

ECOLOGY: AN INTELLIGENT NARRATIVE FOR THE PROTECTION OF PERSONAL DATA IN SMART CITIES

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INTRODUCTION

This article is an attempt to integrate theoretical frameworks that connect people with different backgrounds and expertise, in order to investigate the challenges and opportunities for intensive use of information and communication technologies (ICT) in urban environments. In adopting the term “ecological cities,” an effort was made to identify the theoretical and regulatory contributions made by ecology so that city planners, architects, engineers, public managers and lawyers, among other professionals, can develop a holistic vision of what an urban environment under reconfiguration is like, examining, in particular, issues related to the privacy and personal data protection of citizens.²

SMART CITIES, INFOSPHERE AND ECOLOGY

Urban environments have never been so populated, nor their infrastructures so deficient for providing various types of public services. It is within this context that the term “smart cities” has emerged to describe the massive use of ICT as a possible solution for urban problems and, consequently, for improving the quality of life of citizens (Brazilian Internet Steering Committee [CGI.br], 2017).

The use of ICT as an urban management tool is not new (Nam & Pardo, 2011). The whole idea of urban planning has always been based on the use of data collection and processing technologies for formulation of public policies. To date, this has been the approach, for example, in sociodemographic censuses where the collection of personal data of citizens

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enables generating statistics that guide the expansion and administration of national or local territories (Miller, 1971).

What can be seen today is that, due to recent computational advances (Big Data, Internet of Things, artificial intelligence, etc.), there has been a change in quantitative and qualitative terms. Not only is ICT used more in public management, but it has also started playing an increasingly decisive role in actions and decisions for formulating public policies.

There has been a transformation of the urban environment itself, which is now being designed with technological artifacts for massive data collection and processing. The ostensible and unique figure of the census taker adds to that of sensors dispersed and distributed throughout the territory (Bruno, 2013), and a good portion of the activities of public managers becomes automated.

In this context, physical infrastructure is as important as informational infrastructure for urban development. In the case of mobility, for example, data traffic – informational infrastructure – can make the entire road network more efficient – physical infrastructure – through synchronization of stoplights or redirecting traffic routes according to congestion points. This can also be applied to health and education, energy distribution and water networks, among others. Interdependence among these infrastructures unlocks new dimensions for (auto) monitoring and (auto)management of cities (Nam & Pardo, 2011).

Due to this overlap, it can be said that there is an infosphere (Floridi, 2014) in which all the entities of an ecosystem – including citizens with their smartphones and sensors around them – are organisms that interact through the sharing of data (Floridi, 2014). The operation of this environment is organized primarily through information flows that can influence or define a wide variety of aspects of the lives of citizens.

Individuals live, therefore, not only of natural, physical and biological elements, but also of all the technologies that mediate these relations (Spina, 2017). This broader definition of the environment (Fiorillo, 2011) invites reflection on how interaction takes place between the organisms that inhabit it, and whether the way in which it is being modeled – by natural, physical, biological and technological factors – is desirable and sustainable.

Ecology is precisely the field of study of the relationships between beings (living and non-living) and the environment, based on the premise that there is an interdependence and interconnection between all of them (McIntosh, 2000). The guiding principle of its analysis is to understand the “whole” and provide a holistic vision of the structure and operation of an ecosystem, i.e., the interrelationship between organisms and the set of factors in their midst that form the environment in which they are inserted (Boff, 2008).

An ecological perspective on the intensive use of ICT in urban environments is useful because it highlights other variables: It includes not only discussion of the efficiency of public services and the solution of urban problems, but also everything in their midst, for the purpose of sustainable development (Nusdeo, 1995). It is, above all, a narrative to be explored in order to identify how this new architecture of urban environments triggers a series of reactions in its surroundings, particularly with respect to privacy and the capacity for self-determination of citizens.

ECOLOGY OF PRIVACY: (RE)ANALYZING THE INTERDEPENDENCE BETWEEN TECHNOLOGY AND PRIVACY

The creation and consolidation of the right to privacy have always been associated with the existence of a technological infrastructure that embraces and provides an outlet for this right, i.e., material conditions (Doneda, 2006) that enable individuals to control information about them³. It's no coincidence that one among the various possible definitions and metaphors for the right to privacy is the power of individuals to deprive themselves of social interaction, withdrawing to their castle.

In this sense, corollary rights to privacy have likewise been related to great concern in relation to the physical architecture that supports it. For example, some constitutions expressly use the terms "home" and "correspondence" when establishing the inviolability of the home and communication⁴. In addition to determining the protection of the space in which a person is permanently settled (home) and the transmission of messages (communication), legal texts state what kind of technology support these rights.

Therefore, the existence of "privacy zones" (Kaye, 2015) into which individuals can withdraw (negative freedom) and control information (positive freedom) about themselves depends upon environmental factors⁵. As important, or perhaps more, than the legal architecture for exercising the right to privacy is the technological architecture (Cohen, 2000), wherein there is interdependence that can strengthen or weaken it (Bioni, 2016). This is what has already been referred to as "ecology of privacy" (Sommer, 1966), which precisely denotes this interrelation between privacy and technology (Hildebrandt, 2016).

The intensive use of ICT in urban environments drastically modifies the dynamics of capturing, collecting and processing the personal data of citizens, turning it into one of the main mechanisms for the operation of cities. This tends to become barely visible to individuals and reinforces the existing asymmetry in their relationship with the state and, ultimately, challenges the capacity of citizens to exercise self-determination in this ecosystem.

³ In this article, the terms privacy and protection of personal data will be used interchangeably, even though the conceptual independence between them has been acknowledged, which was explored in another article (Bioni, 2016).

⁴ This is the case with the Federal Constitution of Brazil: Article 5, XI: "the home is the inviolable refuge of the individual, and no one may enter therein without the consent of the dweller, except in the event of *flagrante delicto* or disaster, or to give help, or, during the day, by court order;" Article 5, XII: "the secrecy of correspondence and of telegraphic, data and telephone communications is inviolable, except, in the latter case, by court order, in the cases and in the manner prescribed by law for the purposes of criminal investigation or criminal procedural finding of facts" (Constitution of the Federative Republic of Brazil, 1988).

⁵ It can be noted that, in conceptual terms, an "evolution" of the right to privacy is repeatedly mentioned. Previously perceived as a negative freedom in which individuals only withdrew their information, today the right to privacy is also been viewed as a positive freedom where individuals control the circulation of their personal information and the manner in which it is used. Rodotà (2008) defines it as having two distinct dimensions: a) "person-information-secret"; and b) "person-information-circulation-control."

PROTECTION OF PERSONAL DATA AND INFORMATION ASSYMETRY: (META) TECHNOLOGIES AND TRANSPARENCY

Historically, the protection of personal data has been calibrated by transparency obligations on the part of those responsible for processing it, requiring, among other things, that it be collected for a specific purpose, known in advance by its owner (Doneda, 2015). This was the issue in the paradigmatic case in which the German Federal Court decided that a census law, which did not precisely specify the use and purpose of the sharing of data collected by the public administration, was partially unconstitutional (Schwabe, Martins & Woischnik, 2005).

In coining the term “informational self-determination,” the rationale of this historic ruling took into account that citizens must have a minimal sphere of control over how these informational flows impact their lives, because their data served as input for the formulation of public policies of which they would be beneficiaries. There was already a perception that protection of personal data was a condition for the capacity of self-determination by individuals and the collective body, whose personality and particular characteristics were projected in these data (Bioni, 2016), which provided input for decisions by public managers that impacted their lives.

This problem persists in the context of smart cities: There are questions as to whether massive processing of personal data through the use of ICT will in fact lead to better quality of urban life; and, especially, to what extent it may undermine the capacity of citizens to exercise self-determination, which is increasingly being mediated by automated decision-making processes. As happened earlier in the case in the German Federal Court, one of the key elements in this equation seems to be the reduction of information asymmetry.

Going back to the infosphere concept, it is essential that the informational infrastructure of smart cities be subject to the public scrutiny of their inhabitants. This requires thinking in terms of technologies that govern the (auto)monitoring and (auto)management technologies of cities. In other words, metatechnologies (Floridi, 2014) need to ensure clear views of their infospheres, and especially, give citizens control over their information and that which is extracted from this information for city management.

The theoretical journey covered in this article has directly impacted the current legal system in Brazil. The Access to Information Law directly associates the protection of personal data with transparent information management (Access to Information Law No. 12527, 2011)⁶. An “ecological” reading of this law precisely puts into perspective how the active and passive transparency of public managers entails the development of metatechnologies to this end.

In a nutshell, thinking ecologically in terms of the massive use of ICT in urban centers requires the development of artifacts that permit the reading of this informational environment, especially an understanding of how the organisms in this ecosystem are interlinked and how its capacity is interdependent – ranging from public managers and environmental factors (including technological ones) to citizens.

⁶ This is a systematic interpretation that combines Article 4, Item IV, Article 6, Item III, and Article 31, *caput*.

COLLECTIVE DIMENSION OF THE PROTECTION OF PERSONAL DATA: SMART CITIES AS A “WHOLE”

This approach is not, therefore, about isolated and specific individuals in this informational environment, but how all the organisms form a unit that drives a set of information for operation of the city. Through the massive use of technologies in urban environments, not only is all the territory mapped, but it also predicts and modulates the collective behavior (of groups) of the population in order to optimize the city's resources.

From predictive policing to health system solutions, this requires aggregation of the data of citizens in order to segment them into groups. It is not individuals per se, but the groups to which people belong – having criminal potential or being prone to certain types of diseases – that will determine police interventions or medical-pharmaceutical care, respectively (Lyon, 2003). Collective entities are formed that project and impact the self-determination of the individuals categorized within them (Mantelero, 2016).

For this reason, the protection of personal data assumes, above all, a collective dimension, i.e., legal remedy focused on the diffuse negative externalities in play (Mantelero, 2016). In this sense, there has been a growing number of studies pointing out that the vulnerability and marginalization of certain groups in urban environments tends to be reinforced by the use of ICT in urban management, such as facial recognition technologies and predictive policing in relation to African descendants (Garvie, Bedoya and Frankle, 2016).

This represents an important step to be taken in terms of protection of personal data, not only as an individual right, but also a transindividual right, i.e., of a group of people, or an entire population, whose lives are impacted by the informational infrastructure of the environment in which they are inserted. This broader understanding of the environment makes a relevant theoretical contribution to the field of protection of personal data, breaking away from the historical approach focused on the individual and moving toward collective legal remedies (Mantelero, 2016).

FROM THEORY TO PRACTICE: DECODE PROJECT AND THE CITY OF BARCELONA

Based on the project entitled the Decentralised Citizen-Owned Data Ecosystem (Decode), led by the secretary of innovation and technology, Francesca Bria, the city of Barcelona is putting into practice the entire theoretical contribution of an ecological vision of intensive ICT use for urban management. This theoretical foundation is manifested by the term “data ecosystem,” taking into consideration the way in which citizens – as organisms that are part of this ecosystem – should be part of the “collective decision-making” process for the city's operation (Decentralised Citizen-Owned Data Ecosystem [Decode], 2017).

This initiative is based on the premise that the “sovereignty” of citizens over their data must be ensured (Rohaidi, 2017), focusing primarily on the creation of a “technical infrastructure” that will enable them to exercise that sovereignty (Bria, 2017). In a very schematic way, this infrastructure, which is called “smart rules” (Decode, 2017), is subdivided into two main axes:

- i) Empower citizens with more significant control over their data, making their choices (consent) scalable and granular as to the use of their data;
- ii) Ensure that such choices are effective, through an auditable trail of who accesses the data of citizens and how it is used.

Blockchain is one of the bases of this whole technical infrastructure, through which a decentralized network of computers automates the permission of citizens regarding the use of their data, and registers all access and use by third parties. Instead of hundreds of privacy policies, whose range of options is binary (accept or refuse) and which depend on the manual intervention of citizens, and that, in practice, guarantee little transparency in its processing, there would be a “distributed data management architecture” controlled in a granular way by citizens and under constant public scrutiny.

This is precisely an approach to use technology as an element of empowerment and transparency for citizens to control their data and what is extracted from it for city management. The desired result is a “collective governance” arrangement where each citizen contributes to “democratic control” of the city’s informational infrastructure.

It is not the objective of this article to critically examine the technical and conceptual aspects of the Catalan initiative, but rather, through it, identify how the theoretical contribution of ecology enables that which is conceptualized through the intensive use of ICT in urban centers to unfold in a very practical way – particularly how the use of technologies in urban environments can contribute to:

- i) More significant control by citizens over their data, based on the premise that technology is an element that unleashes this capacity (ecology of privacy);
- ii) Development of transparency technology to monitor the use that is made of such data and of all the city’s informational infrastructure (metatechnologies and reduction of information asymmetry);
- iii) Recognition of a collective dimension of protection of personal data, taking into consideration that the behavior of groups in the population, or its behavior as a whole, is modulated by the massive aggregation and processing of the data of individuals (transindividual nature of the personal data protection).

All of this is the fruit of a holistic outlook on how the insertion of ICT into urban environments affects everything in its midst, especially citizens as organisms belonging to this ecosystem. This broader vision takes into consideration how the protection of the personal data of citizens can be a vector of collective governance arrangements for managing cities. Perhaps more importantly, it also considers how public scrutiny can show whether the management of a city’s physical and informational infrastructures is actually resulting in improved quality of life for people. Ultimately, it is a situation of publicizing the state’s performance and measuring the efficiency of its management, especially when one of its main assets is the personality of its citizens – their personal data.

CONCLUSION: ECOLOGICAL CITIES

Since ecology is a field that studies the relationships of beings (living and non-living) with the environment, it is helpful for understanding how the intensive use of ICT in urban areas impacts the organisms therein, especially citizens. In this sense, the term “ecological cities” highlights the “whole” dimension of ecosystems under reconfiguration, whose new technological artifacts can enhance the protection of personal data of citizens and, at the same time, generate transparency with respect to administration of the city’s informational and physical infrastructures, and whether it is actually improving the quality of life of individuals. This seems to be an intelligent narrative for understanding the phenomenon of smart cities, especially their virtues and vicissitudes in terms of the protection of the privacy and personal data of citizens.

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