POLICY ACTION NETWORK

PAN TOPICAL GUIDES

AI & DATA SERIES 4

AI AND DATA IN SOUTH AFRICA'S CITIES AND TOWNS: CENTERING THE CITIZEN

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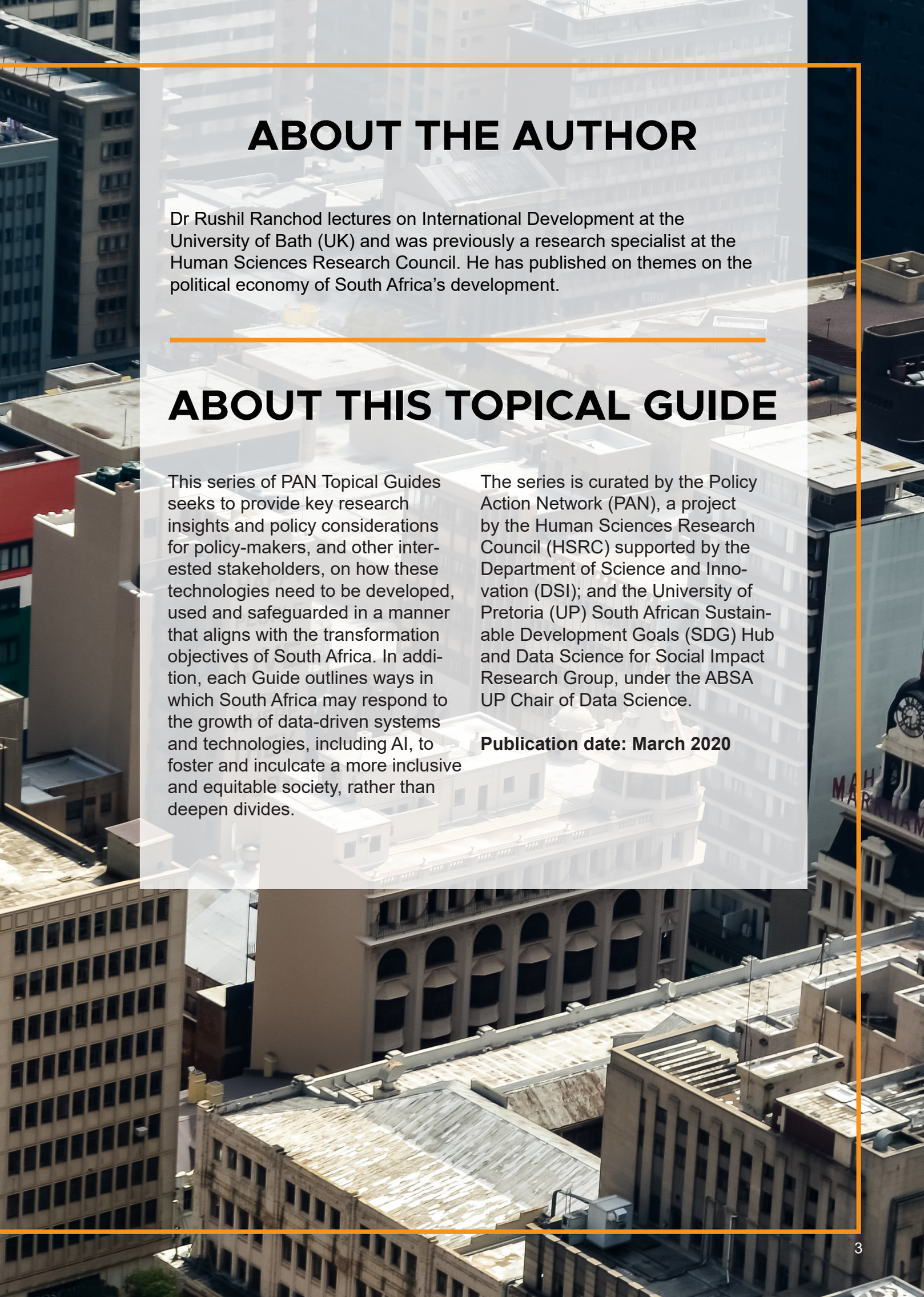
SUMMARY

In South Africa, as elsewhere, cities and towns are incubators for prosperity, opportunity and innovation; they are also spaces of democracy, equity, inclusion, and individual and community flourishing. Evidence suggests that artificial intelligence (AI) and data are reconfiguring the nature, form and function of urban spaces and processes. These technologies are spurring rapid innovation in services and planning with many potential benefits for residents, yet, they also pose challenges to the participatory and democratic foundations of urban life.

Evidence from both developed and developing countries suggests that technology may have an exclusionary effect on citizen engagement, through a deepening digital divide, particularly for the marginalised urban poor. Efforts to smarten cities have led to widening gentrification;[1] rising land values have further pushed poor residents to the urban periphery. In addition, these communities are also disproportionately surveyed within urban spaces[2], for algorithmic and human biases characterise them as threats within cities, a concern of particular relevance for South Africa.

Drawing on emerging research and policy examples, this Topical Guide demonstrates that the regulation of smart cities through law and policy must promote the operationalisation of data justice practices to secure inclusive 'informational rights to the city', which go beyond securing meaningful enjoyment of the right to privacy.[3] This will include leveraging open data practices, cultivating an urban data ecosystem, and democratising capacity building to ensure more equitable AI and data adoption in cities and towns. In this way, greater access, inclusion and participation in urban development initiatives must be ensured through 'bottom up' technological initiatives, supporting more holistic and equitable development outcomes.



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ABOUT THIS TOPICAL GUIDE

This series of PAN Topical Guides seeks to provide key research insights and policy considerations for policy-makers, and other interested stakeholders, on how these technologies need to be developed, used and safeguarded in a manner that aligns with the transformation objectives of South Africa. In addition, each Guide outlines ways in which South Africa may respond to the growth of data-driven systems and technologies, including AI, to foster and inculcate a more inclusive and equitable society, rather than deepen divides.

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BACKGROUND

AI and data are catalysing urban transformations globally and enabling more autonomous, real-time and algorithmic-based decision-making and problem solving. Technologies such as chatbots, automated number plate recognition, dynamic traffic signalling and smart waste management are changing how residents interact with city services.[4]

These intelligence capabilities require the generation and utilisation of vast amounts of data which are captured, processed and integrated to support autonomous decision-making. As scholars note, this enables a more dynamic, 'real-time understanding and control of urbanity.'[5]

AI is defined as: 'a constellation of technologies that enable machines to act with higher levels of intelligence and emulate human capabilities to sense, comprehend and act. These human capabilities are augmented by the ability to learn from experience and adapt over time.'[6] This intelligence capacity is based on algorithms which establish the rules or 'procedure[s] to solve a problem or class of problems' through complex mathematical modelling.[7] Data is central to the development and operation of algorithms; large amounts of high quality data enhance the functioning of these technologies.[8]

Data may assume various forms. Big data is 'huge, unstructured, real-time and transactional'[9] and is characterised by its volume, velocity and variety, resolution and relationality. These characteristics allow for a greater insight into complex phenomena and open pathways for more responsive and transparent policy. Big data generation is enabled through new technologies (such as social media, embedded sensors and smart phones), and processes (such as automation). [10] Open data is data which is 'freely available to anyone and that can be manipulated and repurposed', potentially allowing for greater transparency and accountability in urban governance processes.[11]

South African cities are progressing with plans to embrace technology-centred urban development and management. Technology is being leveraged to support the creation of more efficient, resilient and sustainable cities; by enabling data-driven decision-making, more transparent and accountable governance, innovation-led growth and development, better service delivery and, ultimately, improved quality of life for citizens.

Yet, city governments encounter a range of challenges in deploying these technologies, with distinct impacts on urban society. These include, for example, critical concerns about potential corporate-sector dominance of urban development and administration, deepening technocratic governance and top-down management, exclusion and marginalisation of the urban poor, and deepening surveillance capacity.

Many proponents of the use of AI and data focus on the gains of urban technological innovation for city growth and development. However, the uneven adoption of technology suggests that marginalised groups will find it increasingly difficult to engage with city processes and services and enjoy the espoused benefits of smart cities. As a result, there have been calls for a more human-centric approach to the use of AI and data that actively seeks to include all citizens in urban decision-making processes and inculcate greater democratic accountability, transparency, development and civic empowerment within cities.[12]

South Africa has an extensive set of policy and legislation to support participation and engagement in urban governance processes. However, in many municipalities participation continues to be ineffectual and limited, raising concerns about how the current lack of inclusive interaction may be exacerbated in the face of urban transitions marked by automated technologies and data. The South African experience of participation is part of a wider global trend that has shown the centrality of increasing citizen engagement in cities undergoing processes of technological transition.[13] Given this need, emerging ideas on 'data justice' and bottom-up technological initiatives are critical for building a more inclusive approach to AI and data adoption in cities and towns.

South African Cities Embracing AI and Data

The City of Tshwane has established an internet portal and mobile application to support e-government in the city, allowing residents to pay bills and request services online. Benefits of the platform include, amongst others, enabling more convenient and transparent interactions with the City, and improved accuracy of information[14]. As part of this electronically-enabled approach to enhancing customer engagement, the City suggests that for "proactive interaction and affirming of previous requests, artificial intelligence must be used".[15] The role of AI is not limited to customer engagement. For example, the City has been exploring the use of data-driven measures to mitigate revenue loss in electricity supply.[16]

In other parts of the country, cities and towns have been piloting and implementing similar platforms for improving citizen engagement and planning. The Gauteng City-Region Observatory (GCRO) 'builds the data and analysis to help inform development in this region'.[17] The City of Cape Town's Open Data Portal and related data-driven applications, such as ECAMP, aim to increase transparency and accountability, and to assist businesses and citizens with decision-making about commercial activity and access to services[18]. Cape Town has also received significant publicity around the use of gunshot location technologies and CCTV cameras as part of a dynamic crime mapping initiative. Early successes in the deployment of these surveillance technologies have seen a wider roll-out of these technologies across the metro.[19]

SOUTH AFRICAN POLICIES ON AI, DATA AND URBAN DEVELOPMENT

As indicated in Table 1, South Africa has an array of enabling legislation and policy that provides an overarching framework for guiding participatory approaches to using AI and data in urban development in ways that support and promote the enjoyment of all human rights.

There is no explicit AI policy in South Africa. Similarly, a national smart city policy does not exist. However, analyses of national and local policy and legislation demonstrate the growing importance of digital transformation for realising South Africa's urban development objectives. Initiatives for urban smartening are extensive, if uneven, particularly in larger metros. Secondary cities have also sought to initiate digitisation and datafication processes in attempts to smarten urban functions and operations, although they are less formalised and variable across different sectors.[20]

At the same time, urban policy and legislation identify citizen participation and engagement as a critical element of governance in South Africa. An 'active' and engaged citizenry secures an effective democratic mandate for authorities, provides legitimacy to governance initiatives, and builds trust and social capital. It is important to recognise, too, that active citizenry depends on the enjoyment of and access to other human rights including the right to information about, for example, city planning, and the right to privacy. However, multiple policy initiatives have been explicit about the ineffectiveness of participation measures in South Africa. Structural, institutional and organisational challenges have rendered effective and constructive participation null; it is constrained by functional application and not grounded sufficiently on ideals of human rights, constructive citizenship, equality and empowerment.

In this policy context, several critical questions emerge for policy actors about how to build effective and empowered citizen infrastructures to support the inclusive use of artificial intelligence and data in cities:

- Given the changing structure and form of AI and data-oriented cities, how might citizens be included and participate effectively in urban processes?
- In what ways has algorithmic governance reoriented the terms of participation and engagement in urban life? How might these terms be democratised?
- How might a justice-focused framework create more democratic control and power over the data that feeds algorithmic, autonomous systems within cities?

SCOPE	POLICY/ LEGISLATION	KEY ELEMENTS
INTERNATIONAL	**New Urban Agenda (NIU)**	The NUA supports a wide-ranging sectoral 'smart-city approach' for growth and development; and the 'broaden[ing] of inclusive platforms, in line with national policies, that allow meaningful participation in decision-making, planning and follow-up processes for all, as well as enhanced civil engagement and co-provision and co-production'. The NUA recognises the importance of accurate data to enable implementation of its provision. For example, in seeking to address spatial inequalities it notes: "We will support the development of vertical and horizontal models of distribution of financial resources to decrease inequalities across subnational territories, within urban centres and between urban and rural areas, as well as to promote integrated and balanced territorial development. In this regard, we emphasize the importance of improving the transparency of data on spending and resource allocation as a tool for assessing progress towards equity and spatial integration."[21]
NATIONAL	**Constitution of the Republic of South Africa**	The Constitution entrenches key fundamental rights within its provisions, including the rights to privacy, access to information, and the freedom of expression which are critical to the managing the operation and functions of AI and data in towns and cities. It also calls for 'open government' within municipalities and places a duty on them 'to encourage the involvement of communities or community organisations in the matters of local government'.[22]
	National Development Plan (NDP)	The NDP recognises the use of smart technologies to improve efficiencies in service provisioning. It identifies shortcomings in technology provision and notes inequalities in access and use. 'Active citizenship' is important in developing more equitable human settlements; citizen participation and engagement are critical and the plan envisages the creation of 'citizen-led neighbourhood vision and planning processes and the introduction of social compacts from neighbourhood to city level'.[23] Existing forms of participation in local government are a 'formulaic exercise' with low-levels of citizen trust and social capital. It identifies Integrated Development Plans (IDP) as the mechanism for local-level programme prioritisation. It acknowledges South Africa's urban future as being intimately connected to technology and calls for 'local urban innovation systems to be incentivised.' (p.284)
URBAN (NATIONAL)	**Integrated Urban Development Framework**	The IUDF does not explicitly use the concept of smart cities but sees 'connected infrastructure'- e.g. street lighting technology and smart grids – as important to support service delivery, build urban resilience and spur economic transformation'[24] 'Empowered active communities' are a key policy lever in the strategy. Engagement has been sub-par; it calls for strengthening participatory governance, building individual and institutional capacity for more effective engagement, especially of marginalised communities to participate in decision-making processes, and improving service delivery through co-production mechanisms.[25] The policy sees data as integral to efficient urban management but notes institutional, organisational and capacity constraints in effective data generation and utilisation.

	Municipal Legislation	The Municipal Structures Act, the Municipal Systems Act and the Municipal Finance Management Act legislate the data collection and reporting requirements for municipalities and set in place the structures (e.g. ward committees) for participation and engagement. These legislation supports the national Constitution's requirements for 'open government'.
URBAN (LOCAL)	**Integrated Development Plans**	The IDPs are 'strategic development plans for a municipality' which 'must link, integrate and co-ordinate all the municipality's plans' and established by the Municipal Systems Act, 2000. The development of IDPs are participatory and local government must consult and build the capabilities for community participation. IDPs are a key policy site for guiding the deployment of AI and data at the local level. The City of Cape Town's 2017-2022 IDP for example, expressly identifies 'leverag[ing] technology for progress' as a key objective and notes that '[t]he establishment of an administration-wide big-data analytical platform will enable the City to extract useful information from various datasets to make strategic decisions and improve service delivery across all directorates and departments - making for a truly smart City.'[26] Smaller metros like Nelson Mandela Bay Municipality also recognise the importance of urban digital innovation but contend that these technologies are only useful if they create 'business intelligence that can be utilized for advancement. The impact has to be a measurable change in infrastructure, ways of doing business, behavioural pattern…Sets of data and data-driven solutions will make us far more responsive and relevant in responding to the needs of our citizens, businesses and investors. Budgeting and planning will be more closely related to actual needs. Solutions will be more accurate and measurable in impact.'[27]
TECHNOLOGY	**National E-Strategy**	The National E-Strategy sought to 'articulate the vision for the development of an inclusive information society and knowledge economy' which is 'based on the needs of citizens, business and public sector' entities.[28] Critically, the strategy provides a 'roadmap towards smart cities' which recognises the important interplay between technological, human and institutional factors in creating more innovation-centred solutions to service delivery. However, this roadmap does not provide specific insights into the nature, form and shape of these cities. Municipalities are tasked with planning and implementing smart activities through IDPs. The strategy calls for the development of smart city national guidelines as well as the establishment of Digital Technology Hubs across South Africa 'to drive innovation at local levels' as well as the establishment of high-level, multi-sectoral committees on e-government and the Fourth Industrial Revolution.[29]
	National Integrated ICT Policy White Paper	This policy aims to create a 'digital society' in South Africa. It makes two key interventions: first, in setting out the vision and principles of e-government and participation in South Africa, it emphasises privacy and security imperatives for digital transitions. Second, it initiates a process to set out the overarching principles of open data within government departments. It notes the balance that needs to be struck between making data open, accessible and available for reuse and the imperatives of privacy and security.[30]

PRIVACY AND PROPRIETY	**Protection of Personal Information (POPI) Act, No.4 of 2013**	The POPI Act places strict safeguards on data ownership. It 'establishes a comprehensive compliance framework and places cybersecurity obligations on responsible parties to secure the integrity and confidentiality of personal information.'[31] The POPI Act stipulates a number of conditions that parties, including municipalities, must comply with when processing personal information, such as purpose specification, information quality, openness, security safeguards, and data subject participation.[32] AI technologies open up new challenges in managing data and expose individuals and groups to a wide-ranging set of risks, which may be both intended or unintended. The effect of big data grabs and processing by AI 'are based not just on data that a data subject has consensually submitted, but on data sometimes obtained without the knowledge or consent of a data subject.'[33]
	Copyright Act, No.98 of 1978	The Copyright Act vests ownership of the algorithm and its associated code with its 'author' or the person/organisation commissioning the work.[34] Where these algorithms are developed and deployed by private sector actors for public interest, ethical and political challenges emerge around ownership and rights, not only with respect to technology, but also with the storing, analysis and (re)use[35] of the data as part of city (open) data initiatives. This exacerbates the tensions between public and private realms even where an overarching set of legislative and regulatory safeguards exist.

Table 1: Overview of relevant and selected policy and legislation for AI and data in South Africa

RESEARCH PERSPECTIVES AND POLICY CONSIDERATIONS

The move toward technology and data adoption to support urban transformation in South Africa reflects a wider tendency in global urban and development planning to make cities and towns 'measurable' and 'reducible to data streams' to enable more effective management and control. In these environments, urban citizens are treated as data resources for both city decision-makers and private entities as their behaviour, actions and preferences are datafied and rendered observable, to be enacted upon by autonomous technologies. This leads to the creation of 'digital citizens', which may be useful for automating public service administration, but risks oversimplifying the complexities of citizen behaviour, politics, culture and knowledge.[37] Civil servants are replaced or move deeper into the back office, working as data analysts, further away from citizens and their life experiences.

The techno-utopianism implicit in most policy frameworks that support technology and data-driven decision-making in South Africa runs the risk of obscuring intersecting contradictions and challenges which limits meaningful participation and the enjoyment of other human rights in cities.

Open, participatory governance for whom?

A key challenge in 'technology-led urbanism' is ceding control of urban transformation and development to private sector actors.[38] Technology corporations see urban smartening as a 'business model'[39] in which 'technological lock-ins' and the 'marketisation of public services' are underpinned by market-driven incentives to urban transformation.[40] These corporations are thus able to exercise significant power and control over urban management processes, diluting accountability and transparency in urban governance.

Technocratic governance is at the heart of this corporate smart city. Urban functions are 'measured and monitored and treated as technical problems [and] addressed through technical solutions'. This approach to governance works at arms-length from citizens, meaning that civil servants and policy actors are not able to 'solve the deep-rooted structural problems in cities [as they do not seek] to address their root causes.'[41] A citizen's ability to access services or participate in governance processes then depends on highly unequal access to financial resources and technology.

A further issue is that of algorithmic opacity: the lack of clear and identifiable knowledge about how algorithms compute information.[42] Opacity raises wider concerns around power and trust of urban technologies and decision-systems: technology companies often seek to retain ownership and control over algorithms and data when implementing systems in the public sector, enabling them to retain significant power over public and civic interests, evading transparency and accountability, and heightening the exclusionary potential of these technologies. Further, the lack of clear accountability frameworks to ensure the explainability of how these technologies work, enact decisions, or provide causal explanations about their results, is problematic.[43]

As a result, many cities are looking to develop frameworks to identify applications (from restaurant health inspections to predictive policing) which may result in discrimination or that are 'lacking explanation'.[44] In addition, there are emerging initiatives globally which aim to ensure that citizens are engaged in smart initiatives. For example, the Basque Declaration encourages European towns and cities to leverage 'smart technologies' to 'serve the interest of the citizens and the

public good'; to decrease the 'digital divide' through better infrastructure provisioning at a local level; to limit private control over public data and implementing open standards; and to 'go beyond participatory planning into participatory implementation by supporting and using new approaches like co-production, co-design and co-innovation.'[45] Similarly, the Organisation for Economic Co-operation and Development (OECD) has established principles on AI that 'respects human rights and democratic values'.[46] These initiatives signal growing recognition of ensuring greater equality and human rights protection in managing the socio-cultural and political effects of technological transformations in cities.

In South Africa, the multiple manifestations of inequality require a significant collaborative effort to address the enduring structural conditions of under-development. There is some recognition of what role technology should play and how to integrate emerging technocratic methods and data-driven tools with a more 'bottom up' form of urban smartening.[47] Indeed, open data initiatives have been gaining traction within local government, supported by para-state and civil society organisations. The City of Cape Town's Open Data Portal and the eThekwini Municipality's Economic Development and Growth (EDGE)[48] initiative make data available for public use and scrutiny. In addition, the South African Cities Open Data Almanac (SCODA)[49] and Municipal Money[50] provide data to assist both municipalities and citizens in improving decision-making and ensuring transparency and accountability.

Innovative participatory activities have also been undertaken in smaller municipalities. For example, the Cape Agulhas municipality collaborated with the non-governmental organisation, Open Up, and other civic organisations to encourage youth participation and involvement in municipal processes and decision-making through a workshop initiative called 'Codebridge Youth'.[51] These kinds of initiatives not only make information publicly accessible via digital platforms, but engages marginalised stakeholders to participate in and support development planning.

Pushed to the Periphery

While there are efficiency gains across city sectoral functions in the use of AI and data for urban management, a range of complex (and unintended) challenges also emerge, particularly for those at the margins of urban society. This has significant implications for social and spatial transitions. This section focuses on three emerging challenges.

Land and property

Decisions about the value and allocation of urban land are influenced by access to data and the use of intelligent modelling tools. These tools are increasingly able to analyse and interpret satellite images, providing city administrators with real-time information and analysis of changing use of land and space within city precincts. This enables responsive planning and zoning capabilities, and more accurate and transparent cadastral mapping. However, initiatives to open spatial data risk being captured by private elite interests, creating further marginalisation of local populations. For example, in Bangalore, India, a 'pro-poor, pro-transparency initiative' to digitise land and property information and make it available to local populations, was instead monopolised by corporate buyers. These actors had the technological and analytical capabilities to interpret and use this data to gain advantage over the local population.[52] While open data and intelligent modelling can support greater accountability and transparency, they do not sufficiently account for the complexity of urban land and cadastral information which requires significant analytical and technical capabilities typically held by elite interests. Moreover, open data efforts have been shown to be effective only for those with the capacity to interpret and use its results, effectively worsening the digital divide.[53]

Security and Surveillance

Research shows that the impact of technocratic urban management underpinned by big data and algorithmic systems can have a contradictory response to their engagement with poorer residents: these technologies make them 'observable' and therefore 'capture-able' within data systems, enhancing the ability of government and private actors to extend surveillance capacity in the monitoring of poorer neighbourhoods and citizens. The poor and marginalised are disproportionately surveyed, limiting their democratic rights of access and participation in city life.[54] The rollout of 15,000 CCTV cameras by a private company in Johannesburg is an example of how data and AI-based tools potentially reinforce historical segregation. The technology underpinning these cameras engages in the profiling of individuals to make assumptions of who belongs, and who does not, in Johannesburg's neighbourhoods. Biases are embedded within these technologies, by both human and analytic functions. Black people were disproportionately targeted as 'not belonging' in surveyed zones. Claims that these technologies are reviving the apartheid-era dompas regulations by controlling access to urban public spaces are ethically problematic.[55]

Transport and Mobility

Data and decision-support systems are increasingly used for transport planning. At an individual level, map-based applications are used to avoid congestion. The increasing availability of data allows planners and commuters to respond more quickly to changes in traffic patterns over long and short periods of time. However, emerging research also shows that the use of applications like Google Maps and Waze, which provide 'driver-first traffic fixes' can create new blockages and diffuse traffic congestion into areas not designed to handle large traffic volumes. Mapping out clear, alternative routes for individual drivers fails to see urban transport as a complex system which requires collective decision-making and action to run optimally.

In addition, politically influential communities have historically been able to establish physical traffic controls (and even attempt 'algorithmic adjustments' to get mapping applications to remove their suburbs from route options), effectively redirecting traffic through poorer areas. Living close to high-density transport infrastructures as poor communities do results in a higher disease burden.[56] AI and data use in city transport systems should therefore look to move beyond faster transit times across cities, and seek to enable a more integrated urban mobility approach which emphasises improvements in spatial planning and land use for all urban residents.

RECOMMENDATIONS

To ensure an equitable, democratic and citizen-centric urban technological transition in South Africa's cities and towns, urban policy should be oriented around an 'informational right to the city'.[57] Local governments should be encouraged to:

1 Operationalise a data justice framework locally to ensure democratic participation

A data-justice framework is oriented around 'pro-equity data initiatives'[58] which seek to: (1) ensure privacy of data subjects through enforceable rights and protections, particularly for those at the margins of data life; (2) empower data subjects to 'define for themselves how their data is used, to whom data is resold or the kinds of profiles and interventions that data can enable'; (3) empower data subjects to 'identify and challenge bias in data use' and provide them with the 'freedom not to be discriminated against.'[59]

2 Extend and deepen access for engagement and participation through open data

Open data initiatives are a starting point for cultivating more inclusive and democratic spaces for citizens to participate in local government, thus building social capital and trust. Innovative and creative practices of productive incorporation exist, and urban actors should learn from these local and global initiatives.

3 Cultivate the urban data ecosystem

Local governments should endeavour to build stronger, multi-directional relationships and partnerships with key actors in the urban data ecosystem. These include the private sector, education and research institutions, civil society organisations and communities. A functioning data ecosystem is imperative for inculcating smart governance and cultivating bottom up practices of urban smartening.

4 Democratise capacity building

Greater opportunities for capacity building within the data ecosystem through a process of mutual learning, skills and knowledge development, and dialogue will cultivate technical and social capacities within key actors, and may function to reduce bias, and improve transparency and accountability. Support for ethical algorithm design practices by disseminating relevant knowledges to enhance the explainability of algorithmic decision-making should be prioritised.

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