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Three shades of 'urban-digital citizenship': borders, speculation, and logistics in Cape Town

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ABSTRACT

Drawing upon case studies from Cape Town, 'Africa's smartest city', this article proposes three theses on 'urban-digital citizenship'. First, we suggest that urban-digital citizenship is defined by borders which operate: i) at a socio-spatial level, through the unequal distribution of digital infrastructures across the urban space; ii) through the algorithmic techniques of monitoring, profiling, and sorting, which filter access to urban services, mobility, and participation. Our second argument is that urban-digital citizenship is 'speculative'. The algorithmic infrastructures that have increasingly come to govern urban life operate according to logics of preemption and experimentation that seek to model, and act upon, an array of possible future scenarios. The digitalisation of emergency and security response in Cape Town offers powerful examples of the ways in which urban citizens are caught in a mechanism of machine-learning speculations on future risks and anticipatory interventions. Finally, we propose that digital citizenship has a logistical character. Increasingly, 'smart' cities such as Cape Town function as clusters in global circuits of data, technology, and finance. As data centres and tech startups are concentrated in the urban area, urban citizens have become a testbed for new technological products and a crucial node in the geography of cloud computing.

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Drawing upon case studies from Cape Town, this article aims to single out three key elements for conceptualising 'urban-digital citizenship'. We understand the latter notion as the result of a reframing of, and intersection between 'urban citizenship' and 'digital citizenship' based on three leading assumptions. First, the traditional concept and modern institution of citizenship has been challenged and affected by processes that have led us to perceive the environment in which we live as a highly urbanised and digitalised world. The rise of a new generation of rights belonging to the digital sphere, the growing political relevance of the urban environment on a global scale, the wide use of technology to enact citizen participation and other concomitant phenomena point to the need to rethink the idea of citizenship according to these emerging dimensions. Yet,

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both 'urban' and 'digital' citizenship still remain vague and contested notions among scholars and in the literature (Hintz, Dencik, and Wahl-Jorgensen 2019; Bauböck and Orgad 2020). We suggest that exploring their possible intersections offers a promising perspective for the theoretical and empirical development of these two concepts. Second, the urban space is the quintessential environment in which digitalisation, platformisation, and datafication practices become real and material, meaning that they substantially transform our daily life experience. We contend that a grounded notion of digital citizenship should take into account this interplay between urban environment and technological transformation – e.g. in order to investigate how access to digital rights is limited or fostered in contemporary 'smart cities' (something we will assess in the article's first section). In turn, any idea of urban citizenship should encompass the growing role of digital technologies in reshaping the urban environment, especially in the pandemic context. Indeed, as the editors of this issue argue in the introduction, the production, planning, and governance of the urban space are increasingly accomplished by means of platform and data infrastructures, which create new forms of inclusion/exclusion, negotiation, participation and control – i.e. of citizenship. Third, contemporary scholarship, including this very issue, tends to stress how the Covid-19 crisis has accelerated the impact of digital technologies on the governance of urban life. As we operationalise this hypothesis, however, it is important to pay attention to the contingent and situated ways in which the effects of digital technologies on urban citizenship unfold in pandemic times. In a recent work, Ola Söderström (2021) stresses the importance of investigating the differential modes of existence of what he calls 'the pandemic smart city', that is, how the role of urban smart technologies in the management of Covid-19 is shaped by specific geo-histories and tensions. We will see that, in the context of our case study, the public response to the crisis does not simply accelerate and magnify the processes of urban digitalization, but rather indicates how pandemic management brings to light the fault lines of digital governance.

The theses we advance in this article are based on a multilayered conception of citizenship as both a set of citizen practices and a condition (not necessarily a legal status) that allows subjects to claim, access, and exercise a number of rights, under certain preconditions that are determined by political authorities and social forces. Such a conception will allow our idea of urban-digital citizenship to encompass a bundle of rights and acts of citizenship, as well as the governmental practices that foster or prevent the exercising of such rights and acts. Regarding the former dimension, we will make implicit reference to the idea of *urban rights* as formal and informal rights to access services, infrastructures, and spaces in the urban realm (Lefebvre 1968, 1970; Harvey 2008). We will explore how such rights are put into effect or prevented through the processes of urban digitalisation that shape the technological architectures of Cape Town. Regarding the governmental practices that define urban-digital citizenship, we will focus on the development of *infrastructures* as a core lens for understanding the city and its citizenship dynamics. Indeed, in the urban realm citizen rights, acts, and participation are extensively mediated through infrastructures, whose provision and development, in turn, result from socio-political negotiations and embed relations of power (Star 1999; Graham and Marvin 2001; Graham and McFarlane 2015; Shove and Trentmann 2018; Lemanski 2018, 2019a, 2019b). Through this lens, we will look at the ways in which the development of urban-digital infrastructures – i.e. digital infrastructures deployed on a urban scale – reproduce or transform socio-

spatial dynamics of citizen in/equality, inclusion and exclusion, empowerment and deprivation, emancipation and subjugation (Cardullo 2021). Though this approach – focused on rights and infrastructures – seems to overshadow a crucial dimension of citizenship that entails agency and participation, we will look at these features in the last section (§ 3.2) and in the conclusion by considering the ways in which Cape Town citizens have used social media and digital platforms in the context of the pandemic outbreak to enact forms of logistical urban agency and participatory practices of solidarity.

The article proposes three theses that are aimed at identifying as many guiding trajectories for defining 'urban-digital citizenship' based on our analysis of the Cape Town case. For each thesis, we first advance a theoretical framework (sections 1.1, 2.1 and 3.1) that we subsequently assess and deploy with respect to our case study (sections 1.2, 2.2 and 3.2). In the latter analysis, we also look at the ways in which the pandemic crisis has affected, or interacted with, the dynamics of urban-digital citizenship we are focusing on. The case study is particularly relevant for the aims of this special issue since, in recent years, Cape Town has seen remarkable investments into digital infrastructures both from the local government, as part of the city's Digital Strategy, and from private investors. Labelled as 'Africa's smartest city', 'Silicon Cape', or 'the digital gateway to Africa' (PWC, Wesgro & City of Cape Town 2013), the city has become a hub for digital startups and, more broadly, a critical node in Africa's technological and economic geography. Our notion of 'urban-digital citizenship' is entirely based on the analysis of this specific urban scenario in the pandemic context. In this sense, it is contingent and situated. Yet, we believe that our case study can offer relevant material to think of the way in which the idea of citizenship – as a system of inclusion/exclusion – can be deployed in the contemporary urban realms reshaped by the growing effects of digital technologies.

The article's argument proceeds as follows. First, we suggest that urban-digital citizenship is defined by boundaries which operate: i) at a socio-spatial level, through the unequal distribution of digital infrastructures across the urban space; ii) through the algorithmic techniques of monitoring, profiling, and sorting, which filter access to urban services, mobility, and participation. The second thesis we propose is that urban-digital citizenship is 'speculative'. The algorithmic infrastructures that are increasingly governing urban life operate according to logics of preemption and experimentation that seek to model, and act upon, an array of possible future scenarios. The digitalisation of emergency and security response in Cape Town offers powerful examples of the ways in which urban citizens are caught in a mechanism of machine-learning speculations on future risks and anticipatory interventions. Our third thesis is that digital citizenship has a logistical character. Increasingly, 'smart' cities such as Cape Town function as clusters in global circuits of data, technology, and finance. As data centres and tech startups are concentrated in the urban area, urban citizens have become a testbed for new technological products and a crucial node in the geography of cloud computing.

1. Borders

1.1 Urban-digital citizenship is defined by borders

Our first thesis is that to develop a definition of 'urban-digital citizenship' and to position it in context, we should begin with the analysis of how its boundaries can be understood. The genesis and development of modern citizenship have been closely connected to national boundaries, i.e. to the territorial and social borders of the nation. Birthright citizenship, or *jus soli*, results from birth within the frontiers of the nation state, while citizenship *jure sanguinis* is related to the way in which the boundaries of the social body of a nation are conceived of and legally determined. Within these borders, citizenship has functioned as a powerful driving force of equality (Marshall 1950), while outside it has had major effects of exclusion and discrimination on the global scale (Shachar 2009; Kochenov 2019). In the last four decades, however, this close connection between citizenship and national boundaries has been challenged from several angles by epochal phenomena like globalisation processes, growing migration flows and international human mobility, the rise of new forms of belonging, identity, and participation, and the establishment of supranational forms of citizenship – like the European Union – and entitlement – like the protection of human rights by international organisations and courts. All these processes have undermined the traditional 'boundaries' of citizenship, which nowadays seem to experience significant trends of transformation and multiplication (Mezzadra and Neilson 2013). We contend that the advent of digital technologies has also played a significant role in this direction. This is because the paradigm of the Digital Revolution is based on technologies that produce cyberspace as a new dimension of human existence: a dimension that does not recognize or reproduce the geopolitical borders shaping the world territory (Lessing 2006; Bratton 2015; Orgad and Bauböck 2018). The digital sphere is where a new generation of citizen rights – like access, digital privacy, data encryption and control, etc. – has emerged and grown, where citizen participation and engagement have become increasingly catalysed, and where unprecedented tools of power and domination have been developed (Isin and Ruppert 2015; Tomasello 2022). Hence, 'digital citizenship' has emerged as a central concept to describe the major social and political implications of living in a digital world (Mossberger, Tolbert, and McNeal 2008; Coleman and Blumler 2009; Ratto and Boler 2014; McCosker, Vivienne, and Johns 2016; Hintz, Dencik, and Wahl-Jorgensen 2019). Yet, while throughout political Modernity citizenship has been a quintessentially national institution, the very idea of digital citizenship seems to require a radical rescaling of its boundaries. This is because the digital sphere is intrinsically supranational: it constantly circumvents and eludes those state borders that have forged modern citizenship. Consequently, the definition of the boundaries that can shape the idea of digital citizenship becomes a relevant and challenging question which we aim to address from a specific urban perspective.

The environment in which we live is increasingly a digital world, as much as it is an urban world. While the above-mentioned processes have had the effect of reducing the political centrality of nation states, the urban dimension is indubitably gaining relevance in this changing scenario. Contemporary cities are directly involved in the flows of the global economy and become largely independent of state power regarding the development and organisation of their territories. In scholarship and the international

community, the term 'urban age' is widely used to designate the fact that well over half of humankind now lives in urbanised areas, and that this portion is growing exponentially and destined to encompass three quarters of the Earth's inhabitants by 2050 (unhabitat.org). Hence, the notion of 'urban citizenship', which has long remained marginal in the literature, has gained new and growing attention (Bookchin 1987; Bauböck 2003; Prak 2018; Bauböck & Orgad 2020; Stahl 2020). Geographers identify processes of urbanisation – of production of urban territory – that go far beyond the city-unit to invest entire regional macro-areas, which acquire a fully urban profile in terms of the integration of their infrastructures, systems of mobility, and the organisation of work, trade, and services (Brenner 2013). Even if the paths of urban development are always diverse and situated – as postcolonial scholars have stressed, especially in relation to the Global South (Ong and Roy 2011; Robinson 2011), as cities remain primary sites of biopolitical production (Rossi 2017) – we can assume that these processes of 'planetary urbanisation' (Brenner and Christian 2015; Brenner 2018) also contribute to the phenomena of border transformation and multiplication that we have mentioned above. Our argument is that the global expansion of the urban environment fosters the production of new border regimes and practices *within* contemporary cities (Breitung 2011).

We can use the term 'intra-urban boundaries' to designate these practices, which are quintessentially epitomised by the proliferation of gated communities within the urban space. In the extreme form of the fenced area, the gated community offers the most evident starting point for an analysis of the urban introversion of contemporary borders, which however far more often assume the form of the 'membrane' than that of the fence. We propose to understand 'intra-urban boundaries' as a set of technologies and practices for the articulation of human flows in the city that produce an effect of selective zoning and differential inclusion/exclusion – in terms of urban subjects as well as of timing and modes of permanence in different urban areas (Balibar 2006; Tomasello 2015, 2020). Hence, we can think of intra-urban boundaries as dynamic spatial artefacts determined by political, socio-economic, and even cultural factors, and as multifaceted social institutions whose location and impact result from constant and complex processes of negotiation. Their analysis should therefore focus on how urban planning and design produce bordering effects, regimes, and practices. We will discuss in the next section some factors that have fostered the multiplication of intra-urban boundaries; what is relevant now is to assess the way in which digital technologies participate in the production and reproduction of these socio-spatial artefacts, in order define how the boundaries of digital citizenship can be understood in the urban realm.

In their contribution for this issue, Bignami and Hanakata (2022) advance the notion of platform urbanisation to describe 'a specific kind of urbanisation that is driven and administered through the digital means of platform technologies' and 'a particular way in which planetary urbanisation progresses [...] by introducing various kinds of digital interfaces and sensors' linking people and urban infrastructures (see also Barns 2014; Brenner and Christian 2015). To assess and describe the border effects of this entanglement between urbanisation and digitalisation, we can first look at the so-called *smart borders* that were introduced in the context of the post-9/11 'war on terror' and then proliferated for a multiplicity of aims and uses – including migration control in the US and external borders checks in the EU Schengen area. Smart borders are data-driven technologies that enact a preemptive logic and seek to identify and classify subjects in

virtually every domain of daily life (Amoore 2006). Our argument is that, with the appropriate caveats, the logic of the smart border has seeped into the mundane aspects of urban life, and is increasingly shaping the management of urban services through software and sensing devices. In the smart city, every sensor or login is virtually a checkpoint. Computing infrastructures dissect urban residents into discrete fragments of data, strings of code, numeric values, passwords, credentials, and red flags, which are re-assembled to produce differential paths of access to utilities, services, and benefits, as well as new normative tactics, such as forms of punishment or reward. As one of us argued elsewhere (Antenucci 2021a, 2021b), in contrast to the popular narratives of 'smart' cities as closely interconnected, holistic spaces, urban digitalisation proceeds by creating (or grafting itself upon) zones and by distributing border techniques across infrastructures and mundane objects. The borders produced, or reproduced, through the process of urban digitalisation – from socio-spatial zoning to algorithmic sorting – shape and filter economic opportunities and mobility, access to basic services, and, ultimately, citizen rights. In our view, the analysis of these boundaries and border regimes is the key starting point to develop the idea of urban-digital citizenship as a system of differential inclusion. Urban digitalisation is made of zoning and bordering processes and the way in which it has been developed in Cape Town allows us to describe how 'intra-urban digital borders' work in a contemporary 'smart city'.

1.2 Intra-urban digital boundaries in Cape Town

The planning, experiments, and early implementation of smart projects in Cape Town reveal an interplay of different bordering processes. These operate: i) at a socio-spatial level, through the unequal distribution of digital infrastructures across the urban space, which generates borders to access digital services; ii) at a socio-technical level, through the algorithmic techniques of monitoring, profiling, and sorting, which filter access to urban services, mobility, and participation – what we may call 'algorithmic borders'.

The first kind of intra-urban digital border has to do with the differential development of digital infrastructures throughout the city, which results in differential *access* to the digital sphere. By digital infrastructures here we are referring first to the fibre optic networks that the City of Cape Town has been rolling out since 2011, but also, more broadly, to the wide array of Internet-based facilities and services that have leveraged the presence of fibre optic networks, including Internet of Things (IoT) systems for building management and security, platforms for transport, food delivery, cashless payments, and so on. The development of such infrastructures has not progressed evenly across the urban space, but has concentrated in specific enclaves: in the Central Business District (CBD), which is home to corporate headquarters, upscale hotels, and tourist destinations; in districts that, over the past few years, have emerged as startup hubs, like the former industrial site of Woodstock; and in other wealthy, overwhelmingly white neighbourhoods of the city. In the meantime, the townships of the Cape Flats, built during Apartheid to segregate the black and coloured population of the city, have suffered dramatically lower opportunities to access digital infrastructures. In these areas of the city, where the largest part of the urban population lives, most households cannot afford subscriptions to private Internet providers.

In 2016, the #DataMustFall campaign exposed how low-income South Africans were basically locked out from the digital economy (Cameron 2017). Starting as a Twitter hashtag, the movement quickly grew to a mass protest against the unaffordable prices of mobile data and the oligopolistic conditions of the market. At the time, for around 50% of South Africans, the cost of 1 GB of mobile data amounted to 15% to 40% of their monthly income. Residents are offline in neighbourhoods where public Wi-Fi does not reach. Overall, it is estimated that less than 40% of the metropolitan population has access to a computer on a regular basis; 29.38% of households have no internet access and the percentage grows to 37.6% among black households (City of Cape Town 2018). This social/technological gap has become a terrain of intervention for NGOs, which provide access to the Internet, as well as to computers and laptops, in their township outposts. Commercial players like Google and Cell C have also provided Wi-Fi towers to reach some of the least connected communities of the city, such as Langa, Gugulethu, Khayelitsha, and Philippi. The City of Cape Town has planned to reduce the digital-urban gap by extending network coverage to the whole metropolitan area by 2021, and by providing Wi-Fi hotspots in bus stations, clinics, and libraries. Yet, to date, the distribution of urban digitalisation disturbingly reflects long-standing patterns of socio-economic and racial segregation.

These boundaries that differentiate urban areas in terms of access to digital infrastructures also interact with the major intra-urban borders that shape the physical spaces of Cape Town. The 'smartest' zones of the city are highly securitised, with private guards and cameras restricting access to many premises. In Cape Town, and indeed in the whole of South Africa, the private security industry experienced a boom at the end of the Apartheid regime. This carried clear racist overtones, as white residents increasingly felt threatened by the desegregation of black communities. As private policing still disproportionately targets black individuals (Samara 2010), the checkpoints around and within the digital enclaves of the city are yet another indicator of the ways in which urban digitalisation so far has not reversed, but somehow engrafted upon the spatial legacy of Apartheid and the resulting intra-urban borders. These are part of a more complex set of class, race, and governmental initiatives that filter and hierarchise the ways in which the 'smart' city comes into being – and this brings us to the second feature of the intra-urban digital borders we aim to stress, namely the way in which algorithmic technologies produce border effects in terms of entitlement and access to (non-digital) services and rights.

As computing infrastructures proliferate, they distribute monitoring and profiling techniques throughout a number of everyday activities and essential services. In 2003, Cape Town was one of the first cities in the world to implement an Enterprise Resource Planning (ERP) system to organise various components of the administration into a single, integrated platform. This system was designed and provided by SAP, a German tech multinational that develops enterprise software products for resource management. The initiative was successful enough for some commentators to assert that 'SAP runs Cape Town' ("Case Study" 2013). Currently, the software is responsible for service delivery, human resources, logistics, and finance. The software also creates one single record for each citizen, by running analytics across different data sets, from employment history and income levels to diseases, addictions, and criminal records. This personal record is generated through a process of algorithmic scoring and profiling,

which determines the citizen's position in the system and, consequently, their access to (or denial of) benefits and services. On this basis, city managers claim to be able to identify needs and vulnerabilities more accurately, and to detect potential frauds. This profiling capacity is celebrated as a game-changer for urban administration. In the meantime, however, the rounds of micro-borders – credentials, access to the platform, verification, and authorisation – that citizens must go through to access municipal services, are multiplying. Citizens are tracked, ranked, and profiled for the purpose of anticipating behaviours that might become a burden on the city budget, and of developing cost-effective strategies. For example, households that are profiled as low-income and potentially unable to pay for services, are offered discounts on their bills. This is less expensive for the city than enforcing debt collection. Making people feel that the municipal government has an accurate, comprehensive view of them is also described as a preemptive strategy for discouraging fraudulent behaviour ("Case Study" 2013). Under this system, citizens' rights and entitlements become subject to a continuous process of scrutiny and validation. Households or individuals who fail to pay their bills or to comply with legislation can be flagged and thereafter punished through the reduction of services or the denial of social benefits.

Another example of *algorithmic borders* in urban governance comes from the management of water resources. Since 2015, Cape Town has been facing long droughts and the worst water crisis in its history. As the levels of dams and reservoirs continued to go down, severe restrictions were enforced on water consumption. These included *'smart' water metres*, officially called Water Management Devices (WMDs). The smart metres are connected through IoT networks and managed via mobile platforms. They monitor real-time water usage for each user, detecting and reporting anomalous events, such as leakage, and creating consumption profiles. They even switch the water off when users reach their daily limit. These devices were originally conceived of as disciplinary instruments for 'unruly' households – typically low-income black families – that consumed more water than they could pay for. However, as the water crisis escalated, smart metres were also made available to help non-indigent households to save water. Once again, and similarly to what happened with the SAP municipal platform, for a growing number of households, access to an essential service, such as water, has become dependent on algorithmic scrutiny, scoring, and validation. Now that the crisis seems to have been contained, or at least postponed (Chutel 2018), smart metres are also being celebrated as game-changers ("Smart water solutions" 2017). Planning documents (De Sousa – Alves 2016) illustrate how the city is working towards an increased automation of the water system, introducing the control and reading of metres via IoT devices and the use of analytics to develop proactive strategies.

The public response to the recent pandemic crisis offers a further perspective to look at the functioning of intra-urban digital borders. In the wake of the Covid outbreak, the government of South Africa was quick to develop digital tools to monitor and mitigate the pandemics. The first move was the creation of 'Covid Connect', a Whatsapp channel providing information on symptoms and testing, followed by the launch of a contact tracing app, 'Covid Alert SA'. Built on the Apple-Google Exposure Notifications (GAEN) API, the Covid Alert app uses Bluetooth to notify users of a close contact with another user who tested positive. Experts in digital rights and public health have seen the app as little more than a political gesture, 'a box ticking exercise to show that South Africa was

engaged in tech-based responses' (Alt Advisory 2021, 11). The major obstacle to the effectiveness of the app has been the low number of users. While the exact number of current users is difficult to calculate, it is estimated that less than 10% of the population downloaded the app, making it hardly an effective instrument for monitoring the disease (Alt Advisory 2021). If Covid Alert SA had had wider diffusion among the population, this would have certainly raised concerns regarding surveillance and the potential misuse of personal data. The low rates of usage instead point to the socio-economic borders that still prevent large sectors of the South African population from accessing digital infrastructures.

Using Covid Alert SA requires possession of a smartphone and of a stable Internet connection. As noted earlier in this section, however, for many South African households the price of data bundles still remains too high, effectively preventing a large part of the population from using mobile apps on a regular basis, including Covid Alert SA. These socio-economic barriers in accessing digital infrastructures also disproportionately penalised students from poorer and mostly black communities when, in response to lockdown and social distancing measures, South African schools and universities moved learning activities and examinations onto online platforms. While in line with international initiatives, this strategy resulted in the exclusion of those students who could not afford to be connected for several hours every day, such as those living in rural areas (Marongwe and Garidzirai 2021) or in the townships and informal settlements of Cape Town. As we have seen, borders restricting access to digital infrastructures are structural in the context of Cape Town, and emerge as a legacy of Apartheid urban politics. We suggest, however, that the tech-based state response to the Covid-19 crisis has further deepened these borders and their socio-economic consequences. Indeed, while the digital tracing system in practice failed to reach the residents of townships and informal settlements, those have been particularly exposed to Covid 19 contagion, especially because of living conditions that make adequate sanitation or distancing difficult (De Groot and Lemanski xref). It is in this context of exacerbated inequality, where the rhetoric and/xref; Odendaal 2021). Similarly, the implementation of digital learning systems left out students from poorer urban areas for an extended period of time.

2. Speculation

2.1 Urban-digital citizenship is speculative

In their article for this issue, Reijers, Orgad, and De Filippi advance the model of 'cybernetic citizenship' to describe how relations between citizens and institutions are automated by means of algorithmic technologies and large socio-technical systems that measure, quantify, and evaluate individual behaviours (see also Fourcade and Fleur 2020; Fourcade 2021; Krivý 2018). This model envisages citizens and institutions as connecting nodes in a network based on 'recursive feedback', a network that learns and adapts its activity according to contingent inputs, which are connected and harnessed for citizenship governance. Hence, the 'cybernetic' deployment of the latter relies on vast collections of historical data that 'allow systems to have a "memory" of the past and to "predict" a "future":' it is a governance technology that applies statistical methods to learn from populations' behaviour and uses these data to predict and modulate individual

behaviours (Reijers, Orgad, and De Filippi 2022). To define our notion of 'urban-digital citizenship' and deploy it in the context of Cape Town, we understand these interactions between algorithmic systems, citizenship governance, and behaviour prediction in terms of *speculation*. Louise Amoore (2013) and Marieke De Goede (2012) use the notion of speculation to describe the ways in which after 9/11 security and governance have increasingly been organised around practices that define specific visual fields and which seek to calculate a range of possible future events. For the sake of this paper, we argue that the algorithmic infrastructures that are increasingly governing urban life operate according to logics of speculation inasmuch as they seek to model, and act upon, an array of possible future scenarios.

We contend that 'smart' cities are speculative worlds. At the core of their projects and technological models lies the aspiration to anticipate specific urban futures, out of an array of possible ones, and to manage them preemptively. As Orit Halpern and her colleagues suggest, smart cities are testbeds where not only new technologies but also new forms of government, valorisation, and life are being trialled (Halpern et al. 2013). As several studies have shown (Amoore 2013; Aradau 2015; Pasquinelli 2017), the algorithms in use across security and commercial platforms are designed to generate configurations of future possibilities that are *actionable* in the present. Algorithmic models do not merely represent, but *produce* urban future(s) by blurring the boundaries between population and environment, humans and non-humans. In this regard, Jennifer Gabrys (2016) contends that computing infrastructures exercise an 'ontogenetic power', in that they redefine or create new relations between humans, machines, and natural elements. We here wish to argue that the models and speculative configurations of the smart city are actors in this ontogenesis, as they factor in human and non-human elements of the city to produce paths for preemptive action and new normative patterns. To do so, their analytics rely upon a network of digital devices – such as closed-circuit televisions (CCTVs), acoustics sensors, GPS trackers, and smartphones – and on the data they provide on human and environmental activities alike, to calculate *urban risk factors*. In this context, the object of government is no longer individuals, populations, and things, and not even the environment as a set of living elements, but rather their models – their speculative doubles, projecting them into the future. In 'smart' cities, speculative platforms seek to shape, mould, direct or force the positioning of things and humans in time and space. For this reason, we suggest that governmental uses of algorithmic technologies in the urban realm redefine citizenship along speculative trajectories. Dis-assembled through geographical data sets, urban communities are captured and re-assembled in a series of automated risk calculations that inform preemptive decisions and actions. In this process, algorithms generate specific configurations of urban futures that become normative in the present, insofar as they determine how key components of urban life, such as emergency relief, are provided.

This normative orientation of the emerging forms of urban-digital governance raises the issue that algorithmic calculations are contingent, often self-referential, and strongly imaginative. As Claudia Aradau (2015) explains, algorithmic models work through criteria of proximity, similarity, and sympathy, to develop theoretical constructs rather than produce demonstrable evidence. Yet, the results they produce are highly performative and have tangible effects on urban citizens in at least two ways. First, they sort the city into normative categories, like risk hotspots, which have social consequences, such as causing a particular neighbourhood, block, or street to become (or remain) a regular

target of police attention, security policies, and zoning strategies. Second, these categories feed back into datasets that become the basis for the next models, in a loop that mathematically cements socio-spatial inequalities into future calculations of urban risks. In the next section, we will explore the way in which flawed or biased data, as well as the very inner logic of the algorithmic platforms used to manage urban risks in Cape Town, have the effect of reiterating and magnifying racism and inequality in the provision of urban security. For Leszczynski (2016, 1693), algorithmic modelling is a practice of *futuring* that incorporates urban inequalities and 'projects them forward in time and space'. The intrinsic logic of analytics is speculative, insofar as it is 'designed to anticipate and shape the unfolding of possibilities, particularly those around social deviance, risk and unrest' (Leszczynski 2016, 1692).

We argue that the speculative features and uses of algorithmic technologies indicate a major trajectory for contemporary developments of the idea of *urban security*, broadly understood as the management of a wide range of urban risks spanning from crime to riots, terrorism, health emergencies, traffic issues, natural disasters, and other potentially catastrophic events (De Goede, Simon, and Hoijtink 2014). Since the last quarter of the past century, this idea of urban security as risk management and preemption has inspired the evolution of urban governance in many areas of the world. The decline of the traditional paradigm of the industrial city as a rationalised space, the sprawl of urban territories, and the growth of the urban ontology that what we call metropolis or megalopolis, have fostered the rise of new urban issues and representations of cities as environments marked by a multitude of risks that are inherent in contemporary urbanisation (Tomasello 2020). Hence, the idea of security as risk preemption has come to embody the pivotal principle orienting the governance of urban areas. The 'broken window theory' (Kelling and Wilson 1982), 'crime prevention through urban design' (Newman 1972), and 'zero tolerance' policies reveal the first governmental practices to have deployed such a principle. This paradigm of policing crime and violence epitomises how the logic of risk preemption has reshaped urban governance according to an idea of security as the primal good that the authorities must ensure for urban citizens through risk preemption policies (Simon 2007). Yet, this is only one aspect of the multiple ways in which the securitisation of urban space has been deployed according to a logic of *preemption*. By the latter notion we mean an anticipatory security practice aimed at acting at the earliest possible stage to counteract acts and threats that are still unknown – and ultimately unknowable – but may result from an identified risk category – e.g. water shortages, as we have seen in section 1.2, or floods and fires, as we will consider in the next section. There are evident and multiple connections between preemption practices and what we have described as 'speculation', to indicate the way in which algorithmic technologies operate in the governance of smart cities (Anderson 2010). Indeed, the speculative orientation of such technologies allows data analytics to incorporate anticipatory and preemptive logics (De Goede 2012; De Goede, Simon, and Hoijtink 2014). In this sense, urban digitalisation furthers and transforms the way in which security as risk preemption and as a central principle of urban governance is conceived of, managed, and (differentially) provided for urban populations by algorithmic means of speculative preemption. To illustrate this connection between speculation and preemption in the smart city, we can now look at the creation and development of an algorithmic platform for urban risk management in

Cape Town. The digitalisation of emergency and security response in our case study offers a powerful example of the ways in which urban citizens are caught in a mechanism of machine-learning speculations on future risks and anticipatory interventions.

2.2 Governing urban security in Cape Town

The *Emergency Policing and Incident Command* (EPIC) is a platform that integrates Cape Town's emergency and security services into a single command and control programme. Launched in 2016 as part of Cape Town's digital strategy, with an aim to improve the efficiency, preparedness, and cost-effectiveness of emergency response, EPIC coordinates seven departments: metro police, law enforcement, traffic services, emergency services, fire and rescue, disaster management, and the special investigations unit. Like the ERP system for the management of municipal services (see above section 1.2), the EPIC platform too is powered by software produced by the digital multinational SAP. The latter has developed and commercialised the HANA system (High-Performance Analytics Appliance) for the storage and processing of Big Data – which has become a popular product for a wide range of business operations. This system has been customised for the EPIC platform with the aim of performing real-time monitoring of the urban space and risk modelling. Through these technologies, the distribution of computing infrastructures across the urban space – including GPS trackers, cameras, mobile apps, fire detectors, acoustic sensors for gunshot detections, and more – sets up a grid for the extensive collection of data, which are then modelled into predictions and decisions.

Real-time data, such as livestream images of the streets, and the position of incidents and response units, are visualised on dashboards and interactive maps in the central command and control room of the EPIC. Algorithms register the incidents and sort them into different levels of priority. They also generate risk alerts on different time ranges, from real-time to long-term projections. Priority and risk models dictate in which parts of the city and on what types of incidents the urban security apparatus should focus its attention. In doing so, algorithmic models effectively guide the deployment of different types of emergency respondents – i.e. police patrols, paramedics, and fire brigades – towards presumed urban 'hotspots', or areas where it is anticipated that a specific type of incident might occur. Driven by the proactive imperative to improve preparedness, the software cross-checks real-time data with geographical datasets, police records, and other sources, to sort the city into classes of risk. From this angle, the EPIC shows strong similarities with platforms for predictive policing like PredPol and Hunchlab, which in recent years have been adopted in several US cities like Chicago, New Orleans, Philadelphia, and St. Louis. These platforms, which claim to predict in which urban areas crimes are more likely to take place based on geographical crime records, have drawn critical attention for disproportionately targeting black and Hispanic communities (Chammah and Hansen 2016; Benbouzid 2019). As Richardson, Schultz, and Crawford (2019) observe, predictive policing programs operate with datasets that are often incomplete, manipulated, and racially biased, thus reproducing patterns of racist discrimination and police abuse on already marginalised communities. Indeed, geographical datasets are not neutral: in highly segregated North American cities, as in Cape Town's townships, postcodes are often proxies for race and class (O'Neill 2016).

The models created by the EPIC algorithms determine not only real-time operations, but also measures to improve the preparedness of emergency services in the future. In other words, risk models as well as Key Performance Indicators affect strategic decisions regarding, for example, the organisation of workers' shifts, the allocation of resources across the different departments, and the need to hire or lay off staff. In doing so, machine learning is effectively able to shape key political issues in the governance of the city, such as what is to be considered an emergency or security concern, and what the priorities are in terms of response and relief. This is a highly sensitive matter in a city like Cape Town, where townships and informal settlements are disproportionately affected by hazards such as fires and floods, as well as by disturbing levels of violent crime. At the same time, low-income black individuals regularly suffer an excess, if not abuse, of policing when they move around white(r) areas of the city – according to what we have called intra-urban borders (§ 1.1).

Designed to capture and process urban data in real-time, the EPIC's algorithmic infrastructure could have been leveraged to monitor the spread of the Covid-19 infection in the city and to provide preemptive risk assessments of disease hotspots in the urban space. In the early stages of the pandemic, the South African government declared a national state of disaster to effectively centralise the management of Covid-19 response, prescribing measures such as country-wide lockdown and social distancing. Yet, no specific initiatives were taken to leverage the smart infrastructures and experiments in the digital governance of cities like Cape Town (but also Johannesburg and eThekwini/Durban). Arguably because of the absence of state directives, the powerful data-driven infrastructure of the EPIC has not been repurposed to perform augmented surveillance and risk targeting of Covid-19, but has remained engaged with 'business as usual', that is dealing with ordinary urban emergencies and security issues. According to the smart city narratives surrounding the development of the EPIC, the platform was created precisely with the aim of ensuring increased preparedness and responsiveness to emergencies and disasters. Yet, and perhaps ironically, when a greater-than-ever emergency actually materialised, the platform was not deployed to handle it. In the non-mobilisation of the EPIC platform, we can therefore observe a disjuncture between the tendency towards speculative governance that has emerged from smart city projects and experiments in recent years, and the actual ways in which pandemic governance has taken shape in Cape Town.

3. Logistics

3.1 Digital citizenship is logistical

Infrastructures are part of power networks that transcend national boundaries, while reconfiguring and re-territorialising both the movement of capital and the exercising of sovereignty (Easterling 2014; Cowen 2014; Grappi 2016). From this perspective, while encapsulating distinct processes of technological and economic acceleration, 'smart' cities also operate as nodes in planetary logistics networks. Here, urban citizenship is becoming increasingly organised and stratified according to technopolitical logics that are entangled with the global circulation of technology, information, commodities, and money. By claiming that 'urban-digital citizenship' is logistical, we are not referring to

logistics merely as a specific industrial sector or as a set of shipping operations involving warehouses, trucks, ports, and containers. Rather, we understand logistics as a set of logics and practices – coordination, optimisation, and efficiency – which define a key form of power of our time (Neilson 2012), and organise processes of production, circulation, and governance on different scales across the globe (Cowen 2014 etc.). Today, logistics as a *strategy* (Grappi 2016) is at the core of every business process, including the growing industry of data centres and cloud computing (Neilson and Notley 2019), which is of particular interest in the present analysis. Besides the industrial domain, however, as Neilson (2012, 324) puts it, 'logistics plays a key role in structuring life in adaptive ways that constantly shift in relation to environments and feedback into material conditions'. It is precisely on the ways in which logistics re-structures urban life and citizenship through digital media and platforms that we wish to focus here. We propose to consider how, with digital cities operating more and more as nodes in the global logistics networks, the urban environment is also becoming operationalised through digital media as an infrastructure that enables, and possibly optimises, the flows of data, technology, and money. In this context, claiming the logistical character of 'urban-digital citizenship' is something different than looking at urban processes through the lens of logistical work, or from tracing the impact of logistics on the urban fabric, as other authors have done (Cuppini 2017). Rather, we wish to draw attention to the way in which 'smart' city like Cape Town function as clusters in global circuits of data, technology, and finance in a manner that is exemplified by three processes shaping our case study.

First, as part of an effort to turn Cape Town into 'the digital gateway to Africa', 'Silicon Cape', or 'Africa's smartest city' – led by the state in partnership with multiple corporate players – urban citizens are being enrolled into computing and finance circuits that extend across and beyond the African continent, and in which the city emerges as a crucial hub. The implementation of urban digital infrastructures, from fibre-optic networks to cloud facilities, combined with the numerous programs in support of tech training, entrepreneurship, and innovation, are increasingly channelling access to digital technology along specific pathways, such as working in the BPO sector or launching tech startups. These pathways concur in strengthening Cape Town's position as an obligatory passage point (Pollio 2020) in technology and capital networks that connect multiple players, such as outsourcing companies, startups, cloud computing companies, and venture capital firms, among other financial institutions. The second process that we wish to highlight results from the transformation of the urban environment into a testing ground for the tech industry. Both the wealthy, white, and heavily digitalised areas of the city and the economic and technological marginality of the townships and informal settlements provide opportunities for tech startups to test a variety of new products. This – we suggest – indicates that the urban environment, as it becomes a testbed for technological innovations, is also being operationalised as a supply chain of data and computing experiments, as well as a crucial node for the logistics of the cloud and financial industries, in and beyond the urban space. Third, the concentration of data centres and cloud computing facilities produces a specific re-configuration of the urban territory, defined by the organisation of server-client connections enabled by such infrastructures. As Neilson and Notley (2019, 8) argue, by aggregating and redistributing data and computing operations, data centres generate 'patterns of territorial networking'

that transcend spatial proximity as well as urban (or national) boundaries. In using cloud computing infrastructures, then, digital startups and the urban data they gather become part of a complex network of exchange and coordination of information that exceeds the urban dimension, and which is orchestrated to fuel the cloud industry business strategy. In this sense, data centres turn the sites where they are located into crucial logistical hubs for transnational operations of data extraction and monetisation. Thus, as data centres and tech startups become concentrated in urban areas, urban citizens become a testbed for new technological products and smart cities develop into a crucial node in the global geography of cloud computing.

3.2 Urban statecraft in 'Silicon Cape'

Cape Town, or 'Silicon Cape', as local tech entrepreneurs like to brand it, is a cluster in African and global networks of technological innovation, data storage and processing, and finance. The making of Silicon Cape has been shaped by a convergence of private and public initiatives that have fostered the development of digital infrastructures and the concentration of tech companies in the metropolitan area of Cape Town. The origins of tech clustering in Cape Town can be traced back to the processes of offshoring of IT-enabled business operations. Starting in the early 2000s, companies like Lufthansa, IBM, and Shell moved their customer service divisions to the city, 'leveraging two important colonial legacies: the multilingualism of the Cape and the low labour cost' (Pollio 2020, 2720. This process, which already reveals a logistical rationale, triggered public and private investments in ICT infrastructure, as well as the rise of a narrative about Cape Town as a prime location for tech entrepreneurship in Africa. Over the past two decades, a number of incubator and accelerator programmes have been created through partnerships between local entrepreneurial lobbies and government agencies, with the aim of promoting technological innovation and connecting emerging startups with potential funders among investment firms, especially venture capital (VC) ones.

At the same time, the municipal authorities have devoted significant resources to the rolling out of ICT infrastructures in the urban area. They have also adopted specific policies, including business development programmes targeting young people from marginalised backgrounds, to support the growth of a tech startup ecosystem in the city. As Pollio and Cirolia (2022) note, the municipal interventions in this realm are part of a strategy of *urban statecraft*, i.e. ways in which the state (re)affirms itself through the production of, and control over, urban infrastructures. Urban statecraft combines emerging forms of urbanisation based on technological entrepreneurialism and accumulation, which have been defined as 'startup urbanism' (Rossi 2017). Significantly, urban statecraft and startup urbanism in Cape Town confirm the compresence and overlapping of a post-apartheid development agenda, in which the focus is on digital access and inclusion for marginalised urban communities, and a neoliberal approach, which proposes digital entrepreneurialism as a solution to poverty and racial discrimination (Pollio 2020; Pollio and Cirolia 2022). For example, the Bandwidth Barn, a tech incubator based in the central startup district of Woodstock, operates a branch in Khayelitsha. Here, lack of access to digital technologies has been identified as an opportunity to forge a new generation of entrepreneurs, who are combining a developmental mission with market-oriented

pedagogical intervention (Pollio 2019). 'Start Up Weekends' and entrepreneurial hackathons regularly take place at the Barn, where access to the infrastructures and skills provided is tied to specific requirements, such as presenting an entrepreneurial project, writing a business model or competing against others. The Barn's educational initiatives make it clear how township residents are differentially included in the smart city. Only those who show commitment to entrepreneurial values 'deserve' access to technologies, skills, and further opportunities. This aligns with those strategies of poverty management (Ferguson 2010, 2015; Pollio 2019) which establish individual success on the market and private entrepreneurialism as the main avenues to overcome poverty, as part of a post-apartheid governmentality. Developmental interventions such as tech incubators are filtering and targeting the provisioning of digital devices according to this very strategy.

In recent years, Cape Town has also become a major node for cloud computing on the African continent. Elastic Compute Cloud (EC2), the backbone of Amazon Web Services (AWS), the leader in the cloud computing market, was born from an Amazon development centre operating in Cape Town between 2004 and 2006. Since 2018, both AWS and Azul (Microsoft's cloud service) have opened cloud data centres in Cape Town. Furthermore, by leveraging the implementation of publicly owned fibre networks and data centres, the municipality of Cape Town has become an operator of cloud services itself. At the same time, Cape Town is home to almost 60% of tech startups in Africa (Startup Genome 2021) and 53% of VC deals in South Africa, most of which are directed precisely to tech, and especially fintech, startups (SAVCA 2021; Pollio and Cirolia 2022). For tech startups, as well as for established and high-value companies, the presence of data centres in Cape Town offers an unquestionable logistical advantage. While data can be stored and processed in any location, physical proximity to the servers and computers minimises the latency of data, improving the performances and competitiveness of cloud-based applications.

The highly digitised environment of the city generates flows of data and algorithmic transactions that feed back into the cloud computing facilities, where they are stored and processed. As local tech startups continue to test and update their products by drawing on urban data, they are offered more space and services by cloud computing providers such as AWS and Microsoft. At the same time, urban tests often determine whether startups will succeed in securing further rounds of funding from VC firms or other investors. Of course, the quest for VC defines a rather standard track for emerging startups around the world. In Cape Town, however, the validation (or rejection) of startups' urban experiments by financial players is specifically orchestrated through a set of mentoring programmes, competitions, and public events that are key in making the city a crucial node for the circulation of capital and technology (Pollio and Cirolia 2022). Through these pathways, then, the everyday digital interactions of Capetonian citizens become inscribed into the logistics of global financial networks, which channel investments towards specific clusters of techno-entrepreneurial acceleration. Thus, despite its sharp inequality, or even because of it, the city provides both a market and a testbed for digital products. The central urban areas and the wealthy suburbs offer tech companies ideal conditions to test their products. Extensively digitised and populated with middle-class (and still mostly white) residents, business offices, upscale retail stores, and tourists, these areas of Cape Town are market tests for a wide range of applications,

ranging from e-hailing to food delivery, from biometrics security to automated fraud detection, from retail platforms to mobile payments. Over the past few years, hundreds of tech startups have mushroomed in the city, often competing to dominate specific market segments.[1] Some of these companies are still there, while many have disappeared, but all of them target precisely the heavily digitalised lifestyle of middle-class Capetonians to run their market experiments. At the same time, the townships and informal settlements of Cape Town also provide a suitable testing ground for different types of tech products. The economic marginality of these communities becomes the object of experiments that leverage precisely their lack of integration into formal market infrastructures. For example, fintech apps offer credit services to individuals and informal business owners with no access to formal banking, connect informal retailers with wholesale suppliers, or provide mobile apps for remittances (Pollio and Cirolia 2022).

As we have seen above, the public response to the Covid-19 pandemic has increased these gaps between different urban areas. But the shortcomings of pandemic response also shed light on a different form of logistical network in the smart city, one that is structured around practices of grassroots organisation and solidarity, and which suggests a different way of being 'logistical citizens'. The restrictions imposed by the South African government since March 2020 may have been (relatively) effective in containing the spread of the virus, but took a disproportionately heavy toll on the livelihoods of low-income communities, where staying at home may result in starvation and social distancing is simply impossible (De Groot & Lemanski xref). It is in this context of exacerbated inequality, where the rhetoric and; Odendaal 2021.The enforcement of a lockdown, for example, resulted in severe food insecurity for residents of townships and informal settlements. For the 22% of Capetonian households that struggle to access clean water and are forced to share overcrowded dwellings, complying with rules such as frequent handwashing or social distancing is unrealistic (De Groot & Lemanski xref). It is in this context of exacerbated inequality, where the rhetoric and/xref . It is in this context of exacerbated inequality, where the rhetoric and projects of the 'official' smart city show all their limits, that – as Odendaal (2021) suggests – a different, 'pandemic' smart city has come into play. 'Cape Town Together' is a coalition of community action networks (CANs) that have taken action to provide relief and support to those in need. Set up in March 2020 by a team of mixed backgrounds that included teachers, health practitioners, activists, and artists, CANs engage in a wide range of solidarity initiatives in townships and informal settlements, from soup kitchens to food delivery, from training and health programmes to child and elderly care. These community networks perform place-based politics of care in the midst of the pandemic by recombining technology and place through practices of concrete solidarity. Digital technologies – especially social media – are indeed key to the organisation of CANs. On the one hand, messaging apps are the logistical backbone for coordinating and delivering actions. Activists connect and communicate via WhatsApp and Telegram groups to plan and carry out activities at a neighbourhood level according to specific guidelines ensuring that communication remains project-focused and effective, while avoiding any cluttering, spam, or fake news. On the other hand, the Facebook group provides a platform through which the CANs are able to perform multiple operations to gain visibility and organise their activities. Besides, Facebook is where the CANs produce political discourses, asserting the rights of poorer urban communities and exposing the shortcomings of the government's pandemic

response. Cape Town Together has been vocal, for example, in criticising episodes of police brutality against poorer communities in the context of lockdown enforcement, and in supporting tenants threatened with eviction in the midst of the pandemic. At the same time, the CANs have actively endorsed those aspects of the government's action which they believe are in the communities' actual interest, thus inviting people to follow instructions on sanitation and social distancing, and campaigning for vaccinations.

These examples suggest that the CANs' activities enact a form of urban citizenship that questions and transforms, at least temporarily, logistical relations with digital media in the urban context. While earlier we described how urban digital media involve citizens in the circulation of technology and money, or as part of a permanent testbed, CAN activists can rather be seen to exercise a distinct form of logistical agency in mobilising digital media to deliver local care infrastructures. Digital activism is not new in Cape Town: in recent years grassroots organisations such as the Social Justice Coalition have been effectively using various social media platforms to organise their networks and conduct their campaigns for better infrastructures in the townships, enacting a 'smart city from the bottom up' (Odendaal 2015). In the emergency context of the pandemic, then, CANs seem to have been able to build upon and enhance this know-how in terms of activist logistics. Yet, this logistics of solidarity still relies on privately owned social media and therefore is exposed to the practices of data monetisation and surveillance that are inherent in those platforms (Isin and Ruppert 2015; Hintz, Dencik, and Wahl-Jorgensen 2019). Hence, we do not aim to present CANs simply as a form of participatory citizenship 'from below'. Rather, we suggest that these examples of logistical urban agency reflect the intrinsic ambivalence of 'urban-digital citizenship', showing how different ways of engaging with tech infrastructures may foster different ways of inhabiting the city – as part of a supply chain of computation and finance, or as agents in networks of solidarity and care.

Conclusion

In this article, we have explored how the making of digital infrastructures in Cape Town is reconfiguring urban citizenship as part of a strategy to create a smart city. And we have considered the ambivalent effects of the pandemic crisis on the ongoing processes of urban digitalisation that have led our case study to be referred to as 'Africa's smartest city'. First, we described how the implementation of digital infrastructures across the urban space is grafted upon existing socio-spatial inequalities and produces new borders around access to urban services and citizen rights. In this regard, we argued that the borders created by digital infrastructures have deepened during the Covid pandemic, exacerbating the marginalisation of large sectors of population that do not have access to digital services and infrastructures. In the second section, we examined how the algorithmic management of security inscribes urban citizenship into a speculative logic, based on the anticipation and preemption of future risks. We then stressed how the pandemic management in Cape Town has not furthered this speculative strategy of urban governance, but rather revealed a sort of disjuncture from it, insofar as the EPIC platform for risk management and preemption through urban data analysis has only played a minimal role, if any, in enforcing Covid restrictions. Though the City of Cape Town has committed significant resources, both financial and political, to implementing digital technologies for the management of

emergency and security response, these digital infrastructures have not been significantly used to enforce responses to the pandemic crisis. Hence, we have argued that our case study does not directly subscribe to the assumption that the measures usually adopted by the authorities to face the Covid pandemic – such as lockdown, social distancing, contact tracing, control, and surveillance – straightforwardly entail an acceleration of digitalisation, magnifying the perils of surveillance that come with it. While most examples of pandemic management seem to confirm such a view – as Iyer and Kuriakose (2022) expound in this issue regarding India's smart cities – our analysis has not entirely verified this hypothesis in the Cape Town case.

In the third section, we have addressed the logistical character of 'urban-digital citizenship' by stressing the role of smart cities in the global geography of cloud computing. We have analysed the making of Cape Town as a significant node for the logistics of the cloud and financial industry in global circuits of data, technology, and finance, making the urban environment a testing ground for the digital industry. In such a highly digitised environment, the Covid outbreak has fostered forms of urban-digital citizenship arising from citizen practices aimed at appropriating digital technologies and platforms to build independent 'infrastructures of care' (Odendaal 2021). We believe that while these 'caring' digital citizenship practices may have been serendipitously created by the imperative to provide aid in the midst of the healthcare emergency, they are not confined to such a crisis scenario. On the contrary, the example of community action networks in Cape Town illustrates a way of inhabiting the smart city and its infrastructures that opens up possibilities for participatory forms of urban-digital citizenship well beyond pandemic times. Feminist scholars have looked at the politics of care as possible foundations for a novel notion of democratic citizenship, based on nurturing practices in relation to the environment and others (McGregor 2006; Urban & Ward 2020). In recent years, critical urban digitalisation scholars have been exploring acts and forms of smart citizenship defined by more egalitarian, democratic, and radical relationships between urban dwellers and smart technologies. Such alternative smart citizenship practices include, for example, grassroots projects on open data, hackathons, and data commons; participatory data analysis initiatives for policy impact; and the creation of community-designed and community-owned smart infrastructures (Marvin, Luque-Ayala, and McFarlane 2015; Bria and Morozov 2018; Halegoua 2020; Cardullo 2021). This points to the need to overcome the current paradigm, whereby the tools to enact digital citizenship are owned by Big Tech multinationals that use citizen acts to profile users and monetise their data. The citizens and organisations involved in these initiatives purposefully seek to transform, to some extent, the smart city they live in. These acts and practices of citizen participation indicate a further dimension to expand the notion of urban-digital citizenship that we have outlined in this article by focusing primarily on the development of digital infrastructures rooted in an urban scale and on how they facilitate or prevent the exercising of citizen rights in the urban space.

Note

1. For example, since 2015, more than seven local mobile apps have been battling each other, and Uber, to offer car rides services; at least four platforms have been providing on-demand cleaning services; and the list goes on.

Author's note

The authors are listed in alphabetical order. They equally share the responsibility of the final version and editing of the text. The article's structure and contents have been discussed and developed together according to a shared view and analysis of the subject. Wherever attribution would be required, Dr. Antenucci wrote the sections 1.2, 2.2, 3.2 and the conclusion while Dr. Tomasello wrote the introduction and sections 1.1, 2.1, 3.1.

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References

Alt Advisory, 2021. *Covid-19 Apps. South Africa Project Report*. https://altadvisory.africa/wp-content/uploads/2021/05/South-Africa-Covid-App-Project-final.pdf

Amoore, L. 2006. "Biometric Borders: Governing Mobilities in the War on Terror." *Political Geography* 25 (3): 336–351. doi:10.1016/j.polgeo.2006.02.001.

Amoore, L. 2013. *The Politics of Possibility: Risk and Security beyond Probability*. Durham, NC: Duke University Press.

Anderson, B. 2010. "Preemption, Precaution, Preparedness: Anticipatory Action and Future Geographies." *Progress in Human Geography* 34 (6): 777–798. doi:10.1177/0309132510362600.

Antenucci, I. 2021a. "Infrastructures of Extraction in the Smart City: Zones, Finance, and Platforms in New Town Kolkata." *International Journal of Communication* 15 (2021): 2652–2668.

Antenucci, I. 2021b. "Smart Cities, Smart Borders. Sensing Networks and Security in the Urban Space." In *Sensing In/Security. Sensors as Transnational Security Infrastructures*, edited by N. Klimburg-Witjes, N. Poechacker, and G. C. Bowker, 76–100. Mattering Press.

Aradau, C. 2015. "The Signature of Security Big Data, Anticipation, Surveillance." *Radical Philosophy* 191: 21–28.

Balibar, É. 2006. "Uprisings in the Banlieues." *Lignes* 21: 50–101. doi:10.3917/lignes.021.0050.

Barns, S. 2014. "Platform Urbanism: The Emerging Politics of Open Data for Urban Management." *American Association of Geographers* Annual Conference, Tampa, FL. Tampa, FL.

Bauböck, R. 2003. "Reinventing Urban Citizenship." *Citizenship Studies* 7 (2): 137–158. doi:10.1080/1362102032000065946.

Bauböck, R., and L. Orgad, eds. 2020. "Cities Vs States: Should Urban Citizenship Be Emancipated from Nationality?" EUI Working Paper RSCAS 2020/16: Florence.

Benbouzid, B. 2019. "To Predict and to Manage. Predictive Policing in the United States." *Big Data & Society* 6: 205395171986170. doi:10.1177/2053951719861703.

Bignami, F., and N. Hanakata. 2022. "Platform Urbanization, Its Recent Acceleration, and Implications on Citizenship. The Case of Singapore." *Citizenship Studies*, forthcoming.

Bookchin, M. 1987. *The Rise of Urbanization and the Decline of Citizenship*. San Francisco: Sierra Club Books.

Bratton, B. H. 2015. *The Stack: On Software and Sovereignty*. Cambridge, Massachusetts: MIT press.

Breitung, W. 2011. "Borders and the City: Intra-Urban Boundaries in Guangzhou." *Quaestiones Geographicae* 30 (4): 55–62. doi:10.2478/v10117-011-0038-5.

Brenner, N. 2013. "Theses on Urbanization." *Public Culture* 25 (1): 85–114. doi:10.1215/08992363-1890477.

Brenner, N. 2018. "Debating Planetary Urbanization: For an Engaged Pluralism." *Environment and Planning. Society and Space* 36 (3): 570–590. doi:10.1177/0263775818757510.

Brenner, N., and S. Christian. 2015. "Towards a New Epistemology of the Urban?" *City* 19 (2–3): 151–182. doi:10.1080/13604813.2015.1014712.

Bria, F., and E. Morozov. 2018. *Rethinking the Smart City: Democratizing Urban Technology*. New York: Rosa Luxemburg Stiftung. .

Cameron, A. 2017, April 18. *#Datamustfall: Backhaul bottle-necks expose SA's digital economy*. Cape Town Partnership. Retrieved on 25 October 2017 from http://www.capetownpartnership.co.za/2017/04/datamustfall-backhaul-bottle-necks-expose-sas-digital-economy/

Cardullo, P. 2021. *Citizens in the 'Smart City'. Participation, Co-production, Governance*. London & New York: Routledge.

Case study: How Sap Runs Cape Town. 30 April 2013. Computer Weekly. https://www.computerweekly.com/news/2240182802/Case-study-How-SAP-runs-Cape-Town

Chammah, M., and M. Hansen. 2016. *Policing the Future*. The Marshall Project. Retrieved on 13 January 2018 from https://www.themarshallproject.org/2016/02/03/policing-the-future

Chutel, L. 2018. *How Cape Town Delayed Its Water Shortage Disaster – At Least until 2019*. Quartz Africa. Retrieved on 2 July 2018, from https://qz.com/africa/1272589/how–cape–town–delayed–its–water–disaster–at–least–until–2019/

City of Cape Town (2018). *City of Cape Town report*: http://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/16429%20COCT%20State%20of%20Cape%20Town%20Report%202016%20FINAL.pdf

Coleman, S., and J. G. Blumler. 2009. *The Internet and Democratic Citizenship*. Cambridge: CUP.

Cowen, D. 2014. *The Deadly Life of Logistics: Mapping Violence in Global Trade*. Minneapolis: University of Minnesota Press.

Cuppini, N. 2017. "Dissolving Bologna: Tensions between Citizenship and the Logistics City." *Citizenship Studies* 21 (4): 495–507. doi:10.1080/13621025.2017.1307608.

De Goede, M. 2012. *Speculative Security : The Politics of Pursuing Terrorist Monies*. Minneapolis: University of Minnesota Press.

De Goede, M., S. Simon, and M. Hoijtink. 2014. "Performing Preemption." *Security Dialogue* 45 (5): 411–422. doi:10.1177/0967010614543585.

De Groot, J., and C. Lemanski. 2020. "COVID-19 Responses: Infrastructure Inequality and Privileged Capacity to Transform Everyday Life in South Africa." *Environment & Urbanization* 33 (1): 255–272. doi:10.1177/0956247820970094.

De Sousa – Alves, M. 2016. *Update and Additions to Initial long–term Water Conservation and Water Demand Management Strategy*. City of Cape Town. http://resource.capetown.gov.za/documentcentre/Documents/City%20strategies,%20plans%20and%20frameworks/WCWDM_Strategy_doc.pdf .

Easterling, K. 2014. *Extrastatecraft: The power of infrastructure space*. New York: Verso Books.

Ferguson, J. 2010. "The Uses of Neoliberalism." *Antipode* 41: 166–184. doi:10.1111/j.1467-8330.2009.00721.x.

Ferguson, J. 2015. *Give a Man a Fish: Reflections on the New Politics of Distribution*. Durham: Duke University Press.

Fourcade, M. 2021. "Ordinal Citizenship." *British Journal of Sociology* February: 1–20.

Fourcade, M., and J. Fleur. 2020. "Loops, Ladders and Links: The Recursivity of Social and Machine Learning." *Theory and Society* 49 (5–6): 803–832. doi:10.1007/s11186-020-09409-x.

Gabrys, J. 2016. *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet*. Minneapolis: University of Minnesota Press.

Graham, S., and S. Marvin. 2001. *Splintering Urbanism: Networked Infrastructures and the Urban Condition*. London, UK: Routledge.

Graham, S., and C. McFarlane. 2015. *Infrastructural Lives: Urban Infrastructure in Context*. Abingdon, UK: Routledge.

Grappi, G. (2016). *Logistica*. Ediesse

Halegoua, G. 2020. *Smart cities*. Cambridge, MA: MIT Press.

Halpern, O., J. LeCavalier, N. Calvillo, and W. Pietsch. 2013. "Test-bed Urbanism." *Public Culture* 25 (2): 272–306. doi:10.1215/08992363-2020602.

Harvey, D. 2008. "The Right to the City." *New Left Review* 53 (Sept/Oct): 23–40.

Hintz, A., L. Dencik, and K. Wahl-Jorgensen. 2019. *Digital Citizenship in a Datafied Society*. Cambridge: Polity.

Isin, E., and I. Ruppert. 2015. *Being Digital Citizens*. London: Rowman & Littlefield.

Iyer, D. K., and F. Kuriakose (2022). Becoming Digital Citizens: Covid-19 and Urban Citizenship Regimes in India. *Citizenship Studies*, forthcoming.

Kelling, G. L., and J. Q. Wilson. 1982. "Broken Windows: The Police and Neighborhood Safety." *The Atlantic Monthly* (249): 29–38.

Kochenov, D. 2019. *Citizenship*. Cambridge MA: MIT Press.

Krivý, M. 2018. "Towards a Critique of Cybernetic Urbanism: The Smart City and the Society of Control." *Planning Theory* 17 (1): 8–30. doi:10.1177/1473095216645631.
Lefebvre, H. N. 1968. *Le Droit à la ville*. Paris: Seuil.
Lefebvre, H. 1970. *La Révolution urbaine*. Gallimard: Paris.
Lemanski, C. 2018. "Infrastructural Citizenship: Spaces of Living in Cape Town, South Africa." In *The Routledge Handbook on Spaces of Urban Politics*, edited by A. Jones, B. Miller, K. Ward, and D. Wilson, 350–360. London, UK: Routledge.
Lemanski, C. 2019a. "Infrastructural Citizenship: The Everyday Citizenships of Adapting and/or Destroying Public Infrastructure in Cape Town." *South Africa Transactions of the Institute of British Geographers* 45: 589–605. doi:10.1111/tran.12370.
Lemanski, C., ed. 2019b. *Infrastructures of Citizenship: Practices and Identities of Urban Citizens and the State*. Abingdon, UK: Routledge.
Lessing, L. 2006. *Code and Other Laws of Cyberspace. Version 2.0*. New York: Basic Books.
Leszczynski, A. 2016. "Speculative Futures: Cities, Data, and Governance beyond Smart Urbanism." *Environment and Planning A: Economy and Space* 48 (9): 1691–1708. doi:10.1177/0308518X16651445.
Macgregor, S. 2006. *Beyond Mothering Earth. Ecological Citizenship and the Politics of Care*. Vancouver: University of British Columbia Press.
Marongwe, N., and R. Garidzirai. 2021. "Together but Not Together: Challenges of Remote Learning for Students amid the COVID-19 Pandemic in Rural South African Universities." *Research in Social Sciences and Technology* 6 (3): 213–226. doi:10.46303/ressat.2021.39.
Marshall, T. H. 1950. *Citizenship and Social Class, and Other Essays*. Cambridge: Cambridge University Press.
Marvin, S., A. Luque-Ayala, and C. McFarlane, *eds*. 2015. *Smart Urbanism: Utopian Vision or False Fawn?* London and New York: Routledge.
McCosker, A., S. Vivienne, and A. Johns, eds. 2016. *Negotiating Digital Citizenship: Control, Contest and Culture*. London: Rowman & Littlefield.
Mezzadra, S., and B. Neilson. 2013. *Border as Method. Or, the Moltiplication of Labor*. Durham & London: Duke University Press.
Mossberger, K., C. J. Tolbert, and R. S. McNeal. 2008. *Digital Citizenship: The Internet, Society, and Participation*. Cambridge Ma: MIT Press. .
Neilson, B. 2012. "Five Theses on Understanding Logistics as Power." *Distinktion: Scandinavian Journal of Social Theory* 13 (3): 322–339. 10.1080/1600910X.2012.728533.
Neilson, B., and T. Notley. 2019. "Data Centres as Logistical Facilities: Singapore and the Emergence of Production Topologies." *Work Organisation, Labour & Globalisation* 13 (1): 15–29. doi:10.13169/workorgalaboglob.13.1.0015.
Newman, O. 1972. *Defensible Space. Crime Prevention through Urban Design*. New York: Macmillan.
O'Neill, C. 2016. *Weapons of Math Destruction*. New York: Crown Books.
Odendaal, N. 2015. "Getting smart about smart cities in Cape Town: Beyond the rhetoric." *Smart Urbanism: Utopian Vision or False dawn?* In edited by S. Marvin, A. Luque-Ayala, and C. McFarlane, 87–103. London: Routledge.
Odendaal, N. 2021. "Constructing an "Infrastructure of Care" –understanding the Institutional Remnants and socio-technical Practices that Constitute South Africa's Covid-19 Response." *Urban Geography* 42 (3): 391–398. doi:10.1080/02723638.2020.1807166.
Ong, A., and A. Roy, eds. 2011. *Worlding Cities: Asian Experiments and the Art of Being Global*, 1–26. Oxford: Blackwell.
Orgad, L., and R. Bauböck, eds. 2018. *Cloud Communities: The Dawn of Global Citizenship?* Florence: EUI.
Pasquinelli, M. 2017. "Machines that Morph Logic: Neural Networks and the Distorted Automation of Intelligence as Statistical Inference." *Glass Bead* 1 (1). https://www.glass-bead.org/article/machines-that-morph-logic/?lang=enview .

Pollio, A. 2019. "Incubators at the Frontiers of Capital: An Ethnographic Encounter with Startup Weekend in Khayelitsha, Cape Town." *Annals of the American Association of Geographers* 110 (4): 1–16.
Pollio, A. 2020. "Making the Silicon Cape of Africa: Tales, Theories and the Narration of Startup Urbanism." *Urban Studies* 57 (13): 2715–2732. doi:10.1177/0042098019884275.
Pollio, A., and L. R. Cirolia. 2022. "Fintech Urbanism in the Startup Capital of Africa, Forthcoming." *Journal of Cultural Economy* 15: 168–183. doi:10.1080/17530350.2021.1974072.
Prak, M. 2018. *Citizens without Nations: Urban Citizenship in Europe and the World, C. 1000-1789*. Cambridge: Cambridge University Press.
PWC,WESGRO,and City of Cape Town.2013. *Digital gateway to Africa. Cape Town's creative software design and development sector*. Sanec. http://www.sanec.org/themes/sanec/uploads/files/cape–town–digital–gateway–to–africa.pdf
Ratto, M., and M. Boler, eds. 2014. *DIY Citizenship. Critical Making and Social Media*. Cambridge MA: MIT Press.
Reijers, W., L. Orgad, and F. De Filippi. 2022. "The Rise of Cybernetic Citizenship." *Citizenship Studies*. (forthcoming).
Richardson, R., J. Schultz, and K. Crawford (2019). Dirty Data, Bad Predictions: How Civil Rights Violations Impact Police Data, Predictive Policing Systems, and Justice. *New York University Law Review Online*. https://www.nyulawreview.org/wp-content/uploads/2019/04/NYULawReview-94-Richardson-Schultz-Crawford.pdf
Robinson, J. 2011. "Cities in a World of Cities: The Comparative Gesture." *International Journal of Urban and Regional Research* 35 (1): 1–23. doi:10.1111/j.1468-2427.2010.00982.x.
Rossi, U. 2017. *Cities in Global Capitalism*. Cambridge, UK: Polity Press.
Samara, T. R. 2010. "Order and Security in the City: Producing Race and Policing Neoliberal Spaces in South Africa." *Ethnic and Racial Studies* 33 (4): 637–655. doi:10.1080/01419870903337318.
SAVCA (2021) *Venture Capital Industry Survey*. https://savca.co.za/wp-content/uploads/2021/08/SAVCA-VC-Survey-2021.pdf
Shachar, A. 2009. *The Birthright Lottery: Citizenship and Global Inequality*. Vol. 1. Cambridge, Ma: Harvard University Press.
Shove, E., and F. Trentmann, Eds. 2018. *Infrastructures in Practice: The Dynamics of Democracy in Networked Societies*. Abingdon, UK: Routledge.
Simon, J. 2007. *Governing through Crime: How the War on Crime Transformed American Democracy and Created a Culture of Fear*. Oxford: Oxford University Press.
Smart water solutions create awareness of consumption patterns. 25 October 2017. Accelerate Cape Town. Retrieved on 20 January 2018, from https://acceleratecapetown.co.za/smart-meters/
Söderström, O. 2021. "The Three Modes of Existence of the Pandemic Smart City." *Urban Geography* 42 (3): 399–407. doi:10.1080/02723638.2020.1807167.
Stahl, K. 2020. *Local Citizenship in a Global Age*. Cambridge: Cambridge University Press.
Star, S. L. 1999. "The Ethnography of Infrastructure." *American Behavioral Scientist* 43: 377–391. doi:10.1177/00027649921955326.
Startup Genome. 2021. *The Global Startup Ecosystem Report*. https://startupgenome.com/reports/gser2021
Tomasello, F. 2015. *La Violenza. Saggio Sulle Frontiere del Politico*. Rome: Manifestolibri.
Tomasello, F. 2020. *L'Ordine della Città. Violenza e Spazio Urbano*. Rome: Manifestolibri.
Tomasello, F. 2022. "From Industrial to Digital Citizenship: Rethinking Social Rights in Cyberpace". *Theory and Society*. (forthcoming). doi:10.1007/s11186-022-09480-6.
Urban, P., and L. Ward, eds. 2020. *Care ethics, democratic citizenship and the state*. Springer International Publishing.