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JOHANNESBURG: LEVERAGING BIG DATA AND ANALYTICS FOR TRANSFORMATION AND DECISION MAKING

Tinashe Mushayanyama, Director of Research & Strategic Information, and Zayd Ebrahim, Director of Research, both from the City of Johannesburg, explained how addressing great inequality is one of the chief drivers of making their city smart, along with sustainability, growth and good governance. Big data will play a key role.

Johannesburg recognizes that being a smart city is more than just technology – it is about people. It is South Africa's economic powerhouse, yet it is a divided city, with the digital divide mirroring its socio-economic disparities – see Table 1.

A smart city is a platform for innovative applications in ways such as:

- control centers combining data from more than 20 departments (integrated operations center);
- predicting crime like we predict the weather;
- using broadband and Wi-Fi to allow free education; and
- digital city services.

Data and information can enable a 'smarter' Johannesburg, so the city can become more liveable, workable and sustainable – and make the most of its strategic location and position as South Africa's financial hub.

The city in its context

To put Johannesburg into context, the city is situated within the polycentric Gauteng city-region, which has an estimated population of 13.9 million people in 2016, the largest of any of the country's regions. South Africa's overall population increased from 51.77 million in 2011 to 55.65 million in 2016.

TABLE 1: HOUSEHOLDS' ACCESS TO BASIC SERVICES IN JOHANNESBURG

Service	2011	2016	% increase
Access to piped water	98.6%	96.1%	-2.5%
Connected to electricity	90.8%	90.4%	-0.4%
Flush chemical toilet	90.5%	91.2%	0.7%
Households living in informal dwellings	17.4%	18%	0.6%
Households living in formal dwellings	81.4%	81.3%	0.1%
Refuse collection	95.3%	95.3%	none

Source: City of Johannesburg

Johannesburg's population represents 8.9 percent of South Africa's total population and is the country's most populous city. It receives about 3,027 migrants a month. In 2011, the city had 1.43 million households and now has 1.85 million – an increase of 29.2 percent. Between 2011 and 2016, the city's population increased by 11.6 percent to 4.94 million.

People between the ages of 15 and 34 years' old account for a third of Johannesburg's population, falling from

42 percent in 2011. The prevalence of HIV is 29.5 percent and unemployment rate is 29.8 percent.

The potential of smart city

Johannesburg defines a 'smart city' as a one that uses ICT as an enabler, to merge the dimensions of smart utilities, smart mobility, smart economy, smart environment, smart education, smart people, smart living, smart health, smart planning and smart governance.

The 'smart city' concept brings together all the characteristics associated with organizational change, technological advancement, economic, social development and other dynamics of a modern city.

In Johannesburg 58 percent have access to internet and although only 15 percent have a landline, strong evidence suggests that 93 percent of individuals have access to cell phones, which is an important opportunity for bridging the digital divide. Technology could offer solutions to serious challenges, such as intelligent infrastructure, smart health and safety issues.

If becoming a smart city is to be realized, then an integrated approach towards achieving growth and development strategy is imperative:

- to address inequality;
- for sustainable infrastructure provision;
- to ensure inclusive growth; and
- for good governance.

Johannesburg's smart city strategy is to ensure that it enables the use of all available information to make better decisions and, can be summarized as:

- do more with less – being more efficient across the whole city saves enormous costs;
- do it better by being more effective and raising the quality of the services; and
- do new things by being innovative and utilizing new opportunities, experimenting with new concepts.

Johannesburg has taken a phased approach, cascading data from strategy to delivering services: The preparation phase was between 2013 and February 2014, followed by putting best practices and processes in place, up to July 2014, which also saw the first smart city projects started. The initiative is now in the Urban Living Lab Phase, putting a roadmap of smart city projects in place and working on a yearly update cycle.

The smart city of Johannesburg should:

- Help social development, such as greater social cohesion and human development at scale.
- Improve the efficient delivery of services, which should be interoperable, leveraging service delivery in communities, lowering the cost of service delivery and tracing defaulters.
- Support better decision making, using citizens' input and taking into account all available, relevant data through improved governance.
- Stimulate economic activity, that is, job creation through startups and small- and medium-sized businesses, foster entrepreneurship and make it easier to do business.
- Provide universal internet access – use technology to bridge the digital divide, including leveraging high cell phone penetration.
- Encourage active citizen participation with citizens acting as co-creators and improve communication with all citizens, providing accessible information for communities.
- Create a sustainable and liveable environment so that people can live safely and have sustainable use of resources.

Big data is at the apex of achieving smart city objectives. Although it faces some big challenges – see Figure 1 – the plan is for the city of Johannesburg to use it in many ways. They include:

- for policy making and strategy development, and sound monitoring and evaluation;
- to enhance learnings from other cities so Johannesburg can be innovative in its delivery of services to citizens; and
- as a reliable foundation – globally standardized big data will assist cities in building core knowledge for decision making and enable comparable insight and global benchmarking.

FIGURE 1: LOOKING FORWARD TO OVERCOMING DATA CHALLENGES

Big data is not readily available at city level	In South Africa this means a 10 year gap. Where data is at city level, it is often based on modeling estimates and therefore not always official
International frameworks for data analytics	Reliance on international frameworks for data analytics – definitions are not always applicable to Johannesburg domestification is a must
Big data is sometimes overwhelming for cities	There is a need to balance the use of big data with some continuity or traditional approaches
Lack of capacity	Both technical and user capacity Going forward, capacity building and resourcing will be key
Transforming data	Traditionally incubated within the halls of National Statistics Dept. Need to include practitioners, civil society, the private sector, and even the beneficiaries themselves