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Insourcing the smart city: Assembling an ideo-technical ecosystem of talent, skills, and civic-mindedness in Singapore

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Insourcing the smart city: Assembling an ideo-technical ecosystem of talent, skills, and civic-mindedness in Singapore

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Abstract: This article examines an alternative model of smart city formation, one based on the principle of insourcing technical competencies and capabilities to those responsible for city governance. This model counters the logic of technological outsourcing upon which many assumptions and critiques of the smart city rest, and thus reveals ways in which a more generative discourse can be forged. Drawing on a series of in-depth interviews with senior stakeholders from public and private sector organizations, we develop a case study of Singapore's Smart Nation initiative. Through coordinated efforts to reorganize the public sector's technological functions, develop nation-wide skills upgrading programs, and repatriate overseas tech talent, the government strives to assemble an ideo-technical ecosystem of talent, skills, and civic-mindedness in Singapore. This is an ecosystem designed to establish the public sector as the driver of urban innovation, and thus maximize the benefits of "civic tech".

Keywords: Smart city, insourcing public sector innovation, civic tech, Singapore

Introduction

This article examines an alternative model of smart city formation, one that counters the logic of technological outsourcing upon which many assumptions and critiques of the smart city rest. The outsourcing logic positions the city in a state of antagonistic tension with the global economy – and the seemingly predatorial role of the private sector therein – on the one hand, and civil society on the other. This positioning underscores two problems that define the smart city. One, smart city policies become a "mask for entrepreneurial governance" as they are "best understood as examples of outward-looking policy promotion for the globalized economy" (Wiig, 2015, p. 258). As "outward-looking" attempts to "sell" the city and its problems to private sector solution-providers, the smart city has been interpreted as the latest phase of neoliberal urbanism. This leads to the second problem: neoliberal urbanism involves the "subordination of place and territory to speculative strategies of profit-making at the expense of use values, social needs and public goods" (Peck et al., 2013, p. 1092). In this view, the outward orientation of the city and its administrators obstructs the potential for smart city solutions to "actually address urban inequalities" (Wiig, 2016, p. 535). From the perspective of neoliberal urbanism, the problem of smart cities is that private sector players are incentivized by profit, not civic mindedness. Yet, whilst there is a growing chorus of studies that demonstrate the ways in which "smart city initiatives face problems with respect to value creation and capture" (Oomens & Sadowski, 2019, p. 485), at the same time relatively "little is known about how smart city governance is organized in practice" (Ooms et al., 2020, p. 1227). Indeed, it could be argued that smart city critiques have a role to play in obstructing the development of a more generative discourse.

In helping to overcome this impasse, we explore an alternative model of smart city formation that foregrounds the role – and importance – of public sector actors in driving the design and development of "smart" solutions. In doing so, we contribute to an emerging field of research that explores the nexus of innovative urban governance (IUG) and public sector innovation (PSI). Work in this area not only foregrounds the role of the public sector as a driver of innovation, but also asks critical questions

about “whether innovatory techniques configure or reinscribe existing alignments of power, control and expertise” (McGuirk et al., 2022, p. 1402). Integral to this project is conceptualizing the evolving role of the state in the reproduction of urban political power, the role of the urban-as-scale in driving solutions that can be replicated elsewhere, and the critical assessment of how the normative value often attributed to innovation might distract attention from its adverse impacts. Indeed, as much as the risk of private sector exploitation might justify PSI, so too might “state capacities … be recentralized as authoritative ‘innovation agents’” (McGuirk et al., 2022, p. 1403) that can obscure the potential for alternative forms of innovation, “smartness”, or participatory politics to emerge. By exploring the role of state-led innovation in driving smart city development, we aim to foreground the role of citizens – specifically tech talent – in driving innovation in ways that both highlight the importance of the public sector, but which co-opt the private sector as well. Embracing the bridging capacity of co-optation, we problematize the assumed distinctions between citizens and government, and between public and private sector stakeholders, and in doing so offer a new articulation of “what ‘citizen-centric’ means” (Cardullo & Kitchin, 2019, p. 1). We illustrate this alternative model through an empirical analysis of how tech talent and capabilities are insourced to Singapore.

Insourcing involves attracting tech talent to Singapore, instilling technical knowledge and capabilities amongst those responsible for city governance, and thus upgrading the technical competencies of the public sector more generally. Doing so reveals a desire to compete with, but also decenter, the role of the private sector in bringing smart city policies to (partial) fruition. In doing so, it builds on recent calls for research to “not be blinded” by the role of the private sector when analyzing smart city policies, but instead to focus on “reveal[ing] the creative, reflexive and collaborative actions from within cities” and how they might “speak to a more reflexive and iterative interpretation of the smart city idea” (Söderstrom et al., 2021, p. 105). Understudied is the insourcing of skills from the private to public sector, and how finding, attracting, and retaining such in-demand tech talent might be the foil needed to realize a more genuine, and public-oriented vision of what “smartness” is or could be. Our argument is that much of the critical literature on smart cities rests on, and reproduces, a sense of inequity between the public and private sectors; between structures of governance and civil society; and even between the state and the city. By a stroke of geographical fortuitousness, the island city–state of Singapore overcomes these distinctions and reveals a more integrationist logic of smartness that permeates both the public and private sectors, and society-at-large. This is a logic that moves beyond the idea of remaking the (smart) city “from below” (e.g. Purcell, 2003; Shelton & Laduto, 2019), and gestures towards a more polydirectional assemblage of “smartness” (Perng, 2019) that is public sector led. By problematizing the hierarchical assumption of top-down/bottom-up and the inequitable privileging of private sector interests in public-private partnerships, these assemblages emerge from the space of critique and work towards a state of becoming instead.

Our alternative model is derived from recent calls to situate the smart city in-between the “worlding” and “provincialising” logics of contemporary urbanism (after Burns et al., 2021; Joo, 2021; Kong & Woods, 2021). To do so is to embrace what Söderstrom et al. (2021, p. 104) term a “realist stance” that involves, amongst other things, “identifying and empowering new loci of enunciation from which to speak back against, thereby contesting, mainstream global urbanism” (Sheppard et al., 2013, p. 895). Rather than thinking of the smart city in linear terms – terms that position it somewhere in-between the global and local, or the mainstream and periphery – there remains an ongoing need to recognize the plurality of smart city formations that can illustrate the polydirectionality of the assemblage identified earlier. Empirically helpful is that many Asian cities offer novel developmental pathways that negate the idea that they might be ““catching up” with the smart city models and experiences of the West” (Joo & Tan, 2020, p. 2). The developmentalist nature of many Asian cities is underpinned by an outsized role of the state in urban affairs. Indeed, while “national governments have seldom been discussed in [the] smart city literature, they are often the main actor … in many cases in Asia” (Joo & Tan, 2020, p. 6). Nowhere is this truer than in Singapore, an island city–state that has developed a reputation as a “globally-oriented neo-developmentalist smart cit[y]” (Joo, 2021, p. 1). Drawing on 31 in-depth interviews with public – and private-sector architects of Singapore’s Smart Nation, we explore how the government “drives digitalisation efforts” (Tan, 2021, p. 4) by

insourcing the tech talent needed to develop its own innovation ecosystem that works *with* the private sector, but does not necessarily depend on it.

Insourcing the smart city

Criticisms of the smart city focus on the political economy of urban development, which in turn can obfuscate the more practical problems associated with implementing projects and realizing the vision of a more seamless urban life. As much as smart solutions strive to simplify the city by automating it, so too do they complicate it by implicating more and more stakeholders within the process of urban governance. Neoliberal critiques of the smart city outlined above emphasize the ramifications of this implication by drawing out the public-private distinction, and its material consequences (Tan, 2021; Willems & Graham, 2019). The private sector is often seen to push the public sector to adopt more market-driven forms of governance, but these forms often jar with the complexity of cities and their multi-layered realities (Karvonen et al., 2019). Whilst recent scholarship has embraced the role of PSI in general (McGuirk et al., 2022), and idea of "state intrapreneurship" – the "latent or actually existing entrepreneurialism apparent *within* public sector bureaucracies" (Miao & Phelps, 2019, p. 316, original emphasis) – specifically, our contention is that two factors – public-sector outsourcing and technological enclosure – continue to play an outsized role in limiting the realization of "smartness". Whilst the first factor is now a point of debate within the literature, the second is arguably more novel. Below we outline the inter-relationship between the two factors, and then offer an understanding of how the tensions between them might be reconciled through public sector-led innovation.

The capacity-building logics of policy mobility

There are two mutually reinforcing problems that often fuel critiques of the smart city. The first relates to the policy mobility of smart city solutions and the associated reproduction of neoliberal forms of urban governance, the second relates to the exclusive ecosystems that such forms give rise to. In terms of the first problem, neoliberal urbanism is a paradigm in which the "market arranges services, infrastructure, and resources … that hither-to-fore have been provided by the state" (Cardullo & Kitchin, 2018, p. 816). Central to these arrangements is the role of private sector organizations in supplanting the state, and often obstructing the potential for effective and citizen-centric governance to be realized. Compounding this situation is the scalar dislocation of many (especially large-scale) private sector players in effecting local change. These are players that are abstracted away from local conditions by the lures of global capital: they are not invested in cities, or the specific conditions of any given city, only the solutions they can profit from. As a result of this dynamic, there are underlying "tensions between the smart city policy script of improving on urban problems and the underlying benefit of these policies, which [are] oriented to the globalized information economy" (Wiig, 2016, p. 536). This premise has galvanized the critique of smart city policy mobility. Policies – and the specific solutions or products they give rise to – have been interpreted as "more supply-driven rather than demand-driven" (Angelidou, 2015, p. 101), as "estranged from – partly foreign to – the context in which they encounter them" (Temenos & McCann, 2013, p. 344), and thus subject to intense scrutiny about how they are "assembled, adapted and implemented" (Wiig, 2015, p. 259). Economic abstraction creates cleavages between a trans-regional, or even universal, idea of "smartness" – which is rooted in technological innovation and associated capitalist development – and the idiosyncrasies of the "city" as a socio-spatial assemblage of people, infrastructures, and problems. Accordingly:

> smart cities narrative is not related to a specific place, model or standard, but is rather constituted by a loose discourse which has multiple places of origin and is difficult to "geo-localise". Municipalities and local actors actively (and often strategically) negotiate, reshape, select and produce new versions of this globalizing narrative. (Söderstrom et al., 2021, p. 103)

These processes of negotiation, reshaping, selection, and production are arguably most divisive in cities of the global south. In India, for example, the 100 smart cities initiative has been shown to

"encourage intra-city competition and cooperation with private partners" which in turn "reduces cities to a neoliberal commodity through which improving living standards and reaching sustainability goals are seen through the narrow lens of economic growth parameters" (Das, 2020, p. 55). Whether it is the formulation of policy, the installation and operation of digital infrastructures, the selling of smart solutions, or the appointment of CEOs, CTOs, or CFOs to manage digitalization initiatives, private sector organizations position themselves so that they are "*de facto* the ones in control, particularly because they are presumed to be innovative, competitive and creative" (Das, 2020, p. 60, original emphasis). Doing so reduces the role of citizens and the machinery of democratic participation and accountability in favor of more privatized models of urban decision-making. In South Africa, a similar dynamic is at play. Whilst private sector organizations have been embraced as the "engine driving transnational connections, delivering the smart city as a mobile policy onto the shores of South Africa", the public sector in general, and the apparatus of the state specifically, is "cast in a translator role, evaluating and executing on smart-related private sector investment pressures, as filtered through policy lenses and governance mandates" (Söderstrom et al., 2021, p. 109). Like with India's 100 smart cities initiative, the idea of the smart city in South Africa has become a "vehicle for – and a lexical glue to hold together processes of – digital neoliberalisation" through which private sector interests can become embedded "everywhere" (Söderstrom et al., 2021, p. 115).

Whilst assembling solutions in place is one thing, ensuring the translation of technological innovations to address real-world urban problems is another. In this vein, as much as policy mobility and the reproduction of neoliberal urbanism presents one set of problems, another set stems from the exclusivity that comes with many solution-providers, for whom developing smart solutions presents an opportunity to lock-in clients to their technological ecosystems and ensure future business development. Technological advancement, coupled with the mobility of smart city policies, creates a "booming market of smart city products and solutions" (Angelidou, 2015, p. 95). However, so too does it cause the public sector to become enclosed within, dependent upon, and increasingly driven by private sector-led technological ecosystems that do not necessarily lead to citizen-centric innovation or efficacy. In India, for example, the drive towards making citizens "smarter" has been interpreted as a performative foil for the relative lack of citizen engagement and the failure to address already-existing socio-economic inequalities (Das, 2020; see also Woods, 2020). Going further, Datta (Citation2018, p. 413) argues that in India the "introduction of "smart people" in policy reflects a shift from the ordinary citizen to the tech-savvy, entrepreneurial and judicial citizen working for and on behalf of state enterprise, innovation and growth". Playing an integral role in the alignment of the state with its push towards digital governance, these "smart people" serve as conduits through which political power is reinforced *through* the private sector. Knowledge gaps between public and private sector stakeholders can also pose more fundamental barriers to innovation. In Hong Kong, for example, low levels of digital literacy amongst public – and people-sector stakeholders have impeded the rollout of open data initiatives (Ma & Lam, 2019). These dynamics underscore the second problem: exclusive ecosystems.

The pace of technological change often sits uncomfortably with the public sector, which typically moves more slowly and, in contrast to their private sector counterparts, tends to prioritize legacy over innovation. This creates various gaps: a knowledge/skills gap, a hard/software infrastructure and systems gap, a policy gap, and more. All these factors create opportunities for technological enclosure and profiteering. Perng (2019, p. 418) explains this dynamic insofar as "large infrastructural projects set up to engineer 'smart' or 'testbed' urbanism are often black-boxed due to expert knowledge, specialist equipment, and the political and financial investment of the state and multinational corporations". The "black box" of smart city ecosystems presents a barrier to their applicability, as it limits the potential for the public sector to become an agentic stakeholder in the deployment of smart technologies. Applied research has recently started to focus on the vendors of smart city solutions, the aim being to "help developers, city managers, urban planners, and policy-makers to take better decisions when choosing smart city software solutions" (Saborido & Alba, 2020, p. 1). So too has it started to focus on smart city managers, and their important yet understudied roles in implementing smart city projects (see Michelucci et al., 2016). The fact that these managers have been overlooked

reveals a gap in understanding how people might be responsible for mediating between the private and public sectors. Moreover, whilst this scholarship helpfully draws attention to some of the on-the-ground problems facing urban administrators caught between expectations to demonstrate "smartness" and the enclosing tendencies of private sector implementors, only relatively recently have concerted efforts been made to explore and understand innovation practices that are public sector led.

People, the public sector, and innovative urban governance

Much like the "smart" identifier itself, the embrace of innovation has caused it to become a panacea for urban governance and a principle for sustainable urban futures throughout the world. Innovation has become a "powerful and increasingly ubiquitous societal mindset" with IUG having "trigger[ed] the adoption of novel institutional forms, approaches, and techniques" (McGuirk et al., 2022, p. 1391). Despite holding such a central place in the empirical imagination, critical urban theory has been slow to embrace IUG, and its conceptual twin PSI, due to its ""bright side" normative tendencies and prescriptive endorsement of innovation" (McGuirk et al., 2022, p. 1397). Another arguably more nebulous, factor is the extent to which innovation has become a proxy for economic development, which itself runs the risk of reproducing the exclusionary logics captured earlier. Important in this regard is the location of innovation within *public* sector governance frameworks, and the reconciliation of tensions between news ways of doing things and the "outmoded, overly hierarchical, stiflingly risk averse and oriented towards stability and predictability" (McGuirk et al., 2022, p. 1397) arrangements they often rub up against. IUG frameworks have so far focused on the role of new modalities of operation in driving public sector change. These include new institutional forms like city labs and innovation offices; an embrace of design thinking approaches and public-oriented competitions and challenges; and one-off events like hackathons and prototyping exercises. Altogether, these efforts are designed to valorize an approach to urban governance that is "geared towards agility, responsiveness and speed; experimentation, iteration and the embrace of failure; and multi-sectoral co-design and collaboration" (McGuirk et al., 2022, p. 1392). Whilst these are the ideals that are sought, often their realization is a more fraught process of negotiation, compromise, and un – or sub-satisfactory outcomes.

Notwithstanding, there is empirical evidence to suggest that some cities are more open to experimentation, and more effective in the embedding of innovation and its variable outcomes, than others. In Leeds, UK, Chatterton et al. (2018, p. 227, 240) consider how the "novel institutional personae" of a co-production city lab has been developed to "blend horizontal structures with hierarchies, circular with linear thinking, fast with slow working rhythms" whilst "maintaining politicized concerns about redistribution and inequality" amidst the backdrop of austerity. In Asia, Miao and Phelps (2019) build on well-rehearsed narratives of the role (post-)developmentalist state in effectively driving economic growth and modernization to explore the idea of state intrapreneurship. In countries like Singapore, Hong Kong, Taiwan, and South Korea, the progressive, interventionist, and outsized role of the state in both public and private affairs creates a unique environment in which innovation and entrepreneurship can be incubated and embraced. In doing so they foreground the role, importance, agency, and what they describe as "latitude" (p. 320) of the state in driving the economic transformation of cities. Specifically, they emphasize both the role of the state in creating the conditions through which private sector-led innovation can flourish – through regulation, funding and incentives, tax reliefs and more – but also the "*intrasocietal* precondition for the state to deal with external challenges" (Miao & Phelps, 2019, p. 316, original emphasis). When taken together, these processes lead to the state-led, and state-incubated development of new products, services and markets that leads to the emergence of "new specialist state, quasi-state and private organizations" (Miao & Phelps, 2019, p. 321). Our contribution to these ideas is to foreground the role of citizens as drivers of innovation. In doing so, we emphasize the importance of *insourcing* tech talent to the public sector.

Insourcing the talent, ideas and capabilities needed to drive innovation *from* the public sector provides a departure from the outsourcing tendencies of many smart cities. Outsourcing involves the public

sector looking to the private sector to fill in the gaps created by its deficiencies, whereas insourcing involves the public sector proactively reigning in functions and capabilities that might previously have been outsourced, the aim being to achieve a more flexible and in(ter)dependent modality of operation. The public sector thus becomes the driver of innovation and the structuring force behind the ecosystem. Integral to this modality of operation is the role of citizens – people – in driving change from within. Citizen participation has been conceptualized according to a "scaffold" that positions them in relation to the neoliberal logics that often underpin smart city initiatives (Cardullo & Kitchin, 2019). In some, but by no means *all* contexts these logics have been shown to have a marginalizing effect on citizens. Like the "smart" identifier itself, the idea of citizenship within the neoliberal context of the smart city has been criticized for being an "empty signifier" (Cardullo & Kitchin, 2019, p. 2), a reification of the "self-governing and reflexive subject" that is implicated in "calculative "technologies of government"" and thus "passive adopters and consumers of new technologies" (Tan, 2021, p. 3, 6). Beyond these overarching critiques, there have also been calls to focus on the "actually existing smart citizen" – one that "plays a much messier and more ambivalent role in practice" (Shelton & Laduto, 2019, p. 35), and which might find the smart city to both open up and close down various opportunities for participation, community formation, rights to the city, and civic ideals that transcend the market. As Cardullo and Kitchin (2018, p. 814) assert:

> citizen participation is often synonymous with "choice" and the market, with the predominant citizen roles being: "consumer" or "user", selecting which services to acquire from the marketplace of providers; "resident", if they can afford the exclusive access to a smart district; or "data product", creating data through their use of smart city technologies that companies can then incorporate into products and extract value from.

The citizen is construed as separate from, and subservient to, the market. Whilst this logic might hold true in some contexts, it is by no means universally applicable. Indeed, it is a logic that rests on an assumed distinction between the citizen (people), the governmental-administrative/public sector (public), and the marketplace of smart city product and service providers (private). These distinctions are conceptual abstractions that can easily unravel through empirical application. Lacking is an understanding of how digital transformation in the *broadest* sense can trigger citizens to

> gain a new awareness and … ability to participate in new modalities of government. As they become embedded in digital assemblages of hardware, software and networks, citizens are empowered to communicate, collaborate, and participate in urban governance processes and mechanisms. (Ho, 2017, p. 3102)

In this schema, smart solutions can help to bridge the gap between state and society, even if doing so might create new, or contribute to existing, forms of socio-technical marginality and exclusion. Understandings like this rely on a different interpretation of what "smartness" can entail; these are interpretations that "entail a closer, more efficient and effective way for citizens to relate to government, for government to engage citizens and for how cities are governed" (Ho, 2017, p. 3103). The point is to look beyond state-society relations as being dichotomous, and to recognize the fact that citizens often comprise public sector stakeholders themselves. The same is true for the private sector, given that the private sector is implicated in an economy that is comprised of citizens, technology companies, and citizens working *in* technology as entrepreneurs and employees. It is in this capacity that tech talent can be seen as a mediatory interface that can incubate, translate, or even drive innovation in ways that transcend the market.

Nationalizing the smart city in Singapore

Singapore presents a prototypical case study of how these distinctions have been overcome, and thus provides both theoretical and empirical value to the smart city discourse (after Kong & Woods, 2018). Theoretically, it speaks to a layer of governance – the national – that has often been overlooked. Indeed, Varró and Bunders (2020, p. 209) lament the fact that the policy mobilities literature often

"overemphasizes the global and the local" which has caused the national to "be reproduced by these ideas as a relevant scale of urban regulation, discursive framing and strategy-making under globalization". By defining the national in relation to the local (city) and global (market), it is denied a sense of agency that can offer new insight into pathways of smart city formation. Echoing this sentiment, Bok and Coe (2017, p. 51) have called for the national scale to not be seen "merely as functional and institutional infrastructures across and through which policies circulate" but as an "active agent of policy mobilization across space and scale, especially in contexts of strong, centralized governance". This is a modality of governance that is keenly felt in Singapore, where the "national" is conflated with the "city", creating a uniquely singular governance structure through which policies can be implemented. Further emphasizing the idea of agency is the role of people as public sector agents, and as the targets of policies designed specifically to recruit and nurture smart workers and citizenry, which in many respects underpins the value of the Singapore case. As a global city, it is well-positioned to harness global flows of policy ideas. As a developmentalist city–state, however, the government and public sector plays an interventionist role in moderating the effects of these flows on society (Joo, 2021; Woods & Kong, 2017). Indeed, whilst the Singapore case is unique for many reasons, its developmentalist underpinnings resonate with many other Asian cities in which the state plays an outsized role in shaping developmental policies and outcomes.

Singapore's unique geography creates the conditions through which its developmentalist policies can be implemented with a degree of efficacy that is difficult to reproduce elsewhere. It is not just a "city–state where paradoxically a city must coexist with a territorially coterminous state that exercises sovereignty over itself as a city and state" (Barber, 2013, p. 11), but so too is it an *island* city–state that establishes clear parameters of distinction from that which exist outside its borders, and alignment amongst those inside. Accordingly, Singapore's political leaders have always had to be alive to the need to try and "driv[e] the city's global competitiveness but also … directly meet local citizens' demands" (Joo, 2021, p. 5). This desire for state-society alignment has been further strengthened through the ideological apparatus of the state. Since the formation of the Republic in 1965 there have been "currents of (geo)political existentialism" through which the state's "meta-narratives" are reified through the "practitioner politics of anxiety" (Bok, 2020, p. 1218). This anxiety rests on the discursive construction of threat that spans the political, economic, social, and military domains. Tackling these threats head-on through the ideo-policy frameworks of the state has become a hallmark of governance in Singapore (Hoe, 2016), and provides a compelling counterpoint to the idea that the smart city reproduces a "largely depoliticized ideological rubric" (Brenner & Schmid, 2015, p. 158) through which technocratic neoliberalism – enshrined in the smart city – becomes rooted in place. Contrariwise, Singapore's smart city initiative – termed the "Smart Nation" – adopts a "whole-of-nation approach to enhance the quality of living for the country" (Hoe, 2016, p. 327). It is an initiative that is totalizing and unidirectional in its coverage and established in a way so that it cannot fail.

Altogether, these factors cause Singapore's smart city to be what we term a "nationalizing" construct. Whilst the Smart Nation was first announced by Prime Minister Lee Hsien Loong in November 2014, it draws on a long and largely successful lineage of foregrounding the role of technology in spurring Singapore's socio-spatial and economic development. In many respects, Singapore began its administrative transition to becoming a "smart" city in 1981 with the formation of the National Computer Board, and its policy reorientation in 1986 with the unveiling of the country's first National IT Plan (Ho, 2017). As much as these efforts have been about inducing technology-oriented change, so too do they reflect a "concomitant improvement to governance and how policies are implemented for [the] betterment of society" (Chang & Das, 2020, p. 425). This characteristic sets Singapore apart. The government claims to moderate the role of the private sector in driving innovation and technological development, in turn promoting an image whereby "the government drives digitalisation efforts" (Tan, 2021, p. 4) and appears to assume responsibility for their successes and failures. As we discuss later, in response to the launch of the Smart Nation initiative the government also undertook a restructuring of the civil service and created a Smart Nation Digital Government Office (SNDGO) and a Government Technology Agency (GovTech). Whilst the former oversees strategy, the latter drives the digital transformation of the public sector. This has caused the Smart

Nation to not just be a whole-of-nation approach to the smart city, but also a "whole-of-*government* approach … to solv[ing] problems" (Hoe, 2016, p. 329, emphasis added). There is, however, more to it than just the mechanics of public sector organization and policymaking. Important is the ideological dimension in creating alignment amongst the population. Thus.

> the Singapore government, through masterplans and specific policies, not only puts forward a particular prioritized imagination of a future but it also, in doing so and by providing the infrastructural means, materializes this imagination and, with it, a particular productive, skilled population. (Willems & Graham, 2019, p. 517)

It is at this juncture that the Singapore case deviates from normative understandings of the developmentalist state. Whilst developmental smart cities are understood to be "master-minded, hardware-driven projects developed by governments and big businesses who are keen to apply the most cutting-edge technologies", the Smart Nation initiative is one that strives to "develop a collaborative ecosystem that engages citizens and improves their lives around the Smart Nation platform" (Joo, 2021, p. 4, 9). Whilst we do not discount the role of the interventionist state in molding state-society relations around a distinct vision of what "smartness" is, it is important to appreciate the mobilizing effects of such interventions. As much as mobilization can be seen as the latest, digitally defined form of governmentality in Singapore, so too has it proven to be an effective foil for many of the critiques of the smart city outlined above. A key point of distinction is that Singapore strives as far as possible to *insource* its Smart Nation projects; an action that is premised on "grow[ing] its domestic pipeline of technologies and talent" (Tan, 2021, p. 4) through nation-wide skills upgrading programs, the repatriation of overseas tech talent back to Singapore, and, more generally, a desire to compete with (and reduce the influence of) the private sector in shaping Singapore's urban future. Understanding this dynamic reveals a sedimented modality of urban development that transcends the latest paradigm of urban thinking. These assertions help us understand Singapore's positioning within the global landscape of smart cities, which is now explored through empirical insights derived from the architects and visionaries of the Smart Nation.

Assembling an ideo-technical ecosystem of talent, skills, and civic-mindedness

The subsections that follow draw on qualitative data generated through in-depth interviews with stakeholders representing both the public and private sectors that have been responsible for implementing the Smart Nation. Fieldwork started in April 2021, and was concluded by April 2022. In total, 27 interviews with 31 stakeholders were conducted. The public sector organizations that we sampled included GovTech and SNDGO, ministries like the Ministries of Defence, Foreign Affairs and Home Affairs, and statutory boards such as the Housing and Development Board and the Land Transport Authority. The private sector organizations we sampled included the Development Bank of Singapore (DBS), Singapore Technologies Engineering, Starhub (a local telco) and Huawei International. Important to note is the seniority of many of our interviewees, which included CXOs, Permanent Secretaries, Managing Directors, Directors of divisions and Group Heads. For some organizations, we also sampled more junior employees. Notwithstanding the benefits of access, we are mindful of Miao and Phelps's (2019, p. 323) observation that, when conducting interviews with elites in Singapore, it is difficult to avoid the problem of "interviewees uncritically replicating the 'Singapore story'". Whilst the positive tone struck by many of our interviewees reflects this sentiment, many spoke with candor about the struggles they faced in realizing the vision of the Smart Nation. We also offer critical interpretations of their views where it is fitting and appropriate to do so. Many of the interviews were conducted by all authors, and most were conducted by at least two. All interviews were audio recorded after informed consent was obtained, fully transcribed, and then sent to the interviewee to edit for factual accuracy, redact any sensitive content, and ultimately approve for publication. Given the seniority of most interviewees, they were also given the option to be named personally, to be identified as representatives of their organization, or to be anonymized. This gave us a rich dataset that offers unprecedented insight into the architects of Singapore Smart Nation initiative, and the black box of Singapore's governmentality.

Centralizing "smartness" within and throughout government

The desire to become "smart" has led to changes in the organization and administration of city governance structures throughout the world. Whilst many cities have now "created a dedicated organizational unit focused on planning and implementation of Smart City (SC) projects, led by an SC manager" (Michelucci et al., 2016, p. 23), these moves have often been criticized for being piecemeal, uncoordinated, and thus responsible for reproducing, not ameliorating, the ineffectiveness of smart city policies. This is less evident in Singapore. The Singapore state has long been known for being a "medium and vehicle of knowledge mobilization" (Bok & Coe, 2017, p. 51), and this logic carries through to the Smart Nation initiative as well. Revealing is the scale of change that needed to be implemented for smartness to become centralized throughout government. This centralization coalesces into two distinct entities: GovTech and SNDGO. Coalescence has enabled the government to centralize the government's technological capabilities so that one agency provides the CIOs for all branches of the government, as well as a framework for technology governance to ensure that processes are aligned. Doing so enables the tech functionality to become more concentrated within government, but also to become easier to diffuse throughout the different ministries, ultimately leading to better "cross-functional integration" (Michelucci et al., 2016, p. 26) and what are claimed to be better outcomes.

The logic for doing so is rooted in the high stakes invested in the Smart Nation being a series of policies, products and solutions that must be effective if they are to build societal trust in the state's vision of Singapore's urban future. Tan Kok Yam, Deputy Secretary of SNDGO emphasized how important the entire Smart Nation initiative is: that it is not just a "fad" or about "branding" but something that has long-term implications for Singapore and must, therefore, be executed well. This is a sentiment that was identified as originating from Prime Minister Lee Hsien Loong, before cascading down through the civil service and eventually society too. This offers, then, another way in which smartness is centralized. Ng Chee Khern, Permanent Secretary of SNDGO, shared how.

> our PM is very technically savvy … he codes … he is our greatest mystery shopper. He doesn't just have vision, he actually goes down into the nitty gritty details of how technology is used by people … he has always been quite at the forefront of what it takes to use technology well.

Smartness is not just centralized in organizational units and governance structures, but also from the head of state himself. Whilst critics have argued that the "neoliberal-developmental logics of the state" place limits on smart interventions by "facilitating authoritarian consolidation in Singapore" (Ho, 2017, p. 3101), such consolidation can also be interpreted as a structural benefit that can help overcome many of the barriers to smart city execution outlined earlier. That is, irrespective of whether authoritarian consolidation is facilitated or not, the logics of the state are also designed to maximize the efficacy of its smart interventions. A central challenge in this regard is how to attract and retain the right kind of tech talent that is needed to drive innovation from the public sector outwards. This need underpins the idea of insourcing the smart city, and is justified on the basis that the Smart Nation is a citizen-motivated initiative.

Insourcing talent, skills, and civic-mindedness

Creating and centralizing tech talent within government is integral to its transformation, and to the wider socio-spatial transformation driven by the Smart Nation. Many cities – Singapore included – struggle to overcome the problem of "vertical tech silos" within the public (and private) sectors that "cannot easily and efficiently interact with each other" (Robert et al., 2017, p. 1). The formation of GovTech was designed to ameliorate this problem, reflecting the fact that "we are just not born native digitally, so multiple levels of transformation need to happen" (Kok Ping Soon). It has long been recognized that the Singapore government is a "believer in the virtues of infrastructure advantages" (Mahizhnan, 1999, p. 15), and in the contemporary world these "infrastructures" go beyond the built

environment and include talent as the infrastructural driver of transformation. In this sense the Smart Nation is not just an ideological vision of Singapore's future, but also a pragmatic response to contemporary problems. Whilst these problems are commonly framed as existential threats to the country's survival, so too are there more competitive drivers of transformation. Arguably the most pervasive, and indeed most potentially exploitative, is the role of the private sector in driving innovation. As Chee Khern explained:

Sometimes we feel like we are being frozen by the private sector … [If] you go to your car mechanic, and [he] tells you that you better change your brakes because it is not safe, and if you are not technically inclined, you will not be inclined to argue with him/her, you just accept … ICT systems are like that. When the vendors come back with this and that, if you don't have some expertise of your own to assess what they are telling you, projects turn out to be a lot more expensive than it otherwise could be. So partly it is just defensive, partly it is just so that as we start to invest a lot more in ICTs and smart systems, we know what we are talking about, we can hold the vendors to doing a good job. But it is more than that … the government in Singapore is the thought leader, it drives the economy, drives the society.

Whilst the threat of the private sector taking advantage of the black box of ICT systems can be seen to spur the government to "keep up" on a practical level, on an ideological level so too has the government positioned itself as a leader, and not just follower, of change. Technology can be seen to "further entrench the pragmatic and depoliticized ethos of Singaporean society", but so too does it play an important role in "empowering and transforming practices" (Ho, 2017, p. 3113) throughout all levels of government, society, and economy. The bigger problem in this regard, however, is that building a talent infrastructure does not happen organically, nor is such talent necessarily available in Singapore. Career pathways in Singapore have tended to see technology as a starting point, but then something that is grown out of to reach higher levels of seniority and career progression. As Ping Soon told us

> if I'm looking for people with 15–20 years of experience, Singaporeans in the tech industry, they are not really tech, they are business development, project management, consultancy and all that. They are not the real tech people. If you want to be *real* tech, you're likely to end up with the Googles and Facebooks in Silicon Valley.

Attracting tech talent to relocate from the private sector in Silicon Valley to work for the public sector in Singapore is a tough proposition. Chee Khern told us how he and other senior representatives of SNDGO and GovTech – alongside private sector companies from Singapore and the region – would make annual trips to the San Francisco Bay Area to connect with Singaporeans, update them on developments in Singapore, and begin socializing them into the idea of working for the public sector in Singapore. Chee Khern spoke of the need to develop a "certain engineering culture that can assimilate people who have worked in the private sector" and thus create the conditions through which they can thrive professionally and thus catalyze organizational transformation. The point is that Singapore's public sector has increasingly started to mold itself to the private sector's ways of working, so much so that "the Prime Minister told us not to benchmark to other governments, but benchmark to technology companies" (Chee Khern). GovTech's apparent success in doing this is captured in Tan Chin Hiong's – a Systems Engineer for GovTech – admission that

> a lot of people are attracted to the start-up culture, the start-up branding that GovTech has, and therefore we are able to attract the right people with both the skills that are needed and also the impetus to change things. If you are housed under or within a very bureaucratic organization, at least formally bureaucratic … they might not be able to effect the change that they want to and they end up leaving.

Programs like the Technology Associates and Smart Nation Fellow programs have been initiated to build up GovTech's skills capacity. The Smart Nation Fellowship gives prospective tech talent an

opportunity to experience GovTech's working culture without the commitment and risk that comes with changing jobs. The program works as a "kind of taster" of what working in GovTech is like, wherein "we pay you, you spend two, three months with us, no obligations, you see whether you like it or not" (Ping Soon). To attract exceptionally skilled tech talent, there is also a Distinguished Engineers program wherein "we bring them in not to fill a box, but we bring them in to draw boxes around them … If they are good, I'll let them discover and then I create teams around them" (Ping Soon). We were told how many of the Singaporean engineers based in Silicon Valley expressed a willingness to contribute to the Smart Nation, but did not want to relocate back to Singapore and work for the government. This idea of contributing – of giving back, or of being motivated by civic mindedness rather than salary or prestige – is claimed to be a powerful draw for Singaporeans and non-Singaporeans alike. Notable in this regard was our interview with Hunter Nield, an Australian citizen who was first a Smart Nation Fellow before becoming a Distinguished Engineer with GovTech. As he explained:

> I had an interest in both the Smart Nation but also modernizing government technology, so that was what got me there originally – that kind of civic tech and all those sorts of things was the initial impetus that drove me to submit my application for the Smart Nation Fellowship. I've been in Singapore now for about ten years. About that time, I was about seven years or so [in], I think, and so I also wanted to contribute back. I've been working in the private sector for my entire career … I wanted something a little different, not necessarily just about making money … I wanted to have something that had an impact.

Interesting is that the desire to contribute to society and make an impact transcends citizenship, and gestures towards a more cosmopolitan idea of how harnessing technology might be able to bring about lasting change. This was echoed by our more junior interviewees, who had "never been driven by profit" (Chin Hiong), or who "want to use tech for good … to save money, save time for our fellow citizens" (Christine Yong, Associate Data Scientist, GovTech). The civic mindedness captured here is instilled through the public education system from an early age. Inclusion into the narrative of the Smart Nation, and smart citizenship more generally, can be interpreted as a path-dependent process that starts in school. Through the mechanisms of scholarships, bursaries, and fast-tracked career pathways, Singapore's public service grooms top students from a young age to align with the national-technocratic vision of the government. This adds nuance to Datta's (2018, p. 413; see also Cardullo & Kitchin, 2019) understanding of smart citizenship in India, whereby "smart people [a]re collaborators and endorsers of the smart city, rather than critical and active participants … smart citizens [a]re constructed as allies of state-private sector experiments in urban governance". In Singapore the question is whether the apparent distinction between being a "collaborator" or "endorser" versus a "critical and active participant" is collapsed or not. For many civil servants, socialization into the governmentality of the "smart" state starts at a young age, and is often indistinguishable from a more holistic sense of civic consciousness. Notwithstanding, the opportunity to participate in the advancement of "civic tech", as Hunter put it, is relatively unique to Singapore as the political framework is in place to maximize the chances of creating impact. Hunter again:

> [Singapore] is a little bit of an exemplar in some ways of how a Smart Nation can be run … If I was back in Australia, I would never consider working for the government in that context. You know, I've got good friends who work in Australia in that sense, in the government and in technology and things, and it is a nightmare.

Christine echoed Hunter's sentiment, sharing how "I have not met many of such people in other countries … I feel like that is quite rare". Sentiment like this suggests that as much as the Smart Nation can be seen to cascade down from the Prime Minister, so too is it "actively reworked and reproduced from the bottom-up" (Bok, 2020, p. 1225) in ways that ensure a constant flow of ideo-technical ideals and imageries between the state and society. Thus, by "elevating technology to a powerful human force that humans need to better their city, this [urban] order becomes a symbolic and material system of knowledge that enlists agentive and affective human capabilities to normalise

and legitimise controlled cities" (Georgiou, 2021, p. 397). Importantly, this is a system of knowledge that is patently Singaporean: insourcing talent ensures that civic mindedness is the nucleus of the Smart Nation, and radiates out from there. Whilst the effects of this are manifold, so too has it provoked resistance in response to such dramatic organizational and attitudinal change.

Creating a culture of public sector-led innovation

Whilst insourcing talent is a relatively straightforward process, creating the cultural change needed to ensure this talent can be effective in their work and generative in their impacts is harder. Integrating insourced talent into the civil service was first met with resistance, as the dynamism of Silicon Valley was coming into direct contact with the conservatism and bureaucracy of the Singapore government. Our interviewees drew a clear distinction between the rule, process, and plan-oriented nature of the Singapore government and the action-oriented and more experimental nature of Silicon Valley. New, more agile ways of working sat uneasily with the more risk averse and process-driven style of the civil service. With time, however, the public sector has evolved to better integrate these individuals and their ways of working. These evolutions and integrations provide a point of contrast to other cities. For example, in Dublin, Ireland, Cardullo and Kitchin (2019, p. 1) lament the fact that citizen participation is often limited to them being "consumers or testers, or people to be steered, controlled and nudged to act in certain ways, or as sources of data which can be turned into products". Sentiment like this reflect a short-term, product-centric perspective that is rooted in the premise that citizens are little more than data points from which surplus value can be extracted. In Singapore, integration has enabled civil servants to become the drivers of innovation. Chin Hiong shared that "if we have an idea, we can bring it up to our managers … we can talk about it and see what is the impact it would bring … we can internally get some funding to kickstart this".

The effect of this is that innovation itself is led by the public sector, sometimes in collaborative partnership with private sector partnerships, but not dependent on it. This dynamic builds on a legacy in which "historically the private sector has looked to the government in terms of thought leadership" to the point that "where there are companies, or where there are specific technology areas that we want to promote, we sometimes co-develop, co-source rather than just outsource to companies" (Chee Khern). Doing so blurs the public/private distinction, thus expanding the government's innovation ecosystem, but at the same time it also consolidates its control over what is being developed and how. As Ping Soon explained:

> the way we work with industry is to have industry develop with us. There's a difference between *with* us and *for* us … With us is, look, I have my developers, you have your developers, can we bring our developers together to work on a project? That is what is happening, what we call co-development work … it not only doubles up our capacity, but, more importantly, there is a transfer of skills on both sides.

Noteworthy here is the sense of civic mindedness that permeates such co-development arrangements, whereby skills upgrading leads to the betterment of the domestic workforce through capacity building. In this sense, the Singapore case contributes to existing work (e.g. Burns et al., 2021; Dowling et al., 2021) that aims to problematize the seductive view that "smart cities involve actively using advanced, off-the-shelf technologies to *solve* urban problems" (Joo & Tan, 2020, p. 4, original emphasis). Now GovTech is at a point where it has enough technical capacity to "move up the line of innovation, to abstract away from some of the development work" and to move towards "greater reusability, more platform-based, more standardized control environment, and by doing that it actually opens up opportunities for more small-scale companies" (Ping Soon). This ongoing blending of the private/public sectors is set to become more pronounced as GovTech evolves to

> allow companies to build on our infrastructure, and in fact to extend our infrastructure … When you think about it, one of the values of the government is that we create a very trusted environment. We are a party [which] competitors will feel comfortable

> working with. On their own, they probably wouldn't want to because of data sharing, because of trust and all that (Ping Soon).

Singapore's innovation ecosystem is extended in a controlled way so that the government can maintain a sense of regulatory oversight that ensures that civic mindedness remains embedded throughout all Smart Nation-related initiatives. As Oomens and Sadowski (2019, p. 486) note, "in order to grow, internal alignment of partners in these [smart city] projects is crucial", with the Singapore government becoming a platform from which innovation can unfold. The uniqueness of this platform is the trust that it encapsulates, which is integral to enable data sharing and the mutually beneficial collaboration. It creates a development environment in which "information flows between many kinds of smart connected objects, databases and users" and is not used to "feed 'vertical silos' that are closed to [others]" (Robert et al., 2017, p. 1). This would not be possible without a centralized and interventionist state that opens trusted pathways for collaboration. Its ability to do so is indexed to the extent to which "smartness" has become part of the DNA of insourced smart city governance. Insourcing is reflected in the repatriation of tech talent to Singapore to the generation of a more agile culture of working; and from the public sector leading innovation to civic mindedness being embedded within the Smart Nation.

Conclusions

In many respects, this article is about the positioning of the Singapore case within scholarly discourses on the smart city, and the opportunities and challenges that foreground such positioning. On one hand, the Singapore case tells the story of overcoming barriers to implementation and maximizing the effectiveness of smart solutions. We have demonstrated how Singapore's Smart Nation is a state-led initiative orchestrated by civic-minded tech talent that often double-up as citizens. On another hand, the success of the Singapore case raises fundamental questions concerning the extent to which a "smart" city is an inclusive, vibrant, and equitable city. These are urban characteristics that look beyond popular notions of "livability" and foreground the importance of socio-spatial justice as well. We must not lose sight of Datta's (2018, p. 413) observation, from India, that "new categories of exclusion emerge from the digital realm where the right to be a smart citizen was premised on the removal of those not deemed to belong to the future smart city". In Singapore, the question of how marginal groups are co-opted into the social fabric of smart citizenship remains ambiguous, as does the place and viability of alternative modalities of "smartness" that might exist outside of, or even contradict, and perhaps undermine, the state's vision of the Smart Nation. Altogether, the Singapore case reveals a paradoxical situation where centralized power is integral to the realization of a singular vision "smartness" (McGuirk et al., 2022). Notwithstanding, our contribution rests on the focus on globally mobile tech talent – and their unique geographies and belongings – in bridging the public and private sectors, linking ecosystems, moderating the state, and realizing the benefits of "civic tech". In this vein, we build on existing work that has considered the impact of tech talent on various urban contexts – ranging from the disruptive effects of tech employees on the San Francisco housing market and political ecosystem (McNeill, 2016), to the impact of skilled, globally mobile tech talent on waterfront innovation districts in Boston and Dublin (Heaphy & Wiig, 2020) – and consider how it might underpin the notion of what civic mindedness does, or might mean, in the context of the smart city.

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