7 Towards a study of city experiments

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Introduction

In 2016, Singapore National Research Foundation (NRF) announced the launch of a partnership with Dassault Systems in the development of 'Virtual Singapore', a 'dynamic three-dimensional (3D) city model and collaborative data platform'. This platform would 'enable users from different sectors to develop sophisticated tools and applications for test-bedding concepts and services, planning and decision-making, and research on technologies to solve emerging and complex challenges for Singapore.'[1]

The same year in San Francisco, the Municipal Transportation Authority (SFMTA) was testing the new features of its mobile application, called MuniMobile, in partnership with a non-profit organization, yet closely tied to investment funds City Innovate Foundation. These new features would allow it to optimize the gathering of data related to mobility practices in San Francisco, and possibly use them to introduce incentives designed to nudge people into using transportation systems in such a way that it would alleviate pervasive congestion problems.

These two examples can be seen as almost perfect illustrations of the current trend to try and create smart cities. These initiatives are based on the production, manipulation and circulation of large amounts of data. They are tied to new understanding of how to act on the city, by targeting urban issues, and providing solutions to challenges, such as pollution and waste management, ageing and health services, or public transportation and mobility practices. As they rely on close associations between public bodies and private entities, these initiatives might redefine not only the city's modes of governing, but also the urban political identities, as citizens in Singapore might be offered new ways to intervene in issues that matter to them, and San Francisco inhabitants might be turned into economic agents optimizing their choices according to the incentives that their transportation app provides them.

The 'smartness' of these examples is problematic though. Are these projects connected to concrete realizations or mere flagship announcements that serve window dressing objectives? In what ways are the data on which they rely being used in a 'smart' manner? As we encountered these cases in the context of a research project on urban innovation,[2] we gradually displaced the problematic 'smart' label in order to be able to ask other questions: How to analyze them, not as standalone innovative projects, but as components of a wider evolution in urban policies? How are these initiatives connected to the political and economic ordering of the city? What do they tell us about potential alternatives being left out in that process?

In this chapter, we argue that a way to approach these questions is to set aside, at least temporarily, the 'smart' label, and study cases such as Virtual Singapore or San Francisco's transportation app as 'city experiments'. We use the expression 'city experiments' to point to

[1] https://www.nrf.gov.sg/programmes/virtual-singapore

[2] This project is entitled 'City experiments: new mobility practices and urban infrastructures'. The empirical material used in this chapter comes from a collective fieldwork conducted successively in San Francisco (February and June 2016) and Singapore (February 2017, and February 2018). We conducted interviews in public bodies, private companies, and civil society groups. These interviews were complemented by the relevant public documentation and press materials. We thank the participants to the collective fieldwork: Madeleine Akrich, Stève Bernardin, Jérôme Denis, Liliana Doganova, Félix Talvard, and the graduate students of the Public Affairs and Innovation program at Mines ParisTech.

situations of urban life where experiments are conducted which directly engage the nature of the city itself. A growing literature has been focusing on 'urban experimentations' (Evans et al. 2016), and is an invitation to analyze the means through which experiments can be empirical and theoretical entry points for the study of contemporary urban transformations. The focus on city experiments, we argue, is a way of studying these transformations without taking the claim of novelty at face value, while also reflecting on the possibility for replication, extension, and possibly widespread deployment.
This chapter builds on the two case studies briefly introduced above to explore the analytical interest of the study of city experiments. We start by discussing why these two initiatives can be considered as 'city experiments', and what the analytical consequences of this notion are. We then break down the components of city experiments, again illustrating them with these two cases. Finally, we discuss the analytical value of studying city experiments.

Investigating city experiments

Two experimental situations

The vocabulary of experiments has become a pervasive trope in the contemporary urban discourse. The two examples briefly introduced above can be seen as illustrations of this trend. 'Virtual Singapore' is expected to provide a digital infrastructure through which 'concepts and services' can be 'test-bedded'. Singapore National Research Foundation states that this project offers possibilities for 'virtual experimentation' (e.g. exploring 4G coverage), and 'virtual test-bedding to validate the provision of services' (e.g. modelling crowd dispersion).[3] Here, the simulated environment can be used to test possible scenarios and/or explore in virtual ways the consequences of a particular situation. For instance, as the person in charge of Virtual Singapore showed us during an interview:

> the Dassault Systems' 3D Experience tool is meant to simulate a variety of situations such as a leak in the natural gas network supply and its spreading in a building (meant to determine, by drawing on various behavioural models, the best evacuation plan that would be implemented depending on the profile of inhabitants in the area); a short-time sales operation in a mall (requiring testing the speed and direction of escalators); the positioning of rooftop solar panels (to find out their profitability according to their exposure to certain weather conditions).
>
> (A.P., Dassault Systems, 15 February 2017)

In these virtual experiments, 3D visualization is key to envision a series of scenarios generated by the combination of various datasets. When we met the people in charge of Virtual Singapore at Dassault Systems, they also underlined another dimension of the test, namely that the platform itself, and its components, was experimented with in the process.
In San Francisco, the language of experiments is a recurrent part of the official discourse of public bodies like the SFMTA. The experimental dimension of the MuniMobile App was explicit in the initial testing phase, which was managed by a dedicated private company, and

[3] https://www.nrf.gov.sg/programmes/virtual-singapore

during which self-registered users tested a beta version and offered feedback to the SFMTA.[4] But the experiment extends far beyond the initial testing phase of the app. Once in place, the app offers a platform gathering data, which can be used to test various mechanisms related to pricing and incentives. As the person in charge of innovation at the SFMTA said to us during an interview:

> We're experimenting with what the customers actually care about – what they care about is getting free things. We call that gamification. We don't have the money to pay for these things so we think the right approach is to partner with the private sector and have them do it.
>
> (T.P., SFMTA Office of Innovation, 10 February 2016)

For all their differences, Virtual Singapore and Muni Mobile share a dual dimension of the experimental platform. On the one hand, they are meant to serve as infrastructures on which various tests can be conducted. On the other hand, they are also meant to be tested as platforms supposed to be designed to optimize urban interventions.

Experiments as an analytical category

In these two cases, the language of experiments is that of the actors involved. We see this pervasiveness as an invitation to theorize the notion of experiments, and use it as an analytical category. While this move can build on the recent literature of cities and urban innovation (Gieryn 2006; Halpern et al. 2013; Laurent and Tironi 2015; Tironi and Sànchez Criado 2015; Evans et al. 2016; Kitchin 2016), we take our inspiration here from a series of work in STS that has discussed the politics of experiments. Early works in the field considered experiments as operations that simultaneously act on the production of knowledge and social ordering. Shapin and Schaffer's seminal study of the nascent experimental physics in 17th century England (Shapin and Schaffer 1985) and detailed studies of practices of testing (Pinch 1993) have been followed by studies that have extended the discussion of experiments to situations where economists test, in vitro or in vivo, their theories or models thereby re-arranging the economy itself (Callon 2009; Mitchell 2005), protesters reinvent the forms of political activism (Barry 1999; Doubleday and Wynne 2011), experts test 'technologies of democracy' (Lezaun and Soneryd 2007; Laurent 2011), and users of mundane technologies make sustainable development a matter of personal experience (Marres 2012).

We do not want to provide a detailed review of the rich STS literature on experiments, but rather point to a few lessons that are directly useful for our study of cases, such as Virtual Singapore or San Francisco's MuniMobile. First, experiments associate a sociotechnical apparatus with demonstration practices, for the sake of a learning objective (Barry 1999; Rosental 2013). Crucial to this collective production of knowledge are the ways in which the heterogeneous components of the apparatus are specifically assembled and the demonstration practices are actually performed.

Second, experiments can be 'economic' in that they participate in the making of markets (Callon and Muniesa 2007), and 'political' in that they are components of democratic ordering processes (Laurent 2016). Virtual Singapore and MuniMobile can be seen as both

[4] https://www.sfmta.com/sites/default/files/agendaitems/2015/11-3-15%20Item%2010.4%20MuniMobile%20app.pdf

'economic' and 'political' experiments in that they engage both the elaboration of markets and the would-be appropriate mode of intervention of the city's public bodies.
Third, the study of experiments is neither 'micro' nor 'macro', but focuses on the association between the apparatus making the test possible and the spaces that are re-ordered to make its validation possible (Callon and Latour 1981; Latour 1983; Laurent 2016). Thus, understanding Virtual Singapore as an experiment requires that one connects the test conducted on the platform with the audiences they are expected to convince, including foreign companies that Singapore's government might hope to attract, or investors eager to fund potentially lucrative technological developments. Similarly, San Francisco's MuniMobile cannot be understood as an experiment without accounting for the ecology of actors involved in the design of the app, its successive tests, and the distinct audiences assembled.

City experiments

We use the important body of STS work devoted to experiments to see Virtual Singapore and San Francisco's MuniMobile as 'city experiments'. The expression points to the fact that these initiatives are urban-related projects intended to explicitly serve as tests, arranged to produce new knowledge that remains at least partly uncertain, and tied to public demonstrations.
In the course of these tests, the city itself (or part thereof) is experimented with: whether it is a virtual representation of the city expected to determine future urban organization (e.g. in designing emergency routes), or a transportation test eventually re-routing flows of passengers, any city experiment envisions, explicitly or not, a peculiar definition of the future, and a redesigned and reordered city (e.g. easily manageable, congestion free, etc.) at the core of the test itself.
Echoing the ways in which the Chicago School made Chicago a laboratory and a field-site (Park 1929; Gieryn 2006), these projects are entry points for us to develop an analysis of contemporary forms of urban organizations, in their political and economic dimensions. Such an approach comes with descriptive questions orienting the investigations: What is tested in practice? Who are the experimenters? In which site(s) and experimental conditions are the tests conducted? What are the audiences addressed by the public demonstrations? Who is expected to certify results?

The components of city experiments

Analyzing urban initiatives such as Virtual Singapore or MuniMobile as city experiments implies that we account for a series of components of these projects. In this section, we break down city experiments and discuss their components.

Experimenters

All experiments need experimenters, and city experiments are no exception. But the identity of these experimenters might be more distributed in the latter. In San Francisco, the tests developed with MuniMobile not only associate the SFMTA and the City Innovate Foundation, but also a wide range of private transportation providers such as Uber, Lyft and the local group rideshare company Chariot, and service companies as well (such as Waze or other apps). Virtual Singapore associates a private company, Dassault Systems, and a public body, the National Research Foundation, in the development of the platform. Who might then use it to test 'concepts and services' is still uncertain, but may comprise many different actors. Other examples in Singapore have shown that public bodies might be keen to call for diverse actors to use urban data to test technologies. For instance, the Jurong Lake District has been conceived of as a 'smart district' aimed to make data available for companies, start-

ups, or individuals to develop technological 'solutions'.[5] The language of 'solutions' here points to problems that are not yet identified, but could be so thanks to the intervention of a wide range of actors having expertise related to housing, transportation, healthcare, etc.
For all the possibility of a diversity of experimenters to intervene, city experiments are also strongly dependent on the ability to restrain the perimeter of who is expected to act as experimenters. In Singapore, the circulation of data is problematic. During an interview, a scientist in charge of numerous data production and analysis projects at the Jurong Lake District spoke of an 'Asian point of view'[6] as he referred to the ways in which open data protocols were used in Singapore, as he stressed that making urban data available was also counter-balanced by an active control of their circulation and use. Other kinds of tension are visible in San Francisco, as the tests conducted by the City Innovate Foundation are meant to use data provided by private companies eager to benefit from their economic value, and reluctant to make them widely available. While the political value of data is what makes their circulation problematic in Singapore, it is their economic value that makes it so in San Francisco – a tension that has been dealt with by introducing third party contracts to regulate data circulation.[7]

Experimental subjects and objects

Experiments operate on entities that are made experimental, possibly by cutting their ties, standardizing them, making them comparable with each other (Latour 1987). In city experiments, the entities that are experimented with might be technical systems of data acquisition, pricing mechanisms, or human behaviors. Thus, city experiments shape political objects, whether market objects (Callon et al. 2002) or objects of government (Lezaun 2006), such as testable scenarios and the virtual platform that Virtual Singapore relies on. In doing so, they also manufacture political subjects, such as citizens turned into economic agents expected to make real-time decisions in San Francisco (Laurent and Talvard 2017), or citizens framed as 'smart, efficient subjects' within the Smart Nation program in Singapore (Ho 2016).
Virtual Singapore can operate only if data are available, and this also involves participating inhabitants. Some data layers of the Virtual Singapore Platform have been completed by distributing 40,000 individual sensors to students. These sensors collected data about the students' geolocalized displacements, the noise they were exposed to, or the wifi coverage and connectivity they experienced from one place to another. Thus, Singapore's inhabitants become part of the experiments, as crucial components of the infrastructure required to make the laboratory work.
The MuniMobile app also calls for various kinds of data related to the use of public transport among the municipal network (subways, tramways, buses and trolleys), so that riders can plan their journeys, knowing the transit times of vehicles to a particular stop. To make such data available in real-time, for instance, the precise position of buses is detected with an algorithm calculating an estimation from previous rides on the same line and information remotely provided by the vehicle thanks to GPS tracking tools. Thus, each bus is not a mere transportation vehicle anymore, but also becomes a key data provider, and as such part of the experiment.

[5] W.S.N., Deputy Department Head, Urban Systems at the Institute for Infocomm Research, A*Star, 14 February 2017.
[6] W.S.N., Deputy Department Head, Urban Systems at the Institute for Infocomm Research, A*Star, 14 February 2017.
[7] Thus, the SFMTA regularly sets up agreement with private companies (e.g. transportation app providers) and public universities, whereby the latter use the data of the former for the benefit of the SFMTA but without disclosing the data.

Laboratories

The 'laboratorization' of the world (Latour 1987; Callon 1989) is particularly well illustrated in the city, as parts of the urban space are turned into testing grounds (Karvonen and van Heur 2014; Evans et al. 2016) or entire cities are erected from scratch as test-beds (Halpern et al. 2013). Exploring the laboratories on which city experiments occur means that one is attentive to, at least, the following elements.

First, and contrary to scientific laboratories where secluded research is performed (Callon et al. 2009), the laboratories where city experiments are conducted are part of what is tested (Coletta 2017). Virtual Singapore and MuniMobile are less stable data systems serving as infrastructural background for future tests than sociotechnical apparatus in the making, which might evolve significantly according to the outcomes of city experiments.

Second, analyzing the laboratories of city experiments requires an attention to the spatial organization of the city. In San Francisco, it helps point to an emerging understanding of city organization in terms of permanently evolving flows (of people, cars and other means of transportation) that are supposed to be managed in real-time. This 'real-time' reorganization construes the space of the city as a permanently revised outcome of optimization operations (Kitchin 2014). As such, it can be opposed to long-term planning, which sees the spatial organization of the city as a long-term intervention on costly material elements (Laurent and Talvard 2017). Virtual Singapore offers an illustration of the articulation between virtual and physical spaces. While the boundaries of the virtual laboratory seem neatly defined, as they separate the virtual world from the material one, the articulation between the two is crucial. Gathering data requires that a network of sensors is extended across the city, possibly through the help of inhabitants (see above). The virtual space is less a digital representation of a physical city than a reconstruction of another space, part virtual and part material, that is meant to be a laboratory.

Third, investigating the boundaries of city experiments' laboratories allows us to identify framing operations and subsequent overflowings (Callon 1998), and offer an analytical path to consider entities that do not fit with the standardization process of the tests, and that eventually are cast out (Star 1991). Organizing Virtual Singapore as a laboratory supposes that elements that cannot be measured by the network of sensors on which it relies are left out. Turning San Francisco into a 'real-time city' makes the whole city a laboratory in a way that imagines the role of public bodies (including above all the municipal transportation authorities) as coordinators able to ensure that supplies and demands of urban services are permanently optimized. To most of these public bodies, such a perspective is often framed as an alternative to costly and controversial long-term public investment in transportation infrastructures (Laurent and Talvard 2017). It indeed frames the role of public authorities in a way that excludes long-term action.

Audiences

There is no city experiment without associated demonstrations. City experiments, like other experiments (Shapin and Schaffer 1985; Barry 1999; Rosental 2013), need to assemble an audience expected to attest that their outcomes have value. Simulations in Singapore offer a virtual platform for the production of public proofs addressed to a community of experimenters made of government bodies eager to ground their intervention in the urban environment on tested (if virtual) facts. The audience of the tests is not limited to government bodies though. Another audience is envisioned by the simulations' designers, namely potential stakeholders of the initiative being tested. Eventually, and in line with longstanding practices of collaboration between foreign companies and Singapore's government (Akrich et al. 2017), Virtual Singapore also serves as a demonstration addressed to customers and investors whereby Dassault System may publicly prove the value of its expertise. In San

Francisco, the MuniMobile experiment is meant to produce proofs for transportation managers to act on pricing mechanisms and transportation administration. In a similar fashion as Dassault Systems, the City Innovate Foundation is also a global actor involved in different places and using interventions in one site as a demonstration of what it can do in another. As such, the tests are also meant for all the experimenters involved to provide demonstrations of their ability to act on the city.

Examining the audience component of city experiments offers a way out of two of the difficulties we might encounter when studying smart cities. First, when analyzing audiences, there is little room for asking questions such as whether or not the initiatives at stake are 'mere hype'. As they necessarily comprise the assemblage of public proofs, and an external gaze to witness them, city experiments are necessarily construed as 'hype'. What matters then, for both the actors involved and the analysts studying them, is less whether or not this 'hype' has 'real' grounds than who it manages to convince, convey and eventually transform, and by what means. Second, the study of city experiments' audiences offers an opportunity to avoid questions related to whether the analysis is (or should be) 'micro' or 'macro', 'local' or 'global'. As one cannot understand city experiments without accounting for the audiences that they assemble, they are part of particular spaces within which they are expected to have value. This latter point leads us to our final reflection. We can now get back to our initial questions, and discuss the ways in which the analysis of city experiments offers us a path to answer them.

How do city experiments matter, and to whom?

After having characterized Virtual Singapore and MuniMobile as city experiments, and broken down their components, we can now explore how the analysis of city experiments helps us answer our initial questions: How to analyze city experiments, not as standalone innovative projects, but as components of wider evolutions of urban policies? How are these initiatives connected to the political and economic ordering of the city? What do they tell us about potential alternatives being left out in that process?

A way of approaching these questions is to explore how city experiments matter, and to whom. Of course, this is a question raised by the actors themselves, but it is also relevant as an analytical interrogation, in order to identify relevant sites where contemporary cities are transformed. Studying how city experiments matter and to whom is also a way of examining a crucial issue: are these experiments only first steps before larger deployment? Or can one identify a mode of governing cities that would be characterized by a permanent experimental state? San Francisco and Singapore provide elements that lead us to the second half of this alternative, yet in ways that significantly differ.

San Francisco and real-time democracy

The variety of experimenters intervening in the MuniMobile initiative consider it important in that it takes part in a renewed understanding of the urban organization. Indeed, they naturally connect it to a diversity of city experiments in San Francisco. When we interviewed the head of SFMTA's innovation office, he immediately invited us to talk with some of his colleagues at the Office of Civic Innovation at San Francisco city hall. There, he told us, we could complete our understanding of why initiatives such as those he had just presented to us were important in San Francisco. At the Office of Civic Innovation, which was created in 2012 in the wake of the election of the late Edwin Lee as mayor of San Francisco, we were presented with a series of initiatives aimed to test potential solutions to urban problems, through various partnerships with start-ups, thanks to a new Open Data program. In San Francisco, we encountered other initiatives undertaken by the SFMTA, often in partnership with other

public bodies, and meant to act in adaptive ways. Programs such as 'pavement to parks', 'a collaborative effort between the San Francisco Planning Department, the Department of Public Works, and the Municipal Transportation Agency',[8] seek to involve local inhabitants in the test of small-scale urban infrastructures in dedicated areas of public space.

As we studied the experimenters of the MuniMobile experiment, the entities that were being tested, the laboratory that it relied on, and the audiences it assembled, we were drawn to other city experiments. MuniMobile mattered in that it was connected to these other initiatives, which together aim to turn San Francisco into a self-proclaimed 'capital of innovation', where urban problems and solutions are permanently re-defined and re-adjusted. In this context, city experiments are not just primary trials before a definitive extension of a given technical solution, but technologies of government (Rose and Miller 1992). They are the tools whereby public bodies act on people, and which turn them into particular political subjects, namely individual ones expected to contribute to the identifications of urban problems and solutions. Understanding this was not only a way to re-situate city experiments, but also to better understand the nature of the political, economic and material ordering at stake in the 'capital of innovation'. If MuniMobile is indeed a component of a 'real-time city', what the set of initiatives in which it is situated draws is a type of ordering that makes the real-time adjustment of urban problems and solutions the core task for governing the city. One can see here a problematization of the sources of democratic legitimacy, as well as a proposition for the identification of the active participants of urban life – namely those who mobilize to make urban problems explicit, and/or propose solutions to them. The 'real-time democracy' that emerges here (Laurent and Talvard 2017) is also the outcome of economic ordering processes, as private actors make urban issues a new source of market demand, and, perhaps more fundamentally, as inhabitants are expected to adopt economic modes of reasoning, following incentives, or acting as entrepreneurs to propose new solutions for urban problems.

Singapore and the making of a global laboratory

In Singapore, projects based on simulating the city, or part thereof, in which government bodies are engaged not only comprise Virtual Singapore, but also a modelling tool developed by the French company EDF in collaboration with the House and Development Board (HDB), and various modelling initiatives conducted at the Singapore MIT Alliance for Research and Technology (SMART) in partnership with government bodies such as the Land Transport Authority. The number of these projects, the networks of sensors on which they rely, the sheer amount of data they gather, and their integration into a 'Smart Nation' program might well be components of what a recent book characterizes as a 'smart state' (Calder 2016), thereby re-affirming what others had claimed in the early days of the smart city trend, that Singapore had the potential to become the model smart city (Mahizhnan 1999).

Whether or not this is indeed the case is less important here than what the city experiment lens allows us to account for. A first straightforward remark is that alongside Virtual Singapore aimed at simulating the entire city, other projects offer more detailed information on some features, such as the EDF simulation, which aims to serve as a platform for HDB to test building innovation, and for local stakeholders to confront various choices related to building layout. These other simulation projects could be described using the same categories as those discussed in the previous section. We would then be led to examine connections between these various city experiments, as, for instance, public bodies are involved in several of them, or companies compete to attract would be customers or investors. What emerges then is a desirable horizon of intervention for the Singapore public bodies, whereby

[8] http://pavementtoparks.org/about/

simulation would offer a technological tool on which to base the government of the city, for the sake of political subjects expected not only to be passive simulated entities, but also contributors to the collection of data and as would-be users of the platform.
As real-time democracy in San Francisco is an outcome of both political and economic ordering processes, this type of political ordering is also economic. Indeed, the value of Virtual Singapore for the actors involved is tied to another laboratory that emerges from the collection of city experiments, namely the island of Singapore itself. While global companies use the city of Singapore as a test-bed for experimenting with their technologies (here simulation methods), public bodies deliberately use the characterization of Singapore as a laboratory to attract these companies. The analysis of Virtual Singapore is thus not only that of a single city experiment, but leads us to reflect on the aggregation of them, and eventually on the making of Singapore as the outcome of deliberate experimental strategies. These experimental strategies have been tied to the definition of Singapore as an independent city-state, able to become a global laboratory for multinational corporations to test their technologies. They are now part of a redefinition of Singapore's instruments of government to include virtual tools. Singapore offers yet another case where city experiments are not a first step before mainstreaming, but a central component of how the city is expected to be governed. But whereas San Francisco provided an illustration of techniques of government based on real-time interventions, Singapore makes experiments a condition for the city-state to ensure its long-term stability.

Alternative cities

The political and economic ordering processes that we identified out of the Virtual Singapore and MuniMobile cases are also choices for the desirable city, which have little reason to be consensual and/or uniformly stable. In San Francisco, the affirmation of innovation as an engine for urban life is often met by scepticism, if not violent protest. The city experiments we mention can be contrasted with others, performed by concerned groups and activists (De Kosnik 2014; Maharawal 2014), and perhaps best understood as counter-experiments. Activists protesting the gentrification of the city have been active in the 'anti-eviction mapping project', which gathers data and maps them to illustrate the transformation of the city, and test potential connections with other evolutions, such as the growing role of private actors in transportation. In doing so, they oppose the optimization of flows circulating in the city characteristic of real-time democracy by supporting another type of democratic organization, namely community building. Activists use data to demonstrate the need for political action against the transformations of the city. This demonstration aims to persuade a local audience to join an active community. .Activists' interventions here can be seen as a powerful counter-experiment, and as such offers an alternative vision of the city.
Virtual Singapore offers no example of counter-experiments. Yet it is a telling illustration of the problematic transformation of the global island laboratory. The official discourse calls people in Singapore to act as innovators 'and to co-create with business corporate bodies',[9] actively taking part in technological innovation and participating in the identification of urban problems and solutions. Tools such as Virtual Singapore are meant to serve as platforms for various stakeholders to intervene in the urban life. One can identify here a tension between opening up simulation tools to external contributions (for would-be entrepreneurs, or political discussions about city choices, or foreign actors) and maintaining control. This tension is at the heart of the stabilization of city experiments in Singapore. While it might offer entry points to re-thinking the nature of political intervention in the city state (at both descriptive

[9] V.N., Deputy Head, Smart Nation Programme Office, 8 February 2017.

and normative levels), it also shows that analyzing city experiments is also investigating stabilization processes, and potential sites of friction.

Conclusion

In this chapter, we have proposed to contribute and dialogue with the large amount of works contemplating, urging for, or critically examining the move towards smart cities by focusing on city experiments. Drawing on the STS literature on laboratory and tests practices (Latour 1983; Shapin and Schaffer 1985; Pinch 1993), we suggested that a focus on city experiments offers relevant entry points for the study of contemporary urban transformations. Such an STS-inspired approach builds on the recent invitation to explore 'urban experimentations' as an emerging mode of governance (Karvonen and van Heur 2014; Evans et al. 2016), and develops it in several ways. As it takes seriously the key role of experiments in smart city projects, it proposes to study the production of knowledge about the city, as it is articulated with processes of economic, material and political reorderings. The 'smart' label might cover a wide range of domains, and leads one to examine what is 'smart' and what is not, what is 'real' and what is 'mere hype'. By contrast, city experiments can be empirically accounted for by carefully examining a series of concrete components (e.g. experimenters, experimental subjects and objects, laboratories, audiences). Such an approach thus provides some insights into the investigation of city experiments in practical and theoretical terms. In addition, the analysis of city experiments connects many elements that comprise, but are not limited to, what are commonly seen as components of smart cities. Not only does the investigation point to a range of actors that is far beyond the key players usually made visible (funders, ICT firms, and local start-ups), but it also stresses the ecology of political and economic reorderings – and their articulation to (international) networks in situated, local urban initiatives – in which city experiments take a significant place.

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