

CHAPTER 13

FROM MATCHMAKING TO BOUNDARY MAKING: THINKING INFRASTRUCTURES AND DECENTRING DIGITAL PLATFORMS IN THE SHARING ECONOMY

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ABSTRACT

While digital platforms tend to be unproblematically presented as the infrastructure of the sharing economy – as matchmakers of supply and demand – the authors argue that constituting the boundaries of infrastructures is political and performative, that is, it is implicated in ontological politics, with consequences for the distribution of responsibilities (Latour, 2003; Mol, 1999, 2013; Woolgar & Lezaun, 2013). Drawing on an empirical case study of Uber, including an analysis of court cases, the authors investigate the material-discursive production of digital platforms and their participation in the reconfiguring of the world (Barad, 2007), and examine how the (in)visibility of the digital infrastructure is mobilized (Larkin, 2013) to this effect. The authors argue that the representation of Uber as a “digital platform,” as “just the technological infrastructure” connecting car drivers with clients, is a political act that attempts to redefine social responsibilities, while obscuring important dimensions of the algorithmic infrastructure that regulates this socioeconomic practice. The authors also show how some of these (in)visibilities become exposed in court, and some of the boundaries reshaped, with implications for the constitution of objects, subjects and their responsibilities. Thus, while thinking infrastructures do play a role in regulating and shaping practice through algorithms, it could be otherwise.

Thinking Infrastructures

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Thinking infrastructures relationally decentre digital platforms and encourage us to study them as part of ongoing and contested entanglements in practice.

Keywords: Digital infrastructures; digital platforms; sharing economy; algorithms; performativity; Uber

INTRODUCTION

The pervasiveness of digital infrastructures is transforming our daily practices, forms of knowledge production and socioeconomic exchanges. It is impacting the reach of interactions, and forms of coordination and organizing. The process of digitalization and digital convergence has blurred organizational and industrial boundaries (Tilson, Lyytinen, & Sørensen, 2010) and has given rise to a wide range of new business models and forms of value creation. Most notably, digital platforms are seen to be transforming our economies, forms of communication and socialization, and have been leveraged by some of the most valued companies, such as Apple, Amazon, Facebook or Google.

The centrality given to digital platforms in our societies is attested by the academic debate across disciplines on platform ecosystems and innovation (Constantinides, Henfridsson, & Parker, 2018; Gawer, 2014; Tiwana, Konsynski, & Bush, 2010), platform organizations (Kornberger, Pflueger, & Mouritsen, 2017), platform capitalism (Pasquale, 2016; Srnicek, 2016), media platforms (Bucher, 2012; Gillespie, 2018) or the platformization of the web (Helmond, 2015). They have also been associated with the emergence of the so-called sharing or collaborative economy (Botsman & Rogers, 2011; Sundararajan, 2016).

It can be argued that “digital platforms” have become highly influential as intermediaries of economic and communicative exchanges, despite, or maybe because of, its blurry meaning (Gillespie, 2010), and a tendency to present them as clearly bounded, as ontologically stabilized. The notion of digital platforms as efficient “matchmakers” (Evans & Schmalensee, 2016) of supply and demand is integral to dominant conceptualizations of the sharing economy, exemplified by Uber or Airbnb. Such notions are not innocent and serve platform owners like Uber as a discursive trope to present themselves as neutral intermediaries empowering individuals. But beyond the contested discourses around the “platform,” the thinking algorithmic *infrastructures* of such digital platforms help configure specific sharing economies. In this chapter, we investigate the material-discursive production of digital platforms and its consequences. *Thinking* infrastructure, as a theoretical device, will allow us to decenter digital platforms, moving away from reified notions that take for granted their boundaries.

DIGITAL PLATFORMS IN THE SHARING ECONOMY

What's yours is mine and what's mine is my own.
– Old proverb

Sharing economy and associated terms, such as collaborative economy, have been used to convey a change of paradigm taking place in the digital economic

ecosystem, in which peer-to-peer exchanges are facilitated by digital platforms. The notion of sharing economy is appealing, as sharing is associated to positive images of community building, the efficient use or reuse of limited resources in an environmentally fragile planet, and in which individuals are “empowered” to exchange resources with other individuals, as any service or underused resource can be easily matched with demand in ways previously unthinkable (Belk, 2007; Botsman & Rogers, 2011). However, the elasticity of the term is such, that differing notions of sharing economy co-exist: it has been posited as a new way of doing business and exchanging goods and services (Botsman & Rogers, 2011), sharing resources, and of co-producing goods, services and knowledge (Benkler, 2006; Scholz & Schneider, 2016). It has been associated both to the gift economy and the commons (Benkler, 2006; Ostrom, 1990), to platform capitalism (Srnicsek, 2016) and platform cooperativism (Scholz, 2016a), despite the gaping differences between these economic mechanisms.

The same label has been equally applied to refer, for instance, to Freecycle, where people give away for free unneeded goods to whoever wants to collect them, or to Uber, the best-known example of gig economy, in which a corporation owns an app-based platform that matches drivers with consumers for a fee. It seems that it is to this second sort of model of privately owned platform that the term has come to be most frequently associated to. Recent reports on the “collaborative economy,” commissioned by the European Commission (De Groen & Maselli, 2016), and on the “sharing economy” by Morgan Stanley, and by PwC, focus on ventures, such as Uber, Upwork, Airbnb, and the way they are transforming our economies. Similarly, media and public discourse tends to associate sharing economy to successful for-profit ventures such as Airbnb and Uber, which are seen as disruptive innovators, seemingly (and for some, ideally) beyond the control of traditional, legitimate players such as Taxi unions, the hospitality sector and regulators.

In fact, “sharing” does not seem to be perceived as an essential feature of the sharing economy. In accordance with an individualist view, it is understood as a liberation from traditional fetters that discourage economic flows, which allegedly is as a source of empowerment for individuals who can easily participate in direct economic exchanges with each other (Botsman & Rogers, 2011). The focus on dis-intermediation of mainstream notions of the sharing economy, however, seem to downplay the important role, and substantial benefits, of platform owners such as Uber or Airbnb. Conversely, authors such as Scholz (2016b), Slee (2015) or Srnicsek (2016) present a much more critical view toward these powerful platforms, noting their neoliberal and monopolistic drive, and reflecting on negative implications such as the erosion of worker’s rights, issues of liability or unfair competition, to mention some. As Scholz (2016, p. 6) puts it, the sharing economy is “Reaganism by other means,” conveying the idea that the sharing economy is neither new nor “neutral” in the way sharing takes place, and constitutes a new form of exploitation. Precarious on-demand work (Wood, Graham, Lehdonvirta, & Hjorth, 2018), jobs turned into tasks (Davis, 2016) and surveillance (Moore, 2017) instead of empowerment, is a reality shared by many participants in the so-called sharing economy.

The presumed dis-intermediation is also paradoxical given that current understandings of the sharing economy are distinctively techno-centric. Indeed, the portrayal of digital platforms as efficient “matchmakers” (Evans & Schmalensee,

2016) of supply and demand is co-constitutive of dominant conceptualizations of the sharing economy. This is a representation espoused by powerful actors such as Uber or Airbnb, which depict themselves as benevolent neutral interfaces, as “just the technological platform” connecting individuals providing services or resources, with citizens in search for cheaper products or services; hiding other fundamental aspects that sustain and characterize such technologically mediated economic practice.

These prevailing conceptualizations of the digital platforms of the sharing economy are in consonance with the modernist view of infrastructures; that is, the material substrates that support free circulation of goods and people, and constitute an integral part of the market economy and the liberalist concept of progress (Foucault, 2010; Larkin, 2013; Mattelart, 2000). They are also deeply embedded within the dominant political economic thought, which takes the view that innovation is a necessary component of progress (e.g. Jaffe & Lerner, 2006; Schumpeter, 2009), and imbues innovation and anything that is related to it, with positive connotations.

However, emergent literature that critically discusses the sharing economy (Davis, 2016; Kornberger, Leixnering, Meyer, & Höllerer, 2017; Rosenblat, 2018) attests to the fact that innovation is frequently “concerned with ensuring that, under changing conditions, distributions of symbolic and material reward remain the same” (Suchman & Bishop, 2000). Consequently, we contend that a critical exploration of digital platforms and further theoretical development is needed to broaden the scope of current research. To this aim, we propose an epistemic shift from the idea of thinking platforms as neutral, clearly bounded digital infrastructures, to thinking about platforms infrastructurally, drawing on infrastructure studies. This will allow us to expose the material-discursive production of digital platforms and their participation in the reconfiguring of the world (Barad, 2007), and contribute to resist ontological stabilization. It can be otherwise.

THINKING INFRASTRUCTURE AND OPENING UP THE MEANING OF DIGITAL PLATFORMS

Infrastructures are frequently perceived as the material substrates that enable other objects to operate (pipes, roads, wires, etc.). From this perspective, infrastructures tend to remain in the background, and, as such, they only become visible upon breakdown (Star, 1999). From this objectual view of infrastructure, digital platforms can be interpreted as the technological infrastructure of the sharing economy. This, as we have argued, seems to agree with the well-established matchmaking view.

However, an important body of research in Science and Technology Studies (STS) has convincingly argued that infrastructures are more than technological accomplishments (Bowker, Baker, Millerand, & Ribes, 2009; Hughes, 1987; Star & Ruhleder, 1996); they are not only static well-identifiable substrates, but also layered and complex amalgams of social, technical and organizational components (Bowker et al., 2009). Indeed, technologies are never neutral, or just instrumental,

but always world-making; they perform different possible versions of reality and thus they might help sustain some configurations and not others (Carlile, Nicolini, Langley, & Tsoukas, 2013; Introna, 2007; Law, 2002; Mol, 2013; Suchman, 2005). At the same time, they are embedded in relations with other tools, practices and people, and it is through their location in these heterogeneous networks that they help sustain certain orderings.

The socio-technical view of infrastructures in STS is usually associated to a relational view of infrastructures, according to which infrastructures become infrastructures in relation to organized practices (Bowker et al., 2009; Star, 1999; Star & Ruhleder, 1996). That is, what is background for one person is a daily object for another, or even a barrier. For instance, whereas a pipe might be an infrastructure for me, ready-to-hand, while I cook at home, it is a topical object for a plumber. And stairs might be infrastructure for someone, but a barrier for wheelchair users. Adopting such practice-perspective approach, these authors turn the question “what is an infrastructure?,” to “when is an infrastructure?” (Star & Ruhleder, 1996). In this regard, the definition of infrastructure becomes a methodological and even epistemological question: as researchers we will need to set the boundaries of the infrastructure in relation to the practices we want to study.

But as Hughes (1987) argues, setting these boundaries, as well as deciding the level of analysis, can be noticeably political. For instance, “an electric light and power system can be so defined that externalities or social costs are excluded from the analysis” (p. 55). Indeed, setting such boundaries is far from self-evident if we consider the entangled nature of infrastructures. Critical toward the layered view of infrastructures, Edwards (1998) argues that there is no linear relationship between an underlying system and the phenomena of the world, as infrastructures might operate on different levels at the same time, and even what is the infrastructure and what is the phenomena remains unclear or inseparable. Infrastructures are not just out there; therefore, the act of defining an infrastructure can be seen as a categorizing moment, as a political act (Larkin, 2013).

As part of the politics of defining the boundaries of infrastructures, Larkin (2013) draws on several anthropological studies to show how the visibility of infrastructures is sometimes mobilized for political purposes; for instance, the construction of a new airport can symbolize progress, or it might persuade sponsors, even when their functionality sometimes is far from that expected in other contexts. He therefore convincingly argues that instead of assuming that infrastructures remain invisible, in the background, we need to examine how the (in)visibility of infrastructures is mobilized.

Based on a relational ontology, what we want to propose is an understanding of infrastructures as simultaneously an accomplishment, and as contributing to constitute the world in specific ways, in a process of mattering taking place within a larger configuration of the world, and as such in a constant process of negotiation (Barad, 2007). Assuming the relational character of our capacities for action, infrastructures can be seen as part of, and participating in, the ongoing reconfiguration of objects and subjects, and in the distribution of responsibilities. Thus, orderings can be seen as practices of ontological politics in which subjects and objects are formed as part of assemblages. Accordingly, entities, attributes

and responsibilities are practical accomplishments. Thus, accountability does not refer to relationships between given subjects and objects, but is part of an ontological enactment (Woolgar & Lezaun, 2013, p. 333). As Latour (2003) puts it, once we accept the impossibility of disentangling objects and subjects, technology and society, we realize that matters of fact become states of affairs, in which even defining a computer can lead to bitter disputes. Indeed, defining the boundaries of infrastructures, can be seen as a categorizing moment, a performative and political act with consequences in the definition of responsibilities and accountability.

CONSTITUTING BOUNDARIES AND RESPONSIBILITIES: THE CASE OF UBER

Uber has become a taken-for-granted example, and almost a symbol, of the so-called sharing economy, and one of the most recent global and controversial companies to emerge from Silicon Valley. However, Uber's proposition since its inception has been challenged by traditional actors worldwide. Because of Uber's prominence, it has come under scrutiny in the media, in part because of the number of legal cases it is subject to. As a self-styled representative of the "sharing economy," Uber is heavily involved in attempts to redefine the sharing economy and its regulatory regimes. In fact, it has been claimed that Uber has penetrated markets disregarding laws in an attempt to shape these.

Trying to present this case study is challenging as the definition of Uber is highly controversial. The English Wikipedia offers the following definition: "Uber Technologies Inc. is an American technology company headquartered in San Francisco, California, United States, operating in 570 cities worldwide. It develops, markets and operates the Uber car transportation and food delivery mobile apps" ("Uber (company)," 2017). This same article associates Uber to the concept of sharing economy and refers to Uber as "a pioneer in the sharing economy and the changes in industries." The Spanish Wikipedia, instead, defines Uber ("Uber," 2017a) as an international company that offers private transportation to their customers through their software or app. And the German Wikipedia defines Uber as an American company, which offers online services in several cities around the world ("Uber," 2017b). As we can already perceive from these definitions, not only the nature of the company is unclear (technology or transport provider). In fact, it is difficult to point to a singular Uber as different Ubers are enacted in different cities. Furthermore, "Uber" is not just a single juridical entity, but a complex network.

Despite the allure of the "sharing economy," critical voices are raising concerns about various negative social effects related to Uber: erosion of worker's rights, issues of liability and unfair competition, to mention only some. In fact, Uber – or various Ubers, we should say – has faced protests and lawsuits in various countries, resulting in different definitions of their responsibilities and conditions to operate. In fact, several countries and cities have limited or banned Uber. The main controversies generated by Uber's business model are mostly related to two issues: on the one hand, it has disrupted a highly regulated sector – transport, on the other hand, the Uber's gig economy model which assumes that Uber

drivers are self-employed has been contested. As we will see, in a clear case of ontological politics, the definition of Uber as a digital platform is at the center of much of these controversies.

Considering the variety of Ubers, we will focus our analysis on Uber in the United Kingdom. Specifically, we draw on the UK lawsuits against Uber to study controversies around the ontological status of Uber and their responsibilities. They will allow us to illustrate how certain orderings, certain realities are contested.

A Matter of Regulation: Algorithms and the Court

In the United Kingdom, Uber operates legally, with approximately 40,000 drivers in London by the end of 2017 (O'Connor & Croft, 2017). However, the legal status of Uber in the United Kingdom was questioned due to the way in which ride prices are calculated by the Uber app. More specifically, after protests and pressures from taxi drivers, the transport regulator Transport for London brought the case to court. The question was if Uber app, which calculates surge pricing, should be defined as a taximeter or not, as taximeters are a privilege afforded only to black-cab drivers in return for the extensive training they undergo to learn London's streets. The High Court of Justice (October 2015) ruled that the app was not a taximeter and therefore Uber could operate legally. More specifically, Lord Justice Ouseley ruled that:

The question for decision in the light of those agreed facts is whether the Uber PHVs [private hire vehicles] are equipped with a taximeter, that is, a device for calculating fares. In my judgment, these PHVs are not equipped with a taximeter as defined by section 11(3). The driver's Smartphone with the Driver's App is not a device for calculating fares by itself or in conjunction with Server 2, and even if it were, the vehicle is not equipped with it.

The driver's Smartphone was the primary candidate device for calculating fares. Server 2 receives inputs from the driver's Smartphone, and elsewhere. The results of the calculation are transmitted to the driver and customer via their Uber APPs and to the third party which debits the customer's account. But the Smartphone carries out no calculations; that is not its purpose. The calculation is carried out in fact by Server 2 and wherever it actually does it, it is not in the vehicle.

The essence of a taximeter for the purpose of section 11 is that the device must be for the calculation of the fare then to be charged, based on whatever inputs are appropriate. (...) The Smartphone is not a "thing designed or adapted for a particular functional purpose" namely calculating fares for the PHV; see the Shorter OED. It is not a taximeter. The Smartphone with its Driver's App may be essential to enabling the calculation to take place but that does not make it a device for calculating fares.

Through these excerpts, we can see how the meaning of "taximeter" carries important consequences for the stability of the assemblage of which Uber is part. What Uber is and what Uber is allowed to do is sustained by the thin line of separation between a device which calculates, and a device for calculation. It is also sustained by the boundaries set around technologies: "taximeters" are seen to be clearly contained within a car, while the boundaries of "the app" have been expanded to consider the servers needed to make the calculations. As we can see, the ontological status of the entities involved is an accomplishment with important normative consequences.

The second lawsuit we will study shows a different aspect of Uber. Just as the first case, this will have ontological consequences to the being of Uber, but the process to get there is different. Here, how the platform is deployed, and what it does as a thinking *infrastructure*, will be discussed and analyzed by the actors involved in the lawsuit.

The second lawsuit in the United Kingdom against Uber was brought to the Central London Employment Tribunal in October 2016. The Claimants (Uber drivers) complained about Uber's failure to pay the minimum wage, and failure to provide paid leave. The Respondents ("Uber") saw drivers not as Uber's workers, but as self-employed. The judge ruled that Uber drivers are "workers" entitled to the minimum wage, paid holiday, sick leave and other normal worker entitlements. Once again, the decision affecting this distribution of responsibilities centered around the definition of Uber. What was at stake in this case is what Uber is? Is Uber "just a digital platform"?

The court ruling makes a precise description of the way Uber (as a whole named the "respondents") operates in London. The juridical entity "Uber" as such does not exist. In London, it is a conglomerate of firms: Uber London Limited, a UK company that holds the required Private Hire Vehicle (PHV) license to be able to operate in London vehicles for the purposes of booking and arranging travels; Uber Britannia Limited manages PHV licenses outside London; and Uber B.V. (UBV), a Dutch company that holds the legal rights to the App and is the parent company of the previous two. We can also consider as part of the general entity "Uber," their servers and software (for allocating bookings to drivers, payment, route discovery, etc.).

The basic process of Uber is as follows: a rider (alternatively called the Customer or the User, depending on the documents) uses the Uber App to make a booking. Uber's software allocates the rider to a driver depending on a number of factors (e.g. proximity to the rider, driver rating, etc.). The driver, unknowing of the destination, has to decide whether to accept or refuse the request, but penalties are incurred if too many declines are registered. Once in the car, the driver is made aware of the route and the Uber's designed route appears on his/her mobile phone. This route is to be followed by the driver – evidence presented by the Claimants shows that negative consequences can happen if it is not (e.g. a rider may complain and the driver may not be paid by Uber).

In the introduction of the ruling, Uber is defined as a "smartphone app" through which the enterprise operates. The respondent defends that Uber is not a transport company, and that they do not exercise any control over the drivers. Drivers are self-employed and Uber helps them grow their business. However, documents analyzed in this ruling (contracts, Uber website and internal Uber documents) show an unclear and variable definition of Uber, and the terms of contract with the drivers. Cutting the controversies short, the Judge's ruling was:

It seems to us that the Respondents' general case and the written terms on which they rely do not correspond with the practical reality. The notion that Uber in London is a mosaic of 30,000 small business linked by a common "platform" is to our minds faintly ridiculous.

As we can see, once again the distribution of responsibilities is dependent on boundary setting: what is Uber? What are its boundaries? As just a platform/

technology – as just the infrastructure which Uber tries to make visible – it would not have any responsibility for protecting worker’s rights. While the ruling offers an elaborate discussion of evidence in favor of the Claimants, the main rationale for the Judge’s ruling is: Uber recruits drivers, imposes conditions to drivers (e.g. sort of car), etc.; therefore, Uber is clearly exercising control over the drivers, which contradicts the idea that drivers are independent, self-employed workers. Similarly, another set of reasons refers to how Uber has control over key information (for instance, about the users), the app sets the default route that drivers have to follow, UBV fixes the price, drivers are subject to performance management through a rating system. We can see here a case of algorithmic management, in which the control over workers traditionally exercised by managers is transferred to technology. This algorithmic control has been attested by recent research (Rosenblat, 2018; Rosenblat & Stark, 2016).

This algorithmic, thinking *infrastructure* brings to the fore the question of regulation, and the need to look at its imbrication with technology. While under the logic of the “flexible” sharing economy, Uber has tried to disrupt a highly regulated sector and push toward deregulation, at the same time the algorithms of Uber platform are regulating drivers and even costumers in a non-transparent way. The legal battle is not over. In an attempt to overturn the employment tribunal ruling, Uber appealed against the ruling last year, and after losing this first appeal, they are trying again (Quinn, 2018).

ONTOLOGICAL POLITICS

Notions of sharing economy that focus on dis-intermediation, on the ability of digital infrastructures to connect individuals, seem to downplay the power of platform owners in business models such as Uber. The appropriation of the term “sharing economy,” by actors in the sharing economy such as Uber, in ways that depict a sort of communitarian economy, and the dominant understanding of the notion of digital platform is not innocent; it is generative of certain networks of relations.

Uber presented itself as just a “technology” connecting service providers and costumers, as the neutral infrastructure that facilitates business to run. Uber thus can be seen as disrupting by trying to break some networks (drivers as individual independent workers, just linked to the technological platform), while keeping very strong connections to other actors, for instance to venture capital, which is what sustains an otherwise unviable business.

From the illustrations on the legal controversies of Uber in the United Kingdom discussed in this chapter, we can see that the definition of the boundaries of the “digital platform” is very much at stake. Uber as a matchmaking platform, as the Respondent in the ruling case discussed would like to have it, suggests a distribution of responsibilities that corresponds to the neoliberal model of the gig economy, in which the “flexible” worker, the “self-employed” can grow their business through the platform.

The two lawsuit cases have revealed two different notions of platform as an infrastructure. The first one is that of an unproblematic infrastructure that merely

acts as a mediator between two different actors. This mediator, however, as we have seen, is a thinking, algorithmic *infrastructure*. It makes sense of the landscape of the city, the cars that are available and where they should park, the possible demand that will need to be transported, the routes that must be taken, the price that is calculated for a specific route, etc. It is believed by Uber that it is that piece of software that does all the thinking for all the other parties involved; they only have to concern themselves with expressing their needs, the infrastructure will do the rest.

The consequence of this notion of infrastructure is that Uber renders itself absent while, paradoxically, at the same time is the thinking nexus of all activity. The other actors are ontologically stabilized to the roles that Uber has picked for them: the drivers are entrepreneurs, the passengers are clients and service quality reviewers. They have become ontologically absent in that their capacity to define themselves is at the mercy of the invisible thinking infrastructure that determines their being.

The other notion of infrastructure that we propose is very different. Infrastructure *thinking* is a process of ontological reflection that examines the multiple ontologies of actors involved in an infrastructure: who does what? What are responsibilities? Who decides them? By answering these questions, the actors become empowered not to serve a thinking infrastructure, but to distort and disrupt the infrastructure that is meant to stabilize them along determined boundaries. They become ontological agents that make visible their role, their desires. In this process, as we have seen, the boundaries of the platform as an infrastructure were questioned in the first lawsuit, and some aspects of the thinking infrastructure were made visible in the second lawsuit. The visibility and the definition of the borders of the digital platform can be seen indeed as a political act with real consequences.

Such ontological politics are not only taking place in the courts and in the streets where Uber operates, but also take place in the academia. While the digital platform as a matchmaker of supply and demand suggests empowerment through connecting isolated individuals with new markets (i.e. entrepreneurs with potential passengers), approaching Uber's digital platform from the lens of infrastructures suggests, instead, a concept of disempowerment or entrapment within a platform owner, which tries to set and cement ontological beings within an infrastructure; an infrastructure, where worker's rights and freedoms are being challenged, and need to be fought back. We suggest, therefore, that certain theorizations of digital platforms of the sharing economy, help reify specific notions of "sharing economy," when in fact socially embedded digital platforms could and can help sustain very different socioeconomic models, as exemplified, for instance, by platform cooperativist models. Agency is not only social, and never only the result of algorithmic calculations. It is in the encounter of the social and the technical that realities get constructed and contested.

THINKING INFRASTRUCTURES AND INFRASTRUCTURE THINKING

In this chapter, we have taken issue with received conceptualization of digital platforms of the sharing economy, commonly portrayed in some of the academic

literature, but particularly by its main actors as clearly bounded matchmakers. The theoretical tradition of infrastructure studies helped us question such view. We have argued that this presentation of digital platforms makes some parts visible and others invisible (i.e. the algorithms do more than just matchmaking), that the boundaries of digital platforms are contested, and that the definition of such boundaries has effects; it is therefore a categorizing moment, a political act. In this regard, we need to understand digital platforms as more than technological in two senses: (1) the boundaries of the digital platform are defined socially and (2) the infrastructure of Uber taxi driving cannot only be reduced to a digital platform. The legal system for instance plays an important part.

Through our analysis, we have suggested that the algorithmic nature of digital platforms plays an agentic role, that is, they impact on decision-making. The case reveals how Uber, via its platform, determined the nature of the interaction between the driver and the customer: what route to take, who to pick up, etc. Such a notion of infrastructure based on algorithms puts the emphasis on the sophisticated capacity of the technology to influence the world and the sort of social practice that develops. Infrastructure affects the way in which actors relate socially, trying to determine and control their interactions. These are thinking *infrastructures*: they take decisions for the actors involved (e.g. obligation to review the driver, obligation not to take breaks) and participate in the constitution of the actors within the social practice.

However, we have also argued that infrastructures are not just out there, clearly defined and bounded. They are socially negotiated and relational, they participate in ontological politics. *Thinking* infrastructures as an act of categorizing has worldly effects. Through the study of court cases, we have illustrated that the definition of the digital platforms is controversial, and it has effects on the ontological definition of actors and their responsibilities.

The double play between these two concepts of infrastructure suggests that infrastructures are not only stable foundations, but can also be questioned with regards their very nature. The court and the way their discourse frames Uber's infrastructure suggests that the view of Uber as merely a matchmaker never existed, was never real, even though it was realized. They managed to make it real until alternative elements were made visible, altering forever the ontological politics of the infrastructure.

Such a take on infrastructure implies that the algorithm and its objectuality (e.g. the taximeter, the servers, their location, etc.), is influential, but in this case, not enough to enforce a social practice because it is part of a broader assemblage.

This challenges the notion of infrastructure as merely foundational, determining with force a specific kind of social practice. Instead, a broader take on infrastructure invites a relational view where the centrality of the algorithm and its determining force can be, and in this case, is questioned and performed differently. Drivers sought an alternative ontological reality in which they were no longer individual entrepreneurs, but full-fledged workers with a meaningful relation to the owner of the algorithm. This is achieved through questioning the boundaries of the infrastructure, categorizing another moment in which their place in the world is different. The infrastructure is thus in turn shaped through the larger social practice

of taxi driving that invites a redefinition of Uber not only as a neutral matchmaker, but also as a transport service. The translational change is similar to seeing Uber as the asphalt of the roads, allowing cars to travel on it, to a taxi service.

The important thing here is not only that another infrastructure is possible, but also the translational effort undertaken by drivers to change their conditions through their alliance with the courts. To do so, the drivers needed the involvement of the law for an ontological change to take place. Thus, the legal system and court cases visibly become part of the infrastructure of current practices of working for Uber.

CONCLUSION

Different theorizations of infrastructures have implications for the study of digital platforms in the sharing economy. Much literature implicitly adopts a view of digital platforms as objects with specific architectural characteristics that sustain, as infrastructures, certain practices. In the area of the sharing economy, research has looked into the way digital platforms make matchmaking possible. We have argued that such an approach tends to reinforce specific and limited views of the sharing economy.

Some research has also considered the algorithmic nature of digital platforms, and their capacity to control and regulate practice (Rosenblat & Stark, 2016). This research therefore explores digital platforms as thinking *infrastructures*. We suggest, however, that such approaches do not tackle a further dimension that we wanted to capture in *thinking* infrastructures. The STS tradition has sensitized us that infrastructures are a relational concept, and encourage us to problematize the concept of infrastructure as objects.

We have argued here that technology and its ramifications with other social actors have ontological consequences, and that thinking of these ties, through the way they assemble as infrastructures, helps us understand the ontological transformations they seek or challenge. We have argued that constituting the boundaries of infrastructures is political and performative, that is, it is implicated in ontological politics, with consequences in the distribution of responsibilities (Latour, 2003; Mol, 2013; Woolgar & Lezaun, 2013), and we have proposed to investigate the material-discursive production of digital platforms and their participation in the reconfiguring of the world (Barad, 2007). In this way, we respond to recent calls to develop theories that broaden our understanding of the sharing economy (Kornberger, Leixnering, et al., 2017), and in so doing, we hope to contribute to resist the ontological stabilization of a model of sharing economy that has come to be known as Uberization (Davis, 2016),

REFERENCES

- Barad, K. M. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Durham, NC: Duke University Press.
- Belk, R. (2007). Why not share rather than own? *The Annals of the American Academy of Political and Social Science*, 611(1), 126–140. <https://doi.org/10.1177/0002716206298483>

- Benkler, Y. (2006). *The wealth of networks: How social production transforms markets and freedom*. New Haven, CT: Yale University Press.
- Botsman, R., & Rogers, R. (2011). *What's mine is yours: How collaborative consumption is changing the way we live*. London: Harper Collins Business.
- Bowker, G. C., Baker, K., Millerand, F., & Ribes, D. (2009). Toward information infrastructure studies: Ways of knowing in a networked environment. In J. Hunsinger, L. Klastrup, & M. Allen (Eds.), *International handbook of internet research* (pp. 97–117). Dordrecht, The Netherlands: Springer. https://doi.org/10.1007/978-1-4020-9789-8_5
- Bucher, T. (2012). Want to be on the top? Algorithmic power and the threat of invisibility on Facebook. *New Media & Society*, 14(7), 1164–1180. <https://doi.org/10.1177/1461444812440159>
- Carlile, P. R., Nicolini, D., Langley, A., & Tsoukas, H. (Eds.) (2013). *How matter matters: Objects, artifacts, and materiality in organization studies*. Oxford: Oxford University Press.
- Constantinides, P., Henfridsson, O., & Parker, G. G. (2018). Introduction – Platforms and infrastructures in the digital age. *Information Systems Research*, 29(2), 381–400. <https://doi.org/10.1287/isre.2018.0794>
- Davis, G. (2016). What might replace the modern corporation? Uberization and the web page enterprise. *Seattle University Law Review*, 39(2), 501.
- De Groen, W. P., & Maselli, I. (2016). The impact of the collaborative economy on the labour market. *Paper commissioned by the European Commission as input into its European Agenda for the Collaborative Economy No. 138* (p. 35). Brussels, Belgium: Centre for European Policy Studies. Retrieved from <https://www.ceps.eu/publications/impact-collaborative-economy-labour-market>
- Edwards, P. N. (1998). Y2K: Millennial reflections on computers as infrastructure. *History and Technology*, 15(1–2), 7–29. <https://doi.org/10.1080/07341519808581939>
- Evans, D. S., & Schmalensee, R. (2016). *Matchmakers: The new economics of multisided platforms*. Boston, Massachusetts: Harvard Business Review Press.
- Foucault, M. (2010). In A. I. Davidson (Ed.), G. Burchell (Trans.), *The birth of biopolitics: Lectures at the Collège de France, 1978–1979*: (2008 ed.). New York, NY: Palgrave Macmillan.
- Gawer, A. (2014). Bridging differing perspectives on technological platforms: Toward an integrative framework. *Research Policy*, 43(7), 1239–1249. <https://doi.org/10.1016/j.respol.2014.03.006>
- Gillespie, T. (2010). The politics of ‘platforms’. *New Media & Society*, 12(3), 347–364. <https://doi.org/10.1177/1461444809342738>
- Gillespie, T. (2018). Platforms are not intermediaries. *Georgetown Law Technology Review*, 2(2), 198–216.
- Helmond, A. (2015). The platformization of the web: Making web data platform ready. *Social Media + Society*, 1(2), 1–11. <https://doi.org/10.1177/2056305115603080>
- Hughes, T. P. (1987). The evolution of large technological systems. In W. E. Bijker, T. P. Hughes, & T. J. Pinch (Eds.), *The social construction of technological systems: New directions in the sociology and history of technology* (pp. 51–82). Cambridge, MA: MIT Press.
- Introna, L. D. (2007). Maintaining the reversibility of foldings: Making the ethics (politics) of information technology visible. *Ethics and Information Technology*, 9(1), 11–25. <https://doi.org/10.1007/s10676-006-9133-z>
- Jaffe, A. B., & Lerner, J. (2006). Innovation and its discontents. *Innovation Policy and the Economy*, 6, 27–65.
- Kornberger, M., Leixnering, S., Meyer, R. E., & Höllerer, M. A. (2017). Rethinking the sharing economy: The nature and organization of sharing in the 2015 refugee crisis. *Academy of Management Discoveries*, 4(3), 314–335. <https://doi.org/10.5465/amd.2016.0138>
- Kornberger, M., Plueger, D., & Mouritsen, J. (2017). Evaluative infrastructures: Accounting for platform organization. *Accounting, Organizations and Society*, 60, 79–95. <https://doi.org/10.1016/j.aos.2017.05.002>
- Larkin, B. (2013). The politics and poetics of infrastructure. *Annual Review of Anthropology*, 42(1), 327–343. <https://doi.org/10.1146/annurev-anthro-092412-155522>
- Latour, B. (2003). Is re-modernization occurring – And if so, how to prove it? A commentary on Ulrich Beck. *Theory, Culture & Society*, 20(2), 35–48. <https://doi.org/10.1177/0263276403020002002>
- Law, J. (2002). *Aircraft stories: Decentering the object in technoscience*. Durham, NC: Duke University Press.
- Mattelart, A. (2000). *Networking the world, 1794–2000*. Minneapolis, MN, University of Minnesota Press.
- Mol, A. (1999). Ontological politics. A word and some questions. *The Sociological Review*, 47(suppl. 1), 74–89. <https://doi.org/10.1111/j.1467-954X.1999.tb03483.x>

- Mol, A. (2013). Mind your plate! The ontonorms of Dutch dieting. *Social Studies of Science*, 43(3), 379–396. <https://doi.org/10.1177/0306312712456948>
- Moore, P. V. (2017). *The quantified self in precarity: Work, technology and what counts* (1st ed.). New York, NY: Routledge.
- O'Connor, S., & Croft, J. (2017). Uber set for landmark UK employment case fightback. *Financial Times*, September 25. Retrieved from <https://www.ft.com/content/c690eba2-9f96-11e7-8cd4-932067fbf946>
- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action* (1st ed.). Cambridge: Cambridge University Press.
- Pasquale, F. A. (2016). Two narratives of platform capitalism. *Yale Law & Policy Review*, 35, 309–319.
- Quinn, B. (2018). Uber challenges ruling on drivers' rights at court of appeal. *The Guardian*, October 30. Retrieved from <https://www.theguardian.com/technology/2018/oct/30/uber-challenges-ruling-on-drivers-rights-at-court-of-appeal-london>
- Rosenblat, A. (2018). *Uberland: How algorithms are rewriting the rules of work*. Oakland, CA: University of California Press.
- Rosenblat, A., & Stark, L. (2016). *Algorithmic labor and information asymmetries: A case study of Uber's drivers*. SSRN Scholarly Paper No. ID 2686227. Rochester, NY: Social Science Research Network. Retrieved from <https://papers.ssrn.com/abstract=2686227>
- Scholz, T. (2016a). *Platform Cooperativism: Challenging the corporate sharing economy* (p. 27). New York, NY: Rosa Luxemburg Stiftung: New York Office. Retrieved from <http://www.rosalux-nyc.org/platform-cooperativism-2/>
- Scholz, T. (2016b). *Overworked and underpaid: How workers are disrupting the digital economy* (1st Ed.). Cambridge, UK; Malden, MA: Polity Press.
- Scholz, T., & Schneider, N. (2016). *Ours to hack and to own*. New York, NY: OR Books.
- Schumpeter, J. A. (2009). *Essays: On entrepreneurs, innovations, business cycles, and the evolution of capitalism*. New Brunswick, NJ: Transaction Publishers.
- Slee, T. (2015). *What's yours is mine: Against the sharing economy*. New York, NY: OR Books.
- Srnicek, N. (2016). *Platform capitalism*. Malden, MA: Polity Press.
- Star, S. L. (1999). The ethnography of infrastructure. *The American Behavioral Scientist*, 43(3), 377–391.
- Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research*, 7(1), 111–134. <https://doi.org/Article>
- Suchman, L. (2005). Agencies in technology design: Feminist reconfigurations. Retrieved from <http://www.lancaster.ac.uk/fass/resources/sociology-online-papers/papers/suchman-agenciestechdesign.pdf>
- Suchman, L., & Bishop, L. (2000). Problematising 'innovation' as a critical project. *Technology Analysis & Strategic Management*, 12(3), 327–333.
- Sundararajan, A. (2016). *The sharing economy: The end of employment and the rise of crowd-based capitalism*. Cambridge, MA: MIT Press.
- Tilson, D., Lyytinen, K., & Sørensen, C. (2010). Digital infrastructures: The missing IS research agenda. *Information Systems Research*, 21(4), 748–759. <https://doi.org/10.1287/isre.1100.0318>
- Tiwana, A., Konsynski, B., & Bush, A. A. (2010). Platform evolution: Coevolution of platform architecture, governance, and environmental dynamics. *Information Systems Research*, 21(4), 675–687. <https://doi.org/10.1287/isre.1100.0323>
- Uber. (2017a). Wikipedia, la enciclopedia libre. Retrieved from <https://es.wikipedia.org/w/index.php?title=Uber&oldid=100070775>
- Uber. (2017b). Wikipedia, den frie encyklopædi. Retrieved from <https://da.wikipedia.org/w/index.php?title=Uber&oldid=9099197>
- Uber (company). (2017). Wikipedia. Retrieved from [https://en.wikipedia.org/w/index.php?title=Uber_\(company\)&oldid=787660422](https://en.wikipedia.org/w/index.php?title=Uber_(company)&oldid=787660422)
- Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2018). Good gig, bad gig: Autonomy and algorithmic control in the global gig economy. *Work, Employment and Society*, 33(1), 56–75. <https://doi.org/10.1177/0950017018785616>
- Woolgar, S., & Lezaun, J. (2013). The wrong bin bag: A turn to ontology in science and technology studies? *Social Studies of Science*, 43(3), 321–340. <https://doi.org/10.1177/0306312713488820>