PRIVACY INTERNATIONAL

Smart Cities

Utopian Vision, Dystopian Reality



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SMART CITIES: UTOPIAN VISION, DYSTOPIAN REALITY

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Introduction

> **"Cities are now imbibed with a new consciousness to do things differently and with a spirit of competition. Accordingly, the Smart City mission is the cornerstone of urban renaissance."[1]**
>
> Venkaiah Naidu – India's Urban Development Minister

The smart city market is booming. National and local governments all over the world expect their cities to become more efficient, more sustainable, cleaner and safer by integrating technology, increasing data generation and centralising data to provide better services.[2] From large multinationals to small start-ups, companies want their slice of the multi-billion dollars per year pie of municipal budgets and long-term government contracts.[3]

But do smart cities even exist? And are our cities actually getting smarter? Or are smart cities a mere pretext to collect and process more data? This piece examines the reality of the smart city market beyond the 'smart' marketing term and existing smart city initiatives. We also consider the consequences and significant concerns emerging in terms of privacy and other fundamental human rights.

1 "Smart city project to show results soon," The Economic Times, 28 October 2016, available at: https://economictimes.indiatimes.com/news/economy/infrastructure/smart-city-project-to-show-results-soon-up-lagging-venkaiah-naidu/articleshow/55114370.cms

2 "Case Study: Smart Cities and Our Brave New World," Privacy International, 30 August 2017, available at: https://privacyinternational.org/node/1494

3 "Frost & Sullivan: Global Smart Cities market to reach US$1.56 trillion by 2020," Frost & Sullivan, 26 November 2014, available at: https://ww2.frost.com/news/press-releases/frost-sullivan-global-smart-cities-market-reach-us156-trillion-2020

Smart Cities: the Reality Behind the Term

While the term "smart city" has been broadly used by governments across the world[4] and the private sector alike,[5] it is important to question what qualifies a city as 'smart'. Can cities ever display the characteristics of 'smart'-ness to a degree that they can meaningfully be called 'smart' in their entirety? What then would this mean practically in a variety of domains, such as urban planning, social policy, or human rights protection?

There are as many definitions of smart cities as there are resellers of smart city infrastructure. For American technology multinational IBM, which has so far been eating the largest slice of the 'smart city' pie,[6] it is about finding "new ways for the city to work."[7] For Alphabet company SideWalk Labs it is about "building innovation to help cities meet their biggest challenges."[8] Siemens wants to turn cities into "open-air computers" to make them "healthier, more comfortable, and more relaxed."[9]

The World Bank suggests two possible definitions of smart cities. The first one is "a technology-intensive city, with sensors everywhere and highly efficient public services, thanks to information that is gathered in real time by thousands of interconnected devices." The second one is "a city that cultivates a better relationship between citizens and governments - leveraged by available technology. They rely on feedback from citizens to help improve service delivery, and creating mechanisms to gather this information."[10] Both definitions are oriented around citizen feedback and data collected by devices as a mechanism to achieve efficiency in service delivery, core principles in the "smart city" framework.

Certain governments have adopted a more holistic definition of the "smart city" as a tool to achieve higher-level, though still nebulously defined, social goods beyond service delivery. A research paper commissioned by the British Department for Business Innovation and Skills describes smart city solutions as "applying digital technologies to address social, environmental and economic goals."[11] The Smart Cities

4 See for instance "Smart city project to show results soon," The Economic Times, 28 October 2016, available at: https://economictimes.indiatimes.com/news/economy/infrastructure/smart-city-project-to-show-results-soon-up-lagging-venkaiah-naidu/articleshow/55114370.cms and "The US is investing $165 million into smart city solutions," Business Insider, 15 October 2016, available at: http://www.businessinsider.com/the-us-is-investing-165-million-into-smart-city-solutions-2016-10?IR=T

5 "IBM – Smart Cities", IBM, 26 May 2011, available at: https://www.youtube.com/watch?v=ncV2mrveIlM

6 "IBM and Cisco Retain Leading Positions in Navigant Research Assessment of Smart City Suppliers," Navigant Research, available at: https://www.navigantresearch.com/newsroom/ibm-and-cisco-retain-leading-positions-in-navigant-research-assessment-of-smart-city-suppliers

7 Smarter Cities New cognitive approaches to long-standing challenges, IBM, available at: https://www.ibm.com/smarterplanet/us/en/smarter_cities/overview/index.html

8 Sidewalk Labs, available at: https://www.sidewalklabs.com/

9 "Data-Driven Cities," Siemens, 11 July 2017, available at: https://www.siemens.com/innovation/en/home/pictures-of-the-future/infrastructure-and-finance/smart-cities-trends.html

10 "Smart Cities, The World Bank, 8 January 2015, available at http://www.worldbank.org/en/topic/ict/brief/smart-cities

11 "The Smart City Market: opportunities for the UK," Department for Business Innovation & Skills, October 2013, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/249423/bis-13-1217-smart-city-market-opportunties-uk.pdf

Mission, an Indian government body, in charge of developing smart cities across India, confronts this inherently fuzzy notion by noting that:

> **"There is no universally accepted definition of a smart city. It means different things to different people [...] depending on the level of development, willingness to change and reform, resources and aspirations of the city residents. A smart city would have a different connotation in India than, say, Europe. Even in India, there is no one way of defining a smart city."[12]**
>
> Smart Cities Mission

"Smart city" is thus a term that is both ambiguous but also emphatically used by government and corporate actors to promote very specific visions of urban organisation. The next section will demonstrate IBM's role in shaping this discourse.

IBM's Role in Defining the Smart City

The term "smart city" was reportedly coined by IBM in 2008.[13] Since then the company has become one of the largest players in a market whose size is expected to reach almost US$ 1.56 trillion by 2020.[14] A report by market research group Navigant places IBM as the leader of smart city suppliers based on criteria including market share and geographic reach.[15]

Companies

A wide range of companies offer services that become part of smart city initiatives. They include apps like Qlue in Indonesia – that allow citizens to file reports to the council about anything that may need to be fixed in their area – and the Google-owned navigation map Waze. Waze has developed the Connected Citizens programme: a programme that allows cities to access their data on traffic and public incidents. In exchange, the cities warn Waze about road closures and new traffic policies so Waze can improve its services.

Large corporations including IBM, Microsoft, Oracle, SideWalk Labs (an Alphabet company), Cisco and Hitachi offer infrastructure that allow cities to centralise and process large amounts of data using machine learning.

12 "What is Smart City," Smart Cities Mission, 9 May 2017, available at: http://smartcities.gov.in/content/innerpage/what-is-smart-city.php

13 "Smart Cities Taiwan: Opportunities for Dutch companies," Netherlands Trade & Investment Office Taiwan, 14 April 2017, available at: https://www.rvo.nl/sites/default/files/2017/05/taiwan-ambition-and-development-of-smart-cities-v2.pdf

14 "Frost & Sullivan: Global Smart Cities market to reach US$1.56 trillion by 2020," Frost & Sullivan, 26 November 2014, available at: https://ww2.frost.com/news/press-releases/frost-sullivan-global-smart-cities-market-reach-us156-trillion-2020

15 "IBM and Cisco Retain Leading Positions in Navigant Research Assessment of Smart City Suppliers," Navigant Research, available at: https://www.navigantresearch.com/newsroom/ibm-and-cisco-retain-leading-positions-in-navigant-research-assessment-of-smart-city-suppliers

IBM's vision of a "smart city" is a data-centric one. According to company material, it relies on sensors – electronic components that detect changes in the environment like temperature, movement, light, and sound – placed all over the city to create data for the municipality's use. Cameras placed on highways that transmit the traffic flow and digital meters that record water and energy usage in real time (also known as "smart meters") are two examples that IBM gives of the type of data that a local government can use. So too, IBM highlights, are the communications between citizens and their local governments – including through social media.[16] "If you think about instrumentation, this usually refers to sensors sensing the physical world, but it also includes people with their smartphones and their access to technology. That is mirrored in the rise of social media. Those trends, both technology and societal, are really making things possible," stated Mark Cleverley, former Director of Strategy at IBM Global Government Industry.[17]

Once this data is generated and collected, IBM provides data analytics to allow city offices to "identify trends and patterns." The information is then shared across government bodies using dashboards, visualisation and alerts. A smart city, according to IBM, is therefore one that uses information to deliver better services and to analyse what is occurring in the city, including in real time.[18]

This position of market leadership has allowed IBM to significantly shape the global understanding of a 'smart city', in what used to be a relatively underexplored conceptual territory. Thus, while "smart city" remains an abstract concept that governments and companies have each defined differently, there is an observable and global investment trend in creating cities where data generation is increased and data is centralised for various ends.

The Smarter Cities Challenge

In its promotional material, IBM claims its experience derives from work in 2,000 cities.[19] This international presence is partly due to a programme named the Smarter Cities Challenge (SCC), inaugurated in 2010 by IBM Citizenship. Every year, select cities each receive a so-called grant of US$500,000 to address a specific issue. The programme has become IBM's largest philanthropic programme and IBM values its contribution at more than US$66 million since 2010.[20] [21]

While the SCC is often reported by local media as a grant[22]—a term also used by IBM—what cities receive is the time and expertise of five or six IBM engineers who

[16] "How it Works: Smarter Cities," IBM Think Academy, 6 November 2014, available at: https://www.youtube.com/watch?v=yJVK25wWvbE

[17] "IBM Smarter Cities: Building Smarter Cities," IBM, 30 September 2011, available at: https://www.youtube.com/watch?v=2PtiWdS6UZA

[18] "How it Works: Smarter Cities," IBM Think Academy, 6 November 2014, available at: https://www.youtube.com/watch?v=yJVK25wWvbE

[19] "IBM Smarter Cities: Building Smarter Cities," IBM, 30 September 2011, available at: https://www.youtube.com/watch?v=2PtiWdS6UZA

[20] The Challenge, IBM Smarter Cities Challenge, available at: https://www.smartercitieschallenge.org/about

[21] They add that "the program's impact has been recognized by the White House and the federal governments of South Korea and Australia, as well as by the Committee for Encouraging Corporate Philanthropy."

work on site with city officials for three weeks to provide them with recommendations on the issue the city would have highlighted in their application—in Jakarta's case, for example, traffic congestion. IBM estimates that this service would be worth US$500,000 if cities were to hire an equivalent number of independent experts and host them for three weeks. The city does not directly receive US$500,000 from IBM.

The IBM engineers visit cities and, after consulting with city officials, devise a roadmap with a series of recommendations. Since 2015, IBM has been using Watson analytics, IBM's question-answering computing system and flagship artificial intelligence programme. It has been used for tasks as varied as detecting cyber-attacks[23] or assisting doctors in identifying the best treatment for patients with cancer.[24] Anne McNeill, IBM's Corporate Citizenship and Corporate Affairs Program manager, described to Privacy International how cities provide data that is analysed by the Watson system to help the IBM team sent as part of the SCC be "better informed to make decisions."

As of 2017, McNeill says, cities will select domains in they wish to receive assistance:

> **"[For instance, a] city may need some help around marketing if they are trying to develop an app and they know people are using it. So we can put a marketing person on the team. Some [cities] will get straight-on recommendations but some will say they need help with data governance."**
>
> Anne McNeill, IBM

Queried on the effectiveness of its interventions, McNeill explained to Privacy International that IBM evaluated the success of interventions by whether their recommendations are followed. IBM declined to share the evaluation data or criteria that would allow for an independent assessment of an SCC project's success.

The SCC reflects a tendency towards "one-term-fits-all" approach to deploying smart cities initiatives, often recycling proposals among countries. Moreover, the recommendations put forward by IBM after the 3-week stay in their host cities are broad and hardly revolutionary - they tend to promote long-existing policy staples of urban planning, such as the creation of public transport systems or the launch of a public relations campaigns. For example, Jakarta won the SCC in 2011 and chose

22 See for instance "IBM selects Baton Rouge for 'Smarter Cities Challenge,'" Louisiana Mid-Continent Oil and Gas Association, 26 March 2014, available at: http://www.lmoga.com/news/ibm-selects-baton-rouge-for-smarter-cities-challenge and "STMA receives 500,000 dollars to enhance development," Ghana News Agency, 13 May 2015, available at: http://www.ghananewsagency.org/economics/stma-receives-500-000-dollars-to-enhance-development-89411

23 "IBM Watson is ready to take on the cybercriminals," Amelia Heathman, 13 February 2017, available at: http://www.wired.co.uk/article/ibm-watson-artificial-intelligence

24 "Watson for Oncology," IBM, available at: https://www.ibm.com/watson/health/oncology-and-genomics/oncology/

to have IBM assistance on transportation and traffic issues. IBM recommended that Jakarta:[25]

- Develop and deploy an intelligent transport system [...] to enable (1) public transport operators to dynamically optimize existing transportation resources and (2) travellers to be empowered with real-time transport information.
- Empower a single transportation authority to execute a comprehensive transportation strategy. This body must have authority to enable inter-agency collaboration and cooperation with measurable performance metrics.
- Launch a public relations campaign that communicates the governor's vision and the responsibility of Jakarta citizens and commuters to contribute to the solution.

The Metropolitan Assembly of Sekondi-Takoradi in western Ghana approached IBM in 2015 with the broad objective of "improving living conditions for citizens." IBM's recommendations, after its 2016 intervention, are summarised in the infographic below.[26]



Figure 1 IBM's recommendations for Sekondi-Takoradi

In the Philippines in 2012, Cebu won the SCC and the Metro Cebu Development Coordinating Board received assistance from IBM on land-use planning, transport and traffic. The recommendations focused on governance ("Establish appropriate processes, tools, standards and supporting tools to drive integration and growth"), land use planning ("Develop an Integrated Master Plan to align efforts at all levels: Regional, Provincial, Local Government Unit and Barangay"), and traffic management

25 Jakarta Summary report, IBM's Smarter Cities Challenge, November 2011, available at: http://prd-ibm-smarter-cities-challenge.s3.amazonaws.com/applications/jakarta-indonesia-summary-2011.pdf

26 Executive summary, IBM's Smarter Cities Challenge, available at: https://prd-ibm-smarter-cities-challenge.s3.amazonaws.com/applications/sekondi-takoradi-ghana-2015-summary.pdf

("Improve traffic planning and management through access to timely, comprehensive data").[27]

The impact of the SCC is difficult to evaluate. The nature of the recommendations, which are often broad and unspecific, makes it difficult to assess whether they have been followed. Despite requests by Privacy International, IBM has also declined to share their success metrics, i.e. the data they gather on how frequently the recommendations are followed. If indeed the primary reason for investing in such costly 'smart city' projects, as noted above, is to increase efficiency of service delivery, this silence on how efficiency is measured post-project makes little financial sense. Nevertheless, the SCC offers a vision of a smart city based on broad premises of increased efficiency built on data analytics.

[27] Cebu Summary report, IBM's Smarter Cities Challenge, January 2012, available at: http://prd-ibm-smarter-cities-challenge.s3.amazonaws.com/applications/cebu-philippines-summary-2011.pdf

What Smartness Really Looks Like

The uses of the term “smart cities” explored above suggest smart cities may be nothing but a marketing term, but is that really the case? In fact, smart city initiatives are already shaping the streets we live in. What all these initiatives have in common is that smartness is understood as data collection, facilitated by ever more capable sensor technologies. Many of those initiatives also have a strong focus on security.

For example, IBM’s vision of a smart city resembles a nervous system, with the sensors acting as the nerves relaying information to a ‘brain’.

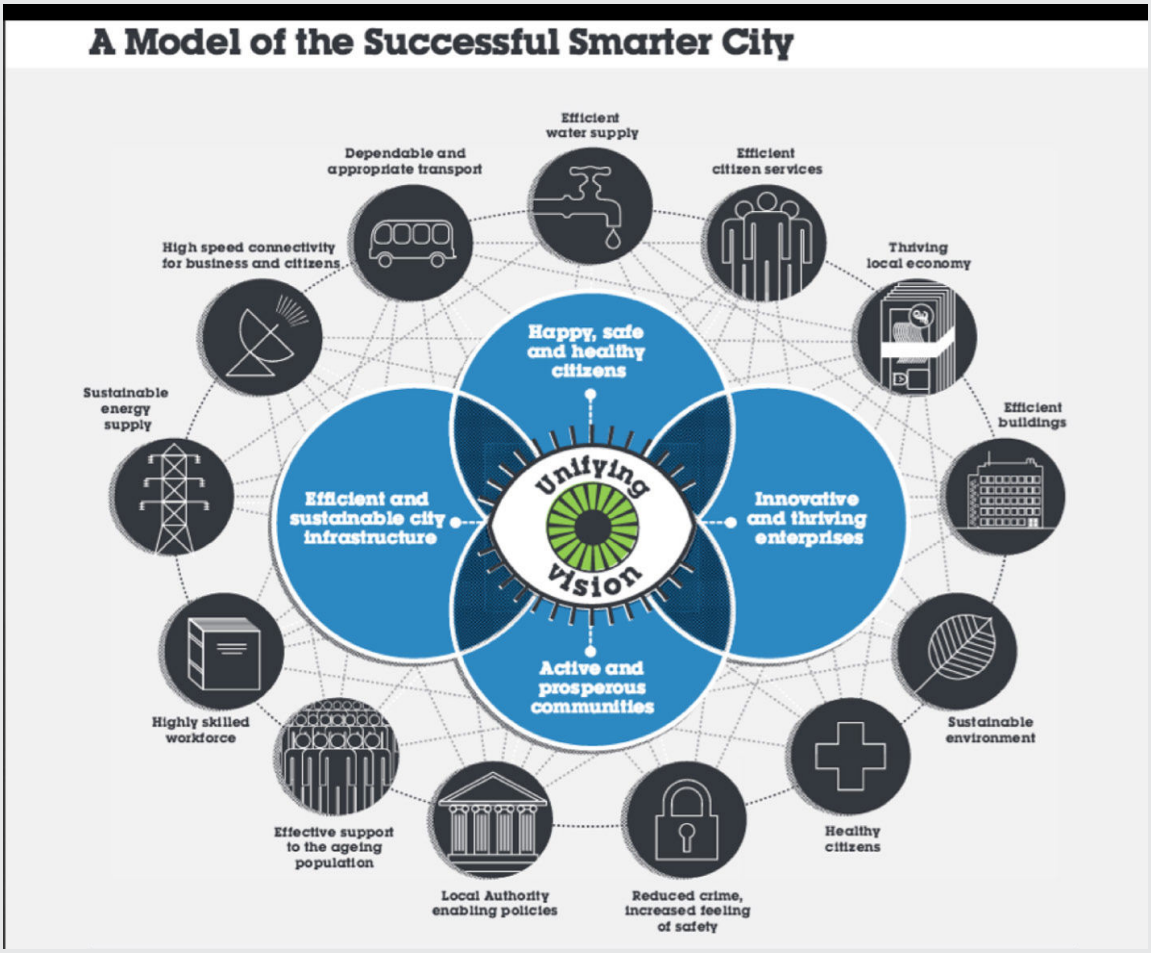


Figure 2 IBM's model of the Successful Smarter City

Part of IBM’s role therefore becomes about creating this brain, a centralised place where the information is processed and analysed. With smart cities initiatives created by IBM, the brain becomes a centralised hub, like the Rio Operations Centre. The operation centre is a control room, where city employees get access to CCTV footage

and maps created from the data collected from the city, including from the multiple sensors placed all over the streetscape.[28]

Similar operations centres have now been built in various cities by other companies, reproducing a concept originally designed by IBM.[29] In Jakarta, the Smart City Lounge is a space for the city administration that contains a monitoring room, similar to the Rio Operations Centre.[30] Data from the navigation app Waze, CCTV footage and reports from the public can be visualised in the monitoring room. This data is also analysed to anticipate problems before they happen.[31]



Figure 3 Rio's Operations Centre

In 2012, the Davao City Government of the Philippines invested in an IBM Intelligent Operation Centre (IOC) specifically for security reasons.[32] The Davao IOC is a platform that enables the coordination of the various agencies that work on public safety. It was designed to allow staff from the Public Safety Security Command Centre (PSSCC) – a division under the office of the City Mayor dedicated to providing "protection, security, safety and risk management to the people of Davao City" – to "monitor and respond to a wide range of safety related incidences from a central location."[33]

28 "City Government and IBM Close Partnership to Make Rio de Janeiro a Smarter City," IBM, 27 December 2010, available at: https://www-03.ibm.com/press/us/en/pressrelease/33303.wss

29 "IBM puts its 'smart city' technology in one package," Rutrell Yasin, 7 June 2011, available at: https://gcn.com/articles/2011/06/07/ibm-intelligent-operations-center-for-smarter-cities.aspx

30 "Jakarta Smart City Lounge opens doors to public," The Jakarta Post, 11 January 2016, available at: http://www.thejakartapost.com/news/2016/01/11/jakarta-smart-city-lounge-opens-doors-public.html

31 "Monitoring Room Jakarta Smart City Lounge, Memantau Seluruh Jakarta," Jakarta Smart City, available at: http://smartcity.jakarta.go.id/blog/68/monitoring-room-jakarta-smart-city-lounge-memantau-seluruh-jakarta

32 "City of Davao and IBM Collaborate to Build a Smarter City," IBM, 27 June 2012, available at: https://www-03.ibm.com/press/us/en/pressrelease/38152.wss

33 "About us," Public Safety and Security Command Center, available at: http://psscc.davaocity.gov.ph/index.php/about-us/

The idea behind this model is that a more secure city will contribute to a stronger economy and ultimately a better city. Mayor Sara Duterte, daughter of President Rodrigo Duterte, himself the mayor of Davao when the city signed its contract with IBM, stated that "by integrating information collected from multiple agencies that are dedicated to protecting the welfare of citizens, we are setting the foundation for a more efficient and safer environment that will foster economic growth."[34]

Singapore is currently planning the next step of "urban dashboards" with the creation of Virtual Singapore, a partnership with French software company Dassault Systèmes. The platform will not only aggregate all data coming from the city using sensors and cameras but also allow government officials to zoom in on apartments to analyse their energy consumption and detect, for instance, possible gas leaks.[35] The sensors and cameras will allow the government to trace every vehicle driving in Singapore, and will also allow them to control crowds and run experiments to predict how epidemics would spread in the city or how crowds would react in the event of a natural disaster or a large scale attack. The government will be able to detect people littering from high-rise building or smoking in prohibited zones. Moreover, some apartments that have been designed for elderly persons are equipped with sensors to detect their movements and monitor if they have fallen.[36] While these initiatives have obvious intended positive aims, they are also highly intrusive, and open to potential misuse or diversion towards less altruistic ends. Under Singapore's current legislation, law enforcement will be able to use the data without needing court approval or citizen consultation.[37]

Sensors are the linchpin of the current model of smart city initiatives. Placed all over the cities, they transmit information on who walks and drives by. Sensors placed in bins can detect the rubbish level. They can measure air pollution, energy use in homes, and what types of connected devices people use, among many other things.[38] As the smart city market grows, companies will no longer only rely on already existing data, as more money can be made by embedding sensors – that governments have to purchase – across cities.[39]

Sensors

A sensor is a device that detects and responds to changes in the environment. There are, for example, sensors inside kettles to shut them down when the water is boiling. In smart cities, sensors have many potential uses. For instance, they can be placed in parking lots to identify free parking spaces. They can be used to ensure lampposts only turn on when people are walking

34 "City of Davao and IBM Collaborate to Build a Smarter City," IBM, 27 June 2012, available at: https://www-03.ibm.com/press/us/en/pressrelease/38152.wss

35 "Virtual Singapore Looks Just Like Singapore IRL—But With More Data," Sam Lubell, 21 February 2017, available at: https://www.wired.com/2017/02/virtual-singapore-looks-just-like-singapore-irl-data/

36 "Singapore Is Taking the 'Smart City' to a Whole New Level," Jake Maxwell Watts and Newley Purnell, 24 April 2016, available at: https://www.wsj.com/articles/singapore-is-taking-the-smart-city-to-a-whole-new-level-1461550026

37 Ibid.

38 "50 Sensor Applications for a Smarter World," Libelium, available at: http://www.libelium.com/resources/top_50_iot_sensor_applications_ranking/

39 "The new smart city – from hi-tech sensors to social innovation," Tim Smedley, 26 November 2013, available at: https://www.theguardian.com/sustainable-business/smart-cities-sensors-social-innovation

on the street where they are located. They can monitor traffic congestion as well as energy consumption when part of an energy grid. While the raw data generated by sensors is not personal data per se, it can nonetheless be interpreted when collected in the aggregate, and further processed to reveal very detailed and personal information about an individual. For example, energy use can reveal religious practice: does someone turn on the light at regular hours every morning? It could be for the morning prayer. Do they stop using electricity on Saturdays? It might be for Shabbat.

The Internet of Things (IoT) is changing the nature of smart cities. This is the development and expansion of objects connected to the internet. Computers and phones are no longer the sole points of access to the internet. Watches, fridges, baby monitors, TVs or even toothbrushes and toasters are now also connected. IoT deeply influences how smart city initiatives are being conceived. Each connected object becomes a source of data that local government can potentially exploit. The phones people carry and sometimes their watches are sensors in their own rights. In their description of the Jakarta Smart City, IBM even calls citizens "sensors":[40]

Yet even without any investment in sensor networks, today's cities already contain millions of the most intelligent and versatile "sensors" that have ever existed: human beings. A public-spirited citizen with a smartphone is an incredibly valuable source of data for government agencies, because they will provide accurate feedback on the status of the city's systems in real time.

[40] "Jakarta Smart City," IBM, 2016, available at: http://ecc.ibm.com/case-study/us-en/ECCF-IMC15094USEN

Smart Cities: The Real Problems Behind the Marketing Term

This vision of smart cities as a nervous system raises serious concerns for the right to privacy. The supposed pay-off of centralising and analysing information collected by 'smart' sensors is increased efficiency of city services. Though as noted above, without meaningful evaluation criteria to track 'success' of a smart city project, this benefit is unsubstantiated. What is clear, however, is that the centralisation of information contributes to the creation of a constantly surveilled space in which the whereabouts and activities of citizens are monitored and relayed to the "brain." In this way, smart city initiatives potentially facilitate human rights abuses, particularly in countries with poor human rights standards and where data protection laws do not exist or are not enforced. If the "brain"—whatever agencies or companies it may comprise—is unaccountable or opaque, the potential for abusive uses of collected data increases.

Beyond the utopian vision promoted by smart city companies and local governments, the development of smart cities has thrown up concrete challenges to the realisation of privacy and human rights, from increased policing and surveillance to issues of exclusion and the reinforcement of social imbalances. In this section, we explore such issues as they have emerged in a selection of cities.

Jakarta

This is particularly evident in Indonesia. The Jakarta Smart City programme was initiated in 2014 as part of a broader open government effort begun in 2012.[41] The city has a series of objectives to achieve by 2025 in five categories: smart living, smart mobility, smart governance, smart economies and smart people.[42]

The current infrastructure consists of the Smart City Lounge, an integrated command centre.[43] The Jakarta Smart City programme also relies heavily on an app called Qlue – developed by a company of the same name. Available on smartphones, Qlue offers citizens the possibility to file report on issues they face in their area: from waste disposal to broken street lamps and traffic congestion.[44] The government uses a programme called CROP—designed by the official Indonesian Google Cloud partner TerraLogiq—to respond to the reports.[45] The Indonesian government has tasked IBM with analysing the data derived from citizens' use of Qlue.[46]

The city appears to have considered issues of exclusion; for example, district delegates

41 "From smart city to open city: Lessons from Jakarta Smart City," Dinita A. Putri and Maharani Karlina, available at: http://cipg.or.id/jakarta-smart-city/

42 "Jakarta Smart City," Jakarta Smart City, available at: http://interactive.smartcity.jakarta.go.id/

43 "Jakarta Smart City Lounge opens doors to public," The Jakarta Post, 11 January 2016, available at: http://www.thejakartapost.com/news/2016/01/11/jakarta-smart-city-lounge-opens-doors-public.html

44 "Monitoring app Qlue helps Jakarta improve services, efficiency," Diella Dachlan, 30 May 2016, available at: http://www.thejakartapost.com/life/2016/05/30/monitoring-app-qlue-helps-jakarta-improve-services-efficiency.html

45 "From smart city to open city: Lessons from Jakarta Smart City," Dinita A. Putri and Maharani Karlina, available at: http://cipg.or.id/jakarta-smart-city/

46 "Jakarta Smart City," IBM, 2016, available at: http://ecc.ibm.com/case-study/us-en/ECCF-IMC15094USEN

are expected to provide feedback for people in areas who do not use smartphones. Qlue has however turned into a tool to monitor city workers with potential negative repercussions. Citizen feedback is being used to assess whether city workers are efficient and working hard enough, and the city can terminate their employment on that basis.[47] This feature leaves room for abuse as ill-intentioned citizens may send a high number of reports and negative feedback to get employees fired, or relevant contextual factors contributing to an employee's underperformance could be disregarded because the sensor, supposedly, 'doesn't lie'.

These are not merely theoretical concerns. According to Dinita Putri from the Centre for Innovation Policy and Governance in Jakarta, a case was reported of a Qlue user repeatedly sending multiple reports for trivial matters – a plastic bag in sewage, a lost pen – so that the sub-district would appear as a problematic area receiving many complaints. The user turned out to be a candidate for the sub-district election. Still, according to interviews conducted by Putri, Qlue and the municipality were obliged to start addressing the issue of abusive reporting. Indeed, citizens would sometimes report issues that did not fall under the responsibility of the sub-district. A new feature then had to be created to allow sub-district worker to close reports they would receive upon uploading a letter showing they were referring the case to the relevant department, such as the police, or the national government.

Rio de Janeiro

Rio de Janeiro became IBM's flagship city in 2010.[48] The goal of the contract between the city and the company was to make the city safer in preparation for the 2014 Football World Cup and the 2016 Olympics.[49]

IBM is also a provider of policing infrastructure, and designs data analysis software solutions for law enforcement purposes.[50] This other role helps to understand how IBM has placed security and public safety at the centre of its vision for smart cities. An executive report entitled "Smarter cities for smarter growth", published in May 2010, highlights four high-impact areas for cities to become smarter "in the most cost-effective and productive fashion". The improvement of public safety ranks second behind traffic reduction and ahead of tailored services for citizens and access to healthcare data. The report mentions two studies by the World Bank, one citing public safety as a factor influencing "highly educated, innovative people" when choosing where to live and another based on Brazilian data showing demands for public safety increases with higher education levels.[51]

47 "From smart city to open city: Lessons from Jakarta Smart City," Dinita A. Putri and Maharani Karlina, available at: http://cipg.or.id/jakarta-smart-city/

48 "City Government and IBM Close Partnership to Make Rio de Janeiro a Smarter City," IBM, 27 December 2010, available at: https://www-03.ibm.com/press/us/en/pressrelease/33303.wss

49 "IBM Helps Rio Become a Smarter City," Vineetadurani, 7 November 2016, available at: https://www.youtube.com/watch?v=vuBBGYFonXM

50 "Intelligence Analysis and Investigations," IBM, available at: https://www.ibm.com/security/intelligence-analysis/

51 "Smarter cities for smarter growth: How cities can optimize their systems for the talent-based economy," IBM Institute for Business Value, May 2010, available at: https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=XB&appname=GBSE_GB_TI_USEN&htmlfid=GBE03348USEN&attachment=GBE03348USEN.PDF

According to the report, IBM wants to rely on information technology to improve the safety of citizens. It believes crime prevention and emergency response can be supported by "getting the right information to the right people at the right time." It promotes a public safety system based on data generation, collection and centralisation, and claims the data can eventually be analysed to predict incidents. It encourages public safety systems that are integrated with the rest of the smart city, for sectors such as transport (traffic management) and health (emergency response).[52] The Rio Operations Centre reflects this trend as it collects data from 30 different government agencies.[53]

But IBM's effective role in Rio may be more complex than marketing material suggests. Research conducted by geographer Christopher Gaffney from the University of Zurich and Cerianne Robertson from NGO Catalytic Communities describes a tense relationship between IBM and PENSA, a government working group tasked with reproducing the type of command centre IBM had deployed in New York. PENSA realised that the model designed for a Western city like New York was not fit for Rio. PENSA therefore adopted some elements but built its own software and allegedly terminated the contract with IBM. Still, according to Gaffney and Robertson's source in Rio, an agreement was reached that IBM could carry on using Rio for their advertising campaign. Gaffney and Robertson mentioned in their research that IBM has contested the claims.[54] However, this case reveals how a Western company-derived, one-size-fits-all model to urban challenges may be ill-adapted to other contexts.

The project has other serious shortcomings. The smart city technology – including the CCTV traffic network – is concentrated in the wealthier areas of the city. Consequently, city managers are intervening more in the wealthier areas – where they get data from – than the more deprived, thus exacerbating already existing inequalities.[55] The Rio Operation Centre also sheds light on the danger of creating an increasingly policed public space, where citizens are constantly surveilled and legitimate dissent therefore easily restrained.[56] During interviews with staff from the Integrated Centre of Command and Control (another "control room" in Rio), Gaffney and Robertson found that of Rio's many pressing social and security problems, the main "natural disasters" the city was tackling were flooding and the pre-World Cup protests,[57] which were violently repressed.[58]

Davao City

Davao City in the Philippines is another case where a smart city initiative has led to a more policed and surveilled city. As we highlighted in the previous chapter, making Davao City more secure was the core motivation for investing in smart

52 Ibid.

53 "Mission Control, Built for Cities," Natasha Singer, 3 March 2012, available at: http://www.nytimes.com/2012/03/04/business/ibm-takes-smarter-cities-concept-to-rio-de-janeiro.html?mcubz=3

54 "Smarter than Smart: Rio de Janeiro's Flawed Emergence as a Smart City," Christopher Gaffney and Cerianne Robertson, 29 April 2016, available at: http://www.tandfonline.com/doi/abs/10.1080/10630732.2015.1102423?journalCode=cjut20

55 Ibid.

56 Ibid.

57 Ibid.

58 "Violence at Rio de Janeiro protest," Dom Phillips, 16 October 2013, available at: https://www.theguardian.com/world/2013/oct/16/violence-rio-de-janeiro-protests

city infrastructure. After the operation centre was built, President Rodrigo Duterte congratulated his daughter and Davao City mayor, Sara Duterte, for purchasing a "sophisticated state-of-the-art surveillance and monitoring system", whose CCTV footage allegedly helped police solve the killing of a Davao businessman. The efficiency of the PSCC has been credited to the IBM equipment.[59]

However, Davao City has witnessed serious repressions of political dissent and high rates of extrajudicial killings and abuses by security services, which undermines the idea that 'smart' policing technology would necessarily be used for legitimate ends.[60] To compound matters, Rodrigo Duterte has been frequently criticised for his government's appalling human rights record.[61]

Smart Cities Mission (India)

With an ambitious programme, India reflects current concerns about smart cities: what will those cities look like beyond the marketing term? Who are those cities actually going to be smart for?

In 2015, Prime Minister Modi launched a programme to build 100 smart cities across India. According to online media Scroll.in, the Bureau of Indian Standards had originally attempted to create a Liveability Index to assess the services and infrastructure that should be provided for a city to be considered "smart." The committee devised indicators on sectors including economics, education, energy, environment, health, governance, transport, shelter and safety. For each indicator, a methodology was prescribed on how to measure the data. However, the Urban Development Ministry, in charge of supervising the mission, refused to endorse it. Still, according to Scroll.in, an official from the ministry wrote in 2016: "The smart city mission is one-of-its-kind and does not start with a definition of a Smart City or sets a-priori Standards for Smart Cities to achieve."[62]

Agreed upon between governments and private companies, smart city initiatives risk increasing the marginalisation of vulnerable populations. For example, land has reportedly been forcibly acquired by the state in Gujarat for building smart cities for wealthier investors and residents.[63] The development of smart cities also justifies attempts at "beautification". Consequently, working class communities have been relocated away from the centre and street vendors have been removed from the roads. However, it was their very presence that, according to some reports, helped made the streets safer for women, by ensuring that they were not deserted.[64]

59 "Duterte credits Inday Sara for Davao City's 'James Bond' gadgets," Silver C. Balanza, available at: https://durianburgdavao.wordpress.com/2014/06/09/duterte-credits-inday-sara-for-davao-citys-james-bond-gadgets/

60 "Ex-Officer in Philippines Says He Led Death Squad at Duterte's Behest," Felipe Villamor, 20 February 2017, available at: https://www.nytimes.com/2017/02/20/world/asia/rodrigo-duterte-philippines-death-squad.html

61 "Philippines: Duterte's First Year a Human Rights Calamity," Human Rights Watch, 28 June 2017, available at: https://www.hrw.org/news/2017/06/28/philippines-dutertes-first-year-human-rights-calamity

62 "What exactly is a smart city? The Indian government does not want you to know," Kumar Sambhav Shrivastava, 4 September 2017, available at: https://amp.scroll.in/article/848933/what-exactly-is-a-smart-city-the-indian-government-does-not-want-you-to-know

63 "Is India's 100 smart cities project a recipe for social apartheid?," Shruti Ravindran, 7 May 2015, available at: https://www.theguardian.com/cities/2015/may/07/india-100-smart-cities-project-social-apartheid?CMP=share_btn_tw

Time for Cities to Get Genuinely Smarter

Surveilled space and surveilling space

While the term "smart city" is problematic – as it has been used to define a wide range of technologies, infrastructure and programmes – examples from around the world show that so-called "smart city" initiatives tend to describe cities that make use of technologies for data collection, with the expansion of sensors and the use of the so-called Internet of Things. Those cities are becoming spaces of systematic data collection for ambivalent purposes and have become increasingly surveilled.

As a result, cities are becoming a tool for surveillance. This threatens citizens' right to privacy in the public space and increasingly private spaces as well, with IoT devices like smart meters, which give government and corporations access to our homes. In countries like the United States, this right has been guaranteed by the law (Katz v. United States, 389 U.S. 347). In others, like the United Kingdom, this right is undermined. In London, the government-funded initiative Future Cities Catapult provided a phone-tracking service in Hyde Park to locate the route of visitors and where they were coming from.[65]

Data collection

This surveillance also raises questions about the use of the data that is collected. Many countries across the world lack adequate data protection legislation. This leaves inhabitants with questions over how the data collected about them will be used, and if it will be used against them. Such cases are already emerging: city employees in Jakarta know that the number of reports filed using the app Qlue can be the reason they will be fired. The London underground ran a study at the end of 2016 to track users throughout their journey using WiFi. It now appears the tracking will be generalised and this data will be sold to third parties.[66] We know already that data such as the time and location from where you fill a form online can affect your credit score.[67] How could the data revealing your whereabouts, what time you go home or where you go be used by credit scoring agencies or insurance companies in the future?

The use of machine learning to process the mass amount of data created by smart city initiatives also comes with its fair share of risks when it comes to discrimination. We know already that our biases are reflected in our datasets and therefore on the

64 "Of Safety and inclusivity," Suneeta Dhar, 16 September 2013, available at: http://www.thehindu.com/opinion/of-safety-and-inclusivity/article5135071.ece

65 "Hyde Park visitors covertly tracked via mobile phone data," Oscar Williams, 25 December 2015, available at: https://www.theguardian.com/world/2015/dec/25/hyde-park-visitors-tracked-mobile-phone-data-ee

66 "Tfl plans to make £322m by collecting data from passengers' mobiles via Tube Wi-Fi," Tom Cheshire, 27 September 2017, available at: http://news.sky.com/story/tfl-may-make-322m-by-selling-on-data-from-passengers-mobiles-via-tube-wifi-11056118

67 "Case Study: Fintech and the Financial Exploitation of Customer Data," Privacy International, 30 August 2017, available at: https://privacyinternational.org/node/1499

decisions that machines make.[68] Facial recognition systems in the US , for instance, are better at recognising white faces than African American ones, which leads to greater risk of being wrongly accused of a crime.[69] As facial recognition starts happening in the streets, used among other things to detect "suspicious behaviours,"[70] the question of discrimination and biases needs to be addressed: who will define what suspicious behaviour looks like?

An increasingly surveilled space will also threaten avenues for political dissent: in Beijing, the government has come up with a "grid management system." The data that is collected from the city and individual households is all gathered in a central database to use artificial intelligence to detect trends of social unrest.[71] The report emerging from intelligence firm Stratfor stated: "if more than three protests occur in one town within a certain period, the new system could alert administrators, who could then send more police to that area or make other policy adjustments to maintain stability."[72] This has potentially chilling effects for democracy.

By relying on companies like IBM, not just to generate and collect data but to also process it, governments need to reflect on what they may be giving up. Do they retain control over the data? Can they guarantee their citizens' data will not be used abusively? It is essential that they remain able to audit and control the systems. Therefore, they also should not trap themselves in decade-long contracts or be dependent on the company for maintenance of infrastructure.

A need for public oversight

There can be positive use of the advancement in technologies to improve the ways our cities function, operate and respond to our needs. Smart cities could contribute to improving citizens' living conditions, to addressing issues of equal and fair resource distribution, and to enabling the enjoyment of fundamental rights, if done properly. But for that to happen, citizens must retain control over their data throughout its lifecycle, proper legal and technical safeguards must be built in from project inception, and the technology used must be properly audited.

Furthermore, there are several systemic problems that plague the roll-out of smart cities. These include the failure to engage with the ultimate beneficiaries, namely citizens, to understand their needs and demands; lack of consultation with specialised and expert groups; and little transparency in decision-making processes. Smart cities are being designed and implemented based on little or no evidence, and without

68 "Machine Bias," Julia Angwin, Jeff Larson, Surya Mattu and Lauren Kirchner, 23 May 2016, available at: https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing

69 "Facial-Recognition Software Might Have a Racial Bias Problem," Clare Garvie and Jonathan Frankle, 7 April 2016, available at: https://www.theatlantic.com/technology/archive/2016/04/the-underlying-bias-of-facial-recognition-systems/476991/

70 "This creepy technology can read your emotions as you walk down the street," Gianluca Mezzofiore, 28 July 2017, available at: http://mashable.com/2017/07/28/russia-facial-recognition-emotion-ntechlab-findface/#zRkFBAlZUkqK

71 "China uses mass surveillance to curb unrest," Jason Murdock, 21 April 2016, available at: http://uk.businessinsider.com/china-uses-mass-surveillance-to-curb-unrest-2016-4?r=US&IR=T

72 "China Intensifies Its Domestic Surveillance Program," Stratfor, 19 April 2016, available at: https://worldview.stratfor.com/image/china-intensifies-its-domestic-surveillance-program

conducting impact assessments on human rights and in particular the right to privacy. As highlighted throughout this report, the current smart city narrative has reflected and reinforced problematic social patterns, including discrimination and exclusion.

It is time for local governments to re-think ways of making our cities smart, before they become dysfunctional, mass data-generating systems that risk betraying us. Instead of relying on excessive and opaque data collection, unlawful profiling, and discriminatory automated decision-making systems, governments should ensure data is collected only when strictly necessary to deliver the services that their citizens need. They must push back against one-size-fits-all solutions and assess the products they are being sold. Citizens need to be given the option to opt out of smart city initiatives without being disadvantaged and excluded from services they are entitled to. They should at all times be given access to the data that has been generated and processed about them and demand that it be updated and/or deleted.

Key Findings and Recommendations

1. Human rights are often overlooked in the "smart cities" discourse.
    - A human rights perspective should be adopted, with a focus on how these solutions could impact on rights such as non-discrimination, freedom of movement, privacy, assembly or freedom of expression.
2. Decisions on the implementation of "smart cities" programmes are adopted without enough input from other actors.
    - An evidence-based approach for developing and implementing “smart city” related policies should be used.
    - Decision-making processes should be open, transparent and inclusive, and allow for sufficient time and resources to seek input and expertise from:
        - Citizens at large, including individual users and organised groups, with a special focus on community groups representing marginalised people;
        - Civil society across disciplines, i.e. privacy, social justice, support networks for marginalised groups, etc.;
        - Technology and security experts;
        - Private sector;
        - Academia.
3. Technologies involved in "smart cities" programmes are being developed with a ‘one size fits all’ approach, putting into question their transparency, security, openness, and effectiveness.
    - Related technologies should operate in an open and auditable manner, with clear documentation and transparency on how information is handled.
    - Access to public services should not be conditioned on the provision of personal data or use of a particular technology.
4. Privacy and data protection issues are not being properly addressed in "smart cities" programmes.
    - All the technological platforms involved should be designed with privacy and security in mind.
    - Programmes should comply with national, regional and international data protection principles and standards[73] when developing a "smart city project". These include:

[73] Such as those encoded in the Council of Europe Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (No. 108), 1981 and the Organization for Economic Co-operation and Development newly revised Guidelines on the Protection of Privacy and Transborder Flows of Personal Data (2013)

- Collection Limitation Principle
- Data Quality Principle
- Purpose Specification Principle
- Use Limitation Principle
- Security Safeguard Principle
- Openness Principle
- Individual Participation Principle
- Accountability Principle.

Specific recommendations:

National Governments (federal and state)

- Implement a comprehensive legal framework (or assess the current one) to protect privacy and data protection at a national and state level, in line with international standards.[74]
- Work with competent authorities and effective mechanisms to properly enforce privacy and data protection.
- Implement a comprehensive legal framework on public transparency (or assess the current one), in line with international standards, to make publicly available the information about policies and partnerships developed by local governments.
- Develop a state-wide policy framework on the use of digital technologies by local governments, setting standards and good practice for its use.
- Regulate local government partnerships with service providers (i.e. the private sector) to prevent them from carrying out further unintended processing of personal data from the information they are given and/or have access to for commercial purposes, e.g. customer profiling and data analytics.
- Provide oversight on how the use of technology by local government is being deployed and its potential consequences on the population, including on decision-making processes, effectiveness, concrete outcomes, and human rights.
- Ensure that local governments are lawfully using the collected data, which should only be done within their current policy and regulatory powers, and must never interfere with human rights.

Local governments (city government, municipalities, districts)

- Develop protocols and procedures as part of the decision-making process which include:
  - An evidence-based problem analysis;

[74] Ibid.

  - An inclusive and gender-sensitive needs assessment of citizens, which takes into account the needs of individuals and groups at risk of discrimination, vulnerability or marginalisation;
  - A human right impact assessment;
  - A gender analysis and assessment of the gender impacts;
  - A data protection impact assessment;
  - A risk assessment;
  - A cost-benefit analysis;
  - Other relevant impact assessments such as environmental.
- Initiate open, transparent and inclusive gender-sensitive consultations with rights-holders and duty-bearers, and in particular the ultimate beneficiaries, citizens.
- Review the completed impact assessments at regular intervals during the design, implementation and audit phases of the project, and ensure that any emerging developments are reflected and acted upon.
- Provide citizens with the choices to opt-in and opt-out of "smart city projects" they are developing, either in whole or in part, and ensuring this decision does not prevent them from accessing services they are entitled to and/or expect to benefit from.
- "Smart city" projects must establish the obligations of controllers and processors through contractual or other legally binding mechanisms, to ensure they are subject to agreed data protection principles and uphold the rights of data subjects.

<u>Recommendations for companies (solution providers)</u>

- Develop guidelines and protocols within the design and delivery of their services, to include:
  - An evidence-based problem analysis;
  - An inclusive and gender-sensitive needs assessment of citizens, which takes into account the needs of individuals and groups at risk of discrimination, vulnerability or marginalisation;
  - A human rights impact assessment;
  - A gender analysis and assessment of the gender impacts;
  - A data protection impact assessment;
  - A risk assessment;
  - A cost-benefit analysis;
  - Other relevant impact assessments such as environmental.
- Take necessary measures to ensure they comply with national, regional and

international data protection principles and standards.

- Develop software, hardware and systems that respect the needs, interests and rights of the persons they are intended to serve.
- Be responsible for ensuring the security, safety and privacy of the software, hardware and systems they design throughout their lifecycles, regardless of if they are directly responsible for their deployment and maintenance.
- Undertake clear and comprehensive audits of the software, hardware and systems they design and deploy. These must be done regularly, and the results of these audits must be made public and accessible.
- Take all necessary measures to ensure that the software, hardware and systems they provide are open, transparent and auditable.

Recommendations for international bodies

- Base their research, recommendations, policies and projects regarding "smart cities" on inclusive, independent and gender-sensitive research, as well as accurate, relevant and timely data.
- Address the issue from a multidisciplinary perspective, avoiding technological or economic reductionisms.
- Initiate open, transparent and inclusive gender-sensitive consultations with rights-holders and duty-bearers, and in particular the ultimate beneficiaries, citizens.
- Undertake thorough multi-disciplinary impact assessments of the "smart city" projects the promote, fund and support to ensure:
    - they address the needs of individuals and groups at risk of discrimination, vulnerability or marginalisation;
    - they include a gender analysis and assessment of the gender impacts;
    - they address the unexpected consequences that arise from the implementation of "smart city" policies;
    - they develop mitigation strategies for the risks identified;
    - the security, safety and privacy of the software, hardware and systems are guaranteed throughout their lifecycles, regardless of if they are directly responsible for their deployment and maintenance.
- Develop gender-sensitive guidance to support their programmes and projects.
- Take necessary measures to ensure their partners and third party contractors comply with national, regional and international data protection principles and standards.
- Establish financial and governance audits to ensure allocated funds are efficiently and effectively managed, and are deployed for the intended purpose.
- Adopt a framework which take in account local realities when making policy recommendations regarding "smart cities", avoiding a ‘one size fits all’ approach.