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BULLETIN

JOURNEYING TO THE SMART CITY: PREPAREDNESS

INTERVIEW WITH CITY OF ROTTERDAM

STRATEGIES FOR SMART CITY IMPLEMENTATION

+

LEARNING FROM TSHWANE

DBSA WORLD BANK GROUP

FOREWORD
by DERICK MANDIWANA

It is a great pleasure for the City to be part of this important initiative.

The current global environment is one of constant change, bringing about various opportunities for the municipality to exploit in its journey towards becoming a Smart City. The involvement of Tshwane in this Pilot Programme will assist us in shaping key elements of our Smart City journey, allowing us to make an impact in the areas of economic competitiveness, the quality of our citizens lives, and promoting increased engagement by citizens and communities in the affairs of the City.

The City already embraces and leverages digital and innovative technology solutions in assisting to address some of its complex customer and service delivery challenges. This project is thus crucial and extremely timely in assisting the city to develop a Smart City Strategy that will go beyond the project partnership between the City and the DBSA, to cultivate Smart City thinking principles in response to the various challenges we face. We expect that the development and implementation of our Smart City Strategy will provide a clear roadmap of how we move from our current situation towards a future state of Smart Governance, Smart Economy, Smart Living, Safer Cities and Smart Environment. The strategy development will thus require the involvement of various stakeholders across the City's departments and ultimately our citizens..

To actualise an impactful and inclusive Smart City Strategy, the DBSA Smart Cities Program was tabled at both the Executive Committee as well as the Mayoral Committee to ensure the mandate is fully endorsed at all levels and there is involvement and active participation of key city departments..

The City's ten priorities and focus areas outlined in the City's 2022-26 Integrated Development Plan (IDP) took into consideration smart city principles of governance, economy, living, environment and safety to guide the city on a more sustainable development trajectory. The unambiguous alignment between the City's' Strategic Priorities and the Smart City Strategy as depicted in the table below will contribute immensely towards the achievement of our Smart City Objectives.

STRATEGIC DEVELOPMENT PRIORITY	SMART CITY OBJECTIVE
A business-friendly city that promotes employment and economic growth	**Smart Economy:** A city that offers its residents diverse economic opportunities by investing in innovation and infrastructure as well as smart sectors.
Enhancing city safety, security, and emergency services	**Smart Safer City:** A city that employees technology to ensure the safety and well-being of its residents. **Smart Living:** A city that makes life easier for its residents by using smart technology in its public places and that developing new ways of connecting people thereby improving citizen amenity.
Maintaining a clean and protected natural environment	**Smart Environment:** A city that applies technology and innovation to ensure a cleaner and more sustainable future.
A professional public service that drives accountability and transparency. Modernization and digitization of city processes	**Smart Governance:** A city that uses technology to support and facilitate better planning and decision making as well as transform how services are delivered.

Several standalone projects which fall in the ambit of smart city projects have been initiated by the various City departments over the years. By establishing a Smart City Office (SCO), the City will be able to coordinate these projects under a single smart city umbrella thereby ensuring optimization of scarce resources (both financial and technical) to support the projects. These current initiatives include:

- e-Tshwane Platform which enables residents to engage digitally with the City;

- eHealth which will not only improve internal efficiency but impact the way residents engage for primary health care services;

- WhatsApp Channel which enables citizens to engage with the City;

- Zeekoegat CHP Project which will produce up to 460 kw of electricity from a waste to energy plant;

- Integrated Emergency Call and Dispatching System which is key for digitisation and improving public safety;

- Establishment of a Command and Communication Centre with all internal and external role players;

- Digitising of Land Development Applications;

These are great catalysts that the World Bank team, DBSA and Smart City Office will seek to align with future projects onto one city platform. We are also mindful that technology is not a magic solution that will suddenly make the city work better but we see it as an important enabler in our journey of becoming a smart city able to enhance effective and efficient service delivery to communities of the City. Part of the DBSA's partnership with Tshwane is to explore funding mechanisms to enable smarter investments in the energy, safety and water sectors and ultimately develop a pipeline of bankable smart city investment projects. We have been working closely with the World Bank and city departments in the three sectors, to deepen our understanding of their challenges and together identify impactful projects, which we can use to demonstrate smart principles in infrastructure and service delivery. Part of this phase of work seeks not only to institutionalise Smart thinking approaches to project conceptualization but to ensure smart practices are adopted downstream into project implementation, maintenance and monitoring and evaluation.

The journey so far has been insightful, with Peer-to-Peer learning and knowledge exchange platforms to promote knowledge sharing between our city and the other participating cities - Johannesburg, Ekurhuleni and eThekwini. One of these was hosted by our City on the 25th of May 2022, where we were fortunate to be joined by the MMC for Corporate and Shared Services and the Group Head for Shared Services who set a very clear tone of support for this smart cities program. Their support echoes the directive of our Executive Mayor, Cllr Randall Williams, delivered at his State of the City Address on 21 April 2022, wherein he emphasised the need to embrace the full potential and opportunities provided by new technology, data solutions, research and analytics as the main competencies that will enable the City in addressing complex customer and citizen issues, and ultimately improving service delivery. It Is for this reason that as the City we should embrace smart city solutions and its related benefits for the betterment of our communities.

We are pleased to deepen and continue our collaboration with the DBSA and World Bank on this smart city assignment that will not only benefit our city but ensure the adoption of new practices and important lessons to realize sustainable strategies, planning, management and governance of South Africa's cities to improve the lives of all.

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Derick Mandiwana
is the Director: Business Applications Management at the City of Tshwane

PREFACE FROM THE EDITORS

by GECI KARURI-SEBINA with LETHU MASANGO

Photo credit: Rudi

We have made it through a cold winter, dark with power cuts and a fairly grim global atmosphere tainted with war, complex geopolitics, growing economic and social pressures, and continuing environmental and health pressures. Yet work has carried on as folks have "gone back to work" - facing "new normals" and becoming more and more aware of the imperative to find efficient and effective ways for us to live with each other, and in more sustainable and empathetic ways. The pressures to feed our populations, to ensure access to basic infrastructures, to support livelihoods, and to ensure avenues for democratic engagement are more real than ever.

In the context of the Smart City South Africa pilot programme, work has also continued. We have worked across cities through continued peer learning and support, but also locally as the cities deepened their engagement with their strategy developments, as well as focused sectoral work on the areas they have begun to prioritise. Specifically, the diagnostic phase and city surveys identified the most common sectoral focus areas for smart city programming as: Energy, Water, Solid Waste Management, Public Safety, and the cross-cutting issue of Digital Infrastructures.

While we are learning which challenges and lessons are common across the cities, the process has also continued to demonstrate that the cities also have their unique characteristics and are at different places with their journeys, strategies and plans, and will therefore move at their own appropriate paces. The DBSA and World Bank teams will continue to lend support to the city teams, facilitate their learning within, between, and also beyond - accessing the best global knowledge possible through sector experts. In this issue, we share two examples of "Deep Dives" into the areas of water and public safety where cities have been connected with such global experts to gain awareness and advice, and we are currently working with the cities individually to even further deepen and localise these sector engagements as the teams prepare to finalise their strategies, and go into project preparation and support phases.

In Bulletin 4, we also continue to reflect on how our cities are progressing with their smart city programming, while trying to cement their smart city strategies and priority sectors for intervention. We specifically benefit from generous sharing by the City of Tshwane about their smart city journey, and their efforts to centre citizen experience and service delivery through a consolidated, more coherent smart city programme. We also receive important caution in our Global Perspective from Frank Vieveen from the City of Rotterdam that while cities certainly need smart strategies, these must not be treated as static orthodoxies. He emphasises the critical importance of nurturing dynamic responsiveness, core competencies, and retaining municipal control over the city's core knowledge and smart infrastructures.

We trust you will find this new issue informative, and we welcome you to continue providing us with your feedback! Let us pull together to develop smarter cities that work for all.

See you in the next issue!

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DIAGNOSING SMART CITY PREPAREDNESS

BY AMY MUTUA & GECI KARURI-SEBINA

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DIAGNOSING SMART CITY PREPAREDNESS

BY *AMY MUTUA & GECI KARURI-SEBINA*

The promise of smart cities is that through the use of technology, urban areas can be transformed through innovation in six key domains: economy, environment, governance, living, mobility, and people (see SmartCity.za Bulletin 1 on Defining Smart Cities). But while there is increasing pressure for municipalities to become 'smarter', it is not always clear what interventions are appropriate or achievable. South African smart cities have to contend with and address various socio-economic challenges in order to meet the specific needs of their populations. Any smart city strategies have to consider the city's "context and needs, local interests, the quality of life of citizens, the readiness of a city for change, and a series of essential smart and sustainable solutions and services to be delivered at all city levels"[3].

Thus there is no one strategy to achieving a smart city. Instead, most literature describes a general process of establishing smart city metrics, organising resources, implementing, and then monitoring the process of projects[4]. Ibrahim et al (2018) propose a 6-phase roadmap to develop smart and sustainable cities – city vision, city readiness, city plan, city transformation, monitoring and evaluation and sustain change. While these models are presented in a linear fashion, the process of developing a smart city strategy is often more iterative as shown in these figures.
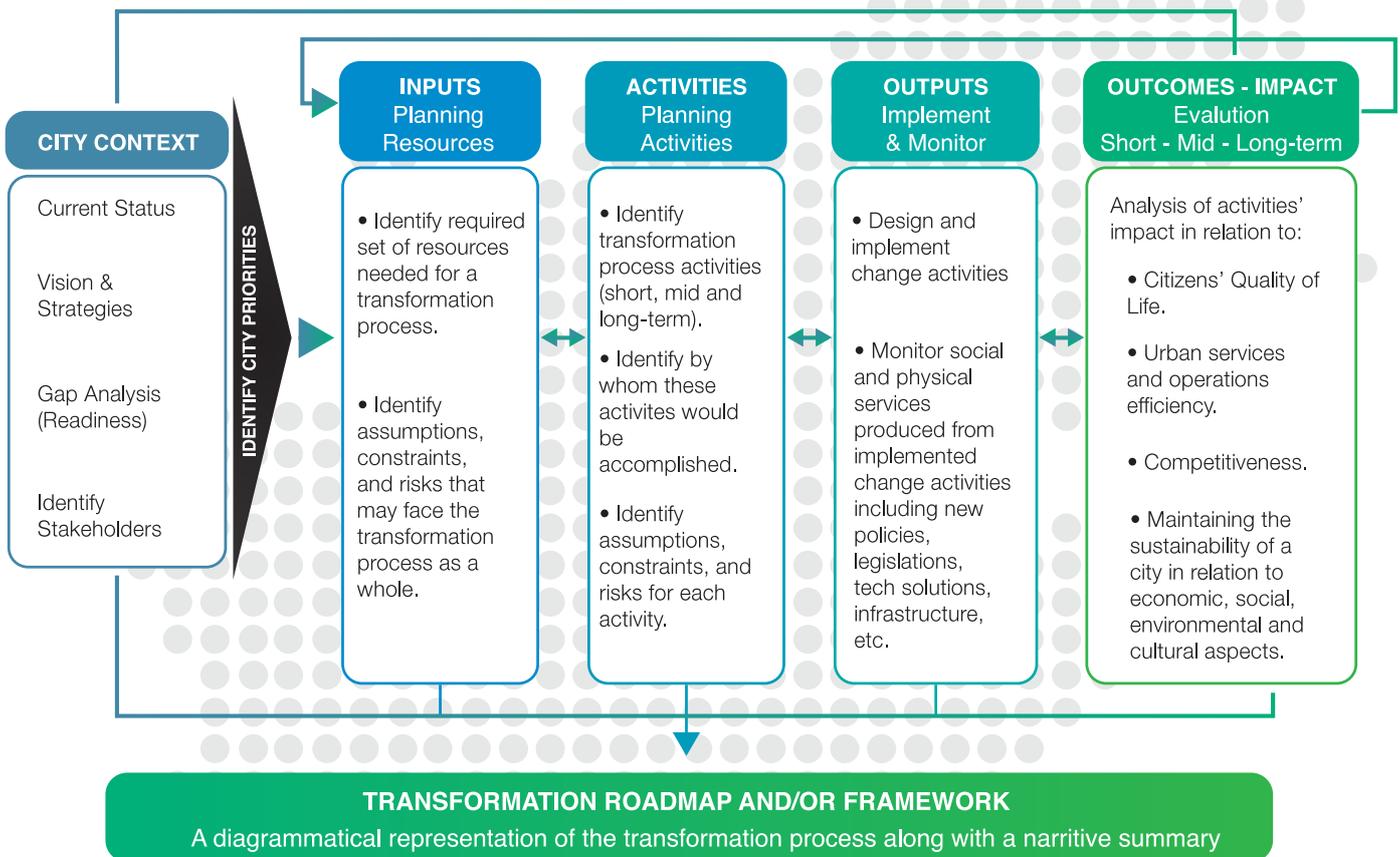

CITY CONTEXT

Current Status

Vision & Strategies

Gap Analysis (Readiness)

Identify Stakeholders

IDENTIFY CITY PRIORITIES

INPUTS
Planning Resources

• Identify required set of resources needed for a transformation process.

• Identify assumptions, constraints, and risks that may face the transformation process as a whole.

ACTIVITIES
Planning Activities

• Identify transformation process activities (short, mid and long-term).

• Identify by whom these activites would be accomplished.

• Identify assumptions, constraints, and risks for each activity.

OUTPUTS
Implement & Monitor

• Design and implement change activities

• Monitor social and physical services produced from implemented change activities including new policies, legislations, tech solutions, infrastructure, etc.

OUTCOMES - IMPACT
Evalution
Short - Mid - Long-term

Analysis of activities' impact in relation to:

• Citizens' Quality of Life.

• Urban services and operations efficiency.

• Competitiveness.

• Maintaining the sustainability of a city in relation to economic, social, environmental and cultural aspects.

TRANSFORMATION ROADMAP AND/OR FRAMEWORK
A diagrammatical representation of the transformation process along with a narritive summary

Figure 1: Theoretical Logic Model for Transformation towards Smart Sustainable Cities (Ibrahim et al, 2018)

[3] Ibrahim, M., El-Zaart, A. and Adams, C., 2018. Smart sustainable cities roadmap: Readiness for transformation towards urban sustainability. Sustainable cities and society, 37, p.531.

[4] Valdez, A.M., Cook, M. and Potter, S., 2018. Roadmaps to utopia: Tales of the smart city. Urban Studies, 55(15), pp.3385-3403.

Figure 2: Smart City Strategy Components

As a first step to smart city development, it is necessary to understand a city's current economic, social and environmental context, as this will inform the smart city vision, objectives and goals. Cities like Amsterdam, New York, Helsinki and Vienna have established comprehensive smart city strategic frameworks that clearly state the cities' long term vision and expected

outcomes. And to be effective, these visions should be developed in collaboration with various stakeholders including planners, the private sector, government, and academics, and speak directly to the needs of citizens.[5] It is also vital to assess the readiness of a city for transformation early on to understand what resources are available and what limitations need to be addressed (Ibrahim et al, 2018; SmartCity. za Bulletin No.3 on Preparedness). With a smart city vision and a better view of the city's readiness, practitioners should be well placed to create a smart city strategy tailored to the specific city, its needs and available resources.

Smart City Vienna[6] (Vienna Munincipal Administration, 2019)

Vienna's Smart City Strategy explicitly states the city's mission to create a high quality of life for everyone in Vienna through social and technical innovation in all areas, while maximising conservation of resources.

The mission directly responds to the local challenges Vienna faces as a rapidly growing city, searching for ways to provide infrastructure and urban services at a larger scale while still conserving natural resources. A stated goal is to build a city where everyone can live a good life but "not at the expense of the environment and future generations." It is from this mission and key principles that the rest of the strategy is born as the stated goals and thematic focus areas reflect this long term vision.

[5] Shamsuzzoha, A., Nieminen, J., Piya, S. and Rutledge, K., 2021. Smart city for sustainable environment: A comparison of participatory strategies from Helsinki, Singapore and London. Cities, 114, pp.1-13.

[6] Vienna Municipal Administration, 2019. Smart City Wien Framework Strategy 2019–2050. Vienna: Vienna Municipal Administration.

Key Considerations for Smart City Strategy

A smart city strategy should have clear goals informed by its long term vision. These goals will in turn guide the thematic focus areas of the strategy. Once these thematic focus areas are clear, more detailed plans and projects can be developed.

Governance structure is also an important factor to consider when preparing the strategy as it is important to be clear on what mechanisms will be used to govern smart city developments[7]. Should smart city projects be coordinated from a centralised office or decentralised to individual departments? For example, Sydney's Smart City Strategy states that it will utilise a decentralised governance approach to "ensure the broad sharing of accountabilities"[8]. While having a centralised office may allow for more efficient coordination of projects, a decentralised approach may allow for more collaboration and autonomy.

A smart city strategy should also consider and plan for funding and financing. Smart city projects often require significant finances for their operationalisation, and practitioners need to consider what public and private funding and financing options are available. A lack of new funding however does not mean that a city cannot become smarter. For example, in Tel Aviv the smart city strategy focuses on integrating existing information systems rather than investing in large scale infrastructure[9].

Implementing a Smart City Strategy

Smart City Zurich (Zurich City Council, 2018)[10]

Zurich's Smart City Strategy clearly states the three main tools to be used for smart city implementation — fostering innovation in the city administration, collaborations, communication and dialogue. The strategy then expands on each of the proposed tools:

• Fostering innovation is to be achieved through innovation grants for the city administration projects, open an innovation suggestion box for staff members and innovation fellowships that allow ICT experts work in the city to foster knowledge sharing and innovation.

• Collaborations with the city are facilitated through the Smart City Lab which works with different partners towards the implementation of smart city projects as well as testing pilot projects. A number of other collaborative initiatives are also laid ouot.

• Communication is streamlined as all projects are easily accessed on a central website, there is also a participation portal for citizens to engage with smart city progress. Lastly, an annual report is published to update the City Council, local coucil, and the public on implementation progress.

There are a variety of challenges that may arise during the implementation of smart city strategies and it is useful to consider these challenges early on so as to develop solutions. Some of the challenges highlighted in literature include resource management, a lack of experience, and weak regulatory institutions. [11] [12]

Efficient resource planning is crucial for the success of the smart city strategy. Difficulty in securing resources such as land, equipment or technology can lead to delays in project implementation. Similarly, poor management of funds may lead to incomplete projects. A lack of experience and capacity can also be detrimental to smart city projects as inexperienced contractors, practitioners, or government officials may contribute to low quality outcomes. Particularly in the African context, there is a need to invest in the upskilling of citizens to ensure there is an appropriate skills capacity for the implementation of the smart city[13]. Weak regulatory institutions is another challenge faced as smart initiatives are only successful if they can be enforced. For example, in Gauteng, many residents do not pay their electronic tolling bills.

Conclusion

A smart city strategy is employed by cities to guide the use of technology to address urban challenges. It is the foundation of smart city transformation. Siokas et al aptly state that "there is no 'proper' or a 'one size fits all' strategy". All cities are unique in their needs and capabilities; therefore, all smart city strategies need to reflect an understanding of the specific city context. African cities tend not to feature in the smart city strategy literature. Further research needs to be done in this area to determine what strategy approaches and implementation models are most effective in the African context.

[7] Lee, J.H., Hancock, M.G. and Hu, M.C., 2014. Towards an effective framework for building smart cities: Lessons from Seoul and San Francisco. Technological Forecasting and Social Change, 89, pp.80-99. [8] City of Sydney, 2020. Smart City Strategic Framework. Sydney: City of Sydney. (p.19). [9] Toch, E. and Feder, E., 2016. International Case Studies of Smart Cities: Tel Aviv, Israel. Inter-American Development Bank. [10] Zurich City Council, 2018. Strategy Smart City Zurich. Zurich: Zurich City Council.

[11] Khan, H.H., Malik, M.N., Zafar, R., Goni, F.A., Chofreh, A.G., Klemeš, J.J. and Alotaibi, Y., 2020. Challenges for sustainable smart city development: A conceptual framework. Sustainable Development, 28(5), pp.1507-1518.

[12] Gupta, K. and Hall, R.P., 2021. Exploring Smart City Project Implementation Risks in the Cities of Kakinada and Kanpur. Journal of Urban Technology, 28(1-2), pp.155-173.

[13] Achieng, M., Ogundaini, O., Makola, D. and Iyamu, T., 2021, May. The African Perspective of a Smart City: Conceptualisation of Context and Relevance. In 2021 IST-Africa Conference (IST-Africa), pp. 1-9.

[14] Balkaran, S., 2019. Smart cities as misplaced priorities in South Africa: A complex balance of conflicting societal needs. Journal of Management & Administration, 2019(2), pp.1-30.

[15] Siokas, G., Tsakanikas, A. and Siokas, E., 2021. Implementing smart city strategies in Greece: Appetite for success. Cities, 108, pp.1-13.

Photo credit: Elzbieta Sekowska

PEER LEARNING ACTIVITY UPDATES

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Peer Learning Event Hosted by City of Tshwane

By Lesego Tshuwa[1]

The DBSA Smart Cities Programme is driven towards holistic learning as part of its deliverables. The Peer Learning events are therefore important platforms at which the pilot cities in the Programme can learn and share from each other. The Programme requests each city to host a peer learning event. The City of Tshwane hosted the 2nd Peer Learning Event (PLE) on the 25th of May 2022. This event was hosted timeously as the City was also ready to commemorate the signing of the Memorandum of Agreement between the DBSA on the Smart City South Africa Programme. It therefore became an important moment to gain traction within the City. The Programme leads, currently the COT Shared Services Department (ICT), therefore invited their political heads as well as other unit heads to the PLE to provide opening remarks and show their support as hosts. In attendance were: the MMC for Corporate and Shared Services at the City of Tshwane, Cllr Kingsley Wakelin, who gave a keynote speech to open the event; and the Group Head of Shared Services, Mr Musa Khumalo, who served as Master of Ceremonies for the PLE Opening. This attendance by the City of Tshwane's

top leadership highlights the recognition of the Programme as an important catalytic element which holds the potential to transform the lives of ordinary citizens in the city.

The objectives for any PLE are to foster growth and progression for the pilot cities on their journeys towards becoming smart. The World Bank and the DBSA aim to assist cities in working towards transformative and impactive smart city project implementation. The City of Tshwane's positive attitude as hosts symbolised an awareness of how important such a Programme can be. The World Bank's Global Lead for Sustainable City Infrastructure and Services, Mr Peter Ellis, who was also in attendance encouraged cities to always think of the 'WHY'. Essentially, his message was that for such programmes to be effective, citizens should be placed at the centre of all spatial planning and interventions being proposed.

Cities were afforded the opportunity to present on their progress, as well as the challenges they were experiencing. Their insights were important, as the cities and technical teams could begin to see where they were positioned individually and also relative to each other in this diagnos-

tic phase of work. The next steps would then be around how the technical team would support each city in identifying areas for practical intervention and implementation over the next few months, also informed by the city surveys conducted which had indicated thematic areas to be focused on for each city. The engagement made very apparent for all stakeholdres present that being strategic about interventions is critically important, and as the work continues to be refined many look forward to changing the manner in which business has been conducted.

On what could be done to assist the cities, the City of Tshwane as hosts noted that with administrative and political support and transparency where such programmes are concerned, a lot of attention can then be effectively focused towards achieving the intended goals of impactful, smart city programmes. This inclusive and consultative approach by the City is one from which other pilot cities can learn and this will assist the City in successfully implementing projects once work has been done with World Bank Global consultants and pre-feasibility studies have been conducted in the coming months.

[1] Lesego Tshuwa is a World Bank Consultant in the Smart City South Africa Pilot Programme.

Smart City – Water Deep–Dive Event with Bill Kingdom

By Thando Madonsela[2]

The implementation of the DBSA-World Bank smart cities programme continues progressively in the four pilot cities namely, City of Ekurhuleni, City of Johannesburg, City of Tshwane, and eThekwini Municipality. After the conclusion and approval of the detailed Maturity Assessment Phase, the technical team in collaboration with the pilot cities Project Steering Committees (PSCs) have progressed towards the next critical phase of work - the Project Implementation Phase. The Project Implementation Phase consists of the development of Terms of Reference (to be adopted by the pilot cities) for pre-feasibility studies to be conducted on three agreed Domains/Sectors per selected pilot city.

In this next critical phase, the World Bank intends to on-board an additional team of international experts from the common priority sectors (water, energy, safe cities, and solid waste management). This is for the specialists to assist in guiding the process of making proposals where feasible, as well as the development of appropriate mechanisms, such as special purpose funding vehicles for Smart City interventions, Public Private Partnerships (PPPs), and other viable institutional and blended finance options.

To launch this next phase of work, the World Bank hosted a Water Sector Deep Dive Session with the DBSA and respective pilot cities. The aim was to provide a peer-to-peer learning platform for the pilot cities around water sector challenges and possible smart solutions. The main highlight of the session was the contribution of keynote speaker Mr Bill Kingdom, a World Bank: Water and Sanitation specialist, based in the United Kingdom who shared local and international insights on Smart Cities in the Water Sector. Bill Kingdom's inputs focused on important principles for Smart Cities - including that they must be built on solid foundations, have access to funds, and maintain creditworthiness to function effectively.

Bill further emphasised the importance of improving municipal rate collections, noting, however, that conventional approaches tend to be input-based and rather than output- / outcome-based. In his closing remarks, Bill highlighted the improvement of Non-Revenue Water (NRW) energy efficiency and collection efficiencies. This is one proposal that can greatly expand the creditworthiness of utilities, through performance-based contracts and output-based approaches.

The cities of Johannesburg and eThekwini shared presentations on their current challenges and proposed smart mitigation measures around water interventions. This invoked discussions around common legislative, operational and procurement challenges that the different pilot cities are experiencing. Some of the key discussions were around the effectiveness of PPPs in the South African context as well as the exploration of the magnitude of challenges associated with contracting and alternative finance options. Striking a balance between maintenance and the development of new, sustainable smart water infrastructure and climate change considerations.

In closing the fruitful session with rich discussions, it was agreed that as part of the next steps, the World Bank team supported by the DBSA will arrange engagements with the different City Water departments in each of the pilot cities for a more solid understanding of the development challenges and potential smart opportunities in the water sector. Other priority sector domain deep dives will follow as part of priority sector peer learning platforms.

[2] Thando Madonsela is a World Bank Senior Consultant in the Smart City South Africa Pilot Programme.
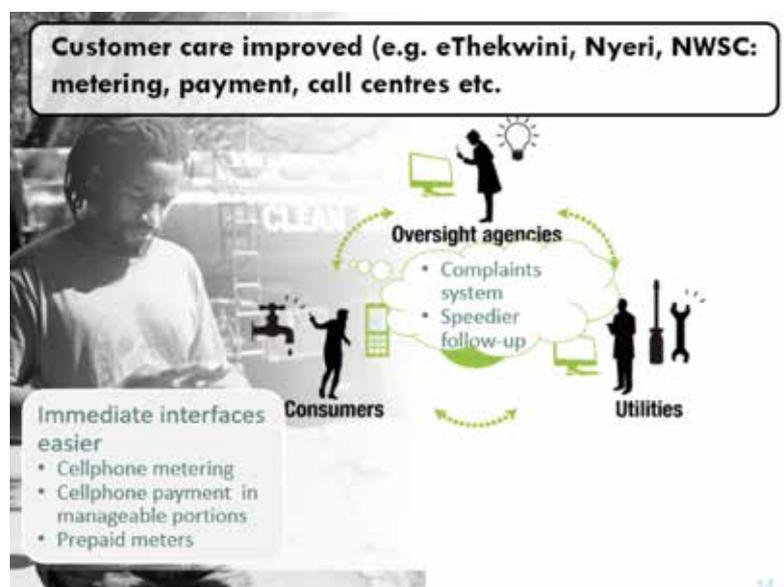
Safer Cities Deep-Dive Event

By Lesego Tshuwa

The DBSA Smart Cities Programme Deep Dive sessions progressed on the 21st of September with the pilot cities getting involved in a discussion around Safer Cities with the World Bank Global expert in this area. Oscar Santiago Uribe Rocha, a renowned expert in conflict resolution, violence prevention, and urban design that is centred around crime prevention measures was the main speaker of the event. Rocha focused on the practicalities of what can be achieved if adequate community engagement is included from onset of any community projects aimed at creating safer communities.

The aim of the local smart city projects being prioritised by each city in this Programme is to focus on transformation and real impact. In terms of the local landscape for public safety, pilot municipalities have indicated common challenges around vandalism of infrastructure, the lack of investment by businesses due to high levels of crime, and an increasingly unstable environment in some of the most under-resourced areas due to a lack of funding for the roll-out of projects.

The aim of this Safer Cities deep dive, as is the goal of all such focused engagements by the technical team, is to explore learnings towards possible smart solutions. Grounding this work, as expressed by the global expert Rocha, should be an understanding of the environments for which interventions will be planned. The community focus and participatory approaches are a key component of how the cities will be able to gain traction in mitigating crime (which in its nature is diverse and can be unpacked at different levels) and achieve safer communities.

As usual, the pilot cities were also afforded the opportunity to present their current situations and challenges. These presentations were useful in analysing commonalities, differences and areas of opportunity for each city. Rocha reflected that of great importance is the exploration of how governance can be tackled with more rigour by each city in trying to deal with local safety and security matters. The structures and environment established at the local level to deal with the maintenance and the governance of this area of work is very important for cities.

The session ultimately proposed that Safer Cities are developed by dealing with prevalent issues at different scales; city scale, human scale and community scale. These scales and the applicable guiding principles will be further unpacked at the forthcoming engagements with the cities where they were scheduled to engage with Rocha on a per-city basis to engage more specifically with the local contexts, strategies and projects.

LOCAL PERSPECTIVE: LEARNING FROM TSHWANE

By Chuma Mbambo

The City of Tshwane is the administrative capital of South Africa and consists of the second largest economy in South Africa[1]. It is the third largest city in the world according to land area[2], and accommodates about 3.3 million[3] residents. Tshwane is the research capital of South Africa, hosting about 90% of the country's research and development institutions[4] and has been recognised to have the potential to establish itself as the innovation capital of South Africa. Over the past decade, the city has been piloting various smart initiatives that have the potential to improve city governance and service delivery in order to improve the livelihoods of its residents.

[1] Stats SA 2022 [2] Tshwane Draft IDP 2022-26, [3] City of Tshwane, IDP 2020/21, [4] Tshwane Draft IDP 2022-26.

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The smart city concept in the City of Tshwane was established around 2014 when the City developed their ICT Strategy and commenced with its smart metering programme. The Smart City is recognized as the 7th Pillar of the ICT Strategy, and through this pillar, Tshwane aims to further develop the smart city concept to include various domains such as transport, energy, safety and the environment, amongst others. The City of Tshwane's Smart City intention is to improve customer experience through the introduction of online and digital platforms that the City and access various services without visiting any of the walk-in centres. The City also intends to modernize and optimize its operations through the use of open data and improve its competitiveness while lowering the cost of doing business for its residents. will enable its customers to engage with

To date, the smart city programme in Tshwane is primarily driven through the Group ICT and Shared Services Department (see organogram below). This is because of Tshwane's perspective on ICT as the anchor for improved city functions. The City of Tshwane, therefore, aims to utilize ICT to "…define and set ICT standards, norms, policies around all ICT operational domains in the City to maintain best-practice standards, implementation of policies, and maximise the utilization of ICTs to reduce duplication of effort and to improve operational inefficiencies". Tshwane seeks to promote strategic evidence-based decision-making, through efficient data and information management in the City. This will be done through the integration of business systems and applications in the City, not only to aid strategic planning, but also ensure reliability and the integrity of all city information.

One of the main assignments of the GICT Department is to develop and implement the Smart City Master Plan. Through the smart city approach, the City of Tshwane seeks to achieve:

• Better and safer life for citizens

• Improved capability and performance

• Improved and consistent decision making
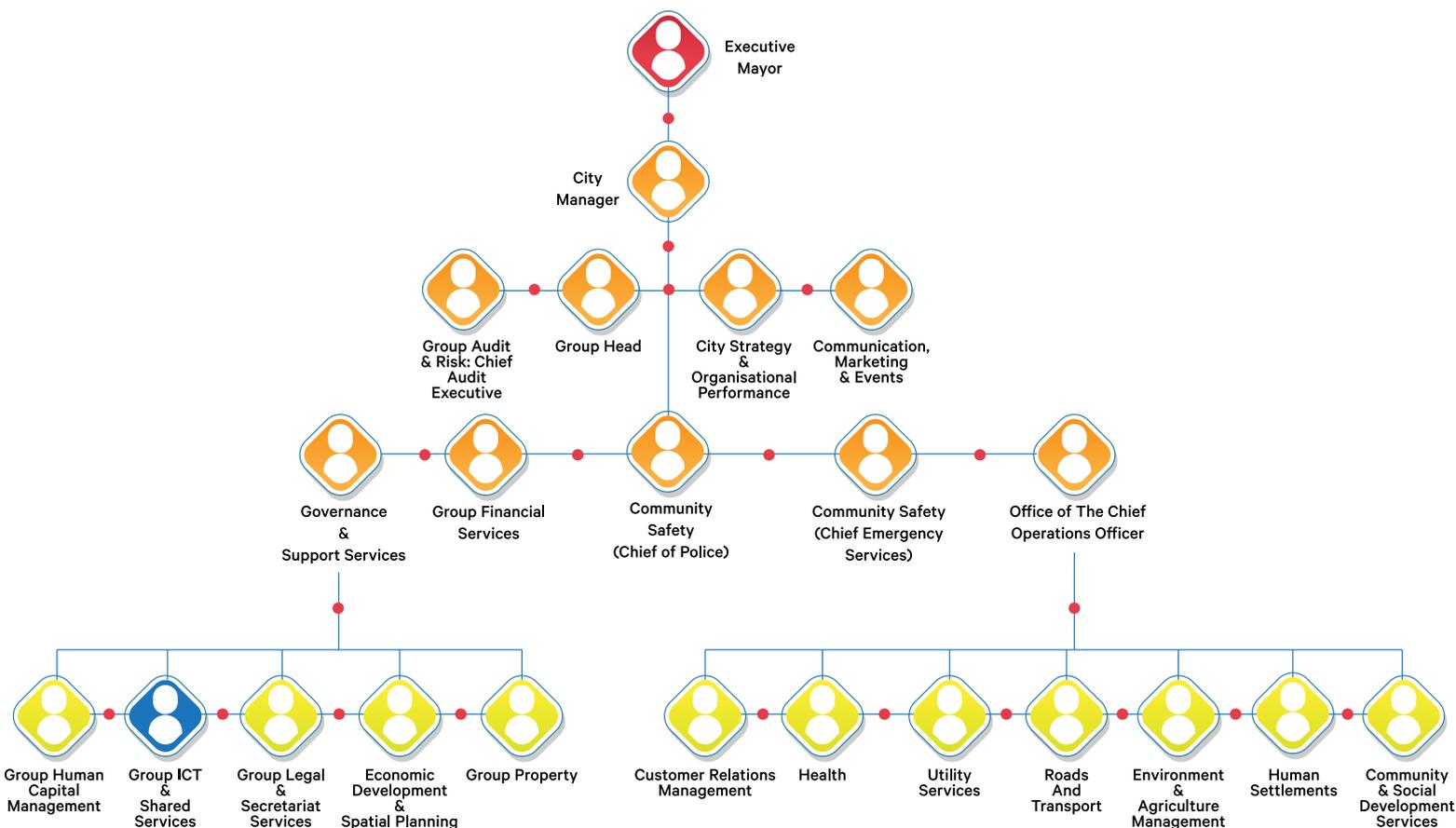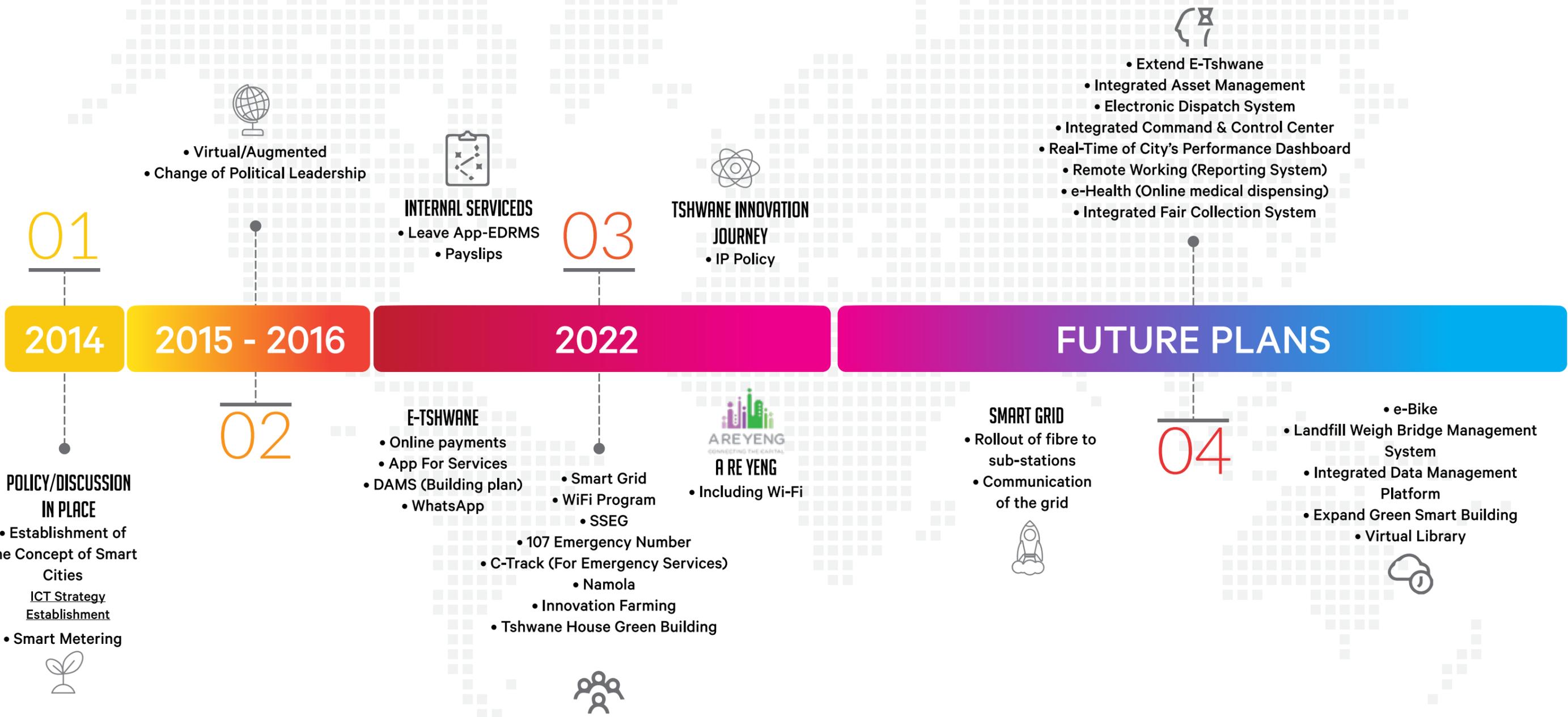
• Higher return on investment

Figure1: City of Tshwane Organogram

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Over the past decade, Tshwane has commenced various initiatives that seek to improve governance in the City. The following timeline provides an indicative timeline of the City of Tshwane's smart city journey.

Pre Smart City Programme Years

01

02

03

04

2014	2015 - 2016	2022	FUTURE PLANS

• Virtual/Augmented
• Change of Political Leadership

INTERNAL SERVICEDS
• Leave App-EDRMS
• Payslips

TSHWANE INNOVATION JOURNEY
• IP Policy

• Extend E-Tshwane
• Integrated Asset Management
• Electronic Dispatch System
• Integrated Command & Control Center
• Real-Time of City's Performance Dashboard
• Remote Working (Reporting System)
• e-Health (Online medical dispensing)
• Integrated Fair Collection System

POLICY/DISCUSSION IN PLACE
• Establishment of the Concept of Smart Cities
ICT Strategy Establishment
• Smart Metering

E-TSHWANE
• Online payments
• App For Services
• DAMS (Building plan)
• WhatsApp

• Smart Grid
• WiFi Program
• SSEG
• 107 Emergency Number
• C-Track (For Emergency Services)
• Namola
• Innovation Farming
• Tshwane House Green Building

A RE YENG
CONNECTING THE CAPITAL
A RE YENG
• Including Wi-Fi

SMART GRID
• Rollout of fibre to sub-stations
• Communication of the grid

• e-Bike
• Landfill Weigh Bridge Management System
• Integrated Data Management Platform
• Expand Green Smart Building
• Virtual Library

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The following projects are implemented by the City of Tshwane. These projects also relate to the "smart city concept" and may form a baseline when identifying pipeline projects in the upcoming phases.

| PROJECT	DESCRIPTION	PARTNERS
E-TSHWANE PLATFORM	Enables residents to engage with the City electronically from the comfort of their home. The solution enables viewing and payments of accounts, submission of meter readings, lodging of queries, applications for clearance certificates and other services.	Group Financial Services Customer Relations Management Energy and Electricity Emergency Services Water and Sanitation
ELECTRONIC WAYLEAVE MANAGEMENT SYSTEM	Enables submission of application for Wayleaves, approval of applications, payment of refundable deposits and processing of such refunds once the work has been completed in incompliance with the relevant by-laws.	Roads and Transport
ACCOUNT PAYMENTS THROUGH WHATSAPP	An extension of the e-Tshwane platform which enables citizens to get in touch with the City, request and download service request forms, access critical links and the ability to make card payments via WhatsApp.	Group Financial Services
FREE WI-FI INITIATIVE	City-funded initiative aimed at bridging the digital divide by providing free Wi-Fi access to residents at schools and recreational centres across all regions. The initiative supports other initiatives by enabling access to online platforms provided by the City	Group Shared Services
ELECTRONIC DOCUMENTS AND RECORDS MANAGEMENT SYSTEM	One of the recent projects aimed at ensuring compliance with the Records Management and Archives regulation. The project will lay a foundation for automation of internal processes, minimiszing reliance on paper and reducing printing costs that are currently very high.	Group Shared Services

New Initiatives

PROJECT	DESCRIPTION	PARTNERS
SAP ARIBA	Digitization of the supply chain management process from distribution of tender documents to awarding of tenders. Phase 0 –planning of an online portal for submission of bids currently underway.	Supply Chain Management
SAP VENDING	The SAP Direct Vending Programme aims to Enhance the City of Tshwane's vending environment to an SAP based environment, eliminating the dependency on the third-party vending systems.	Group Finance
SINCH	Sinch is a multichannel platform that brings organisations and customers closer with tools enabling personal engagement via mobile messaging, voice, video and social media channels. Go Live – Q1 2022/23	Customer Relations Management Department
EHEALTH	Electronic Health Management System - Another new initiative which will not only improve internal efficiency, but also have an enormous impact on the way city residents engage the city for primary health care services.	Health Department
INTEGRATED BUS RAPID TRANSPORT SYSTEM (AREYENG)	Also known as Mobility as A Service Features include: Fixed Route – Pay as You Go on Tshwane Buses Services On Demand – Pay as you go with integration to partners such as airlines, Gautrain, uber, Banks etc. Currently under planning phase	Roads and Transport Department

The City of Tshwane's smart city approach constantly seeks ways to improve city functions and service delivery. The City's priority is ensuring that city residents have equal access to services by ensuring convenience and bridging the gap between the customer and the municipality. This not only has benefits for residents and visitors of Tshwane but improves trust and ultimately revenue for the City.

The City of Tshwane aims to leverage the Smart City approach to integrate all city functions and provide more efficient service delivery for its customers, to improve quality of life.

CITY
INTERVIEW
WITH DERICK MANDIWANA

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Photo Credit: Arnold Petersen
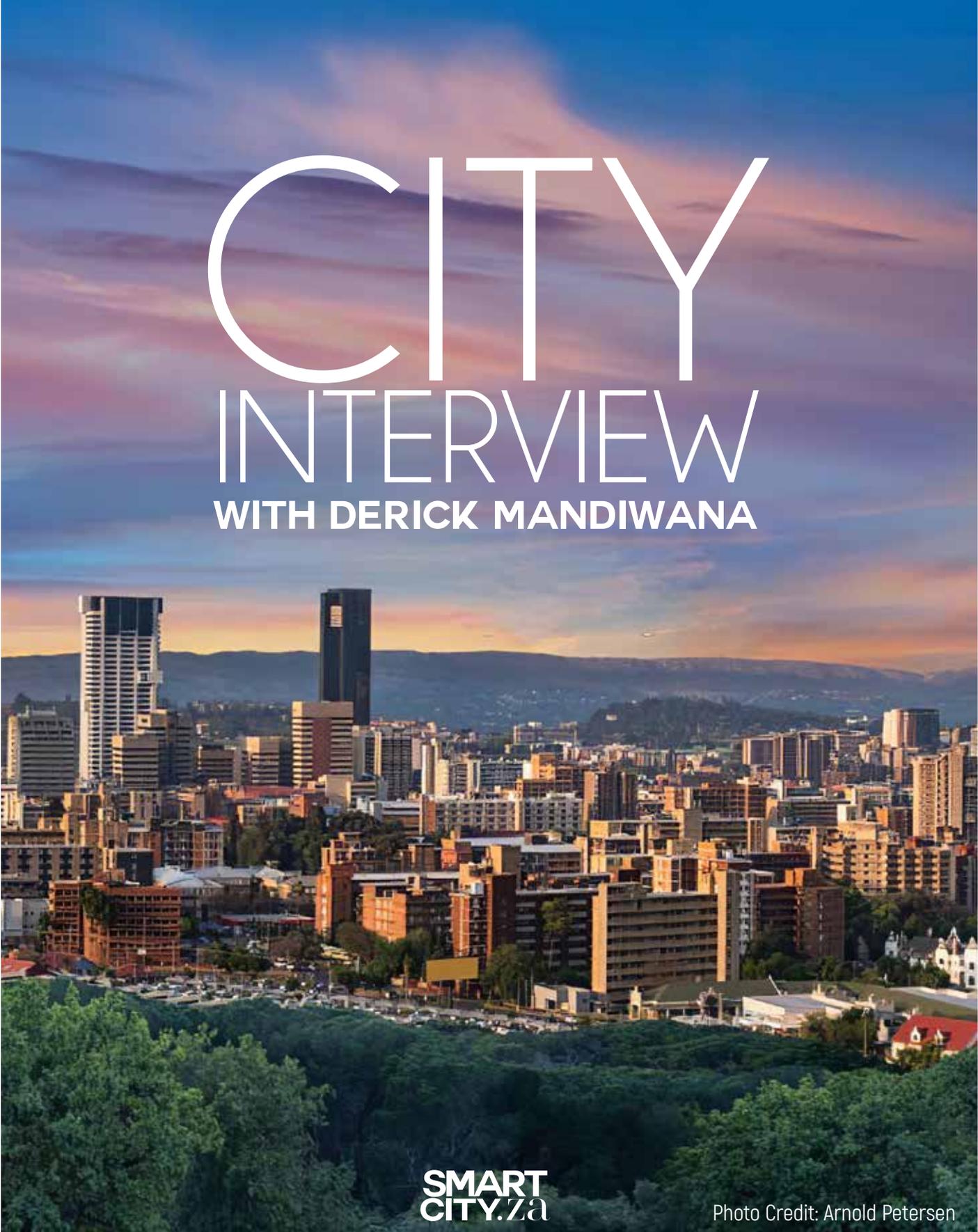
INTERVIEW
WITH **DERICK MANDIWANA**

Developing a smart city strategy is a crucial part of any smart city journey. It articulates an institution's objectives, and plays a key role in the institutionalisation of the smart city approach. The City of Tshwane intends to go very far with the smart city approach, as the key driving force in the smart city journey is to ensure that no one is left behind. Chuma Mbambo speaks to Derick Mandiwana on the City of Tshwane's journey to developing their smart city strategy. Derick is the Director for ICT Business Applications in the City of Tshwane.

Q: Why is it important for the City of Tshwane to adopt the Smart City approach, and furthermore develop a Smart City Strategy?

A: I believe that the main objective for the existence of cities is around the provision of services to the residents of the city. Through the smart city approach and its various initiatives, the city is in a better place to provide services to its citizens and improve livelihoods. There are obviously other benefits that emanate from this. But essentially, if the city is well organised, it will be able to reduce wastage and become more efficient. When this is done well, the beneficiaries are the citizens.

Q: The City of Tshwane started recognising the need for the Smart City back in 2014 through the ICT Strategy, how has the Smart City approach evolved since then?

A: You will understand that the smart city concept is actually evolving. Previously when you spoke about smart cities, the discourse was around ICT, but we have observed that ICT is only an enabler that assists in various domains. That being said, at the time, it made sense for smart cities to be spearheaded from the ICT perspective. So, when we developed the ICT strategy in 2014, it was meant to support the smart city vision. In other words, all programmes that were under the ICT strategy were aimed at making sure that we become a smart city at the end of the day. Hence most of the things that were done were more ICT related, propelling the city towards being a smart city.

I remember we even established a programme called e-initiatives, which supported a smart city by coming up with smart services. There could have been other linkages that would have been made with other sector domains, but with limited understanding of what a smart city was, we couldn't make those linkages then.

Q: What value do you envision the Smart City Strategy will add to the City of Tshwane and how will it align or complement existing city policy?

A: As we have acknowledged that the smart city isn't just about ICT, the strategy will ensure that there is alignment across all city departments. The smart city strategy allows us to ensure that all programmes that are run at departmental level align and foster the vision of becoming a smart city. Without a strategy you will find many programmes running

in different directions, and not contributing to the common goal. But with the smart city strategy, where all departments will make inputs, we are able to make sure that as they implement projects, they are contributing to the same objective.

Q: You mentioned the e-initiatives earlier, can you tell me more about some of the earliest smart city projects that the City implemented?

A: The e-initiatives were established when we realised that we needed to improve the way in which customers interact with the city. So we came up with an online platform that would, at the time, enable customers to access their bill statements without having to come to the city office physically. In fact, the platform that is now known as e-Tshwane, was called the Electronic Bill Presentment and Payment Platform (EBPP). But then we saw opportunities for expansion, for example, we realised that e-services can mean more than just bill presentment and payment, but has the potential to be a platform that citizens can use to access numerous services. With that understanding, the EBPP platform was then rebranded and publicised as the e-Tshwane platform.

Q: In what ways do you think the Smart City approach will improve service delivery?

A: It's actually quite interesting, and I'll give you some examples just to put this into context. If you were to have a smart transport system, this will mean that visitors and residents of Tshwane are able to move from one location to another seamlessly. Even with the integration of the transport system to improve mobility across the different modes of transport. The convenience that comes with that will benefit everyone. Likewise with the various parts of the city. With a bit of smart planning, we can come up with ways to improve many city functions.

There are also internal benefits for supporting smart initiatives. Operations and infrastructure management in the city also becomes easier. If we have a team of technicians that address various service delivery issues, let's take electricity for example. With a smart system we can completely eliminate the need for someone to drive to someone's house to either connect or disconnect electricity, and rather do that remotely from a central location. So, we can definitely improve turnaround time for services rendered and I'm sure indirectly you can improve city revenue collection as well.

Q: How did the change in political leadership in 2016 affect your Smart City journey? What has this experience taught you about how you will implement the Smart City approach in Tshwane?

A: Cities are run through political administrations and now and then there's bound to be changes in the city administration. Therefore, some programmes that may be implemented during a particular administration may not continue beyond that. However, if we are able to develop a good business case and engage all city stakeholders thoroughly, sometimes it doesn't matter who is in charge. It may take a bit of time for an incoming administration to understand the objectives, but if we engage and follow approval structures accordingly, some programmes can outlive any political term. That's what we've managed to do with the smart city approach. Our e-initiatives, for example, have lived through two different administrations, because impact of the service and the convenience created for the customers is indisputable.

Q: What have been the challenges in developing the Smart City Strategy?

A: The first challenge is that there is no central office or structure that is meant to enforce the smart city implementation. So right now departments implement their own strategies, focused on their own goals, and there is no coordinated effort to implement the smart city. That is why we need the smart city strategy, where departments will contribute to the same objective. The lack of an integrated or crosscutting strategy is a challenge. Second is the issue of funding. We can sit and come up with the best initiatives, but without funding they won't see the light of day. Lastly, it's the procurement processes. This process is meant to assist in identifying and procuring the best suited projects and implementation partners. But now and then, because of procurement policies (and understandably so), the outcome of the procurement process isn't always the best solution to take the city forward.

Q: Why do you think participating in the DBSA South African Smart Cities Programme is important for your Smart City development journey?

A: The smart city approach in eThekwiniA: There are quite a number of reasons actually. One, is learning from the other participating cities. Coupled with that, it's being able to compare ourselves, in terms of how we are doing in relation to other South African cities. The second thing is the ability to learn from the likes of the DBSA and the World Bank that may have experience with similar projects,. Sso, we are able to tap into their knowledge. Even during the sessions that we've had already, Trevor has spent a lot of time explaining the methodology that has been tried and tested. So, we can definitely learn from that and adapt where possible. The third thing is the fact that there's potential funding. This can either supplement the city's funding for smart city initiatives, or assist the city so that available funds are allocated to other city priorities. Most importantly, the programmme is helping us develop our smart city strategy. That strategy will live beyond this programme and that to me is a major benefit from this programme.

Q: What have been the key lessons so far in your Smart City journey?

A: Our approach is to try and to make this exercise as consultative as possible. That way, we get buy-in from all city departments, even ones that won't necessarily be part of the programme. It is very important to have the support of others. That being said, we do not want to run this programme from a corner, we want it to be known. In fact, we want it to make its way to the Integrated Development Plan (IDP), so that as the city develops its plans, the smart city is one of the key pillars. Unfortunately, this may take more time, but I think it's time well spent considering what you gain from it in the long-term. It also doesn't help to rush through the process and towards the end, you realise that you're on your own because you've left everyone behind.

Q: What lies ahead for the City of Tshwane in the Smart City Journey?

A: What lies ahead is the consolidation of all the inputs from the departments and we develop the smart city strategy. From there we identify projects that we will prioritise, and we start with the implementation. Whether or not we get funding from the DBSA, all these inputs and identified projects will be included the city plans going forward.
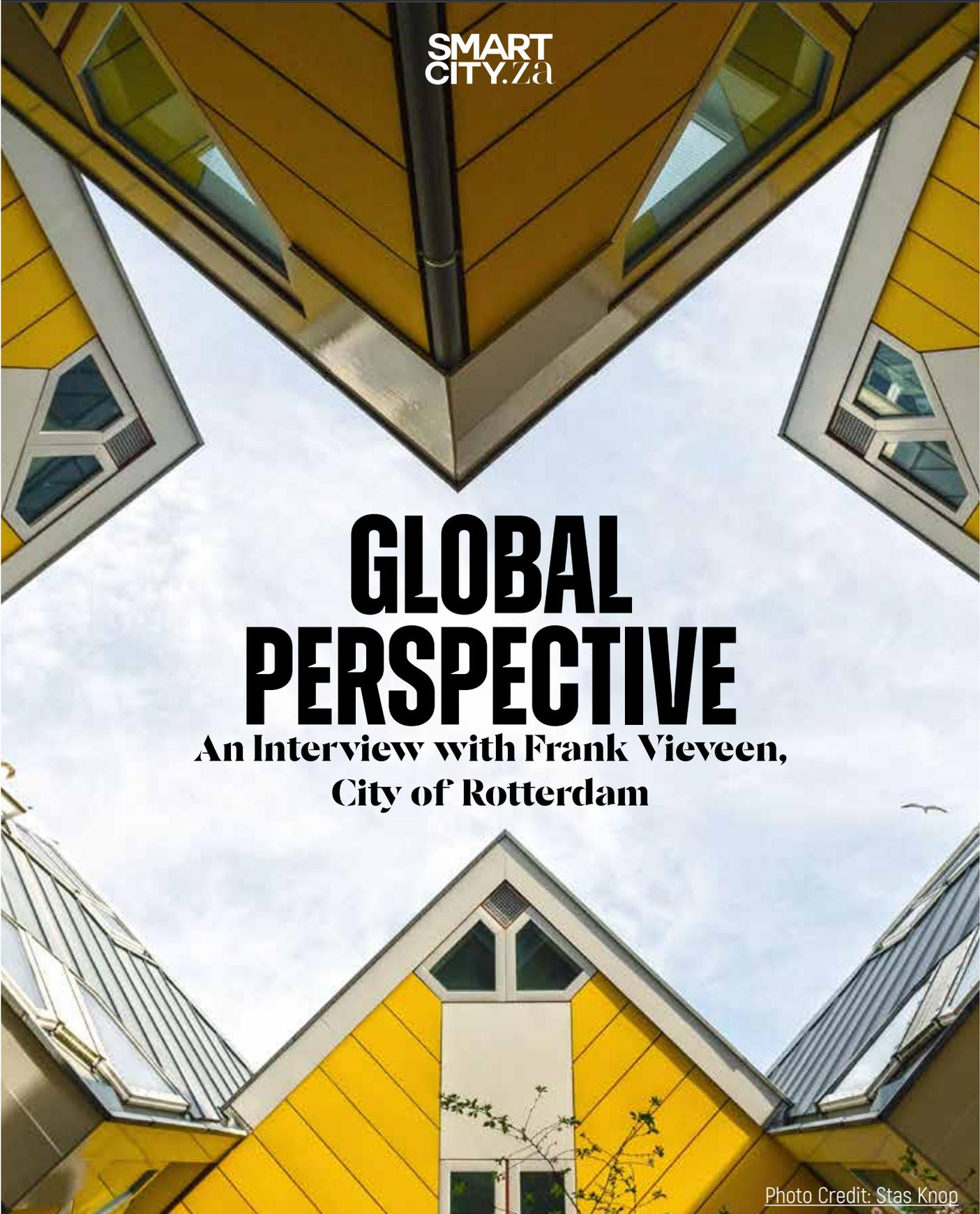
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GLOBAL PERSPECTIVE
An Interview with Frank Vieveen, City of Rotterdam

Photo Credit: Stas Knop

For this edition, Geci Karuri-Sebina had the opportunity to interview Frank Vieveen who is a Program Manager at the City of Rotterdam's Urban Development Department. Frank has worked with the city for 13 years on digital innovation in the urban environment, and he currently runs Rotterdam's Smart City and Digital Economy programme.

INTERVIEW
WITH **FRANK VIEVEEN**

Q: How important is it for cities to develop smart city strategies, and what is their key role or purpose?

Frank: First and foremost it is important to clarify what Smart City perspective you are taking - it can mean many things. For us, it is not an ICT perspective but an urban development perspective.

Given that - I would say that it is very important to have a strategy. In fact, Rotterdam has several strategies - smart strategies for Resilience, Sustainability, Mobility, and so on. A lot of urban environment topics have separate strategies. But we recognise that there is also a need to have a sense of how they all connect together.

There are more than thirteen thousand people working for our municipality. Connection becomes important - and indeed our National SC report a few years ago showed that we have a lot of pillars working on separate topics. So we are now developing an approach to connect all of these pillars to the municipality's urban digital layer. But it is ongoing.

The SC approach is a process. We have a lot of programme managers who know on an ongoing basis what is the next step, and also make mistakes or change course as they move along the way. You have to be able to change your route along the way, adapt to new circumstances. That's why I am always a bit scared about strategies - if the strategy becomes the fixed truth and people think that's the only thing to do because it's what the strategy said, then it can be a problem. You have to have ways to deviate, so that you can adapt.

Q: What has the role been of these explicit smart city strategies for Rotterdam?

I cannot be in charge of every smart city programme or project - I am not a specialist in all of the sectors. But I can understand how to connect the dots. A city needs to know how to facilitate and standardise all of these programmes. Firstly, we have to focus on how to capacitate workers. For instance, do the people working for the municipality understand how to work in a more data-driven way, and do they have the right tools? Secondly, standardisation. For example, many companies offer smart city solutions, but how does the municipality facilitate the core itself, so that businesses can provide specialised knowledge but which has to fit into the municipality's core system?

YOU HAVE TO HAVE WAYS TO DEVIATE, SO THAT YOU CAN ADAPT.

One example of standardisation by Rotterdam was the Centre - a modularised light pole which took 3 to 4 years to develop; we are now rolling out 200 units. Facilitating digital connectivity on street level allows for a plug-and-play approach to using sensors, connectivity, etc. for the solutions that the city wants to roll out. It also enables working with businesses who also want to measure things - using the same infrastructure with some municipal control as a provider of the connectivity.

We have a 3-d model of the City, and another unit is mapping the data - basically a digital twin. This enables facilitation of citizen participation. So for example, if you want to create a children's playground, the city can show the location, budget, and use the digital city map to invite people to create / explore the playground.

Q: What would you consider to be important criteria for assessing a smart city strategy?

Firstly, what is the added value that you create for citizens, businesses, visitors, etc.?

Secondly, is it inclusive - can everyone make use of it?

Thirdly, is it efficient - given we are a tax-funded body?

Q: What would be 3 key lessons you can share from Rotterdam's Smart City journey and success?

One, that it is not an ICT thing - it is a challenge of departments themselves. (But of course this doesn't mean that ICT has nothing to do with it - the strategy must increase awareness of more digital-driven working.).

Two, make it modular as previously explained.

And three, build up your knowledge! You need to know what you are talking about. Both about how the city works, and also about the tools that you have to have. Hiring an expert is good, but when the expert leaves, so does the knowledge. You can outsource, but the core must always be in your own hands.

Q: Are there any other illustrative examples of smart city strategy experiences that you have encountered which you think were either instructive or cautionary?

Amsterdam. They have a full team dealing with SC strategy and plans, more than Rotterdam, . Bbut they have a large central team. Our strategy is to have the departments themselves working on smart teams within; we think this is the better route. But we still learn from Amsterdam's central organiszation - but for ours it must be small and adaptable, setting direction for the department teams because they have the specialiszed knowledge. Amsterdam also does well with digital participation.

Barcelona, London, Copenhagen are other European cities we learn from. I am especially looking at European cities because we tend to find that American or Asian contexts are too different for us to take from their solutions or approaches. Sometimes their solutions are not comparable; for example Abu Dhabi's new smart neighbourhood approach which could be just decided from above - we can't do that in Rotterdam.

Q: In South Africa we have a nagging challenge that we describe as having "great strategies / policies, but poor implementation." Is this a problem or risk that you have encountered in relation to smart city strategies, and what are some words of advice that you might have about ensuring implementability and implementation?

Our thing is that we have multiple strategies, including for implementation. Our challenge is how to connect the different strategies by facilitating with the central infrastructure. Implementation is not such an issue - we do a lot. The issue is how to oversee everything, connect the dots, etc . A city is a very complex environment - there are so many things we are responsible for, you can't know it all.

One strategic issue is how to create a steering group made of representatives from different departments to help set the priorities. It is possible, for example, that a solution for mobility might get in the way of energy transition, or education. The question is how to prioritise and trade-off?

My advice would also be that you should have someone in the City Council who takes responsibility to keep your smart city approach high on the agenda. An ambassador, as we call them. They will help on the political level. The smart city strategy has to be supported on the political level.

For us, we have a Minister responsible for Digitalisation broadly. That person also understands what is our own digital agenda - they cover all the other issues regarding systems to run our operations, and also oversees issues of transparency, data privacy, cyber security, etc. - these are all different domains, and the risk is to focus too much on our one [urban] domain and not those others. It is all connected, part of a bigger picture. So we can focus on city level, but on the whole you need to have all four key pillars in place: strong digital fundament, strong digital government, strong digital society, and strong digital economy.

Q: Do you have any other useful messages you would want to share with our Cities here as they continue into strategy formulation?

Do not focus on "the strategy" too much! You need to have the outline and the strategy so that departments can commit to that strategy - but the strategy must also include how to organise this. A smart city is not about the digital part only. Yes, of course you will be implementing digital solutions, but the organisational part is where things tend to go wrong. This should be a major part of your strategy. That means ensuring commitments, responsibilities, points on the horizon where we all want to go (shared vision across departments), and support by the whole organisation.

Frank Vieveen

Frank Vieveen is the city lead for the Smart City program of the City of Rotterdam. This program focuses on different smart city themes with special focus on digital economy, digital infrastructures and digital innovation ecosystems. The Smart City program started 7 years ago and is now one of the priorities of the urban and economic development of the municipality. Before starting the Smart City program Frank worked on digital innovation and infrastructures within the Economic Department of the municipality for 5 years.

Prior to joining the City of Rotterdam, Frank worked for LogicaCMG (currently known as CGI) as manager and director in internet consultancy and telecom industry.

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SNIPPETS

Smart Cities Strategy, with City of Canterbury Bankstown (Australia)

Podcast (2019)

In this episode of Smart Cities Chronicles, the City of Canterbury's Smart City Roadmap is explored. Some of the key points discussed were the process of creating a smart cities governance structure, the criteria used to select smart cities projects, and Canterbury's inclusive community engagement exercises.

We need smarter cities, not "smart cities"

Article (2022)

This article is an apt reminder that when pursuing smart cities, we cannot only focus on increasing technology. All technology should be implemented in a thoughtful and holistic way keeping in mind the residents of a city and their needs and realities.

Smart city implementation: Nine tips to get you started

Article (2019)

Smart city implementation is a complex process with a myriad of possible challenges. These nine helpful tips are sure to start you off on the right footing and help make your city smarter.

Top 10: Smart cities driving sustainability around the world

Article (2022)

London, Singapore and Oslo are some of the 'smartest' cities in the world. They provide great examples of how cities can harness technology to improve efficiency and contribute to sustainability. This article highlights ten smart city case studies from across the world.

Want to elevate your smart city planning game? This 7-step roadmap gets you hyper-connected

Article (2019)

Learning from the experiences of other cities is vital when strategizing your smart city. Through studying over 100 metros, the author has been able to find some of the best smart practices. These seven helpful points promise to elevate your smart city planning game.

Our Alliance is creating smart city governance

Article (2022)

Smart cities often gather and analyse large amounts of data to improve various aspects of cities. However, it is vital that cities maintain a level of trust with their citizens through establishing smart city governance initiatives that ensure data is handled ethically and transparently.

5 focal points needed to develop a smart city

Article (2020)

There are many different models to create a smart city. This author suggests that all smart cities should include five basic areas: backbone infrastructure, leadership structures, sustainable provision of services, developments in technology and innovation, and community social infrastructure.

G20 Global Smart Cities Alliance - Global Policy Roadmap

Database

The G20 Global Smart Cities Alliance on Technology Governance is the largest global initiative. Through partnering with global experts, they have compiled and analysed policies from around the world to identify model policies for successful, ethical smart cities. These documents provide a starting point for cities to develop smart city policies.

CONTACT

DBSA

Dr. Patrick Ntsime,
DBSA Programme Lead
Coverage Division: Metros,
Intermediate Cities & Water Boards
T: +27 11 313 3911
M: +27 82 900 2541
E: patrickn@dbsa.org
W: www.dbsa.org

Mr. Konstant Bruinette,
Senior Deal Originator
Coverage Division: Metros,
Intermediate Cities & Water Boards
T: +27 11 313 3911
M: +27 83 391 0104
E: konstantb@dbsa.org
W: www.dbsa.org

WORLD BANK GROUP

Mr. Lethu Masango,
World Bank Task Lead
Urban Resilience and Land
T: +27 21 724 3204
M: +27 82 331 0158
E: cmasango@worldbank.org
W: www.worldbank.org

Dr. Geci Karuri-Sebina,
Visiting Associate Professor,
Wits School of Governance
M: +27 72 148 1132
E: Geci.karuri-sebina@wits.ac.za
W: www.civictech.africa

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