Building a National IoT Plan: Policy Recommendations and the Case of Brazil

Ronaldo Lemos
In 2016, the Nasdaq Educational Foundation awarded the Columbia University School of International and Public Affairs (SIPA) a multi-year grant to support initiatives at the intersection of digital entrepreneurship and public policy. Over the past three years, SIPA has undertaken new research, introduced new pedagogy, launched student venture competitions, and convened policy forums that have engaged scholars across Columbia University as well as entrepreneurs and leaders from both the public and private sectors. New research has covered three broad areas: Cities & Innovation; Digital Innovation & Entrepreneurial Solutions; and Emerging Global Digital Policy. Specific topics have included global education technology; cryptocurrencies and the new technologies of money; the urban innovation environment, with a focus on New York City; government measures to support the digital economy in Brazil, Shenzhen, China, and India; and entrepreneurship focused on addressing misinformation.

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This work serves as a comprehensive survey of the landscape of the Internet of Things and the burgeoning role of regulation in this field, offering insights to other developing countries. Lemos finalized this work while at SIPA. This is a translation of a work originally written and published in Portuguese and published in the United States and in English with the help of Columbia University’s School of International and Public Affairs and the Entrepreneurship & Policy Initiative.

The introduction is below, to download the complete report please click here.

(https://sipa.columbia.edu/sites/default/files/Lemos_IoT.pdf)

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Introduction

The Internet of Things (“IoT”) is an expression that refers to a whole set of new services and devices that includes at least three fundamental aspects: connectivity, use of sensors or actuators, and computational capacity for data processing and storage. The Internet of Things goes beyond connecting objects to each other; it also gives them the power to process data (thereby making them “smart”).

This development emerges from increased accessibility of already available technologies, which are now being used in mass. For example, a tractor equipped with an IoT device does not simply plow but can also collect data for subsequent analysis. This is done through an app hosted at a data center, which produces reports that allow farmers to make decisions about where and when to plant. In assembly lines, sensors provide data for analysis, which can in turn be used to determine the ideal times to perform equipment maintenance.

Estimates show that the Internet of Things has the potential to add from $4 to $11 trillion to the global economy by 2025; in Brazil alone that number could hit between $50 and $200 billion. Beyond the economic impact, IoT could lead to extremely significant social gains, such as helping countries to achieve United Nations Sustainable Development Goals.

For developing countries such as Brazil, the opportunities offered by the Internet of Things can compensate for shortcomings in infrastructure and services, and can improve innovation, quality of life, productivity, and even the economic complexity of our basket of export products. An example of a high-impact initiative in our cities is implementation of smart public lighting systems. Such systems use monitors and sensors to optimize the use and replacement of public lighting assets, thus enabling the reduction of operational costs for this important service.

Within the emergence of an innovative ecosystem for the Internet of Things, important opportunities are appearing for enhancing the business environment to foster entrepreneurship. The development of an innovative ecosystem for the Internet of Things requires promotion of entrepreneurship, with a particular focus on the role of universities and science and technology institutions in this process.

However, the way in which each country will seize this opportunity will depend on its specific aspirations and strategies. The broader economic, social, political, and legal context of the country should be considered, as well as the local development of information and communication technologies.

For this reason, the National Bank for Economic and Social Development (BNDES), in partnership with the Ministry of Science, Technology, Innovation and Communications (MCTIC), has commissioned the study, “Internet of Things: An Action Plan for Brazil.” This study, mapped by a consortium comprised by McKinsey & Company, the CPQD Foundation, and Pereira Neto | Macedo Law Firm, outlines the local technological and economic challenges related to the topic, as well as how to address legal issues inherent to the development of IoT in Brazil.

The final objective of this technical study was to contribute to the development of a strategic action plan, called the National Plan for the Internet of Things, which has been introduced by the recently enacted Decree No. 9.894/2019, so that the country can position itself in terms of public policies in the field of Internet of Things.

One of the main characteristics of this study is its participatory and multisectoral character. It involved the constant participation of several sectors of Brazilian society, through public consultations, events, and working groups. This consultative process helped define priority and strategic actions in order to foment the ecosystem of the Internet of Things in Brazil.

Initial diagnostics: This book aims to present the results of the study on the Internet of Things, but the focus is on local regulatory aspects that can serve as either catalysts or barriers in the development of IoT in Brazil.

First, in recent years Brazil has advanced in the implementation of IoT devices and in providing the necessary infrastructure. For example, in the smart cities environment, there is noteworthy collaboration between the Brazilian Agency for Research and Industrial Innovation (EMBRAPII), the CPQD Foundation, and private partners, enabling the development of smart street lighting solutions for Brazilian cities.
The model developed by this partnership allows municipalities to manage public lighting through smart and connected infrastructure, which in the future may include other functionalities, such as vehicle and pedestrian traffic monitoring. It can also aggregate real-time detection of gunshots, with detailed information on the precise area of the incident, the number of subjects involved, number of shots fired, and even the caliber and type of firearm used, allowing for swifter response from safety authorities.

Meanwhile, on fields and farms, the use of drones, automated machines, and sensors for agricultural production has created new possibilities for productivity, and above all, agriculture based on data analysis. The Internet of Things will help Brazil’s already highly competitive agribusiness sector to become more efficient and to reach even higher international standards.

Second, there was a need to reconsider certain aspects of Brazilian legislation and reorganize institutional arrangements: possible changes in telecommunications regulation, the establishment of rules and institutions to deal with information security challenges, the recent legislation for the protection of personal data by private initiative and the government, and taxation matters and other issues related to import and customs clearance.

Throughout this project, telecommunications regulation was the subject of heated debate. Among the aspects evaluated were the appropriateness of the telecommunications services and obligations imposed by sector regulation on service providers, as these were designed for traditional telecommunication companies offering services directed at users (e.g., requirements for quality of service), and not for machine-to-machine (M2M) communication systems.

Another important consideration was the need to issue a standard that is capable of dealing with the complexity and nuances of personal data, one offering legal certainty for this unprecedented change in society. With the proliferation of new Internet-connected devices capable of storing, collecting, and processing a significant amount of data, there has been attendant and recurrent concern about the legitimate uses of data and the vulnerabilities of the generated databases. There was also a need for a regulatory entity capable of presenting specific technical opinions and guidance on unified and homogeneous compliance with the rules on personal data protection. Such issues were encompassed by Law No. 13.709/2018 (General Data Protection Legislation or LGPD), which has recently been amended by Law No. 13.853/2019 so as to create a national data protection authority, and will enter into force on August, 2020.

Areas of investigation: After meetings with government actors and other interested entities, the consortium determined that the legal analysis developed within the scope of this study on the Internet of Things would be divided into two main stages of analysis. The first step evaluated horizontal regulatory issues, extending to sectors that may benefit from the implementation of IoT devices: telecommunications, taxation, privacy, and information security. The second step analyzed vertical regulatory issues for sectors previously selected with the support of the Brazilian government: smart cities, health, and the rural environment.

The chapters in this book deal with each of the identified horizontal and vertical issues in order to present the current scenario of regulation (or deregulation), as well as a synthesis of the main potentialities and challenges in question. We intend offer best guidelines for the Brazilian Internet of Things sector and to help Brazilian public and private entities achieve better results in areas such as urban mobility, precision agriculture, health, information security, privacy, telecommunications, personal data protection, connected infrastructure, and taxation. Additionally, the study presents several other topics from a legal and regulatory point of view.

Chapter Content: In addition to these introductory notes and a brief conclusion, the information is contained in seven chapters. In Chapter 1, we present some important considerations related to the possibilities that the Internet of Things brings to foster innovation and entrepreneurship in developing countries, especially in Brazil.

Chapter 2 examines rules related to telecommunications, given that the applications of the Internet of Things, featuring some kind of connectivity, directly interface with this sector. We deal with the main challenges within Brazilian telecommunications legislation for the efficient implementation of IoT technologies, such as requirements for traditional telecommunic-
tions services that provide services directly to users, which are therefore inappropriate for machine-to-machine communication (M2M).

Another challenge concerns incentives to improve the infrastructure of telecommunications networks. Such networks are necessary to access the Internet in Brazil. Therefore, infrastructure improvement is essential for the development of the Internet of Things in Brazil. This study shows that improvements are needed not just in telecommunications infrastructure. Investment in capacity and territorial reach of Internet access services for proper connectivity of the devices is also essential.

The study describes possible alternatives to the use of radiofrequency spectrum through these new technologies, such as the use of idle bands in the radiofrequency spectrum and the provision of IoT solutions by means of radiofrequency equipment. The importance of fostering design for IoT technologies, as it relates to tax exemption for equipment classified as M2M, is discussed.

Given the hybrid nature of IoT solutions, which can range from the importation of components to the domestic sale of devices to services such as software licensing, Chapter 3 deals with issues involving entities in the Brazilian federation (union, states, municipalities) that tax certain services; the accumulation of tributes that may incur high tax burdens; and the difficulty in approving changes to the tax system by legislative bodies. In addition to describing the challenges encountered by the IoT ecosystem in relation to taxes on income and consumption, we present some existing tax benefits in Brazil that could potentially foster the tech industry. An example is the “The Good Law,” which provides benefits for companies investing in research on and development of technological innovation, and the Manaus Free Trade Zone, an area of free trade for imports and exports in northern Brazil.

This third chapter also analyzes the imports and customs clearance process in Brazil. It discusses activities of the entities responsible for issuing standardization and regulatory rules, such as the National Institute of Metrology, Quality and Technology (INMETRO) and the Brazilian Association of Technical Regulations, which can play a relevant role in ensuring the interoperability of IoT devices.

Chapter 4 discusses issues regarding the privacy and personal data protection of individuals who directly or indirectly use Internet of Things solutions. It includes an overview of the current legislation and regulations in Brazil that address this issue, including the right to privacy as established in the Brazilian Federal Constitution, consumer and telecommunications regulation, the advent of the Civil Rights Framework for the Internet (known in Brazil as the MCI), and its regulatory Decree, which are standards that introduced a microsystem in the Brazilian legal framework to protect personal data on the Internet, as well as the LGPD, which introduced a general data protection standard in the country.

The chapter shows that one of the challenges in the development of a national IoT ecosystem is the adequacy of this legal framework to face issues inherent in new technologies, especially through the issuing of a general law for personal data protection (which was solved with the LGPD) and the existence of a regulatory body capable of ensuring compliance with existing standards and issuing technical opinions on the subject. The institution of such authority should consider the country’s political and institutional context, grounded, for example, in the public resources and the organizational capacity of the involved sectors. It should be capable of establishing effective participation, in a true multi-stakeholder movement.

Faced with the expansion of vulnerabilities in networks and the “open borders” nature of information security incidents, Chapter 5 discusses the adoption of measures related to cybersecurity by both public and private initiatives, based on models of international cooperation. This chapter discusses the possibility of Brazil joining the Convention on Cybercrime in Budapest and engagement with Agreements on Mutual Protection and Exchange of Classified Information, a strategy already underway in Brazil. Adherence to these agreements could generate partnerships with countries where there is interest, sophistication, and updates on information security.

At the national level, developers of IoT applications are encouraged to adopt protective measures for information security, either by incorporating voluntary device certification mechanisms or by complying with minimum security criteria in critical infrastructures.
We believe that a certification system based on voluntary self-assessment, without the existence of legal obligations for members, has the potential to create a culture of transparency, by providing information to the user and encouraging the acceptance of high-level safety standards by private entities.

Chapter 6 presents an analysis of the importance of net neutrality for the development of IoT, concluding that the rule currently in effect in Brazil does not constitute a barrier for the development of new business models or the implementation of specific services. Possible cybersecurity policies include cooperation from several sectors, such as public power; the private sector; academia; the technical and scientific community; and civil society, among others.

Chapter 7 addresses the offer of improved and more modern services resulting from the use of new machine-to-machine (M2M) technologies. This would include the electricity infrastructure, street lighting, urban mobility, and public safety. Such use of IoT technologies for optimized management of urban public policies has been linked to the still-controversial idea of smart cities. This use of technological devices in urban areas, capable of collecting data on citizens, monitoring their daily lives, and, in some situations, even identifying them, creates concerns regarding the privacy of the urban population.

The chapter begins by presenting the steps authorities must take to enable the collection, processing, storage, and sharing of personal and non-personal data in private and in public environments. For example, authorities should be able to guarantee the security of data collected and the devices used to store it; the use of data for the specific purposes for which it was collected; and the security of anonymization techniques.

Following this, we analyze smart power networks, which incorporate technological information, measurement, and monitoring devices of infrastructure. This ensures the expansion of multidirectional networks (with energy flowing through the network in different directions, from utilities to consumers, from renewable sources distributed by the network to consumers, from home generation to the network), faster data transmission and quantity, and integration of the energy system with other public services. Our discussion of smart grids will focus on the implementation of smart electric meters in Brazil, devices capable of controlling energy demand through advanced metering infrastructure and consequent regulation by the National Electric Energy Agency (ANEEL). These devices allow for dynamic pricing based on energy availability and instantaneous user demand, in addition to functionalities for monitoring service quality and for identifying anomalies.

Additionally, in this chapter we discuss another aspect of urban public services, the advent of smart public lighting. The replacement of metallic halide lights with light-emitting diode (LED) boards, which are more efficient, can serve as an important inducer for the development of IoT, since it would introduce mechanisms that enable wireless communication with control and communication devices. We discuss the possibilities and obstacles of installing IoT devices in public lighting, including how to regulate sharing of these assets and the restrictions on the number of fixing points they may have. We identify the ongoing discussion in Brazil of financing of public lighting, in particular the possibility of directing funds from the Contribution for Cost of Public Lighting (COSIP) for the implementation of public-private partnerships, which will be aimed at modernizing lighting in Brazilian cities.

On the topic of mobility, the chapter will discuss how public administration can properly utilize the Internet of Things in traffic control, through the addition of technology to traditional CCTV and radar monitoring, and efficient planning of the municipal transport system. Both the modernization of traffic and urban lighting involves, as we have shown, alignment of federal and municipal regulations with current technological changes. We will also discuss the progressive modernization of public safety mechanisms in Brazilian municipalities, through the adoption of IoT technologies such as audiovisual equipment and high-definition and sensitivity microphones, new cameras with optical character recognition (OCR) technology, and accurate facial recognition systems. The core of the debate revolves around the need for public administration to consider notions of necessity and proportionality, so that the implementation of technologies with the potential to enhance the fundamen-
tal right to safety does not greatly invade the privacy of individuals. We present international initiatives that can serve as a model for Brazilian authorities.

Later in Chapter 7, we conduct a brief analysis of the government’s contracting of information and communication technology (ICT) goods and services, which includes hardware, software, and technical assistance services necessary for the execution of public activities. We identify the standards for contracting of these solutions by the federal public administration, which can also serve as parameters for municipal entities in the absence of local regulation. We discuss contracting of a cloud computing service, a relevant example of ICT contracting at the federal level. Also, we address the main impasses for contracting these solutions by public entities, and we articulate ongoing debates about possible adaptation and improvement of existing standards.

In Chapter 8, which discusses healthcare practices, we study regulatory barriers that may negatively affect the development of technologies aimed at monitoring of patient conditions, locating assets within healthcare facilities, and identifying and controlling epidemics. We identify the standards and guidelines that underpin the national health sector, especially those related to the requirement of recording or registering health products at the National Health Surveillance Agency (ANVISA), a public entity responsible for regulating, controlling, and inspecting products and services involving public health risk. IoT equipment may have a therapeutic or diagnostic purpose and, therefore, will be classified as a health product, subject to rules for registration of medical equipment.

Another technological advance in healthcare concerns the use of digital medical records and the exercise of telemedicine (that is, practicing medicine through audiovisual and data communication), both already regulated by the Federal Council of Medicine. As we shall see, the objective of the council in crafting these regulations was to ensure, in addition to professional confidentiality, the privacy of health service users. We also highlight concerns about the ability of regulatory entities to keep up with technological advances, since innumerable and diverse IoT applications are being created for the healthcare arena and for processing extremely personal healthcare data.

Finally, in Chapter 9 we deal with the rural environment, addressing issues related to legislation applicable to remotely piloted aircraft systems (RPAS). Current regulations on drones, as these systems are popularly known, may pose a major hindrance to the development of this type of technology when focused on rural activities. This is due to the costs of implementation and the focus on urban use of RPAS, which limits scaling up such technology for rural regions. They have very different conditions from cities, with fewer technical requirements. We also explore the dilemmas that concern connectivity in rural regions, in terms of ownership and protection of data generated through IoT technologies. The aspects of the debate are quite complex, since there are clear differences between the two large groups involved. On the one hand, agricultural producers have advocated for greater protection of data generated from rural technologies, while private initiative in agricultural inputs and technologies takes the stance that seeks more freedom in the use of rural data.

In conclusion, we will present the main regulatory issues related to the Internet of Things in Brazil in order to provide a global view in this project, presenting the various challenges and complexities for development of the IoT around the world.