When open data and data activism meet: An analysis of civic participation in Cape Town, South Africa

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Key Messages

- In Cape Town, South Africa, local civil society organizations have been driving engagement with municipal open data, as a form of data-driven activism.
- The notion of "bi-directional open data" is developed here to characterize emerging possibilities for data openness between governments and the public.
- We recommend that cities adopt a new philosophy of data openness that embraces civic participation with open data, leading towards city-citizen data relations.

Municipal open data projects are motivated by a desire to democratize data access and knowledge production, strengthen transparency, and advance cities socially and economically. However, their effects and implications are insufficiently analyzed. This paper examines civic engagement in open data in Cape Town, South Africa, the continent's first municipal-level open data initiative. Findings reveal how local civil society organizations have been driving engagement with municipal open data as part of their recent turn towards technology and data-driven forms of public engagement and activism. This analysis highlights the important role of the "smart civil society organization"—occupying a position between the smart city and smart citizen—that is developing significant capacity to produce and share data about the city's informal settlements with stakeholders in government, the private sector, and wider society. Minimal engagement with or recognition of civil society efforts illustrates the limits to the city's philosophy of data openness, which is largely restricted to releasing selected government datasets to the public. The notion of "bi-directional open data" is developed here to characterize emerging possibilities for data openness between governments and the public. This may be particularly relevant for cities like Cape Town with a highly active, capable, and data-literate civil society.

Keywords: open data, smart cities, civic engagement, data activism, Global South

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Quand les données ouvertes et l'activisme axé sur les données se rencontrent : une analyse de la participation civique au Cap, en Afrique du Sud

Les projets municipaux de données ouvertes sont motivés par un désir de démocratiser l'accès aux données et la production de savoir ainsi que de renforcer la transparence et de faire progresser les villes sur les plans social et économique. Toutefois, leurs effets et leurs implications ne sont pas suffisamment analysés. Ce texte étudie l'engagement civique envers les données ouvertes au Cap, en Afrique du Sud, soit la première initiative de données ouvertes au niveau municipal sur le continent africain. Nos conclusions révèlent la façon dont les organisations locales de la société civile se sont engagées dans le processus de données municipales ouvertes dans le cadre de leur récent virage vers la technologie et l'activisme axé sur les données. La présente analyse met aussi en évidence le rôle important de « l'organisation intelligente de la société civile, ce phénomène stimulant de manière importante la capacité de produire et de partager entre les intervenants des données au sujet des règlements informels de la ville. À l'inverse, l'engagement minimal avec la société civile ou la reconnaissance de ses efforts illustre les limites de la philosophie d'ouverture des données de la ville qui se borne strictement à communiquer au public des séries de données. En conséquence, la notion de « données ouvertes bidirectionnelles » est proposée ici pour décrire les nouvelles possibilités d'échange des données entre les gouvernements et le public. Ceci peut être particulièrement pertinent pour les villes comme Le Cap qui possèdent une société civile très active.

Mots clés : données ouvertes, villes intelligentes, engagement civique, activisme axé sur les données, pays du Sud

Introduction

There is a growing movement to make data open. This is a movement aimed at making data publicly available on the internet directly by the government, private sector, or other organizations (Gurstein 2011; Janssen et al. 2012). Claims around the potential of open data focus on how it could democratize data access and knowledge production, unite cities and citizens, encourage transparent governance, strengthen democracy, and ultimately advance cities socially and economically in new and far-reaching ways (Zuiderwijk and Janssen 2014; Mainka et al. 2015; Sieber and Johnson 2015). A burgeoning scholarly critique of these types of wider claims highlights, in contrast, a number of serious problems and weaknesses, including: the still limited inroads of the open data movement outside mostly wealthy cities of the Global North; co-optation by hackers and corporations (Kitchin 2014); the reinforcement, rather than reform, of extant power relations (Gurstein 2011); concerns with embedded neoliberal logics of personal responsibility and entrepreneurialism (Bates 2013); and finally, the threat of such co-optations to social justice (Johnson 2014). Beyond the conflicting imaginaries associated with the promise of open data, less attention has been paid to both the practices and practical consequences of the open data experiment. A few scholars have explored the empirical impacts and effects of open data (e.g., Kuk and Davies 2011; McClean 2011;

Bates 2012; Ojo et al. 2015); however, relatively little is known about open data in action. Whether in Seattle, Toronto, Amsterdam, or Cape Town, knowledge of the outcomes and impacts of governmental open data experiments are still notably scarce. Focusing on Cape Town—one of the first municipal open data initiatives in the Global South—this paper analyzes one potential impact of cities releasing data to the public: the instantiation of a new type of "smart civil society organization" positioned between smart cities (Townsend 2013) and smart citizens (Barns 2016; Cardullo and Kitchin 2018). More than data intermediaries (Van Schalkwyk et al. 2015; Schrock and Shaffer 2017), such smart civil society organizations (CSOs) are advancing a variety of grassroots data practices within, across, and beyond the purview of open data experiments.

Based primarily on research and evidence from cities in the Global North, Sieber and Johnson (2015) developed a framework for characterizing municipal open data initiatives according to their varying relationship between city and citizen. Their four-part framework includes: the "data over the wall" approach in which cities just make data available online, usually as a portal for data downloads often accompanied by data visualization and dashboard features; the "code exchange" model in which cities also advocate for and promote data use/reuse by citizens and private corporations; the "civic issue tracker" approach that includes citizen participation in augmenting municipal data sets; and the

more fully participatory open data model in which cities and citizens collaborate on data production and use, while shaping the agenda for future urban data needs. In characterizing these various approaches, the authors note how the role of the government is shifting from data collection and data maintenance to provisioning, while also providing more opportunities for the role of the citizen and civil society as actors in open data ecosystems.

Paralleling the rise of open data over the past decade, new forms of data production and sharing are originating not with municipal governments but at the urban grassroots level, offering opportunities for citizens and community organizations to collect, share, and benefit from information produced in and about local areas. Although initially mostly confined to more-developed settings, the increasing global proliferation of the Internet, and especially of mobile phones, is resulting in a rapid increase in grassroots forms of data production across the Global South (Mitchell and Odendaal 2015). As part of this broader phenomenon of grassroots data production and sharing, recent research is highlighting a diversity of activities under the banner of data activism, from reactive actions designed to challenge data accumulation and analytics by governments and corporations, to more proactive actions based on the production and use of data for purposes of grassroots emancipation and empowerment (Robins 2014; Milan and van der Velden 2016; Schrock 2016; Baack 2018; Milan and Gutierrez 2018; Kennedy 2018; Lehtiniemi and Ruckenstein 2019). With the growth of citizen engagement with data, as part of a municipal open data ecosystem and through grassroots practices such as data activism, there is considerable potential for advancing new forms of city-citizen data relations.

Against this backdrop, this paper examines the evolution of a municipal open data ecosystem in Cape Town, South Africa, and how it has been shaped by parallel engagements in data activism by local CSOs. This research was guided by two overarching research questions:

- How do civil society organizations facilitate civic engagement with open data for activism in Cape Town?
- What are the related motivations, practices, and politics associated with this open data activism hybrid in Cape Town?

In the following section, we provide a background on a specific local culture of civic engagement in Cape Town and in South Africa more broadly. This provides a basis for understanding the City of Cape Town's data sharing ambitions, within the context of a growing movement by CSOs to produce and share data at the grassroots level. In the case study and discussion sections that follow, the two research questions are answered by describing the data practices of three local CSOs. They are utilizing the city's open data, and also producing their own data to advance grassroots goals around two contentious challenges facing the urban poor in Cape Town: access to sanitation services, and documentation of property rights. The final section concludes with a discussion of the implications for cities and citizens when open data meets data activism. In particular, findings suggest that an engaged, data-literate civil society should be understood as an opportunity rather than a threat to cities; however, this will require new models of city-citizen data relations, as well as a more comprehensive philosophy of data openness beyond simply hoisting some datasets over the wall. The notion of bi-directional open data is developed in this paper to characterize emerging possibilities for data sharing between governments and the public, which may be particularly relevant for cities such as Cape Town, which possess a highly active and capable civil society sector.

Background

Context of Cape Town, South Africa

Cape Town has been successively reshaped by the socio-spatial and racial-legal power regimes, first by the Dutch as early as 1652, then during the British colonial occupation (1798–1910), the early Commonwealth era (1910–1948), and particularly the apartheid era (1948–1994) (McDonald 2008). Legacies of segregation and inequality remain deeply entrenched in the democratic era. Despite the city's attractiveness to both domestic and foreign tourists, and its economic competencies in tourism, agro-food processing, and port and transhipment logistics, more than half of Cape Town's residents are either abjectly poor or hovering just above poverty (Crankshaw 2012). Consequently, nearly half the overall metropolitan

budget accordingly addresses "brown agenda" needs like building and operating energy, water, waste, and sewerage systems (Swilling 2010). Other major challenges across the city-region include violence and social unrest, particularly in the Cape Flats area, as well as public health and HIV needs and concerns, with ecological degradation in multiple socio-natural systems (Cartwright et al. 2012).

To address these multiple and interlocking urban challenges, South African cities have engaged since the mid-1990s in developmental local governance implemented through integrated development plans. These initiatives draw on a long history of participatory governance and grassroots organizing with roots in the anti-apartheid struggle (Bénit-Gbaffou 2015). In this context, governance theoretically "is not about the delivery of goods to a passive citizenry. It is about active involvement and growing empowerment" (Binns and Nel 2002, 111). Moving away from top-down, sectoral- and project-oriented practices towards, in principle, bottom-up, consultative, comprehensive, and joined-up policy delivery has implied not only the political willingness of citizens to engage on these terms, but also their capacity to do so. This considerable capacity is fuelled by a well-established network of civil society organizations that coordinate and encourage citizens to engage in active citizenship towards the ambition of governance from below (Robins 2014).

However, weak data infrastructures constrain the potential of developmental local governance and governance from below, particularly with regard to historically disadvantaged populations (Roberts and Diederichs 2002; Parnell 2004). Compounding this problem is that much of the economic and even political life in former apartheid townships is not well known to the policymakers in the city's administrative and economic core; these spaces are the *terrae incognita* of Cape Town's complex yet still "silent" urban economic and administrative geographies (Dierwechter 2004; Donovan 2012; Mitchell and Odendaal 2015; McFarlane and Silver 2017). Recent academic notice to the growing dis-integration of Global South cities implores us to pay attention not only to the cores of cities such as Cape Town, but also to their "fragments" (McFarlane and Silver 2017), including the informal settlements that emerge at urban peripheries, interstices, and underused spaces (Dovey and King 2011). While Cape Town actively confronts the legacies of apartheid and the ongoing socio-spatial inequalities of the post-apartheid era, the city is largely unable to manage the growth of informal settlements, apart from targeted upgrading of some settlements more visible to outsiders and tourist populations (Mels et al. 2009; McFarlane and Silver 2017). It is in this context that local CSOs in Cape Town and other South African cities have shown an interest in data and information as part of their effort to highlight informal settlements and to enhance the voice of their residents.

Open data and data activism in Cape Town

The term "smart cities" is generally used to refer to the relationships between technology, organizations, citizens, and governance as they relate to innovations in cities (Townsend 2013; Datta 2015). Data access, sharing, and use are central to global smart city ambitions, because data are understood to be a key resource, enabling more effective decision making and competitive advantage as cities increasingly seek status recognition on the global stage (Kitchin 2014; Alvarez León and Rosen 2019). Data commonly associated with smart cities include actively and passively produced "big data" collected by automated processes and sensors and from online activities and social media (Batty 2013; Shelton et al. 2015; Zook 2017). However, more conventional forms of data collected and managed by municipal government departments as part of their operations remain important to the smart city imaginary. Proponents of open data contend that making such forms of municipal data available is important for particular smart city objectives (though not all), especially the ideals of enhancing democratic accountability and transparency, promoting citizen engagement in urban affairs, and stimulating social and economic development (Van Schalkwyk et al. 2017).

Cape Town's open data initiative draws directly from these claims. In addition, the origin story of Cape Town's open data experiment is particularly bound up with the city's ambition to be a "world city" (McDonald 2008) which, amongst other things, saw the city apply for and be successful in its bid to be the 2014 World Design Capital (Willmers et al. 2015). This bid was part of its strategic effort to help facilitate "design, creativity,

and innovation" (World Design Organization 2013), and to strengthen South Africa's constitutional commitments to participatory local governance and enhanced information access (Adams and Adeleke 2016).

As part of the program mandate to share design-led urban revitalization programs and strategies to build a city's global reputation for design, creativity, and innovation, the Mayor of Cape Town, Patricia de Lille, met with Jussi Pajunen, then Mayor of Helsinki (the 2012 World Design Capital) in 2013. The idea for a Cape Town open data portal came from these meetings. Mayor de Lille promised to develop an open data portal by 2015, which became a reality in January of that year (Willmers et al. 2015). The city originally released 29 data sets on their website; by 2017, 105 datasets had been made available, which increased to 139 by 2020. These datasets were offered in a range of useful (e.g., GIS accessible) formats.

Just prior to the initial release of data, Mayor de Lille explained the rationale and ambition of the open data initiative:

> The City of Cape Town generates a significant amount of data that is potentially useful to residents. In the Information Age, making public sector data available for anyone to use as they wish allows us as government to tap into the creativity and innovative thinking of business and society to assist us in building a better city. This allows us to truly make progress possible together. Providing access to our data underscores our commitment to being an open, transparent and accountable government. (de Lille 2014)

Three key goals of the city's open data strategy are evident in this quote. Transparency and public engagement are central to the city's open data ambitions; however, they are understood not as separate from, but rather intimately interwoven with the goal of encouraging commercial and entrepreneurial uses of open data. Indeed, the City of Cape Town publicly asserts that a central aim of the data portal is to make useful and potentially empowering information available to residents with the hope of enabling innovative entrepreneurial activity (City of Cape Town 2018).

However, as soon as data were released, a variety of Cape Town CSOs immediately made efforts to use these data not for entrepreneurial purposes, but to fuel participatory governance, public engagement, and activist agendas. While CSOs operate as conventional data intermediaries in Cape Town (Van Schalkwyk et al. 2015), new data analysis capacity has opened up further possibilities beyond enabling the use of open data by citizens. Specifically, this engagement with open data by CSOs was a key initiator of a wider strategy of data production and use for activism pertaining to issues in informal settlements. In the absence of data on these areas (from the open data portal or other sources), CSOs began to collaborate with local residents to produce and analyze their own data, with the aim of demonstrating unequal access to services such as housing, health, sanitation, and education in these areas (Robins 2014). The CSOs are advancing the city's two key goals of transparency and public engagement, but they are realizing them through activism rather than entrepreneurial activity. It is in this alternative area of application that we can see one interesting, and less expected, impact of developing an open data portal: the encouragement of a data-driven civil society interested in data for purposes other than envisioned by the municipal government.

There has been separate academic attention to Cape Town's open data portal (Willmers et al. 2015) and data activism initiatives (Rossouw 2015; McFarlane and Silver 2017; Cinnamon 2019). This paper seeks to advance an understanding of the two phenomena as part of a wider process of civic engagement with and through data. The following section traces the activities of three data-driven CSOs in Cape Town, providing a basis for the following discussion of the tensions and possibilities of civic engagement with data within, across, and beyond a city's open data experiment.

Case study: When open data meets data activism

This case study focuses on the use of open data and wider data activism initiatives by three CSOs in Cape Town: OpenUp (OpenUp 2017), Violence Prevention through Urban Upgrading (VPUU 2019), and the Social Justice Coalition (Social Justice Coalition 2019). This research was framed to find out if and how civil society organizations facilitate civic engagement with open data for activism and

to identify the related motivations, practices, and politics associated with open data in Cape Town. Research was conducted between 2015 and 2017, using a case study approach. Findings are derived from semi-structured interviews with key informants from these CSOs and from local government, participant observation, site visits with CSOs conducting data collection activities in informal settlements, and a document analysis of government and CSO reports. Interviews, observations, and field data were transcribed and thematically coded.

OpenUp—a non-profit civic technology lab—is the most conventional user of open data of the three case study CSOs. OpenUp aims to use data and technology to promote informed decision making that drives social change. Originally called Code4SouthAfrica, it found its original name a barrier to those who do not identify as programmers. The name change occurred in 2017, to best reflect its mission to "open up" data and technology through two key actions: developing public-facing data products, and teaching members of the public how to use open data themselves. Regarding the former, OpenUp generated a "living wage calculator" so that employers of domestic workers can input key variables, such as "how many children does your worker support," to calculate survival wages. OpenUp's key motivation can be understood as public engagement: "In civic tech, technology is not the focus, but rather one of the core skillsets that helps us achieve our goals, which is to open up lines of communication between citizens and government. Through data and technology, we are able to build tools and platforms that enable greater civic engagement and participation" (OpenUp 2017). Regarding the latter, OpenUp regularly holds training events, to inspire and teach others to wrangle open data from the city's portal and beyond. An interviewee from OpenUp explained that "code" and "hacking" are terms that can be intimidating, so they call their events "Easter Egg Hunts" (rather than using the traditional though exclusionary term "hackathon"), and everyone is welcome and encouraged to engage with the data together. OpenUp's training events illustrate its key role as an open data intermediary focused on public engagement with data, but it also points to its role in promoting government transparency, as explained in its description of these events: "What is an Easter Egg Hunt? That is very

simple; it is the search for hidden message(s). In the case of our open data day hunt, finding answers to questions inside a dataset" (OpenUp 2017). When those data are a record of government activity or spending, citizens and civil society can be empowered to question governance decisions, although OpenUp as an organization does not, generally, pursue further investigations or activist initiatives itself. An interviewee from OpenUp put it tactfully: open data can be used to "illuminate inefficiencies."

The second and third CSOs considered in the study use open data and further data-driven tactics to move beyond just illuminating inefficiencies. Violence Prevention through Urban Upgrading (VPUU) more explicitly works to highlight governance decisions through participatory initiatives with community and government stakeholders. The broad approach of VPUU is to promote safe and integrated communities, and to mitigate social and economic exclusion through a range of community-based development projects. VPUU focuses on urban design, early childhood educational opportunities, and a suite of other progressive initiatives that ensure and protect the basic human rights of at-risk populations, including those living in informal settlements (Krause et al. 2014). VPUU has initiated several efforts across multiple townships and informal settlements to formalize and legitimize local knowledge and lived experiences by these populations. It deploys a participatory design approach to risk reduction and urban upgrading, which has included technology and data-driven components. The Social Justice Coalition (SJC), meanwhile, occupies a more overtly activist position in civil society than VPUU, although its focus areas are similar. SJC's *raison d'être* is not only to question governance decisions and inefficiencies, but also to contest and publicly challenge them. In recent years SJC has developed significant data production and analysis capacity as one approach to highlighting and contesting inequities in the provision of basic services, particularly housing and sanitation. Its aim is data-driven mobilization with the goal of using data to empower locals to confront city government regarding service delivery (Mitchell and Odendaal 2015).

Going into detail on the related efforts of the VPUU and SJC on access to sanitation and housing, the paper now considers the potential of data production and sharing by smart CSOs for improving knowledge about marginalized areas of the city. This illustrates significant possibilities for public engagement and

transparency, as the ambitions of open data begin to blend with practices of data activism.

Access to sanitation

Although access to sanitation is a basic human right guaranteed by South Africa's 1996 constitution, Cape Town has struggled to provide sanitation for all of its residents, particularly in informal settlements. How a culture views and discusses, or does not discuss, the issue of waste directly correlates with access to improved sanitation (Jewitt 2011). Avoiding the topic influences how sanitation infrastructure is documented and represented; when neglected, significant health inequities emerge (Jewitt 2011). In Cape Town, these problems relate to the unglamorous yet crucial urban brown agenda—what MacFarlane and Silver (2016) term the "*poo*litical"—as well as wider challenges of insufficient service access to solid waste management, basic electricity, reliable refuse collection, clean water, and so on (Mels et al. 2009; Mitchell and Odendaal 2015; McFarlane and Silver 2017). Perhaps as many as 500,000 of the 3.74 million residents in Cape Town do not have adequate access to sanitation services (Ndifuna Ukwazi and Social Justice Coalition 2014; Ndifuna Ukwazi 2015). According to an interviewee from VPUU, without access to formal sanitation facilities, residents often practice open defecation which leads to a variety of health risks both personal and environmental. These risks include direct personal risk such as being robbed or raped, as well as other public health and environmental risks associated with fecal contamination of fresh water, harming ecosystem services offered by wetlands that include flood erosion protection.

VPUU has developed data and technology capacity to enable a systematic approach to monitor the problem of access to sanitation. The city claims there are no spatial data related to locations of latrines that were placed by the municipal government in informal settlements, and for this reason they do not regularly check on or maintain these latrines. VPUU has developed the CitySpec mobile application for informal settlement dwellers to regularly monitor and inventory the status of toilets provided by the municipal government. The app also allows participants to report location-based safety concerns. It developed standardized variables including the timestamp of the data entry, the position (latitude and longitud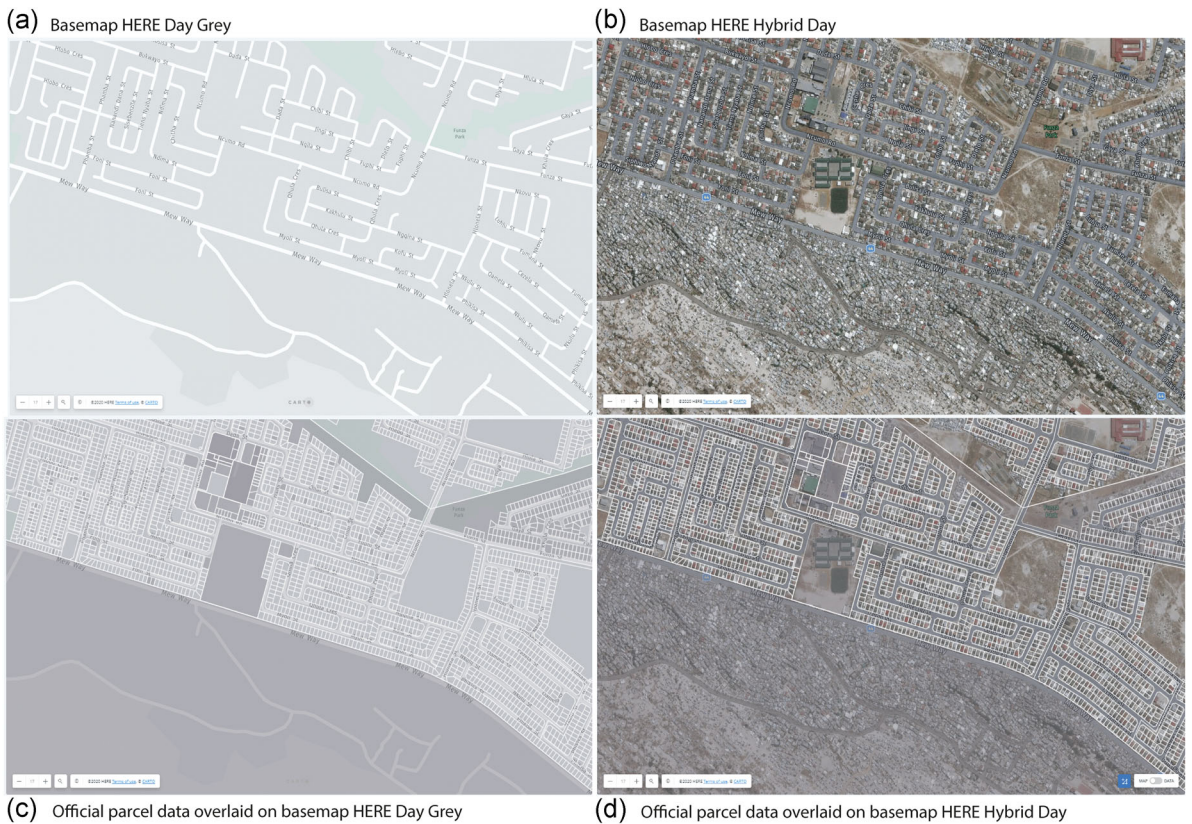e) of the toilet, status (working, not working), and an opportunity to collect photographic evidence. Data can be aggregated to better understand service delivery trends.

Like VPUU, the SJC has also collected data and generated reports about the conditions of sanitation facilities in informal settlements in Cape Town using the social audit community collaboration approach to data activism. Social audits have emerged in South Africa as an evidence-based approach for grassroots organizations to make service provision issues visible in informal settlements. With social audits, these organizations are typically forced to submit access-to-information requests to gain access to government-held services allocation and budgeting data, because this information is not part of the open data initiative. In many cases access requests are simply denied. If they are able to gain access to the data, the next step in social audits is to engage with local residents of informal settlements to collect data about actual services provided in these areas (see Ndifuna Ukwazi 2015; Social Audit Network 2015; Equal Education 2016; Planact 2017). Results of social audits often demonstrate significant gaps between budgeted allocation of services and the services that actually exist. While social audits do potentially highlight government incompetence or mismanagement, they also present up-to-date data on the location and condition of services and infrastructure in informal settlements—valuable information that is often not available in official records, and when it is, it has not been released to the public as part of the open data initiative.

Property ownership and informal settlements

While residents in informal settlements generally do not own their land, they typically do own the four walls they erected around it. However, they have no legal proof of ownership, as the city only maintains parcel data for formal residential areas. As shown in Figure 1(A–D), satellite imagery shows the informal settlements that are not represented in the official data used for resource management and decision-making purposes. Interactive maps allow the user to view where official parcels are located and where they are not, namely in the informal settlements.

VPUU has created a pseudo-formalized procedure to create "deeds" for dwelling owners in informal settlements (see Figure 2A). VPUU trains community members to digitally trace and map house rooftops

(a) Basemap HERE Day Grey

(b) Basemap HERE Hybrid Day

(c) Official parcel data overlaid on basemap HERE Day Grey

(d) Official parcel data overlaid on basemap HERE Hybrid Day

Figure 1 All four maps show the same area of Cape Town, which has both formal and informal settlements and is a region where VPUU works. A. Only a few streets are visible and streets south of Mew Way are not labelled. B. Houses north of Mew Way are well organized and ordered, while dwellings south of Mew Way are informal settlements and are less organized. C. Overlay displaying official open data from City of Cape Town. Boundaries for parcels are delineated with white lines. Note there are no parcel data in the informal settlements. D. Official open data from City of Cape Town. Boundaries for parcels are delineated with white lines.
SOURCE: Map created by first author using CARTO (https://carto.com) and data from City of Cape Town Open Data Portal and HERE. https://bricker.carto.com/builder/5d30037a-f881-4240-ba85-d366858438f1/embed.

linked to databases using QGIS, a free and open source GIS much like the proprietary counterpart GIS used by the government to produce official parcel maps. In the process, it also completed a census of informal settlements where the data were collected. Volunteers (who are compensated with a small stipend and childcare) went door to door to enumerate these residential areas in which population and demographic figures are unknown or estimated. Volunteers trace rooftops and then add population counts as attributes in the database attached to each polygon representing a dwelling. As shown in Figure 2, VPUU prints an "official" document that the homeowner may use to sell or bequeath the structure to

someone else. Figure 2(B,C) shows volunteers inside two different Community Information Centres, where residents can stop by and learn about the projects, as well as assist with the community registry, volunteer, or simply pick up their deed document.

This effort literally puts informal settlements on the map through spatial delineation of housing and through a systematized census of informal settlement residents. Furthermore, it helps to train community members with limited digital literacy in a valuable and specialized technical skill.

Whether the focus is sanitation, housing, or population counts in informal settlements, the actions of OpenUp, VPUU, and SJC demonstrate

(a)

(b)

(c)

Figure 2   A. Output of a sample "deed" generated by volunteers at VPUU as an official document to show ownership of a dwelling and an address. B. VPUU volunteers in charge of entering data into an open source GIS in select informal settlements around Cape Town. C. VPUU volunteers at a different location showing second author the process of data entry and printing the deed.

the potential for data activism to considerably improve availability and sharing of data on marginalized areas and residents of Cape Town. In particular, VPUU and SJC have generated crucial data about services and infrastructure that they are willing to share with the wider community, and with governments struggling to achieve the promises of South Africa's democratic era, including equitable access to water, sanitation, education, and housing. Local governments often say they do not have time or resources to monitor all civic issues, so these initiatives present an opportunity for enhancing the city's data resources. Both VPUU and the city's open data curator were asked if these new and unofficial datasets were being integrated

into official datasets. Both actors indicated that CSOs and the municipality are making efforts to share data resources and move forward. Yet, as discussed below, the promise and potential of wider participation in data production and use in Cape Town is limited by a narrow understanding of what openness might mean in the context of urban data and civic participation.

Data activism and the rhetoric of data openness in Cape Town

As the first municipal-level open data initiative in Sub-Saharan Africa, Cape Town's pioneering

example may provide valuable insight for further open data projects in cities in the Global South. However, our findings will be especially relevant to other cities with a strong culture of civil society engagement, whether in the Global North or South. Although further evidence is needed, our analysis highlights how the city's CSOs have shaped a particular form of civic participation in open data, as part of a wider turn to data and technology to support citizen and activist agendas. The rapid genesis and implementation of Cape Town's open data initiative represents a paradigmatic example of "fast policymaking" (Peck and Theodore 2015), a common practice around open data and technology in the network of cities aiming to be global players in smart urbanism (Joss et al. 2019). The city's strategy aligns with Sieber and Johnson's (2015) data-over-the-wall model of open data, in which the aim is simply to make datasets available on a web portal for public access and use. As we argue in the remainder of this section, however, the over-the-wall model provides only limited possibility to demonstrate true openness regarding data, and, in cities such as Cape Town, it misses an opportunity to benefit from the capabilities of the city's smart CSOs.

For many cities, the over-the-wall model is relatively simple to implement and poses few risks. There are financial costs associated with identifying and preparing datasets and setting up and hosting the portal, as well as the ongoing costs associated with data curation and updates; however, further costs are unlikely to be substantial. Other risks include the potential harm of releasing data with limitations, gaps, or inaccuracies. Some cities have to be prepared for data to be used to highlight government negligence or mismanagement. In the case of Cape Town, promoting transparency in governance is one key motivation for the open data initiative, along with public engagement and promoting entrepreneurialism and economic development, so any use of its data for highlighting issues such as uneven provision of services should be expected. As the open data portal website proclaims: "By sharing this data, the City aims to increase transparency in its processes and actively involve residents and other stakeholders in local government, as well as promote economic opportunity" (City of Cape Town 2018). Although the statement above suggests that the city wants to see varied use of the data, the

particular data in its over-the-wall model provided little ability to understand its impacts, which in this case includes shining the spotlight on data as a means of advancing grassroots activism.

Sieber and Johnson's (2015) code exchange model—in which cities are actively involved in promoting the use of data by CSOs, citizens, and the private sector—provides an opportunity for cities to understand and indeed shape how open data is put into use. While the city has engaged to a degree with some CSOs, most of the actions around open data promotion and use have been organized and implemented by OpenUp and a variety of other CSOs, without City of Cape Town involvement. Although less relevant to the work of OpenUp, whose purview only hints on the possibility of data activism, the work of groups like the SJC and VPUU illustrate that one impact of the City's open data initiative has been to further stimulate interest in data by CSOs, as part of their larger turn towards data for public engagement and activism purposes. SJC and VPUU efforts to collect data on sanitation facilities provide an example of how the City of Cape Town could benefit from a closer engagement with the public—a move "beyond the wall" and into the realm of the Cape Town's smart CSOs and citizens. The considerable efforts of these groups to systematically document sanitation standards could potentially be an example of Sieber and Johnson's (2015) civic issue tracker model of open data, in which organizations and members of the public are enrolled to add to or augment existing datasets. These efforts produce new data in conjunction with governmental open data, suggesting potential to facilitate a productive bi-directional discussion between communities and governments to improve service delivery. More broadly, such efforts signal the potential establishment of new forms of city-citizen data relations, where data openness is best understood as a two-way street. However, this would require significant reinterpretation of what "open data" might mean.

The example of service provision social audits by the SJC—along with other CSOs such as Ndifuna Ukwazi (2015), Equal Education (2016), and Planact (2017)—illustrates the limited depth to the city's philosophy of openness regarding data, despite the stated goals of transparency. Although they have considerably improved data on informal settlements, these efforts have been strongly resisted by government officials (Rossouw 2015; Bradlow and

Swartbooi 2016). Cinnamon (2019) describes how social audits have been highly contested in South Africa, with government officials basing their criticism of these efforts on assumptions of data limitations and using this as an opportunity to suggest that local residents and CSOs should

themselves shoulder some of the responsibility for inadequate service provision. However, another response to civil society data activism is possible; rather than perceiving these efforts as "counter-data" actions of resistance or contestation (Currie et al. 2016; Meng and DiSalvo 2018), a truly "open
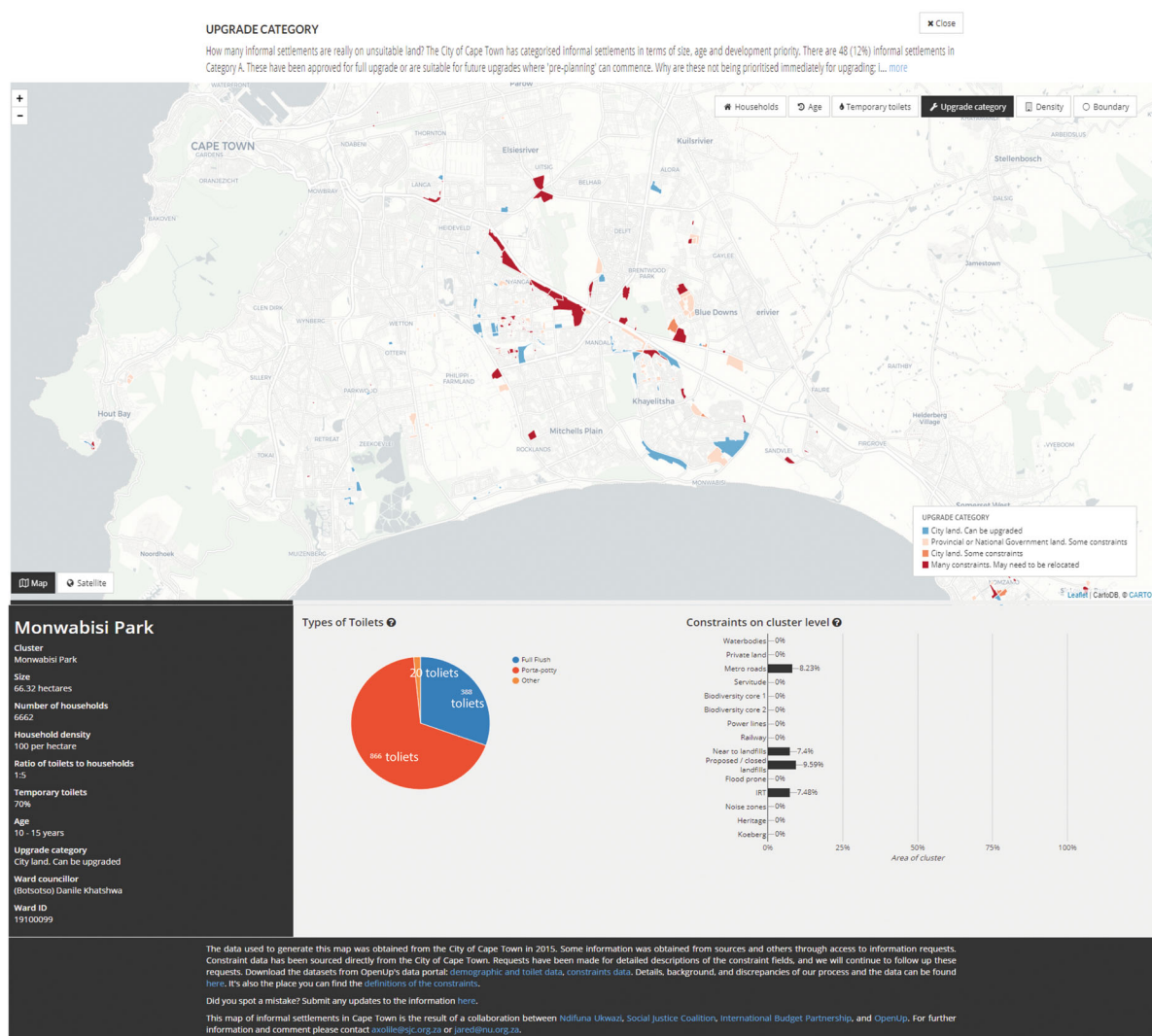
Figure 3 Screenshot from a web-based interactive dashboard and map showing data regarding infrastructure, sanitation services, and other information about informal settlements across Cape Town.

minded" government wanting to improve data capacity through openness and transparency might consider engaging with these groups in a more formalized and consistent capacity to improve existing municipal data resources.

Such a shift in philosophy around data and openness might reflect Sieber and Johnson's (2015) more fully participatory open data model, in which the collection and use of data are a co-production between citizens and governments. In these models—although uncommon in practice—cities must be prepared to relinquish control over the data agenda and engage on an equal basis with other data stakeholders, towards ideals of open government. Although not the focus of the present case study, several recent projects by Cape Town's smart CSOs illustrate the potential for open data to be reconceptualized as a bi-directional process. VPUU and OpenUp are working on the web-based Community Atlas data platform, which collates government open data and locally-derived data, and is specifically designed for sharing this comprehensive data resource with all relevant stakeholders "such as community stakeholders, government officials, NGOs and other interested parties" (VPUU 2019). Similarly, the SJC and OpenUp, in collaboration with allied CSOs in Cape Town, recently developed an interactive map-based dashboard and data portal for sanitation and toilet information for Cape Town's informal settlements (Struggle for Dignity 2020). The portal presents the most current, accessible, and comprehensive source of information on toilet location and type, as well as other information including informal settlement size, when a settlement was established, and whether or not it is possible to upgrade the settlement (see Figure 3). This information came from official government sources; however, it was not part of the city's open data. Instead, it was acquired by these CSOs through access to information requests and through unofficial channels (data leakages). These recent initiatives in particular, as well as the overall findings of this study, suggest considerable potential for a bi-directional open data model to flourish in Cape Town—in terms of the data production and sharing capacity of the city's smart CSOs, if not the willingness of the city to engage with their efforts.

With regard to wider implications for smart city and open data initiatives, our findings suggest that projects must be sensitive to local conditions and contexts—especially when they are markedly different from the places where the normative models have been developed. Cape Town wishes to be seen as a global rather than African city. As the former mayor explains, "[w]e try to put the bar very high and not compete with Johannesburg and Durban. We live in a global village. To be competitive you must compete with cities like Singapore, Vancouver, New York and Sydney" (The Worldfolio 2014). Yet, the city's rapid implementation of an open data strategy based on policies and practices of Global North settings has helped to illuminate at least one key way in which Cape Town diverges from the global city model—the presence of a large and highly activist civil society willing to engage with the city on a more advanced version of open data, beyond the over-the-wall model. In explaining that activists' efforts may highlight mismanagement, even though the aim is to collaborate with government, an employee from OpenUp put it this way: "We're a really young democracy, so I suppose you can give them a little bit of leeway." More attempts by the government to extend that olive branch could signal the development of new forms of bi-directional open data. These may be relevant to contexts that are defined by weak data infrastructures, alongside a strong civil society willing and able to help improve it. In this case, claiming to engage in "open data" must mean also acknowledging the validity of data production and sharing efforts by civil society.

Conclusions and future work

Drawing on a variety of data usage, production, and sharing efforts by smart CSOs, the findings of this study provide insight into the specific case of civic participation in open data in Cape Town, which, while partially aligning with normative models (largely derived from Global North settings), illustrates new possibilities for more advanced understandings of data openness. Dynamic engagement with municipal open data, and the production of new data and data sharing portals by activist organizations, should come as no surprise in a country with a substantial civil society sector, a long history of participatory governance and activism, and the growing interest in data use by the grassroots. In this study we focused on a small number of CSOs that are facilitating civic

engagement with data to address significant social injustices, to gather insight on one dimension of the wider ecosystem of open data in Cape Town. We acknowledge that there are more organizations in Cape Town doing valuable work with open data. Our findings suggest that civic participation and engagement in open data, as part of a wider turn to data for activism purposes in the city, present both an opportunity and a risk for the City of Cape Town. We recommend that cities, rather than seeing the data initiatives of civil society and activist organizations as risky or confrontational, adopt a more progressive philosophy of data openness that embraces these actions, leading towards new forms of city-citizen data relations. The CSOs focused on in this paper used open data as a starting point for new data collection, and for engagement in conversation with communities and government. They did not point fingers at the government for their shortcomings, but rather offered to help augment existing spatial data collection to collectively enhance the data environment in the city. By inviting collaborations with CSOs, governments may be able to better address the data inequalities that render poor and marginalized urban spaces invisible. Doing so could also help to overcome the exclusionary nature of conventional data systems that tend to overlook or miscount the vulnerable in society; more and diverse voices can be included in data production—and the resulting datasets—thereby reducing the likelihood of replicating social injustices.

Future research should seek to strengthen our understanding of how models of data sharing and openness are shaped by local contexts, through further in-depth research with a wider array of data users—including conventional data intermediaries, and also those who are extending their data capacity to include the production and sharing of their own datasets. Although Cape Town purports to be a global city, the specific social, economic, and political realities it faces are more accurately mirrored by places like Durban and Johannesburg, each of which is also developing open data initiatives. Cross-comparative research with similar cities with strong, active, and data literate civil societies—in Global North or South settings—is needed to understand the potential benefits and risks of the broader conceptualization of data openness advanced in this study.

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