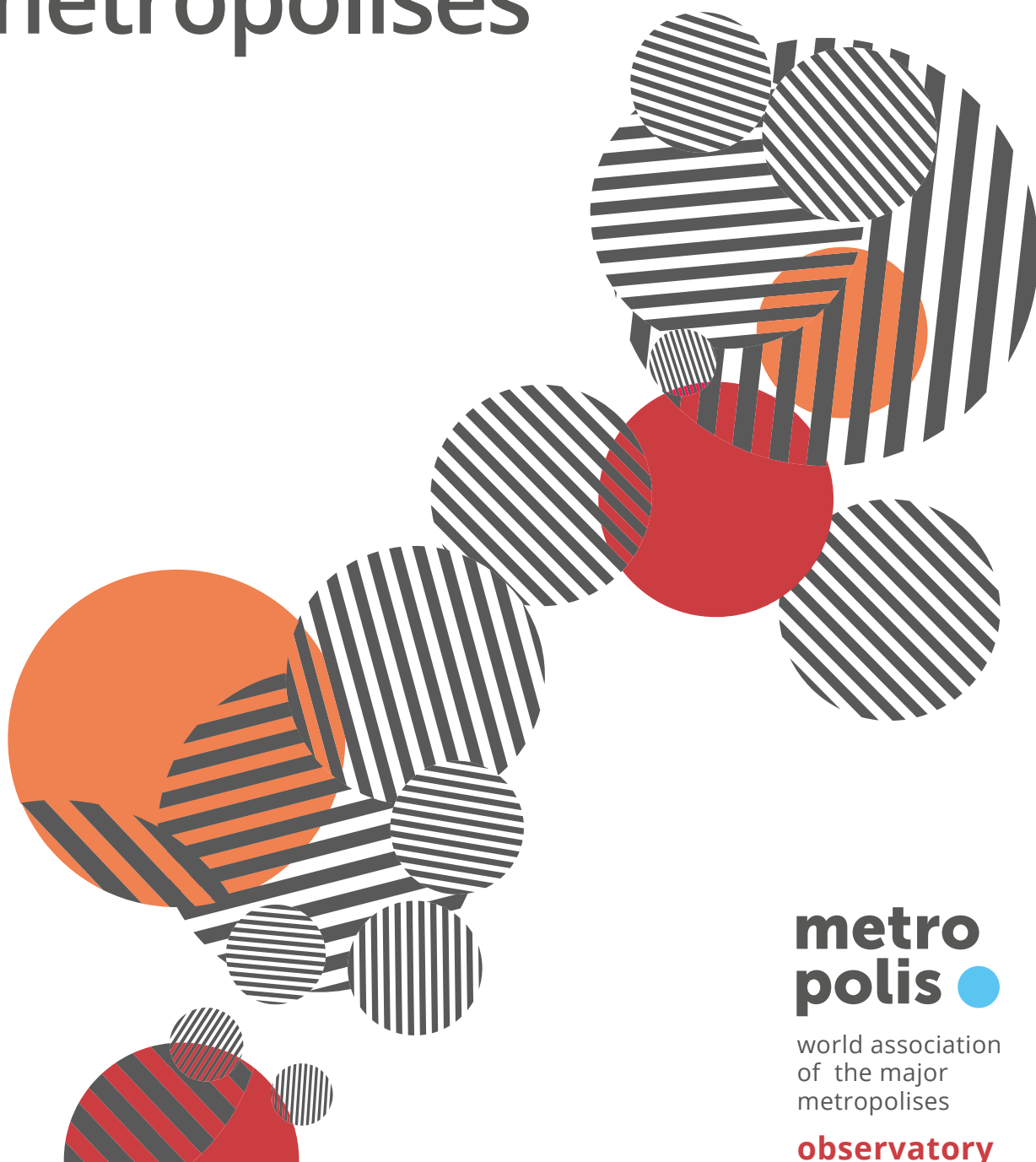


Metropolis Observatory
Luís M. A. Bettencourt

08

ISSUE PAPER

The digital transformation of metropolises



**metro
polis** ●

world association
of the major
metropolises

observatory

Contents

page 3

Introduction

page 4

Information in urban environments

page 5

Beyond smart cities

page 7

Challenges and opportunities of digitalization

page 10

Closing the gender digital gap

page 11

How local and regional governments can leverage digitalization

page 12

Data security and privacy

page 13

Recommendations

page 14

Bibliography

Introduction

In just a few decades, our societies have changed drastically due to the explosion of digital information. Today it is almost unthinkable to navigate a city without a smartphone. Interactive maps have largely replaced paper; bicycles, scooters and public transit are now available on demand; and businesses and services can be accessed on-the-go. In fast-developing urban areas around the world, digital technologies are also creating new growth opportunities that are leap-frogging traditional approaches and institutions. Many growing cities in Asia and Africa now have banking without banks, transportation without transit, and housing without property maps. All of these changes—and more over the horizon—are enabled by new ways to create, share, and access information.

Digitization refers to making information accessible to both people and computing devices. As technology evolves, there is an emphasis on computation embedded in machines (e.g., Internet of Things protocols)

and cloud computing, woven together in increasingly complex and distributed networks. The digitalization of metropolitan spaces deals with the seamless integration of people, socioeconomic organizations, governments, and other urban stakeholders in complex networks across a shared territory, orchestrated by information and communication technologies.

In the eighth edition of the Metropolis Observatory issue papers, we invite urban scientist Luís Bettencourt, Inaugural Director of the Mansueto Institute of Urban Innovation and Professor of Ecology and Evolution at the University of Chicago, to address these questions and to further explore the essential role of information in urban environments.

This publication aims to provide a framework to think about data in cities, as well as strategic recommendations for constructive and just uses of these resources at the metropolitan scale.



Octavi de la Varga
Metropolis Secretary General

Information in urban environments

The coordination of a vast number of agents and stakeholders is the most important factor allowing metropolises to function

Metropolitan areas are integrated labor markets that comprise places of residence, work, and leisure for their residents and are the natural definition of functional cities. However, politically and practically, metropolitan areas consist of many constituencies, from central cities to suburban communities, county authorities, regional governments, water and power authorities, and so on.

The coordination of a vast number of agents and stakeholders is the most important factor allowing urban environments to function: Information of many different kinds provides the signals and the basis for decisions that make such vast and complex organization possible. This includes providing essential services such as public transportation, affordable housing, safe water and sanitation, participatory democracy tools, environmental quality, or universal health services. Modern cities, especially in large urban areas, most of these issues are metropolitan in that they transcend existing political and legal jurisdictions. Other, more strategic decisions, are just as important and deal with innovation and investments that create change and become the foundations for processes of economic growth and human development. Because of the pervasive and critical use of information, the *Digitization of Metropolitan Spaces* has the potential to affect all aspects of how urban areas operate and plan for their future.

In this paper, we discuss how early “smart city” strategies have failed to be revolutionary or even inspiring. This is because automated engineering and efficiency are not enough to create environments

where people can thrive, or to promote innovation and human development. Such approaches are, in fact, often at odds with the real complexity and possibilities of urban environments.

Secondly, we explore the challenges and opportunities of the use of information and communication technologies (ICTs) in metropolitan environments. Surveillance, alienation of privacy, loss of civic and public agency, and imbalanced governance are all dangers of simple strategies. However, the integration of digital technologies in urban areas continues to be powerful and transformative. This includes meaningful improvements and integration of existing metropolitan governance structures and city services, often in light of ambitious long-term sustainability and resilience goals.

Finally, we will discuss how local and regional governments can better leverage digitization, particularly in regard to furthering equity, prosperity and sustainability. Digital divides or technology gaps define the differences in access to information and technology by different groups of people. Women and girls, minorities, people with disabilities and low-income populations often have limited and inequitable access to information and technology. Systemic efforts to improve education, access and co-creation of technology that reflects the full diversity and challenges of people in cities are key for using new technologies better than we do today.

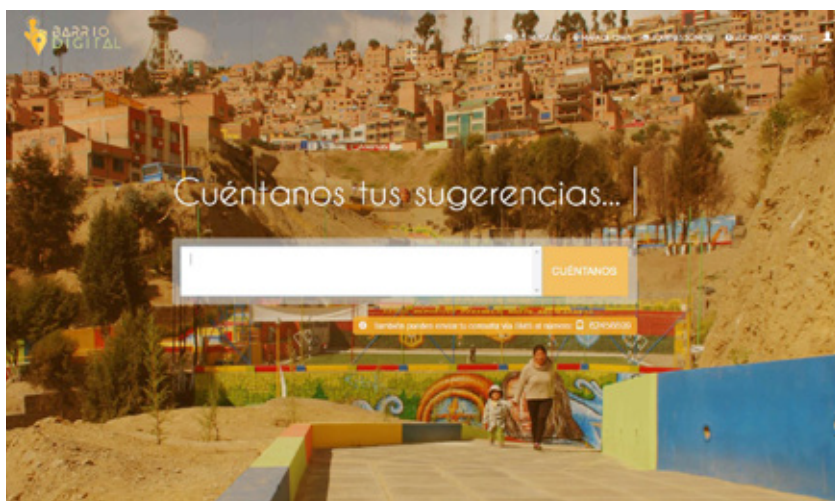
We are just starting to witness and understand the many uses of information in cities and the impacts of digitization on operations, as well as the participation and empowerment of all residents. Local and regional governments are critical in harnessing the latent potential of digital technologies and providing opportunities for everyone. This role is likely to increase in importance and scope in the near future, requiring greater technical sophistication, strategic vision, and increased capacity.

Beyond smart cities

Less than 10 years ago, the concept of *Smart Cities* captured the imagination of many governments and corporations. Through *bigger data* and new information and communications technologies (ICTs), cities sought to provide new transformative solutions for urban challenges, from affordable energy and public transportation to equal education and universal social services.

From the perspective of local governments, these approaches promised i) greater efficiency of operations, including cost savings, ii) better services, in the sense of measurable outcomes, and iii) potentially increased revenue from greater compliance, for example tied to the payment for services, taxes, and various fees. This meant that, for example, transportation could be dispatched on-demand and run on time; government services could be more responsive to the needs of households and firms; crime could be

> Barrio Digital, La Paz, Bolivia (<http://barriodigital.lapaz.bo/>)



unsafe spaces could be mapped; energy systems could become more integrated and more responsive to dynamic demand; and environmental health could be measured and systematically improved.

All these objectives remain important tactical goals for local governments, but solutions mediated primarily by engineering and applied data science have generally proven insufficient, except in relatively simple problems. Today, it is fair to say that visions for optimal cities driven by pervasive technology have not come to pass. Where attempted from scratch at great expense, technologically driven urban management and design have generated uninspiring environments, not the “future of cities.” In many places, such as Rio de Janeiro, the Smart Cities implementation became controversial in other ways, including its capacity for pervasive surveillance and its detachment from the challenges of social inequality or environmental stress of its own metropolitan area.

Even as some primarily “top-down” attempts for the use of digital technologies in cities continue to play out, we have become awash in data generated from the “bottom up,” organized and used by a myriad of people and organizations. What has been learned from these early experiments has been an appreciation for new emergent uses of technology and data in collaborations that include governments, and other stakeholders.

For example, several forms of e-governance have emerged as very useful and popular. Local and regional governments like **City of Montreal** have taken strides to share the data they produce in open-data portals and via APIs, and many have increasingly integrated quantitative information in their operations, planning, and interactions with the public.

The results are encouraging in that they have increased the transparency of government budgeting and practices, the quality of

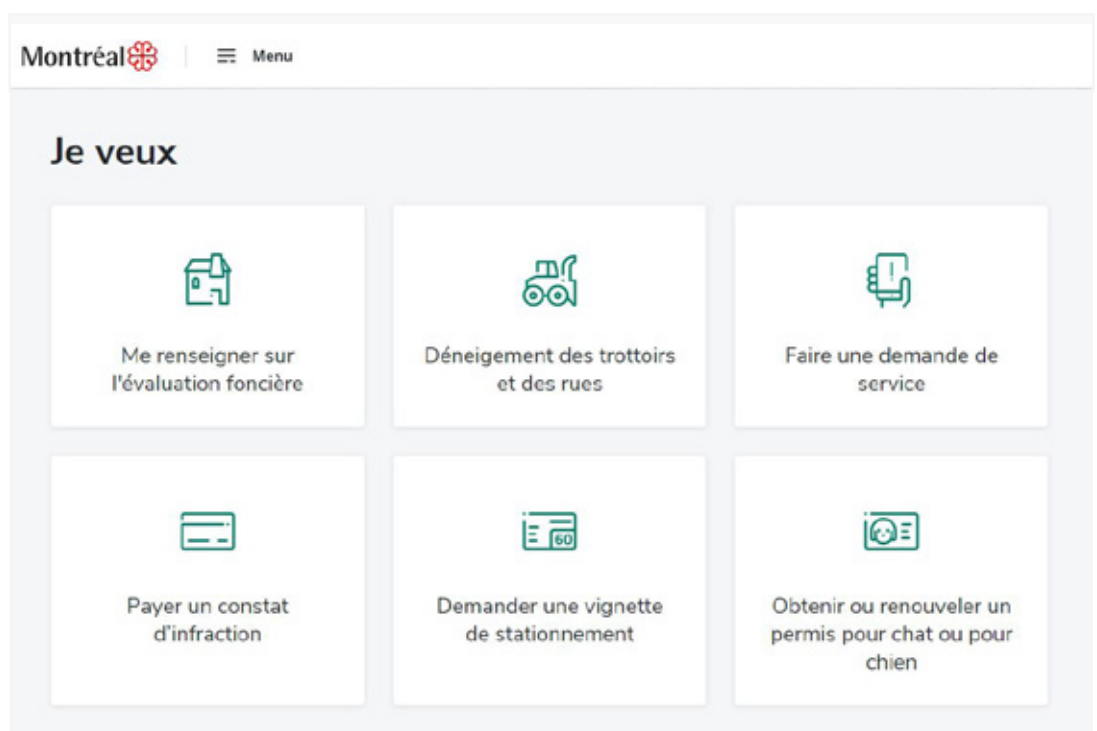
Several forms of e-governance emerged as very useful and popular, increasing transparency and enhancing the quality of public services

public services, and allowed city agencies to “see the bigger picture” and align siloed daily operations with strategic long-term objectives. These services have also evolved over time and from city to city.

Local governments produce copious amounts of data as part of their daily operations. This includes mapping and planning, urban services, licensing, permits, and data acquired in partnership with service providers. Every time one rides in a cab, rents a bicycle, pays a utility bill, or requests building permit, data is created. Until recently, most of this information remained segregated within specialized agencies. Hundreds of local governments around the world are leading a movement to share this data through open-data portals which organize, standardize, and make this information machine readable. Open data can also pave the way for participatory democracy, such as **Barcelona’s** City Council, whose **decidim.barcelona** portal invited over 13,000 suggestions

from the public on matters such as the design of a thoroughfare. In this way, ICTs can be an instrument to build a metropolitan governance of everyday life through more inclusive governance that incorporates the feedback of residents and puts people at the heart of its action and policies.

This kind of collaborative approach also helps to surface different visions, needs and realities to formulate better policy. For example, in **Santiago de Chile**, Gov-Lab has led studies on issues of gender in urban mobility, where the needs of women and girls have not traditionally been taken into account. Forty percent of women travel by foot around the city, and difficulties in public transportation can make them more susceptible to harassment.



The screenshot shows the top navigation bar with the Montreal logo and a "Menu" button. Below the navigation is a section titled "Je veux" (I want) with six service tiles:

- Me renseigner sur l'évaluation foncière (Get information on property valuation)
- Déneigement des trottoirs et des rues (Snow removal of sidewalks and streets)
- Faire une demande de service (Make a service request)
- Payer un constat d'infraction (Pay a violation ticket)
- Demander une vignette de stationnement (Request a parking vignette)
- Obtenir ou renouveler un permis pour chat ou pour chien (Get or renew a permit for a cat or dog)



> **Decidim. Barcelona** participatory process.
(Source: Ajuntament Barcelona)

Challenges and opportunities of digitalization

There are three main general challenges for the digitization of urban areas. The **first challenge** involves upskilling local government staff through **training and capacity-building**. Local governments often struggle to attract and retain talent with relevant expertise and promote their creativity. This is partly the result of traditionally risk-averse culture, to reduce disruption of systems delivering essential basic services. Such culture can be at odds with the pace of innovation in the private sector, where jobs may also be more financially attractive, potentially depriving government of critical imagination and capacity. Some cities have developed solutions that provide incentives for learning and innovation by partnering with research and education institutions, such as the sharing cities initiative led

by **Lisbon**, London and Milan, which creates industry-city partnerships towards developing replicable and scalable smart-city solutions. This localizes data and capacity from central government statistics and allows the development and testing of data-driven policies in each locality, while at the same time promoting national innovation and integration.

The **second challenge** highlights using ICTs and data to support and transform strategic planning in urban areas, and to **promote multi-stakeholder coordination**. Data and new technologies present a number of clear opportunities in this respect, which we discuss later in this document. Challenges stem from rejecting or externalizing uses of these technologies to private companies. In this respect, metropolitan governments must act to balance (not stop) business innovation, disruption and entrepreneurship with public safety, privacy, universal access and social good. Businesses have been particularly fast and effective at using technology and data to create new services, such as those associated with the sharing economy. However, their disruptive attitude of “moving fast and breaking things” can be at odds with governments, who are committed to more universal and predictable services that can support entire populations. Cities like San Francisco, Chicago, **Seoul** and Amsterdam are learning to use their procurement and licensing power to require business models that explicitly work more in the public interest and produce open information. Such strategies naturally provide coordination at the metropolitan scale, and support setting and tracking strategic sustainable development goals increasingly expressed in ongoing local voluntary reviews towards local fulfillments of the 2030 Agenda for Sustainable Development.

The **third challenge** is getting government to see **the strategic value of open data and welcoming public input** and analysis towards creating public goods. Only

The challenges for the digitalization of the metropolises are related to capacity-building, multi-stakeholder coordination, and welcoming public input and analysis

then can urban areas become creative in using new technological opportunities, as civic organizations and diverse individuals acquire the capacity to push their governments to identify new needs and opportunities. This is challenging because city agencies tend to be “data shy” or play primarily to their instinct for self-preservation, particularly when it comes to metrics of performance that may shine a harsh light on their operations or costs structures.

These issues culminate in questions of who owns the data and who benefits from using it. Data as a public good, used in the interest of diverse stakeholders, is a balancing act that requires the stewardship and enforcement power of governments, especially in cities. But governments do not need to do this alone: sustaining active civic tech communities can keep local governments and businesses accountable in terms of releasing data to the public, including police and crime data, building violations, environmental conditions and more. Code for America, Code for Africa and other similar organizations work to explicitly close digital gaps in local governments by embedding technologists who inject some of the expertise of the private sector into government and the ethos of public goods back into businesses.

Network collaborations with universities,

research and educational institutions, public-private partnerships and international agencies can also help local and regional governments acquire capacity and know-how towards creating public-minded strategy. Such collaborations require building common ground where the distinct interests and capacities of governments, universities and businesses can be integrated to generate more than the sum of the parts in terms of new insights and solutions.

On the other hand, some of the most interesting opportunities deal with data usage to improve coordination both of existing operations and for long-term strategic goals. At the metropolitan level, this can include better management of transportation and land uses, but increasingly also environmental management of water, air and soil ecosystems and issues related to climate adaptation and resilience.

Integrated metropolitan governance and planning

As cities continue to grow, especially in developing environments, the creation of frameworks for metropolitan governance is key. Most metropolitan areas are struggling with fragmented management and lack of integrated strategic vision and practice. Digital technologies offer some essential new ingredients for coordination and integration of local efforts. These efforts have lagged in many parts of the world and most metropolitan definitions and models of governance remain ad hoc. A salient recent effort is a collaboration of the European Union with OECD Statistics, which is creating consistent definitions and indicators in a growing number of nations.

These challenges notwithstanding, there is a growing convergence of policy objectives towards both urgent carbon emissions measurement and mitigation policies at the local level, for which new standards have arisen due to the coordinated ef-

> **Geographic Information Systems of Ramallah City.**
 (Source: <https://www.ramallah-gis.ps/>)





> Mapping and Planning Informal Settlements via new spatial data. (Source: Mansueto Institute for Urban Innovation)

forts of international not-for-profits and city consortia, such as C40. Beyond these efforts lie much broader issues of localizing global sustainable development objectives in urban areas, such as creating neighborhood-level metrics and reporting systems for the UN Sustainable Development Goals, and developing approaches and policies to deliver transformative solutions according to objectives set in each urban area, such as those for Los Angeles.

Bottom-up data creation for collaborative planning and policy

Data is becoming closer to the human experience, easier to create and use by people and for people, facilitating processes of more equitable planning and policy that are less technocratic and more expressive of diverse peoples' needs.

For example, collaborative mapping via OpenStreetMap and other local NGOs, combined with high resolution remote sensing, is providing richer maps world-

wide, especially of developing cities that expose many of the challenges of residents and their governments. OpenStreetMap data is of unprecedented precision in many parts of the world that until recently had not been mapped, and is often triggered by emergency response in the wake of extreme events, such as earthquakes, health epidemics, hurricanes and typhoons.

This type of precise mapping and more comprehensive spatial information can provide better assessments of development issues across different scales, such as place-based inequalities between neighborhoods and their aggregate expression at the metropolitan level. In this sense, new forms of mapping that marry remote sensing, machine learning, community organizing, and action by city governments promises to revolutionize urban planning and policy. This can help track and promote complex long-term objectives, from environmental goals to economic development, across various segments of the population, including by gender, age and socioeconomic status.

Closing the gender digital gap

Worldwide there is fast growing access to the internet and digital technologies.

However, the global Internet user gender gap (percent men minus women) grew from 11% in 2013 to 12% in 2016. The gap remains large in the world's so-called least developed countries, around 31%. For mobile phone ownership, the gender digital divide is most pronounced in South Asia where women are 26% less likely to own a mobile phone than men.

Lack of skills in using and creating technology affects employment and future career prospects. The gender imbalance in tech may become a self-perpetuating cycle if girls and young women are unable to see their perspectives, priorities and needs reflected in the sector, and therefore shy away from pursuing such careers. Data-driven approaches, including new uses

of Artificial Intelligence in urban socioeconomic contexts, may in such a context reproduce gender and status biases and forego economic and civic solutions that are fair and inclusive.

The impacts of digital exclusion are wide-ranging. Digital illiteracy and barriers in access to devices limit access to information and learning opportunities, and increase vulnerabilities. Moreover, if girls and women are not involved in creating digital tools and online contents, they may exacerbate existing inequalities.

Novel educational approaches and public services should aim to eliminate this digital gender gap. Local governments can play a critical role in making access to technology safer, more affordable and accessible to women and girls, and also tackle the ingrained gender norms that prevent girls from seeing technology roles as accessible career paths.

Strategies that bring digital technologies and data to deal with real life challenges of diverse people and places can ensure not only greater equity in terms of access, but also create communities of innovation that promote their perspectives towards both sustainability and more inclusive growth. Many cities are experimenting with models of education and training that support female entrepreneurship, partner with not-for-profits and create new tech talent pipelines. The key is to create and sustain a rich ecology of individuals and organizations that together build a new kind of digital social capital, which can better harness the promise of digital technologies for the improvement of communities and urban areas.

> Women learning to code in Ghana. (Source: Wikimedia Commons)



How local and regional governments can leverage digitalization

There are two distinct ways to consider data in cities that are equally important but that lead to different questions and insights. The first is to think of a city on a daily basis and all the activities and operations that recur. The second has to do with growth and development over time.

We have discussed using data to improve local government operations and services, such as filling potholes or health inspections. There are many challenges, however, which do not work in this way. These are known to planners and policymakers as wicked problems and involve familiar social and economic issues such as education, crime, environmental health, economic development, poverty, or sustainability. These issues are complex and open-ended, and typically lack “magic bullet” solutions.

In such cases, data still has an important role to play. It can be used to generate more systematic and comprehensive assessments of current conditions and a clearer mapping of what cities and the public consider deficits, possibly through comparisons with other neighborhoods, urban areas or even nations. One can think about health, education or even crime in this way, in that there are tangible measures of improvement, but there is typically no end goal. Some issues, such

as eliminating carbon, or eradicating HIV/AIDS and other contagious diseases may take a simpler character, at least in the sense that the end goal is clear and measurable.

Assessing progress and learning “what works” for complex problems is much harder if the evidence is fuzzy or altogether absent. Data collected on an ongoing basis can also become a means for discovering and testing policies, and gaining traction on solutions by comparing observable situations to stated objectives as an iterative process over time.

Finally, data has an important (and under-explored) quality in that it can produce common ground and a shared vision for diverse stakeholders on which to collaborate. In this respect, there are opportunities to co-produce and assess information that can improve planning governance processes and generate better solutions as judged by people, placing everybody on the same page and on the map.

Data collected on an ongoing basis is a means to discover and test policies, and gain traction on solutions

Data security and privacy

Data contains information, including increasingly sensitive personal identifiers that may adversely affect people's perception and behavior, including reputation, decisions about job opportunities, access to services, and civic rights and obligations. How this data is created, stored and used is therefore critical.

A general strategy to address the management of data in urban areas requires a two-pronged approach: 1) Tracking and enforcing the scope of data collection, and 2) the uses of the data. In many legal systems, these two issues are separate and bring up different questions and challenges.

The issue of data collection often receives more attention because it precedes its uses; it is however difficult to preclude altogether. For example, most of us routinely accept user agreements with businesses, from visiting websites, social media platforms, and web search to location data and online purchases. With governments, we tend to accept records on our income and taxes, public services, employment, criminal records and so on. In some nations, this information is more pervasive and integrated in constantly updated personal record databases, while in others it is less organized and systematic.

Guaranteeing individual dignity and freedoms is key for a city to be just and open. In each place, there are typically legal protections as to who owns and can use what kind of data and for what purposes. Enforcement of these protections in the public interest can also help preserve

business advantages, such as intellectual property and limited corporate liabilities. However, the timely evaluation of ownership and use cases remains a challenge everywhere, and is especially unenforceable at present in contexts with slow or weak legal institutions.

This space is very fluid at present, and no general best practices have yet emerged. Legal battles like the state of California's passage of AB5 to regulate Uber and Lyft, or issues of data privacy and standards in Google's Sidewalk Labs project in Toronto, or several smart cities in China are testing some of the boundaries and creating new legal environments, private contracts and enforcement mechanisms in urban spaces.

Digital Rights and Ethics

A number of cities worldwide led by Amsterdam, Barcelona and New York City recently launched Cities for Digital Rights, a joint initiative to protect, promote and monitor residents and visitors' digital rights. The declaration advocates for universal and equal access to the internet and digital literacy, among other protections for privacy and security.

For more information:
<https://citiesfordigitalrights.org/>

Recommendations

We are just starting to witness and understand the many uses and impacts of information in urban spaces, as well as the participation and empowerment of all citizens. Local and regional governments are critical in harnessing the latent potential of digital technologies and providing equal opportunities for everyone. This role is likely to increase in importance and scope in the near future, requiring greater democratic structure, technical capacities, and social strategic vision.

The metropolitan scale is particularly critical in all these processes because it reflects the integrated socioeconomic character of urban areas. Whether the challenges of our metropolitan communities primarily deal with resilience or require leap-frogging solutions that can place fast-developing cities at the forefront of sustainable development, a strategy of digitalization promises not only short-term solutions but more fundamentally can drive the creation of ecosystems of problem solvers that can promote new context-appropriate solutions for thousands of cities and millions of urban communities in the critical decades ahead.

Navigating the tensions between positive and transformational uses of data in metropolitan spaces, as well as some of its negative consequences, remains a work in progress. However, we can now better appreciate that progress in this area must be incremental but steady, true to each place and culture but also collaborative in nature.

Some recommendations to move towards this vision are:

- Incorporate and use data for internal operations, efficiency and government responsiveness and transparency. Partner with universities, businesses and NGOs whenever possible.
- Make data an instrument for better collaborative policy. Data that is close to the human experience can lead to more meaningful, diverse and helpful planning and policy.
- Use data as a strategic tool for goal setting and monitoring of progress in complex issues. Use disaggregated data to assess equity issues and local solutions, neighborhood by neighborhood, as a coordination mechanism among citizens, civic organizations, businesses and other stakeholders
- Create data as a public good. Governments can promote information and public goods that support communities of innovators who can create economic value and human development. Cities may consider a utility model for data and information, where all citizens have access to information that is enabling of their local experience and opportunities.
- Close the gender digital divide by providing equal educational opportunities for women and girls in tech, making digital environments safer and empowering women and girls in the creation of new solutions, data, products and information.

- Set data collection standards with developers, operators, and city agencies. Cities play a key role through their regulatory and permitting capacity to demand standards from businesses and not-for-profits.
- Gather data in aggregated and anonymized ways, such as through secure channels and encryption. Continuously assess the status of these protections.
- Enforce scope and limitations of usage. This typically involves legal enforcement, which may be more or less effective in various contexts.

This is an area that requires development of national or metropolitan integrated approaches that holds government to timely standards to protect the rights and mutual obligations of its residents.

In the vision for the digitalization of metropolitan spaces and communities, wdata and technology are supportive (not prescriptive) of a broad transformative strategy that promotes the universal “Right to the City” of diverse people and organizations, and empowers collective work toward people-centric planning and development aligned with local and international sustainable development goals.

Bibliography

The President’s Council of Advisors on Science and Technology.

(2016). *Technology and the Future of Cities.*

https://www.whitehouse.gov/sites/whitehouse.gov/files/images/Blog/PCAST%20Cities%20Report%20_%20FINAL.pdf

Federal Ministry for Economic Cooperation and Governance.

(2015). *Unpacking Metropolitan Governance for Sustainable Development.*

https://www.metropolis.org/sites/default/files/unpacking_metropolitan_governance_for_sustainable_development

The World Bank, UN-Habitat and BID. (2017).

Steering the Metropolis: Metropolitan Governance for Sustainable Urban Development.

<http://habitat3.org/wp-content/uploads/Steering-the-Metropolis-V20.pdf>

Bloomberg Cities. (2019).

The future of city innovation. <https://medium.com/@BloombergCities/the-future-of-city-innovation-99a0950a76c3>

Luís M. A. Bettencourt (2019)

Designing for Complexity: The Challenge to Spatial Design from Sustainable Human Development in Cities, *Technology | Architecture + Design*, 3:1, 24-32, DOI: 10.1080/24751448.2019.1571793

Luís M. A. Bettencourt (2014)

The Uses of Big Data in Cities, *Big Data*. 2014 Mar;2(1):12-22. doi: <https://www.liebertpub.com/doi/10.1089/big.2013.0042>. Epub 2014 Feb 7.

About the author

Luís Bettencourt is the inaugural director of the Mansueto Institute for Urban Innovation at the University of Chicago. He is also a professor of ecology and evolution at the University of Chicago, associate faculty of sociology and external professor of complex systems at the Santa Fe Institute.

Prof. Bettencourt's research investigates the fundamental processes of biological and social organization in complex systems with an emphasis on cities and urbanization. His research seeks to identify and explore new data, models and real-life contexts that allow for quantitative comparisons of cities through time and space in order to produce new insights and theory.

Originally trained as a theoretical physicist, Prof. Bettencourt has held postdoctoral positions at the University of Heidelberg, Los Alamos National Laboratory and at MIT Center for Theoretical Physics. He is the author of over 120 scientific papers and several edited books. His research has been influential in building a new understanding of cities worldwide and throughout history, as well as processes of sustainable development. His work has been featured in leading media outlets, such as The New York Times, Nature, Science, WIRED, New Scientist, and Smithsonian.



Prof. Luís M. A. Bettencourt

Director of the Mansueto Institute for Urban Innovation
at the University of Chicago.

The information and views set out in this publication are those of the author and do not necessarily reflect the institutional opinion of the World Association of the Major Metropolises (Metropolis). Neither the Metropolis Secretariat General nor any person acting on behalf of the association may be held responsible for the use which may be made of the contents of this work.

This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view a copy of this license, visit: <https://creativecommons.org/licenses/by-nc-sa/4.0/>



Supported by:



Edition:
November 2019

This publication contributes to the implementation of the following Sustainable Development Goals:



Secretariat General

Avinyó, 15. 08002 Barcelona (Spain)
Tel. +34 93 342 94 60
metropolis@metropolis.org
metropolis.org

#MetroGovernance