtasun outlines:

> Basically, we can reconstruct the world this way. We have all these different assets and then at generation time you can decide I want to generate the scene at this particular place in the world, with this particular traffic configuration and then we're going to have reactive actors that are intelligent and the AV is going to be placed in that particular scenario. And then we can test particular scenarios that are of interest to us (Urtasun 2020: n.p.).

Given the centrality of data to Uber's business model at large (Attoh et al. 2019; Diab 2019), it is hardly surprising that the company does not disclose much information on how its data collection efforts are being distributed, both quantitatively and qualitatively, across its ATG city hubs of Pittsburgh, San Francisco, Dallas, Washington D.C. and Toronto. While it is clear that the sum total of all of Uber ATG's data is being collected at these five sites, it is not easy to gauge Toronto's importance as a real-life urban data pool relative to the four other cities.

This known unknown notwithstanding, there are a number of indicators that suggest that Toronto's urban everyday life has been turned, over the last couple of years, into a key data collection site for Uber. First, the TorontoCity benchmark is a clear indicator of the centrality of the Ontarian metropolis to Uber ATG's data collection efforts at large. None of the other four urban ATG hubs have seen a comparably granular effort of close-up data collection (Wang et al. 2017). Furthermore, Uber's testing activities in Ontario have neither caused noteworthy political debate nor activist resistance. This stands in contrast to legal quarrels Uber had with the State of California over its early AV testing programme, leading to the reshipping of Uber's then existing AV fleet to the state of Arizona in 2016 (Rosenblat 2018: 173-174). Thirdly, the Province of Ontario – and with it the City of Toronto – have remained, to this day, a juridical terra nullius in terms of

policies governing the collection, storing and further processing of data through big tech companies. While data collection through AVs has been legal in Ontario since the introduction of the province's AV testing framework in 2016 (Ontario 2016), and while the City of Toronto (2019a) has prepared an elaborate Automated Vehicle Tactical Plan, the implementation of substantive data policies and standards is still under process (Bennett Jones 2021; Ontario 2021). Clearly, the time lag between the practical start of data collection and the sanctioning of potentially more restrictive legal guidelines opens up the province as a vast data collection playing field ready to be harvested by big tech (Schindler/Marvin 2018).

It is within the context of this legal void that the above explorations can shed some much-needed light on Uber's manifold data collection efforts and the deeply asymmetric power relations underlying them (Thatcher et al. 2016). Uber's elaborate procedures of data capture – from the multi-sensory creation of the static TorontoCity benchmark to the LIDAR and video-based reconstruction of gigantic inventories of dynamic vehicle and pedestrian digital 'assets' – clearly transgress the more narrowly defined boundaries of data extraction (Sadowski 2019). As argued, the data collection procedures pursued at Uber ATG's five urban nodes can be seen as instances of digital landscape production (Alvarez León 2016). The latter aims at and profits from the data of completely uninvolved individuals and collectives, broadening the socio-spatial scope of data collection from the formal consensus effected through EULAs to the rhythms of urban everyday life as such (Dean 2016). To return to the example of the LIDARsim-based capture of a passer-by above: Most likely unbeknownst to this person, their body is now part of Uber's digital data base and, as such, has been transformed into a potential source of future corporate revenues. These revenues could be realised once Uber's algorithms have been trained on a sufficiently broad and diverse set of data as to allow the deployment of AVs – and thereby a drastic reduction in labour costs for Uber.

4 – Conclusion: Towards Data Struggles

This chapter examined Uber's AV efforts through the lens of Uber ATG in Toronto. It provided a first-hand account of how processes of ML-based automation are crisscrossed and mediated by complex processes of data collection. In the case of Uber's AV programme, the necessary data is collected, first, on the data collection base layer of Uber's general ridehail network via the modality of data extraction (Sadowski 2019) and,

secondly, on the top layer of Uber ATG's more exclusive urban network comprising the cities of San Francisco, Dallas, Washington D.C. and Toronto. At this level, processes of digital landscape production (Alvarez León 2016) allow Uber to create the virtual traffic scenarios needed for the training of Uber's self-driving software. It is one of the findings of this chapter that Uber's AV efforts are not isolated from its ridehail core business. On the contrary, Uber's ridehail core business creates the data-extractive basis for Uber ATG's elaborate procedures of digital landscape production. Seen through the prism of the two processes of data extraction and digital landscape production, the automation of Uber's ridehail system emerges as a process that is much more complex, nuanced and politically vulnerable than present debates about automation – even critical ones – would sometimes suggest.

By and large, these debates, as Nick Dyer-Witheford, Atle Mikkola Kjøsen and James Steinhoff (2019: 4-8) have recently suggested, have produced two broadly conceived, ideal-type theoretical positions. First, there is the 'minimalist position' (Dyer-Witheford et al. 2019: 4-6). The latter is marked by the – more or less drastic – downplaying of current technological advancements as, to put it somewhat exaggeratedly, a hugely inflated tech-boosterist discourse driven by the corporate interests of Silicon Valley tech capitalists and their political advocates. "The left 'minimalist' position," as Dyer-Witheford et al. put it, "dismisses current discourses on AI as hype and hucksterism" (2019: 4). At the risk of papering over some of the important differences *within* the minimalist position and, as a consequence, missing some of the very productive insights of these authors, Dyer-Witheford et al. warn that "writing it all off as bluff and hype, may be reassuring, but it is unwise, sentimental and dangerously complacent" (2019: 5; similarly, Wark 2019). While arguments put forth within the minimalist position do in fact vary widely (Huws 2014; 2019; Moody 2018; Smith 2020; Taylor 2018), and while scholars writing from this broadly defined angle most rightly point to important social, legal, political and economic *continuities* or recurring *cycles* underlying the current surge in new technologies (Benanav 2019a; 2019b), the overall theoretical and political thrust, I would agree with Dyer-Witheford et al., is one of deep seated 'technological scepticism'.

At the other end of the spectrum stands the 'maximalist position' (Dyer-Witheford et al. 2019: 6-8). Epitomised most prominently by Nick Srnicek and Alex Williams's widely circulated book *Inventing the Future* (2016; similarly, Bastani 2019; Hester 2018; Laboria Cuboniks 2018), the maximalist position, often with recourse to Marx's (1973: 690-712) machine fragment in the *Grundrisse*, embraces current technological developments as a sine-qua-non precondition for a future beyond (wage) work, paving

the way to a more socially just and potentially even post-capitalist society (Mason 2015). Consequently, Srnicek and Williams write that "the tendencies towards automation and the replacement of human labour should be enthusiastically accelerated and targeted as a political project of the left" (2016: 109). While often critiqued for its overtly optimistic view on technological advancements on the one hand and potential future processes of automation on the other (Galloway 2017; Smith 2017a; 2017b; Wark 2013), the maximalist position, if in a somewhat over-passionate way, rightly points to the unexplored potentials – still to be tried and tested – of the recent boost in technology to serve manifold emancipatory goals. Such emancipatory technological potentials, widely unexplored as they remain to this day (yet see, Buckermann et al. 2017; Butollo/Nuss 2019; Daum/Nuss 2021), have also given rise, if from perhaps more sober theoretical standpoints, to what has come to be known as the 'reconfiguration debate' (Dyer-Witheford et al. 2019: 147-149): an intellectual exploration, grounded in radical social theory, of the emancipatory potentials, yet also limitations of current technological shifts in and beyond the related fields of logistics, AI and automation (Bernes 2013; Jameson 2009: Ch. 16; Toscano 2011; 2014). I will return to the idea of a potential reconfiguration of Uber in Chapter VII.

While diametrically opposed in their respective evaluations of the feasibility of full-scale or partial automation, the minimalist and maximalist positions share some important theoretical common ground. For both positions, if for different reasons, largely eschew a deeper engagement with the actual technological changes underlying current versions of a widespread 'automation discourse' (Benanav 2019: 6-16) or even 'automation fever' (Bassett et al. 2020: 43-46). Both the minimalist and the maximalist position, that is, are marked by a more or less pronounced disinterest in more detailed – and most of all: empirically grounded – investigations into the technological workings that underlie current capitalist efforts at automation in various 'productive' and 'reproductive' sectors. To adopt McKenzie Wark's Marxian vocabulary, neither the minimalist nor the maximalist position confront the crucial question – recurring with increased acuteness in the age of AI, algorithms and automation – of "how the *forces of production* actually work" (2019: 19). Chastising "genteel forms of Western Marxist thinking" (2019: 19) for their inability to grapple with this question, an answer to it requires, as Wark continues, "some actual technical knowledge and experience, or at least a willingness to concede that others may know about such things and to learn from them" (2019: 19). In light of recent breakthroughs in the fields of AI and machine learning, then, it is simply not enough to *either* reduce these technological advancements to mere corporate boosterism *or*, on the other hand, embrace them as steady pathways to a 'fully automated luxury

communism' (Bastani 2019). Rather, confronting the current conjuncture, as Dyer-Witheford et al. put it, "demands understanding AI and its automating capacities" (2019: 6; similarly, Upchurch 2018).[68]

This chapter underlines Dyer-Witheford et al.'s (2019) and Wark's (2019) respective calls for a closer engagement with the functional principles of state-of-the-art AI and its gradual integration into urban everyday life. Based on this insight, and loosely following Dyer-Witheford et al.'s (2019: 101-108) formulation of a heptagon of AI-related struggles, I would like to use the remainder of this conclusion to present and briefly think through the wide-ranging political arena of 'data struggles'. Understood, in their broadest sense, as contestations to the unhindered access of Uber and other tech giants to data, data struggles are one element, of growing overall importance, within a larger multiplicity of anti-Uber struggles (on further such struggles, see Chapter VII). At the forefront of the latter are the already more visible forms of labour struggles, protests and campaigns led by Uber drivers and unions in various cities worldwide (Woodcock/Graham 2020). Most prominently, these struggles have orbited around questions of employee rights[69] for Uber drivers as well as frustrations stemming from the sheer obliqueness of Uber's algorithmic management approach (e.g. Calo/Rosenblat 2017; Huws 2016; Lee et al. 2015; Rosenblat/Stark 2016; Wu et al. 2019).

As important as these struggles doubtlessly are, they run the risk of falling short of their full potential if the deeply conflictual issues around Uber's data mining practices remain beyond their purview (Attoh et al. 2019). A more systematic understanding of data struggles is paramount, therefore, to more fully integrate the latter with already existing campaigns. As I would like to suggest, then, there are four specific standpoints – all with their specific tactical (dis-)advantages, varying socio-spatial scopes and potential political pitfalls – from which different data struggles can be waged against Uber. Data struggles

[68] Unmistakably, Wark's (2019) and Dyer-Witheford et al.'s (2019) prompts to take seriously the functional principles of state-of-the-art AI and ML technologies echo earlier axiomatic calls, ringing out already throughout the 1970s and 1980s, for closer empirical engagement with the construction of scientific knowledge and the formation of new technologies from the then newly consolidating research fields of science and technology studies (STS), the social construction of technology (SCOT) and related areas of the sociology of science (Bauer et al. 2017; Bijker et al. 2012). From the very beginning, the formation of these research fields was linked to the ambition to not only explore the socio-economic *context* within which the formation of new scientific knowledge and technologies might take place, but also the actual *substance* of such processes on an empirical level: "Studies in this area," as Wiebe E. Bijker and Trevor Pinch paradigmatically put it, "take the actual content of scientific ideas, theories, and experiments as the subject of analysis" (2012: 12).

[69] With regard to employee rights and the key question of whether Uber drivers should be classified as independent contractors or, as driver organisations worldwide have argued, as full employees, the preeminent case, at least in the North American context, is that of Proposition 22 in California. Having spent more than US $200 million in a campaign against the proposed law (which would have granted employee status to drivers), Uber and Lyft settled the cause to the effect that drivers remain independent contractors (Paul 2020).

can be waged (i) from the standpoint of data extraction; (ii) from the standpoint of consumer intervention and passenger defection; (iii) from the standpoint of digital landscape production and state regulation; and, finally, (iv) from the standpoint of data labour.

First, and as discussed above, data extraction marks a key strategic site of current and future data struggles. Based on formal user consent and funnelled through the obligatory passage point of EULAs (Thatcher et al. 2016: 996), data extraction in the case of Uber concerns both passengers and drivers. Neither the former nor the latter receive any monetary compensation for the data they produce before, during or after a ride (Attoh et al. 2019). As argued above, this extracted passenger and driver data is a most valuable resource for Uber not only in terms of the effective algorithmic management of its drivers (Rosenblat/Stark 2016), but also vis-à-vis its self-driving car programme. Extracted data, in short, helps Uber to identify its most valuable local markets and, within these, the most attractive routes offering themselves for the selective deployment of AVs (Attoh et al. 2019: 1008; Uber ATG 2018). Despite the centrality of data extraction to Uber's business model, struggles around these issues have only gradually and occasionally been taken up. A noteworthy exception is the legal bid of the UK-based App Drivers and Couriers Union (ADCU) demanding insight into the personal data sets Uber collects of every driver and which may contain data tags such as 'inappropriate behaviour' or 'late arrivals' that may influence Uber's dispatch system and the rides it allocates to these drivers (ADCU 2020). In essence, drivers of the ADCU demanded "to see the huge amounts of data the ride-sharing company collects on them and how this is used to exert management control" (Booth 2020: n.p.). While only partly successful (Klovig Skelton 2021), the ADCU case has set an important legal landmark in terms of further steps towards user data autonomy.[70]

Secondly, early cases of platform defection point to data struggles emanating from the specific position of the passenger user (Dyer-Witheford et al. 2019: 105). While driver data may be even more specific to Uber's aims, also passenger-users leave valuable data traces on Uber's platform, including personal information (age, gender, nationality, etc.), favourite destinations and travel times. Hence, the departure of parts of Uber's local consumer base in a specific market can have a serious impact on the company's data mining efforts. Consider, for instance, what happened in New York City on 27 January 2017, shortly after newly elected US President Donald Trump implemented the so-called

[70] To my knowledge, there hasn't been a similar legal action that demands insights into Uber's data sets collected from passengers.

'Muslim travel ban'. As a direct reaction and a gesture of protest and solidarity, the NYTWA – a great part of whose members are Muslim (Mathew 2008) – initiated a spontaneous taxi strike at John F. Kennedy Airport. When Uber, in turn, disenabled surge pricing around JFK as a direct reaction to the strike, commentators on Twitter interpreted the company's step as a ruthless way to increase profits during a night when taxi competition was out of the way (Isaac 2019: 207-210). It was during this night that the hashtag *#deleteUber* was born. While it remains unclear how many users actually deleted their accounts (it turned out during the Twitter campaign that deleting one's Uber account was (un)surprisingly difficult), the #deleteUber hashtag set into motion a dynamic previously unknown to the Silicon Valley startup: Users were not flocking towards but actively vacating its platform. Apart from the reputational damages, it is hard to gauge the effects of platform defection. Still, such actions – especially when practised in solidarity with (striking or otherwise disobedient) drivers – need to be taken seriously as an important way of stopping or at least slowing down the flow of data on Uber's platform.

Thirdly, and marking one of the analytical foci of this chapter, processes of digital landscape production used for the creation of Uber's virtual AV training scenarios open up an even broader vista of potential data struggles. As argued with recourse to Alvarez León's (2016) account of Google Street View, digital landscape production goes far beyond the narrower arena of (passenger and driver-user) data extraction. It involves, potentially at least, the entirety of interactions of urban everyday life, as the latter is increasingly being 'colonised' by a sensorium of data-capturing devices (Dean 2016; Thatcher et al. 2016). It is worthwhile, in this context, to contrast Uber's Toronto-based AV test runs with the Sidewalk Labs Quayside development project that – also based in Toronto – was supposed to turn a plot of industrial wasteland at the shore of Lake Ontario into a hyper-modernised smart city neighbourhood loaded with a dense web of data-capturing sensoria (Valverde/Flynn 2020). While the Quayside project eventually faltered due to substantial political resistance emerging from urban activist groups and involved city officials, Uber's test runs have not incited a similar level of political debate, not to speak of steadfast opposition. Uber's key advantage, besides the certainly more clever (i.e. less pompous) public presentation of its actions, probably consists in the more dispersed character of its data collection programme. While the Sidewalk Labs project soon became a localisable icon of the privacy issues attached to smart city developments, Uber's more disseminated data mining programme has never produced the same symbolic or actual visibility.

Both projects, meanwhile, point to the heightened importance of state regulatory frameworks that could more closely regulate increasingly ubiquitous forms of data collection (Schindler/Marvin 2018). Without doubt, more restrictive data and privacy legislation at various state scales have the potential to substantially curtail and complicate the data collection efforts of big-tech capital. While, for instance, the European Union's General Data Protection Regulation (EUGDPR) has set comparatively narrow boundaries around data privacy issues in its member states, both the United States and China have tended towards laxer legislation (Dyer-Witheford et al. 2019: 104-105). Canada, for the time being, continues to occupy a sort of middle ground. With substantial legislation still underway, ongoing negotiations about national and provincial data protection laws mark a key strategic site of political and activist intervention (Bennett Jones 2021; Ontario 2021). Such realpolitik interventions might open up further discursive space for even more radical political measures such as the commoning of corporate data sets (De Angelis 2017). The "socialization of the data banks" (Morozov 2015: n.p.), as Dyer-Witheford et al. elaborate, would "extend beyond the regulation or breakup of oligopolies to the establishment of 'commons' institutions separate from both state and market" (2019: 108). Notably, a commoning of the data sets would not simply denounce the collection of data as such (some of which is undoubtedly very useful), but could – accompanied by a necessary (radical) democratisation of its governance structures and a critical evaluation of sensible and less sensible data gathering practices –open up productive avenues for the reconfiguration of big data's uses towards more emancipatory and perhaps even radically socialist agendas (Jameson 2009: Ch. 16; Morozov 2015; 2019; Phillips/Rozworski 2019).

The substantial degrees of human labour involved in current processes of AI automation allow for a fourth important intervention point for data struggles. Despite industry-wide efforts to reduce the organic composition of AI work, data collection, processing and labelling are tasks that still require substantial degrees of human intervention, opening up new global divisions of labour (Altenried 2022; Dyer-Witheford 2015: 67-80). On the one hand, there are those highly skilled tech workers whose expertise is strongly sought after by global tech companies. On the other hand, and opening up a research field of its very own, there are the myriad of lowly paid crowdworkers who are needed to annotate Uber's mapping data such that it can be used for ML training (Schmidt 2019). It is not without significance in this context that parts of AI tech workers, despite their relatively privileged positions, have started to question the societal role of their big-tech employers. At the same time, tech-oriented labour unions have started to emerge with the aim to convert growing frustration among tech workers around issues such as excessive hours,

sexism[71] and other forms of discrimination into more steady forms of workplace organisation (Asher-Schapiro 2019). Notably, such efforts include attempts to build bridges of 'in-house' labour solidarity between tech and gig workers by starting, in the words of the Silicon Valley-based Tech Workers Coalition, to "think seriously about the potential to build a class alliance between the workers that build platforms and the workers that use – or are used by – platforms" (Tech Workers Coalition 2018: n.p.).

In the case of Uber, practices of solidarity between the company's comparatively privileged tech workers and its low-wage, often racialised drivers would allow for new ways to politicise issues of (uncompensated) data extraction, with engineers having access to exactly those data that Uber drivers have started to demand insight into.[72] Similarly, and in line with rising tech-worker concerns about the ethical conduct of their big-tech employees in terms of military contracting and population-wide surveillance (Dyer-Witheford et al. 2019: 103), it may not be too far fetched to assume that ongoing practices of digital landscape production – including Uber's LIDARsim and GEOsim technologies – may strike at least some Uber engineers as problematically violating the privacy rights of individuals or even entire urban populations.

Taken together, data struggles waged from the combined standpoints of data extraction, passenger defection, digital landscape production and state regulation as well as data labour open up a broad spectrum of perspectives from which the asymmetric power relations underlying practices of data collection can not only be made more visible, but can even be turned into the explicit target of political and activist counter campaigns.

[71] The engineer Susan Fowler took on a pioneering role in this regard when she made visible and stood up to the pervasive workplace sexism and 'bro culture' at her former employee Uber. Sexually harassed by her manager, Fowler reported the incidence to the HR division only to be sent away and not being taken seriously. Fowler (2017) made public a full personal report of the incidence and the reasons why she left Uber (see also, Isaac 2019: Ch. 22).

[72] First signs of a possible alliance between Uber's engineers and drivers became visible during the heated Proposition 22 campaign that Uber launched as an effort to quench driver demands to be classified as employees. During Uber and Lyft's US $200 million campaign, two of its engineers – Eddy Hernandez and, somewhat later, Kurt Nelson – publically spoke out in support of drivers and against Uber's labour management practices (Hernandez, E. 2020; Nelson 2020).

Chapter VII

Reconfiguring Uber
Conclusion

This thesis has shown how Uberisation reformats urbanisation and vice versa. After a presentation of and reflection on my research process and used methods in Chapter II, Chapter III laid out the theoretical groundwork for the rest of this work. In particular, it developed the central concept of the Uberisation of the urban. The Uberisation of the urban – or, in short: Uberisation – was theorised as a process in which the forces of Uberisation – composed of the three vectors of *data extraction*, *labour exploitation* and *platform expansion* – come into contact with the urban conditions of Uberisation: those existing social and physical geographies that companies like Uber necessarily need to confront, in order to create legal, social and physical conditions largely conducive of their operations (Mezzadra/Neilson 2019: 2-3). In other words, I conceptualised Uberisation not as a process taking place in a material and social void, but one that unfolds in, with and against the dense social and material thickness of an urban environment that, especially in a North American context, has been deeply affected by the twin dynamics of inward-oriented austerity urbanism (Peck 2012) on the one hand and the extrospective policy boosterism of a quickly proliferating smart urbanism on the other (Marvin et al. 2016).

Secondly, by way of three case studies of Uberisation in Toronto and the GTHA, this thesis brought to light three neuralgic points – or, perhaps better: *layers* – of intervention particularly vital to the Uberisation of the urban: the regulatory layer (Chapter IV), the infrastructural layer (Chapter V) as well as a newly emerging, rapidly expanding data layer (Chapter VI).

As Chapter IV showed, the regulatory frameworks of local taxi industries serve as the initial entry point of Uberisation. This early contact between Uberisation and urbanisation unfolds, as I argued, along processes of regulated deregulation (Aalbers 2016) that entail both the deregulation of existing taxi markets and the creation of new ridehail markets shaped – to locally variegated degrees – by the regulatory requirements of the Uber platform. While often referred to in prominent media discourses as tech-driven 'disruption' (Lepore 2014), and while usually criticised by scholars first and foremost for its *de*-regulatory impetus (Rosenblat 2018: 171-177; Valverde 2018), this early phase of Uberisation also possesses an equally important 'creative' side. In other words: the re-regulation of local taxi industries entails both the roll-back of existing neoliberal policy frameworks and the roll-out of new ones (Peck/Tickell 2002). It is by way of regulated deregulation, in short, that Uberisation works its way through bits and pieces of the regulatory layer of the urban. In Toronto, such processes of regulated deregulation were driven by the three socio-spatial dynamics of (i) an existing neoliberal 'common sense' of urban politics in particular at the provincial state scale; (ii) the prolonged and unresolved crisis of Toronto's taxi industry; and (iii) a newly consolidating consensus of local political and economic elites in the GTHA to establish Toronto as a globally visible 'smart city'. Taken together, these three dynamics allowed Uber to lobby for a local regulatory framework in Toronto outstandingly conducive of its business model.

With regard to the infrastructural layer, and as shown in Chapter V, the gradual establishment of public-private ridehail partnerships (PPRPs) plays a crucial role for the further expansion of Uberisation. In this chapter, I argued that the current trend towards PPRPs is driven by the two central tendencies of a *winner-takes-it-all dynamic* on the one hand and a *short-term-benefits-over-long-term-use dynamic* on the other. From the perspective of ridehail companies, PPRPs, by harnessing state-sanctioned monopoly rights around suburban transit stations and other hub spaces such as shopping malls or universities, provide a viable tool to generate network effects in dispersed suburban territories that would usually defy a business model dependent on an overflow of spatially concentrated movements and mobilities (Woodcock/Graham 2020: 45). Vice versa, from

the perspective of local and regional state authorities, PPRPs have offered themselves as (i) infrastructural fixes, (ii) fiscal fixes or (iii) 'smart' speculative fixes. PPRPs, while also existent in inner-city cores, function as a viable political tool for Uber and Lyft to expand the spatial boundaries of early Uberisation beyond the narrower limits of inner-city urban cores, pushing their mobility services further into the less densely populated, yet often explosively growing, areas of the (post-)suburban, in-between and exurban parts of the city (Keil 2018; Phelps/Wu 2011; Young et al. 2011). What we could call a second 'stage' of Uberisation is closely bound up, then, with a strategic operational shift towards an infrastructural urban layer that – via PPRPs and the opening up of (sub-)urban hinterlands – allows for a horizontal spatial expansion of the Uber phenomenon.

Finally, there is the newly emerging data layer of the urban process. Partly in contrast to Uberisation's regulatory and infrastructural urban touch points, which have existed long before Uber and Lyft, the data layer of the smart city is being brought into existence by Uberisation (and other platform-driven business models) itself. As Chapter VI explored, Uberisation adds to the fabrication of a newly emerging urban data layer via two modalities of data collection: data extraction (Sadowski 2019) and digital landscape production (Alvarez León 2016). Operating on the level of Uber's ridehail core business, Uber harnesses data extraction for creating individual (driver and passenger) user profiles. These individual profile data feed into aggregate insights about the overall profitability and many more key metrics of any of Uber's ridehail markets (Attoh et al. 2019). This *base level* of Uberised data production serves as the foundation of a more exclusive data *top level* that entails those city regions – Dallas, Pittsburgh, San Francisco, Toronto and Washington D.C. – that have hosted Uber ATG's self-driving car programme. At this level, processes of digital landscape production (Alvarez León 2016) – the detailed mapping and digital remodelling of entire cityscapes – help to create those virtual traffic scenarios needed for the training of Uber's self-driving software. Seen through the prism of data extraction and digital landscape production, the automation of Uber's ridehail system emerges as a complex, gradual and politically contested process of data production that defies any simplistic notion of soon-to-be-accomplished, full automation.

Taken together, the three case studies of this thesis suggest that Uberisation will continue to have immense effects on urban regions both in any beyond North America (Kitchin 2015; Shelton et al. 2015). If we take the three main vectors of Uberisation – data extraction, labour exploitation, platform expansion – as rough guidelines, a number of important observations can be made about the likely future trajectories of cities under

Uberisation. First, from the viewpoint of the vector of *data extraction*[73], the private appropriation of ever more data by Uber and Lyft creates growing power imbalances between these profit-seeking private companies and those public institutions – local or regional transit agencies, regulators or whole cities – that often can only dream of the detailed understandings that the data analytics of Uber and Lyft yield, be it in terms of traffic patterns or even more complex rhythms of urban everyday life (Attoh et al. 2019). Gaining at least partial access to ridehail companies' data analytics, therefore, is likely to function as a strong incentive for local officials to enter into various forms of partnerships with these enterprises; partnerships that, most likely, will introduce a growing degree of platformised market logics into the realm of public transportation (Van Dijck et al. 2018: Ch. 4).

Secondly, from the vantage of *labour exploitation*, Uberisation promises to both entrench existing as well as introduce new racialised and gendered divisions of labour across various geographic scales (Dyer-Witheford 2015: 78-80; Huws 2019; McNeill 2016). Locally, and especially in cities such as San Francisco or Toronto where Uber employs comparatively large numbers of engineers, AI experts and other technical staff, Uberisation threatens to establish growing polarisations between this high-salary tech staff on the one hand and tens of thousands of precariously (self-)employed local Uber drivers on the other, the latter often (yet certainly not always) racialised men (Hua/Ray 2018). Globally, in turn, the relatively privileged stance of Uber's tech workers further stands in contrast to those largely invisible armadas of clickworkers and crowdworkers – often located in poor countries of the Global South – whose work is needed, for instance, for the manual annotation of Uber ATG's collected mapping data such that it can be used for the training of self-driving ML algorithms (Altenried 2022: 99-100; Schmidt 2019). Seen from this angle, Chapters IV and VI of this thesis stand in complementary relationship to each other. While the former drew attention to the working conditions of Uber drivers and the regulatory frameworks that govern their daily life, the latter provided a glimpse of Uber's more privileged workforce of AI engineers.

Finally, from the perspective of *platform expansion*, new dynamics of uneven development and splintering infrastructure provision are likely to occur (Graham/Marvin 2001). As Chapter V showed in the context of PPRPs in sub- and exurban areas, the inherent striving of mobility platforms towards network effects is likely to drive, first, a

[73] I'm here referring to what, in Chapter III, I developed as one of three specific vectors of Uberisation, namely the vector of data extraction. This *vector* of data extraction must be distinguished from Sadowski's *concept* of data extraction, which I mainly used in this thesis in Chapters III and VI.

winner-takes-it-all dynamic in which already privileged (sub-)urban areas gain even more infrastructural investment, while underserved, less privileged parts of the urban fabric tend to be neglected. Secondly, and as argued with regard to the 'Innisfil Transit' example, the platformised mobility services of Uber further drive a dynamic of *short-term-benefits-over-long-term-use* that risks to privilege immediate fiscal benefits and smart-city image creation over more long-range infrastructural planning ideals (McCann 2013; Wiig 2015b). In sum, the increasing platformisation of urban mobility through companies like Uber and Lyft and the emerging trends toward PPRPs largely fall in line with, and even risk to intensify, those broader trends already identified by Graham and Marvin (2001) two decades ago: a splintering – now 'smartified' – urbanism that creates new dynamics of urban unevenness and spatialised social polarisation in the infrastructural reality of the coming smart city.

Against the backdrop of these expectable effects of continued Uberisation, this conclusion will turn its attention to those experiments and emerging grassroots attempts that aim to reign in on Uberisation in its currently existing form, exploring more emancipatory avenues of platformised mobility. I proceed as follows: First, I will explore the broad outlines of currently unfolding contestations of Uber. I propose a dual understanding of such anti-Uber struggles along, on the one hand, a medium-term horizon concerned with what in Chapter III I called the *forces of Uberisation* and, on the other hand, a more long-term horizon concerned with the *urban conditions of Uberisation*. Next, and taking these considerations to a somewhat more speculative terrain, I will situate ongoing processes of Uberisation within the horizons of what has come to be known as the reconfiguration debate (Bernes 2013; Toscano 2011; 2014). Here, early Situationist musings on the taxi as a vehicle of anti-instrumentalist dérive provide me with an opportunity to think through the proto-communist potentials of the Uber phenomenon. A final section, meanwhile, will shed light on some of the gaps, blind spots and shortcomings of this thesis. Even more, it will identify a number of important research tasks for forthcoming studies grappling with the Uber phenomenon.

1 – Contesting Uber

The sometimes devastating socio-political effects of Uberisation have not remained unchallenged. This section approaches ongoing contestations of Uberisation from the two standpoints identified in Chapter III: the *forces of Uberisation* with their three main

vectors of data extraction, labour exploitation and platform expansion on the one hand and the *urban conditions of Uberisation* on the other. While ongoing challenges to the forces of Uberisation open up a short to medium-term horizon of anti-Uber contestations, a reshaping of the urban conditions of Uberisation demands a more long-term engagement with the basic parameters of urban politics and development. Together, anti-Uber struggles within both of these temporal horizons have the potential to both enable and hinder, speed up or slow down, further processes of Uberisation.

Horizons of Contestation I: The Forces of Uberisation

Contesting Uber and other big-tech corporate platforms is not exactly a new issue.[74] It has been posed, with due political urgency, by scholars, hackers, state officials, activists and other stakeholders assembling around the issue of platform cooperativism and similar grassroots initiatives (Morozov/Bria 2018; Muldoon 2022; Piétron et al. 2021; Scholz/Schneider 2016). The driving vision of platform cooperativism, as Trebor Scholz outlines it, challenges the dominant business models of platform giants such as Uber, Airbnb or Amazon: "[J]ust for one moment imagine," Scholz writes, "that the algorithmic heart of any of these citadels of anti-unionism could be cloned and brought back to life under a different ownership model, with fair working conditions, as a humane alternative to the free market model" (Scholz 2014: n.p.). "Worker-owned cooperatives," Scholz continues,

> can offer an alternative model of social organization to address financial instability. They will need to be
> - collectively owned,
> - democratically controlled businesses,
> - with a mission to anchor jobs,
> - offer health insurance and pension funds and,
> - a degree of dignity (2014: n.p.).

Similarly, Woodcock and Graham (2020: 112-145) recently formulated the four key principles of (i) increased platform *transparency*, (ii) heightened *accountability* of platform providers, (iii) the building of *worker power* and (iv) the *democratic ownership* of platforms as essential conditions for any current or future attempt to make the existing gig economy more socially just.[75]

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[74] I would like to thank Nina Scholz for contributing some very helpful advice and literature for this section.
[75] See also the draft convention on platform work in the same book (Woodcock/Graham 2020: 146-151).

With regard to Uberisation, RideAustin offers an illuminating example. Operating as a non-profit mobility platform that operated in Austin, Texas between May 2016 and June 2020, RideAustin is indicative of both the dormant potentials as well as the subsisting difficulties of establishing local, yet potentially scalable, alternatives to the profit-driven offers of Uber and Lyft (Piétron et al. 2021: 68). When in May 2016 the City of Austin passed local ridehail regulations that prescribed mandatory fingerprints for all drivers, Uber and Lyft – both heavily opposing the law – shut down their local operations and, in parallel, started to lobby the government of Texas for state-wide regulations that would overrule Austin's local framework (Rosenblat 2018: 175-177). The exodus of Uber and Lyft opened a window of opportunity for alternative platform models, including RideAustin. Operating on the basis of core values such as fair wages and decent labour conditions for drivers as well as affordable prices for passengers, RideAustin – contrary to Uber and Lyft and their usual 25 per cent commission deducted from every ride – took "no money on the fares of its standard rides, [instead] earning money to maintain its operations from donations, a $2 booking fee, and a $1 processing fee" (Luckerson 2017: n.p.; Piétron et al. 2021: 68). While not a platform cooperative in the real sense of the word (key operative decisions were still in the hands of a small managerial elite and not under the control of drivers or passengers), RideAustin offered a local ridehail alternative that partly broke with the profit motive and nevertheless, or perhaps exactly for this reason, could draw a sufficiently large user base to its platform (Hernandez, N. 2020).

Despite its early successes, the RideAustin experiment abruptly ended in 2020. It was stopped short by two momentous events that, at least in their combination, were too heavy a burden for the still fragile structure of the local non-profit. First, Uber and Lyft succeeded in pushing for a state-wide law that overruled Austin's local regulations and, with it, the fingerprint and background check requirement that drove them out in the first place. Roughly one year after their exit, Uber and Lyft successfully re-entered Austin and, accompanied by large PR campaigns and financial bonuses for passengers and drivers, were able to win back great parts of the market almost instantly (Borkholder et al. 2018: 17; Tryba 2017).[76] Secondly, and as witnessed in municipalities around the globe, the Covid-19 pandemic drastically reduced demand for ridehail services. This was an additional burden for RideAustin, and it was severe revenue losses after the outbreak of the pandemic that brought RideAustin to a final halt in June 2020.[77]

[76] For a more extensive discussion, see the account of RideAustin CEO and co-founder Andy Tryba (2017).

[77] Interestingly, the Canadian ridehail coop Eva – currently operating in the cities of Calgary, Montreal, Québec and Saguenay – used the pandemic as an opportunity to partly shift its 'business' model towards food and grocery delivery, a gig work sector that clearly profited from prolonged lockdowns and hours of home office (Eva 2021).

Two crucial lessons can be learnt from the RideAustin experiment. On the one hand, it sheds light on the fact that state regulation – across various scales – remains a central arena of contestation with regard to mobility platforms. As Chapter III argued in theoretical terms and as Chapter IV explored in more concrete ways, state regulation, while beyond direct corporate control, is more than a passive 'background condition' of the Uber business model; it is part and parcel of the Uber platform's innermost logic and needs to be seen as fully integral to its functioning. This doesn't mean, vice versa, that state power cannot be used *against* Uber. On the contrary, as the RideAustin example demonstrates, regulations oriented towards the public good are of fundamental importance for creating conditions within which alternative ridehail models have a chance to compete with their big-tech 'equivalents'. These, in short, are some of the potentials that the RideAustin case points to. On the other hand, RideAustin is also indicative of one of the key difficulties that continues to confront any attempt to establish ridehail cooperativism in the long(er) term: the limited capital funds of such projects. Contrary to its Silicon Valley corporate competitors, RideAustin could not rely on sufficient capital reserves to weather out the storm of the pandemic and its prolonged economic turbulences. The observation may not be new, but cooperatives such as RideAustin "do not effortlessly escape the dictates of capitalism" (Taylor 2016: 234). One way forward through this long existing problem, as Astra Taylor further suggests, could be hybrid models that forge strategic alliances between state-owned platforms on the one hand and worker-owned coops on the other. Without doubt, a state-owned platform is far better prepared to financially withstand periods of short-term and long-term economic crisis. On the other hand, commons-based solutions such as the Canadian Uber alternative 'Eva' – currently operating in the cities of Calgary, Montreal and Québec – hold greater potentials for direct democratic control over the platform (Eva 2021).

If one can understand, as Woodcock and Graham have suggested, the currently existing gig economy as a "capitalist laboratory through which new techniques of management, control, worker exploitation and the extraction of profit are tested and refined" (2020: 40), then equally concrete counter-experiments with *combinations* of both centralised public mobility platforms and decentralised cooperatives need to be high on the agenda for any political movement aiming to challenge Uber's current hegemonic position (Piétron et al. 2021; Taylor 2016: 235). Such real-world experiments aiming to 'occupy the platform' (Sweeney/Treat 2020: 229) can be seen as mainly operating within the short to medium-term time horizon of a potential contestation of Uber.

There is, however, a more long-term time horizon that the question of contesting Uber inescapably opens up, too. For Uber, as Chapter V has explored at some length, is more than a seemingly weightless, merely digital platform. From an infrastructural point of view (Plantin et al. 2018), it is clear that Uber's ridehail network continues to depend on the heavy physical infrastructure of an existing system of automobility whose detrimental social and ecologic effects have long been noted (Freund/Martin 1993; Sheller/Urry 2000; Urry 2004). Uberisation can hardly be seen as a full break with this system. Rather, the recent Uberisation of hundreds of cities across North America presents itself as a 21st-century technological fix grafted upon what some have called western capitalism's foremost spatial fix of the postwar decades: the massive suburbanisation of the North American city and its thoroughgoing restructuring along the spatial needs of the private car (Filion 2015; Hall 1988: Ch. 9; Harvey 2006 [1982]; Moos/Walter-Joseph 2017). As it tends to happen with capital's technological fixes (Morozov 2013; Rosner 2004), their results are ambivalent, to say the least. It is fully conceivable, for instance, that there are situations, not least in sub- and exurban zones, where the Uberisation of existing automobility – for example through place-specific and reasonably regulated PPRPs – may well be able to partly alleviate existing trends of excessive congestion and other detrimental effects of automobility. At the same time, empirical studies show that, on a city-wide scale, Uberisation tends to increase congestion rather than diminishing it (Balding et al. 2018; Schaller Consulting 2018).

Serious attempts to contest Uber must aim to transform, therefore, the urban ground of Uberisation itself. For, clearly, the more long-term horizons of a potential contestation of Uber is inextricably linked to some of the most pressing questions of current and future urban development, including the environmental need of a departure from auto-centric dispersed suburbanisation and an ensuing re-orientation towards more concentrated settlement types easier to be served by – various forms of – mass public transit (Filion 2018; Kipfer 2013; Mees 2010). From the viewpoint of an ecologically more sustainable and socially more inclusive urban infrastructure (Kębłowski et al. 2019; Sheller 2018), the guiding political principle of a contestation of Uber-as-infrastructure could be to try to minimise, as far as possible, those situations where Uber, under given circumstances, might indeed possess some reasonable infrastructural use: namely, most of all, in those peripheral, low-density sub- and exurban areas where decades of unhindered sprawl, often driven by state-backed private interests of real-estate industries (Kipfer 2013), have rendered the provision of affordable mass public transit very difficult, if not virtually

impossible (Addie 2016; Filion/Keil 2016). This, then, is a more long-term political project fighting for urban development guided less by privatised (sub-)urban consumption and more by ideals of public democracy, ecologic sustainability and, perhaps most of all, social justice. As Mike Davies captures the inherently *political* character of such a long-term re-orientation of urban development:

> [T]he cornerstone of the low-carbon city, far more than any particular green design or technology, is the priority given to public affluence over private wealth. [...] Most contemporary cities, in rich countries or poor, repress the potential environmental efficiencies inherent in human settlement density. The ecological genius of the city remains a vast, largely hidden power. *But there is no planetary shortage of 'carrying capacity' if we are willing to make democratic public space, rather than modular, private consumption, the engine of sustainable equality* (2010: 43; emphasis added).

Most likely, urban environments created along such – admittedly, rather broadly defined – ideals of increased density and heightened social justice would have far less need for Uberised automobility in the first place. Even more, they would clearly go against the grain of exactly that sweeping double imperative of North American post-recession urban politics that, as shown in Chapter III, helped to create the conditions of possibility for large-scale Uberisation in the first place: introspective austerity urbanism (Peck 2012) on the one hand paired with extrospective smart urbanism on the other (Marvin et al. 2016).

In this context, urban activist groups advocating for a general shift of balance from auto-centric transportation to active transport modes such as walking and cycling play a substantial role in reshaping Uberisation's urban conditions of possibility (Dellheim/Prince 2018; Planka.nu 2016). Proliferating experiments with, and sometimes even the long-term establishment of, fare-free public transit systems are also likely to diminish the need for privatised, profit-oriented urban mobility (Kębłowski 2019). As such, the map below (Figure 23), showing free-transit initiatives across the USA, may well be seen as an apt counter-cartography of the map presented in Chapter V that showcased recent PPRPs across the same geography (see Figure 8 on page 100).

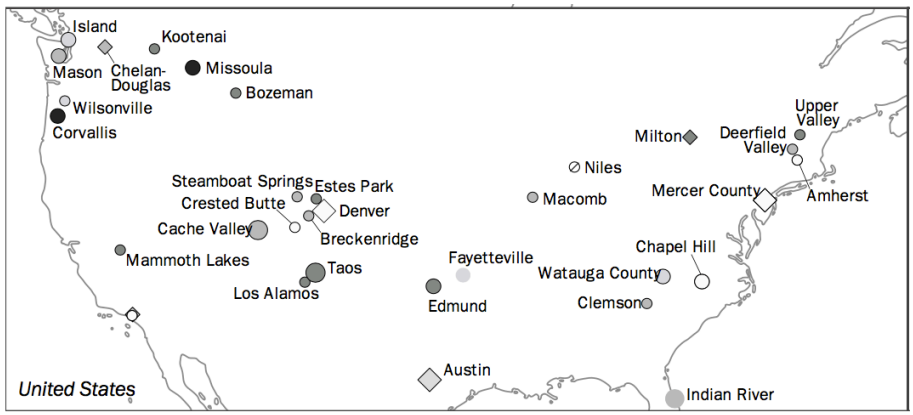

Figure 23: Map showing fare-free public transport initiatives in the United States. Source: Kębłowski (2019: 2818).

In sum, attempts to contest Uber will need to take into account and tackle both the forces of Uberisation and the urban conditions of Uberisation as key constitutive elements of the Uber phenomenon in its 'totality'. Labour struggles aiming at better working conditions, fairer regulation and increased data and platform transparency for drivers open up political leeway beyond the forces of Uberisation's three dominant vectors of data extraction, labour exploitation and platform expansion. Efforts aiming at a contestation of the urban conditions of Uberisation, on the other hand, would need to work against the newly consolidating, post-crisis nexus of inward-oriented austerity politics and outward-oriented smart-city boosterism. The urban entrepreneurialism of the austere smart city is, at least in North America, the default urban condition on which Uber has been able to thrive since its beginnings (Harvey 1989; Sadowski/Bendor 2019; Shelton et al. 2015). As a consequence, as Harvey puts it in some resonance with Davis's above proposition: "Our political task [...] is to imagine and reconstitute a totally different kind of city out of the disgusting mess of a globalizing, urbanizing capital run amok (2012: xv-xvi).

Taking seriously the task of having to actively re-*imagine* futures beyond the urban dictates of capital, the section below will engage in an attempt to think Uber beyond its currently existing, capitalist forms: a thought experiment that – taking up recent discussions about the potential post-capitalist uses of existing capitalist infrastructures (Bernes 2013; Toscano 2011) – aims to shed light on a potential *reconfiguration of Uber*.

2 – Reconfiguring Uber: Dérive by the Mile

The anti-Uber struggles explored above provide a number of anchor points for contesting Uber from *within* the confines of a capitalist system of production and reproduction. Not

seldom, critical reflections on such anti-Uber contestations tend towards narratives in which the benefits of public transport infrastructures are being contrasted with the ills of Uber as a private mobility service (e.g. Leszczynski/Kitchin 2019; Sweeney/Treat 2020). From the standpoint of political mobilisation, such quasi-dichotomous narratives are an obvious choice, as they allow to foreground the – very real – rewards of a publicly run and well-funded transport system. Such rewards include, inter alia, heightened ecological sustainability or, usually, higher labour standards for public transport workers (see my own analysis in Chapter V). Nevertheless, an all too simplistic juxtaposition of Uber (as the villain of future urban mobility), on the one hand, and mass public transport (as its seemingly universal saviour), on the other, may not be our best inspiration for imagining more radical urban futures: futures, that is, beyond the imperatives of capitalist accumulation and the frantic rhythms of everyday urban mobility that they give rise to.

It is at this point that it seems worthwhile to integrate into this concluding discussion what has come to be known as the reconfiguration debate (for an overview, see Dyer-Witheford et al. 2019: 147-149). Informed by radical social theory, the reconfiguration debate has emerged as an intellectual exploration of the emancipatory potentials, yet also grave limitations, of current technological shifts in and beyond the related practical and theoretical fields of global logistics, AI and automation (Bernes 2013; Fields et al. 2020; Jameson 2009: Ch. 16; Toscano 2011; 2014; Phillips/Rozworski 2019). The debate's key question is as simple as it is vexed: is it possible to free (at least parts of) capitalism's existing high-tech infrastructure – the data circuits of variously scaled AI systems, global logistics networks, high-speed railways and other large technological systems – from their current profit-driven fetters and *reconfigure* them towards more socially progressive and perhaps even socialist or communist uses? *In concreto*: "Could the speed, standardization and automation of the container port, or the capacities of Walmart distribution chains, be regarded as possible material bases for alternative, antagonistic organizations of production, circulation and distribution" (Toscano 2014: n.p.)? In parallel, we might ask whether it is possible to imagine an Uber system beyond its currently dominant vectors of extraction, exploitation and expansion – an Uber system, that is, beyond capitalism.

The unlikely source of Situationist musings on the taxi as a vehicle of anti-instrumental dérive provides us with what may not be the worst springboard for such a necessarily speculative endeavour. "One of the basic situationist practices," as Guy Debord wrote in 1956, "is the dérive [literally: 'drifting'] (1956: n.p.). In a dérive, as Debord further explains, "one or more persons during a certain period drop their relations, their work and

leisure activities [...] and let themselves be drawn by the attractions of the terrain and the encounters they find" (1956: n.p.). While thinking dérive, first and foremost, as an 'on foot experience' – a walking of the city along its hidden psychogeographies (Wollen 2001: 125-126) – the Situationists also had a particular interest in and predilection for the taxi as, quite literally, a 'vehicle' of motorised dérive. A section within a 1954 publication of the Situationist International entitled 'Dérive by the Mile' states the point most clearly and, as such, deserves to be quoted at some length:

> In an article published in the August 19 issue of *France-Observateur,* Christian Hébert proposes a radical solution to the problem of parking in Paris: the prohibition of all private vehicles within the city limits and their replacement by a large fleet of moderately-priced taxis.
>
> This proposal has our unqualified support. We all know how important taxis are for the recreational activity we call 'dérive,' from which we expect to draw educationally conclusive results.
>
> Only taxis allow true freedom of movement. By traveling varying distances in a set time, they contribute to automatic disorientation. Since taxis are interchangeable, no connection is established with the 'traveler' and they can be left anywhere and taken at random. A trip with no destination, diverted arbitrarily en route, is only possible with a taxi's essentially random itinerary.
>
> Aside from providing an egalitarian solution to a particularly irritating problem, the measures proposed by Mr. Hébert would have the invaluable advantage of allowing large sectors of the population to break free from the routes imposed by the Metrobus, and enjoy a hitherto rather expensive means of dérive (Situationist International 1954: n.p.).

While the Situationists' idea of the 'taxi dérive' is certainly not identical with the mobility services offered by Uber today (Uber is neither inexpensive nor is it possible to start a trip without a set destination or arbitrarily divert an itinerary during a ride), the above lines provide us with a welcome occasion to rethink the Uber phenomenon from the standpoint of its potential post-capitalist reconfiguration.

Most of all, it is noteworthy how the Situationists characterise the taxi – or, rather: a widely available fleet of taxis partly prefiguring Uber's current ridehail system – as a mode of individual and collective urban mobility transcending the rigid temporalities and predetermined spatialities of public transit. We might even add, if on a multiply more abstract level, that the taxi dérive goes against the grain of capitalist time-space as such (Harvey 2017: 136-143). Upending capital's preference for and dependence on a "universal and fixed temporal and spatial frame" (Harvey 2017: 137) constructed along the affordances of Euclidean geometry and globally coordinated clock-time, the taxi

dérive opens up a different, potentially counter-hegemonic time-space oriented towards anti-instrumentalist ideals such as – to rephrase some of the above Situationist watchwords – 'automatic disorientation', 'arbitrariness' and 'psychogeographical randomness': a "letting go", in short, of "the usual motives for movement and action" (Debord 1956: n.p.).

While bracketing due concerns of, not least, environmental sustainability, the Situationists' idea of the taxi dérive duly reminds us of the possibility of genuinely joyful forms of urban mobility; modes of mobility that, potentially at least, transcend capitalism's relentless daily rhythms of "*métro-boulot-dodo* (commuting, working, sleeping)" (Stanek 2014: xxxix). While required to take most seriously the anti-Uber contestations outlined in this chapter and throughout this thesis, a radical perspective on Uber should at least remain open to the possibility that the 'desire called Uber' – the promise of easily accessible, virtually instant and flexible urban mobility – may not fully be reducible to the ideological phantasmagorias of Silicon Valley tech capitalists. It may also carry within it forebodings of genuine human enjoyment: momentary sparks of *jouissance* (Lefebvre 2014) utterly alien to capital's alienating drive for commodification.

3 – Moving Forward

It goes without saying that such joyful futures are a far cry from the multiple economic, ecological and epidemiological crises that have haunted the planet lately (Malm 2020; Tooze 2021; Toscano 2020). In the firm belief that the possibility of politically and socially more encouraging futures presupposes a diligent *working through* of today's problems – including, among many more, the Uberisation of the urban – I shall address in this last section some of the inescapable limitations of this thesis itself. I will do so by taking stock, on the one hand, of some of the dimensions of Uberisation that I could not address in due depth in this work and by suggesting, on the other hand, a number of pathways for future critical research grappling with the Uber phenomenon.

Known Unknowns: On Some of the Limitations of This Work

There are clear limits to the knowledge claims made in this thesis. In particular, the scope and insights of the above chapters have been constricted by what Tuvikene et al. call the

"limits of the lone researcher" (2017: 279) – to wit: my finite temporal, fiscal and intellectual capacities and my own situatedness in particular academic and everyday geographies and temporalities. In every scholarly work there are, as Cowen (2014: 17) remarks in allusion to Donald Rumsfeld's now notorious dichotomy, those 'known unknowns' that we are more or less conscious of as well as those 'unknown unknowns' – unconscious blind spots of our research – that we haven't even realised yet. As for the latter, I'm sure there could be assembled a full inventory of such blind spots. With regard to the known unknowns of this work, meanwhile, there are three major limitations that I would like to discuss at least briefly.

First, it is paramount to acknowledge the spatial situatedness of my work. The three case studies conducted in Chapters IV, V and VI are all set in Toronto and the surrounding urban region of the GTHA. The Province of Ontario, the state-national setting of Canada and the supra-national environment of the North American continent form the broader geographic context(s) of my study. It is evident that Uberisation, as a worldwide phenomenon (Amorim/Moda 2020; Rekhviashvili/Sgibnev 2018; Wu et al. 2019), clearly transcends the small patch of land that I could cover – in whatever incomplete way – in this work. Any aspiration for comprehensiveness, therefore, is surely beyond the ambition of *Uberising the Urban*. Similarly, it should be noted that Uber and Lyft – the main empirical foci of my research – are far from the only corporate bearers of Uberisation as a broader process. While Ola in India, Careem in the United Arab Emirates and Didi Chuxing in China all pursue very similar business strategies as their North American counterparts, they clearly do not attract as much scholarly attention – at least not in the high-profile academic journals of the 'West'. This marks a severe blind spot within currently existing 'Uber scholarship', as for instance Didi Chuxing "by far outperforms its admittedly more famous Uber brethren in terms of ridership (1.4 billion v. one billion riders in 2015) – albeit not in market value" (Rekhviashvili/Sgibnev 2018: 73). It will have to be the task of future (potentially comparative) studies to bring to light both the similarities as well as some of the likely variances that Uberisation produces in different parts of the world.

Secondly, the deeply racialised and gendered dimensions of the Uber phenomenon deserve much closer attention than the above chapters have granted them. While Chapter IV briefly discussed how Uber's arrival in Toronto has introduced new racialised fault lines between (more negatively perceived) taxi drivers on the one hand and (more positively perceived) Uber drivers on the other (Phung et al. 2021), I must admit that the drivers that have made appearance in this thesis largely have done so as part of a 'mass

precariat' undifferentiated in terms of race, gender and other crucial social dividing lines. Criticising such universalising narratives of Uberisation, Julietta Hua and Kasturi Ray have proposed to understand the lived experience of gig workers through the lens of 'assembly', thereby foregrounding those produced differences of "race, gender, and citizenship [that] continue to buoy some laborers while destroying others" (2018: 272). While the main epistemological interest of this thesis has been on the conflictual interplay between Uberisation and urbanisation, a thinking through of both of these terms via their various dynamics of difference is, undoubtedly, a crucial task that warrants much more scholarly work in the future (for scholarly undertakings in this direction, see Benvegnù/Kampouri 2021; Cook et al. 2021; Ge et al. 2016; Van Doorn 2017).

Thirdly, the limited time frame of my research needs to be acknowledged. Completing my fieldwork in Toronto in late 2019, the onset of the Covid-19 pandemic only few months later made it close to impossible for me to take into account the thoroughly changed circumstances of Uberisation under lockdown conditions (Katta et al. 2020; Sweeney/Treat 2020). What this thesis does cover, in its Torontonian context, is the roughly ten-year period between the global economic crisis of 2008 at one end and the onset of the Covid-19 pandemic in the western hemisphere in early 2020 at the other end. The political and social repercussions of 'Uberisation under lockdown' will have to be the research object of other studies, hopefully to be conducted in the future or already underway. The next section will suggest a number of potential pathways for such scholarly endeavours.

Finally, and further speaking to the temporal limitations of this work, an important caveat concerning the legal classification of Uber drivers in Ontario must be noted. While Chapter IV closely examined the regulatory ground on which Uber has been able to move in Toronto between early 2012 and late 2016, this ground has started to significantly shift again *after* this crucial time period. In 2017, David Heller, a Toronto-based UberEATS driver, initiated a lawsuit against Uber that contested the classificatory status of drivers as independent contractors and demanded that drivers be recognised as full employees of Uber. As such, drivers would be entitled to minimum wages, overtime and vacation pay and other basic labour rights guaranteed under Ontario's Employment Standards Act (Lewis 2017; Thomas 2009: 67-71). After year-long legal skirmishes between Uber and Heller involving various Ontarian courts, Canada's Supreme Court eventually ruled in June 2020 that Uber's arbitration practice – a procedure that circumvented Ontarian labour regulations and directed complaints filed by Canadian Uber drivers to a costly arbitration process in the Netherlands – was unconscionable. While the contractor status

of Ontario's Uber drivers has remained unchanged (Deschamps 2021), the Supreme Court's ruling once and for all paved the way for Heller's class-action lawsuit "to move through the Ontario court system" (Mojtehedzadeh 2020: n.p.). It could well be, therefore, that Toronto's Uber drivers (and other gig workers) will be employees rather than independent contractors soon. In line with similar court cases around the globe, the *Heller vs. Uber Technologies Inc.* case once more demonstrates the central role of state regulation vis-à-vis the gig economy in general and Uber in particular.

Uber Unexamined: Pathways for Future Research

While the Uber phenomenon has received growing scholarly attention, there are a number of developments and dynamics that deserve far more specific scrutiny. Arguably, and certainly not without good reasons, most of the critical empirical research on Uber has approached the latter from the standpoint of platformised practices of control and algorithmic management (Lee et al. 2015; Rekhviashvili/Sgibnev 2018; Rosenblat 2018; Wu et al. 2019). Without doubt, this early research has created the very foundation for a deeper understanding of Uberisation and its continuing reliance on masses of cheap driver labour. In this sense, more studies from hitherto unexplored sites of Uberisation, especially in the Global South, are needed (Amorim/Moda 2020; Arubayi 2021). At the same time, an at least partial change of perspective from a rather narrow focus on labour control to broader vistas also taking into account practices of labour resistance would be more than helpful at this point. For instance, it could be a fine intellectual-cum-practical exercise to more systematically map past and ongoing Uber labour struggles, potentially creating an inventory of both successful and unsuccessful strategies and tactics of Uber-driver resistance worldwide (see in this regard, Arubayi 2021; Woodcock/Graham 2020: Ch. 4). In short: While critical research has gained a sufficiently detailed understanding of how Uber controls drivers, there is still comparatively little knowledge about drivers eluding and contesting such control (Woodcock 2021).

Similarly, the far from uniform uses of data within Uber's platform remain widely uncharted territory to this day (yet see, Attoh et al. 2019; Diab 2019). Making use of Sadowski's (2019) recent contribution on data capital, Chapter III identified five different uses that Uber puts its big data to: (i) targeting and profiling, (ii) system optimisation, (iii) practices of management, surveillance and control, (iv) scenario building and modelling and, finally, (v) building stuff. Each of these five fields deserves closer scholarly

engagement in its own right. Attoh et al. (2019), for instance, have offered an intriguing account of how Uber collects traffic data for scenario building via its UberMovement application, leveraging the latter to establish a PPRP with local officials in Washington D.C. More specifically targeting the data-use of 'building stuff', Chapter VI has explored Uber's processes of large-scale data production feeding into its AV development programme. Here, too, more work needs to be done, not least with regard to how Uber's in-depth mapping data is being channelled through complex global divisions of labour in which the repetitive clickwork of precarised crowdworkers, usually situated in low-wage countries of the Global South, annotate data such that it can then be used for AI training (for a pioneering study in this regard, see Schmidt 2019). Exploring the intersection of labour and data within Uber's business model in more detail presents a formidable task for future critical engagements with the Uber phenomenon.

This holds equally true for one aspect of the Uber platform that, at least to my knowledge, hasn't been explored in a more systematic fashion at all so far: the reciprocal relationships and practices of cross-subsidisation between the Uber platform's various sub-businesses such as Uber's ridehail core business on the one hand and its UberEATS side arm on the other (Srnicek 2017: 46). Especially under lockdown conditions, UberEATS has gained increasing strategic import for Uber, as the food delivery app could partly offset the temporary demise of Uber's ridehail business (Katta et al. 2020; Raj et al. 2020). Even beyond this striking example, there may be further interdependencies between Uber's various platform sub-branches that haven't even started to register on the surface of critical social research, this work included.

In light of these important provisos, I propose to see *Uberising the Urban* as adding some early exploratory tracings on a still largely blank canvas that, by help of future research on the Uber phenomenon, could be turned into a more fully developed (*counter-*)cartography; a counter-cartography that may help to expose those "'levers', nerve-centres or weak links" (Toscano/Kinkle 2015: 8) within the complex geography of global Uberisation that first need to be identified analytically before they can be confronted with adequate precision politically.

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