URBAN REAL ESTATE
RESEARCH UNIT

URERU SMART CITY SERIES PART 4:

THE WAY FORWARD FOR THE CITY OF CAPE TOWN AND WHAT IT MEANS TO BE ‘SMART’ IN AFRICA

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source: https://www.weforum.org

TERMINOLOGY/CONCEPTS

Fourth Industrial Revolution:

The Fourth Industrial Revolution (4IR) is characterised by a fusion of technologies that is blurring the lines between the physical, digital and biological spheres. It is characterised by the exponential proliferation of emerging technological breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing. The 4IR is characterised by a much more ubiquitous and mobile Internet, accessed by smaller sensors that have become cheaper and have more processing power due to artificial intelligence and machine learning (Schwab, 2016). One of the key pillars of this revolution is connectivity supported by increased computing abilities.

Enterprise Resource Planning:

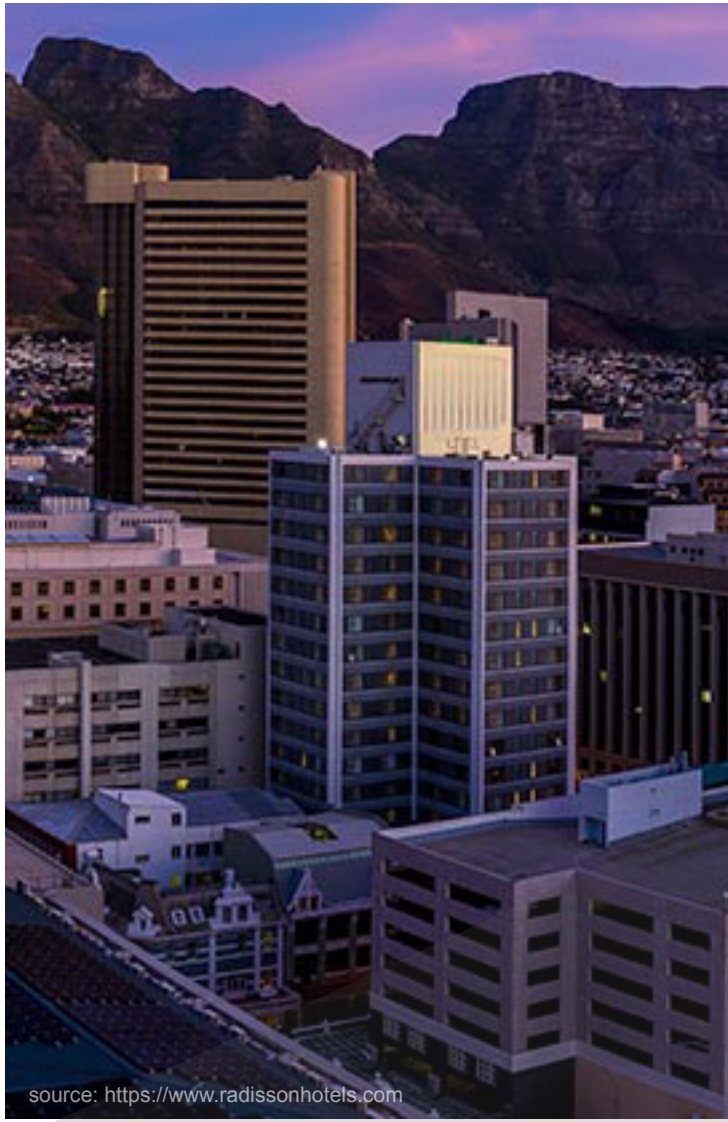
Enterprise Resource Planning (ERP) refers to business process management software that allows an organisation to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources. ERP software typically integrates all facets of an operation (including product/service planning, development, manufacturing, sales and marketing) into a single database, application and user interface.

Information and Communication Technology:

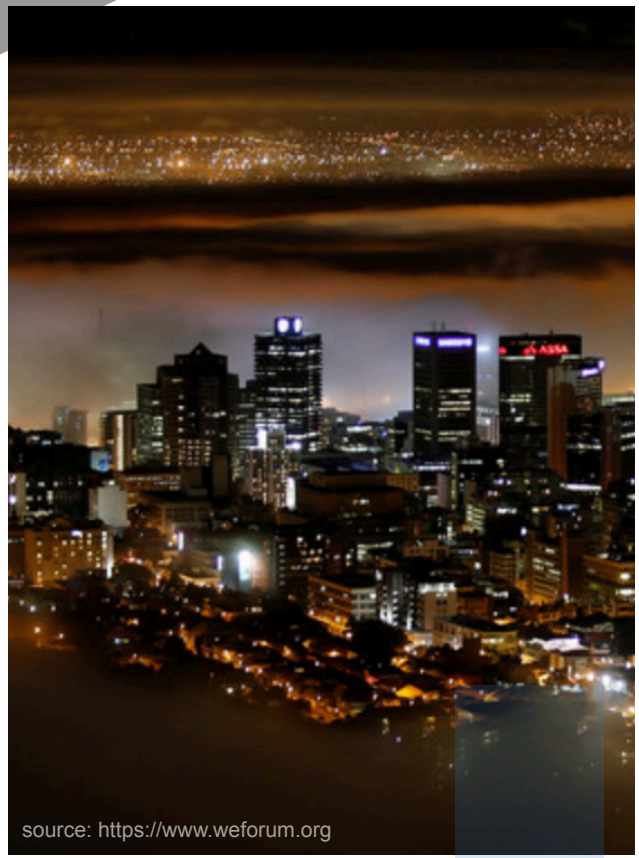
Information and Communication Technology (ICT) refers to technologies that provides access to information through telecommunications. It is similar to Information Technology (IT) but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums.

Integrated Development Planning:

An IDP is a super plan for an area that gives an overall framework for development of an area, in this case, a city. It involves the entire municipality and its citizens in finding the best solutions to achieve good long-term development (Education & Training Unit, nd)



source: https://www.radissonhotels.com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Internet of Things:

The Internet of Thing (IoT) refers to a network of internet connected devices that are able to collect and exchange data. Gunshot detectors are a useful example of IoT.

Internet Service Providers:

An Internet Service Provider (ISP) is a business that provides services for accessing, using, or participating in the Internet.

Open Data:

Open data is data that can be used, re-used and redistributed by anyone without restriction. Open data is easily accessible and compatible with a variety of machines and applications. Open datasets must also be able to be easily inter-mixed and added upon (Open Knowledge Foundation, 2019).

Smart City:

The Urban Real Estate Research Unit subscribes to an understanding of a smart city as a technologically supported ecosystem that enables the open and collaborative exchange between urban actors (including various state agencies, citizens, civil society organisations, private sector and academia) with the aim of developing innovative urban solutions, delivering public services and supporting decision making with the central aim of improving the quality of life for all urban citizens. It is worth noting that there is currently no city on the planet that comprehensively fits this description of a smart city.

1. INTRODUCTION

Over the past few years smart city development in Africa has become an increasingly topical field and many African cities have embarked on exciting digital journeys in pursuit of grand visions of urban futures. Politically, the term 'smart city' has also begun to attract attention as evidenced by recent State of the Nation Addresses in South Africa where the President emphasised the role of new 'smart' cities in addressing many of the urban challenges faced in the country. Many South African municipalities are now beginning to market themselves as smart cities with elaborate plans of harnessing technology to stimulate innovative solutions to improve urban systems. Nevertheless, there is still very little understanding of how the smart city concept is emerging in South Africa and this needs further exploration. Gaining a deeper understanding of this concept as it develops in an African context is vital in devising appropriate and considered smart city initiatives that drive economic growth and urban transformation that adequately responds to the challenges faced by African cities.

The Urban Real Estate Research Unit (URERU) has embarked on a pioneering research project that seeks to understand the role of smart city development in South Africa. The research draws upon an exploration of active and ongoing projects revolving around The City of Cape Town's smart city journey. The research aims to start bridging the gap between smart city literature and applications on the ground in South Africa by investigating the contextual considerations required to apply smart city principles. A potential outcome could be that more effective policies and strategies can be formulated to help guide smart city development in South Africa. On a broader level, this project also seeks to stimulate a discussion around what smart urbanism means in an African context.

Cape Town is largely considered to be leading in efforts to interpret the emerging concepts of smart urbanism into African urban realities. The City of Cape Town has established some ambitious smart city aspirations and is positioning itself to become Africa's first truly digital city. The City of Cape Town (*The City*[1]) started on this exciting quest in the early 2000s with the establishment of its first smart city strategy. Since then the strategy has evolved and developed to provide an example to other African municipalities of the type of leadership and skills required to progress along the path of smart city transformation.

[1] The term '*The City*' for the purposes of this research series refers to The City of Cape Town municipality that carries out the administrative functions and service delivery of government and is also seen as the central driver of a smart city strategy for Cape Town. Thus, the terms *the City* and The City of Cape Town, are used interchangeably. The word 'city' refers to an urban hub where a large number of people live and work, namely:

The first report provides an overview and critical analysis of *The City*'s Digital City Strategy; the guiding framework for smart city development for The City of Cape Town. This report found that the Digital City Strategy exhibited some of the pioneering thinking behind Cape Town's ambitious plans that have placed *The City* in a leading position in the competition to becoming Africa's smartest city. However, *The City*'s strategy lacks substance and is not grounded upon smart models of operation. It is argued that merely adding a digital layer to conventional models of operation, like many of the initiatives in the strategy do, does not make a city 'smart' and that smart city transformation requires embedding innovative practices (which are supported by technology) into the organisation to address structural problems and drive development.

The second report uses the analysis of the Digital City Strategy and interview data to develop an understanding of where *The City* currently is in terms of its smart city development, and the characteristics that have defined the advancement of *The City*'s smart city ambitions to date. Following that, the report discusses how the current state and characteristics relate to the Digital City Strategy outlined in the first report before providing some insight into what this reveals about *The City*'s approach to smart city development.

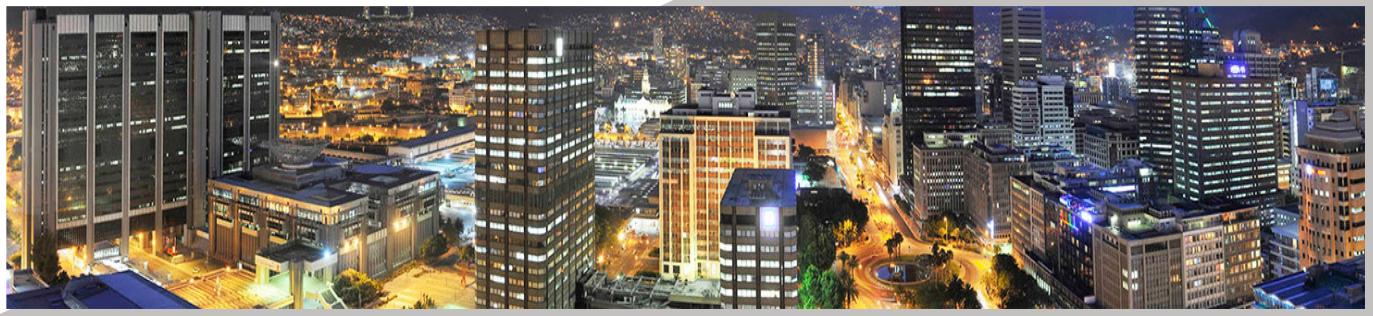
The third report serves to unpack some of the key opportunities and challenges that Cape Town faces in terms of achieving and unlocking the potential for a smarter, more sustainable urban future. Opportunities related to Cape Town's tech-related skills base and the maturity of *The City* as well as the ability to leapfrog technologies. Identified challenges relate to the scale of the digital divide, institutional limitations and the complexities of local government in South Africa. Following that, the report reflects on these opportunities and challenges and provides some insight to what it means on a broader level for smart city development in Cape Town.

This report, the final edition of a four-part research series, attempts to put forward some recommendations that we hope may assist The City of Cape Town as they continue on their digital journey. These recommendations are based on what has emerged out of the previous three reports. The final report also attempts to distil the findings of this research to provide some reflection on what they may mean for Africa more broadly. These are presented as important considerations that can be applied to the context of other African cities with smart city aspirations.

The structure of the report series is outlined below:

- Report 1: Critical Analysis of Cape Town's Digital City Strategy.
- Report 2: The Current State and Characteristics of Cape Town's Smart City Implementation.
- Report 3: Identifying the Opportunities and Challenges that exist for Cape Town as it embarks on its Smart City journey.
- Report 4: The Way Forward for The City of Cape Town and What it Means to be 'Smart' in Africa

This report is divided into five sections. Following the introduction, we outline the approach to the final report. The third section discusses various recommendations that may assist smart city development in Cape Town. The fourth section provides some insight regarding key considerations for African cities looking to become 'smarter'. Finally, the conclusion provides a brief recap on the report series and the final report. Additionally, the conclusion aims to provide some final reflections on smartness and what it could mean in an African context.



2. APPROACH TO FINAL REPORT OF THE SERIES

The first half of the final report will put forward proposed recommendations based on what has emerged from the analysis of *The City*'s smart city development to date. The intention of these recommendations is to provide a point of departure for *The City* to start thinking about revising their strategies and address some of the challenges that it currently faces in terms of driving an effective smart city strategy. Whilst what is proposed is based on an in-depth analysis of The City of Cape Town's smart city transformation, it is worth mentioning that these recommendations may not be easy or possible to implement. This is because the researchers may not have sufficient insight into the institutional and procedural complexities of *The City*. However, the intent of this report is not to provide a comprehensive roadmap for *The City*, but rather to provide a mechanism to start evaluating their strategy in order to address some of the challenges that have emerged from this report series.

The second half of this final report will take the lessons learnt from Cape Town's smart city experience and apply the key takeaways to the broader African context. Again, the purpose of this is to attempt to start a conversation that centres around what city governments across Africa should consider when devising smart city strategies. It could be argued that African cities are infinitely diverse, and the Cape Town smart city experience is largely unrelatable to the experience of other African cities seeking technological interventions to steward urban development. Naturally, these insights are not directly applicable to the diverse urban centres that exist across the continent and the generalisability of what is put forward has its limitations. However, we assert that the research findings uncovered many societal and political challenges that are commonplace across the continent and many of the insights could be broadly applicable to other African cities. Though it must be noted that each city has its own unique context and priorities, and thus will need to develop its own unique smart city strategies.

What is hoped to be gained from this report is that it locates discussions around African smart city development within its context. In doing so, it is hoped that it may mitigate the likelihood of city governments being seduced by the glamour of smart cities and diverting attention away from the critical and systemic challenges that many African cities face. These are important conversations to have, particularly in South Africa, when political decisions are focussing on the development of widespread digitisation and new 'smart cities' when the institution responsible for providing the nation with reliable electricity is failing. To this end, a key outcome of this report is to highlight some of the key considerations needed to effectively incorporate technology into matters of urban governance, and to contribute to a conversation around African cities that is largely still in its infancy.

3. THE WAY FORWARD FOR THE CITY OF CAPE TOWN

Based on the in-depth analysis on The City of Cape Town's transformation into becoming smarter we have put forward some recommendations that *The City* may find useful to consider when continuing to build on their pioneering work within the smart city space. Whilst we acknowledge that URERU is unlikely to have enough institutional insight into *The City* to make these recommendations easily actionable, we reiterate that the purpose of the following section is to provide a mechanism to assist conversations pertaining to the future direction of smart city transformations across Cape Town. Thus, these recommendations are not intended to be presented as a prescription for *The City* to apply directly. The subsequent subsections will outline the key areas under which *The City* could consider for the further development of their smart city ambitions.

source: https://www.southafrica.net/za/en/

3.1 SMART CITY DEVELOPMENTS NEEDS A CLEAR STRATEGY WHICH IS DRIVEN OUT FROM THE TOP OF CITY STRUCTURE

"I think, in terms of The City, the top priority, would be to, actually at a very high level, adopt a strategy or a policy. Because that then drives everything below and what you do have, at the moment, is individuals fighting the good fight but it's fighting the organization, basically"

Arguably the most apparent finding of this research project is the issue of leadership when it comes to *The City*'s smart city development strategies. The absence of a strong smart city champion within *The City*'s leadership has meant that there is little coordination between the innovative efforts of many officials. This lack of leadership is also linked to other institutional challenges that have hindered smart city development in Cape Town, namely: a lack of widespread skills and understanding, institutional silos which limit collaboration, and the difficulties in partnering with outside organisations. What is required is a clear and well-communicated smart city vision that is championed from *The City* leadership. This vision should be strongly linked to key objectives of *The City* such as the Integrated Development Plan (IDP) in order to develop a sense of political commitment to an overarching smart city strategy.

The previous paragraph highlighted the importance of creating a vision that is championed at the political level. However, solely having political leadership for a smart city vision is likely to be ineffective if it is not translated into practices and policies that relates to the various departments and directorates. Thus, *The City* needs to create alignment to a smart city vision across the organisation. Ideally, this would consolidate the various functions and objectives of *The City* into a guiding framework that is relevant to all *City* officials. This will enable 'smarter' principles to be embedded across the organisation.

To this end it is suggested that *The City* establish a dedicated smart city department/unit that is directly supervised by *the City* Manager or the Mayor. This means that they have the institutional reach, and perhaps the necessary resources, to devote to this exercise. The unit should be solely dedicated to developing and supporting the implementation of a citywide smart city strategy. Such a department/unit should have a deep understanding of the municipal structure, the IDP, and the various technologies available to *The City*. Moreover, it is recommended that this department/unit is not bound by the mandate of a particular directorate and would need to have a member of each directorate, preferably the Executive Director, sitting on a steering committee that helps define its objectives. The idea is that the department/unit can engage with the various departments and facilitate the collaborative formulation of a comprehensive strategy with clear mandates and implementation mechanisms for all of *The City*'s directorates and departments. It is believed that is would help translate the benefits of the smart city vision into the various departmental contexts. This will provide fertile ground for institutional buy-in across the entire organisation to take root so that a vision is executed consistently across *The City* and not primarily driven out by the operationally focused IT department.

3.2 GREATER FOCUS ON FORGING PARTNERSHIPS

"I think in the government space, we are bound really by issues of mandates and often the territoriality of mandates limits our abilities to do things in ways that are innovative or collaborative"

Central to successful smart city transformation in any global context is partnerships with other spheres of government, private sector, academia, and civil society organisations. This is particularly true in Africa as municipal governments have especially constrained resources and cannot deliver on smart city strategies without outside help. The nature and ideals of smart city development fundamentally leverage off partnerships. Not only in terms of sharing resources and filling skills gaps, but also in exchanging ideas. This allows both government and private sector goods and services to be better aligned with the interests and expectations of the other. All in all, this makes for more effective and transparent solutions.

The scale of transformations required to achieve the conceptions of a 'smart city' as defined by this report series is significant. The City of Cape Town simply does not have the financial, technical and human resources to meaningfully achieve this on their own. Therefore, *The City* needs to look to partner with various non-state actors in order to realise their smart city aspirations. However, as outlined in the last report, *The City* experiences difficulties when creating partnerships with outside organisations. In ways some of the tensions and difficulties experienced by *The City* in this regard are related to the lack of a coherent strategy. This is coupled by the fact that policy and procedures that regulate the way that *The City* operates often make the creation of synergies a laborious and time-consuming task which does not align well with private sector timelines.

A number of recommendations are put forward that may create plurality in the synergies that *The City* can create, both internally and externally. Firstly, *The City* should look to ways that they can better facilitate collaboration within the institution. Many initiatives get bogged down in the institution due to the difficulties of collaborating, vested interests and the unwillingness of some departments to collaborate. Often the biggest challenge that city officials face is fostering collaboration across an institution that is full of people used to working in silos (The Innovators Forum, 2019). Therefore, it is suggested that departmental mandates be examined to see how internal collaboration can be encouraged. This also stands for partnerships with external actors and other spheres of government (provincial and national). It is suggested that cities could be incentivised to be more open to forging partnerships through embedding practices that support the co-production of innovative ideas into the Key Performance Indicators (KPIs) of departmental mandates.

Secondly, the effort required in establishing a formalised partnership (within and outside *The City*) needs to be reduced. Pathways and procedures for *City* officials need to be established so that partnerships can be established quickly and easily. This may involve having an official whose role is to facilitate processes around establishing partnerships across *The City*.

Thirdly, *The City* needs to gain a better understanding of the needs of private sector and other outside actors that could potentially partner with them. This could be fostered by creating seminars and forums where various private sector organisations, civil society actors and academic institutions can interact with *City* officials around particular smart city topics. Furthermore, these forums can play an important role in connecting leaders in the smart city space from diverse sectors across the city.

3.3 THE CITY NEEDS TO CHANGE HOW IT VIEWS CITIZENS

"It's creating an internally and externally* [smart city]*. I think we are creating the environment and space where people can utilise our materials, equipment, energy and IT in order to improve their lives and sense of community"

In the earlier reports we put forward the conception of a smart city as a physical and digital ecosystem that facilitates the collaboration of various urban stakeholders that can collectively deliver urban services and co-produce innovative solutions to improve well-being for all city residents. In this idealised view of a smart city, the city government acts as a platform forming a central part of the ecosystem which facilitates the two-way exchange of ideas, resources and information between government, citizens, business and academia. Ultimately, this should be the ambition for any city looking to meaningfully incorporate models of smart governance and smart city development, necessitating radically different operating models for city governments. This goes beyond the types of partnerships outlined in the previous section and, at its core, involves a sharing of responsibility and facilitating and coordinating the emergence of community and citizen resources and involvement.

Some city governments in the Global North have made significant progress along this pathway. The City of Cape Town has also demonstrated similar forward-thinking approaches to smart city development through the integration of its Emergency Policing and Incident Command (EPIC) system with *The City's* back office platform and civil society groups such as neighbourhood watch organisations. Despite the promise and enormous potential of EPIC, *The City* has struggled to fully embrace this dynamic view of non-state actors. Currently, it appears as though *The City* has mostly maintained a top-down approach in their dealings with citizens and perceive them as consumers of public goods and services. This is perhaps entrenched by the strongly held understanding of local government by many *City* officials as a business. Thus, public services and goods are understood through a business lens. There is no doubt that this business worldview of local government is useful in that it helps define the organisation and focus its efforts, but it also creates a binary and over-simplified view of non-state actors which is no longer appropriate for contemporary cities.

Looking forward, *The City* ought to attempt to embed a widespread understanding that in cities of the future, citizens can be both producers and consumers ('prosumers') of public goods and services and non-state actors are well-positioned to provide input and solutions to urban challenges. This innovative understanding of non-state actors requires breaking down the walls of territoriality so that *City* officials can bring citizens into the challenges that they have, thereby relinquishing some of their responsibility, requiring a much more externally-focused institution. Typically, this goes against the conventional model of local governments in South Africa and revolutionising the practices and perceptions of 30,000 City of Cape Town officials is a massive undertaking. Thus, attempts to steward this significant institutional change requires bold and dedicated leadership. On a more practical level, *The City* could look for projects that demonstrate the value of these technologically enabled systems of governance so that officials can witness the benefits of handing over responsibility and increasing involvement of outside organisations. *The City*'s Open Data Portal is a useful example of such a project as it allows citizens, academia and businesses to access city data for a variety of uses.

3.4 INNOVATION, EXPERIMENTATION & PILOT PROJECTS

"The true method of knowledge is experiment" – (William Blake)

Central to smart city development is building a culture of innovation and experimentation within local government (The Innovators Forum, 2019). Experimentation is often difficult in the context of local government in South Africa. These difficulties most notably relate to the limited resources city governments have coupled by the considerable service backlogs and inequalities they are required to address. As a result, *The City* like many other African municipalities are risk averse and experimenting with new technologies or innovative ways of operating is not always a political priority. Consequently, it is hard to justify diverting resources away from these critical needs to risk incorporating a new technology with no guarantees of its success.

The above reinforces the importance of making partnerships with outside organisations like businesses, academic institutions and civil society groups. These organisations are largely not bound by important commitments to the general public and are not legally mandated to provide social services. This makes non-government actors much better positioned to engage in experimentation and have much more freedom to try new techniques. Additionally, due to the size of public sector institutions they are not as agile and are not as able to adjust their strategies to exploit an emergent opportunity.

Thus, *The City* should be looking to leverage the skills and experimental abilities of outside actors to assist in developing innovations.

Nevertheless, there are limitations to how much a city government can rely on outside help when experimenting with new technologies and ways of operating. For instance, there would need to be a deep level of public investment (financial or otherwise) into a pilot project taking place in a community. Further, there is only so much that outside actors can assist in improving the internal workings of *The City*. This needs to be driven from within, and therefore, requires that *City* officials have an enabling environment to experiment and adopt new ways of thinking and operating. One way in which *The City* has attempted to innovate/experiment is through the data science team that was the first of its kind in South African municipalities. The data science unit is unique in the sense that it is small, flexible and able to partner with various departments as its mandate is centred around using data from across *The City*. This small unit has a degree of autonomy and freedom to experiment.

"You need to create an enabling environment for new ideas. So, almost like a sandbox where by-laws are relaxed, some of the rules and regulations are relaxed. So, a facility that enables new opportunities to land in a space where it is collaborative with government, private sector, citizens and NGO's"

One of the other major benefits of a unit of this nature is that it is able to build buy-in for new and innovative practices. This has been done by demonstrating the value of data analytics within the context of different departments. As a result, a broad spectrum of *City* officials are beginning to understand the value of data which has started to break down walls that previously stood in the way of effective data collection, storage, sharing and analysis. In effect, this has started to create the administrative/ institutional buy-in necessary to drive the type of institutional change management required for smart city development.

Whilst it is probably not possible for an organisation like The City of Cape Town to operate like this entirely, it demonstrates the ability of large public institutions to be able to innovate and create change management through the use of experimentation and innovative hubs within the organisational structure. What is recommended is that more directorates begin to incorporate similar units to expand the scope and disciplines under which innovation/experimentation can be made. This does not necessarily mean creating new units but could more simply mean creating the mandate/incentive for units or personnel within a department to pilot new ideas or enable experimentation within a department. The reality is that getting innovation off the ground requires patience, skill and commitment. If *City* officials are expected to take on risk and more work that isn't part of their job requirement it is far less likely that they will experiment and and innovate. Hence, linking innovative ideas and experimenting to the performance criteria of *City* officials is a vital mechanism to drive innovation in *The City*. This could be as simple as creating room for experimentation and pilot projects in departmental mandates or attempting to provide some budget allocation to this.

"It has also spun off a whole lot of other child projects because it's just, fundamentally, showing them what we can do with this data. Now having access to this data means that a whole lot of other departments are also interested in using it for their work"

Another way in which *The City* can make itself more amenable to innovation and experimentation is by examining ways in which it can modify certain procurement processes to be more accommodating of innovation and experimentation with emerging technologies. The problem is that municipal government policy is typically structured around compliance and affordability than it is around incentivising desired performance outcomes (Green, 2019). Leading cities in the smart city space have introduced flexible procurement rules, regulatory sandboxes, interdepartmental budgets and tax incentives (The Innovators Forum, 2019). Additionally, it is suggested that *The City* investigate setting up an incubation facility that may allow for *The City* to better partner with innovative companies and cut some of the red tape.

Despite some of the challenges that limit innovation in *The City*, there are without a doubt many innovative people and practices currently demonstrated by *City* officials. It is encouraging to see the organisation has created opportunities for experimentation and innovation in a risk and corruption averse environment. In many cases they have found the right mix of political support, legislative support and institutional support, legislative support and institutional support. We hope that the above recommendations may help them to continue to build on this.

Many of the recommendations in the first half of this report speak to overlapping ideas, namely around change management and the importance of having a clear vision supported by appropriate policy and procedures that can enable that. The next section provides some reflections on what other African cities may need to consider when formulating strategies to incorporate emerging technologies to meet urban development objectives.

4. WHAT IT MEANS TO BE ‘SMART’ IN AFRICA

As mentioned in section two, this section of the report distils some of the key considerations that emerged from the analysis of The City of Cape Town’s experience and attempts to locate them in a broader African context. Cape Town is largely considered to be a leading city in African smart urbanism and there are many lessons that can be learnt from the pioneering path that they have forged to become smarter. Further, many of the issues faced in Cape Town are not unique and are experienced across the continent and even across the globe. Thus, much of what is put forward in this section is also applicable to smart city development around the world. However, this section seeks to identify the key considerations that may need particular attention in the context of some of African cities most pressing challenges.

4.1 STRONG AND CAPABLE STATE INSTITUTIONS

This report series strongly asserts that the smart city starts at city hall. Ultimately, it is local governments that are going to drive these principles, provide the framework and set the overarching objectives of smart city transformation. Thus, without a strong and capable state that is able guide and support the trajectory of smart city developments, a smart city will never truly emerge. It is therefore critical that city governments align municipal mechanisms with smart city principles if they intend to make meaningful strides in transforming their cities into smarter one. As Ben Green (2019: p.130) explains, what makes leading cities smart *"…are not the technical skills but the ability to pair technical acumen with municipal needs and operations... The benefits of machine learning and open data platforms cannot be realised without an arduous process of governance and institutional change."*

This subsection provides various considerations relevant to building a city government that can effectively drive smart city transformation. What follows is largely a reiteration of insights gained from the findings of the Cape Town case study. These most notably relate to leadership, institutional support and developing a coherent smart city strategy.

Strong Leadership

As illustrated by the Cape Town experience, it is particularly crucial in an African context to have strong leadership when it comes to smart city development. This is because of the trade-offs that need to be made in order to drive technological interventions. It is often difficult to justify the establishment of a fibre or 5G network if there are large portions of an urban population living in informal settlements in the urban periphery. In the face of these critical issues, it may not be practical, or even just, to prioritise such interventions. Therefore, investments in smart city interventions need to be strongly linked to broader development objectives and clearly justified. For example, investing in an affordable 5G network to provide opportunities for upward mobility and creating the foundations for economic activities in informal settlements (at the cost of providing less formal housing) may be a trade-off that is worth exploring. Leaders need to identify these trade-offs, support them strongly and develop a robust business case for them. This reiterates the importance of having a political champion who understands the value of technology and how it links to specific city development objectives.

Hence, strong leadership needs to be backed by a firm appreciation of the enabling aspects of technological interventions for meeting development objectives. Further, the commitment to this appreciation needs to be linked to a vision that extends far beyond an

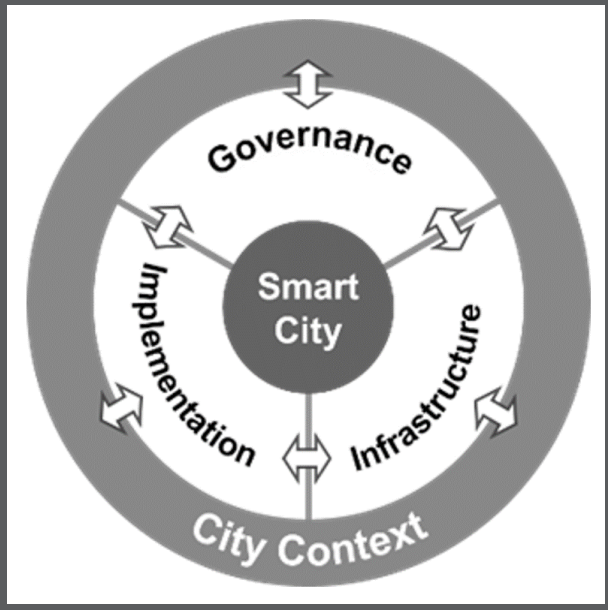
election cycle. The tangible benefits of creating an open data portal or creating a fibre network may take many years to be realised. These types of intervention require meaningful investment. They are different from ribbon-cutting smart city ceremonies that politicians like to celebrate that tend to be more focused on city branding rather than transformation. An example of this deeper level of leadership is the implementation of the ERP platform in Cape Town in the early 2000s. This was a massive investment and a big risk at the time, but the politicians and officials that supported it had a clear commitment to a vision that had buy-in, meaning that the project transcended changes in political office. This meant that the project transcended changes in political office. This was also due to the commitment and skill of *City* officials, but it was the strong leadership and vision that paved the way for the success of the ERP project. The City of Cape Town is currently seen as the best run municipality in South Africa and this is largely attributable to the strong and decisive leadership in the early 2000s.

We caution that city governments in Africa should not get seduced by the glamour of smart city 'solutions' to leverage the concept for political mileage. Instead they should focus on the key developmental objectives of their city before looking for technological interventions. It is about finding an appropriate solution that is enabled by technology.

Well Formulated Strategy

There is no doubt that having strong leadership is a crucial consideration for any African smart city looking to realise concepts of smart city development. However, this leadership needs a point of reference for a city government. There needs to be clear and detailed implementation plans for the visions put forward by city leaders. In other words, the vision needs a blueprint. Moreover, this 'blueprint' needs to be carefully coordinated across the various departments of the city government. A lack of coordination across local government institutions can doom even the most well-intentioned efforts (Green, 2019). What is required is that city governments 'hardwire' smart city visions into their organisational structures and institutional workings. This needs buy-in from the leadership. Many leading cities across the world employ Chief Technical Officers (CTOs) to head up their smart city strategies. These CTOs typically sit alongside the executive management of the city leadership and have a dedicated team that drives the implementation of a smart city strategy.

In addition, the effective alignment of policies (from housing to transport and sanitation) and procedures into a more holistic smart city strategy requires the coordination of diverse mandates and objectives across city governments. For example, cities should understand how water and sanitation would fit into an overarching smart city strategy or all departments must understand the importance of data in their smart city vision. This necessitates the input of all city departments and directorates. Many strong city leaders across the continent are eager to promote the ideals of smart cities without having a coherent action plan to make them a reality. A recent white paper by Interact (2020) surveyed a number of smart city experts across the globe and reported that most cities do not have an integrated strategy for smart city transformation. Moreover, most approaches consist of disjointed individual solutions that lack consistency and coordination. To this end, African cities should look to devise a coherent and comprehensive strategy before investing in technological solutions.



Institutions that can Support and Drive Principles of Smart City Development

"…just because a revolution stems from technology does not mean that its primary impacts will be technical: digital technologies designed for the smart city will drastically alter municipal governance and urban life"

(Green, 2019: p.143)

As highlighted in the beginning of this section, a key insight of this research project is that a city, as an institution, needs to be able to effectively support technological interventions in order for smart city initiatives to be successful. Green (2019) asserts that often issues that are perceived to be viewed as solvable by technology are actually related to organisational capacities, and addressing them requires working with people and institutions rather than building technology. This underlines the notion that smart city development goes far beyond technical requirements and essentially hinges on effective institutions.

For a variety of social, economic and political reasons, African cities struggle to create strong public institutions. The result of which has meant that many African cities fail to deliver on their obligations to their citizens. Technology alone can never solve these problems. The irony is that the benefits of a smart city are only likely to be realised once non-technical institutional aspects of city government are addressed. Additionally, smart city development is fundamentally reliant on collaborative interventions that are driven from a multitude of agencies representing various aspects of society; public sector, private sector, civil society and academia. Municipal governments in Africa exhibit difficulties in cultivating and coordinating these partnerships. Therefore, African cities looking to develop smart city strategies need to recognise that their ability to implement those strategies hinges on the ability of city governments to develop an enabling environment for collaboration, experimentation and partnerships at various scales and organisational types.

The above not only relates to the leadership and policy frameworks outlined earlier in the report, but also to the skills and culture within city governments. For example, The City of Cape Town has some visionary officials that have pushed hard for conducting advanced data analytics, but in an organisation that largely does not understand the value of data or lacks the general skillset to unlock its value, there are limitations to the impact this strategy will have. Hence, to derive benefit from technology, cities must overcome institutional barriers by reforming policy and practices (Green, 2019). Smart city development requires the improvement of human capital, not necessarily technical capabilities.

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Legislation to Support Smart City Development

Many technologies associated with smart cities are new or untested in Africa. As a result, much of the legislation regulating their use and guiding their implementation has yet to be formulated. This has a limiting effect on organisations working with emerging technologies, and in turn, city governments looking to adopt new technologies or models of operation. Furthermore, existing legislative vehicles are not responsive to changing needs brought about by rapid technological advancements that are broadly grouped as the Fourth Industrial Revolution (4IR). An example of this is the municipal procurement legislation which hinders innovation in South African municipalities. Hence, a key consideration for African governments is how to create a legislative environment that accommodates the needs of smart city development as technologies continue to evolve at a rapid rate.

On a national level, there needs to be a framework under which cities can subscribe to. On a local level, that needs to be translated into legislation matching city operations. In South Africa, for example, there is a national policy called the Protection of Personal Information (POPI) Act which is essentially a code of conduct for the way government and companies deal with people's information. South African municipalities must subscribe to POPI, but this act contains little instruction regarding the protocols and practices that local governments need to enforce to ensure compliance with the act. Thus, policy needs to be clear enough that it can be linked to actions but not too prescriptive that they restrict institutions looking to innovate. Policy helps create guidelines, security and confidence in trying something new and untested. Therefore, city governments should attempt to understand what policy requirements will support various smart city interventions. Following that, municipalities should consider policy pathways which can guide and support various tech-related interventions at the city level. Looking to policy pathways of leading cities like New York could offer useful lessons in this regard.

4.2 STRATEGIC APPLICATION OF SMART CITY INTERVENTIONS

Due to the resource and institutional limitations of African cities we argue that smart city development on the continent needs to be all the more strategic. Interventions need to be extensively deliberated before they are applied. This section outlines the various ways that African cities can be more strategic when approaching smart city transformation.

'Keeping up' with Global Cities and Leapfrogging

"The lack of leadership and skill means that many "smart" initiatives are undertaken for the sake of 'keeping up with the Jones" or not to be seen to be lagging"

Contemporary cities are under immense pressure to be proactive in adopting innovative strategies that embrace the Fourth Industrial Revolution (4IR). This is seen as a necessity to attract talent and investment, create jobs and remain competitive. In many ways this is a healthy competition as it pushes cities to continually innovate. Nevertheless, many cities invest in technology in order to maintain/ create a particular image without the requisite consideration for how this intervention may promote meaningful urban transformations. The results often manifest as cosmetic smart city 'white elephants' and are examples of technology for technology's sake that fail to meet a greater objective.

A further concern regarding smart city interventions that are motivated by desires to 'keep up with the Jones'' is that they tend to rely on foreign technology developed by proprietary software companies. This means that the skills associated with these interventions reside outside the city or country of deployment. A result is that African cities' digital transformation could become dependent on foreign skills and technology companies. This could bring into question the legitimacy of African smart city visions that are largely influenced by foreign capitalist actors. In an extreme case this could be an incredibly dangerous place for African cities to enter where urban development is dictated by tech firms in a form of neo-colonialism.

Despite the above, there are many fantastic opportunities for African cities to leapfrog technological progressions made in more advanced societies. This means that African cities can play 'catch up' and provide technological solutions without investing in dated infrastructure. This has been highlighted through the Cape Town smart city experience in earlier reports. However, African cities should consider the right time to invest in emerging technologies and evaluate how effective these technologies will be within their context. For example, with the advent of 5G technology and the increasing affordability of distributed sensors, Internet of Things (IoT) is an achievable intervention for some African cities in the not so distant future. Nevertheless, African cities should investigate whether this is an appropriate and necessary intervention given their current context. It is argued that it may be better to wait and learn and not be at the forefront of technological advancements.

"In the South, if we think that we're going to do innovation, we need to think very carefully… You could just burn lots of money, effort and time. Better to watch what's happening up North and then adopt it"

Investing in emerging smart city technologies is risky activity for African municipalities to engage in. For a variety of reasons, it is often beneficial to resist the temptation to keep up and deploy cutting edge technologies and wait for a technology to become more established. Firstly, useful lessons can be learnt from pioneering cities like Singapore and New York that are experimenting with new technologies. These local governments are much better at bearing the risks of experimenting with untested technologies. Though African cities must be cognisant of the fact that technological solutions may not be directly applicable across diverse cities and should not simply copy what is done in these leading cities. Secondly, there are lower cost implications of waiting for a technology to become more established meaning that they will be more accessible for resource constrained African municipalities. And, thirdly, waiting allows for skills and experience to be built around new technologies, creating the necessary knowledge to optimise a technology more available.

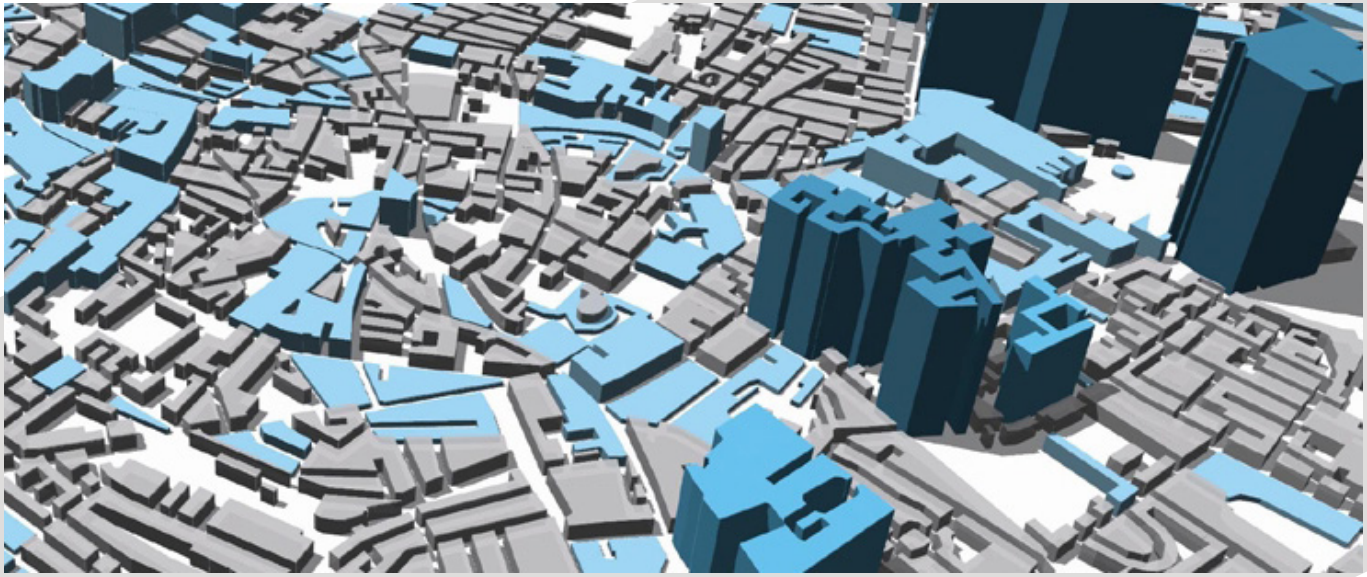
African cities should be encouraged to see what technological interventions work, check to see if they are applicable and appropriate for their needs, then develop a pipeline of skills that can enable the organisation to unlock the potential of an emerging technology. Certain interventions may be better to adopt as the existing skills may be closely aligned with the requirements of a particular technological intervention. Therefore, the skills and experience element of leapfrogging is a crucial consideration. A failure to do this may result in a dependency on tech firms as mentioned earlier. In addition, cities should support and foster innovations that are taking place locally within the continent. Local solutions devised for local challenges are far more likely to leave lasting legacies than imported solutions since they usually have a much deeper appreciation of contextual complexities. Examples such as the Congolese robots that monitor and direct traffic in Kinshasa; and the Kenyan app, Usalama, which turns a phone into a GPS enabled panic button that alerts emergency services, are just a few examples of the innovative solutions that are being developed across the continent, for the continent. Governments should look to facilitate and support these innovative solutions before looking elsewhere.

Ultimately, motivations behind smart city aspirations must go much deeper than purely keeping up or remaining competitive with Global Cities. The consequences for African cities that follow a superficial path of investing in technological solutions as a marketing exercise could be severe. However, there are many opportunities that can be exploited if cities are patient and strategically invest in technologies. These investments should be conducted in a way that fosters self-reliance and capacitates government. This requires investing in technologies that can be optimised by a city's current expertise or develop the expertise necessary to optimise the introduction of a new technology or model of working. Further, it requires looking to what solutions can emerge from the local context. For instance, Uganda's Ministry of ICT has a programme that specifically looks to support local innovations.

Decisions to invest in new technologies must be supported by a strong case for its use and a clear understanding of the broader objective the technology upholds. At the end of the day, like with so many issues relating to smart city transformations in Africa and across the globe, it comes back to having leadership with the understanding of smart city interventions in the context of broader contextual and urban priorities. Often, what this entails is starting small with a longer-term goal of achieving ambitious smart city interventions. We discuss this in more detail below.

Smart City Transformations are Incremental

Smart city development requires significant changes in the way that city governments operate. Instituting such change in large city organisations, which often lack the skills and structures to best leverage innovative solutions, is a massive challenge, particularly in African cities. To this end local governments need to realise that a smart city transformation is not a short-term goal but a continuous process. Therefore, it is important that city governments support their smart city ambitions with smaller, incremental action plans and start with actions that do not require significant investment and operational changes. This enables the necessary skills, infrastructure and organisational change to be built around the various technologies associated with smart city transformation.

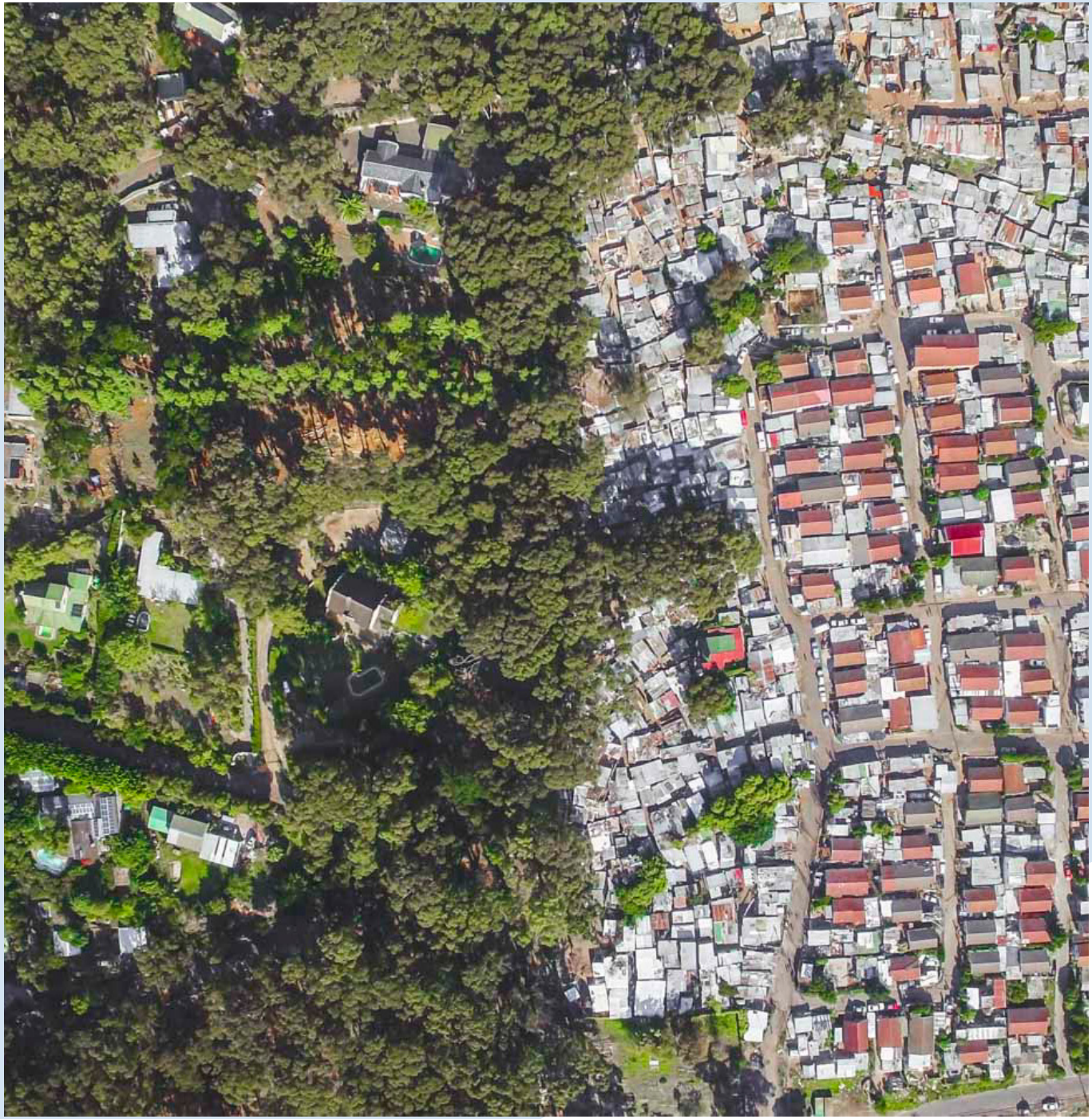


An additional point to consider is the fact that smart city transformation is not always going to be a political priority for African cities, and thus it is likely that the resources allocated to smart city interventions will be limited. As such, African cities should rather look to what they already have in place when devising solutions rather than solely investing in smart technologies. There are often effective low-tech solutions that are overlooked when devising smart city strategies. But if a technological solution is necessary, it is advisable to start small, prove its value and expand within the institution. A useful example is Durban EDGE, eThekwini's open data portal. Due to the resource and capacity constraints of the municipality, eThekwini decided to start their open data journey by focussing on economic development. The portal uses a few useful datasets from a single department with the intention of spreading it to other departments once it has proven its value. There is now political support to roll out a much broader open data project within the city. This supports Green's (2019) suggestion of identifying small projects that address each departments priorities and needs. Again, this comes down to understanding the objectives within the context of the government institution. Thus, managing your ambitions with your reality.

Understanding the Issues at Hand

"Technology is a great tool, but it is not the answer… Technology is a tool to getting the answer more efficiently" (Lucas, 2019)

The above quote underlines the important and often overlooked teaching that a smart city is not an IT solution. Ultimately, the strategic implementation of technology necessary for smart city transformation on the African continent pivots on city governments' ability to determine and understand their priorities/ issues. This stands for cities in other global contexts too. In line with the above assertion, it is suggested that city governments research priority issues before looking to technology. City officials are often too focused on deploying technology to problems rather than trying to understand them. You cannot solve a problem you do not understand (Green, 2019). Once a firm understanding has been created, city governments can develop policies and start thinking about ways in which technology can be embedded into the solution. The understanding of the issues and priorities needs to be augmented by a firm understanding of the value of technology within the context of solving key issues in a particular city. These solutions need to be evaluated in the context of financial, capacity and institutional limitations of local government. Essentially, this understanding links back to having a capable state with leaders who understand the potential of smart city transformation and the contextual challenges that emerge in a particular city.



4.3 CITIZENS ARE NOT PASSIVE TRAVELLER'S ON THE SMART CITY JOURNEY

African cities looking to implement smart city programmes need to gain a deeper understanding of the ways that residents access and engage with smart city interventions. More developed regions of the world tend to have a higher level of digital skills, contact with technology and access to connectivity. As a result, the adoption of emerging technologies tends to be smoother as there is a higher acceptance of technology and a better appreciation of its value. Hence, it is unlikely that transplanted solutions developed overseas will be received in the same way in African cities. In the absence of a critical mass of skills and applications of technology across a broad spectrum of society, much deeper contemplation needs to be afforded to the ways in which citizens engage with technology. Hence, it cannot be expected that citizens will passively adopt whatever technological intervention is passed their way.

If technology is going to be an important tool for empowerment then it needs to be delivered at the level of all citizens. Therefore, smart city strategies need to be informed by an understanding of the ways in which diverse populations receive technology, particularly those in underserviced communities. Ayona Datta (2019) explains that smart city interventions will never be truly transformative if they do not consider how people in the margins align with it. This means considering the channels through which citizens access information and interact with technology.

A prime example of a tech-related solution that appropriately considers this is Kenya's M-Pesa virtual banking system that works off mobile phones. M-Pesa has become the world's leading mobile money service with 11 billion transactions made via the service in 2018 (Vodafone, 2020). The service has been incredibly successful because it provides a critical need (a banking solution) using existing technology in a way that its users best interact with technology; through a mobile phone. Further, it uses mobile network operators to operate the services which means that mobile banking does not need a bank account or even a smart phone. A key takeaway from this example is that smart city interventions need to be devised to service citizen requirements first and foremost. In addition, city governments do not need to invest in 'high-technology' to provide important solutions for its citizens. It could even be questioned whether such technological solutions are aligned with end-user needs. This suggests the need for a reframing of people as central to smart city development as opposed to science and technology.

What was innovative about M-Pesa was not the technology deployed but rather the way in which long-established mobile technology was harnessed to respond to a critical need for banking services to people in emerging economies. Thus, it is important to recognise that innovation does not equate to technology. Significant innovations can take place by using what is already available. Many city governments forget this crucial teaching when seduced by IT solutions marketed by tech vendors. What is more important is that interventions are appropriate to, and aligned with, the end-user's needs and available resources. A failure to adequately consider this will mean that smart city programmes will fall short of their transformative aspirations. What's more is that if these considerations are not made there is a risk of excluding people from smart city development by not providing mechanisms that enable them to contribute, effectively further alienating those in the virtual and physical margins. This underscores the point that African cities need to be cognisant of the socio-economic disparities that persist in urban centres. An aspect of this which is central to smart city transformation is the digital divide which is discussed in the following section.

4.4 CENTRAL TO DEVELOPMENT OF SMART URBANISM IN AFRICA IS A CONCENTRATED EFFORT TO SHRINK THE DIGITAL DIVIDE

The most critical aspect relating to smart city transformation in Africa is the need to address the digital divide. This is arguably the most significant difference between considerations for smart city development in Africa and the Global North. Indeed, the digital divide is a pervasive issue in most global contexts, though it is argued that this phenomenon is most explicitly exhibited in emerging countries, particularly in Africa. The prospects of smart cities of the future will never emerge if large portions of urban populations are excluded due to the vast disparities in access to, and use of, digital connectivity and technology.

Having ubiquitous and affordable internet connectivity not only provides opportunities for upward mobility but also provides opportunities for deepening smart city development by empowering and engaging citizens in the margins. Ideally, fast and reliable internet connectivity should be something that is included in a Bill of Rights, much like access to adequate and dignified housing, so that the poorest and most vulnerable populations are granted access without charge. This view is starting to permeate mainstream notions about contemporary urban development which is an encouraging sign.

Having access to connectivity plays a central role in narrowing the digital divide. However,

Having access to connectivity plays a central role in narrowing the digital divide. However, this is one element of a multi-faceted problem. Other significant challenges that sit on top of connectivity are digital skills and access to technology which speaks more to broader societal issues prevalent in Africa such as education and income inequality. Truly making headway in narrowing the digital divide will require extensive educational programmes and providing the poorest communities with access to technology. Whilst The City of Cape Town has seen some success with their Sm@rtCape initiative, the scale of the initiative means that there are severe limitations to its potential impact. This highlights the fact that a city government alone will never be able to make significant strides in addressing such massive issues such as the digital divide. What is required is a coordinated commitment between national, regional and local governments in driving connectivity, digital skills and access to technology. For example, Uganda has made significant progress in making connectivity affordable through its commitment to establishing a nationwide fibre network. The project is far from complete and has already decreased the cost of internet bandwidth by nearly 95% (NITA Uganda, 2020).

In addition to the state, the role of civil society and private sector is not to be underestimated in tackling the digital divide. For example, private sector is particularly well-positioned in providing the networks and products that deliver connectivity. Across the continent there is already an active and thriving ISP sector that is servicing more affluent urban areas with fibre connectivity. City governments in Africa need to develop ways to support and facilitate the delivery of fibre networks in marginalised communities by harnessing private sector actors. This could be in the form of legislation that promotes competition and removes barriers that may otherwise prevent private actors in providing digital infrastructure in underserviced communities. Or by taking on some of the risk or capital outlay needed to establish digital infrastructure networks. Additionally, civil society can play a crucial role in supporting the development of skills and acting as intermediaries between citizens, government, and private sector. An example of this is Too Much Wi-Fi (TMW) in Cape Town. TMW addresses the layered challenges of the digital divide in Imizamo Yethu informal settlement by both providing affordable access to connectivity and the development of skills that support greater digital adoption. Both regional and local government have started to partner with this organisation. TMW exhibits a great example of how citizens and organisations can develop solutions and then government agencies can further support that by partnering with them to help them scale. It could be argued that this is the essence of being ‘smart’; supporting and enabling citizen-driven innovation that leads to improved services and quality of life. Though it must be noted that there are limitations to the scale at which these types of initiatives can provide scalable support.

Ultimately, there needs to be commitment from all spheres of government to make meaningful strides at addressing the digital divide. Without this commitment and support the unequal access to technology and connectivity will present a significant hindrance in achieving smart city transformations. This will result in the further entrenchment of practices of exclusion and inequal access to services and goods that currently exist in African cities.

The second half of the report pondered the various consideration that African governments should consider when implementing strategies to transform their cities with the help of technology. What becomes clear is that there are many similarities to the considerations of smart city strategies in other global contexts, but certain aspects require more attention than what would be expected in more technologically advanced cities.

5. CONCLUSION

5.1 SUMMARY OF THE CAPE TOWN SMART CITY EXPERIENCE

This report series has closely followed the transformation of The City of Cape Town as it has continued along its smart city journey which started nearly two decades ago. The reports highlight the exciting and encouraging progress made in embracing urban innovation through Cape Town's quest to become the most technologically advanced city in Africa. A central aim of this research series is to use The City of Cape Town as a case study from which *The City* and other municipalities might derive benefits.

Whilst Cape Town lacks a coordinated approach with concrete implementation strategies, *The City* has many opportunities that it has been able to exploit in order to forge ahead as a shining example for other African cities to learn from. *The City* has driven out various innovative initiatives and there are many *City* officials with a great deal of expertise who understand the need to drive an overarching smart city strategy. It appears that one of the biggest obstacles holding back *The City*'s transformation is the institution itself. There is a need for stronger leadership and wide-reaching skills across the organisation to devise and implement a comprehensive smart city strategy. Another momentous challenge is linked to the digital divide; a layered and complex issue that speaks to broader societal issues that have become entrenched in South African society.

Looking forward, Cape Town is likely to remain a pioneer city in the African smart city space. Though there are some aspects that the *The City* could consider in making the organisation more supportive of their smart city aspirations. Most importantly, this relates to having a clear and coordinated strategy that is championed at both the political level and at the administrative level through aligning the strategy with departmental mandates.

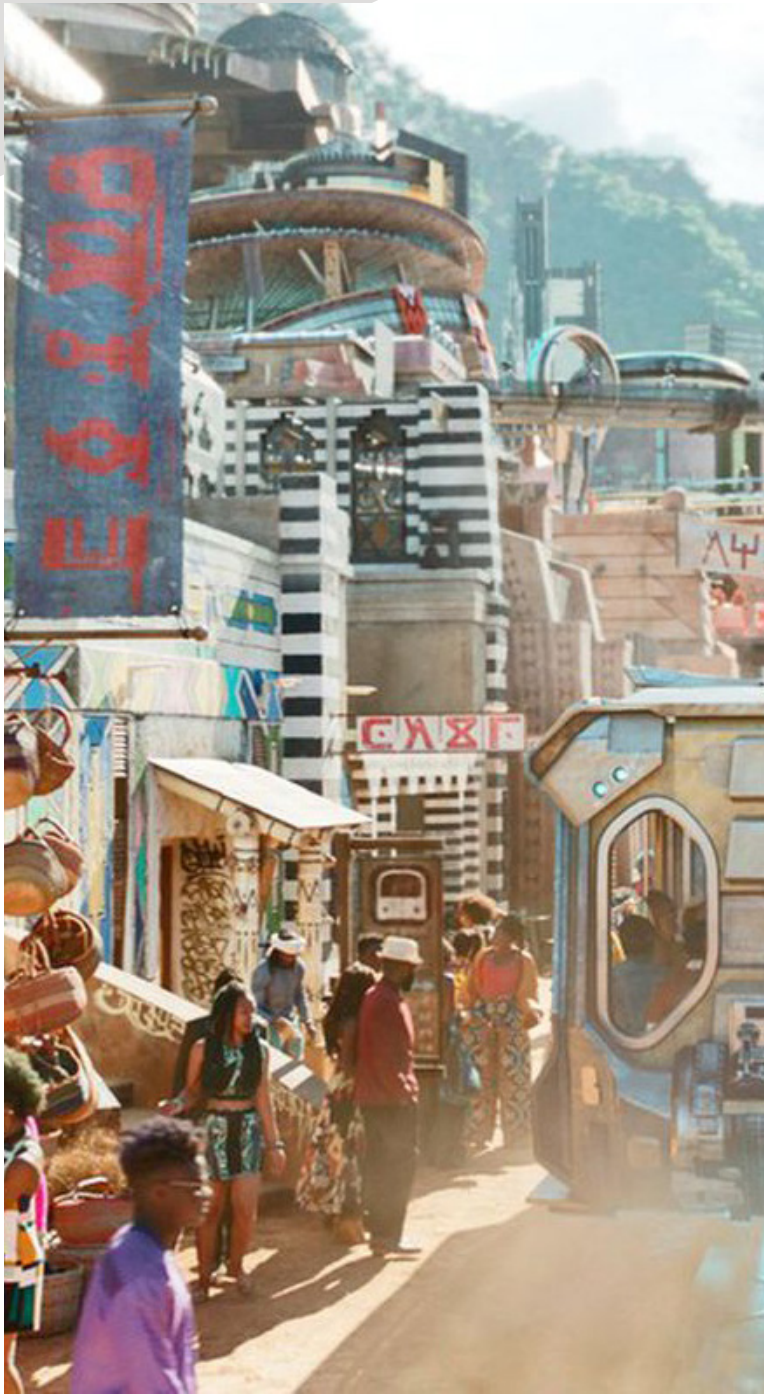
Ultimately Cape Town is a city at a crossroads. They have received significant success in digitising their back office and establishing the platform from which to become Africa's most innovative city. However, the focus has remained internal and operationally-based. To continue to truly stand out as a leading example for Africa, Cape Town needs to once again take a bold and ambitious leap by opening up and become more externally focussed and provide a platform to drive more collaborative solutions for citizens' needs. This will require strong and committed leadership from across the institution with a focus on developing the capacity and culture required to support 'platform urbanism' (Barns, 2020).

5.2 CONTEMPLATING SMART CITY DEVELOPMENT IN AFRICA

Turning the focus more broadly to Africa, this research project has helped to shed light on some of the contextual challenges associated with smart city transformation in a context of rapid urbanisation, severe poverty and government limitations. Interestingly, what has consistently emerged out of this research is that issues around smart city development rarely revolves around technology itself, but rather around the institutional capabilities and practices required to harness technology and implement coordinated smart city transformations. This corresponds with Green (2019) who opines that technological innovation in cities is about deploying technology in conjunction with nontechnical change and expertise. In Africa, these non-technical issues most strongly correlate to leadership, human resources, and the need to understand development priorities in the context of the city government and more broadly across the city. Smart cities only make sense when technology meets citizens' needs (Green, 2019).

In light of the above, it is suggested that city governments need to have a firm grasp of their priorities and how smart city interventions fit into that, if at all. What mechanisms can address those priorities and what innovative practices or available technologies can support them? Thus, greater consideration is required before looking to technological solutions, these mostly relate to the appropriateness and necessity of the intervention, and the institutional capacity to effectively utilise technology.

The findings in this report largely support literature on smart city development in other regions of the world. This suggests that the key considerations for smart city transformations are largely the same regardless of where they explored. Perhaps what more clearly distinguishes the African smart city journey is the sheer scale of urbanisation, inequality, urban poverty, and government limitations. Thus, this report series has highlighted that certain considerations emerge as being more critical to smartness within the contextual challenges of African cities. Aspects such as addressing the digital divide, being cognisant of the ways in which people respond to technology, and the role of the state in promoting smart city transformation, require far greater consideration in Africa due to some of the issues outlined in this and previous reports. That being said, the African continent has remarkable opportunities to use its own innovative ideas and lessons learnt from other parts of the world to make significant improvements to the lives of urban occupants across the continent with the strategic intervention of various (not necessarily 'smart') technologies and innovations. This needs to be supported by an understanding that technology alone cannot solve intractable social and political problems that appear to be systemic on the African continent.

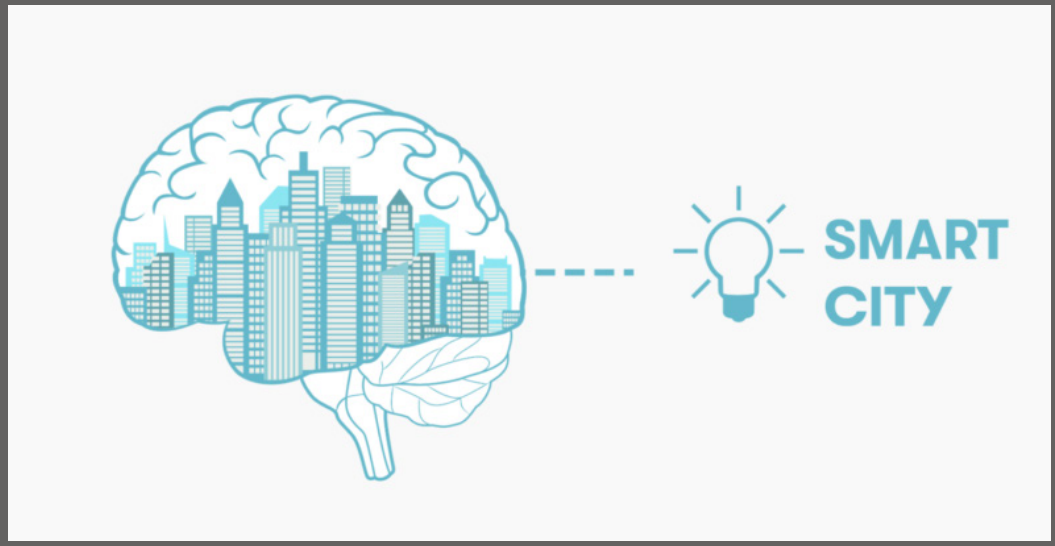


5.3 REFLECTIONS ON SMARTNESS

This research has attempted to locate the concept of a 'smart city' within an African context. An unintended consequence of this journey is that it has triggered the need to interrogate the appropriateness and effectiveness of the common perceptions of this concept, not just in Africa but globally. The result is the emergence of key questions, such as: is technology going to deliver the urban utopia that proprietary software companies would have people believe? And if so, whose utopian vision is this? What does it mean when you have data on your phone, but no food on your table? What are the other ethical dilemmas and consequences of pushing for a technocratic response to unimaginably complex urban systems? These are critical postulations to examine, not just in a context where inequality is so entrenched and pervasive, but even in more technologically advanced societies with fewer socio-economic challenges.

The above provocations have underpinned a compelling backlash against the notion of 'smart' in the urban space, not only because of the mistrust of capitalist involvement in democratic processes of urban governance, but also because of the ideals that common understandings of the concept promote regarding how we approach complex contemporary challenges. The term 'smart' is even seen to be problematic for practical urban policy and innovation (d'Almeida, 2018). Further, many argue that the 'smart city' is just a repetition of reductionist, technocratic approaches that have consistently proven to be ineffective at responding to contemporary societal challenges such as climate change and sustainable urban development. Technology alone will never solve the social and structural issues that persist in African cities, and it would be foolish to view smart city development as the panacea to the wave of complex issues that will surge into African cities as they continue to urbanise at such unprecedented rates.

Development in cities needs to be centred around collective needs and interests, as well as creating mechanisms of interaction that support synergies and complementary skillsets. This does not necessitate technology; however, technology provides invaluable opportunities to support these processes. It also creates efficiencies in driving the solutions that emerge from these processes. This idea is closely aligned with more recent conceptualisations of the role of technology in transforming cities. Such interpretations more accurately describe 'smart enough' or 'smarter' cities, reaffirming the idea that the transformation triggered by embedding technology into urban development and governance processes is a journey and not an end in itself. Therefore, a smart or smart enough city should be understood as a system of development and governance that continually seeks to develop innovative ideas that promote the well-being of all urban citizens in a rapidly evolving urban landscape.



Essentially, what the above provocations highlight is the role that government institutions play in delivering the mechanisms through which a technologically enhanced and sustainable urban future can be achieved. When you strip away the various interests, functions and priorities of a city government what is left on a fundamental level is its responsibility to respond to the needs of citizens. This is separate from developing a functional city or an optimal city which are not always aligned with this central responsibility, particularly in an African context. Thus, in the context of overburdened African municipalities that have to prioritise a number of pressing concerns, a useful question to ask is whether a smart city intervention is going to clearly serve citizens. If it is not the case then city governments should reconsider if it is a worthwhile investment. The point being made is that in the modern urban landscape where new ideas and technologies are emerging at an exponential rate, it is crucial that city governments, the central mechanisms that steward smart city transformation, revisit their fundamental responsibilities to their citizens.

In an age when cities have cemented their role as political and economic centres; where global issues are both most harshly experienced and also most likely to be solved, it is more important than ever that we look to these innovative hubs to reprioritise the needs of its citizens above grand ideas of a technologically enhanced future. This is no more prevalent than in Africa. With the great promise that comes with advancements in technology also comes great risk. If these technologies are not administered responsibly and with the right intentions at heart there is a risk that the dystopian urban prophesies cautioned by smart city sceptics may become an urban reality. Ultimately smart city transformation fulcrums on the leadership and institutional capacity of municipal government. Central to municipal government aspirations should be the prioritising of the needs of citizens in any strategy to harness the powerful benefits of technology. A failure to do so will likely further fortify the inequities and injustices that make life so challenging for the majority of Africa's urban population.

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