Smart city governance in Mexico: reflections from a case study

Governança de cidades inteligentes no México: reflexões de um estudo de caso

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1. Introdução

Major cities around the world are considering new models of governance to ensure the delivery public services and to enhance citizen cooperation. Among the most relevant proposals, the adoption of digital platforms through ubiquitous technology stands out, known as smart cities. Here, citizen interaction is addressed from an indirect interaction with these devices whose main task is to gather personal data of citizens and through this develop particularized services. The impact of this technological approach also benefits the development of public policies. By personalized interaction with citizens, the public sector would be able to properly detect the most important needs of determined social areas and, consequently, develop the proper strategy to fulfil such needs.

Nonetheless, the particularization of services intended by this approach relies in the massive acquisition of personal data, which may lead

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to law related scenarios. This requires an interdisciplinary approach where governance through ubiquitous technology operates through the lawful process of personal data. From a technical perspective, the success of this approach depends on the characteristics of the urban area where it will operate. As part of this, smart city projects located in Europe and North America present different results to those located in underdeveloped areas such as Latin America or certain areas in Asia. To properly understand this scenario, it will be addressed from the position of one of the most influential nations in Latin America: Mexico. This country holds a plant to transform its capital, Mexico City, into a smart urban area and it has since, developed strategies that cover both technical and legal requirements. This will present how digital governance strategies are developed ensuring law compliant management of personal data in smart cities.

2. Defining the scenario: Smart cities

In 2018, over 55% of the world's population lived in cities[1]. This has raised a series of complex challenges that traditional governmental approaches have been unable to achieve. Here, several urban variables such as wealth, high quality services along with sustainability need to converge into a balanced scheme in order to provide an adequate standard of living. Additionally, cities are becoming multicultural centres where citizens with diverse social, economic, and religious backgrounds converge in harmony[2]. This has led to the widely accepted notion that cities should no longer operate as isolated modules; on the contrary, they ought to function as highly integrated structures that represent all sectors of society and their needs[3]. In this scenario, smart cities emerge as a proposal capable to achieve both technical and social objectives.

One of the most relevant proposals to address this is the adoption of the smart city urban approach, which includes four equally important components: industry, education, participation, and technical infrastructure[4]. This has been expanded to include smart economy, smart mobility,

1 UNITED NATIONS, 2018.

2 MEIJER; RODRÍGUEZ BOLÍVAR, 2016.

3 MOSS KANTER; LITOW, 2009.

4 GIFFINGER; FERTNER; KRAMAR; MEIJERS, 2007.

smart environment, smart people, smart living, and smart governance. In this sense, the term "smart" has become fundamental within urban contexts, as Washburn *et al* state: "those that operate at the core of the city's infrastructure, allowing to provide services in a remarkably efficient manner"[5]. This definition departs from the traditional conception of computational technologies for urban spaces, which conceives these devices as mere administrative tools that rely on human interaction for management purposes. This data is later sent to human operators that use it for different purposes, which can vary from analysing the advance of a specific public policy to measuring the level of public participation.

Nonetheless, it is important to establish that lawful process and management of personal data is a feature that should be present as early as the design stage of a smart city. This results compatible with some design methodologies, especially those that conceive the development of technology around citizens. In this sense, the technical architecture of smart cities requires the integration of two fundamental components: citizens and government[6].

From a techno-legal point of view, the first one interacts directly with ubiquitous technology and perceives the effect of the policies implemented by the second. Here, citizens[7] rely on internet-based government services, provided through environmental connectivity flexible enough to deliver public services to users[8]. Therefore, this type of technical architecture reflects the perspective of the human element as a centric component for their operation[9]. However, it is important to mention that some of these approaches are yet to be complemented with the capacity to process personal data according to the legal framework. Consequently, the design process would contain particular legal provisions that reduce the chances of producing unwanted legal consequences

As part of this, it is important to establish that there are several approaches of how smart cities should be developed. In the following lines, some of them will be presented.

5 WASHBURN; SINDHU; BALAOURAS; DINES; HAYES; NELSON, 2009.

6 NAM; PARDO, 2011.

7 MOROZOV; BRIA, 2018.

8 AL-HADER; RODZI; SHARIF; AHMAD, 2009.

9 SHAPIRO, 2006.

2.1 Perspectives for smart cities development

The success of smart cities depends not only on technological but also on cultural characteristics proper of citizens that reside on the urban area where this approach will be implemented. The three most important ones are[10]:

Restrictive perspective
1) *Pure techno-centric approach*: Here, cooperation and integration methods are shaped after the information technology tools that are going to be adopted. This maximizes connectivity, data process, and management of digital resources.
2) *ICTs are projected as an end in itself*: This approach establishes a direct link between the development of the technological network and public services. Here, operational efficiency is perceived as a fundamental element to increase the quality of life of citizens.
Both approaches require an in-depth study of the societal and cultural characteristics of the scenario where they would be implemented. This, since they need to incentivize social and political inclusion and to reduce social disparities.
Reflective perspective
3) This approach operates by addressing the methodology through which communication technologies (ICTs) will be implemented and if they result suitable to achieve previously established social goals, such as justice and inclusion[11]. It also aims to develop the capacity of citizens to innovate and to contribute as active economic members of society to ultimately achieve social good. Consequently, the reflective perspective operates on a previously acquired version of the social elements that will interact within the smart city. Even though this approach may be considered time consuming in relation to others, it will deliver a more accurate design for the smart city thus, increasing the chances of operation success.

In relation to the user, both approaches find desirable that they have the capacity to properly interact with the particularities of the digital environment and to participate in digital public life. Ideally, this citizen will have the affinity to lifelong learning, social and ethnic plurality, flexibility, creativity, cosmopolitanism, open-mindedness[12]. This will allow him to properly participate in a constantly evolving world where the main source

10 KUMMITHA, 2017.

11 ANGELIDOU, 2015.

12 NAM; PARDO, 2011.

of interaction would be through digital technologies. The proposed type of user is known as "smart citizen".

Nonetheless, the current social reality faced in Latin America[13] implies that the level of digital culture of the population is not within the desirable levels. This has led to the development of strategies to prepare citizens for the adoption of this type of technologies. In the particular case of Mexico City, it has maintained a level of internet interaction of around 80% of its population. Of these, most of the connections are performed through smart phones (32.6%) and tablets (16%), leaving a relatively small percentage of accesses through computers (32%)[14].

2.1.1 E-government and the infrastructure of smart cities

Smart cities are conceived not only as developments whose main objective is to increase public efficiency and to reduce negative practices such as excess of bureaucracy. A natural, yet complex, area of collaboration is E-government[15]. This, because an individual may assume several roles such as a service user, citizen, and even as an employee in a business. In relation to its operative configuration, E-government offers the following approaches[16]:

1) Government-to-citizen (G2C): Here, government services are delivered through high-quality technological approaches, which increases the level of interaction between the public and private sectors.
2) Government-to-employee (G2E): This approach aims to increase productivity by facilitating the communication and cooperation between the government and its staff.
3) Government-to-Government (G2G): The objective of this proposal is to enhance collaboration among governmental offices through cross-referencing information strategies. This contributes with the goal of increasing productivity and better management of human resources.
4) Government-to-Business (G2B): it reduces redundant data collection and increases communication quality for electronic business purposes.

13 MARCHETTI; OLIVEIRA; FIGUEIRA, 2019.
14 INSTITUTO NACIONAL DE ESTADISTICA Y GEOGRAFIA, 2019.
15 TWIZEYIMANA; ANNIKA, 2019; JIRÓN; IMILÁN; LANGE; MANSILLA, 2020.
16 CARTER; BELANGER, 2004.

Relevantly, Government-to-citizen (G2C) participation results compatible with current strategies implemented in countries such as Mexico. These scenarios, where the level of transparency and public trust are considered low[17], offer a solution where citizens can actively participate in public processes. This facilitates the delivery of a series of citizen-driven initiatives aimed to bring people with different technological backgrounds together, exchange relevant data and to establish transparency processes.

Nonetheless, the Mexican government has implemented a plan to enhance its e-government capabilities. Additionally, a relevant aspect is the role that process and management of personal data holds for e-government and smart city purposes. This scenario will be delivered in the following section.

2.2 Operative implications of personal data gathering in smart cities

Smart urban environments provide personalised services through the collection of personal data in specific scenarios. Among the variety of information collected, there are, for instance, civil status (birth, death, and marriage), housing, working place, among others. Relevantly, data related to sensitive aspects is also included (social and economic care, health, political opinions etc.). This technology allows local governments to monitor demographic patterns, measuring the quality of public digital services, and to boost public collaboration and democratic values. Regardless the fact that smart cities are being developed around the world and that their designers are considering personal data as a fundamental operational item, there are sectors which claim that security measures need to be improved.

Relevantly, most of this data is the result of previously existing processes, some of those are based on non-smart technology and are not likely to be used in a particularised manner[18]. In this sense, data collection has been present before the arrival of digital processes; nonetheless, it has increased the volume of information collected[19]. However, collection and management of personal data acquire a new dimension when it comes to surveillance-related tasks. Here, privacy declines in favour of security

17 INSTITUTO NACIONAL DE ESTADISTICA Y GEOGRAFIA, 2019.

18 VAN ZOONEN, 2016.

19 A HISTORY, 2018; MIYASAKI, 2015.

measures against online illegal activities. This has generated new efforts which include police data, that covers from small infraction to actual offences[20]. Consequently, relevant strategies are constantly being developed to ensure the integrity of personal data. Here, a desirable element is its compatibility with the legal framework. To illustrate this, the position of the Mexican jurisdiction related to personal data will be presented in the following section.

2.2.1 Data collection for security purposes: the Mexican case

From a constitutional perspective, the protection of personal data is addressed on articles 6th and 16th of the Mexican Federal Constitution. The first one, on its second paragraph, states: "Every person has the right to freely access plural and pertinent information, as well as to search, receive and spread information and ideas of any type through any form of expression"[21]. In turn, the second paragraph of Article 16th of the Mexican Constitution states:

> Every person has the right to have their personal data protected, in relation to access, rectification and cancellation, as well as to manifest their opposition, in the terms expressed by the law, which will provide the assumptions of exemption to the principles that direct data management for reasons of national security, dispositions of public interest, public security and health or to protect the rights of a third party[22].

This constitutional precept led to the development of two federal laws: The Federal Law on Protection of Personal Data Held by Obliged Subjects[23] and the Federal Law on Protection of Personal Data Held by Individuals[24]. These legal documents provide the legal requirements to properly process personal data for both public bodies and private citizens. Relevantly, it also defines the term "sensitive data" as:

20 VAN ZOONEN, 2016.
21 CÁMARA DE DIPUTADOS, 2012.
22 CÁMARA DE DIPUTADOS, 2012.
23 CÁMARA DE DIPUTADOS, 2017.
24 CÁMARA DE DIPUTADOS, 2017a.

> Personal data that affects the most intimate of its owner or that its utilization may generate discrimination or a serious danger to him. Particularly, it is considered sensitive data that information that may reveal aspects such as race or ethnicity, present or future estate of health, genetic information, religious, philosophical and moral beliefs, labour affiliation, political opinions and sexual preferences25.

Regardless of the effectiveness of these two legislations, they are in constant evolution due to the dynamic nature of technologies implemented to gather and process personal data. This turns into a more complex issue when not all the processes are done by a single party but with the inclusion of a third one, leading to jurisdictional problems.

Overall, the Mexican position regarding personal data aims to provide the right's holder a major degree of control over his data. In this sense, this legislation holds a degree of similarity with the EU's General Data Protection Regulation[26]. In both cases, flexibility is presented as a relevant feature that allows the adaptation of the law to the rapid technological changes that may affect its efficiency.

With regard to Mexico, the most notorious case is the tracking of personal devices to gather information related to criminal activities, particularly organized crime. The Mexican Supreme Court ruled in September 2019 that:

> the State holds a duty to its citizen to ensure their right to decide which aspects of their personal life should or should not be recognized or reserved by the rest of the individuals that integrate society, this entails that the obligation to avoid aggressive or arbitrary invasions by third parties or public authorities must be ensured before new technological platforms27.

An early position of the Supreme Court back in 2014 established that the intervention of telecommunications does not constitute a violation when it is performed in cases where the life of a person is in real or im-

25 CÁMARA DE DIPUTADOS, 2017a.

26 EUROPEAN COMISION, s/d.

27 MEXICO, 2018.

minent danger[28]. This led to what is known as the Geolocation Decree[29], which provides three scenarios where authorities are allowed to access personal devices without the need of a legal order delivered by a judge:

> 1 – When the device is directly related to investigations of organized crime, crimes against health, extortion or public health;
> 2 – In "exceptional and urgent" cases, such as life threating situations or when the physical integrity of the victims of a crime is at stake; and
> 3 – When there is the risk of hiding or disappearance of the object of the crime.

Regardless the apparent novelty of this, intervention of communication has been included within criminal law in Mexico since, at least, a decade ago[30]. This shows a recognition of the crescent role technology has in crime related tasks and the necessity to adapt investigation strategies to cope with the role of technology. Nonetheless, collection of personal data from digital platforms requires a normative framework that delivers the specific cases where this action could proceed. This would not only provide legal certainty to users of this technology, but it will also serve to develop a closer collaboration between these two sectors. In this sense, legislation is complemented with contributions from relevant developments. In the case of smart urban technology, their architecture not only is capable to replicate a specific section of the law, but it also provides a new perspective for legislators.

Overall, the intervention of communication is a well-defined legal act relevant to the legal procedure. Here, authorities can develop their investigations and the architecture of their cases based on relevant information gathered from technological sources. In this sense, smart cities can provide criminal related data obtained through devices located in an area where a crime was committed. Also, digital channels to enhance citizen-authorities communication can also deliver relevant information to solve a crime. In both cases, this data can be stored within the police department's database for future use[31]. Currently, research is taking place to ultimate a mathemat-

28 MEXICO, 2013.
29 MEXICO, 2012.
30 MEXICO, 2009.
31 PRISLAN; SLAK, 2018.

ical model that would allow to obtain the ultimate benefit from the data collected in Mexico[32].

In the following section, the relation between the data protection legislation and the development of smart urban technology will be presented from the perspective of Mexico City.

2.2.2 Mexico City as a digital and knowledge-based city

The transformation of Mexico City into a smart city has led to the collaboration between the computational, urban, and legal areas. This relationship has facilitated the development of laws that aim at particular interdisciplinary scenarios such as the Law to Promote the Development of Mexico City as a Digital and Knowledge-Based City. This legislation delivers the technological architecture required to guarantee information access to the population of Mexico City. The article 5th of this law defines digital cities as:

> The local environment where a considerable advance in the implementation of the Information and Knowledge Society exists in every scope of the activities performed by citizens, covering the private and public sectors, as well as individual and collective levels, generating new forms of interrelation, strengthening communication among the parties involved, specially between the government and the citizens. In a Digital City, public administration is the leader integrating initiatives and responsible of reducing the digital gap[33].

The main objective of this law is to develop the operational framework through which citizens of all social sectors could participate in the achievement of governmental objectives. Technological components are addressed not only as part of the required infrastructure, but also as a fundamental element to ensure the quality of life of its citizens. It states that the development of a successful model of digital governance in Mexico requires, first of all, the development of a new type of citizen, one with the sufficient capacity to properly interact with the government through technology-based platforms, this is, the digital citizen[34].

32 TORRES; LEAL; GALVÁN; ALCOCER, 2019.

33 MEXICO, 2012a.

34 JOHNSON; ROBINSON; PHILPOT, 2020; DE WAAL; DIGNUM, 2017; SHELTON; LODATO, 2019.

However, due to the social and political disparities Mexico currently faces, this objective does not seem achievable in the short term[35]. This is a direct effect of the digital divide, which points to the uneven distribution of access to information technology tools among distinct social groups[36]. This has led to an inadequate dissemination of technology within the country in general and in some scenarios its operation can be qualified as barely productive. Consequently, the development of public policies to adequate the level of digital culture among Mexican citizens becomes fundamental. Additionally, it would set a new scenario of collaboration between public and private sectors where the benefits of smart technology will be maximized, allowing the development of a governance model for smart urban scenarios in Mexico City[37].

Overall, it is important to establish that Mexico is still on the path to develop a suitable model of digital governance. In this aspect, important advances have been made towards the enforcement of data protection law in digital platforms. Even though there is still work to be done, the fact that a legal traditional system such as the Mexican contemplates technological scenarios could be perceived as a rapprochement that will eventually lead to relevant joint techno-legal developments.

3. Governance in smart city urban scenarios: The challenge of lawful process of personal data

Transformation of traditional urban centres into smart cities is a process that includes the interaction of technological components with political and institutional elements[38]. Among the first areas that experience this there are the city council, city government, and city mayor, along with policy agendas that may have repercussion on technology initiatives. In relation to the institutional elements, these address institutional readiness, allowing the adoption of the smart city concept in a more direct and efficient manner. Consequently, this has led to the development of a new

35 HERNÁNDEZ ARMENTA, 2019.

36 NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION (DOC), 1995.

37 BERRA, 2013.

38 MAUHER; VANJA, 2006.

governance approach, which embraces the role of technologies as fundamental elements in providing legal certainty to smart city's users.

By its own nature, governance is a collection of dynamic processes that interact according to the particularities of a specific situation. It involves the exchange of relevant information based on rules and standards in order to achieve goals and objectives[39]. Additionally, to maximize efficiency, cooperation between stakeholders should emphasize support of leadership, structure of alliances and working under different jurisdictions[40]. The last point is of significant importance: management of information should not be designed taking under consideration local jurisdictions alone. The technical composition of digital platforms, especially the internet, covers more than one jurisdiction, meaning that there will be situations where process of information will fall outside the jurisdiction it was originally gathered from.

Consequently, the operative nature of internet-based services requires a governance approach that should not be designed on local requirements only. To maximize its efficiency, it must be developed based on a close relation with the law. In the following lines, this will be analyzed.

3.1 The Mexican approach towards smart cities

A relevant case study of smart cities in Latin America is Mexico City. This has one of the highest levels of social and economic disparity[41] rates in the world. To affront this, Mexican authorities have adopted these digital platforms as tools to help in reducing this gap. According to Llorente and Cuenca, "Mexico City wants to confront these challenges [misery and violence] and be a leader within the region by putting in place proper planning initiatives and utilizing the third wave of the internet"[42]. This project is based on the "Connectivity Master Plan for Mexico City" that was run in 2016 by Secretary of Economic Development in coordination with the National Autonomous University of Mexico and the World Bank. It has four main objectives[43]:

39 JOHNSTON; HANSEN, 2011.

40 SCHOLL; BARZILAI-NAHON; AHN; POPOVA; RE, 2009.

41 MEXICO, 2018a.

42 ROMERO; ELLSTEIN, 2018.

43 SECRETARIA DE DESARROLLO ECONÓMICO, 2013.

- To analyse governmental structure and identify needs;
- To identify the current connectivity structure of the city;
- To estimate the connectivity demanded in Mexico City;
- To propose the design of the Connectivity Network of Mexico City; and
- To propose the redesign of the broadcast network in Mexico City.

This focuses on three equally important areas: technology, priority inclusion from the government and citizen participation, and legislation[44]. The result of this was a new role of dominance from the public to the private sector.

The adoption of technology to enhance the quality of administrative services in Mexico has been present for over two decades. This began around 1971 with the Committee Consultant Technician of Computer Units (CTCUI) that later became the National Institute of Statistics, Geography and Informatics (INEGI)[45]. Nonetheless, this approach was focalized, and it was not replicated by other services within the Mexican government.

This first experience brought lessons that will prove valuable for the design of other public related areas, such as smart cities. First, the quality of services can be improved without increasing public spending. Second, e-government incentivised the collaboration between citizens and public bodies, allowing the achievement of public policy goals within scheduled time. Lastly, it introduced a new model of bureaucrat, one with the capacity to operate through technologies to maximize the efficiency of public service. Given the dynamic nature of e-government, it has led to a new configuration of public bodies, generating an environment where the collaboration with citizens became more frequent. This scenario will be addressed from the perspective of the Mexican case.

3.2 Smart environments and the development of the digital citizen in Mexico

To this point, it has been established that the success of smart cities depends on a variety of factors, which cover technical infrastructure, citizen

44 CONSULTANCY.LAT, 2018.

45 HILBERT; BUSTOS; FERRAZ, 2003.

participation and lawful gathering and process of personal data. Nonetheless, social scientists and practitioners have agreed that these relations require a new method that perceives the second element as an element that improves smart cities. In this sense, Dan Hill stated this technology has a lot of potential to offer if such schemes become more open and inclusive towards the public:

> Instead of the smart city, perhaps we should be more preoccupied with smart citizens. The smart city vision tends to focus on infrastructure, buildings, vehicles, looking for a client amidst the city governments that procure or plan such things. But the city is something else. The city is its people. We don't make cities in order to make buildings and infrastructure. We make cities in order to come together, to create wealth, culture, more people[46].

This concept proposes a strategical change that combines technology and social objectives thus creating a bottom-up, context-sensitive, and citizen-centric vision approach[47]. Experts like Sassen affirm that technological openness must include citizens through a kind of "open urbanism" or "urban WikiLeaks", claiming for systems that put technology truly at the service of the inhabitants[48]. Remarkably, society has taken independent steps towards the adoption of this approach with a variety of results[49]. For example, back in 2013, Townsend stated that smart city projects incentivise the collaboration of citizens with different backgrounds even claiming it functions as platform that promotes democratic values[50].

This has led to not so positive opinions towards the potential inclusion of the citizen sector in the smart city infrastructure. An early position about this was made by Gabris who stated that: "citizenship [in smart cities] transforms into citizen sensing", that "[m]onitoring and managing data in order to feedback information into urban systems are practices that become constitutive of citizenship"[51]. The author extends her position by

46 HILL, 2013.
47 SHELTON; LODATO, 2019.
48 SASSEN, 2015.
49 ZANDBERGEN, 2017.
50 TOWNSEND, 2013; THRIFT, 2014; THRIFT, 2014a; LIM; KIM; MAGLIO, 2018.
51 GABRYS, 2014.

stating that there is the potential danger of developing a new type of citizen that is fundamentally more passive:

> The actions of citizens have less to do with individuals exercising rights and responsibilities, and more to do with operationalizing the cybernetic functions of the smart city. Participation involves computational responsiveness and is coextensive with actions of monitoring and managing one's relations to environments, rather than advancing democratic engagement through dialogue and debate. The citizen is a data point, both a generator of data and a responsive node in a system of feedback[52].

Fortunately, this position has been changing due to the arrival of new perspectives that deem the cooperation between developers, the public sphere and citizens as equally important. An example of this is Mexico City[53] where public policies design includes collaboration channels to allow citizens to communicate with authorities during the implementation process. Additionally, relevant and up-to-date data is gathered and processed under specific criteria for urban and social political purposes. Nonetheless, scenarios such as Mexico City that lack cultural homogeneity, does not allow the development of a unified governance approach, which compromises the success of its smart city project. Invariably, this leads to the development of a paradigm of governance that reflects the social and political particularities of Mexico City. Here, the main objective is to achieve a degree of uniformity within social sectors, which would later facilitate the fulfilment objectives originally designed for the Mexican capital[54].

4. Conclusion

Digital technology is a major asset in the development of new governance projects around the world, particularly in smart cities. In this context, new conceptions of traditional terms such as bureaucracy and public policies are being developed in forms that result compatible with emerging technical approaches. In this scenario, citizen participation plays a funda-

52 GABRYS, 2014.

53 ROMERO; ELLSTEIN, 2018; WILLIS, 2019.

54 CARDULLO; KITCHIN, 2019.

mental role in the success of public objectives. First, it allows measuring their impact through the perspective of the social sector to which it is addressed. Second, it increases confidence and collaboration between these two spheres. Relevantly, new governance schemes require the inclusion of strategies that ensure the integrity of personal data gathered from their citizens. To provide this, the adoption of technology capable of operating based on legal provisions is proposed. Finally, the experience of Mexico City illustrates that, in order to ensure the success of new models of digital governance, it is necessary to develop citizens with the capacity to understand and interact with this technology through digital culture.

References

A HISTORY of Data Collection, Storage, and Analysis (website). *GutCheck*. 2018. Available at: https://www.gutcheckit.com/blog/a-history-of-data/. Accessed Apr. 18 2020.

AL-HADER, Mahmoud; SHARIF, Abdul; RODZI, Ahmad; AHMAD, Noordin. "SOA of Smart City Geospatial Management" (2009) *Proceedings of the EMS - Third UKSim European Symposium on Computer Modelling and Simulation*, Athens, Greece, November, v. 25–27, pp. 6-10, 2009.

ANGELIDOU, Margarita. Smart cities: A conjuncture of four forces. *Cities*, v. 47, pp. 95-106, 2015.

BERRA, Mariella. De la ciudad digital a la ciudad incluyente: La construcción de un capital sociotécnico. *Sociológica (México)*, v. 28(79), pp.7-49, 2013.

CÁMARA DE DIPUTADOS. *Constitución Política de los Estados Unidos Mexicanos*. México: Cámara de Diputados, 2012.

CÁMARA DE DIPUTADOS. *Ley Federal de Protección de Datos Personales en Posesión de Sujetos Obligados*. México: Cámara de Diputados, 2017.

CÁMARA DE DIPUTADOS. *Congreso de la Unión. Ley Federal de Protección de Datos Personales en Posesión de los Particulares*. México: Cámara de Diputados, 2017a.

CÁMARA DE DIPUTADOS. *Código Federal de Procedimientos Penales*. México: Cámara de Diputados, 2020.

CARDULLO, Paolo; KITCHIN, Rob. Being a 'citizen'in the smart city: up and down the scaffold of smart citizen participation in Dublin, Ireland. *GeoJournal,* v. 84.1., pp. 1-13, 2019.

CARTER, Lemuria; BELANGER, France. Citizen adoption of electronic government initiatives. *37th Annual Hawaii International Conference on System Sciences, 2004*. Proceedings of the. IEEE, 2004.

CONSULTANCY.LAT. *Latin American smart city potential*: Mexico City leads the way. Latin America. Consultancy.lat. Available at: https://www.consultancy.lat/news/236/latin-american-smart-city-potential-mexico-city-leads-the-way. Last access 25th October 2020.

DE WAAL, Martijn; MARLOES, Dignum. The citizen in the smart city. How the smart city could transform citizenship. *it-Information Technology*, v. 59.6, pp. 263-273, 2017.

EUROPEAN COMISION. *Data protection. Rules for the protection of personal data inside and outside the EU*. Available at: https://ec.europa.eu/info/law/law-topic/data-protection_en. Accessed Oct. 25 2020.

GABRYS, Jennifer. Programming Environments: Environmentality and Citizen Sensing in the Smart City. *Environment and Planning D: Society and Space*, v. 32 (1), p. 30, 2014.

GIFFINGER, Rudolf; FERTNER, Christian; KRAMAR, Hans; MEIJERS, Evert. Smart Cities: Ranking of European Medium-sized Cities. *Centre of Regional Science Vienna*, 2007.

HERNÁNDEZ ARMENTA, Mauricio. México requiere de regulaciones para incentivar y adoptar redes 5G: GSMA. *Forbes Mexico*. 2019 Available at: https://www.forbes.com.mx/mexico-requiere-de-regulaciones-para-incentivar-y-adoptar-redes-5g-gsma/. Accessed Oct. 25 2020.

HILBERT, M.; BUSTOS, S.; FERRAZ, J. *Estrategias nacionales para la sociedad de la información en América Latina y el Caribe*. Comisión Económica para América Latina y el Caribe (CEPAL), 2003.

HILL, Dan. On the Smart City; Or, a 'Manifesto' for Smart Citizens Instead. *Cityofsound*, 2013. Available at: http://www.cityofsound.com/blog/2013/02/on-the-smart-city-acall-for-smart-citizens-instead.html. Accessed Oct. 25 2020.

INSTITUTO NACIONAL DE ESTADISTICA Y GEOGRAFIA. Encuestas obre Disponibilidad y Uso de Tecnologías de la Información y la Comunicación en los Hogares proporciona información a nivel nacional, estatal, estatal rural-urbano y para 49 ciudades del país. *Instituto Federal de Telecomunicaciones*. Available at: https://www.inegi.org.mx/contenidos/saladeprensa/boletines/2019/OtrTemEcon/ENDUTIH_2018.pdf. Accessed Oct. 25 2020.

JIRÓN, P.; IMILÁN, W. A.; LANGE, C.; MANSILLA, P. Placebo urban interventions: Observing smart city narratives in Santiago de Chile. *Urban Studies*, 2020.

JOHNSON, P. A.; ROBINSON, P. J.; PHILPOT, S. Type, tweet, tap, and pass: How smart city technology is creating a transactional citizen. *Government Information Quarterly*, v. 37(1), pp. 101-414, 2020.

JOHNSTON, Erik W.; HANSEN, Derek L. Design lessons for smart governance infrastructures. In: Dwight Ink, Alan P. Balutis and Terry F. Buss, (eds.), *American Governance 3.0: Rebooting the Public Square?* (National Academy of Public Administration), 2011.

KUMMITHA R. K. R.; CRUTZEN, N. How do we understand smart cities? An evolutionary perspective. *Cities*, v. 67, pp. 43-52, 2017.

LIM, Chiehyeon; KIM, Kwang-Jae; MAGLIO, Paul P. Smart cities with big data: Reference models, challenges, and considerations. *Cities,* v. 82, pp. 86-99, 2018.

MAUHER, Mladen; SMOKVINA, Vanja. Digital to intelligent local government transition framework. *MIPRO 2006,* 29th International Convention, 2006.

MARCHETTI, D.; OLIVEIRA, R.; FIGUEIRA, A. R. Are global north smart city models capable to assess Latin American cities? A model and indicators for a new context. *Cities*, 2019.

MEIJER, Albert; RODRÍGUEZ BOLÍVAR, Manuel Pedro. Governing the smart city: a review of the literature on smart urban governance. *International Review of Administrative Sciences,* v. 82, no. 2, p. 393, 2016.

MEXICO. CONSEJO DE LA JUDICATURA FEDERAL. Publicaciones. *Nuevo Sistema de Justicia Penal Oral*. Mexico, 2009. Available at: https://mexico.justia.com/federales/codigos/codigo-federal-de-procedimientos-penales/titulo-sexto/capitulo-viii-bis/. Accessed Oct. 25 2020.

MEXICO. *Ley de Geolocalización.* Mexico, 2012. Available at: http://www.mexicosos.org/dossier/legislacion/261-ley-geolocalizacion. Accessed Oct. 25 2020.

MEXICO. *Asamblea Legislativa del Distrito Federal*. Ley para el Desarrollo del Distrito Federal como Ciudad Digital y del Conocimiento. *VI Legislatura*. Mexico, 2012a. Available at: http://www.aldf.gob.mx/archivo-815a69869b1735c03f73ce34bc0e39c7.pdf. Accessed Oct. 25 2020.

MEXICO. *Suprema Corte de Justicia de la Nación*. Amparo directo en revisión 3886/2013. Mexico, 2013. Available at: http://www2.scjn.gob.mx/

ConsultaTematica/PaginasPub/DetallePub.aspx?AsuntoID=158606. Accessed Oct. 25 2020.

MEXICO. *Suprema Corte de Justicia de la Nación*. Amparo directo 535/2018. Mexico, 2018. Available at: shorturl.at/oCPW8. Accessed Oct. 25 2020.

MEXICO. Entidades Federativas. Ciudad de México. *Pobreza Estatal 2018*. Consejo Nacional de Evaluación de la Política de Desarrollo Social. Mexico, 2018a. Available at:https://www.coneval.org.mx/coordinacion/entidades/DistritoFederal/Paginas/Pobreza_2018.aspx. Accessed Oct. 25 2020.

MIYASAKI, Masashi. A brief history of data analysis. *FlyData*. 2015. Available at: https://www.flydata.com/blog/a-brief-history-of-data analysis/ Accessed Oct. 25 2020.

MOROZOV, E.; BRIA, F. Rethinking the smart city. *Democratizing Urban Technology*. New York, *NY:* Rosa Luxemburg Foundation, 2018.

MOSS KANTER, Rosabeth; LITOW, Stanley S. Informed and interconnected: A manifesto for smarter cities. *Journal of Urban Technology*, vol. 22, no. 1, pp. 3–21, 2009.

NAM, Taewoo; PARDO, Theresa A. Conceptualizing Smart City with Dimensions of Technology, People, and Institutions. *Proceedings of the 12th Conference on Digital Government Researc*h College Park, MD, pp. 12– 15, June 2011.

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION (DOC), Washington, DC. *Falling through the net*: A Survey of the "have nots" in rural and urban America. ERIC Clearinghouse, 1995.

PRISLAN, Kaja; SLAK, Boštjan. Analysis of the Relationship Between Smart Cities, Policing and Criminal Investigation. *Journal of Criminal Justice and Security,* v. 4, p. 399, 2018.

ROMERO, Alejandro; ELLSTEIN, Arie. Mexico City: Keys and challenges to building a smart city for citizens. *Developing Ideas Llorente and Cuenca* Madrid, Spain, 2018.

SASSEN, Saskia. Urbanising technology. *The Electric City Newspaper*. Urban Age Electric City Conference. LSE Cities. 2015. Available at: https://lsecities.net/wp-content/uploads/2012/12/the-electric-city-newspaper.pdf. Accessed Oct. 25 2020.

SCHOLL, Hans Jochen; BARZILAI-NAHON, Karine; AHN, Jin-Hyuk; POPOVA, Olga; RE, Barbara. E-commerce and e-government: How do they compare? What can they learn from each other? *Proceedings of the 42nd Hawaiian International Conference on System Sciences (HICSS 2009*), Koloa, Hawaii, pp. 4-7, January, 2009.

SHAPIRO, Jess M. Smart Cities: Quality of Life, Productivity, and the Growth Effects of Human Capital. *Review of Economics & Statistics*, v. 88: 2, pp. 324–335, 2006.

SHELTON, Taylor; LODATO, Thomas, Actually existing smart citizens: Expertise and (non) participation in the making of the smart city. *City*, v. 4, 2019.

SECRETARIA DE DESARROLLO ECONÓMICO. *Inicia GCDMX Plan Maestro de Conectividad. Gobierno de la Ciudad de México*. 2013. Available at: https://www.sedeco.cdmx.gob.mx/comunicacion/nota/inicia-g-cdmx-plan-maestro-de-conectividad. Accessed Oct. 25 2020.

THRIFT, Nigel. The promise of urban informatics: Some speculations. *Environment and Planning A, v.* 46.6, pp. 1263-1266, 2014.

THRIFT, Nigel. The 'sentient'city and what it may portend. *Big Data & Society, v.* 1.1, 2014.

TORRES, J. A. M.; LEAL, E. T.; GALVÁN, G. R.; ALCOCER, U. M. R. Un enfoque basado en datos para predecir eventos delictivos en ciudades inteligentes (a data-driven approach for predicting criminal events in smart cities). *Pistas Educativas*, v. 41(134), 2019.

TOWNSEND, Anthony M. Smart cities: Big data, civic hackers, and the quest for a new utopia. *WW Norton & Company*, 2013.

TWIZEYIMANA, Jean Damascene; ANNIKA, Andersson. The public value of E-Government–A literature review. *Government information quarterly*, 2019.

UNITED NATIONS. *World urbanization prospects*: The 2018 revision. 2018. Available at: https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html. Accessed Oct. 25 2020.

VAN ZOONEN, Liesbet. Privacy concerns in smart cities. *Government Information Quarterly*, v. 33.3, p. 476, 2016.

WASHBURN, Doug; SINDHU, Usman; BALAOURAS, Stephanie; DINES, Rachel A.; HAYES, Nicholas; NELSON, Lauren E. Helping CIOs understand "smart city" initiatives. *Growth* 17, no. 2: p. 2. 2009.

WILLIS, K. S. *Whose right to the smart city?* In The Right to the Smart City. Emerald Publishing Limited, 2019.

ZANDBERGEN, Dorien. We Are Sensemakers: The (Anti-) politics of Smart City Co-creation. *Public Culture, v.* 29, no. 3 (83), pp. 539-562, 2017.

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