MUNICIPAL DATA GOVERNANCE: AN ANALYSIS OF BRAZILIAN AND EUROPEAN PRACTICES

GOVERNANÇA DE DADOS MUNICIPAL: UMA ANÁLISE DAS PRÁTICAS BRASILEIRAS E EUROPÉIAS

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ABSTRACT

Over the last decade, the "Smart City" formula has become a true marketing mantra, gaining momentum not only in the business environment, but also in academic circles and among policymakers. The formula is utilised to describe cities that, on the one hand, are increasingly penetrated and ubiquitously monitored by information and communication technologies (ICTs) and, on the other, are struggling to restructure their economy and governance based on data usage.

The possibility of using increasingly growing and diverse data sets, including personal and non-personal data, to stimulate innovation and entrepreneurship and to organize the life of city dwellers has drawn the attention of a heterogeneous group of entities that collect and process data for purposes such as planning, regulating, or making sense of urbanization process in developed and developing countries. In such a context, the opportunities generated by the use of open data and the diffusion of technologies such as Internet of Things (IoT) and Big Data analytics are stimulating a radical transformation in municipal governance. In this perspective, the use of data within the so-called Smart Cities is supposed to provide not only a much more sophisticated, broader and finer understanding of the city functioning, but also allows predicting and managing urban dynamics more efficiently and effectively, and in real time.

Given the role that Smart Cities systems will play – and are already playing – in the definition of urban governance and public policy, as well as the impact that Smart City services will have on a steadily increasing number of individuals, there is an urgent need to determine how public managers and private companies are defining and implementing such systems and services. This includes the consultative processes used to develop Smart City policies, the governance of urban IoT and Big Data

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systems, the analysis of the privacy and security implications of the forms of governance adopted for citizens, and the impact assessment of Smart City strategies on the functioning of urban centers.

Notably, while the mere data collection and processing seem to be considered by some Smart City proponents as a sufficient condition to acknowledge the city smartness, it seems necessary to wonder if the introduction of such databased tools is going to support or supplant the existing municipal governance processes. Indeed, while data collection and processing has the potential to enhance and strengthen municipal governance, it also risks automating biased decision-making and discriminatory provision of public services, thus disempowering city-dwellers.

In this perspective, the first section of this article will examine the key elements and conceptions of Smart City strategies. Subsequently, the second part of this text will explore some regulatory and governance dimensions of Smart Cities, with a particular focus on the challenges raised by the protection of personal data. We will utilize the case study of the city of Rio de Janeiro to illustrate such challenges in the Brazilian context, while stressing how such challenges may present themselves in all cities lacking clear legal smart city framework, with particular regard to data protection. This section will highlight the existence of legal gaps that may allow abusive exploitation of data and social and economic discrimination. Thirdly, this article will analyze the good practices of two successful examples of Smart City governance experimentation, the cities of Barcelona and Lyon, to distil some suggestions for Ethical Municipal Governance.

The purpose of this article is to identify unsolved challenges and emerging models that may offer solutions for innovative and ethical governance for the organization and implementation of efficient smart city services, while ensuring the protection of city-dwellers rights. The cases analysed will be used to illustrate successes and failures in the organization and provision of smart cities in order to compare some of the existing models, putting forward recommendations on Ethical Municipal Governance. Thus, this chapter will address the smart cities complexities by identifying solutions likely to maximize individuals' control over their personal data, as well as cybersecurity and transparency, while strengthening democratic processes at the municipal level.

Keywords: Personal Data; Municipal Governance; Ethics; Smart Cities.

RESUMO

Na última década, a fórmula "Cidade Inteligente" tornou-se um verdadeiro mantra de marketing, ganhando impulso não apenas no ambiente de negócios, mas também nos círculos acadêmicos e entre os legisladores. A fórmula é utilizada para descrever cidades que, por um lado, são cada vez mais

penetradas e monitoradas pelas tecnologias de informação e comunicação (TICs) e, por outro lado, lutam para reestruturar sua economia e governança com base no uso de dados.

A possibilidade de usar conjuntos de dados cada vez mais crescentes e diversos, incluindo dados pessoais e não pessoais, para estimular a inovação e o empreendedorismo e para organizar a vida dos moradores da cidade tem chamado a atenção de um grupo heterogêneo de entidades que coletam e processam dados para tais fins. como planejamento, regulamentação ou dar sentido ao processo de urbanização em países desenvolvidos e em desenvolvimento. Nesse contexto, as oportunidades geradas pelo uso de dados abertos e pela difusão de tecnologias como a Internet das Coisas (IoT) e a análise de Big Data estão estimulando uma transformação radical na governança municipal. Nesta perspectiva, o uso de dados dentro das chamadas Smart Cities deve fornecer não apenas uma compreensão muito mais sofisticada, mais ampla e precisa do funcionamento da cidade, mas também permite prever e gerenciar a dinâmica urbana de forma mais eficiente e eficaz, e em tempo real.

Dado o papel que os sistemas Smart Cities irão desempenhar - e já estão desempenhando - na definição de governança urbana e políticas públicas, bem como o impacto que os serviços Smart City terão em um número cada vez maior de indivíduos, há uma necessidade urgente de determinar como os gestores públicos e empresas privadas estão definindo e implementando tais sistemas e serviços. Isso inclui os processos consultivos usados para desenvolver políticas de Cidades Inteligentes, a governança de sistemas urbanos de IoT e Big Data, a análise das implicações de privacidade e segurança das formas de governança adotadas para os cidadãos e a avaliação de impacto das estratégias de Cidades Inteligentes no funcionamento dos centros urbanos.

Notavelmente, enquanto a mera coleta e processamento de dados parecem ser considerados por alguns proponentes de Cidades Inteligentes como uma condição suficiente para reconhecer a inteligência da cidade, parece necessário questionar se a introdução de tais ferramentas baseadas em dados irá apoiar ou suplantar a governança municipal existente nesses processos. De fato, embora a coleta e o processamento de dados tenham o potencial de melhorar e fortalecer a governança municipal, também corre o risco de automatizar a tomada de decisões tendenciosa e a prestação discriminatória de serviços públicos, enfraquecendo os moradores da cidade.

Nessa perspectiva, a primeira seção deste artigo examinará os principais elementos e concepções das estratégias de Cidades Inteligentes. Posteriormente, a segunda parte deste texto explorará algumas dimensões regulatórias e de governança das Cidades Inteligentes, com um foco particular nos desafios colocados pela proteção de dados pessoais. Utilizaremos o estudo de caso da cidade do Rio de Janeiro para ilustrar tais desafios no contexto brasileiro, ao mesmo tempo em que enfatizaremos como tais desafios podem se apresentar em todas as cidades que carecem de uma estrutura legal de cidade inteligente clara, com particular atenção à proteção de dados. Esta seção destacará a existência de

lacunas legais que podem permitir a exploração abusiva de dados e a discriminação social e econômica. Em terceiro lugar, este artigo analisará as boas práticas de dois exemplos bem-sucedidos de experimentação de governança de Cidade Inteligente, as cidades de Barcelona e Lyon, para destilar algumas sugestões para uma governança municipal ética.

O objetivo deste artigo é identificar desafios não resolvidos e modelos emergentes que podem oferecer soluções para governança inovadora e ética para a organização e implementação de serviços eficientes de Cidades Inteligentes, garantindo a proteção dos direitos dos moradores da cidade. Os casos analisados serão usados para ilustrar sucessos e fracassos na organização e provisão de Cidades Inteligentes de forma a comparar alguns dos modelos existentes, apresentando recomendações sobre Governança Ética Municipal. Assim, este capítulo abordará as complexidades das cidades inteligentes, identificando soluções que possam maximizar o controle dos indivíduos sobre seus dados pessoais, bem como a segurança cibernética e a transparência, ao mesmo tempo que fortalece os processos democráticos no nível municipal.

Palavras-chave: Dados pessoais; Governança Municipal; Ética; Cidades Inteligentes.

Over the last decade, the "Smart City" formula has become a true marketing mantra, gaining momentum not only in the business environment, but also in academic circles and among policymakers. The formula is utilised to describe cities that, on the one hand, are increasingly penetrated and ubiquitously monitored by information and communication technologies (ICTs) and, on the other, are struggling to restructure their economy and governance based on data usage.

The possibility of using increasingly growing and diverse data sets, including personal and non-personal data, to stimulate innovation and entrepreneurship and to organize the life of city dwellers has drawn the attention of a heterogeneous group of entities that collect and process data for purposes such as planning, regulating, or making sense of urbanization process in developed and developing countries. In such a context, the opportunities generated by the use of open data and the diffusion of technologies such as Internet of Things (IoT) and Big Data analytics are stimulating a radical transformation in municipal governance. In this perspective, the use of data within the so-called Smart Cities is supposed to provide not only a much more sophisticated, broader and finer understanding of the city functioning, but also allows predicting and managing urban dynamics more efficiently and effectively, and in real time.

Given the role that Smart Cities systems will play – and are already playing – in the definition of urban governance and public policy, as well as the impact that Smart City services will have on a steadily increasing number of individuals, there is an urgent need to determine how public managers

and private companies are defining and implementing such systems and services. This includes the consultative processes used to develop Smart City policies, the governance of urban IoT and Big Data systems, the analysis of the privacy and security implications of the forms of governance adopted for citizens, and the impact assessment of Smart City strategies on the functioning of urban centers.

Notably, while the mere data collection and processing seem to be considered by some Smart City proponents as a sufficient condition to acknowledge the city smartness, it seems necessary to wonder if the introduction of such databased tools is going to support or supplant the existing municipal governance processes. Indeed, while data collection and processing has the potential to enhance and strengthen municipal governance, it also risks automating biased decision-making and discriminatory provision of public services, thus disempowering city-dwellers.

In this perspective, the first section of this article will examine the key elements and conceptions of Smart City strategies. Subsequently, the second part of this text will explore some regulatory and governance dimensions of Smart Cities, with a particular focus on the challenges raised by the protection of personal data. We will utilize the case study of the city of Rio de Janeiro to illustrate such challenges in the Brazilian context, while stressing how such challenges may present themselves in all cities lacking clear legal smart city framework, with particular regard to data protection. This section will highlight the existence of legal gaps that may allow abusive exploitation of data and social and economic discrimination. Thirdly, this article will analyze the good practices of two successful examples of Smart City governance experimentation, the cities of Barcelona and Lyon, to distil some suggestions for Ethical Municipal Governance.

The purpose of this article is to identify unsolved challenges and emerging models that may offer solutions for innovative and ethical governance for the organization and implementation of efficient smart city services, while ensuring the protection of city-dwellers rights. The cases analysed will be used to illustrate successes and failures in the organization and provision of smart cities in order to compare some of the existing models, putting forward recommendations on Ethical Municipal Governance. Thus, this chapter will address the smart cities complexities by identifying solutions likely to maximize individuals' control over their personal data, as well as cybersecurity and transparency, while strengthening democratic processes at the municipal level.

1. SMART CITY CONCEPTIONS

Since the last decade of the XX century, the increase in the urbanization phenomenon and the incessant adoption of ICTs lead to the emerging of the notion of Smart Cities, underpinned by a wide

array of conceptions and conceptualizations. In this perspective, literature analysis[3] suggests that a plethora of Smart City definitions exist, though no one has managed to crystallize consensus of the various stakeholders – including administrations, business enterprises, researchers and city-dwellers themselves – whose interests are directly shaped by the city governance and impacted by the type and degree of "smartness" of such governance.

Importantly, the concept of Smart City is highly reliant on the definition and interpretation of the adjective "smart." Such adjective may be utilized to convey intelligent management, or the aspiration towards a city management oriented at achieving and promoting sustainability and knowledge, or a city in which a wide range of activities are monitored and the data resulting from such monitoring are used to enrich decision making processes and their implementation. To provide a suitable working definition, the International Telecommunication Union (ITU)'s Focus Group on Smart Sustainable Cities has argued that "a smart sustainable city is an innovative city that uses ICTs and other means to improve the quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects."[4]

The abovementioned conceptions are not mutually exclusive and, on the contrary, should be seen as complementary to meet the challenges and opportunities brought about by increasing urbanization. According to the Population Division of the UN Department of Economic and Social Affairs, currently 55% of the world's population is already living in urban areas, and such proportion "is expected to increase to 68% by 2050 [and the] future increases in the size of the world's urban population are expected to be highly concentrated in just a few countries. Together, India, China and Nigeria will account for 35% of the projected growth of the world's urban population between 2018 and 2050."[5]

Urbanization is nurtured by the increasing flows of people moving from rural and more disadvantaged areas to cities in hope of a higher standard of living. This movement is usually determined by the underdevelopment of rural economies, by adverse and unpredictable weather conditions or by insecurity, which can more easily affect in an adverse fashion the lives of non-urban populations. On the one hand, urbanization is determining positive externalities such as the creation of new job opportunities, the improvement of standards of living of a considerable number of individuals as well as the advancement of city economies and the promotion of social integration. However, it is important to stress that the increasing concentration of population in cities and in mega

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[3] See Cocchia (2014)
[4] See https://www.itu.int/en/ITU-T/focusgroups/ssc/Pages/default.aspx
[5] See UN-DESA (2018)

cities is also producing a range of undesirable effects in need of efficient, rapid and effective solutions, for which the use of ICTs, in the context of smart city policies and processes, may became not only useful but essential.

The increased dimension and complexity of the city structure and its population demands a wiser allocation and management of resources, reducing or, ideally eliminating, wastes, and reorganizing both the city territory and infrastructures serving its population. In this scenario, increasing cities' smartness by monitoring complex phenomena and automatizing the widest possible number of tasks becomes an attractive option, fostering the interplay of a smart economy, mobility and governance to improve the sustainability of urban areas. In this sense, the UN-HABITAT (2015) notes that

> "The role of ICTs in networked urbanization and the dynamism of cities in the 21st century is becoming increasingly understood. ICTs have ushered significant and irrevocable changes in the way people live, boosted social prosperity, and had significant impact on the growth and competitiveness of economies and cities. There is also growing recognition of ICTs' potential to achieve desired outcomes in urban development: high-quality public spaces, well-connected grids, well-designed density, increased resource efficiency, improved quality of life, growth with reduced carbon emissions, and knowledge creation and management that address emerging needs and risks --- the contours of cities that are smart and sustainable."[6]

Indeed, urbanization is triggering a range of challenges spanning from increased criminality to the proliferation of slums, the struggle to provide universally accessible and good quality public services and to address mobility problems and disaster risks. To address these issues, Smart City Planning and Design is fostering "an approach leveraging new knowledge and tools to promote urban planning and design that address evolving needs and challenges of urbanization."[7] Such an approach relies on the extensive use of ICTs to monitor and enhance the efficiency of the various facets of urban systems – including transportations, mobility, power grids, citizen participation, e-government, etc. – while increasing access and quality of public services.

Interestingly, according to the different conceptions of Smart City, specific technologies may become constitutive elements of the very definition of what is a Smart City, as in the Brazilian scenario, where the ABDI-INMETRO Reference Paper Technology Demonstration Environment for Smart Cities,[8] provides an understanding of a Smart City as

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[6] See UN-HABITAT (2015).

[7] Idem.

[8] The Reference Paper was published by the Brazilian Industrial Development Agency (ABDI) and the National Institute of Metrology, Quality and Technology (Inmetro). See https://cidadesinteligentes.abdi.com.br/sobre

> "one that, through the absorption of innovative solutions, especially linked to Information and Communication Technologies (ICTs), the Internet of Things movement and Big Data phenomenon, optimizes the public demands (which vary according to the City in study), taking into consideration, as far as possible, the current technological stage of humanity."

However, it seems a very reductionist and uncritical view to argue that the city "smartness" is limited to the mere use of ICTs or specific technologies. On the contrary, the city smartness exceeds the mere use of ITCs and includes several core elements such as paying special attention to physical and network infrastructures; providing of more efficient public services; combining, interconnecting and integrating infrastructures and systems to enable social, environmental, cultural and economic development; and the elaboration of a shared vision for a more sustainable future. Some useful tools to evaluate the city smartness are provided by the International Organization for Standardization (ISO) standards and methodologies[9] aimed at assessing the centralized, integrated and smart control of information and public structures and services of the city, telecommunications infrastructure and connectivity in the city, smart public lighting, smart public safety, and smart management of public health.

The combination of these elements has the potential to trigger transformations of ample magnitude and with potentially tremendous impact on city dwellers' everyday life. In light of the impact – that may be very positive but may also be negative – of the "smartification" of cities on their inhabitants, it is necessary to accompany such process with a democratic debate and reflection aimed at maximizing the benefits and understanding and avoiding risks. Such reflection is essential for the formulation of a regulatory environment that encourages the implementation of smart cities in a way that adequately protects the rights of its inhabitants.

Notably, there are important challenges to be faced in the infrastructure and logic layers to provide connectivity and interoperability at appropriate levels, as well as others related to development of appropriate policies. However, ensuring the rights of citizens, whose data will be massively collected and processed in the smart city ecosystem, is increasingly highlighted as the fundamental issue it is and should be considered, especially in a context of increasing use of smart services for (predictive) policing.

In addition to interfering with the right to privacy, it is no wonder that collecting personal data on a large scale increases the risk of discriminatory bias in algorithmic and automated decision-making

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The Reference Paper is based on the Internet of Things (IoT) Action Plan developed by the Brazilian Ministry of Science, Technology, Innovation and Communication (MCTIC) and the Brazilian Development Bank (BNDES). See MCTIC-BNDES (2017).

[9] See ISO 37122:2019.

systems, especially in predictive policing and facial recognition applications against minorities and vulnerable groups.

In the context of smart cities, it is important to point out that the collective dimension of data protection becomes particularly relevant. The classification of groups of people using automated profiling techniques with the ultimate purpose of predicting the behavior of such groups may evade the traditionally individual perspective of privacy protection and the concept of personal data defined by article 5,I of the new Brazilian General Data Protection Law (LGPD).[10] In such context, the personal data protection principles of transparency and prevention should be applied in order to identify the need for additional caution, requiring impact reports to protect data or even to prohibit the use of some technologies.

2.   BRAZILIAN SMART CITY PRACTICES

The forthcoming entry into force of the LGPD in August 2020 will require all activities that to some extent involve the processing of personal data to comply with the provisions set forth by the new legislation. In the context of the LGPD, the need for protection of citizens and data subjects should be translated into rights and freedoms of city dwellers and data subjects, and into the duties of public authorities, controllers and operators. As such, the legal regime defining the basic protections for city dwellers, which must accompany systems implemented in smart cities, should include at least:

a)   Right to anonymity or data anonymization: personal information collected in smart city systems should be treated only if necessary and appropriate for the purpose of its collection and processing, otherwise, if excessive, it should be anonymized (LGPD, art. 6th,\III);

b)   Right to review decisions made by automated systems that provide unlawful interference in the legally protected interests of the data subject (LGPD, article 20);

c)   Obligation to adopt the pertinent technical and administrative security measures (articles 6, VII, 46) in order to implement reliable information standards according to the state of the art;

d)   Obligation to carry out an impact assessment of specific smart city systems on the protection of personal data (RIPD).

However, the analysis of the existing municipal laws related to smart cities, in São Paulo, Rio de Janeiro and Curitiba, which was undertaken by the FGV Law School project "Discrimination vs. Data

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[10] See Lei Nº 13.709, de 14 De Agosto de 2018. http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/lei/L13709.htm

Control in Brazilian Smart Cities"[11], revealed that the current situation is far from the framework designed by the upcoming LGPD, highlighting the absence of consistent policies regarding the regulation of personal data processing promoted by local Public Administrations. Sharing of personal data between municipal administrations and private corporations is a practice that, so far, does not have strong specific legal basis. This lack of specific legal boundaries can both lead to abusive behaviors and discourage the sharing of data, as legal uncertainty about potential incidence of general rules or even constitutional principles can elevate the risks of such operations. Such situation highlights the need to predefine rules regarding what type of data can be shared and how such data can be used, in the contracts and terms of use that regulate such data processing.

One major example of personal data sharing between private and public bodies, which also leads to the development of a more general set of rules and even a platform for data sharing is the case of Waze, a GPS navigation software widely adopted by drivers worldwide and, in particular, by Brazilian drivers. Waze works as an app in a mobile phone and provides turn-by-turn navigation options while also counting with feedback from its users not only to better specify itineraries and timing, but also in a social layer with some degree of interaction. Waze, formerly known as FreeMap Israel, was created by Israel developers and was bought by Google in 2013.

As mentioned, Waze is very popular in some countries, one of them Brazil, to the point that its database of urban mobility data turned into a valuable asset for urban planners to develop urban mobility from the point of view of public sector and public interest[12]. Having this in mind while also considering that, at the time, it enjoyed the hardly enviable position as the city in South America where inhabitants spend the most daily time in traffic[13], the municipality of Rio de Janeiro made a deal with the mobility platform in 2013.

By the time, Rio de Janeiro was on the eve of great events (the World Youth Day, organized by the Catholic Church in 2013, the World Cup with several matches hosted in the city, in 2014, and the Olympics in 2016) among its recurrent mobility issues. Furthermore, the city had been recognized in some occasions as a model for smart city - Rio de Janeiro was even acclaimed as the 'smartest city' in the conference *Smart City Expo World*, held in 2013 in Barcelona, Spain. Such recognition was largely due to its 'smart' Operations Centre (COR, or '*Centro de Operações do Rio'),* which is headquarter to a series of public bodies from the city of Rio, providing monitoring and a series of smart city services to

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[11] See Doneda (2019).

[12] See Yamamoto, E.M., Torres Jr., A.S., Molina, R.A., COsta Filho, E.R., Teberga, P., 'Análise do impacto da integração do waze no controle de trânsito da cidade do Rio de Janeiro', in *Annals of "Encontro dos Mestrados Profissionais em Administração".* São Paulo: EAD/FGEA/USP, 2016, *p.*

[13] As of June 2019, Rio de Janeiro is the 5th city with the major traffic congestion Leven in South America and the 22nd in the world. <https://www.tomtom.com/en_gb/traffic-index/ranking/>

Rio's population. The abovementioned agreement between the city of Rio de Janeiro and Waze, in 2013, provided for the sharing of data of Waze and COR[14] and can be seen as one of the main smart city initiatives organized by COR. Even if several Rio de Janeiro's smart city services have been dismantled since 2016, due to a reduced interest of the new Rio de Janeiro administration, this particular deal with Waze is still ongoing.

This deal Rio de Janeiro/ Waze is particularly relevant because it started what became a general trend, setting a global platform for Waze perform similar deals with other cities in the world. In 2014, Waze launched the initiative '*Connected Citizens*', [15] aiming at recreating the experience originally developed in Rio de Janeiro with other cities. *Connected Cities* can be deemed as a successful initiative, as in 2016 it included 102 partners in the Americas (most of them in North America) and in August 2018 it celebrated 600 partners in 50 countries[16]. Those partners were municipalities but also other bodies of government, agencies and even NGOs.

The original deal with Rio de Janeiro and its developments are, thus, an occasion to dig into the practices revolving data sharing with a prominent mobility app and municipalities, and much can be learned from its original shape.

The original partnership in 2013 included not only provisions regarding the use by Rio de Janeiro's public bodies from Waze but also the other way round, which meant that data would also flow from the municipalities of Rio de Janeiro to Waze. Waze would supply Rio de Janeiro with real-time data aggregated regarding traffic, including incidents, traffic jams and other relevant events, either perceived by its systems or reported by Waze users. The fact the data was meant to be aggregated means that, theoretically, no personal and identifiable data would be supplied by Waze. Rio de Janeiro would, respectively, supply Waze with the traffic data it already gathered through other sources and means, as well as public data and information that could be relevant to the platform, such as the decision of public authorities to block of a specific street.

The mere activity of personal data sharing between public and private sector raises a series of questions, which can be addressed by regulation when a general and integrated legal framework for data protection do exist. However, when such a frameworks does not exist or presents some degree of uncertainty, there is more room for particular deals and negotiations. In the case of Rio de Janeiro, the original deal was crafted and signed in the absence of specific data protection regulation (which is still the case, as the Brazilian LGPD will only enter into force in August 2020). It is important to note

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[14] https://oglobo.globo.com/economia/tecnologia/prefeitura-comeca-usar-waze-no-centro-de-operacoes-rio-9152370

[15] The initiative developed since then and is now labelled as 'Waze for cities'. < https://www.waze.com/en/ccp>

[16] https://medium.com/waze/waze-celebrates-600-connected-citizens-program-partners-36945fbceb66

that this configuration may also happen in several other cities located in jurisdictions that do not have such a framework,

It should be also stressed that other regulation that could be relevant to influence such deal, such as, for example, provisions regarding data protection and privacy into the developing Brazilian frameworks of Internet of Things[17] were not ever considered as a substantial or even structural part of the process. As it became clear with the recent publication of the new Brazilian Decree defining the National Internet of Things Plan[18], references to privacy and data protection risks are generic and do not pose significant constraints.

Municipal legislation from the city of Rio de Janeiro has not developed to the point of delivering a concrete legal basis for the use of data in a situation such as the Waze agreement, at least from the point of view of data protection. Even considering that Brazil is a Federation with its specific regime of competences distributed along its three federal entities (the union, states and municipalities), and that such structure limits the type of data protection norms that could fit in a municipal statute, it is possible to recognize that the municipal legal framework could be more comprehensive in some points.

Rio de Janeiro's municipal legislation, as the legislation of most Brazilian cities, has not developed a structured legal framework on data protection, even considering the issues that relates the most to its municipal legal competence, which are related to rules governing the treatment of personal data by municipal bodies and the sharing of personal data amongst then. In fact, the earliest municipal statute of Rio de Janeiro regarding the subject dates back from 1986 and was a rather important as well as an almost premonitory one. Municipal Law 872 of 1986 granted to every citizen the right of free access to his or her personal data stored in any of the city's administrative bodies, as well as the possibility of correct them. This was, in fact, a predecessor of the Habeas Data writ that was bound to be included in the 1988 Brazilian Constitution as a provision concerning every public entity.

Other statutes worth mentioning are Municipal Law 8445 of 2009, which establishes rules on the relationship between the municipality and citizens regarding health services and includes provisions regarding the protection of privacy, and Municipal Decree 44745 of 2018 regulates in the

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[17] The Brazilian Internet of Things framework was developed from a study commissioned by Brazilian Development Bank (BNDES) titled 'Internet of Things: An action plan for Brazil', available at < https://www.bndes.gov.br/wps/portal/site/home/conhecimento/pesquisaedados/estudos/estudo-internet-das-coisas-iot/estudo-internet-das-coisas-um-plano-de-acao-para-o-brasil?

[18] <http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2018/Decreto/D9584.htm>

city's level the Access to Information Law (Federal Law 12.527 of 2011), literally repeating the dispositions contained in the federal statute regarding privacy and data protection.

The statute that more closely relates to the Waze agreement is Municipal Decree 44399 of 2018, concerning some aspects of paid private transportation organized by digital platforms. This statute was one of the new urban mobility legislation that several Brazilian cities issued to regulate the offer of services by platforms such as Uber or Cabify. As regards privacy and data protection, the Decree merely specifies general provisions regarding the confidentiality of personal information gathered by the platforms, without specifying rules and limitations to the usage of this data by the city - even if one of the main aspects of the legislation is precisely the establishment of obligations to the platform to supply the municipality with data about its usage, including personal data. However, the purpose of the use of the data by the municipality is mentioned (urban mobility planning and the overview and supervision of the services), which can be considered from the point of view of LGPD as an concrete indication of what can be done by the municipality with the personal data gathered.

In the case of Brazil, considering that the upcoming Data Protection legislation shall still be implemented to frame initiatives as Connected Citizens, some considerations and recommendations can be made regarding the development of such a partnership.

First, and maybe foremost, transparency must play a fundamental role, as it is a basic obligation of the public sector to inform citizens on how their data are being collected and used, especially when personal data gathered by the public sector are also shared with private enterprises. The lack of such communication can raise serious issues not only from a data protection point of view but also from an accountability perspective. The availability, to any citizen or body interested, of complete and clear information about the use of personal data, thus, is fundamental to legitimize the operation as well as to help society contribute to develop its terms, reducing potential risks to citizens, safeguarding eventual competition issues and so on.

Second, the deal must abide to incorporate a comprehensive set of data protection principles and practices, including data subject's rights. Those principles and practices are now streamlined by the LGPD, which offer an easier and more efficient avenue for compliance. However, even if more specific data protection provisions may have been harder to envisage by the time the original deal was made, on the other hand it does not justify ignoring a fairly comprehensive set of privacy and data protection rules that could, at the time, be gathered from several pieces of legislation (Federal Constitution, Access to Information Law and other).

For instance, even before LGPD, Brazilian Constitution had provisions regarding the fundamental right to privacy, non-discrimination as well as a writ (Habeas Data) that made sure that

all personal data in the hands of public or private sector entities should be provided to their subjects upon request (the right of access) as well as corrected if needed.[19] Moreover, further legislation emphasized the data subjects' rights on their data, such as the Access to Information Law[20], which built a set of rights and warranties to the data subjects regarding personal data treated by the public sector.

Another most recent example is the Internet Civil Rights Framework ('*Marco Civil da Internet*')[21], which established a bundle of data subjects' rights and other provision related to privacy and data protection - among other provisions, it established some general data protection principles in Brazilian Law, such as the purpose principle or the security principle. Even if it wasn't a comprehensive and general data protection legislation, '*Marco Civil*' was a very good indicator of the data protection framework that was, at the time, at the verge of being implemented in Brazil.

In order to provide useful guidance regarding how smart city policies can be made compatible with and even strengthen data protection frameworks, the following section will analyze two examples of smart city initiatives that may be deemed as good practices, putting the citizen at the center of smart urban environment and its governance.

3. SMART CITY GOOD PRACTICES

Two initiatives connected with the rising MyData movement[22] can be seen as particularly relevant examples of how smart city governance can be developed and implemented to maximise the needs and rights of the citizen. The first one is the MesInfos pilot project in Lyon while the second is the Barcelona smart city experience.

3.1. THE *MESINFOS* PROJECT

The term *MesInfos* translates as MyData and directly stems from the MyData philosophy, developed openly and collaboratively, by a wide range of stakeholders[23], originally led by the Open Knowledge Finland and the Helsinki Institute for Information Technology and the Tampere University of Technology and sponsored by the Finnish Ministry of Transport and Communications (Poikola et al., 2015). As stressed by Belli, Schwartz and Louzada (2017), the MyData approach is unique in that it is not one specific data management tool or digital service but is rather a set of principles defining what

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[19] See BELLI, BARROS and REIA (2018: 593-596)
[20] Law 12.527 of 2011.
[21] Law 12.965 of 2014.
[22] See www.mydata.org
[23] See https://mydata.org/founders/

"human centric" data management looks like and how it could be enacted with the technological solutions at hand. In this perspective, the MyData principles include:

- Human centric control over data: people have a right to access their personal data and control their privacy settings, as well as the means necessary to enact these rights;

- Usable data: People can get access to their personal data held by companies, governments, or other third parties in a format that is machine-readable, open, and accessible via application programming interfaces (APIs) and open standards;

- Open business environment: by complying to a common set of personal data standards, business and services make it possible for people to exercise freedom of choice between interoperable services, preventing the current scenario where people get "locked" into silos of services owned by a single company because they cannot export their data and take it elsewhere.[24]

MesInfo is a pilot project aimed at implementing the MyData philosophy, developed by the French Think-Tank FING, the Tubà Living Lab, in coordination with the French Data Protection Authority (CNIL) with the aim to "foster innovation, incubating and developing new urban services around public/private data."[25] As stressed by Grignard (2018), the project started in 2016, after four years of preparatory studies, to foster the "self-data" concept, which is defined as "the production, use and share of personal data by the user, under his control and for his own benefits."[26] Such a concept is based on the consideration that personal data have acquired strong economic value and, for this reason, control over such data represent an empowerment mechanism for individuals.[27]

Importantly, the self-data concept as well as the MesInfos project do not claim or promote ownership of personal data, acknowledging that the current data-intensive economy relies on data usage by multiple entities and the value of personal data relies on being able to access and having control over them but also to enjoy services. To promote self-data value, the entire digital ecosystem must be designed having the individual user's needs and rights as a main priority, in order to stimulate trust, competition and user empowerment.

To design such an ecosystem, it is critical to adopt a cooperative multistakeholder approach, where individuals are engaged in the data processing, acquiring the understanding of how data are used and, ideally, having the possibility to define their data-exploitation permissions and preferences via user-friendly and interoperable tools; business players design information systems in order to be

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[24] See Poikola, Kuikkaniemi and Honko (2015)
[25] See Grignard (2018)
[26] See idem.
[27] See Belli, Schwartz and Louzada (2017),

compatible with such tools and respect user preferences; and policymakers fashion legal frameworks, incentivizing the adoption of such practices by the private sector.[28]

As pointed out by Grignard (2018), such a multistakeholder approach must involve companies holding personal data; actors developing PIMS (Personal Information Management Systems); application and service providers; users who benefit from the services; and researchers to analyze the dynamics of this new paradigm. The immediate benefits that such a dynamic generates for the user are a wider access to personal data, control and knowledge, improved decisions and choices, and the possibility for better collaboration with others. On the other hand, the benefit for the data holders such as corporates, administrations, and institutions is three-fold:

1.   Restoring trust and gaining loyalty from customers who retrieve and access their data in a systematic way

2.   Opening dialogue with customers to better understand their behaviors upon the usage they make of this collected data

3.   Designing premium customized services based upon data of different types[29]

In this perspective, the Tubà Living Lab implemented the abovementioned vision organizing a process that fostered stakeholder engagement able not only to provide useful inputs but also to suggest concrete examples of services that make the self-data concept a reality. As such, the process was organized according to the following steps:

1.   Partners shared with their users what personal data they hold on them, such as data collected by their services (e.g. power consumption, etc.)

2.   Personal data were stored on personal cloud called "Cozy cloud"[30] for each and every pilot user

3.   New services were developed by web or application designers re-using the data stored on the Cozy clouds

4.   Each pilot user tests the new services for their own benefit

5.   Researchers study, analyze and assess closely the users' feedback on the process, the platform, the services, etc.[31]

To facilitate the elaboration of a wide range of services that may meet the needs of the local population and be adopted by city dwellers, the Tubà Living Lab promoted a series of hackathons and

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[28] See Belli, Schwartz and Louzada (2017).
[29] See Grignard (2018).
[30] See https://cozy.io/en/
[31] See Grignard (2018).

challenges developing technical solutions that may fit into the Cozy clouds. Importantly, to date the *MesInfos* project includes 2,700 users, enjoying:

- 25 data sets from
- 15+ partnering organizations
- re-engineered by a developer community incl. 5 schools, to provide
- 3 partners' apps and
- 10+ beta-test apps, all available on
- 1 personal cloud per user.

3.2. THE IMPLEMENTATION OF SMART CITIES PROJECTS IN BARCELONA, SPAIN

In the most recent years, Barcelona's approach to its Smart City project improved in terms of its ambition and outcomes. The city considered the need and opportunity to integrate the infrastructure already existent into a conception that tries to put the citizen in the forefront, as the one and only final user of the Smart City infrastructure and services.

The differences between this new approach and what can be identified as a more 'traditional' approach to the Smart Cities movement reveals some rather disturbing facts, the most important of them maybe being that, to a considerable extent and very often this movement gathers much of its force from the technological agenda itself, more than from the mapping and consideration of citizens' demands and needs related to the potential implementation of new technologies[32]. This hypothesis becomes stronger if you consider the lack of comprehensive studies relating overall improvements on well-being and quality of citizen's life considering a whole plethora of Smart Cities resources applied in a certain situation, in contrast with abundant specifications of the effects of specific products or resources - which are necessary in order to justify the investment on such product.

A dive into Barcelona' smart city resources brings also to attention the conscientious and valuable approach the city had to solve a conceptual question: depending what is aimed and considered, the term 'smart city' can mean very different and unrelated things - including platforms for sustainability, creative uses of citizens data or even raw surveillance. The most recent developments in Barcelona aims to insert its already consistent smart city experience into a human-centered perspective, based on the adherence to the digital economy at the same time its citizens are given effective means of controlling their data.

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[32] Gemma Galdón Clavell. "¿Smart cities'sin futuro?" < http://lameva.barcelona.cat/bcnmetropolis/2007-2017/es/author/gemma-galdon/>

Barcelona is not new at all to the smart cities debate and perspective. In fact, its communications infrastructure, an established tradition in urban planning, as well as other factors highlight Barcelona's position in the smart cities movement. Indeed, the city also hosts some of the most important events related, such as the Mobile World Congress and the Smart City Expo and is a traditional hub for industry as well as for researchers and urban planners that consider the implementation and impact of technology to the city's dynamics.

This section focuses on Barcelona's developments in the most recent period, even if some projects and pre-conditions (such as the city's infrastructure) sometimes dates back to way before. In 2011, when Xavier Trias was elected Mayor of Barcelona, a platform to integrate existing projects and identify new opportunities to enhance services was created - the so-called Smart City Barcelona, which was the axis of his platform for technological innovation in public services from 2011 to 2015. The platform identified areas for intervention, as transportation, water, energy, waste, and open government, and initiated 22 programs, in a total of 83 projects.

By 2016, after Xavier Trias's mandate ended, Barcelona had an interesting inventory of implemented projects - many of them taking advantage from already existing infrastructure, as the 500 kilometers of optic fiber whiten the city - and, as the literature on smart cities points out, strong technological and infrastructure basis increase the potential for innovation.

The existent optic fiber was the foundation not only of a comprehensive public wi-fi system but as well of the introduction of almost 20.000 smart energy meters, integrated public transportation systems, a smart irrigation system in public parks, an online system for parking cars in public spaces or the so-called Lighting Masterplan, that integrated movement sensors, city lights and wi-fi stations, among others.

A particularly well-known experience of the city on merging technology infrastructure in urban planning is, for example, 22@ (or 22@Barcelona)[33], the 'innovation district' built in a former industrial area of Barcelona. The project, starting from around 2000, was conceived not merely as a pure urban regeneration program, but, instead, also included integration between several of its parts. For instance, centralized heating and air-conditioning, electricity distribution, waste disposal, telecommunications infrastructure, smart traffic management systems and others were viewed as an ensemble and integrated, rather than work merely as autonomous systems. 22@, as well as Sant

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[33] ECPA Urban Planning. *Case Study: 22@ Barcelona Innovation District.* <https://www.smartcitiesdive.com/ex/sustainablecitiescollective/case-study-22-barcelona-innovation-district/27601/>

Cugat[34] are areas of Barcelona where re-conception produced proofs of concept and urban solutions techniques to accelerate the implementation of Smart City projects since the early 2000's.

Partnerships with the private sector played an important role in Barcelona, as it usually happens also in other cities. A partnership with the North-American enterprise Cisco, for example, fuelled not only the @22 project[35] as was consolidates in 2012 when a Partnership agreement was made between the enterprise and the City Council of Barcelona to develop initiatives with the objective to become a global reference model in terms of sustainable urban development.

The city is, after all, broadly recognized as one of the leading European smart cities and it is no wonder that Barcelona was named in 2014 the first European Capital of Innovation by the European Commission[36]. The prize considered the city's use of open data, its sustainable initiatives for smart lighting, mobility, and residual energy, initiatives on sustainable city growth on smart lighting, mobility (e-vehicle) and residual energy (heating and cooling networks), among other factors.

More recently, Barcelona shifted its strategy, after diagnosing that its experience had contributed to the formulation of data-silos[37] and could address more directly citizens' needs and experiences. The new approach has privacy, data sovereignty, and data security as core elements in order to address these concerns and, as a change of paradigm, relies in a new strategy.

The most recent steps on the development of Barcelona' smart city strategy is usually associated to the administration of Ada Colau, Barcelona's mayor since 2015[38]. After a political career that had a great surge when she led the *Plataforma de Afectados por la Hipoteca* (PAH) (Platform for People Affected by Mortgages) during a house rises in the city, one of the first and most distinguished programs her administration implemented was *Decidim* (We decide), a platform for direct citizen participation. The city also appointed a Chief Technology and Digital Innovation Officer for the city, most probably the first known similar move os a city, in the person of Francesca Bria. This policy transition has been shaped through grassroots innovation strategies and implemented using the Digital Plan 2017–2020, called 'Barcelona Ciutat Digital: A Roadmap Toward Technological Sovereignty'[39].

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[34] <http://optimus-smartcity.eu/sites/default/files/SANT%20CUGAT.pdf>
[35] Laura Adler, "How Barcelona brought the Internet of Things to life," Data-Smart City Solutions blog, Ash Center, Harvard Kennedy School of Government, February 18, 2016. <https://datasmart.ash.harvard.edu/news/article/how-smart-city-barcelona-brought-the-internet-of-things-to-life-789>
[36] <http://europa.eu/rapid/press-release_IP-14-239_en.htm>
[37] McK p.93
[38] Plataforma de Afectados por la Hipoteca (PAH) (Platform for People Affected by Mortgages)
[39] <https://ajuntament.barcelona.cat/digital/ca>

The creation of *Decidim Barcelona*, a digital platform for civic participation, played also an important role. *Decidim* offers citizens a way to participate in city council decisions, make proposals, join discussion groups, and more.

The Barcelona Digital City Plan was approved by Barcelona City Council in October 2016 and comprehends:

• Opening up public procurement, making it more transparent, simple and objective, while reducing the bureaucracy involved. Innovation in the procurement processes will also enable diversification in technology providers.

• The creation, through a digital market platform, of a diversified group made up of expert local providers.

• The promotion of the use of agile methodologies in digital services, both internally and in provider relations.

• The revision of procurement procedures for technology assets and services to reinforce technological and data sovereignty.

• The use of free and open source software in municipal systems, except in exceptional and justified circumstances.

Among the results of the plan, the work on data ethics is particularly important. A policy toolkit with digital ethical standards was developed[40] which detailed rules and procedures to implement much of the project's goals in public policies. This toolkit is a concrete step towards the systematic adoption of practices and procedures in the realm of public administration that reinforces digital rights of citizens by redesigning government' services. The main elements of the Toolkit are described in the following section as a conclusion of the article.

4. CONCLUSIONS

The consideration of ethical values when applying ICTs has been stressed as a factor of growing importance, due to the need to take into considerations the potential outcomes of deploying new technologies and stipulate standards of conduct that avoid abuses while, at the same time, avoiding regulatory or legal instruments that may eventually be too rigid or even impossible to implement correctly.

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[40] "Ethical Digital Standards: A Policy ToolKit". <https://www.barcelona.cat/digitalstandards/en/init/0.1/index.html>

This particular situation has been the scenario for the drafting of a series of documents regarding Ethical Standards in the development of technology, due to a high degree of uncertainty regarding the type of technology to which the standards will be applied and the consequences of such implementation. In the specific smart cities field, a mostly pragmatic approach seems to be necessary, considering the extent that several smart cities elements are already being deployed in the urban fabric.

Thus, the toolkit 'Ethical Digital Standards: a Policy Toolkit', presented by the municipality of Barcelona, distinguishes several sets of situations and procedures by bringing an applied approach to the implementation of smart cities technologies, while considering ethical implications of its deployment. The toolkit is based on a document titled "Manifesto in favor of technological sovereignty and digital rights for cities" [41] , which identifies the employment of open source software, open standards, open data and the pursuit of technological sovereignty as instruments to achieve the implementation of its core values:

- Technological sovereignty, including data sovereignty;
- Digital rights for citizens;
- Interoperability and accessibility;
- Collaborative development, through sharing and pooling of resources;
- Citizen and industry participation in technology design and governance;
- Transparency and auditability, security and privacy.

In order to implement these values, the Toolkit identified a set of areas to be developed, divided into eight main groups. Some of them are detailed implementation procedures related to some of its core values, such as the Free Software Management[42], already approved in a Government Measure of 2017 and linked to other areas, such as the development of a Technology Code of Practice[43] or the development of the concept of Technological Sovereignty [44] . Another area in which implementation is fundamental is the specification of standards for the city's digital services[45] that provides clear guidance to shape a series of services delivered by the municipal administration.

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[41] The collective authorship of the manifesto is held by a group formed by: Francesca Bria (Chair), Malcolm Bain (coordinator) and the contributors Richard Stallman, Javier Ruiz, Roberto Di Cosmo, Mitchell Baker, Renata Ávila, Marleen Stikker, Paolo Vecchi, Sergio Amadeu. <https://www.barcelona.cat/digitalstandards/manifesto/0.2/>

[42] <https://www.barcelona.cat/digitalstandards/en/free-soft/0.2/introduction/>

[43] <https://www.barcelona.cat/digitalstandards/en/tech-practices/0.1/aim-and-scope/>

[44] <https://www.barcelona.cat/digitalstandards/en/tech-sovereignty/0.1/introduction/>

[45] <https://www.barcelona.cat/digitalstandards/en/digital-services/0.1/>

In short, it is noticeable that the projection of ethical principles and values into the city administration level have provided for pragmatic and concrete approaches and actions such as those envisaged in the Toolkit. Indeed, there is hardly any point in the toolkit that depends on further considerations to be directly applied and the challenge will certainly be to which extent its implementation and operation will live to the promises of introducing an ethical approach in the city's administration.

An important milestone in the implementation of the Barcelona approach was the realization of the Decode research project. The project is funded by the European Commission and aims at fostering digital sovereignty, promoting tools and processes to give citizen's control over their personal data to make their own decisions on its use - basically control over who, how and for what reason the data is used. The project, which is also implemented in Amsterdam, has its focus in Barcelona on open democracy and the Internet of Things[46].

An initiative such as the Policy Toolkit proves to be of fundamental importance to the research on smart cities at least in the sense it presents an almost unique possibility of modelling the several (and different) aspects of what is recognized by a smart city implementation inside a set of ethical principles. The asset of such principle-based approach is that it can be adapted and applied to heterogeneous smart-city configurations, technologies and situations without constrains and limitations that legal models would have. However, it is important to stress that Ethics principles shall not be perceived as a substitute to clear legal measures, as in several situations it might be already required the implementation of already existing and well-established norms that can touch upon many of the already regulated data protection fields.

A key question for the future will be further analysis on the actual effects of such policies on the development of cities. Such analysis essentially rely on the possibility to conduct research on the impact that both proposed smart city models and Ethics standards can deploy or can fail to deploy. In the meantime, it seems important that the toolkit be improved with the feedback of its users, while keeping on exercising what have the potential to be positive effects on city's life.

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[46] An inicial evaluation of the project is in: Antonio Lopez. "Technopolitical Democratization and Digital Commoning: the Case of the Digital Democracy and Data Commons (DDDC) pilot". <https://decodeproject.eu/publications/technopolitical-democratization-and-digital-commoning-case-digital-democracy-and-data>. Some of the legal questions regarding the project are discussed in "Digital Democracy and Data Commons pilot: kick off workshop notes". <https://decidim-decode.s3.amazonaws.com/decidim-decode/uploads/decidim/attachment/file/15/Kick_off_workshop_notes_-_Decidim_DECODE_pilot.pdf>.

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