Université de Montréal

Law in the Present Future
Approaching the Legal Imaginary of Smart Cities with Science (and) Fiction

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Présentée par
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A été évaluée par un jury composé des personnes suivantes

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Résumé

Cette recherche doctorale centrée sur les villes intelligentes met en évidence les solutions numériques et les questionnements sociétaux qui ont trait aux technologies innovantes, ainsi qu'aux principaux modèles et projets développés autour d'elles à travers le monde. Des perspectives multiples en lien avec ces développements ont été identifiées à l'aide d'outils en ligne qui ont permis l'analyse textuelle de deux bases de données comprenant des publications scientifiques et des écrits médiatiques. De ce processus analytique ont émergé des éléments juridiques relatifs aux questions de vie privée, de sécurité, de transparence, de participation, d'imputabilité et de gouvernance. De plus, à partir de ces informations a été réalisée une revue des politiques publiques relatives aux mégadonnées dans les villes de Rio de Janeiro et de Montréal, ainsi que des réglementations nationales du Canada et du Brésil en lien avec ce sujet. Finalement, à travers l'exploration d'écrits scientifiques et fictionnels de la littérature, les principaux enjeux normatifs soulevés localement et mondialement par la surveillance urbaine, les changements climatiques et les politiques néolibérales ont pu être mis à jour. Le courant cyberpunk de la science-fiction s'est avéré particulièrement utile pour révéler les principaux problèmes politiques, en lien avec la préservation de la démocratie, auxquelles sont confrontées nos sociétés présentement. Les résultats de la recherche démontrent finalement la présence d'un réseau de pratiques et de significations entre le droit (post)moderne et les représentations imaginaires du futur.

Mots-clés : analyse de texte, droit postmoderne, littérature cyberpunk, mégadonnées, Montréal, politique publique, Rio de Janeiro, science-fiction, science moderne, ville intelligente.

Abstract

This doctoral research concerns smart cities, describing digital solutions and social issues related to their innovative technologies, adopted models, and major projects around the world. The many perspectives mentioned in it were identified by online tools used for the textual analysis of two databases that were built from relevant publications on the main subject by authors coming from media and academia. Expected legal elements emerged from the applied process, such as privacy, security, transparency, participation, accountability, and governance. A general review was produced on the information available about the public policies of Big Data in the two municipal cases of Rio de Janeiro and Montréal, and their regulation in the Brazilian and Canadian contexts. The combined approaches from science and literature were explored to reflect on the normative concerns represented by the global challenges and local risks brought by urban surveillance, climate change, and other neoliberal conditions. Cyberpunk Science Fiction reveals itself useful for engaging with the shared problems that need to be faced in the present time, all involving democracy. The results achieved reveal that this work was, in fact, about the complex network of practices and senses between (post)modern law and the imaginary of the future.

Keywords: Big Data, Cyberpunk literature, modern science, Montréal, postmodern law, public policy, Rio de Janeiro, science fiction, smart city, text analytics.

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List of Acronyms

ACM	Association for Computing Machinery
AI	Artificial Intelligence
BASE	Bielefeld Academic Search Engine
BI	Business Intelligence
CC4	Creative Commons Attribution 4.0 International license
CCTV	Closed Circuit TV
CEFRIO	Centre facilitant la recherche et l'innovation dans les organisations
CEO	Chief Executive Officer
CGMU	Centre de gestion de la mobilité urbaine
CICC	Centro Integrado de Comando e Controle
CIGC	Centre intégré de gestion de la circulation
CIO	Chief Information Officer
CIPPIC	Samuelson-Glushko Canadian Internet Policy and Public Interest Clinic
CIRAIG	Centre international de référence sur le cycle de vie des produits
COR	Centro de Operações Rio
CO2	Carbon dioxide
CORE	Computing Research and Education Association of Australasia
CRDP	Centre de recherche en droit prospectif
CRIM	Centre de recherche informatique de Montréal
DNA	Deoxyribonucleic acid
ENAP	École nationale d'administration publique
EU	European Union
FGV-Rio	Fundação Getúlio Vargas Rio de Janeiro
FIFA	Fédération Internationale de Football Association
GDP	Gross domestic product
GDPR	General Data Protection Regulation
ICF	Intelligent Community Forum
IEEE	Institute of Electrical and Electronics Engineers
IOP	Institute of Physics
IoT	Internet of Things
IP	Intellectual Property
IT	Information Technology
JSTOR	Journal Storage
LADOPPRP	Loi sur l'accès aux documents des organismes publics et sur la protection des renseignements personnels
LAI	Lei de Acesso à Informação
LGPD	Lei Geral de Proteção de Dados
MDPI	Multidisciplinary Digital Publishing Institute
NASA	National Aeronautics and Space Administration

NDA	Non-Disclosure Agreements
NGO	Non-Governmental Organisation
P3	Public-private partnership
PDF	Portable Document Format
PENSA	Pensa Sala de ideias
PIA	Privacy Impact Assessments
PPP	Public-private partnership
ROI	Return of investment
SERENE-RISC	Smart Cybersecurity Network
SF	Science Fiction
SSRN	Social Science Research Network
UdeM	Université de Montréal
URL	Uniform Resource Locator
US	United States

Expression of Appreciation

I am very grateful to many people for getting to the very end of this dissertation, they are always on my mental screen, and here is the opportunity to dedicate it to them:

To my parents, Angela and Jacques. I had the rare privilege of witnessing you writing your own theses and advising so many others. You are my greatest guides in life.

To my love and life companion, Priscylla. You know why (and me) better than anyone. If there is anything missing, I can whisper it into your ear, nobody else needs to know it.

To my son, Téo. If there is any reason to explain why life is worth living and why this text was worth writing down, it is you. I'll make up for all the stolen time and health, OK?

To all my Brazilian and Canadian family, in the name of Tiago Therrien. It could not be done without you, I would not be here without you. I'm sorry, you'll see more of me soon.

To my research advisor, Pierre Trudel. As I said many, many times before, thank you for all the patience and the many words along the long and hard way. *On y est arrivé !*

To all my professors, in the name of the late Magnólia Guerra and Marcos Colares. You all gave me much, and this dissertation is a result of your work. I wish you could see it.

To all the CRDP, in the name of the director Vincent Gautrais. You opened many doors, connected many dots, and made me feel useful in the moment that I needed the most.

To my colleagues of all countries, generations, colours, races, genders, orientations... "the old get older, and the young get stronger. May take a week, and it may take longer."

To the librarians of the Faculty of Law, in the name of Stéphanie Pham-Dang. *La bibliothèque de droit de l'UdeM* feels like my second home in Montréal because of you.

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To all my friends, you know I'm talking to you too. Please forgive me for my self-exile into the research cave. I hope you are still around and that you will accept me(?) back.

Epigraph

Night City was like a deranged experiment in social Darwinism, designed by a bored researcher who kept one thumb permanently on the fast forward button.

– William Gibson, *Neuromancer*

There is nothing that suits us more than most of the world believing that their will is being carried out by governments that do exactly as they please.

– Malka Older, *Infomocracy*

Preface, But We Can Call It a Postface Too

You probably know that a preface is not a compulsory part of a dissertation, so let's make an exception where the author can address the reader more directly. You must know that we are not supposed to discuss the content of the research in first and second persons, so please give me a chance to tell you about a few things that are underwritten here. Doctoral dissertations can capture part of ourselves in a textual time capsule: did you know that too?

Before you try to extract some sense and meaning (and maybe usefulness) from the far too many pages of this text, it is only fair to present you a few publishable reasons and personal motivations that conspired for it to be created. Long before the ideas, questions, and objectives that were combined into the research project of this dissertation, my life experiences brought many of the jigsaw pieces that were assembled in the doctoral table (some did not fit). When playing with complicated jigsaws, we can find some joy, boredom, and anguish when just like looking at and arranging the pieces that compose the research, yet with a difference: we never fully finish the aspired picture of the dissertation because there are always missing parts that might be found only further along in a research career on the subject, if we are lucky (or not).

Looking back to postface this preface, I admit that this dissertation is a material representation of my mid-life retrospective, crisis, and overcoming. The doctoral (grinding) process of analysis can put much of our professional, academic, and personal elements into perspective, and provide a rare chance to conciliate them and move ahead. I promise not to show you this (painstaking) process in the following chapters—nobody besides me is really interested in that—but please allow me to mention three of them here, it only takes a page.

My interest in approaching the *legal imaginary of smart cities* proposed by this research comes from eight years spent working in a major city hall, in the midst of twelve years as a

lecturer in law schools and a legal consultant for technology companies. Fortaleza is a city with 2.6 million people, many beauties and many problems that taught me a lot and left me with much to reflect on. It affected the idealistic (and naïve) basis and ideas on law and technology that I used to present to students in classes and clients in meetings, up to the point that I could no longer affirm them. This research was a hard way of examining and resignifying many of these questions, yet a very effective way of getting there.

Speaking of places, this dissertation is also a by-product of my academic studies in Brazil, Spain, and Canada. The adopted approaches, the methodological choices, and the mentioned authors in this document are an epistemological *potpourri* of what I have been learning and (un)thinking about law, technology, and society in my formative undergraduate studies in Fortaleza, the transformative master degree in Madrid, and the (peri)performative doctoral years in Montréal. It is kind of a roller coaster ride full of my academic joys and fears.

Since I am getting personal here, there is a last factor that I should confess to you about the unusual mixing of law, science, and literature in my dissertation for *reading the world*. Here and in life, I read law as a *scientist wannabe*, I read science as a *literature aficionado*, and I read science fiction as a *legal explorer*. These have been personal traits (or academic vices) since my first days in a law school, so it makes sense to bring them to my last days in one.

Finally, after this short and intimate incursion behind the scenes of this research, I ask you to read the following introduction to help you make some sense of the research for yourself. Despite all the private notes above, this dissertation is neither a mere reflection of my *persona* on the research subject, nor does it necessarily express what I think the subject and research are, or what I would like them to be. This work is based on my efforts to earn a doctoral title—this is a very sincere preface—but it will only accomplish its true purpose if it brings something new and valuable for the law and for the reader. Could we try it together?

0.1. Introducing a Strange, Open, and Legal Thesis

Before moving into the dissertation, it is advisable to be aware of *the terms and conditions* expressed here in *chapter 0.1*. It is not a *chapter zero* because the research was not born from *tabula rasa*, as advanced in the preface, but it brings the initial sparks that came to illuminate the paths that it followed. This introduction brings the main objectives, questions, hypotheses, and methods engaged by the doctoral project, as any introduction should do, yet it also contains a few warnings of what may be found (and missed) ahead by the eventual reader.

Such warnings are needed because it is not the usual kind of dissertation produced by the classic approaches of/by/from law, with the expected hermeneutical analysis on legal theory, legislation, and jurisprudence. It was written to address legal scholars and practitioners—hopefully, scholars and professionals from other areas too—but it will not be deeply appreciated by every jurist. Still, it is a *legal thesis with open and strange features* to fit its topics and goals.

This document is an attempt at exploring a network of values, norms, and facts that form a specific thesis in a given time-space. The term *thesis* used here should be understood as the argumentative statements that guided the research process and the elaboration of the dissertation. It might be called a thesis because it is the first stage of a dialectic relation with the members of a jury who will evaluate this work according to their views, argue about some (or many) of its elements, and help it to progress into a synthesis. Hopefully, this synthesis will reach a larger public to start the process all over again as a new thesis for (and with) other readers.

This dissertation is a *legal thesis* because, despite the nodes in the web of topics which have been distributed, law serves as the central hub that gives purpose and direction to its informational flows. Such condition were already expected, after all, the author is a doctoral candidate in a law school, but the main subject has so much “technology push & market pull”

that it could be seen differently. Still, without the background provided by the rationality of law, this thesis would easily lose itself amid the flows of information it contains. In fact, the thesis might have been lost for a (not so short) period ot time to find itself later with the guidance of law.

Finding itself again was viable because this is an *open thesis* as a result of transparency being *conditio sine qua non* for the research. The first steps in proposing this doctoral project were inspired by public transparency, the development efforts are due to the provided access to information, and its last moments will be for opening its contents for anyone interested in them. With more ways to bring light into the project since its conception, it became easier to (re)locate the research when needed, by rearranging the ways to pursue its open and strange goals.

Finally, it is a *strange thesis* because it took a few different paths that are not usually chosen by its respective academic pairs. Doctoral candidates are supposed to follow safer passages to go through the thesis research and describe it with familiar terms to the scholars who are supposed to evaluate it, leaving most novelties for later publications. Such expected lanes were there in the initial plan for this dissertation. However, plans exist to allow change when they need new ways to be executed. One can only hope that the reader will bear some unusual tools and marginal legal views in mind when reviewing this thesis and, perhaps, enjoy the company of other methods and areas of knowledge that came along the process.

Even knowing that the initial *terms and conditions* involving any technological issues are never fully clear before the actual experience of accessing them—not even to specialists in the matter—it is time to briefly present the objectives, questions, hypotheses, and methods in this dissertation. A last confirmation box should pop-up: “are you sure you want to continue?”

As advanced by the subtitle, *this research explores the legal imaginary involved in what have been called smart cities, by combining approaches from science, law, and literature.*

This objective does not originally appear in the initial doctoral research project—it was initially a “quest” for balancing transparency and privacy in Big Data applications for smart cities—but as a matter of late recognition, it was already there as an essential goal. It took scavenging efforts to reveal what was hidden in plain sight, and it gave place to interpreting the research as a way of pursuing a more ambitious goal.

As the title suggests, *the research also speculates how the law relates to the future by interpreting the present time*. Smart cities can be considered the projected cities of the near future that are being built in the present, so examining the developing legal imaginary of smart cities might be a reasonable way of inquiring the relations between the law and the future.

When dealing with possible futures to be realized or prevented, the rationality of law often manifests itself through public policies rather than only through the usual and formal sources of law. Therefore, the analysis of public policies must also be included to pursue the intertwined research goals expressed in the title and subtitle, forming the main hypotheses of this work.

Respecting proper limits and possible capabilities, the doctoral research established more specific and attainable objectives:

- Expose a theoretical framework able to contextualize and guide the research;
- Identify the available knowledge and experience concerning the topics of study;
- Examine technological elements, legal perspectives, and tendencies of the subject;
- Analyze the public policies of smart city projects of international reference;
- Summarize the applicable legislation related to the specific cases of smart projects;
- Synthesize potential scenarios and sociolegal concerns for cities in the near future;
- Discuss possible factors and contributions to the legal imaginary of smart cities;
- Present the results to academic, governmental, and legal communities.

All the objectives were aligned for attempting to answer the general research question: *what might the components of the legal imaginary of smart cities be?*

In order to answer the general question, some specific questions needed to be extracted from it to pursue the purpose of the doctoral research:

- What can the dominant (meta)narratives about smart cities be?
- What may the technological components and scientific approaches to smart cities be?
- What could the existent legal elements in the imaginary of smart cities be?
- What might the literary contributions to the legal imaginary of smart cities be?

The objectives and questions provided working hypotheses to be used by the research:

- The legal imaginary of smart cities gathers plural perspectives from media narratives, technoscientific promises, sociolegal concerns, and literary and visual representations;
- Despite the hypermodern promise of lawless algorithmic normativity, law is part of the imaginary of smart cities and provides guidance for public policies dealing with its risks;
- The benefits and risks related to the planning and management of smart cities can vary according to local techno-social conditions and specific political and legal dispositions;
- Instead of simplistic legal measures for balancing benefits and risks in smart cities, a dynamic and network-based balance might be designed according to each context;
- Privacy, security, transparency, participation, accountability, and governance form a legal network of principles for the axes of opacity, intelligibility, and compliancy in smart cities;
- Modern law has limits for dealing with the risks of smart cities that have to be overcome through the development and expansion of legal frameworks into laws and policies.

The hypotheses, questions, and objectives express legal concerns—after all, this is a *legal thesis*—that bring legal approaches along, but they are not enough for answering them. Legal research on legislation and jurisprudence is exceptional for evaluating the past; it allows a better understanding of the present time by examining the sociolegal effects from the choices and decisions taken in the past; but using laws and judgements in the same capacity cannot be affirmed when inquiring about the future. Public policies contain elements of the legal imaginary that are projected into the future and, in order to evaluate what of their components are probing into the future and what their legal concerns are, interdisciplinary approaches are necessary.

This doctoral research combines the moral-practical rationality of law with the cognitive-instrumental rationality of science and the aesthetic-expressive rationality of literature. The scientific rationality is a well-known resource for legal scholars and judges when law faces unknown elements in the interpretation of norms and decisions in courts. Still, science is a lot more effective in interpreting and intervening in reality than in anticipating and preventing the future effects of its actions on society. Western law has turned many times to consult literature in crucial social topics in the past, and such influence is also projected into the relations of law with the future. Descriptions and images of futuristic cities in literature (and cinema based on literature) can serve law as a representation of what society might be and become from the elements in the present, and what might be changed and avoided in the future.

To combine law with science and literature, a methodology was adapted to gather different fields of knowledge that might contribute to the legal imaginary of smart cities. As advanced, an unusual set of methods was adopted here to develop this *strange thesis*:

- A multi-theoretical approach will examine the narratives and conditions of knowledge for the scientific, legal, and literary aspects of research on smart cities.
- A text analytics approach to publications from media and academia (natural and social sciences, law, urbanism, humanities) will outline the main topics related to smart cities;
- A legal approach will identify the normative elements and main legal issues related to specific public policies in two international cases of smart city projects;
- Finally, a mixed *Law and Literature* and *Literature and Science* approach will interlace all the previous efforts, focusing on the *cyberpunk* subgenre of science fiction literature.

Considering the necessary requirements and resources for verifying the many elements of the research, once the doctoral degree is concluded, an open access website will provide: the full dissertation, the defence presentation, the databases used, the results from text mining tools (also accessible for the public), and all shareable documents. As warned, it is an *open thesis*.

1. Theoretical Layers for a Legal Imaginary About the Cities of the Near Future

This doctoral dissertation is a story. It is an extensive and mixed narrative written for a small and specific public, about limited and peculiar subjects, told from an unusual point of view with a voice that sounds unfamiliar—but it is a story, anyhow. This story is constructed over other stories, which could also be called narratives or even theories, and it will seem to counter other more accepted stories. As with every human story, this dissertation is fiction. Its content was chosen, researched, interpreted, written, and edited as it happens in any fiction on a bookshelf.

As it works with/on/through science, this text is also about science as fiction:

> The word fiction contains largely positive connotations when it appears in a literary or artistic context. The same word, however, continues to conjure up rather negative associations when it is understood as the antithesis of reality. Regardless, these two perspectives mix and blur. During the eighteenth and especially the nineteenth centuries, consuming fictional works was considered a problem, as a world of dangerous illusions could capture the reader. The word fiction may also be used in scientific contexts. Scientific experiments fail to access certain experiences and areas of reality, either directly or at any time. Such phenomena may only be captured hypothetically. Moreover, the scientific hypothesis itself presents a form of deductive fiction.[1]

And as it works with/on/through law, this text is also about law as fiction:

> What is law as a 'reality'? If it is a 'thing' made up of its constituent 'properties,' then these properties… incorporate many fictional elements and notions. Then, again, perhaps one might think of law 'as if' it is a fiction.[2]

The initial insights about the factors of this *doctoral fiction* (an academic exam of "as if" science and "as if" law?)[3] varies depending on the readers, who come from distinct intellectual

[1] Anke K Finger, Rainer Guldin & Gustavo Bernardo, "Science as Fiction, Fiction as Science" in *Vilém Flusser: an introduction* (Minneapolis: University of Minnesota Press, 2011) 109 at 109.
[2] Samuel Geoffrey, "Is Law a Fiction?" in Maksymilian del Mar & William Twining, eds, *Legal fictions in theory and practice* (Cham: Springer, 2015) 31 at 31.
[3] "We do not intrinsically approach reality via things; we approach it via relationships generated through things. Because such relationships are constructed similarly to fictions, we should closely examine the modalities determining our handling of fictions. Fictions are an 'as if.'" Finger, Guldin & Bernardo, *supra* note 1 at 114. *See also* "Law as a Science: Science or 'As If' Science?" Geoffrey, *supra* note 2 at 40.

backgrounds and will inevitably interpret the text under different horizons of perspective. So, in order to share a common understanding along the way, it is imperative to locate the most relevant points of theoretical reference used in the chosen trails of rationality and argumentation ahead.

There are plural and interlaced subjects in this research; nonetheless the main idea that interconnects all subjects lies on one main speculation: projections of how the *near future cities* will look and work. A directly linked idea assumes that cities will be transformed by information technologies that already exist and which have been extensively deployed in the urban fabric. Depending on the imagined scenarios of those cities, very different perspectives about the role (and rule) of law may be projected in this near future, as well as in the present which builds it.

Many times, during the development of the present dissertation, the main projections of an *advanced present* were much more referred to as a matter of *science fiction* than as a subject of science and law. These references to literature were often used to picture a bright and hopeful *urban habitat* perfected by science, as well as to skeptically discredit any value of the anticipation of legal concerns over techno-social dilemmas presented by fiction. Inevitably, science fiction arises as a background element in scientific and legal debates about digital technologies applied to cities, as a part of a collective imaginary about the future.

"The future is already here–it's just unevenly distributed,"[4] as goes the citation attributed (and not contested)[5] to the science fiction author William Gibson. In many ways, the Western civilization has already arrived in the (so much speculated in the last century) future, with the availability of technologies almost indistinguishable from magic,[6] but not quite there yet. During

[4] William Gibson. The Economist, "Broadband blues" *The Economist* (21 June 2001), online: <https://www.economist.com/business/2001/06/21/broadband-blues>.
[5] Garson O'Toole, "The Future Has Arrived — It's Just Not Evenly Distributed Yet", (24 January 2012), online: *Quote Investigator* <https://quoteinvestigator.com/2012/01/24/future-has-arrived/>.
[6] In accordance with Clarke's third law. *See:* Arthur C Clarke, *Profiles of the future: an inquiry into the limits of the possible* (Orion, 2013).

a great extent of the 20th century, media and literature projected a peaceful, rational, and advanced society in the 21st century countless times, when all problems would be solved by technology, yet it still seems very far from the perceived reality of the world in the present time.

Contradicting part of the famous Gibson's quote, many of the uneven futuristic technologies are in fact highly distributed around the whole world.[7] Many technologies are far more sophisticated and shared than ever expected even in literature—as the billions of powerful computers are carried in the pockets and bags of urban dwellers every day are—and they become available almost simultaneously around the world right after their launching. In spite of this, new or improved technologies will not necessarily be absorbed and evenly used in the same manner everywhere ("the street finds its own uses for things"),[8] so any generalizations or predictions about their applications and consequences must be carefully taken with moderation.

As a result, high doses of precaution were taken to avoid making or accepting any "scientific predictions" in this legal dissertation. Once treating a subject of futuristic projection (*the smart city*) running advanced and emergent technologies (*Big Data, Artificial Intelligence*), this academic work had to resist any (explicit) temptation of prophesizing legal solutions for the future. For the function of debating the present through imagery blended with the future in relationship to technology and social themes, science fiction was intertwined with the research.

Despite its reputation, science fiction (SF) most frequently fails miserably in predicting the future. Some of the most famous SF authors are celebrated for of their few hits and forgiven

[7] Science fiction writer Ian MacDonald counters William Gibson's famous quote: "William Gibson once said that the future is here, it's not it's just not evenly distributed. I actually disagree about it. I think it is actually evenly distributed, it's just that other people are doing more interesting and fun things with it." Francesco Verso, "Master of Science Fiction: Ian McDonald interviewed by Francesco Verso", (21 April 2014), online: *YouTube* <https://youtu.be/xW9f_INWtUQ?t=126> at 2min06s.
[8] Gibson William, "Burning chrome" (1982) Omni 168–191.

for their many misses,[9] despite being described as credible foretellers by the mass media. Instead of trying to make predictions about the future, the most recognized SF authors try to *predict the present* with a story in a futuristic scenario that amplifies some social dilemmas already set in order to influence it[10]—a goal that this dissertation may also share.

When the third decade of the 21st century is about to start, it may appear very significative that literature (and mass media) still make very few references about what will become of the state of humanity in the 22nd century.[11] The modern projections of a scientific and lawful society in the future are no longer dominant in popular culture, contrasting with the bright expectancies about *global smart cities*, which seem closer to the initial SF narratives of the 20th century. This contradiction is one of the fundamental landmarks to depart from in the theoretical approach to the collocations between science, law, and literature.

Those three forms of human knowledge, practice, and expression—science, law, and literature—form the hard core of the paradigm of modernity from which this research takes all epistemological assumptions. From the theoretical approach to the documental analysis and conclusions, this doctoral dissertation considers that there is a major shift in the modern paradigm that is still in motion. For the intents of this first part which presents the theories for the research based on "shifting grounds",[12] the next (and lengthier) part of the chapter is based on

[9] "Gibson tells me. 'There's an ancient tendency to account for the alleged soothsayer's hits and ignore his misses. I've missed multitudes of things about imaginary futures.'" Joseph Walsh, "William Gibson Talks Cyberpunk, Cyberspace, and His Experiences in Hollywood", (3 December 2014), online: *Vice* <https://www.vice.com/en_ca/article/bn5k5m/william-gibson-interview-399>.

[10] "If the future can be predicted, then it is inevitable. If it's inevitable, then what we do doesn't matter. If what we do doesn't matter, why bother getting out of bed in the morning? Science fiction does something better than predict the future: It influences it." Cory Doctorow, "I've Created a Monster! And so can you", (22 May 2017), online: *Slate Magazine* <https://slate.com/technology/2017/05/sci-fi-doesnt-predict-the-future-it-influences-it.html>.

[11] As remarked by Bruce Sterling in: AnnLab, "Geek Speaks: Cyberpunk - Past and Future: The Origins of Cyberpunk Culture", (5 May 2015), online: *Vimeo* <https://vimeo.com/126913876> Part 4min32s.

[12] "*En 1951 déjà, Savatier ne consacrait-il pas une étude à l'accélération du droit, notant, non sans quelque mélancolie, que 'les juristes d'aujourd'hui tracent leurs lignes sur le sable d'institutions mouvantes'?*" François Ost, *Le temps du droit* (Paris: Odile Jacob, 1999) at 281.

the works of Boaventura de Souza Santos, in cross-dialogue with other authors, mainly Jean-François Lyotard, Michel Morin, François Ost, and Fredric Jameson.

1.1. Paradigmatic Shifts of Rationality and Knowledge

Assembling the conditions of rationality and knowledge for developing a dissertation and as a tool to adjust the cognitive lens of the research was among the first tasks in the early stages of a doctoral program in law. A theoretical framework had to be specifically assembled to fit the techno-legal-social components of the research subject, as well as to focus on what the initial project intended to find. This puzzling process is commonly overwhelming and full of dead or loose ends, as most doctoral candidates and their research advisors can testify.

At the same time, a doctoral candidate may find some relief (?) in figuring out that there is no consensual or secure form of approaching a subject, due to the contingent and complex conditions in any scientific and legal research—especially when considering paradigmatic changes in science and law, as the present research does. If there is any sense of total certainty and comfortable conformity, it must be left behind to move beyond the limits of knowledge—even if only a little bit—for doctoral research.

These are challenging times for doctoral dissertations in law. It could seem too superficial to justify this generic allegation taking in account the actual volatility of democracy and the rule of law in Western society,[13] even though it unavoidably impacted the theoretical framework of this dissertation. The challenge could be related to the information crisis which overwhelms

[13] For example, the always-shocking-but-never-surprising legal and political turmoils in Brazil, the ideological divide and the political changes in the USA, the Brexit process in the European Union and their effects beyond England, Catalunya's secession attempt in Spain. In our case, these contexts changed during the doctoral research and affected, in large-scale, the development conditions of smart cities' projects of prime reference, as Rio de Janeiro, New York, London, and Barcelona.

contemporary legal research, demonstrated by the self-evident inflation on the legislative,[14] doctrinal,[15] normative,[16] jurisprudential,[17] and contractual[18] fronts of legal practice and theory. Still, the challenge could be pointed to the continuous acceleration of technological development of human society,[19] which greatly changed the conditions and applications which were considered in the initial stages of the research.

Analyzing those three challenges could easily take some extra pages (or theses, or lives), but there are many better places and thinkers for their discussion. Nevertheless, the research departed considering that the major challenge of all would be to think and produce a coherent legal-scientific dissertation in a period of crisis of the dominant paradigms of science and law. In other words, science and law are no longer the same since called into question by the crisis of the socio-cultural paradigm of modernity in which this dissertation is set.

Understanding why the dominant theories of law did not fit well in the initial observations from the research was the first problem faced by the present dissertation. In effect, it took an article for discussing the different paradigms for legal research, with the help of science fiction.[20] For overcoming this fundamental task which kept up until the end of the writing process, the

[14] *See* CRDP UdeM, "Mistrale Goudreau - Normes énormes: inflation législative", (7 December 2015), online: *YouTube* <https://youtu.be/9udKOIa0iKs>.
[15] *See* CRDP UdeM, "Vincent Larriviere - Normes Énormes : inflation doctrinale", (14 November 2015), online: *YouTube* <https://youtu.be/ZJV2vGcmNow>.
[16] *See* CRDP UdeM, "Ejan Mackaay - Normes énormes: inflation normative", (15 February 2016), online: *YouTube* <https://youtu.be/AjtsbRMDZLY>.
[17] *See* CRDP UdeM, "Mathieu Devinat - Normes énormes: inflation jurisprudentielle", (1 March 2016), online: *YouTube* <https://youtu.be/-UoDzjdqk-I>.
[18] *See* CRDP UdeM, "Mustapha Mekki - Normes énormes: inflation contractuelle", (30 March 2016), online: *YouTube* <https://youtu.be/J8x1QiPh-jk>.
[19] "An analysis of the history of technology shows that technological change is exponential, contrary to the common-sense 'intuitive linear' view. So we won't experience 100 years of progress in the 21st century – it will be more like 20,000 years of progress (at today's rate)."Ray Kurzweil, "The Law of Accelerating Returns" in Christof Teuscher, ed, *Alan Turing: Life and Legacy of a Great Thinker* (Berlin: Springer, 2004) 381.
[20] It is better described in the article produced from the doctoral seminars at Université de Montréal. *See* Cristiano Therrien, "Law as Network and The Matrix: Over-affection for my subject made the red pill hard to swallow" (2015) 3 Ch rech droit 19–26.

concept of *paradigm shift* has been set on permanent perspective. As Thomas Kuhn first described,[21] when the basic concepts and shared worldviews of a scientific community—oversimplifying, the essence of a scientific paradigm—are on the move, knowledge moves on toward new paradigms, like the primary matters of the research here.

The relations between technologies, normativities, and cities are the primary matters of fact in this dissertation, representing the respective frontiers of science, state and society as general matters of concern.[22] Enquiring after such connected frontiers became the decisive foundation for the work of (re)construction of the theoretical frameworks implied in the doctoral research. Those operations necessarily involved some sense of loss and freedom which should be stated here, what seems the case by presenting the *grand narrative* of modernity.

The most relevant contribution to understanding the concept of narrative and metanarrative for academic purposes came from the work *La Condition postmoderne : Rapport sur le savoir*, from the French philosopher Jean-François Lyotard. It came from the report, *Les problèmes du savoir dans les sociétés industrielles les plus développées,* commissioned by the *Conseil des Universités du gouvernement du Québec,* published in 1979. The report came to be highly influential for many other authors who would later develop beyond the key elements of this publication. In this sense, this report will be contrasted here with the work, *Toward a New Common Sense: Law, Science and Politics in the Paradigmatic Transition,*[23] published by the sociologist and legal scholar Boaventura de Sousa Santos.

[21] Thomas S Kuhn, *The structure of scientific revolutions.* (Chicago: University of Chicago Press, 1962).
[22] About “matters of fact” and “matters of concern”, See Bruno Latour, “Why has critique ran out of steam? From Matters of Fact to Matters of Concern” (2004) 30:2 Critical inquiry 225–248.
[23] Boaventura de Sousa Santos, *Toward a new common sense: law, science and politics in the paradigmatic transition* (London: Routledge, 1995). The author has a vast bibliography. It was a choice to focus on this single publication in English with a broader access for non-Portuguese speakers.

1.1.1. The Tale of the Paradigm of Modernity

To further explain the paradigmatic *shifting grounds*, this subchapter will try to briefly describe this complex, revolutionary, contradictory, and globalized sociocultural paradigm called modernity for the ends of the research. During the pre-modern and modern eras, what have been called *the most highly developed societies* created the project of modernity based on the Enlightenment narrative. For the means of this dissertation, as in Lyotard's work, it uses "the term modern to designate any science that legitimates itself with reference to a metadiscourse of this kind making an explicit appeal to some grand narrative."[24]

The *grand narrative* or *metanarrative*—the great story giving the conditions and legitimacy to all other stories—of modernity raised the social expectations above and beyond the social experiences. "Scientific knowledge is a kind of discourse,"[25] converting itself in a powerful metadiscourse which came to dominate all other discourses in modernity. The expectations of a better human society in a future produced by unconditional scientific progress are core ideas (and excesses) of modernity.

Despite modernity and capitalism being very interconnected, their systems are not to be confused. Modernity, as a sociocultural paradigm, was formulated before capitalism as a mode of production and will disappear before capitalism ceases to be dominant.[26] The paradigmatic transformation in course is a consequence of capitalism, and there are no ways to determine the full impact of its disappearance.

The rich and ambitious project of modernity may disappear from a combination of

[24] Jean-François Lyotard, *The postmodern condition: a report on knowledge*, translated by Geoffrey Bennington & Brian Massumi (University Of Minnesota Press, 1984) at xxiii.
[25] *Ibid* at 4. This paragraph and much of the next paragraphs come from Santos' work.
[26] Santos, *supra* note 23 at 1.

processes of supersession and obsolescence. Supersession is taking place because some of its goals are already (over)achieved and need to be replaced. Obsolescence is also taking place because other goals are poorly (under)implemented and can be abandoned.

Modernity was based on the dynamic tension of two pillars: regulation and emancipation. Regulation establishes the norms, institutions, and practices that promote stability between social expectations and social experiences. Emancipation establishes the aspirations and practices that promote the divergence between social expectations and social experiences. There is a symmetry,[27] by design or coincidence, between the status quo promoted by regulation and the confrontation promoted by emancipation.

The pillar of regulation is based on three principles that give meaning and direction to social action: the principle of state, formulated first and foremost by Thomas Hobbes; the principle of market, developed primarily by John Locke and Adam Smith; and the principle of community, a major contribution from Jean-Jacques Rousseau's political and social theory.

The principle of state establishes the vertical and political obligations between the citizens and the state, in a relation of coercion and legitimacy. The principle of the market endorses the horizontal and antagonistic obligations between the agents of the market, based on the self-interest of market partners. The principle of community describes the horizontal and solidary obligations between individuals and groups, involving everything else out of the state and market belongingness.

The three principles of regulation stabilize social expectations: the state, “by establishing the horizon of the possible (and hence only legitimate) expectations,”[28] the market by

[27] Symmetry, as a measure of mathematical perfection related to aesthetic beauty, can be considered as a very modern characteristic.
[28] Santos, *supra* note 23 at 3.

guaranteeing fulfillment of expectations obtained with a minimum of imposition out of self-interest; and the community by "defining what a particular group collective may expect or attain within the boundaries of state and outside or beyond the market."[29]

The pillar of emancipation is animated by the three logics of rationality identified by Max Weber, which give meaning and direction to social action: the aesthetic-expressive rationality of arts and literature; the cognitive-instrumental rationality of science and technology; and the moral-practical rationality of ethics and the rule of law.

The logics of emancipation create possible futures: the aesthetic-expressive rationality of art and literature by releasing humans from circumstance and constraint, through play and semblance, in the physical and moral sense; the cognitive-instrumental rationality of science and technology, "by freeing humans from the chains of circumstances and established limits, but it does so through the potentially infinite succession of technological revolutions";[30] and the moral-practical rationality of ethics and the rule of law, by "transforming new ethical demands of liberty, equality, and fraternity into political imperatives and juridical demands".[31]

The three logics destabilize social expectations by expanding the possibilities of social transformation beyond the boundaries traced by regulation. The logics have a utopian dimension, empowering imagination for new modes of human possibilities and shaping new applications of human will for building the world. The logics of rationality contest the status quo by creating new political expectations for the future, on "behalf of something radically better that is worth fighting for, and to which humanity is fully entitled."[32]

[29] *Ibid*.
[30] *Ibid* at 4.
[31] *Ibid*.
[32] *Ibid* at 3.

According to Santos, who uses many of Weber's and Habermas' theories of modernity, the ambitious and diverse project of modernity pretended at a reciprocal and harmonious development of both pillars of regulation and emancipation. The complex contradictions of the modern paradigm, on the one hand, opened a wide horizon for social and cultural innovation. On the other hand, modernity overfulfilled many promises and underfulfilled many other promises. Excesses and deficits are in the core of this internal contradiction of the modern paradigm that was supposed to ensure the harmonization of potentially incompatible social values: justice and autonomy, solidarity and identity, and equality and freedom.

The excesses and deficits were in the core of the modern matrix, likely perceived from the beginning, but viewed as deviations and shortcomings to be solved by the dynamics of modernity. A fragile balance doomed to fail, as the pillars, their logics and principles tend to maximize their potential: “on the side of regulation, the maximization of the state, the maximization of the market, or the maximization of the community; or, on the side of emancipation, aestheticization, scientificization, or juridification of the social praxis.”[33] Among the possible maximizations, science was turned into the powerhouse of the modern era.

By the end of the transition from the tradition-based society to modernity-based society, in the 19th century, modern science replaced religion as the supreme moral authority, beyond good and evil. Politics came to be seen as a provisory social area of human activity providing imperfect solutions which would be later replaced by scientific knowledge and technical procedures. It was the origin of the idea that social problems can only be adequately solved if and when turned into scientific and technical problems—a very modern argument which still resonates strongly in contemporary society.

[33] *Ibid* at 2.

But in practice, during the modern era, the natural sciences proved to be *still insufficient* and the social sciences *too immature* to scientifically manage the (many) problems of society. Law then continued to be central and necessary, at least in the short term, to fulfill large parts of this management role, provided it was subordinate to science. Therefore, there is a colonization of the moral-practical rationality by the cognitive-instrumental rationality.

Once positioned to stay limited to a *second-best* to science, law assumed a positivist framework to assert itself as scientific: “the presentation of normative claims as scientific claims and the presentation of scientific claims as normative claims are endemic in the paradigm of modernity.”[34] Law became synthesized and limited as state law; even if, in fact, the state had never been fully limited by state law. A legal utopia of social engineering by law depoliticized the state and the social conflicts.

Since then, law operates under the *aegis of the hyperscientificization of emancipation* captured by an overdeveloped market, and it is supposed to reflect its brilliant and ambitious promises of productivity, justice, freedom, liberty, peace, domination of nature, and common benefit of humankind. These modern promises are well expressed in all constitutional charts of modern democracies based under the rule of law. But did those science-based promises attend their objectives despite also being market-oriented?

The results of the promises can be observed. The promise of a just and freer society by converting science/technology into a productive force: in the 20th century, more people died of hunger than during any of the preceding centuries, even considering population proportions. The promise of liberty and peace: between the 18 to 20th centuries, the modern wars killed a lot more people than the previous centuries, even considering population proportions. The promise of

[34] *Ibid* at 4.

domination of nature and its use for humankind: modern society became the main force of global climate change, and eminent ecologic disasters became the most dangerous menaces to human survival in the next centuries—many scientists mention decades.

Meanwhile, observing the pillar of regulation, the principle of the market has developed excessively and has become the dominant force over the other principles of the state and the community. The capitalist mode of production, connected but not confused with modernity, has promoted a hypermarketization of regulation, mainly in the post-welfare state capitalism. As a secondary force of regulation under capitalism, the state became the *loyal servant* of the market.

Just as the rationality of law has become dominated by the principle of the state, the scientific rationality has become managed by the principle of the market. Science and technology have been turned into subservient resources to the primary productive forces of the market, which are promoted and funded by the state and protected by law. As a result, the pillar of emancipation became a double of the pillar of regulation.

With the hyperscientificization of emancipation and the hypermarketization of regulation, modern society bears witness to the growing asymmetry between an excessive capacity to act and a deficient capacity to predict the effects of its acts in time and space. Science and technology controlled by the logic of the market became a force of intervention in the natural environment to achieve the ends of the economic players. The striking forces of transformation powered by science and technology in the modern era contrast with the very limited engagement and measures of anticipating and mitigating the risks of the transformations caused by them.

Science is the champion of the modern metanarrative because “the hero of knowledge works toward a good ethico-political end—universal peace.”[35] The modern promise underlining

[35] Lyotard, *supra* note 24 at xxiv.

the grand narrative was to eradicate the risks associated with premodernity (opacities, violence, ignorance), but it recreated and multiplied the risks in a hypermodern way. In consequence, it is no surprise to agree today, decades later, with Lyotard's prediction that the "narrative function is losing its functors, its great hero, its great dangers, its great voyages, its great goal."[36]

Science, the modern champion, "will maintain and no doubt strengthen its preeminence in the arsenal of productive capacities of the nation-states."[37] But this metanarrative no longer runs over the same conditions, facing the incredulity produced by its own progress in sciences, to be discussed next with the epistemological crisis moving science toward a new paradigm. To this end, the works of Michel Morin and Boaventura de Sousa Santos will be of major use.

1.1.2. The Rise and Crisis of Science as the Modern Champion

Science, as presented before, became the driving force of modernity, prevailing as the dominant paradigm of rationality over the two other logics of emancipation: the moral-practical rationality, which made a long and continuous effort of redefining itself to legitimize *law as a science*; and the aesthetic-expressive rationality, which produced much literature presenting scientists as heroic characters. Despite both displaying great reverence to the scientific rationality, the cognitive-instrumental rationality still "ostensibly discriminates against two nonscientific (hence potentially disturbing) forms of knowledge: common sense, and the so-called humanities (the latter including, among others, history, philology, legal doctrine, literary studies, philosophy and theology)."[38] After all, "Science has always been in conflict with narratives,"[39] qualifying any other form of knowledge as *fables* while seeking the scientific truth.

[36] *Ibid*.
[37] *Ibid* at 5.
[38] Santos, *supra* note 23 at 11.
[39] Lyotard, *supra* note 24 at xxiii.

Yet, science is not only scientific, being still incapable of thinking about itself without other forms of knowledge,[40] as pointed out by Edgar Morin. As proposed by the French philosopher and sociologist, in order to discuss the multidimensional reality of science, it is necessary to think of its complexity in the historical and social context in which science inseparably takes part. To visualize this task, Morin proposes understanding scientific theories as *icebergs* with huge parts submerged which are not scientific, but indispensable to the development of science.[41]

There is no denial of the high relevance of science in modern society over all other forms of knowledge, and of the fabulous scientific accomplishments of the modern era. Science is, "the alive knowledge which conducts the great adventure of discovery about the universe, life, and mankind."[42] Scientific knowledge brought unprecedented technical progress, solving enigmas, satisfying social needs, and blossoming civilization.

Modern science emerged in the sixteenth century through the scientific revolutions from the works of Copernicus, Galileo and Newton, "abandoning the esoteric speculations of its founders to become the ferment of an unprecedented social and technological transformation."[43] Even so, much before the consolidation of the modern era, the powerful effects of science were already perceived as "not simple, either for better or for worse,"[44] deeply ambivalent. Jean-Jacques Rousseau, in his famous *Discours sur les sciences et les arts* (1750), had already raised fundamental questions about the emerging form of knowledge:

> Is there a relationship between science and virtue? Is there any serious reason to replace the common-sense knowledge we have of nature and life, and which we share with the other men and women of our society, by the scientific knowledge produced by a few and unavailable to the majority of people? Does science contribute to bridging the widening gap in our society between what someone is and what one seems to be, between knowing how to say and

[40] Edgar Morin, *Science avec conscience* (Paris: Fayard, 1982) at 9–10.
[41] *Ibid* at 21.
[42] *Ibid* at 15.
[43] Santos, *supra* note 23 at 10.
[44] Morin, *supra* note 40 at 9.

> knowing what to do, between theory and practice? To these simple questions, Rousseau gives an equally simple reply: a resounding "no."[45]

Two centuries after Rousseau, the same "enlightening, enriching, conquering and triumphant science"[46] brought diametric problems to the society that it has transformed: a liberating science producing possibilities of subjugation; a creating science producing risks of destruction of humanity. Similar questions about the paradigm of science in our society are to be raised, "[t]hus we have to be far more Rousseauian in our asking than in our answering."[47] For example, why is it relevant to question the conditions of modern science at all?[48]

In order to try answering (part of) it, there are ambivalences to be recognized. As already suggested, it is not the case of simplifying the problem and dividing science between a beneficial *good science* and a harmful *bad science,* but instead embracing its intrinsic complexity.[49] Morin lists five well-known *negative traits* of science: overspecialization and enclosure of knowledge; disconnection between natural sciences and human sciences; social sciences get all the vices of specialization without any of its advantages; a tendency of fragmentation, disjunction, esotericisation, and anonymity of the scientific knowledge; and a scientific process producing both subjugating and beneficial potentials.[50]

Science promotes the progress: of the scientific knowledge, in parallel to the progress of scientific ignorance; of its beneficial aspects but also of its harmful aspects; and of its powers, in parallel to the impotence of scientists regarding these same powers.[51] It would be easy to repeat the frequent argumentation and justification that the lack of power of scientists over their work is

[45] Santos, *supra* note 23 at 10.
[46] Morin, *supra* note 40 at 10.
[47] Santos, *supra* note 23 at 11.
[48] Or even: why has this legal dissertation have started by questioning modern science?
[49] Morin, *supra* note 40 at 15.
[50] *Ibid* at 16.
[51] *Ibid* at 18.

due to the hypermarketization of society which transformed them into employees who can no longer keep science *pure and noble*, or that the perverted use of science is due to politicians, capitalism, totalitarianism, etc. But the complexity of the subject points to a deeper core of irreconcilable contradictions in modern science.

Notwithstanding the many strengths of modern science and their accomplishments for human society, there is one main contradiction that the "ever-expanding material, intellectual, and institutional resources of modernity"[52] are still not able to solve by following the same scientific assumptions: the abyssal asymmetry between the growing capacity to act and the failing capacity to predict. This contradiction is central to the purposes of this research:

> Science and technology have expanded our capacity to act without precedent, and with it, the spatial-temporal dimension of our actions. While in the past social actions and their consequences shared the same spatial-temporal dimension, today the technological action may prolong its consequences, both in time and in space, far beyond the dimension of the action itself and through causality chains that are ever-more complex and opaque.[53]

Depending on the processes and concerns, this asymmetry can be understood as either a deficit or an excess of science: the deficient scientific capacity of previewing and preventing possible harmful or deadly consequences of its intervention on nature/society in relation to the capacity of producing them; or an excessive scientific capacity to intervene in reality in relation to the capacity to predict the risks of its actions. The two views are very different from each other and have significative implications to modern science—and this dissertation.

The first and still predominant view, the *deficit of science*, demands more scientific progress to fill the gap of knowledge and solve the deficit: more scientific actions need to be done to methodologically measure the consequences, and more risks and costs are necessary

[52] Santos, *supra* note 23 at 3.
[53] *Ibid* at 9.

to be taken to measure them. More science and more technology would be the only solutions to the deficit, what Hans Jonas could call *automatic utopianism of technology*,[54] and Evgeny Morozov could claim as *technological solutionism*.[55]

The second and emerging view, the *excess of science*, implies a questioning of the concept of science and further questions: "how is that modern science, rather than eradicating the risks, the opacities, the violences, and the ignorances which were once associated with premodernity, is indeed recreating them in a hypermodern form?"[56] The solution to this excess cannot come by the same scientific methods by themselves; instead, science must be renewed with a philosophical reflection and political and ethical conscience.[57] As Morin observes, there is no clear frontier between science and philosophy, despite the difference between their polarities and cores, and science needs the reflexivity from philosophy, so it is no surprise that great scientists of the 20th century were also *wild philosophers*: Poincaré, Einstein, Niels Bohr, Born, Heisenberg, Lévy-Leblond, Prigogine, Espagnat, and Costa de Beauregard.[58]

Some of these *hard scientists* were the fiercest critics of modern science and the best contributors to theories used for identifying its epistemological crisis. Morin and Santos list some of the dissonant scientific elements that point to an exit of the previous modern metadiscourse. Instead of a simple, orderly, deterministic, homogeneous, divisible, mechanical, and rigorous modern science, the same scientific discourse must reveal itself as a complex, chaotic, unpredictable, heterogeneous, interconnected, spontaneous, and creative science.

[54] Hans Jonas, *The imperative of responsibility: in search of an ethics for the technological age* (Chicago: University of Chicago Press, 1985) at 21.
[55] Evgeny Morozov, *To save everything, click here: the folly of technological solutionism* (New York: PublicAffairs, 2013) at 1.
[56] Santos, *supra* note 23 at 9.
[57] Morin, *supra* note 40 at 10.
[58] *Ibid* at 60.

One of the first fissures of the monolithic view of science, from the time that physicians believed that their "supreme science was almost complete,"[59] came from the (unfinished) scientific revolution started by the theories from Einstein and the quantic mechanics that shook the Newtonian physics. From the relativity of Einstein, humanity started to accept that there is no universal simultaneity,[60] so there is no absolute space and time, and it is the observer who chooses an arbitrary reference. All measures are taken in local references, so their accuracy depends on choice, what takes to a second break on the previous *scientific status quo*.

"If Einstein relativized the accuracy of Newton's law in the field of astrophysics, quantum physics did the same in the field of microphysics,"[61] from which many *order disturbing* elements could be pointed out, but above all,[62] the Heisenberg Uncertainty Principle.[63] There is no form to observe or measure an object without interfering with the object; what can be known from the object (the reality) is the intervention done on it. In this sense, there is no deterministic form to understand and predict the universe but only a probabilistic approach. Due to the limitation of observing and measuring an object, "the whole of reality is not reducible to the sum of the parts into which we divide it,"[64] so there are complex relations between the observer and the object.

If accuracy is no longer absolute in the astronomical and quantic scales, Gödel's theorem of incompleteness shows that even if mathematical logic is applied, it is possible to reach

[59] *Ibid* at 10.
[60] *See* Max Jammer, *Concepts of simultaneity: from antiquity to Einstein and beyond* (Baltimore, Md: Johns Hopkins University Press, 2006) at 15.
[61] Santos, *supra* note 23 at 18.
[62] Also valid for the sake of this research.
[63] "The principle holds that we cannot know the present state of the world in full detail, let alone predict the future with absolute precision. It marks a clear break from the classical deterministic view of the universe." Aya Furuta, "One Thing Is Certain: Heisenberg's Uncertainty Principle Is Not Dead", online: *Scientific American* <https://www.scientificamerican.com/article/heisenbergs-uncertainty-principle-is-not-dead/>.
[64] Santos, *supra* note 23 at 18.

propositions that cannot be proved or refuted.[65] Mathematical rigour (as any rigour) also implies selectivity, that the criteria to be chosen will always miss some positive results or produce some falsehoods. It greatly impacts the modern narrative of the mathematical language of science as precise, obvious, and universal.

Finally, other scientific theories demonstrate a shifting movement in science, as in Prigogine's "dissipative structures theory," the principle of *order through fluctuations*, and many key ideas in his work *The End of Certainty: Time, Chaos, and the New Laws of Nature*,[66] which revived some pre-modern concepts as "Aristotelian concepts of potentiality and virtuality"[67]. This scientist and *wild philosopher* recognized the problem of a "science whose advance has been felt by some as the triumph of reason, but by others as a disillusionment, as the painful discovery of the robotlike stupidity of nature."[68]

Agreeing with Morin, Santos points out that "we can safely state that there have never been so many philosopher-scientists as today, a trend that is not intellectually accidental."[69] Many other theories and (still non-predominant) scientific innovations could be listed here, as they transform many narratives of modern science, bringing closer the concepts of microphysics, chemistry, and biology by using terminologies from the social sciences (self-organization, model, process) and abandoning terms such as *natural laws*. In the referred works, both Morin and Santos stress the impact of those epistemological changes as paradigm shifts.

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[65] "Gödel's incompleteness theorems are among the most important results in modern logic. These discoveries revolutionized the understanding of mathematics and logic, and had dramatic implications for the philosophy of mathematics." Panu Raatikainen, "Gödel's Incompleteness Theorems" in Edward N Zalta, ed, *The Stanford Encyclopedia of Philosophy* (Stanford University, 2018).
[66] *See* Ilya Prigogine & Isabelle Stengers, *The end of certainty: time, chaos, and the new laws of nature*, 1st ed (New York: Free Press, 1997).
[67] Santos, *supra* note 23 at 19.
[68] Ilya Prigogine & Isabelle Stengers, *Order out of chaos: man's new dialogue with nature* (New York: Bantam, 1984) at 45.
[69] Santos, *supra* note 23 at 20.

In this sense, Morin acknowledges Kuhn's concept of paradigm—as, "what is at the beginning of the construction of theories, it is the obscure nucleus that guides the theoretical discourses in this or that sense"[70]—and suggests that all the present scientific horizons point toward a paradigm shift. There are many authors describing enough signs of a paradigm in transition for science, even if they do not agree to characterize and name it in the same way. "Such times are half blind and half invisible"[71] for many reasons, the old and known paradigm is not gone, the new and strange paradigm is not done.

Law shares the moving grounds of science in a related but distinct crisis of paradigm. The main goal here was to demonstrate the changes in the paradigm of modern science, which also implies in a paradigmatic turn for modern law and its *stunt double role* of science. For this next analysis, the works from François Ost, Michel Van de Kerchove, and Boaventura de Souza Santos will take on the conditions and ends of law from a modern to a postmodern era.

1.1.3. The Crumbling of the Great Pyramid of Law?

In their book, *De la pyramide au réseau? pour une théorie dialectique du droit*,[72] Ost and Kerchove offer a statement from the initial title to the very last paragraph. Their proposition flows in a similar sense of the paradigm shift previously focused on science, but their focus is on law. Referring to Kuhn, they affirm that "the theory of paradigm change is a particularly enlightening instrument of analysis to realize the current transformations of the state and the law."[73]

In this work of major reference, Ost and Kerchove make an extensive analysis of the crisis in the legal paradigm that continues considerably unchallenged in legal education and

[70] Morin, *supra* note 40 at 45.
[71] Santos, *supra* note 23 at xvi.
[72] François Ost & Michel Van de Kerchove, *De la pyramide au réseau? : pour une théorie dialectique du droit* (Bruxelles: Publications des Facultés universitaires Saint-Louis, 2002).
[73] *Ibid* at 20. My translation from French, as in all the next citations from their book.

judicial institutions. The dominant paradigm of law operates on the works from Kelsen, Hart, and Ross—probably the best interpreters of the occidental legal thought in the 20th century[74]—and it will remain as such for a long time to come while useful, functional, and valuable in the paradigmatic transition. Hans Kelsen described law as a pyramid, a visual archetype imprinted in every *Bachelor of Laws'* mind in the Western world and, henceforth, it is here used to represent modern law, despite all the signs of inadequacy, decay, and change of this symbol.

Before describing the signs of paradigm change, it is worth to briefly describe the main characteristics of the pyramidal model of law production,[75] as presented by Ost and Kerchove.[76] The pyramid is grounded on the three axes: legal positivism, as the most elaborated version of legal scientism;[77] legal statism, as the law is reduced to the state will and form;[78] and legalism, as legislation is the main source of the law.[79] The pyramid is developed on a hierarchical, linear, and tree-shaped structure: hierarchical, as it declares a situation of superiority or subordination in norms and institutions of the legal system; linear, as it supposes one-way relationships between the different hierarchical levels; and tree-based, as all the different elements scale from a common point of original creation. After taking these features into account, it is understandable why "the image of a pyramid, with a single summit, firmly seated on its base and stratified in several intermediate levels, is the most expressive expression of such a model."[80]

In the name of order and stability (functions of modern *law-as-regulation*), the contradictions from the paradigm shift are often perceived only as *superficial cracks* on the

[74] *Ibid* at 11.
[75] Legal theory does not constitute the central element of analysis and contribution of the doctoral research.
[76] *See* Ost & Van de Kerchove, *supra* note 72 at 43.
[77] Boaventura de Sousa Santos, *Toward a new legal common sense: law, globalization, and emancipation*, 2nd ed, Law in context (London: Butterworths LexisNexis, 2002) at 62.
[78] *See* Massimo La Torre, *Law as institution* (Dordrecht: Springer, 2010) at 108.
[79] Proyecto Grado Cero AEJ, "¿De la pirámide a la red? ¿Un cambio de paradigma jurídico? con François Ost", (12 January 2015), online: *YouTube* <https://youtu.be/r6b1NFdJ4YQ> at 5min 55s.
[80] Ost & Van de Kerchove, *supra* note 76 at 44.

pyramid of law—anomalies to be treated as *ad hoc hypothesis*—in order not to contradict the dominant legal theory. The strategy of avoiding contradiction and imposing acceptance of the theory supporting the law is called *doctrine* for some reason. Legal doctrine resists contradiction (as any scientific theory would do during paradigmatic changes) but loses strength when the exceptions multiply, and the theory can no longer explain legal practices as it used to.

There is much research describing the profound changes in the legal paradigms of democratic societies based on the rule of law at the time of globalization of economy, politics, and law itself,[81] but, for the ends of this subchapter, Kerchove and Ost present enough key examples of the aforementioned *anomalies*. Beyond the original difficulties[82] that are thoroughly discussed by many authors,[83] *strange loops* and *tangled hierarchies* in the Kelsenian theory,[84] with their characteristic paradoxes and self-references, expose the limits of the pyramidal hierarchy: discontinuity, incompleteness, and alternation. Subordination gives place to coordination and collaboration, linearity becomes relative as it witnesses loopbacks and the inversion of relations, and the tree structure gets diluted with many points of law creation.[85]

These spreading anomalies of *heterarchies*[86] go deeper in the symbolic foundations of the pyramid, such as the separation of powers in constitutional democracies:[87] the executive power is the *de facto* main proponent of new legislation; the parliament became merely an adopter of laws; judges exert the power to repeal (or even create or ignore) a law; constitutional courts substitute the will of the parliamentary constituencies, by enriching and replacing the law

[81] *See* Karim Benyekhlef, *Une possible histoire de la norme: les normativités émergentes de la mondialisation*, 2nd ed (Montréal: Thémis, 2015).
[82] Borrowing the expressions and concepts from Douglas Hofstadter, Ost & Van de Kerchove, *supra* note 72 at 45. *See* Douglas Hofstadter, *I am a strange loop* (New York; London: BasicBooks, 2007).
[83] *See* François Ost & Michel Van de Kerchove, *Jalons pour une theorie critique du droit* (Bruxelles: Publications des Facultés universitaires Saint-Louis, 1987).
[84] Ost & Van de Kerchove, *supra* note 72 at 49.
[85] *Ibid* at 50.
[86] As used by Hofstadter, referring to strange loop hierarchies when tangled.
[87] Ost & Van de Kerchove, *supra* note 72 at 80.

through interpretation; public prosecutors define their own criminal policies, choosing priorities and criteria, beyond the will of legislators; executive ministers[88] and administrative authorities[89] exercise powers of regulation. Beyond the anomalies of the internal dimensions of checks and balances, sovereignty[90] and hierarchy have also become relative between (as in the European Union), under (as tensions of independence of regions), and besides (the overwhelming power of big private corporations) the national states.

Scientific and legal theorists, even when facing undeniable evidence of paradigmatic change, are supposed to resist through the expansion of the dominant theories beyond their intrinsic limitations. This strategy of developing an epistemological break,[91] as Gaston Bachelard called it,[92] illustrates an effort of conserving the questioned theory through accommodation of the emergent alternative theory. This effort of subjugation can be illustrated when the pyramidal model tries to explain the frequent *phenomena* of judges deciding in *creative ways*, declaring it as deviations of the law, *judicial activism*, *politicization of justice*, *judicialization of politics*, or *government of judges*.[93] In this case, instead of recognizing the change in the balance of powers, the pyramidal perspective tends to deny or misinterpret those increasing practices and falls incapable of properly framing these *anomalous* facts.

But the main strategy in front of any apparent lack of adequate treatment or understanding of social phenomena is still attributing it to a lack of adequate law (for better legal instruments), or a lack of proper science (for better scientific framing). After all, there is a "cooperative relationship and circulation of meanings between science and law, under the aegis

[88] *Ibid* at 89.
[89] *Ibid* at 94.
[90] *Ibid* at 87.
[91] *See* Proyecto Grado Cero AEJ, *supra* note 79 at 40min 27s.
[92] *See* Gaston Bachelard, *The formation of the scientific mind* (Manchester: Clinamen, 2002) c 1st.
[93] This particular subject, explained in detail by Ost and Kerchove for describing a European scenario in 2002, constitutes the most conflictive debate about the Judiciary power in Brazil since 2014.

of science"[94] as the founding metanarrative sustaining modernity, as described by Sousa:

> Modern law thus became a second-rate rationalizer of social life, as a kind of surrogate scientifization of society, the closer we could get–at least for the time being–to the full scientificization of society, which could only be brought about by modern science itself. In order to perform this function, however, modern law had to surrender to the cognitive-instrumental rationality of modern science and become scientific itself. Moreover, in order to become scientific, however, modern law had also to become statist, since the triumph of order over chaos was to be guaranteed by the state, **at least as long as science could not guarantee it.**[95]

In this sense, a "deficit of law" and a "deficit of science" could mean the same, for the "profound isomorphisms between modern science and modern law,"[96] since the legal utopia of social engineering would serve as an intermediary front-end of the science. The process of scientificization of law, though, does not come from the "pure theory of law" of the dominant paradigm which strongly affirms a scientific approach to law,[97] but from as early process of retake of Roman law in the 19th century: a reduced blueprint of Roman law that turns "the science of law into mathematics"[98] as a form of social regulation, as if science would be considered the only rationality for social emancipation.

Even before the re-adoption of Roman law, the rationalist natural law movements[99] of the 17th and 18th centuries showed "early manifestation of the complicities between modern science and modern law,"[100] resulting in the theories of the social contract in Hobbes, Locke, and Rousseau, which projected the modern tension between regulation and emancipation. Their

[94] Santos, *supra* note 77 at 5.
[95] Santos, *supra* note 23 at 56. Emphasis added.
[96] Santos, *supra* note 77 at 4–7.
[97] At this point, this theoretical chapter could get into a very popular and populous debate in the legal academy about law as a science. But it will remain limited to what the mentioned authors propose.
[98] Santos, *supra* note 23 at 60. *See also* Rudolf von Jhering & John J Lalor, *The struggle for law* (Chicago: Callaghan and Company, 1879) at 114.
[99] Rationalist natural law served to legitimate both the liberal/democratic ideas and the despotic/terror practices in the French Revolution. This flexibility keeps quite some resemblance with the present days.
[100] Santos, *supra* note 23 at 61.

concepts and priorities of law diverge: Hobbes intends to build a "science of natural justice,"[101] viewing law as a product of the sovereign's will;[102] for Locke, law is a product of consent and delegated to the state, which is to be limited, with an emphasis on the protection of property as a guarantee against political oppression; and for Rousseau, who conceives law as an ethical principle and an instrument of social ordering, law is self-prescribed, so the community does not alienate the power of legislating to the sovereign/state. The positions toward the rationality of law between the three founders of modern politics—law potentially as the sovereign's will, consent, and self-prescription—display the complexity of the paradigm of modernity, where "the law is the exercise of regulation in the name of emancipation."[103]

The principles of regulation tensioned by logics of emancipation[104] described in the theories of social contract would face their *proof of concept* with the final consolidation of capitalism in the core of Western countries, when modern law builds its lasting institutions over the ruins of the pluralistic legal models from feudal society (seignioral law, royal law, urban law, *lex mercatoria).*[105] Since the 19th century, the modern paradigm has become directly tied to the development of capitalism, and so is the law. Legal-political modernity changes accordingly to the different periods of capitalism, here presented as three stages:[106] the period of liberal capitalism, during the whole of the 19th century; the period of organized capitalism, by the end of the century and up to two decades after World War II; and the period of disorganized capitalism from the end of 1960 to the present days.[107]

[101] *Ibid* at 64.
[102] *Ibid* at 70.
[103] *Ibid* at 71.
[104] For Santos, the three founders must be understood in the modern project of rationalization of social life, not only as theorists of regulation, but as well of rationality: Hobbes was most identified with the cognitive rationality of science; Rousseau, to the moral-practical rationality and the aesthetic-expressive rationality; Locke combines moral-practical rationality and common sense. See *Ibid* at 70.
[105] *Ibid* at 58.
[106] As originated by Hilferding and developed by Offe and others, according to Santos, *Ibid* at 71.
[107] *Ibid* at 72.

The constitutional state of the first period exposed the ambitious contradictions of modernity and was featured by the process of scientism and statism of modern law. Positivism arose as the dominant epistemology of modern science, securing legal positivism into law and jurisprudence as a necessary partnership. Framing knowledge-as-regulation, positivism advocated for the primacy of order over chaos in nature and society; order relied on regularity, where regularity was needed for systematic knowledge. Systematic knowledge and systematic regularity became double-sided aspects of order; knowing was observing regularities, where regulating was controlling observed regularities and producing regularity to be known. Through positivism, nature was supposed to be known-and-controlled, while the society was supposed to become controlled-and-predictable.

The symbioticism between scientific laws and state laws under positivism sought to fill the gap between the knowledge about nature (as it is) and society (as it is and ought to be), where modern science (with laws of societal evolution) would assist the state to scientifically construct modern law.[108] The *state-as-an-artificial-person* would manifest will to produce formal and rational law, in order to operate the *state-as-a-machine* and regulate the market, guaranteeing certainty and predictability. This process reduced law to an instrument of the state, but it did not turn the state into an instrument of law: as law became statist, it lost autonomy and power to a state increasingly scientific which gained it.[109]

In sum, in the period of liberal capitalism:

> [S]cientism and statism fashioned law in such a way as to convert it into an automatic utopia of social regulation, indeed isomorphic with the automatic utopia of technology engendered by modern science. This means that through modernity conceived of **law as a second-best (and probably provisional) principle of social ordering when compared to science**, once reduced to the capitalist state, law itself became a scientific artifact of the first order. From then on, the automatic utopianism of technology grew together with the automatic

[108] *Ibid* at 73.
[109] *Ibid* at 74.

> utopia of legal engineering, and indeed, the two processes have been feeding one another ever since.[110]

In the second period, the development of the welfare state in the Western societies would characterize the *organized capitalism*, acknowledging the inevitability of excesses and deficits in the social expectations of modernity,[111] dramatically changing the legal and political landscape by the increasing dominion of capitalism over economic and social relations.[112] Modern law would be redefined and refocused to accommodate antagonist social expectations and balance unachieved interests under realistic proportions and principled compromises.[113] Modern ideals of emancipation should be made compatible by state action: at one pole, autonomy, identity, and freedom; at another pole, solidarity, justice, and equality.[114]

In a greater or smaller scale, some of those incompatible values were made possible under partial fulfilments of the promises of a fairer distribution of material resources and greater democratization of political power. New realms of law had to be created—labour law, social law, economic law—for the development and monitoring of the new model of social regulation by the state. The social aspirations for an automatic utopia of the legal engineering, all announced and largely underachieved in the first period, would finally be credible to be implemented by state interventionism and legal instrumentalization. As an intervention of the state is necessarily an intervention in the state[115] (the same goes for the law), it transformed the statist and scientism of state law, sweeping away freedoms and self-regulations of the first period through an "unprecedented juridification of social life."[116]

[110] *Ibid* at 75. Emphasis added.
[111] *Ibid* at 76.
[112] *Ibid* at 77.
[113] *Ibid* at 78.
[114] *Ibid* at 79.
[115] *Ibid* at 80.
[116] *Ibid* at 81.

By this legal manipulability of state and society, law moved to two possible contradictory positions under the welfare state: the overuse of law by an intense legal activism that led to an ideology of modern bureaucracy and institutional fetishism; and the trivialization of law by downgrading from a principle of state legitimacy to an instrument of state legitimacy. Notwithstanding, the legitimization of the formal rationality of the welfare state was mostly based on the sustainability of significative economic development and the increase of social wellbeing that would no longer be the guiding force in the period of *disorganized capitalism*.

The third period of capitalism, beginning in the seventies of the 20th century, is marked by the degradation of the welfare state and a new phase for state law. The term *disorganized* may appear misleading, as capitalism has become more organized and has since advanced to all aspects of social life, practically neutralizing all possible opposition. The term makes sense when it illustrates the incapacity of the state in keeping its order in a new phase of capitalism in the central countries of the world, with the erosion of modern promises in many forms (increasing social inequalities, ideological delegitimization of the facilitative state, etc.).[117]

Within the pillar of regulation, the principle of the market overruns and colonizes the principles of state and community to a far larger extent than before under the ideology and practice of neoliberalism.[118] The nation-state loses its centrality with the expanding power of transnational corporations and international entities. Deregulation and privatization become common political slogans vis-a-vis a state transformation of growing weakness and inefficiency in keeping up with the market.[119] The always unfinished principle of community (a citizen-to-citizen relation) recedes even more from the forms of the second period (reduced to taxpayer to

[117] *Ibid* at 82.
[118] Neoliberalism is a concept of problematic definition, as there are many schools of thought associated to the term. Here is used in the Chicago School inflection. *See* Kean Birch, *A research agenda for neoliberalism* (Edward Elgar, 2017).
[119] Santos, *supra* note 23 at 83.

state, welfare client to state) in the third period, because the market does not effectively replace (and does not intend to replace) the monopoly of welfare provisions.[120]

The crisis of the welfare state is a crisis of the *materialization* of modern law—the overlegalization of society is symmetric to the oversocialization of law—not a crisis of the legal form itself, but a crisis of its political form. The real crisis is in the social fields (family, work, education, health, etc.)[121] regulated by a state law and scientific law that can neither effectively intervene nor satisfactorily explain why it cannot. The crisis of modern law (reduced to a state/scientific law) is better explained by a state progressively being bent under the aegis of the market, and by consequence, a science increasingly guided by the market, eliminating the tension between social regulation and social emancipation.

In the period of liberal capitalism, emancipation made concessions to regulatory needs in core countries of the Western world;[122] in the period of organized capitalism, state regulation tried to accommodate emancipation projects considered compatible to the historical needs of capitalism then. In the third period, the false synthesis of social expectations and social actions resulted in the end of the tension between the pillars of modernity. This leads to a reciprocal disintegration of emancipation and regulation. These deconstructive conditions set the context to perceivable signs of the crumbling of the pyramidal paradigm of law that is described in a prominent article from François Ost where he sets elements for analysis for a possible transition.

In the article *Le temps virtuel des lois postmodernes ou comment le droit se traite dans la société de l'information*,[123] the legal philosopher François Ost proposes an analogy for the

[120] *Ibid* at 84–85.
[121] *Ibid* at 87.
[122] Evidently, in the central capitalist economies but in a shorter extent in the Global South, as in Brazil.
[123] François Ost, "Le temps virtuel des lois postmodernes ou comment le droit se traite dans la société de l'information" in Jean Clam et al, eds, *Les transformations de la régulation juridique* Droit et société 5 (Paris: L.G.D.J, 1998) 423.

changes on the production of law in the emergence of a new legal paradigm, when the model of *handwriting of law* on papers moves to the model of *word processing of law* in computers.[124] Despite this *avant-garde* text being "largely ignored this work by civil law scholars, and virtually unknown by common law scholars"[125] after its publication, his work aged well and still inspires insights about the crisis/changes of modern law.

Instead of the orderly, predictable, and durable legal characteristics of the pyramid, the contemporary legal production runs on unstable, ephemeral, and aleatory processes demonstrated by the legislative inflation, the programed text obsolescence, and the acceleration of legal change.[126] Instead of the common image of technocratic operators of (boring) normative procedures, contemporary legal professionals now live under a form of (no longer new) anxiety. What was supposed to be transitory became habitual (the transitory is the "new normal"), urgency became permanent, even subversive for law production, and it is everywhere.[127] Law as a whole is set to be in movement, *in transit*, on the run, where change overrides stability, where the instantaneous discharges the duration. The sense of temporality becomes contingent, variable, radically relative, and almost volatile, which greatly contrasts with the self-image of the solid and hierarchical pyramid of law.

The analogy of a new computer-based model of *word processing*—diverging from the previous paper-based model of manual writing that worked for centuries—has much to say about legal professions. Despite being used for more than 30 years, the effects of creating and

[124] Most of the references to the mentioned Ost's article here where previously utilized in a case study about the *Brazilian Civil Rights Framework for the Internet*, here used relating the theoretical construction initiated in the doctoral seminar with professor Pierre Trudel in 2014. The resulting work came to be published: Cristiano Therrien & Pierre Trudel, "The Brazilian Civil Rights Framework for the Internet (or the Virtual Times of a Postmodern Law)" (2015) 20:3 Pensar - Revista de Ciências Jurídicas 746–766.
[125] Florian Martin-Bariteau, "The Matrix of Law: From Paper, to Word Processing, to Wiki" (2014) 19:1 Lex Electronica, online: <https://www.lex-electronica.org/docs/19-1_martin-bariteau.pdf> at 3.
[126] Ost, *supra* note 123 at 423.
[127] *Ibid* at 424.

distributing legal text in digital form are not to be taken lightly for the production and interpretation of law. The legal text editing becomes more and more circular, reversible, unstable, and virtual,[128] as in the metaphor proposed by Charles-Albert Morand, inspired by Karl Popper: a chaotic and unpredictable cloud-based model (teleocracy) is replacing the former mechanical and predictable clock-based model (nomocracy) of legal production, which was once recognized as linear, oriented, and reasonably stable (historical).[129]

The historical model of legal writing was based on the existence of an ideal author (supposedly, "the legislator") invested with legitimate power, who would present a new material proposition—a message with a fixed and finished character—properly dated and localized, supported by an institution, which then becomes publicly signed and imposed to all under the public domain.[130] Oppositely from what should be this *classic view* from the pyramid summit, the legislative process now works under a logic of *text processing*,[131] operated by an undefined number of authors (even absent and anonymous) from unexpected origins,[132] who multiply successive versions/propositions more in a copy/paste practice of reassembling used pieces than creating original elements of text; This generates a permanent rewriting of legal (hyper)text, in a perpetual gestation of working papers, available to be reshaped at any time.[133] The elasticity of the *new legal materials,* as a *soft dough*,[134] justifies the permanent recycling of legal doctrine, even without the supposedly necessary *distance* from the recent past: there is a need for shorter frequencies for staying relevant in the perennial flux of data in the *information society*.

The temporality of the law is also forcefully altered by *real time flows*, multiplying sources,

[128] *Ibid* at 425.
[129] *Ibid*.
[130] *Ibid* at 426.
[131] Or even more updated for the present times, *wiki processing*. *See* Martin-Bariteau, *supra* note 125.
[132] Ost Ibid. p.427.
[133] Ost Ibid. p.428.
[134] Ost Ibid. p.429.

and multidirectional senses of legal data. In the virtual time of word processing of legal information, there are no acts or events, but a flux of almost-reflex adjustments in a multitude of interaction points. It is a dilated present, a timing of simultaneity instead of historicity, dealing with a multilateralism of reports flowing from innumerable possible routes of information, operating under a quasi-anonymity of all-round communication in a new legal context of instantaneity, interaction, and synchrony.[135]

Under this fast-forwarding pace, there is asynchrony with the classical form of the constitutional state, which presupposes an authoritarian, unilateral, and centralized model of pyramidal comprehension of law based on clear distinctions (legal and socioeconomic, public and private) and separations (civil society and state, national and international, state powers). The interpenetration between public/private and legal/socioeconomic and national/international now serves as an instrumentalization (and legitimacy) of regulation, under the form of sector regulation and self-regulation by the market, working as a self-loading mechanism supposedly developed to maintain or restore the balance of a system threatened by disturbances.[136]

As independent administrative authorities assume the responsibility of delicate operations to balance competing powers in society through self-regulation, it serves as evidence of the erosion of the symbolic power of law. The transference of legal power/production to these hybrid institutions comes from the imperative of socioeconomic efficiency, as the managerial rationality arises as the main parameter to self-balance interests and creates a *soft consensus* in law,[137] particularly when dealing with highly specialized and unstable subjects.[138] The

[135] Ost, *supra* note 123 at 432–433.
[136] *Ibid* at 433–434.
[137] *Ibid* at 435.
[138] As pointed by Santos: “In some areas in which the technological component of legal regulation is paramount, legal rule becomes expertise rule, with norms *and* facts interpenetrating, each other to the point of becoming indistinguishable.” Santos, *supra* note 23 at 81.

transference of public powers and the reduction of the autonomy and efficacy of the state in the name of efficiency and management better illustrates the crisis of the pyramidal paradigm than any consideration of failing by the overuse of state law.

The welfare state faces an obvious crisis, yet its main public policies—full employment, economic development, education, health, culture, housing, environment protection—are still of general interest of society, even if now their pretensions are more modest and indirectly subject of regulations. Legislation becomes programmatic, bounded to a gradual achievement of its established objectives, and the plasticity of law is modulated by the resistance of facts. The legitimacy of law used to come from axiological, procedural and symbolical parameters, but now depends on performance: legislation legitimacy becomes contingent and relative to numerical and quantitative results/parameters that should be demonstrated, despite how difficult and improbable the realization of any public policy can really be done. Under this instrumental and pragmatic perspective, Ost points that the process of formation and application of law, from discontinuous and linear, becomes continuous and cybernetic.[139]

The production of law is no longer created as a new piece of the pyramid: the law no longer is an event or an act, but a process and a program; the law no longer works through dispositions, but though previsions; the law no longer establishes institutions, but elaborates scenarios; the law no longer imposes rules, but opens options. What the modern law lost from its security and normativity, the law now compensates in gains of adaptability and reversibility. The obligation of knowing the law is a double obligation of previewing and reviewing the law.[140]

This double obligation of knowing the law—an ongoing learning process of trial and error in the writing and rewriting of laws—has become an imposed task for lawmakers after the period

[139] Ost, *supra* note 123 at 436.
[140] *Ibid* at 437.

of welfare certainties, who also had to consider prudent *risk management* of centralized state impulses. The principles of precaution and prevention enforce the considerations of uncertain risks and unpredictable eventualities, putting the probabilistic logic at the limit. The logic of *legal risk management* demands legislators to justify their initiatives, applying it a test of proportionality that brings them back to modesty: every law is an experience as much social as legal.[141]

Even so, much of the experimentation that the rhetoric of risk presents as programmed temporalities, in fact, is better explained as improvisations, trying self-adjustment procedures as (*ad hoc*) reactions to the *anomalies* that legal theory fails to frame. It may seem that law lost the mastery of rhythm and control of its timing when,[142] in the abstinence of a methodology of change, legal production appears as the product of circumstance, as pragmatic responses to immediate priorities, exposing successions of change of weak amplitude. This regime qualifies as *provisional plasticity* that the legislator maintains as a transitory way of keeping his own relevance—since a permanent text would weaken his mastery on the legal subject—leading to successive extensions and periodic corrections of law. The provisional legislative orientations are subjected to unexpected changes of trajectory by reasons not always clear, giving place to discontinuous transitions, and untimely regime shifts.[143]

In the *state spectacle* context, the lawmaker (the minister, the legislator, the judge) becomes a media person who needs to show his/herself as someone capable of reactions in (almost) real-time who will meet social expectations (and imaginations) and who will keep visibility in niches, looking for a profitable (viral?) *hit* for its (internal and external) audience. This decision-maker sets in motion a new circuit of legitimacy in the normative production, based on

[141] *Ibid* at 438–439.
[142] *Ibid* at 444–445.
[143] *Ibid* at 446.

a need for the creation of laws, orchestrated by conditioning techniques of public opinion.[144] To all ends and means, the law fulfills an accessory function for the aesthetics of the show.

In these times of mediatic urgency and conditioning limits to the moral-practical rationality of law, beyond the applied constraints of the cognitive rationality of science, the change of paradigm in the aesthetic-expressive rationality of art and literature may provide relevant insights for both law and science—and to the ends of the present research. For this purpose, the next subchapter will conclude this series of possible theoretical dialogues between authors: Boaventura de Sousa Santos will forward considerations about possible contributions of art and literature for a new paradigm with key ideas from the ground-breaking work *Postmodernism, or, the Cultural Logic of Late Capitalism* by Fredric Jameson.[145]

1.1.4. The Postmodern Cultural Patchwork

This theoretical chapter went through an attempt of textual dialogues between works of authors of reference for the objectives of this research. First, Lyotard and Santos presented the undergoing change in the paradigm of modernity, locating the challenge of producing a coherent dissertation under shifting conditions of rationality and knowledge. Then, Morin and Santos described the signs of the crisis of modern science, the dominant rationality of modernity, setting further perspectives of change in contemporary society. Following this sequence, Ost, Kerchove, and Santos illustrated the paradigmatic change in law, directly linked to the crisis of *scientism* and *statism* of modern law under the current state of capitalism development. Finally, the end of this subchapter is dedicated to Jameson and Santos providing subsidizing views about what art and literature may reveal about the crisis in science and law in *late capitalism*.

[144] *Ibid*.
[145] Fredric Jameson, *Postmodernism, or, The cultural logic of late capitalism* (Durham, NC: Duke University Press, 1992).

Regarding term *late capitalism,* Jameson writes, "[i]t is not my favorite slogan, and I try to vary it with the appropriate synonyms ('multinational capitalism,' 'spectacle or image society,' 'media capitalism,' 'the world system,' even 'Postmodernism' itself),"[146] crediting the origin of the term to the *Frankfurt School*.[147] Jameson outlines three stages of capitalism[148] in relation to cultural practices: market capitalism, associated with technological developments as the steam-based motors and an emphasis on realism aesthetics; monopoly capitalism, associated with electricity and combustion motors, with modernism as dominant aesthetics; and multinational or consumer capitalism, associated with nuclear and electronic technologies, with postmodernism as its cultural manifestation.[149] The periods and descriptions are very similar to those previously used by Santos, so the term *late capitalism* (so much focused on marketing, selling and consuming commodities) can here be used as another term for the *disorganized capitalism* characterized by the erosion of the welfare state, when "[n]o one particularly notices the expansion of the state sector and bureaucratization any longer."[150]

Both Jameson and Santos make many references to Habermas' theories of modernity and his proposition of *completing* the modern project of civilization, even if he was not very hopeful of it himself: "the chances for this today are not very good"[151] in the entire Western world, with art in the forefront of negation. The point-of-no-return to the project of modernity, even "in a situation in which we are not even sure there is so coherent a thing as an 'age,' or Zeitgeist or 'system' or 'current situation' any longer,"[152] was first expressed by art (even better in literature). The vanguard of art and literature announcing and imagining an emergent paradigm for Western

[146] *Ibid* at xviii.
[147] Fredric Jameson, *Late Marxism: Adorno, or, The Persistence of the Dialectic* (London: Verso, 2007).
[148] The division in three periods deserves a reference to the works of Ernest Mandel, even if Jameson referred the term *late capitalism* more to Theodor Adorno and Rudolph Hilferding.
[149] Mary Klages, *Literary theory: a guide for the perplexed* (London: Continuum, 2011) at 166.
[150] Jameson, *supra* note 145 at xviii.
[151] Jürgen Habermas & Seyla Ben-Habib, "Modernity versus Postmodernity" (1981) 22 New German Critique 3–14 at 13.
[152] Jameson, *supra* note 145 at xi.

society is not surprising, considering the resistance that the aesthetic-expressive rationality successfully countered co-optation by the performativity-utilitarian rationality of science.[153]

It is necessary to stress that the new paradigm is emerging from modernity; it is based on it, looking for solutions to the deficits and excesses, above all in what was left unfinished by its project. Despite being possible to formulate the modern problem using a modern standpoint, there are no satisfactory modern solutions when insisting on the modern privileged views from science and the interests of market,[154] or even on law and state submitted to them. In this sense, the unfinished and open representations of the principle of community and the aesthetic-expressive rationality of art and literature provide new elements for an *archeology* of the modern project that may better explain its present, and point to possible futures.[155]

The most neglected principle of modern regulation in the last 200 years,[156] the principle of the community had many of its elements almost absorbed by the state and market, and it remains a very open and unfinished representation of modernity. In contemporary times, what this principle constitutes and empowers is underrepresented, notably when compared to exhaustive academic descriptions and social imperatives of the other two principles of regulation.[157] Even so, community "resisted the full technicoscientific specialization and differentiation through which the cognitive-instrumentality of modern science colonized the other forms of modern regulation."[158] Only three key communitarian elements have been partially colonized by market and state: participation, solidarity, and pleasure.[159]

[153] Santos, *supra* note 23 at 23.
[154] Insisting on "more of the same", the *libertarian canon* of more capitalism to solve the capitalist harms, and more technology to solve the new technological troubles, is a major motto in the political arena.
[155] Santos, *supra* note 23 at 22.
[156] Neglected *in theory and in practice*, or even better, *in involvement or compromise*.
[157] Despite the respectable academic production of the subject, the *academic involvement/compromise* with community is less than shy when compared to the academic production toward state and market.
[158] Santos, *supra* note 23 at 23.
[159] *Ibid*.

Participation has been reduced to representative democracy and citizen engagement by liberal politics/theories, but largely remains as an undifferentiated competence and unsubmissive potentiality of the community. Solidarity has been mostly limited to social policies of the welfare state (*social safety nets*) in advanced capitalist economies, but overwhelmingly provided by the community (*welfare society*) in most nation-states. Pleasure has suffered attempts of industrialization of leisure as a market commodity but persists irreducible and intersubjective as an expression of the *homo ludens* that resists closure. By resisting the *automatic utopianism of technology* and the *automatic utopia of legal engineering*, the principle of community suffered the cost of marginalization in the modern paradigm, but with the benefit of remaining open to a "positive dialect with the pillar of emancipation"[160] with all its three logics — in special with the aesthetic-expressive rationality of art and literature.

Another resistant and marginal representation of modernity, the aesthetic-expressive rationality has been "as open-textured and unfinished as the artwork itself, and so it cannot be captured in the rubber cage of technicoscientific automatism."[161] There is much debate in art and literature theories about it, but one of the key elements to explain this difference and discontinuity is the "author—along with all the concepts associated to with it, such as initiative, autonomy, creativity, authority, authenticity, and originality,"[162] modern concepts which evolved after the Enlightenment (*Renaissance*). The modern authorship (despite all *the reports of its death were greatly exaggerated*)[163], empowered by the related concepts, remains as a force of resistance to the colonization by science and law when combined with discursive (agency in) artifactuality.

[160] *Ibid*.
[161] *Ibid*.
[162] *Ibid* at 24.
[163] Misquoting Mark Twain, the intensive discussion about the *death of the author* by structuralist and poststructuralist authors is not relevant for this research, even if there are eleements to be recognized, yet much left out: "The artistic and literary field is thus a field in which the parts are more than the whole". *Ibid*.

All artifacts/works in art and literature must be made/done under a specific intention and constructive act, for which "the nature, the quality, the relevance, the appropriateness of such intention and construction are established through argumentative discourse for a relevant audience."[164] Based on this discursive and potentially everchanging artifactuality, the aesthetic-expressive rationality promotes rhetorical knowledge that "unifies what scientific rationality separates (cause and intention) and establishes quality and relevance (instead of truth)."[165] A crucial exercise of rhetoric over a "dynamic imbalance tilting toward emancipation, an asymmetry in favor of emancipation over regulation"[166] is what the community of art and literature (artists, writers, and their public) has contributed to the debate about postmodernity.[167]

Reflections about postmodernity, "as an attempt to think the present historically in an age that has forgotten how to think historically in the first place",[168] had a grand *début* on the aforementioned work of Lyotard, which concentrated most of the argumentation on science, as Habermas did for philosophy. But Jameson, who wrote the foreword of *The Postmodern Condition*,[169] pinpointed how much Lyotard and Habermas missed the subject of culture and any influence of it over the capitalist transformations of their time: "for both of them, a return to the older critical modernism is still possible".[170] In *Postmodernism*, Jameson started a materialist critique of postmodern culture in arts and literature—with an emphasis on architecture—about their "shifts and irrevocable changes in the representation of things and the way they change."[171]

[164] *Ibid* at 25.
[165] *Ibid*.
[166] *Ibid*.
[167] For Santos, "Postmodernity means precisely, if anything, this dynamic imbalance or asymmetry in favor of emancipation, accomplished with the epistemological complicity of both the principle of community and the aesthetic-expressive rationality." *Ibid*.
[168] In the first phrase in the introduction of *Postmodernism, or, the Cultural Logic of Late Capitalism*. Jameson, *supra* note 145 at ix.
[169] Lyotard, *supra* note 24.
[170] Fredric Jameson, "Foreword" in Geoffrey Bennington & Brian Massumi, eds, *The postmodern condition: a report on knowledge* (1984) at xvii.
[171] Jameson, supra, p.ix

It is necessary to highlight that many authors will stress the differences between postmodernity and postmodernism, where postmodernity symbolizes a new general paradigm of society and the changes of conditions and institutions, while postmodernism would be the most appropriated term for the aesthetic and literary movements or reactions to postmodernity.[172] Despite being more limited to specific realms, postmodernism is not "only the reflex and the concomitant of yet another systemic modification of capitalism,"[173] but also what came to be called the general frame of cultural and intellectual reference which criticizes modernity and counteracts modern cultural expressions. The general frame of postmodernism is composed of divergent sets of theories and schools of critical thought—with not a single, linear, logical, central order—mostly expressed in art and literature with which Jameson and his *Postmodernism* proficiently "redrew the whole map of the postmodern at one stroke – a prodigious gesture that has commanded the field ever since."[174]

Jameson came to be the first—and for a while, the only—to fully relate the postmodern movement in art and literature to a change in capitalism itself, not describing it as only one more aesthetic phase in culture. As the title of his work states, Jameson draws a horizon of *late capitalism* to discuss the cultural manifestation of postmodernism: a "world capitalist system fundamentally distinct from the older imperialism," dominated by "transnational business" run by corporations, ruptured by "computers and automation," under a "new dynamic in international banking and the stock exchanges", and related to the ascension of "new forms of media interrelationship."[175] The elements of late capitalism set the economic, social and technological conditions for the ruptures and continuations from a modernist to a postmodernist culture:

[172] And even political, social, philosophical, religious movements. The richness of the full postmodernist debate is too overwhelming to be dealt within this doctoral dissertation – and unnecessary for it.
[173] Jameson, ibid p.xii
[174] Perry Anderson, *The origins of postmodernity* (London: Verso, 1999) at 54.
[175] Jameson, *supra* note 145 at xix.

> Postmodernism is what you have when the modernization process is complete and nature is gone for good. It is a more fully human world than the older one, but one in which "culture" has become a veritable "second nature."[…] So, in postmodern culture, "culture" has become a product in its own right; the market has become a substitute for itself and fully as much a commodity as any of the items it includes within itself.[176]

A closer examination of the relations between the new phase of capitalism, the social and epistemological paradigm of postmodernity, and the postmodern culture are necessary for understanding how to navigate between the many possible angles of the prefix *post*[177] in postmodernism, according to the intended view. This dissertation focuses on angles of *change* and *shift* of paradigms in science and law from modernity to postmodernity, but there is a known confusion of many possible meanings of *post*—as *result*, *aftermath*, *afterbirth*, *development*, *denial,*[178] etc.—which postmodern art and literature have been openly dealing with long before the debate of science and law in postmodernity. In addition to postmodernism, law and science have much to learn from/with/through art beyond instrumental aesthetics (beauty, style, design) as the analysis of modernity that literary studies[179] have done so far—for example, what is called *postmodern* is not necessarily anti-modern or a complete rejection of modernism.

"Postmodernism is not something we can settle once and for all and then use with a clear conscience."[180] At the very east, the vastly available bibliography about postmodernism in literary studies about often-discussed tendencies may provide some substrate to the differences between modernism and postmodernism in culture, as a way of finding some coordinates to navigate the mazes of this complex debate. Paradoxically, the references provided next are

[176] *Ibid* at ix–x.
[177] *See* Kwame Anthony Appiah, "Is the Post- in Postmodernism the Post- in Postcolonial?" (1991) 17:2 Critical Inquiry 336–357.
[178] Postmodernism in Literature - IITM, "Lecture 1a: Introduction - Postmodernism in Literature", (2018), online: *YouTube* <https://youtu.be/6CqxHRt7_gg> at 9min 39s.
[179] Under a *peer-review process* of the literary community that many could describe as a lot more critical and unforgiven than in the scientific and legal communities.
[180] Jameson, *supra* note 145 at xxii.

disposed in a very modern form of oppositions and contrasts, as an evidence that modernity is not over, and postmodernity does not imply in the total end of the modern forms (as homogeneities, simplicities, binarities) of "bourgeois aesthetics and most notably in high modernism, of one of the age-old functions of art – the pedagogical and the didactic."[181]

Modern and postmodern cultures coexist in the present times and their production in art, literature, and architecture influence each other, with "Postmodernism not as a style, but rather as a cultural dominant"[182] over (high) modernism, which is still very much under production. Modernism presents fragmentation and extreme subjectivity like crises and problems to be solved in a mainly epistemological approach (a question of knowledge); Postmodernism accepts fragmentation and incoherence as chaos is inevitable and must be embraced, in a more ontological approach (a question of being). Modernism advocates for art as a provider of unity and meaning for modern life; postmodernism does not assert that art can make meaning, or even that the world has a meaning. Modernism cultivates austerity, promotes realism through individual consciousness, and propels absolute determinacy; postmodernism explores pleasure, opposes realism as a deluding notion, and postulates a relative indeterminacy.[183] Finally, it should be stressed that there is no consensual understanding about the relations between modernism and postmodernism,[184] yet for the objectives (and meta-structures) of this doctoral dissertation, these modest categories and other descriptions still follow a modernist (and arbitrary) sense for explaining postmodernism.

For Jameson, "modernism was still minimally and tendentially the critique of the commodity and the effort to make it transcend itself," while postmodernism "is the consumption

[181] *Ibid* at 50.
[182] *Ibid* at 4.
[183] Postmodernism in Literature - IITM, *supra* note 178 at 11min 52s.
[184] See Lawrence E Cahoone, ed, *From modernism to postmodernism: an anthology*, 2nd ed, Blackwell philosophy anthologies 2 (Malden: Blackwell Pub, 2003).

of sheer commodification as a process."[185] The commodification of culture as a postmodern condition can be perceived in *moves,*[186] or constitutive features that are lengthily described by Jameson in his *Postmodernism* in art and literature, as well as in architecture and urban planning:

- By comparing the works of high-modernist Vicent Van Gogh (*A Pair of Shoes*) and postmodernist Andy Warhol (*Diamond Dust Shoes*), the first difference emerges as "a new kind of flatness or depthlessness, a new kind of superficiality in the most literal sense, perhaps the supreme formal feature of all the Postmodernisms."[187] Depthlessness "finds its prolongation in contemporary 'theory' and in a whole new culture of image or the simulacrum,"[188] as reality is replaced with a fragmented representation of the subject that can ever move beyond (multiple) surfaces or *false consciousness*;

- It leads to a "consequent weakening of historicity, both in our relationship to public History and in the new forms of our private temporality."[189] Referring to poetry (*China*, by Bob Perelman) and literature (the book-in-a-book in Flaubert's *Parrot*), Jameson details a *weakening of historicity* meaning a "loss of any active sense of history, either as hope or memory," a discontinuity from "a charged sense of the past" with its traditions and dreams, as well as the expectancies of the future that characterized modernism, "fading back into a perpetual present."[190]

[185] Jameson, *supra* note 145 at x.
[186] Anderson, *supra* note 174 at 54.
[187] Jameson, *supra* note 145 at 9.
[188] *Ibid* at 6. Jameson refers to Jean Baudrillard's theory of simulacrum (simulacra): "Simulation is no longer that of a territory, a referential being, or a substance. It is the generation by models of a real without origin or reality: a hyperreal.... It is no longer a question of imitation, nor duplication, nor even parody. It is a question of substituting the signs of the real for the real". *See* Jean Baudrillard & Sheila Faria Glaser, *Simulacra and simulation* (Ann Arbor: University of Michigan Press, 2018) at 1–2.
[189] Jameson, *supra* note 145 at 6.
[190] Anderson, *supra* note 174 at 56.

- As a consequence, there is a “waning of affect,” as “a liberation from anxiety but a liberation from every other kind of feeling as well, since there is no longer a self present to do the feeling.”[191] Following Lyotard, Jameson describes "a whole new type of emotional ground tone—what I will call 'intensities'—which can best be grasped by a return to older theories of the sublime."[192] Using architecture as a parameter (as Frank Gehry’s spaces), he contrast what would be considered as the negative emotions of modernism—“anxiety, terror, the being-unto-death”—with the “intensities” of the postmodern as “messiness of a dispersed existence, existential messiness, the perpetual temporal distraction of post-sixties life.”[193]

- In postmodernism, there is a breakdown in “the older (essentially high-modernist) frontier between high culture and so-called mass or commercial culture,”[194] (low culture or popular culture). There is a transgression between what was called literature,[195] as the works of difficult access even for middle class (e.g., James Joyce and Marcel Proust) to what became literature: the “so-called paraliterature, with its airport paperback categories of the gothic and the romance, the popular biography, the murder mystery, and the science fiction or fantasy novel.”[196]

- Following the practices of mixing *high* and *low* cultures, ***pastiche*** is one of the main characteristics of cultural production in postmodernism according to Jameson: “Pastiche is thus blank parody… the practice of a kind of blank irony.”[197]

[191] Jameson, *supra* note 152 at 15.
[192] Jameson, *supra* note 145 at 6.
[193] *Ibid* at 115.
[194] *Ibid* at 2.
[195] About the moving line between what is considered literature and what is not, see: Terry Eagleton, *Literary theory: an introduction* (Malden; Oxford: Blackwell Publishing, 2015).
[196] Jameson, *supra* note 145 at 2–3.
[197] *Ibid* at 17.

> Parody can express the self-conscious, self-contradictory, self-undermining statements associated with postmodernism.[198] For Jameson, pastiche is used to represent the past under the form of *pop history*, "in which we are condemned to seek History by way of our own pop images and simulacra of that history,"[199] detailed by examples in literature (e.g. *Ragtime*, by E.L Doctorow) and cinema (e.g. *American Graffiti*, by George Lucas).

Finally, it is worth emphasising the relevance of the development of technological innovations for postmodern culture, as "the deep constitutive relationships of all this to a whole new technology, which is itself a figure for a whole new economic world system."[200] The diffusion of the colour television and the computer terminal, as massified technologies in the post-war epoch, contribute to explaining the shift from a cultural paradigm of modernism seized by *images and texts of machinery,* to a new dominant paradigm of *machinery of image and text*.[201] It is important "to avoid the implication that technology is in any way the 'ultimately determining instance' either of our present-day social life or of our cultural production,"[202] but at the same time understand that those networked (and now fully digital) technologies of power and control represent "the whole new decentered global network of the third stage of capital itself."[203]

In sum: reflexivity, self-referentiality, superficiality, irony, intertextuality, instability, discontinuity, hybridity and decentrality are considered general characteristics that can be found in postmodern arts, literature, and architecture. However, postmodernism is not expressed in the same way in all forms of the aesthetic-expressive rationality. Postmodernism and postmodernity,

[198] See: Linda Hutcheon, *The politics of postmodernism* (London: Routledge, 2007).
[199] Jameson, *supra* note 145 at 25.
[200] *Ibid* at 6.
[201] Anderson, *supra* note 174 at 88.
[202] Jameson, *supra* note 145 at 37.
[203] *Ibid* at 38.

as a reaction to (the failures of) modernism and modernity, find different expressions in literature and architecture—which are of major importance for the ends of the present research—because high modernism has also been expressed in different ways.

In modernism, architecture found itself in the apex of the excesses (and deficits) of modernity, with a maximum commitment to science and technology for establishing order and progress for society, submission and dominance over nature, and a cold logic that distrusted human factors. “More decisively than in the other arts or media, postmodernist positions in architecture have been inseparable from an implacable critique of architectural high modernism,”[204] as a reaction against the austere utopias of scientific perfection and technological design—idealized by Le Corbusier, Mies, Wright, etc.—which Jameson “credited with the destruction of the fabric of the traditional city and its older neighborhood culture.”[205] It was exactly the postmodernist movement in architecture which first and most significantly called attention of the author, thus he dedicates a large part of his comparative analysis to it—especially to the works of Frank Gehry and John Portman—and draws the postmodern characteristics and conditions from it, adjusting the approach for the other cultural expressions.

Literary modernism represented an offensive against the modern science and skepticism about the ideas of progress, in a very distinct strand (and almost oppositional) from architectural modernism, and it illustrates the complexities and contradictions inside modernism(s). Some modernisms were considered *antimodern*, protesting against modernization—industrial progress, rationalization, reorganization of production and administration—and values of innovation and transformation by technological progress. In many fields of art and literature, during the whole second period (monopoly capitalism or organized capitalism), there was a “new

[204] *Ibid* at 2.
[205] *Ibid*.

wave of anti-positivist, spiritualistic, irrational reactions against triumphant enlightenment progress or reason,"[206] that can be seen as a rebellious reaction of the aesthetic-expressive rationality against the hyperscientificization and hypermarketization of the late modern paradigm.

As Jameson summarizes in the conclusion of *Postmodernism,* "the deepest and most fundamental feature shared by all the modernisms is not so much their hostility to a technology some (like the Futurists) actually celebrated, but rather their hostility to the market itself."[207] It is a revealing contradiction, since high modernism manifested hostility against capitalism, even being run under elitist conditions: by making art of difficult access and interpretation, modern arts, literature, and music were kept obscure to the masses (including the middle class). In opposition to it, the various postmodernisms "all at least share a resonant affirmation, when not an outright celebration, of the market as such,"[208] and embrace massification and commodification of art based on lower and middle classes.

As a last and necessary remark about the chosen work for this analysis, Jameson does not lament or celebrate the ascension of postmodernism as the current cultural dominance of temporal conditions of late capitalism, as other authors do—he instead promoted the exposed ideas, even if displeasing most authors from left to right, Marxists and poststructuralists—but intended to build a framework for dealing with it. Yet Jameson confesses what he considers a major fault in his work, right in the very first endnote in the introduction of *Postmodernism*:

> This is the place to regret **the absence from this book of a chapter on cyberpunk**, henceforth, for many of us, the supreme literary expression if not of Postmodernism, then of late capitalism itself.[209]

[206] *Ibid* at 304.
[207] *Ibid*.
[208] *Ibid* at 305.
[209] *Ibid* at 419. Emphasis added.

Fortunately, other authors endured on the trail of the pertinence of the cyberpunk literary subgenre for understanding the postmodern paradigm – and what could be done about it.

Cyberpunk literature could well express many of the elements that will next be presented in this dissertation: networked society/law, digital/global cities, risks of the present/future, and (hopefully some clues about) what law should serve in this context. The next subchapter will summarize the remaining theoretical references that served here as secondary frameworks in the metanarrative of the research, while relating them to the ways in which they all serve the purposes of the research.

The first part of the subchapter was dedicated to imaginary dialogues between works of central reference for this dissertation. By exploring possible convergences between authors and their ideas, a theoretical framework was constructed, developing the one brought in the initial research project, and developing it further during the research process. In each part, the *theory chapter* used different formats of cross-dialogue between works (an experiment itself) in an attempt of bringing up the most relevant ideas for the guiding references of the research, as well as the elements for interpreting the goals of the research.

The second part of the chapter gives the coordinates of another part of the network of theoretical references and authors that form the design of this dissertation. Their ideas and works are not less relevant or secondary here; in fact, many times their influence is a lot more explicit on the narratives about cities. Exactly because the theories discussed in the first part run deeper and more implicit in the texts, the second part takes a different direction, exposing theoretical frameworks in a more direct format about the references. There is less need for developing an interaction than in the first part, considering that the references in the next subchapter are frequently more accessible and better known by someone who might be reading this dissertation.

1.2. Storytelling and Counter-Storytelling a Legal Dissertation About Future Cities

The first chapter started by stating that this doctoral dissertation is a story and, like every story, it is told considering who will read it. This academic story could only be told to a public from a faculty of law, and not all of them: a small number of faculties of law could receive such a hybrid, experimental, and unconventional research project; very few doctoral programs would provide the critical, theoretical, and heterogeneous elements to develop it as they are here; maybe some of them have an advanced group of legal scholars who could receive, analyze, and surpass the contradictions in the premises and results of the research; only one specific group from only one faculty—*la Faculté de droit de l'Université de Montréal (UdeM)*—may accept this story as it is now, containing so many different voices for telling it.

Even considering that there was a conscious effort of making the most of this dissertation accessible for the general public as possible, the main narrative reveals much about how the research came to be. This dissertation is, in several ways, a product of the law doctoral program at Université de Montréal, gathering many influences and afluences that it could absorb from the *Faculté de droit de L'UdeM*,[210] its main research centre, and researchers.[211] It is not for nothing that, despite being written in English, there are so many references to European and North American authors in the theoretical framework, but with a strong French accent.[212] This academic landscape was a determinant condition for producing an interdisciplinary dissertation written with so many voices and (sometimes dissonating) tones, with a pluralistic vision of law set on a global postmodern horizon to frame it—for many faculties of law such conditions and work would be innovative, but not at UdeM*,* for the last two decades, at least.

[210] See more at www.droit.umontreal.ca.
[211] See more at www.crdp.umontreal.ca.
[212] A by-product of the authors and schools of thought presented at Université de Montréal.

Not only the results come from the many contributions by the "École de Montréal"[213] but they also compose with elements that the doctoral researcher brought from a more Latin-Ibero-American approach of law, technology and society. Those different visions were well accepted by the academic community at UdeM when presented and contrasted during events and discussions, which turned into an invitation for moving further into their interaction here.

Most references here can be traced back to the doctoral courses, class readings, series of conferences, meetings with advisors, conversations at *bureaus* and the several borrowed books from the shelves of professors. Any doctoral candidate familiar with the *Centre de recherche en droit prospectif* (CRDP) at UdeM would understand these dynamics and the *how and why* they are reflected in the networked theoretical framework capable of focusing in technological topics that found innovative methods to be achieved (or not) in this dissertation.

1.2.1. About Networked Cities That Used to Exist Only in the Future

This research departed assuming *the network as design* in all possible forms of making some sense about society, technology, state, law, culture, and even *the self*. First, it was through the trilogy of books *The Information Age: Economy, Society and Culture*[214] by Manuel Castells—and several readings of other authors to better understand it—that technology and society were brought as an integrated subject to the research project, because:

> Information technology became the indispensable tool for the effective implementation of processes of socio-economic restructuring. Particularly important was its role in allowing the development of networking as a dynamic, self-expanding form of organization of human activity. This prevailing, networking logic transforms all domains of social and economic life.[215]

[213] *See* Vincent Gautrais, ed, *École de Montréal*, 1st ed (Montréal: Thémis, 2019).
[214] Manuel Castells, *The Information Age: Economy, Society and Culture* (Oxford: Wiley-Blackwell, 2010).
[215] Manuel Castells, "Conclusion: Making Sense of our World" in *End of millennium*, 2d ed (Chichester, West Sussex: Wiley-Blackwell, 2010) at 372–373.

The perspective of *society as a network* was already part of the initial doctoral project, coming from theoretical influences carried on since the times of research related to a master's thesis in Spain.[216] But the significative revisions in the second edition of the first book[217] (about 40% different) and the debates in the doctoral seminars advanced some of the previous visions about the reference, spreading the concepts of the network society to other dimensions. The research and debates at UdeM were fundamental for applying a *network logic* and conciliating the ideas of the *network state*[218] as conceived by Castells, and the *law as a network* as set by Ost and Van de Kerchove.[219] In *Une possible histoire de la norme: les normativités émergentes de la mondialisation*, Karim Benyekhlef provides all the elements for it:

> *À cet égard, la figure du réseau constitue pour Ost et Van de Kerchove un des pôles – l'autre étant représenté par la pyramide – de la dialectique sans synthèse qui doit aujourd'hui caractériser les réflexions sur le droit.*[220]

Considering the *dialogues* between Santos, Ost and Van de Kerchove, is important to follow the advice of Benyekhlef that, despite the crumbling of the modern pyramid and the emergence of the postmodern network, it does not mean that the totality of the modern law should be thrown into the trash bin.[221] It is necessary to privilege the dialectic method of not choosing the pyramid or the network but keep a tension between them, "*parce de cette opposition surgit, sans doute, une meilleure compréhension de la complexité du réel*."[222]

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[216] Cristiano Therrien, *Transfronteras de la protección de los datos personales: una perspectiva brasileña en un nuevo paradigma global-legal* (Master's thesis, Universidad Complutense de Madrid, 2001) [unpublished].
[217] Manuel Castells, *The rise of the network society* (Oxford: Wiley-Blackwell, 2009).
[218] "[A] network state formed by nation-states, international institutions, associations of nation-states, regional and local governments, and non-governmental organizations." Manuel Castells, *The Power of Identity*, 2nd ed (Malden: Blackwell, 2004) at 364.
[219] Benyekhlef, *supra* note 81 at 691–730.
[220] *Ibid* at 694. Considering the possible readers for this dissertation, the choice here was keeping it in the original language. Many scholars would appreciate reading this impressive work in French language.
[221] *Ibid* at 35.
[222] *Ibid* at 47.

Understanding how people perceive the many complexities of reality—in the specific case, how people perceived networked complexities in the subject of smart cities—was one of the first worries from the start of the research. It was a key component to frame the research about its polemic topics, during paradigmatic exchanges between *old* and *new media*, information and misinformation overloads, public and private narratives in dispute through digital technologies. Therefore, other frameworks were necessary for a broader comprehension of information, communication and culture also under a network perspective, attending to:

> the larger problem of the relation between 'culture' and 'information'. Information, that is, might be more than simply the content of a communication. We are no longer mostly dealing with information that is transmitted from a source to a receiver, but increasingly also with informational dynamics – that is with the relation between noise and signal, including fluctuations and microvariations, entropic emergencies and negentropic emergences, positive feedback and chaotic processes. If there is an informational quality to contemporary culture, then it might be not so much because we exchange more information than before, or even because we buy, sell or copy informational commodities, but because cultural processes are taking on the attributes of information – they are increasingly grasped and conceived in terms of their informational dynamics.[223]

In *Network Culture: Politics for the Information Age*, Tiziana Terranova advances the network logics over media that Castells details in *The New Media and the Diversification of Mass Audience,*[224] and its role on network culture in times, "characterized by an unprecedented abundance of information output and by an acceleration of informational dynamics."[225] Both authors acknowledge the selectivity and segmentation in media and audiences, which is deepened by the simultaneity and multiplicity of messages and sources.[226] Departing on these ideas, the research incorporated media as a constituent source of messages and audiences.

[223] Tiziana Terranova, *Network Culture Politics for the Information Age* (London: Pluto, 2004) at 7.
[224] Castells, *supra* note 217 at 365–370.
[225] Terranova, *supra* note 223 at 1.
[226] *See* Françoise Sabbah, "The new media" in Manuel Castells, ed, *High technology, space, and society* (Beverly Hills: Sage, 1985) 210.

Presuming that “law and legal institutions aren't separate from these processes of cultural construction,”[227] another approach under a network logic was absorbed concerning how liberal political theory has constrained legal scholarship in technology by turning liberal aspirations into factual assumptions, as well as what could be combined from other areas of knowledge to overcome these gaps in legal theory toward information flows. Such questioning and interdisciplinary approaches were brought by the book, *Configuring the Network Self: Law, Code, and the Play of Everyday Practice*, by Julie E. Cohen, where the professor puts in motion “a set of methodologies often lumped together under the heading of ‘postmodernism.’”[228] Her work combines legal theory and contributions from other areas, developing central subjects for this research that law and public policy have struggled to conciliate, such as openness and privacy:

> [L]egal and policy discussions about control of cultural information and control of personal information have remained largely separate. For the most part, the leading scholarly books on these topics do not acknowledge, much less attempt to explore, the interconnections. Within the wider public policy arena, copyright and privacy issues are rarely linked. To an extent, this disconnect also has a political explanation. Advocates of increased commodification and transparency have nothing to gain from highlighting the overlap. Advocates of “free culture” and “access to knowledge,” meanwhile, tend to be uneasy with the limitations on access that privacy claims represent, and so have difficulty making common cause with privacy advocates across a broad range of issues.[229]

The liberal idea of the individual—dominant in legal theory on privacy in North America—as an “autonomous rational disembodied pre-cultural self that makes autonomous rational pre-cultural choices,”[230] presupposes the self and culture as fundamentally separate entities and that is not what many other fronts of knowledge have been saying for a long time. The legal gaps

[227] Center for Media & Social Impact, “Visiting Scholar Series 2013 | Julie Cohen - Configuring the Networked Self”, (29 March 2013), online: *YouTube* <https://www.youtube.com/watch?v=bHiMIkLOPdI> at 8min 25s.
[228] Julie E Cohen, *Configuring the networked self law, code, and the play of everyday practice* (New Haven: Yale University Press, 2012) at 10.
[229] *Ibid* at 1.
[230] Center for Media & Social Impact, *supra* note 227 at 7min 37s.

and contradictions of *information-as-control* and *information-as-freedom*[231] must be addressed to go beyond this binary limitation to face the realities and needs of individuals and collectivities. For example, consider people walking down the sensor-packed streets of smart cities, all supposedly consenting for the use of their data by a lightly regulated data market. The *timeless time* and the *space of flows* advocated by Castells are supportive of the ideas of multiple potentials for identity and a *networked sense of self* sustained by a sociality performed via a network of relations—one of the main hubs of the network being the city. [232]

Before becoming the main theoretician about the *information age*, Castells was a researcher on urban issues,[233] and his works in the field still ressonate today. Therefore, it is not surprising that the subject of cities in the network society figures as an integrated subject in his theory, giving much space of thought for this doctoral dissertation. Consider the major (bi)polarities of the *space of flows* and the *space of places*, for example:

> In the space of flows, separate locations are linked up electronically in an interactive network that connects people and activities in different geographical contexts. Now, the spatial flows – let us say, the financial networks, the international production networks, and the media networks – are not a-territorial. They consist of territories which are distant, which are linked to different geographic hinterlands. But they are electronically connected; their function and their meaning come from their connections. Thus, they do not exist separately. In that sense, they are not purely electronic networks. The electronic networks link up the specific places, and it is this hybrid space that is the space of flows. The space of places organises experience and activity around the confines of locality. What is critical in our society is that cities are structured and restructured simultaneously by the competing logics of the space of flows and the space of places. Cities do not disappear into the virtual networks. Rather, they are transformed in the interface between electronic communication and physical interaction. They are transformed by the combination in practice of cities, networks, and places but without fully integrating them.[234]

[231] *See* Cohen, *supra* note 228 at 3.
[232] *See* Zizi Papacharissi, "Introduction" in Zizi Papacharissi, ed, *A networked self and love*, 1st ed (New York: Routledge, 2018).
[233] *See* Manuel Castells, *The city and the grassroots: a cross-cultural theory of urban social movements*, California series in urban development 2 (Berkeley: University of California Press, 1983).
[234] Manuel Castells, "Local and Global: Cities in the Network Society" (2002) 93:5 Tijdschrift voor economische en sociale geografie 548–558 at 553–554.

Once set clear that the network acts as the background of flowing spaces of this research, it is necessary to reaffirm *the city as the focal point* of this dissertation and a very useful vector of approaching several techno-social issues despite the physical distances and different legal contexts of cities. Saksia Sassen, author of *The Global City*,[235] is thought to have first coined this term that highlights the new role of cities in globalized and digitized operational spaces for corporate actors and intermediary functions (as finance, legal, accounting and other services) that need to work with networked knowledge and power. The Dutch-American sociologist was also one of the first major academics to address the smart city within this logic, questioning how technology has been used to enable and alter urban infrastructure and asking how to *urbanize the technology* – closed systems trying to operate the open urban systems that may turn them, instead of an intelligent city, into an obsolete city.[236]

Sassen points out that many world cities of today outlasted empires, national states and entire ages, by adaptation and differentiation, but the present times of inter-city global circuits have brought new conditions that have much to do with information technologies.[237] There is much in her contributions that relate to the spatial transformations described by Castells—they have agreements on the historical transformations caused by technology, globalization and networking—and their works are essential parts in the construction of theories of spatial forms and processes adapted to the current techno-social context. Sassen's works have offered much for the first stages of the research but, above all, to not fall into overly-nihilist perspectives while thinking about the technologies of global corporations spreading in cities:

> Digital networks are contributing to the production of counter-geographies of

[235] *See* Saskia Sassen, *The Global City: New York, London, Tokio* (Princeton: Princeton University, 2001).
[236] *See* Liftconference, "Saskia Sassen 'The Future of Smart Cities'", (2011), online: *YouTube* <https://youtu.be/Ww4pYjLViFE>.
[237] *See* Saskia Sassen, "The Global City: Introducing a Concept" (2005) 11:2 BJWA 27–43; Saskia Sassen, "The Specialised Differences of Cities Matter in Today's Global Economy" in Sam Whimster, ed, *Reforming the city: responses to the global financial crisis*, 1st ed (London: Forumpress, 2009) 209.

> globalization. These can be constituted at multiple scales. Digital networks can be used by political activists for global or non-local transactions. But they can also be used for strengthening local communications and transactions inside a city. Recognizing how the new digital technology can serve to support local initiatives and alliances across a city's neighborhoods is extremely important in an age where the notion of the local is often seen as losing ground to global dynamics and actors.[238]

The critical thinking of academics about cities that reverberates on or originates from local activism of social movements was an essential matter of questioning in the research since its conception. The concerns and concepts that come along the *right to the city*, an idea first spread by the French philosopher and sociologist Henri Lefebvre in his book *Le droit à la ville*,[239] are contemporaneously symbolized and expressed by David Harvey:

> The right to the city is not merely a right of access to what already exists, but a right to change it after our heart's desire. We need to be sure we can live with our own creations (a problem for every planner, architect and utopian thinker). But the right to remake ourselves by creating a qualitatively different kind of urban sociality is one of the most precious of all human rights. The sheer pace and chaotic forms of urbanization throughout the world have made it hard to reflect on the nature of this task. We have been made and re-made without knowing exactly why, how, wherefore and to what end. How then, can we better exercise this right to the city?[240]

There is a very broad literature on the subject—that took a lot of time for reflection, even if not directly mentioned in the text—but what would always remain present during the research was a very basic question from Harvey: are the key urban problems being discussed? And, advancing on the same line of reasoning, another direct question that Harvey posed at a *Smart City Expo*: "why are our cities becoming centres for actually people storing savings and investments[…] rather than cities being built as reasonable living environments for the mass of

[238] Saskia Sassen, "Towards a Sociology of Information Technology" (2002) 50:3 Current Sociology 365–388 at 380.
[239] Henri Lefebvre, *Le droit a la ville*, 2nd ed (Paris: Anthropos, 1968).
[240] David Harvey, "The right to the city" (2003) 27:4 International Journal of Urban and Regional Research 939–941 at 939.

the population?"[241] There is much about smart cities to be discussed under this perspective and researchers on the subject must keep it in focus as some have been doing quite alone.[242]

Contrary to some critics of the smart city agenda, David Harvey is not against technologies improving city services, as he explains in an interview to Evgeny Morozov, but against the idea that technologies can solve the urban problems of social relations.[243] The interviewer himself, author of books and articles often mentioned in this dissertation, is one of the most important critics on the subject who wisely advises that it is not a question of rejecting technology outright but demystifying *smartness* itself to move away from the neoliberal agenda of privatization and outsourcing in cities.[244] Morozov has been one of the main voices questioning what would mean the "right to the city" in fully privatized digital cities and also one of the few authors explaining why it is so difficult for mayors to move away from this model, even when there is political will to do it, as seen in Barcelona.[245]

Evgeny Morozov and Francesca Bria—at the time of the publication, Chief Technology and Digital Innovation Officer at the Barcelona City Council—contribute to demystifying not only smartness, but also any hope of easy solutions or proven alternative models to the dominant smart city models ("No specific city has 'gotten it right' thus far")[246] in their work, *Rethinking the*

[241] Smart City Expo World Congress, "Inspirational Talk - David Harvey. Right to the City", (2016), online: *YouTube* <https://youtu.be/4cL5c600R3o> at 33min 30s.
[242] *See* Rob Kitchin, Paolo Cardullo & Cesare Di Feliciantonio, "Citizenship, Justice, and the Right to the Smart City" in *The Right to the Smart City* (Emerald, 2019) 1; Katharine S Willis, "Whose Right to the Smart City?" in *The Right to the Smart City* (Emerald, 2019) 27. I need to thank Rob Kitchin for sending me their pre-published work at the best time for this dissertation.
[243] Bits, "David Harvey on post-neoliberalism, Trump, infrastructure, sharing economy, smart city", (15 November 2016), online: *YouTube* <https://youtu.be/wb6rhHyJJ_4> at 18min.
[244] Evgeny Morozov & Francesca Bria, *Rethinking the Smart City: Democratizing Urban Technology* (New York: Rosa Luxemburg Foundation, 2018) at 25.
[245] *See* Laboratoire de Cyberjustice, "Evgeny Morozov - Technologie et culture de la délibération", (10 November 2015), online: *YouTube* <https://youtu.be/uF1DheVDmlY?t=1966> at 32min 50s. The project *Laboratoire de Cyberjustice* at UdeM promoted a conference with Evgeny Morozov at the Faculty of Law and it allowed me to have an *enlightening-even-if-pessimistic* conversation about smart cities with him. I need to thank the *Cyberlab* project and its director, Karim Benyekhlef, for this unique opportunity.
[246] Morozov & Bria, *supra* note 244 at 23.

Smart City. Their work(s) advanced the goals of the research by helping it to realize that:

> In practical terms, the appeal of quick technological fixes to city bureaucrats cannot be explained by their ideological confusion or technocratic faith alone, for there are actual structural factors which make the enlistment of technology firms in the business of running the city as well as generating income for some of its inhabitants such an attractive choice. Understanding these structural factors should, at the very least, make us aware that articulating and executing a vision for a truly non-neoliberal smart city is much more difficult than it first appears, for it is not merely a matter of building different technologies or alternative property regimes around data generated in the city. These are necessary, but not sufficient conditions.[247]

In effect, there were previous elements that already suspected about the limitations of well-intended engineers, public authorities, and legal counsellors in city halls, but Morozov and Bria brought it to the surface. They also reinforced another intuition in the research relating to the need of a "counter-history" of the smart city and the similar past terms "of this same idea—the media city, the information city, the telematic city, the city of bits—almost never receive a mention."[248] Media, telematics, and bits play a major role in the debates and visions about smart cities because, as was coined by Marshall McLuhan, "the medium is the message,"[249] and all techno-social perspectives on the cities of the future depend on its "content" (the public).

McLuhan, the most cited Canadian researcher in the world (and roughly understood, so frequently misquoted), by his famous aphorism, advanced the many transformations that the world would experience when technology and media disrupt all aspects of life.[250] Anticipated by McLuhan in 1962, the idea that "new electronic interdependence recreates the world in the image

[247] *Ibid* at 15.
[248] *Ibid* at 5.
[249] *See* Marshall McLuhan, *The medium is the massage* (New York; Toronto: Bantam Books, 1967). *See also* BBC Radio 4, "The Medium is the Message", (27 January 2015), online: *YouTube* <https://youtu.be/Ko6J9v1C9zE>.
[250] Gaëtan Tremblay, "From Marshall McLuhan to Harold Innis, or From the Global Village to the World Empire" (2012) 37:4 Canadian Journal of Communication 561–575 at 564.

of a global village"[251] is often invoked to refer to the globally interconnected smart cities. Just like McLuhan, Castells argues that media and technologies need to be studied to understand society,[252] adding one more good reason(ing) to include, embedding it into the research, the mixed media and messages with their images and narratives about smart cities.

1.2.2. Countering Techno-Legal Narratives with Cyberpunk Science Fiction

> *McLuhan l'avait annoncé : le message, c'est le médium. Le passage à la limite du médium c'est de parler du médium. On connaît cet effet boule de neige : une information produite par un médium devient la substance des informations des autres médias. L'information, l'image et les médias se communiquent.*[253]

François Ost, in his recent book, *À quoi sert le droit ? Usages, fonctions, finalités,* dedicates the *Interlude* of this major work to warning legal scholars about two current counter-examples of what the law is for: "profiling and data-mining practices on the one hand, and the practice of storytelling on the other – two techniques, algorithmic and imaginary,"[254] two elements of major importance in this dissertation. There is much research about the deployed *storytelling* and the embedded narratives that build the *techno-social imaginaries of smart cities*,[255] and how much they become translated into media (more specifically, what Ost calls the *videosphere*),[256] corporate presentations,[257] government communications,[258] and even in the introductions and

[251] Marshall McLuhan, *The Gutenberg Galaxy: the Making of Typographic Man* (Toronto: New American Library, 1962) at 31.
[252] See Philip N Howard, *Castells and the media* (Cambridge: Polity, 2011).
[253] François Ost, *À quoi sert le droit? : usages, fonctions, finalités*, Penser le droit (Bruxelles: Bruylant, 2016) at 319.
[254] François Ost, *À quoi sert le droit ? À compter jusqu'à trois. Les contre-exemples du data mining et du storytelling* (COMPTRASEC, 2017) at 2.
[255] *See* Manuel Fernández González, *La smart city como imaginario socio-tecnológico: la construcción de la utopía urbana digital* (Doctoral dissertation, Universidad del País Vasco-Euskal Herriko Unibertsitatea, 2015) [unpublished]. The author has also published an English version at his website.
[256] *See* Ost, *supra* note 253 at 319.
[257] Jathan Sadowski & Roy Bendor, "Selling Smartness: Corporate Narratives and the Smart City as a Sociotechnical Imaginary" (2018) 44:3 Science, Technology, & Human Values 540–563.
[258] Stephen Goldsmith, "Storytelling Powers Change in Cities", (28 November 2018), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/storytelling-powers-change-cities>.

conclusions of academic publications. The *data mining* claims to govern cities based on reality (real-time, real-space, reality data) are backed by the storytelling claiming to govern cities based on fiction (clever fictions of smart cities),[259] and it apparently works:

> *Mobilisant aujourd'hui les puissances fabuleuses du spectacle, et s'insinuant dans le quotidien de chacun par le biais des technologies numériques, ce récit peut même donner l'illusion à ses destinataires qu'ils en sont en partie les auteurs, dès lors que les scénarios interactifs sont suffisamment souples pour leur ménager une place. Le digital storytelling pratique l'immersion virtuelle dans des univers multisensoriels qui peuvent donner l'illusion de la créativité personnelle tout en poussant le conditionnement à un point jamais encore égalé. Un « nouvel ordre narratif » se met ainsi en place, au service des pouvoirs de toutes sortes, désormais en mesure de contrôler les esprits par la manipulation des émotions.*[260]

It is necessary to advise that Ost takes on a sense of *storytelling* which, *a priori*, comes from a predominantly French approach to the term which—surprisingly or not, keeping the word in English for its analysis—originated in the book *Storytelling, la machine à fabriquer les images et à formater les esprits*, by Christian Salmon.[261] Salmon admits his "fault" for introducing the English term in France to politicians and journalists and converting it into a term symbolizing manipulation, instrumentalization, and attention-capture techniques.[262] In Anglophone legal communities, the term storytelling is used in distinct senses,[263] mainly signified as an *art of narrative* that rarely comes with a similar critic approach about its use. This gap of perspectives is filled by the Belgian law philosopher, who may surprise its readers for addressing the normative roles that *Big Data* and *storytelling* are gaining in society and "the hypothesis that the law could very well be diluted in an ocean of indistinct normativity."[264] Considering these

[259] *See* Ost, *supra* note 253 at 325.
[260] *Ibid* at 318.
[261] Christian Salmon, *Storytelling, la machine à fabriquer les images et à formater les esprits* (Paris: La Découverte, 2007).
[262] The RSA, "Christian Salmon - Storytelling: How narratives shape our reality, ideas and behaviour", (13 April 2010), online: *YouTube* <https://youtu.be/C02u0C7a80c> at 2min 40s.
[263] *See* Christopher Rideout, "Applied Legal Storytelling: A Bibliography" (2015) 12 Legal Communication & Rhetoric: JALWD 247–264.
[264] Ost, *supra* note 254 at 2.

perspectives, Ost contributes with a warning for legal scholars, in a timely manner:

> *Lorsqu'ils opèrent comme outils de marketing, de propagande ou d'embrigadement sectaire, les récits voient leurs fonctions s'inverser : loin de susciter des parcours inédits, ils orientent les lecteurs comme des cobayes ; loin d'inviter, par empathie imaginaire, à se mettre à la place d'autrui, ils cultivent les émotions primaires d'identification et de rejet ; loin de nourrir l'esprit critique, ils entretiennent la confusion quant aux limites du réel. En cela, le storytelling a cessé depuis longtemps d'être seulement le volet communicationnel d'une régulation pour le reste inchangée ; elle devient un objectif en soi, qui en a transformé les ressorts intimes, substituant des personnages et des fables aux argumentaires et aux programmes d'action. Des technologies de la fiction, complexes de scénarios et de logiciels, s'imposent, qui ne se contentent plus de « surveiller et punir », mais sont désormais en mesure d'enrôler (susciter l'adhésion à un rôle), de contrôler et de dresser efficacement les individus au service d'objectifs les plus divers.*[265]

Much could be explored in a literature review about the "storytelling revival" that uses "narrative as instrument of control" that favours "the new fiction economy" and their "mutant companies of new age capitalism,"[266] which could label the smart city discourse and the tech companies in *late capitalism*. But, for the ends of this research, it is enough to point out these elements for any interested reader, while also necessary to recommend composing other possible visions of storytelling—as *powers of the multitude* consisting of *flows of desires and beliefs* that circulate between human beings—in which logics can be understood as retaken as levers of emancipation instead of regulation.[267] In this sense, François Ost also offers the tools for this dispute of narratives and rescue of meanings, after all, "*comme je n'ai cessé de le rappeler, que l'humain est un 'animal fabulans', qu'il ne se mobilise que sous l'action des fables et le charme des enchantements,*"[268] by deploying the ressources of the *graphosphère* of *law & literature* to face the *vidéosphere* of *big data & storytelling*.[269]

[265] Ost, *supra* note 253 at 318.
[266] *See* Christian Salmon, *Storytelling: Bewitching the Modern Mind* (London; New York: Verso, 2010).
[267] *See* Yves Citton, *Mythocratie : storytelling et imaginaire de gauche* (Paris: Éd. Amsterdam, 2010).
[268] Ost, *supra* note 253 at 315.
[269] *Ibid* at 319.

Not only law and legal scholars, but also science and scientists have much to gain with literature, beyond the skill of telling better stories. As advised by Yves Citton in his work *Pour une interprétation littéraire des controverses scientifiques*, literature might help: supporting them to take a step back to critically evaluate, assisted by certain texts, their ways of thinking; assessing on these thoughts, questioning the ways of acting; and based on those assessments, reformulating their guiding values as "*la réflexion sur l'expression de ces valeurs étant indissociable de l'élaboration de nouvelles formules susceptibles de mieux régir notre vie collective*."[270] This critical stepback of literature may be essential at this moment for the legal scholars wandering around the *ocean of indistinct normativity* diluting law and the scientists drowning in the *ocean of data and discourses* diluting science:

> *On assiste ainsi à un retournement intéressant des rapports entre recherche scientifique et principe d'autorité. L'histoire des idées nous a répété pendant des décennies que la science était née du jour où Descartes aurait dévalorisé le principe d'autorité pour lui substituer ceux de la rationalité critique et de l'expérimentation empirique ; nous redécouvrons aujourd'hui, perdus dans l'océan de données et de discours dont nous inonde internet, que le principe d'autorité reste toujours utile dans la dynamique de la recherche scientifique, dans la mesure où il opère comme un filtre et comme un raccourci, qui nous évitent de devoir réinventer la roue et les décimales de π à chaque nouveau tour de piste.*[271]

In times of narrative deviations from the most basic and once agreed facts and norms, some authority may be needed to address and interpret objective data (*matters of fact*) that is entangled in sociopolitical issues related to interests, desires and anxieties in society (*matters of concern*) as underlined by Bruno Latour.[272] This needed respect for an authority principle may not come from increasing the same discourses and practices of objectivity and legality against a growing storytelling that says otherwise, but it may come from narratives and approaches that

[270] Yves Citton, *Pour une interprétation littéraire des controverses scientifiques.* (Versailles: Quæ, 2013) at 142.
[271] *Ibid* at 159.
[272] *Ibid* at 15.

also address the emancipatory elements of science and law. For example, *law and literature* and *literature and science* movements have been facing them in renewed ways in the *graphosphere* level, but the *videosphere* level might also be engaged to dispute the present narratives shaping the future.[273] If not clear enough yet, this doctoral dissertation explores the narrative and counter-narrative possibilities with an experimental approach to science, law, and literature – not necessarily in a pioneering way, but still with an original approach, just like what all legal scholars have been doing when working with science fiction.

If it is to mention a scholar on *law and literature* who is recognized as the pioneer on this peculiar field, Bruce L. Rockwood has already advised that "Science Fiction is easy to describe, but not so easy to define."[274] The more relevant task here will be highlighting some of its multiple relationships with law. Science fiction has an important role in science by shaping the many metaphors of life that people deal with every day, including those that are used in law and by law.[275] In the law & technology scholarship, for example, science fiction references in literature and cinema are used to ilustrate social implications of new technologies, as well explore political and legal alternatives in the present and future.[276] For this legal dissertation with a central subject that has to deal with urban utopias/dystopias and governance models somewhere in the middle of them, science fiction has much to offer:

> Science Fiction explores what is wrong with many possible futures and the institutions, laws, rhetoric and trends that appear to be taking us towards them all too swiftly. Science Fiction writers, of various political persuasions, address contemporary political disputes as they play out in imagined futures. Science Fiction is marked by its openness to ideas, regardless of their source, in pursuit of the notion that humanity is capable of adapting to any challenge, can change through the use of intelligence, and can recognize that "facts" have to be dealt with, whatever the "facts" may be. Thomas Disch notes that "SF writers often

[273] Head Geneve, "Yves Citton – Narratives of a Near Future", (2 September 2018), online: *YouTube* <https://youtu.be/V_Nvywa3nh8>.
[274] Bruce L Rockwood, "New Possibilities Symposium: Law, Lecture, and Science Fiction" (1999) 3 Legal Stud F 267–280 at 268.
[275] *Ibid* at 269.
[276] *Ibid* at 271.

> score prophetic bull's eyes while getting all the details wrong, as Orwell did in 1984. They can also be uncannily accurate at micro prediction and still miss the big picture," as was Huxley in Brave New World. Whatever its failings, Science Fiction attracts active and engaged readers and systematically challenges its readers to question our society, to evaluate who and what we are from the perspective of imagined futures that have the real possibility of becoming lived realities.[277]

Despite the many suspicions and criticisms from legal scholars and scientists toward science fiction, "popular culture images of law, on the one hand, and popular culture images of science, on the other, have proved to be fruitful for understanding law, and science, respectively."[278] Yet, not all science fiction is treated the same in *law and literature* and *literature and science* studies, because there are, "those who will distinguish hard science fiction (or [plausible] science in fiction) from science fantasy,"[279] and these two "forms" of science fiction have a great impact on the popular image of scientific authority and public trust in science (which were never a given and especially not now).[280] This research opted for one subgenre of science fiction where most of the works (supported by a highly critical base of readers) can be considered *hard science fiction,* so it could include the advice from works of the more exigent, *hardcore* scholars in the fronts of *law-and-science-and-literature* as David Stanley Caudill, not only for this dissertation, but for further research beyond it.[281] His work, *Stories about Science in Law: Literary and Historical Images of Acquired Expertise,* has much to offer to all legal scholars (not necessarily in *law and literature*) and practitioners, in order to discuss:

> [T]he significance of one's images of science and scientific expertise and their role in legal contexts, whether in administrative decision-making involving science and technology or in the courtroom when a lawsuit involves scientific issues. Clearly, law relies on science, but how do we picture that relationship? One resource for exploring our understanding of science and its place in law is popular culture, including the literary representatives of law and science in

[277] *Ibid* at 278–279.
[278] David Stanley Caudill, *Stories about Science in Law: Literary and Historical Images of Acquired Expertise* (Farnham: Routledge, 2011) at 2.
[279] *Ibid* at 3.
[280] *Ibid* at 8.
[281] Setting great examples for my (eventual) future research, *also see*: Kieran Tranter, *Living in Technical Legality: Science Fiction and Law as Technology*, 1st ed (Edinburgh: Edinburgh University Press, 2018).

> novels, plays, and movies, as well as in historical narratives.[282]

In fact, while dealing with legal research centred on a narrative of information technologies as tools for a scientific approach to the city, it was a combination of the propositions of Santos, Ost, and this particular work of Caudill that set the basis for the triple approach on law, science and literature in this dissertation. The research took into consideration Caudill's experiments in his book and some of the explicit premises in this passage of text:

> My own effort is aimed at combining (1) law-and-literature studies (wherein literature offers insights into legal processes and institutions) with (2) literature-and-science studies (wherein literature offers insights into scientific practice and progress) to enrich the discourse of (3) law/science relations (which is itself a field of study that focuses on contemporary rules of evidence and regulatory frameworks, and seldom relies on literary or historical sources). In such an enterprise, we do learn something about law, especially the ways in which law relies on science and sometimes idealizes the capacity of science to settle legal disputes; we also learn something about science, especially the ways in which science is like law—institutional, rhetorical, cultural, and even political. But my primary goal is to focus on stories that explore the relationship between law and science, and especially the cultural images of science that prevail in legal contexts.[283]

The close relations between law and science,[284] with the excesses and deficits of the modern paradigm,[285] brought contradictions that are hardly solved under the same paradigm, and they are the reason of bringing literature to this legal dissertation concerning technology. "Law is often called to humanise technology"[286] *gone wrong* that came as the result of scientific development but, at the same time, "the law called to save humanity from technology is tool-like[…] instrumental, plastic, and capable of being called upon and fashioned toward any end[…] it is law as technology."[287] This *technical legality*—best described by Kieran Tranter in his recent

[282] Caudill, *supra* note 278 at 2.
[283] *Ibid* at 4.
[284] *See* David Stanley Caudill & Lewis H LaRue, *No magic wand: the idealization of science in law* (Lanham: Rowman & Littlefield, 2006).
[285] As discussed in the subchapter "The Tale of the Paradigm of Modernity."
[286] Tranter, *supra* note 281 at 1.
[287] *Ibid* at 1–2.

book *Living in Technical Legality: Science Fiction and Law as Technology*—that surfaces in the hypermodern narratives of smart cities where *algorithmic normativity* could be simply programmed into urban devices, just as previously warned by François Ost. This projected future when science rules over urban management is clearly reflected in the "general lawlessness of science fiction that has inhibited law and humanities' engagement with science fiction."[288] This lack of law in science fiction is a sign for engaging more with it.

This engagement has been assumed by several legal scholars and works when approaching science fiction and law, with promising results, as said by Pierre-Jérôme Delage:

> *Où l'on assiste alors à la rencontre de la science-fiction et de la science juridique, lesquelles, par tout ce qui les fonde, les interroge et les anime, s'entrecroisent à la façon de deux cercles sécants : comme la science-fiction, la science juridique place l'Homme, sa destinée, son avenir, au cœur de ses préoccupations (c'est le propre de l'humanisme juridique, comme du célèbre aphorisme d'Hermogénien : « Hominum causa omne jus constitutum », le droit a été institué tout entier pour les Hommes) ; et, comme en la science-fiction, il existe en la science juridique une fonction prospective, de la réflexion pour le demain (qu'il soit songé, par example, aux projections de lege ferenda)…. la science juridique peut « penser avec la science-fiction », c'est-à-dire se saisir de son imaginaire comme point de départ à un jeu – le jeu n'excluant pas le sérieux – d'anticipation juridique (François Terré a d'ailleurs ouvert une piste en cette direction, qui a écrit que « Le temps incertain qui s'écoule, tandis que la [science réelle] s'emploie à rejoindre la [science- fiction], permet [au Droit] de dégager le consensus nécessaire au traitement de telles nouveautés par la société des hommes »).*[289]

There is still much to learn (or to admit) from the interactions between science fiction and law, so it would be prudent here not to forget a lesson from François Ost, before moving forward: "*Ex facto ius oritur (« le droit surgit du fait ») enseignent les juristes classiques; il serait plus exact de dire : Ex fabula ius oritur (« le droit s'origine dans la fiction »*)."[290] This premise also needs to

[288] *Ibid* at 7.
[289] Pierre-Jérôme Delage, ed, *Science-fiction et science juridique*, Les voies du droit (Paris: IRJS Éditions, 2013) at 15.
[290] François Ost & Laurent Van Eynde, "Le droit au miroir de la littérature" in François Ost et al, eds, *Lettres et lois : le droit au miroir de la littérature*, 1st ed (Bruxelles: Publications des Facultés universitaires Saint-Louis, 2001) 7 at 9.

be remembered when dealing with complex subjects (like smart cities) that represent global challenges for law in a context of networked states and risk narratives:

> *[L]ors que, dans nos « sociétés du risque », les menaces sont devenues globales et extrêmement diversifiées : risques financiers, environnementaux ou sanitaires dus à l'interconnexion intense des économies et la circulation des personnes et des produits, dangers terroristes, menaces informatiques, criminalité financière, inquiétudes climatiques… Ces changements d'échelle et de nature des menaces contraignent les États à collaborer au-delà de leurs frontières, ainsi qu'à solliciter le concours d'experts et de partenaires privés pour faire face aux défis technologiques et aussi financiers que représente la lutte contre ces nouvelles formes d'insécurité.*[291]

Ost makes a reference to the sociologist Ulrich Beck and his work *Risk Society: Towards a New Modernity*,[292] which brings a concept of risk that is related to cultural perception, therefore it also related to narratives and fictions. Beck defined risk as "a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself,"[293] and that "modern society has become a risk society in the sense that it is increasingly occupied with debating, preventing and managing risk that itself has produced"[294] from the "unwanted and unseen consequences of the victory of modernity."[295] In his debates with other authors to defend the existent criticisms of his earlier works about the concepts of risk and risk society, Beck would detail some elements of high pertinence in the choice of adding literature to this dissertation:

> Risks are not the same as destruction. They do not refer to damages incurred. If they were, all insurance companies would be made bankrupt. However, risks do threaten destruction. The discourse of risk begins where trust in our security and belief in progress end. It ceases to apply when the potential catastrophe actually occurs. The concept of risk thus characterizes a peculiar, intermediate state between security and destruction, where the *perception* of threatening risks determines thought and action… So ultimately: *it is cultural perception and definition that constitutes risk*. 'Risk' and the '(public) definition of risk' are one and the same. This peculiar reality status of 'no-longer-but-not-yet' - no longer *trust!* security, not yet destruction/disaster – is what the concept of risk

[291] Ost, *supra* note 253 at 405–406.
[292] Ulrich Beck, *Risk Society: Towards a New Modernity* (London: Sage, 1992).
[293] *Ibid* at 21.
[294] St Gallen Symposium, "Living in and coping with world risk society - Ulrich Beck", (5 May 2012), online: *YouTube* <https://youtu.be/PeKiD5JLGIE> at 6min.
[295] *Ibid* at 3min 26s.

> expresses and what makes it a public frame of reference. The sociology of risk is a science of potentialities and judgements about probabilities... Risks, then, 'are' a type of virtual reality, real virtuality.[296]

Risk is directly linked to cultural perception, and so it is the paradigm of law. “Risk and (public) definition of risk,” as said by Beck, are treated as one and the same in the postmodern discourse of law, where risk is called to justify the interventions *by/for/in* law:

> *Dans la postmodernité, le risque apparaît comme une composante majeure de la reconfiguration des processus délibératifs associés à la production du droit. Les perceptions diverses ou convergentes au sujet des risques, leur existence ou leur ampleur contribuent à construire les legislations sur lequelles se fondent les règles de droit. L'anticipation, la gestion et la répartition des risques figurent parmi les grandes préoccupations des systèmes juridiques.*[297]

It would not be hard to demonstrate that public perception of risk is essential for creating or modifying legislation, and it goes much further in law. This legal dissertation would probably not even exist if there were no convincing risks, in both legal and technological perspectives, on the subject of smart cities. In fact, the perception of risk is also present in policies guiding technological environments of public administrations because legal risk management demands it, even when policies already satisfy the applicable legislation, as noted by Pierre Trudel:

> *Enfin, tout se passe comme si la mise en place d'un véritable cadre qui soit compatible avec l'état de droit passe par des démarches de gestion de risques juridiques... On a l'impression que pour assurer la prise en compte effective des exigences de la loi et notamment sur les aléas et les contraintes de la technique, il semble qu'il soit nécessaire de d'accompagner le développement des environnements de l'administration électronique, d'analyse approfondie des risques techniques... Ça c'est connu, c'est bien établie, mais aussi des risques juridiques, des enjeux plus difficiles où souvent plus diffus à l'égard des droits fondamentaux... Peut-être pas de la conformité aux lois puisque soit forcément on trouve toujours moyens de s'assurer d'être conforme aux lois, mais qu'en est il des situations où les droits fondamentaux pourraient être mises en cause et aussi l'anticipation des situations: la responsabilité d'une entité peut être remise*

[296] Ulrich Beck, “Risk Society Revisited: Theory, Politics and Research Programmes” in Barbara Adam, Ulrich Beck & Joost van Loon, eds, *The risk society and beyond: critical issues for social theory*, 1st ed (London: SAGE, 2000) 211 at 212–213.

[297] Pierre Trudel, “Le risque, fondement et facteur d'effectivité du droit” in Karim Benyekhlef, ed, *Gouvernance et risque: les défis de la régulation dans un monde global* (Montréal: Éditions Thémis, 2013) 241 at 250.

> *en cause, ce qui est très souvent caractéristique de la démarche de gestion des risques juridiques telle qu'elle est pratiquée dans les milieux où elle se fait.*[298]

Risk management has become a perennial function of the state, ergo, law has to constantly adapt to it, because "*le risque est le fil conducteur des transformations que connaît le droit dans la postmodernité*."[299] Postmodern state law has an obligation to know, preview, and review;[300] initiatives, perspectives, and adjustments have to be made in the name of risk and its possible damages, imputable responsibilities and avoidable harms;[301] any regulation is justified by the state regarding what may be caused by an inadequate framework of relations between subjects of legal concern.[302] According to François Ost, it may come from a patient learning process of trial-and-error, but in certain areas of law of more recent development:

> *[L]es risques potentiels liés aux options prises sont parfois d'une telle gravité qu'on ne peut plus se contenter de prendre en compte les effets prévisibles ou même simplement probables des choix opérés. Le principe de précaution prend ici le relais du principe de prévention en obligeant désormais les décideurs à tenir compte, pour redoubler de prudence, des risques incertains, des éventualités non probabilisables. De sorte que, comme le souligne G. Martin, le droit à l'information s'en trouve enrichi: il ne s'agit plus seulement d'accéder à des informations disponibles, à propos de risques prévisibles, établis par des techniques scientifiques éprouvées ; il pourra s'agir d'exiger qu'on produise de nouvelles informations, à propos d'hypothèses incertaines qui demanderont peut-être la mobilisation de connaissances et de techniques encore minoritaires et marginales.*[303]

Concerning the risks related to smart cities, this research chose to access the available information on the subject offered by the academic production but also to mobilize *minority and*

[298] CRDP UdeM, "Pierre Trudel | État de droit et e-gouvernement", (23 June 2017), online: *YouTube* <https://youtu.be/CQ7zw39mBZg> at 26min 08s. *See also*: Pierre Trudel, "État de droit et e-gouvernement" in Karim Benyekhlef & Pierre Trudel, eds, *État de droit et virtualité* (Montréal: Éditions Thémis, 2009) at 408.
[299] Trudel, *supra* note 297 at 251.
[300] Ost, *supra* note 123 at 437.
[301] For further development on notions of risk of harm, *see*: Éloïse Gratton, *Understanding Personal Information: Managing Privacy Risks* (Markham, Ont: LexisNexis, 2013).
[302] *See* Trudel, *supra* note 297 at 251.
[303] Ost, *supra* note 123 at 438–439.

marginal techniques for law. In this case, one specific sub-genre of science fiction:

> Science fiction—at least according to its official dogma—has always been about the impact of technology. But times have changed since the comfortable era of Hugo Gernsback, when Science was enshrined—and confined—in an ivory tower. The careless technofilia of those days belongs to a vanished, sluggish era, when authority still had a comfortable margin of control.
> For the cyberpunks, by stark contrast, technology is visceral. It is not the bottled genie of remote Big Science boffins; it is pervasive, utterly intimate. Not outside us, but next to us. Under our skin; often inside our minds.[304]

It seems appropriate to start presenting the cyberpunk movement in science fiction by quoting what many call, "the cyberpunk manifesto," as written by its most legitimate propagandist, Bruce Sterling.[305] The reference to the *era of Hugo Gernsback*—the popularization of the term *science fiction* and the whole genre is often attributed to this minor author and major editor—is due to an era of science, literature, and society that was ending and to the new paradigm that was on the rise. Cyberpunk is referred to by numerous authors consulted during the research as the best expression in literature of the postmodern condition/culture, breaking away from the modern paradigm of science that characterized the golden age of science fiction (1940–1960s) symbolized by Gernsback, and going further in the paths opened by the avant-garde of (the loose generation of writers from) the new wave science fiction (1960–1970s).[306]

As mentioned in the last part of the first subchapter, Fredric Jameson confessed regretting not dedicating a chapter of his book (a very postmodern passage in his *Late Capitalism*, by the way) to cyberpunk, the *supreme expression of postmodernism in literature*. As postmodernism in culture/literature was already (and overly) explored, this last part will not explore the postmodern characteristics of cyberpunk, because there is an extensive bibliography

[304] Bruce Sterling, "Preface" in Bruce Sterling, ed, *Mirrorshades: The Cyberpunk Anthology* (New York: Ace Books, 1988) at xiii.
[305] *See* Mark Bould, "Cyberpunk" in *A Companion to Science Fiction* (John Wiley & Sons, Ltd, 2007) 217 at 222. Not a coincidence, there is a contribution from Bruce Sterling in the beginning of this chapter.
[306] *See* Adam Roberts, *The history of science fiction*, Palgrave Histories of Literature (Basingstoke: Palgrave Macmillan, 2007).

on the subject developed over more than thirty years, easily accessible in all sorts of media. Also, many details about the *cyberpunk canon* are largely explored in the third chapter, so it is preferable to avoid redundancy here and focus on a few elements for introducing the subgenre and its possible relations with the research subject, despite how hard it might be to present a "supreme postmodern expression" in an objective way for a dissertation.

"Science fiction is hard to define to any readers' or critic's satisfaction,"[307] is the phrase with which Dani Cavallaro starts her book, one of the most relevant studies on cyberpunk. It gives a clue of how hard it would be to try to define its best known postmodern subgenre. Trying to keep it simple (if even impossible), a common attempt is to decompose the term to explain it. First and foremost, the *cyber* component in "cyberpunk refers to science and, in particular, to the revolutionary redefinition of the relationship between humans and machines brought by the science of cybernetics."[308] Second and equally important for the research, the "[p]unk element, for its part, hints at a defiant attitude based on urban street culture."[309] Combining advanced technologies in near urban futures with the punk culture of "no future and no illusions", this science fiction subgenre of *high-tech and low-life* imagined plural versions of semi-lawless dystopian societies dominated by mega-corporations remains at the horizon until today.

If the dominant narrative in smart cities projects images of utopian urban areas designed under the aegis of modern science, science fiction offers several counternarratives that defy it and have much to offer to a legal dissertation produced by public perceptions of risk. Especially if agreeing with Bruce Sterling and William Gibson that *the streets find its own uses for things*, as it might happen in the *present future* of smart cities, law finds valuable opportunities for

[307] Dani Cavallaro, *Cyberpunk & Cyberculture: Science Fiction and the Work of William Gibson* (A&C Black, 2000) at 1.
[308] *Ibid* at 12.
[309] *Ibid* at 14.

research in the urban alternate space-times of cyberpunk:

> The strong idea of the movement focused on sending back the relevancy of the urban discourses to street again, as a stage for fashions, vices and urban living, breaking up this way with the traditional Sci-Fi that remained divided in sub-genres and mostly dedicated to study the impact of technologies in society and the frame of the civilizational process. The cyberpunk writers' texts appear like something so sharp that their writing "school" began to be nicknamed as "Radical Sci-Fi", the cyberpunk writers start to be labeled as "The Mirrorshades Groups" and as "The hardcore Sci-Fi Nucleus". Their writing was, for the 80s, to powerful, considering that it was easy to digest, it was simply convincing, it was not meant to be a science technical instructions book camouflaged under the popular pocket novel concept. It was so cuttingedged that the writers were regardless to the genre classifications by assuming the concern with matters in study. Yet if the cyberpunk figures this was the rebel one, as designers of the future, the cyberpunk writers refused to agree with classification systems, but they knew how to nominate what they thought to be cyberpunk.[310]

This doctoral research takes advantage of a few cyberpunk works that not only stood the test of time for their considerations about cities and technologies on postmodern perspectives of science and law, but also received much attention from media and academia since their publications. As well, a selection of more recent works—from authors who also do not necessarily agree with classification systems labeling their novels as (post)cyberpunk—are included here as *postcyberpunk science fiction*:

> Cyberpunk had been envisaged as something ephemeral, a truly postmodern cutting edge, which was declared dead (some time around 1986) before most people had even noticed it. Nevertheless, the sub-genre continues as cyberpunk, post-cyberpunk, cyberpunk-seasoned.[311]

Even less consensual than its main reference, postcyberpunk works and authors embrace several elements of cyberpunk, but with different endgames that serve this dissertation better. In postcyberpunk, "the future has been transformed from a dead-end to an arena of

[310] Herlander Elias, *Cyberpunk 2.0: fiction and contemporary* (Covilhã: LabCom Books, 2009) at 12.
[311] Andrew M Butler, "Postmodernism and science fiction" in Edward James & Farah Mendlesohn, eds, *The Cambridge Companion to Science Fiction* (Cambridge: Cambridge University Press, 2003) at 144.

possible change again,"[312] which contrasts with cyberpunk and also correlates with law: "*entre droit et litttérature, les liaisons ne sont-elles pas nécessairement dangereuses?*"[313]

Thinking has always been dangerous, especially when such thinking is told through a story. The more convincing it gets, the more dangerous its becomes, especially when thinking differently with an unusual story. Therefore, telling this legal science fiction can be really risky. This is the reason why this dissertation needed a convincing background story before moving on to the next chapters. The objective was to provide and expose the theoretical grounds of the research which, in return, should remain coherent to them all along the dissertation.

In sum, the main proposition here was to build new, prudent and emancipatory knowledge with the rationalities of science and law under the aegis of literature. Theoretical references of the specific field of research were described and will remain linked with the main proposition in the next chapters. They form the underlying metanarratives of the research.

The next chapter fulfills an indispensable academic role—the literature review—and will serve as a first research experiment for science and law, which is explained in the third chapter.

[312] Dennis Geef, *Late Capitalism and Its Fictitious Future (s): The Postmodern, Science Fiction, and the Contemporary Dystopia* (Tectum Wissenschaftsverlag, 2015) at 193.
[313] François Ost, *Raconter la loi : aux sources de l'imaginaire juridique* (Paris: Jacob, 2004) at 10.

2. A Literature Review on Smart and (not so) Normal Cities

If not sufficiently acknowledged before, it would be accurate to say that all the main subjects of this dissertation orbit around one core idea: the city of the near future. As any futuristic projection, it represents ever-changing and unrealized urban ideas that may seem beyond the grasp of the present, but have already been anticipated by reasoned approaches under many forms: modern science and other forms of knowledge, state law and other forms of regulation, and science fiction literature and other forms of culture. These forms have been focused on here, each bringing a distinctive comprehension, discourse, and imagery to approach the near-futuristic city by looking to the past and the present.

The scientific method approaches the city with questions, observations, hypotheses, experimentations, and conclusions that frequently propose solutions to present problems. The legal reasoning follows the dominant positivist approach by spotting issues of conflict in the city, identifying the applicable principles and rules, examining the facts and conditions, and establishing positions to treat the issues through the application of the present rules to the facts. The literary devices[314] use the city as a *key motif* to recognize elements,[315] interpret situations, and express ideas about possible repercussions from specific factors of the present society. The three logics of rationality use different approaches to the human experience in the recorded past

[314] An author has plural narrative techniques at disposal to tell a story that, when used in combination with each other, allows limitless forms of approach. For a fast access to the subject, see: Jay Braiman, "Literary Devices", (2007), online: *MrBraiman* <http://www.jbraiman.com/mrbraiman/lit.htm>. For illustrative examples of literary devices in science fiction, see: Annalee Newitz, "10 Literary Devices, And Where You Can Find Them in Science Fiction", (8 June 2012), online: *Gizmodo* <https://io9.gizmodo.com/5930325/10-literary-devices-and-where-you-can-find-them-in-science-fiction>.

[315] Katherine Mullin, "Cities in modernist literature", (25 May 2016), online: *British Library* <https://www.bl.uk/20th-century-literature/articles/cities-in-modernist-literature>. For a more comprehensive analysis about the relevance of the city in literature, see: Richard Daniel Lehan, *The city in literature: an intellectual and cultural history* (Berkeley: University of California Press, 1998); Press Cambridge University & Kevin R McNamara, *The Cambridge companion to the city in literature* (New York: Cambridge University Press, 2014). For more on the relation between key motifs and the research subjects, see: JA Smith, "Theorists of the Postmodern, Global, and Digital City" in Jeremy Tambling, ed, *The Palgrave Handbook of Literature and the City* (London: Palgrave Macmillan, 2016).

and distinct descriptions to human perception of the perceived present, yet they share some elements of the human imaginary about the projected future.

The aesthetic-expressive rationality may be the foremost logic identified with the human imaginary, which could explain why science fiction (SF) is frequently associated with the cities of the future.[316] SF literature is constantly mentioned by the scientific community as a source of inspiration,[317] in a co-dependency relation with the literary community,[318] so both combine sources for the futuristic cities driven by science and technology. Even before what became known as literature or science, the idea of combining knowledge and state order for an ideal futuristic city has been imprinted in Occidental culture since at least *The Republic of Plato*, where philosophy and law would build together "The Just City."[319] Therefore, the speculation of what the future city could be (and should avoid) is existent in the imaginaries of law, science, and literature in a "discursive negotiation and construction, principally a kind of textuality."[320]

This chapter performs a general review of the literature and deals with three different

[316] There are dozens of media and academic articles In the bibliography mentioning science fiction For illustrations, see: Carl Abbot, "Beyond Blade Runner: Community in Cities of the Future", (10 February 2017), online: *Los Angeles Review of Books* <https://lareviewofbooks.org/article/beyond-blade-runner>; Melissa Petrucci, "Villes intelligentes: de la science-fiction à la réalité", (3 March 2018), online: *Natura-Sciences* <http://www.natura-sciences.com/energie/villes-intelligentes-monde992.html>; Robert Cowley, "Science Fiction and the Smart-Eco City" (2016) 14 Reflections, online: <https://www.westminster.ac.uk/file/71541/download>; Mark C Childs, "Learning from new millennium science fiction cities" (2015) 8:1 Journal of Urbanism: International Research on Placemaking and Urban Sustainability 97–109.

[317] Affirming that "scientists are inspired by science fiction" is almost a cliché in scientific and literature events (many more professionals are, they have no exclusivity in this), yet there are good reasons ahead in the text to state this here. For proper illustrations, see: Michael J I Brown et al, "Scientists on their favourite science fiction", (27 December 2015), online: *The Conversation* <https://theconversation.com/scientists-on-their-favourite-science-fiction-51738>; Nature, "Science Fiction Special", (10 September 2016), online: *Nature* <https://web.archive.org/web/20160910183210/https://www.nature.com/news/scifi-special-1.20529>.

[318] Susan Stepney, "The real science of science fiction", (21 January 2015), online: *The Guardian* <https://www.theguardian.com/books/booksblog/2015/jan/21/real-science-science-fiction-sf-scholar>.

[319] For a science fiction speculation of Plato's Republic which gives strong emphasis on art, sports, knowledge and technology, see: Jo Walton, *The Just City* (Tom Doherty Associates, 2015).

[320] Referring to science, but as well applicable to a legal thinking. Damien Broderick, *Reading by Starlight: Postmodern Science Fiction* (London: Routledge, 1995) at 129.

textualities when describing, interpreting, and questioning elements of the imaginaries involved in what became known as *Smart Cities*. For this goal, three movements will be drawn in this chapter, with each subchapter presenting sources and (meta)narratives that support its objectives. The distribution of the subchapters intends to reproduce the logical and probable efforts of a jurist seeking to apprehend and understand a complex thematic: first, by trying to overview the general subject by meeting (what is said about) the facts; then, moving to the knowledge developed in the scientific domains involving the subject; and finally, looking for legal references on the topic for guidance for reasoning in the next stages of the research.

The first subchapter is a composition of numerous publications of significative reference in the (bigger and smaller) media about the most mentioned topics concerning smart cities. All the topics were sorted by the main keywords that came up from data analytics tools used on the contents of more than six hundred websites of media outlets, blogs, and similar publications that are detailed in the third chapter. The plural narratives of the smart city in the media will provide a panoramic view of how the subject is presented to society in general.

The second subchapter focuses on convergent efforts of explaining the essence, relevance, and controversy of smart cities. First it tries to present some of the many attempts of conceptualization of smart cities in academic works and other related publications. After setting these premises, the subchapter moves to its core: an attempt of synthetizing a general scientific perspective on smart cities to be confronted later with a legal perspective. The topics come from several scientific areas, based on the most emergent topics extracted from hundreds of academic publications by a text analysis which is explained in the third chapter.

The third subchapter combines two approaches for developing a legal perspective in the literature review of smart cities: first, it presents a series of references to issues of legal concern that were expressed in the scientific production, pinpointing possible axes and factors for legal

research; finally, the subchapter analyses the contributions from publications by legal scholars that came to build the basis of this dissertation concerning law and public policies. References from media are combined with legal references, aligned with the goals of previous subchapters.

As an extensive introduction, the first part of the review of the literature on smart cities sets in place the most relevant terms of the public debate on the subject and contributes to the two subsequent parts. This subchapter came to be during the first stages of the research, when it became clear that any legal debate of the contents of this dissertation would involve the social perceptions of the storytelling of the smart city. Thousands of sites were consulted during the research, and a selection of the most relevant is referred to here, with easy access for verification of content. By listing the main elements, questions, and considerations related to smart cities expressed through the media, it also combines them with personal evaluations and inevitable bias present in the research(er). There is an expectancy that the eventual reader will find the underlying metanarrative of this first subchapter and consider its possible functions.

2.1. Narratives of the Media-Smart and Futuristic City That We Get to Know

The story of this dissertation began while imagining an initial idea for the doctoral project submission, spinning around the (good, the bad, the undefined) possibilities of a smart city,[321] an unrefined idea of what cities would become in the near future.[322] The project was influenced by media publications of that period,[323] first-hand professional experiences in a major city hall, and through meetings with IT companies like IBM and Cisco, at a time when Big Data seemed

[321] Adam Greenfield, “Beyond the ‘smart city’”, (17 February 2011), online: *Urbanscale* <http://urbanscale.org/news/2011/02/17/beyond-the-smart-city/>.
[322] Jane Wakefield, “How will our future cities look?”, *BBC News* (17 February 2013), online: <https://www.bbc.co.uk/news/technology-20770518>.
[323] Ludwig Siegele, “Mining the urban data” *The Economist* (21 November 2012), online: <https://www.economist.com/news/2012/11/21/mining-the-urban-data>.

to be the new force of urban modelling[324] and the new big (data) game in town.[325] Running in the background, there were some positive visions (not only from tehnologogiststechnologists, but also from artists, architects and designers)[326] about preparing a multitude of solutions[327] for the problematic consequences of a futuristic city very close[328] to happening or already present.[329]

There was a strong belief that some new technologies were about to define the future,[330] and even as the population of cities was projected to increase,[331] there was much hope about the exciting times ahead.[332] The optimistic expectancy for a smarter city that would create a healthier world[333] gave place to the idea of an urban machine that would never sleep, a vision that should keep people awake.[334] This cyborg upgrade to sensing cites, guided by an informed imagination about technologies still under development,[335] brings many questions far beyond the

[324] Alain Clapaud, "Villes intelligentes : le Big Data va modeler les villes de demain", (16 September 2013), online: *Decideo* <https://www.decideo.fr/Villes-intelligentes-le-Big-Data-va-modeler-les-villes-de-demain_a6353.html>.
[325] Alison Heppenstall & Nick Malleson, "How big data and The Sims are helping us to build the cities of the future", (22 October 2015), online: *The Conversation* <http://theconversation.com/how-big-data-and-the-sims-are-helping-us-to-build-the-cities-of-the-future-47292>.
[326] Nick Dunn, "Have our visions of future cities become more positive?", (26 November 2014), online: *CityMetric* <https://www.citymetric.com/horizons/have-our-visions-future-cities-become-more-positive-516>.
[327] John D Macomber, "The 4 Types of Cities and How to Prepare Them for the Future", (18 January 2016), online: *Harvard Business Review* <https://hbr.org/2016/01/the-4-types-of-cities-and-how-to-prepare-them-for-the-future>.
[328] Roger K Lewis, "'Smart cities' are closer to reality than we realize", (27 May 2016), online: *Washington Post* <https://www.washingtonpost.com/realestate/smart-cities-are-closer-to-reality-than-we-realize/2016/05/26/e326bcda-1179-11e6-93ae-50921721165d_story.html>.
[329] Manu Fernández, "Smart cities in present tense", (7 May 2016), online: *Manu Fernández* <https://medium.com/@manufernandez/smart-cities-in-present-tense-69537ea1df2e#.ikp36vjql>.
[330] Colin O'Donnell, "The 5 technologies that are going to define the next decade in cities", (23 September 2016), online: *TechCrunch* <http://social.techcrunch.com/2016/09/23/the-5-technologies-that-are-going-to-define-the-next-decade-in-cities/>.
[331] Alejandro Aravena, "Two billion more people will live in cities by 2035. This could be good – or very bad", *The Guardian* (19 October 2016), online: <https://www.theguardian.com/cities/2016/oct/19/two-billion-more-people-live-cities-alejandro-aravena-habitat-3>.
[332] Joan Torres, "Smart Cities: Past, Present and Future", (24 March 2017), online: *LinkedIn* <https://www.linkedin.com/pulse/smart-cities-past-present-future-joan-torres>.
[333] Adrian Bridwater, "The city in 2030", (12 April 2017), online: *Raconteur* <https://www.raconteur.net/technology/the-city-in-2030>.
[334] Jane Wakefield, "Tomorrow's cities - nightmare vision of the future?", *BBC News* (22 February 2017), online: <https://www.bbc.co.uk/news/technology-37384152>.
[335] Todd Jaquith, "Here's a Look at the Smart Cities of the Future", (18 January 2017), online: *Futurism* <https://futurism.com/heres-a-look-at-the-smart-cities-of-the-future/>.

highlighted technical aspects, as in the economic, environmental and social dimensions of this city of tomorrow.[336] After all, the technical challenges would be the least of the new problems presented—for example, setting conditions of data collection capabilities[337] should raise more challenges—as the present experiences of high-tech cities[338] have already shown their promised potential for responding to some struggles of the future, at the cost of creating more of them.[339]

The smart city has been taken as a (re)designed city,[340] needed for future sustainability[341] for a swelling urban population,[342] a transhuman city combining high-tech and humans for the survival of the species,[343] a continuous urban transformation[344]—even if no one seems so sure of the end product. The smart city is supposed to cater to human needs but ends up creating other needs—such as connectivity, standardization and data governance[345]—which, in turn, will only be met if fulfilling the "old-fashioned" need of truly listening to its residents.[346] Unfortunately, the inhabitants of this (supposedly) rising-green-futuristic-smart city seem to be list(en)ed more

[336] Nicolas Martin, "Ville de demain : une ville intelligente ?", (12 April 2017), online: *France Culture* <https://www.franceculture.fr/emissions/la-methode-scientifique/ville-de-demain-une-ville-intelligente>.
[337] Ian Austen, "City of the Future? Humans, Not Technology, Are the Challenge in Toronto", *The New York Times* (3 January 2018), online: <https://www.nytimes.com/2017/12/29/world/canada/google-toronto-city-future.html>.
[338] Mateja Kovacic, "If you want to see the future of your city, take a look at these 3 places", (11 April 2018), online: *World Economic Forum* <https://www.weforum.org/agenda/2018/04/robot-cities-three-urban-prototypes-for-future-living/>.
[339] Alice Mariete, "Villes intelligentes : répondre aux défis de demain", (12 May 2018), online: *Le Devoir* <https://www.ledevoir.com/politique/quebec/527249/villes-intelligentes-repondre-aux-defis-de-demain>.
[340] Jane Wakefield, "What if...you could design a city?", *BBC* (22 February 2013), online: <https://www.bbc.com/news/technology-21032725>.
[341] Hannah Greinetz, "What Do We Need to Build Sustainable Cities?", (22 October 2014), online: *Meeting of the Minds* <https://meetingoftheminds.org/need-build-sustainable-cities-11882>.
[342] Aditi Shah, "India builds first 'smart' city as urban population swells", *Reuters* (15 April 2015), online: <https://in.reuters.com/article/india-cities-smart-idINKBN0N52I320150415>.
[343] Madhumita Venkataramanan, "Smart cities will be necessary for our survival" *Wired UK* (11 January 2016), online: <https://www.wired.co.uk/article/smart-city-planning-permission>.
[344] Chris Vein, "Why we need smart cities", (21 February 2017), online: *Digital Pulse PWC* <https://www.digitalpulse.pwc.com.au/why-we-need-smart-cities/>.
[345] Alex Scroxton, "Three steps towards a hierarchy of needs for smart cities", (19 February 2016), online: *ComputerWeekly* <https://www.computerweekly.com/feature/Three-steps-towards-a-hierarchy-of-needs-for-smart-cities>.
[346] Adrian Smith, "Smart cities need thick data, not big data", *The Guardian* (18 April 2018), online: <https://www.theguardian.com/science/political-science/2018/apr/18/smart-cities-need-thick-data-not-big-data>.

as consumers[347] than as citizens by business models that insist on appearing in full force, raising justified social alarms, failing to respond to expectations, but always rising again.[348]

There have been numerous business cases of smart cities in the last years—more recently, the sensor-based city[349] is on the rise—which have been used as levers for emerging new technologies.[350] As the projects multiplied and diversified, companies like IBM, Cisco, Microsoft, AT&T (and many more) have evolved the initial smart city model[351] into multiple customizable versions, from the comprehensive *all-in-one-solution* to more modest *piece-by-piece* models. The *hardware* and *software* (and their respective *humanware*) emerging from the smart city scene have already become more interoperable[352] and finally start to avoid unnecessary (and evident) incompatibilities that could exclude other companies from the game: despite the fast-paced game of the last years, the rising smart city is a long game that has just begun with an increasing number of pieces, multilevel players, and ever-changing rules.[353]

2.1.1. The Smart City in a (too) Clever World

As if it were an imperative future to be lived,[354] the *smart city game* has expanded all over

[347] Jim McClelland, "Rise of the smart city consumer", (6 June 2012), online: *Raconteur* <https://www.raconteur.net/technology/rise-of-the-smart-city-consumer>.
[348] Sommer Mathis, "The Rise and Fall and Eventual Rise Again of the 'Smart City'", (13 January 2014), online: *CityLab* <http://www.theatlanticcities.com/technology/2014/01/rise-and-fall-and-eventual-rise-again-smart-city/8081/>.
[349] Tod Newcombe, "The Rise of the Sensor-Based Smart City", (2 June 2014), online: *Government Technology* <http://www.govtech.com/data/The-Rise-of-the-Sensor-Based-City.html>.
[350] Anitha Vadavatha & Anish Mohammed, "Smart Cities Built on Emerging Tech is India's Latest Initiative", (19 March 2015), online: *Singularity Hub* <https://singularityhub.com/2015/03/19/smart-cities-built-on-emerging-tech-is-indias-latest-initiative/>.
[351] Adam Stone, "A New Smart City Model Is Emerging", (2 June 2016), online: *Government Technology* <http://www.govtech.com/data/A-New-Smart-City-Model-Is-Emerging.html>.
[352] Tom Blewitt, "Interoperability: The key to the emerging smart city", (9 March 2017), online: *ReadWrite* <https://readwrite.com/2017/03/09/interoperability-the-key-to-the-emerging-smart-city-cl1/>.
[353] Michael Totty, "The Rise of the Smart City", *Wall Street Journal* (17 April 2017), online: <https://www.wsj.com/articles/the-rise-of-the-smart-city-1492395120>.
[354] Jane Wakefield, "Do you want to live in a smart city?", *BBC News* (19 August 2013), online: <https://www.bbc.com/news/technology-22538561>.

the world, with fierce competition between cities and mayors aiming to get at the top of the podium.[355] At a time when cities are announced as the political unities set to save humanity from itself,[356] as their mayors are declared as the *master builders of a smart world* by conciliating resource constraints and environmental concerns,[357] some cities (and their *smart leaders*) are setting the bar for all the rest.[358] Different priorities and strategies are being adopted across the world,[359] making it relevant to know the status of the (arguably) *top smart city governments* in order to set their unavoidable reference over the topic.[360]

Hosting the most important event of smart cities in the world[361] and usually appearing in all kinds of rankings,[362] there is no better symbol of the smart city than the highly connected city of *Barcelona*.[363] For a long time, the Catalan capital has been used as the major urban testbed for all kinds of systems and smart sensors,[364] but now the municipality has been under a priority redirection toward their people's needs[365] (and less for the technology needs) since a new

[355] Sally Davies, "Glasgow aims to be first 'smart city'", (3 June 2014), online: *Financial Times* <https://www.ft.com/content/d119ac06-e57e-11e3-a7f5-00144feabdc0>.
[356] Jonn Elledge, "Can cities save the world? Benjamin Barber, Edward Glaeser and others say they can", (18 November 2015), online: *CityMetric* <https://www.citymetric.com/politics/can-cities-save-world-benjamin-barber-edward-glaeser-and-others-say-they-can-1479>.
[357] Laurence Goasduff, "The Future City in a Smart World", (19 May 2015), online: *Gartner* <https://www.gartner.com/smarterwithgartner/the-future-city-in-a-smart-world/>.
[358] Aaron Souppouris, "Singapore is striving to be the world's first 'smart city'", (11 March 2016), online: *Engadget* <https://www.engadget.com/2016/11/03/singapore-smart-nation-smart-city/>.
[359] Brian Buntz, "7 smart city strategies from pioneering cities across the world", (5 October 2017), online: *IoT World Today* <https://www.iotworldtoday.com/2017/10/05/7-smart-city-strategies-cities-across-world/>.
[360] Laurel Deppen, "The top 20 smart city governments worldwide", (9 July 2018), online: *TechRepublic* <https://www.techrepublic.com/article/the-top-20-smart-city-governments-worldwide/>.
[361] Noelia Hernández, "Smart Cities, las ciudades del futuro", (18 November 2013), online: *ComputerHoy* <https://computerhoy.com/noticias/internet/smart-cities-ciudades-del-futuro-7474>.
[362] Sean Barton, "University experts help create first mobile-connected smart city ranking", (2 May 2014), online: *Phys.org* <https://phys.org/news/2014-05-university-experts-mobile-connected-smart-city.html>.
[363] Vivienne Walt, "Barcelona: The most wired city in the world", (29 July 2015), online: *Fortune* <http://fortune.com/2015/07/29/barcelona-wired-city/>.
[364] Laura Adler, "How Smart City Barcelona Brought the Internet of Things to Life", (18 February 2016), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/how-smart-city-barcelona-brought-the-internet-of-things-to-life-789>.
[365] Nurfilzah Rohaidi, "How Barcelona's citizens will control the use of their data", (19 June 2017), online: *GovInsider* <https://govinsider.asia/inclusive-gov/barcelona-city-council-citizen-data-sharing-francesca-bria/>.

political orientation started an entirely new movement to rethink and remodel the smart city paradigm.[366] Nowadays, Barcelona spearheads a movement of municipalities that are changing the dominant relations between the public and private sectors[367] in smart city projects, as well as the dominant understanding that every smart city would have to be a surveillance city[368] while keeping the acknowledgment as one of the most intelligent cities of the world.[369]

In the Olympic games of 2012, *London* was claimed as a city with all smart features[370] and recognized as a global model of the smart city.[371] The British capital attracts much attention in smart city events with its famous *Oyster card* and other experiences in public transportation deploying data analytics,[372] which are kept under close surveillance by one of the most impressive CCTV networks of the world.[373] The many services provided by the technological layers of the city remain seamless to many people,[374] maybe because the continuous urban innovation through the use of data analytics has been taken as an expected fact of life[375] in this

[366] Ross Tieman, "Barcelona: smart city revolution in progress", (26 October 2017), online: *Financial Times* <https://www.ft.com/content/6d2fe2a8-722c-11e7-93ff-99f383b09ff9>.
[367] Richard Forster, "How Barcelona's smart city strategy is giving 'power to the people'", (3 April 2018), online: *ITU News* <https://news.itu.int/how-barcelonas-smart-city-strategy-is-giving-power-to-the-people/>.
[368] Thomas Graham, "Barcelona is leading the fightback against smart city surveillance", (18 May 2018), online: *Wired* <https://www.wired.co.uk/article/barcelona-decidim-ada-colau-francesca-bria-decode>.
[369] Víctor Pérez, "Las razones por las que Barcelona es una de las 3 ciudades más inteligentes del mundo", (21 June 2018), online: *Business Insider* <https://www.businessinsider.es/barcelona-razones-3-ciudades-mas-inteligentes-mundo-193738>.
[370] Ian McVey, "Transforming London: Can We Achieve the Smart City Vision?", (19 December 2013), online: *HuffPost UK* <http://www.huffingtonpost.co.uk/ian-mcvey/transforming-london-can-w_b_4467242.html>.
[371] Pascual Berrone & Joan Enric Ricart, "London Tops the Ranking of the World's 'Smartest' Cities", (2015), online: *IESE Insight* <http://www.ieseinsight.com/doc.aspx?id=1679>.
[372] Bernard Marr, "How Big Data And The Internet Of Things Improve Public Transport In London", (27 May 2015), online: *Forbes* <https://www.forbes.com/sites/bernardmarr/2015/05/27/how-big-data-and-the-internet-of-things-improve-public-transport-in-london/>.
[373] Joe Shute, "Can anyone escape Britain's surveillance state?", *The Telegraph* (28 August 2015), online: <https://www.telegraph.co.uk/technology/news/11831533/Can-anyone-escape-Britains-surveillance-state.html>.
[374] Katyanna Quach, "Brits who live in smart cities don't really care", (5 May 2016), online: *The Register* <https://www.theregister.co.uk/2016/05/05/are_smart_cities_even_that_smart_the_british_public_dont_think_so/>.
[375] Edwin Smith, "By 2050, will London still be a smart city?", (15 March 2017), online: *Raconteur* <https://www.raconteur.net/technology/will-london-remain-a-smart-city>.

global-leading smart city with strong institutional support[376] – and many stories to tell about it.[377]

New York is another *smart-city-star,* generating global media waves about ambitious, smart projects such as citywide free Wi-Fi,[378] predictive data analytics,[379] and ubiquitous fibre-optic connectivity.[380] All this attention comes at the price of many critics questioning how much the initial marketing about NY's pioneer projects contrasts with the data extractivism on residents promoted by the city and its partners.[381] The experiences in New York play a major referential role, first because most American cities are already in the same trend,[382] and second because this global-reaching city intends to remain influential to all smart cities.[383]

Another global city with much influence over others, *Paris* is recognized by projects of mobility in the smart city agenda,[384] but despite having much light to shine on the subject,[385] the

[376] April Slattery, "Khan turns to Londoners to drive capital's smart city status", (24 January 2018), online: *CBR Government* <https://www.cbrgovernment.com/local-government/khan-turns-londoners-drive-capitals-smart-city-status/>.
[377] Eddie Copeland, "Why London in 1854 was the world's first smart city", (28 May 2018), online: *The Next Web* <https://thenextweb.com/syndication/2018/05/28/why-london-in-1854-was-the-worlds-first-smart-city/>.
[378] Alex Marshall, "NYC's Plan for Free, Citywide Wi-Fi", (1 February 2015), online: *Governing* <http://www.governing.com/columns/eco-engines/gov-nyc-pay-phones-internet.html>.
[379] Alexander Howard, "How New York City Is Using Big Data To Serve Its Residents", (13 November 2015), online: *HuffPost Canada* <http://www.huffingtonpost.com/entry/how-new-york-city-is-using-big-data-to-serve-its-residents_us_56461423e4b08cda34887f1a>.
[380] Thomas Arbuckle II, "Link.nyc and future of the smart cities [NYC leading the way]", (10 November 2016), online: *NYC Blockchain & Tech News* <http://silicon.nyc/link-nyc-future-smart-city/>.
[381] Nick Pinto, "Google Is Transforming NYC's Payphones Into a 'Personalized Propaganda Engine'", (6 July 2016), online: *The Village Voice* <https://www.villagevoice.com/2016/07/06/google-is-transforming-nycs-payphones-into-a-personalized-propaganda-engine/>.
[382] Teena Maddox, "66% of US cities investing in smart tech", (6 November 2017), online: *TechRepublic* <https://www.techrepublic.com/article/66-of-us-cities-are-investing-in-smart-city-technology/>.
[383] Dan Patterson, "How NY plans to become a smart city leader", (1 March 2018), online: *TechRepublic* <https://www.techrepublic.com/article/how-new-york-city-plans-to-become-a-smart-city-leader/>.
[384] Marie Perez, "Paris, capitale de la mobilité urbaine ?", (11 April 2017), online: *The Urban Mobility Daily* <https://urbanmobilitydaily.com/paris-capitale-mobilite-urbaine/>.
[385] Jean-Pierre Gonguet, "Paris : la Ville lumière, métropole éclairée !", (20 November 2014), online: *La Tribune* <https://www.latribune.fr/regions/smart-cities/20141120tribab8880521/paris-la-ville-lumiere-metropole-eclairee.html>.

emphasis has also been on aspects of economic development.[386] This focus on the innovation ecosystem has not prevented the French capital from aspiring a world leadership in smart cities,[387] intending to combine it with promises of citizen participation, sustainability, and transparency.[388] One of the differentials of the French publications about smart cities has been the frequent and direct criticism of the intrinsic tendencies of aggravating social inequality,[389] at the same time that their media claims for more competitiveness vis-à-vis other countries.[390]

Competition means a lot to cities in the *smartness race*, with some countries going to great lengths to achieve it. When a city is also a country, planning a smart city may also mean becoming a smart nation,[391] a pursuit undertaken in long-term efforts by Singapore.[392] This exceptional (because one of the few functioning) city-state[393] is referred to as the most futuristic city in present times[394] due to its impressive technological achievements in urban management

[386] Max Armanet, "'Comme Smart City, Paris n'a rien à envier à Londres!' (Anne Hidalgo)", (14 November 2014), online: *La Tribune* <https://www.latribune.fr/regions/smart-cities/20141114trib580dfadc4/comme-smart-city-paris-n-a-rien-a-envier-a-londres-anne-hidalgo.html>.
[387] Jean-Pierre Gonguet & Sylvain Rolland, "'Paris doit devenir la capitale mondiale des villes intelligentes' Jean-Louis Missika", (14 May 2015), online: *La Tribune* <https://www.latribune.fr/economie/france/paris-doit-devenir-la-capitale-mondiale-des-villes-intelligentes-476207.html>.
[388] Agathe Mercante, "Paris se rêve en ville intelligente et durable", (28 May 2015), online: *Les Echos* <https://www.lesechos.fr/28/05/2015/lesechos.fr/02195747726_paris-se-reve-en-ville-intelligente-et-durable.htm>.
[389] Franck DeCloquement, "Les villes les plus innovantes sont aussi les villes où les inégalités se creusent le plus et ça n'est pas une coïncidence", (13 November 2017), online: *Atlantico* <http://www.atlantico.fr/decryptage/villes-plus-innovantes-sont-aussi-villes-ou-inegalites-se-creusent-plus-et-est-pas-coincidence-3221509.html>.
[390] Jean-Marc Sylvestre, "Paris et (est?) le retard français", (3 April 2018), online: *Atlantico* <http://www.atlantico.fr/decryptage/paris-et-est-retard-francais-capitale-ne-figure-meme-pas-dans-classement-mondial-villes-intelligentes-jean-marc-sylvestre-3351897.html>.
[391] Eileen Yu, "Singapore unveils plan in push to become smart nation", (17 June 2014), online: *ZDNet* <https://www.zdnet.com/article/singapore-unveils-plan-in-push-to-become-smart-nation/>.
[392] Melissa Low, "Many Smart Cities, One Smart Nation – Singapore's Smart Nation Vision", (15 June 2015), online: *SCL* <https://www.scl.org/articles/3390-many-smart-cities-one-smart-nation-singapore-s-smart-nation-vision>.
[393] Simon Long, "The Singapore exception" *The Economist* (18 July 2015), online: <https://www.economist.com/special-report/2015/07/18/the-singapore-exception>.
[394] Colin Aboy, "Singapore May Become the City of the Future…And an Orwellian Nightmare", (29 April 2016), online: *Futurism* <https://futurism.com/smart-city-singapore-going-get-smarter/>.

and planning that seem to work only there.[395] One of the main reasons for such exceptionality is the fact that these technological experiments are not limited by "democratic constraints" and societal concerns that allows which would allow to work on "the whole shebang,"[396] but it may teach democratic nations that political will and deep pockets may not be enough to make efficient and technocratic cities[397] run smoothly: there are other costs and risks involved.

Smart cities built from scratch are all about costs and risks, with three of them well representing the high bets on the trend: *Songdo*, *Masdar* and *Neom*. The most famous of all, the once all-promising Songdo was supposed to be the urban utopia of South Korea.[398] Not only did it fail to meet its many expectations,[399] but today it seems more of an idealized suburb of the past than a high-tech city of the future.[400] Masdar, the multibillion dollar investment of the United Arab Emirate to build a technological and ecological urban oasis in a desert,[401] so far suffers from a more acute form of green ghost town syndrome[402] that similarly affects its Korean counterpart, despite all the governmental efforts to attract companies and students. Even so, both previous examples did not prevent another bigger and newer attempt of building a smart

[395] Matt Hamblen, "Singapore's 'city brain' project is groundbreaking -- but what about privacy?", (12 December 2016), online: *Computerworld* <https://www.computerworld.com/article/3148186/emerging-technology/singapore-s-city-brain-project-is-groundbreaking-but-what-about-privacy.html>.
[396] Kathryn Cave, "What can other cities learn from Singapore's extensive tech initiatives?", (11 May 2017), online: *IDG Connect* <https://www.idgconnect.com/blog-abstract/26821/what-cities-learn-singapore-extensive-tech-initiatives>.
[397] Sara M Watson, "What the UK can learn from Singapore's smart city" *Wired UK* (20 June 2017), online: <https://www.wired.co.uk/article/sara-watson-singapore-smart-cities>.
[398] Jack Eidt, "Songdo: Utopian City of Big Data and Urban 'Sustainability'", (2 October 2013), online: *Wilder Utopia* <https://www.wilderutopia.com/sustainability/land/songdo-south-korea-utopian-city-of-big-data-and-urban-sustainability/>.
[399] Chris White, "South Korea's 'Smart City': not quite smart enough?", (25 March 2018), online: *South China Morning Post* <http://www.scmp.com/week-asia/business/article/2137838/south-koreas-smart-city-songdo-not-quite-smart-enough>.
[400] Linda Poon, "Sleepy in Songdo, Korea's Smartest City", (22 June 2018), online: *CityLab* <https://www.citylab.com/life/2018/06/sleepy-in-songdo-koreas-smartest-city/561374/>.
[401] Suzanne Goldenberg, "Masdar's zero-carbon dream could become a green ghost town", *The Guardian* (16 February 2016), online: <https://www.theguardian.com/environment/2016/feb/16/masdars-zero-carbon-dream-could-become-worlds-first-green-ghost-town>.
[402] Coco Liu, "Oil-rich Abu Dhabi's Masdar City: green oasis or green ghost town?", (22 February 2018), online: *South China Morning Post* <http://www.scmp.com/week-asia/business/article/2133409/oil-rich-abu-dhabis-masdar-city-green-oasis-or-green-ghost-town>.

city with a $500 billion budget[403] in Saudi Arabia: Neom, which is supposed to become a futurist megacity for a "life with no limits" in a society known by many democratic limits.[404] In fact, it seems that there are serious limitations that these three cities may not overcome in the near future and that it would be advisable for a democratic society if they do not.[405]

The preparation for the populous cities of the future was already in the national plans of *China* in 2013, with more than 193 municipalities under pilot trials[406] for smart cities, supported by initial funding ready to be multiplied[407] to the order of hundreds of billions of dollars. After the central government took over the lead for the development of smart cities, most Chinese cities got into the "smart aspirations,"[408] hoping that their "data all the rage" projects[409] would deal with the urgent pressure of millions of rural migrants coming to the urban areas. China quickly became the country with the most smart city initiatives, with over 500 cities fuelling the IT industrial chains,[410] raising the already high bar of related concerns on the subject by making their systems worldwide available for export,[411] with more aggressive ambitions that start to dwarf other

[403] Zachary Karabell, "Saudi Prince Plans a 'City of the Future.' Don't Bet on It" *Wired* (6 December 2017), online: <https://www.wired.com/story/saudi-prince-plans-a-city-of-the-future-dont-bet-on-it/>.
[404] Glen Carey, Vivian Nereim & Christopher Cannon, "Sun, Sea and Robots: Saudi Arabia's Sci-Fi City in the Desert", *Bloomberg* (26 October 2017), online: <https://www.bloomberg.com/graphics/2017-neom-saudi-mega-city/>.
[405] Celine Deluzarche, "Smart city : pourquoi la ville ordinateur n'est pas un futur souhaitable", (26 April 2018), online: *Maddyness* <https://www.maddyness.com/2018/04/26/smart-city-ville-ordinateur-enfer/>.
[406] Xi Sun, "China to Be Ready for Smart City Construction Boom", (16 October 2013), online: *All China Women's Federation* <http://www.womenofchina.cn/html/report/166254-1.htm>.
[407] Arno Maierbrugger, "China allocates $8b fund for smart cities", (11 April 2014), online: *Investvine* <http://investvine.com/china-allocates-8b-fund-for-smart-cities/>.
[408] Christina Nelson, "Smart City Development in China", (17 June 2014), online: *China Business Review* <https://www.chinabusinessreview.com/smart-city-development-in-china/>.
[409] Federico Guerrini, "Cities Cannot Be Reduced to Just Big Data and IoT: Lessons from China", (19 September 2016), online: *Forbes* <https://www.forbes.com/sites/federicoguerrini/2016/09/19/engaging-citizens-or-just-managing-them-smart-city-lessons-from-china/>.
[410] Wenyu Sun, "China's 'smart cities' to number 500 before end of 2017", (20 April 2017), online: *People's Daily Online* <http://en.people.cn/n3/2017/0420/c90000-9205652.html>.
[411] Timothy Revell, "A smart city in China tracks every citizen and yours could too", (24 October 2017), online: *New Scientist* <https://www.newscientist.com/article/2151297-a-smart-city-in-china-tracks-every-citizen-and-yours-could-too/>.

reputable *high-tech* Asian cities such as *Hong Kong*[412] and *Tokyo*.[413]

Another very ambitious initiative that tracks global attention is the Indian plan for a hundred smart cities, which aims to build new cities or retrofit old cities,[414] and is backed by a justification of solving the serious challenges of the infrastructure of the country.[415] Being "smart" in this context could be facing the critic urbanization deficits[416]—such as sanitation, water supply, and housing—but the typical digital infrastructure seems to remain as a crucial element for the Indian plan,[417] maintaining some differences from the Western versions. The *smart Indian city* includes regional variations involving innovation, entrepreneurship, and the business needs of the country,[418] which has one of the strongest IT service industries in the world, attracting much corporative and international interest and investment from (the usual) smart city players[419]—although there is evidence that information technology may not be considered as priority *solutions* for the problems to be tackled. Much can be learnt from the Indian developments underway, either from the massive innovative approaches being deployed in the biggest world

[412] Kelly Olsen, "Hong Kong is stuck playing catch-up in the global 'smart city' rush", (27 April 2018), online: *CNBC* <https://www.cnbc.com/2018/04/27/hong-kong-smarty-city-playing-catch-up-in-the-global-rush.html>.
[413] Steve McCaskill, "Smart Stadiums, Streets & Airports: How Tokyo Is Preparing For 2020 Olympics", (23 May 2017), online: *Silicon* <https://www.silicon.co.uk/networks/tokyo-2020-panasonic-212535>.
[414] Casey Tolan, "Cities of the future? Indian PM pushes plan for 100 'smart cities'", (18 July 2014), online: *CNN* <http://www.cnn.com/2014/07/18/world/asia/india-modi-smart-cities/index.html>.
[415] Jon Kher Kaw, "In Search of India's Smart Cities", (17 October 2014), online: *End Poverty in South Asia* <http://blogs.worldbank.org/endpovertyinsouthasia/search-india-s-smart-cities>.
[416] AFP, "India's 'smart' cities plan risks leaving millions behind", (16 December 2014), online: *Deccan Chronicle* <https://www.deccanchronicle.com/141216/nation-current-affairs/article/indias-smart-cities-plan-risks-leaving-millions-behind>.
[417] Nyshka Chandran, "Are India's smart cities too ambitious?", (19 April 2015), online: *CNBC* <https://www.cnbc.com/2015/04/19/are-indias-smart-cities-too-ambitious.html>.
[418] Ayona Datta, "Will India's experiment with smart cities tackle poverty – or make it worse?", (27 January 2016), online: *The Conversation* <http://theconversation.com/will-indias-experiment-with-smart-cities-tackle-poverty-or-make-it-worse-53678>.
[419] Rahul Bhatia, "'We don't need IT here': the inside story of India's smart city gold rush", *The Guardian* (22 January 2016), online: <https://www.theguardian.com/cities/2016/jan/22/inside-story-india-smart-city-gold-rush-it>.

democracy,[420] or from the necessary criticism that the efforts toward *smart technologies* should not get in the way of facing the struggles for basic services and human dignity in urban areas that are common struggles in the developing countries of the Global South.[421]

As smart city projects spread across the globe, the dominant model of the developed smart city of the Global North seems to find no fit in the megacities of the Global East,[422] and moving through African and Latin American countries, it becomes clear that their usual smart solutions will not become the saviours of their cities either.[423] The smart city projects in the Global South are also moving fast, overcoming infrastructure vices through mobile connectivity,[424] using innovative *socialtech* and data crowdsourcing to bridge the urban divide in extremely unequal conditions.[425] Despite keeping global cities like Barcelona as their benchmark, there are complex problems like security—urban digital devices are easy targets in countries with high rates of criminality—that considerably change the conditions for any smart city project.[426] Regardless of all the differences, the populations of the south are not to be considered less *tech-savvy* or less committed to tech-driven solutions for a very near future,[427] once capitalism brings *smartness* as a factor of competition between the cities in the same regions and between underdeveloped

[420] Patricia McMarney, "City Data Matters: Lessons For India, Canada And The World", (27 January 2017), online: *HuffPost Canada* <https://www.huffingtonpost.ca/dr-patricia-mccarney/city-data_b_14300204.html>.
[421] Chatterjee Patralekha, "Criticism of India's Smart Cities is mounting", (23 August 2017), online: *Eco-Business* <http://www.eco-business.com/news/criticism-of-indias-smart-cities-mission-is-mounting/>.
[422] Tim Smedley, "Smart cities: adapting the concept for the global south", *The Guardian* (21 November 2013), online: <https://www.theguardian.com/global-development-professionals-network/2013/nov/21/smart-cities-relevant-developing-world>.
[423] Mike Hower, "The problem with translating smart cities to the global South", (22 April 2015), online: *GreenBiz* <https://www.greenbiz.com/article/translating-smart-cities-global-south>.
[424] Bianca Wright, "Can South Africa deliver on its smart city dreams?", (12 August 2016), online: *IDG Connect* <https://www.idgconnect.com/abstract/19292/can-south-africa-deliver-smart-city-dreams>.
[425] Théo Roux, "Why should Smart Cities look up to Favelas for inspiration?", (March 2017), online: *L'Atelier BNP Paribas* <https://atelier.bnpparibas/en/smart-city/article/smart-cities-favelas-inspiration>.
[426] Benedict Mander, "Buenos Aires: 'smart cities' still require water and sanitation", (4 April 2017), online: *Financial Times* <https://www.ft.com/content/7eac10d4-f9e5-11e6-bd4e-68d53499ed71>.
[427] Chris Giles, "African smart cities: A high-tech solution to overpopulated megacities?", (9 April 2018), online: *CNN* <https://www.cnn.com/2017/12/12/africa/africa-new-smart-cities/index.html>.

countries all over the world.[428]

Smart city rankings are urban competition translated to numbers and are very well known and used by politicians, consultants and journalists in North America,[429] Asia/Pacific,[430] Latin America,[431] and—the region with, by far, the most measured and compared cities by many rankings—Europe.[432] There are many reasons to ask[433] about what are the objectives, parameters[434] and relevance of all kinds of rankings of smart cities: *IESE, Juniper, Fast Company, ICF*, and many more. Despite the significative discordances between the rankings that make their application very volatile, it is a well-known fact that they are used in local politics, tech businesses, and major institutions[435] as measures for evaluating the current state of cities and even for what cities are supposed to be or become.[436]

There is absolutely nothing wrong in wanting to live in a city with better conditions as a resident or wanting to better serve your city as a municipal civil servant because there is better

[428] Átila Varela, "Fortaleza é a terceira do País no ranking de Cidades Inteligentes", (27 June 2018), online: *Jornal O Povo* <https://www.opovo.com.br/jornal/economia/2018/06/fortaleza-e-a-terceira-do-pais-no-ranking-de-cidades-inteligentes.html>.
[429] Boyd Cohen, "The 10 Smartest Cities In North America", (14 November 2013), online: *Fast Company* <https://www.fastcompany.com/3021592/the-10-smartest-cities-in-north-america>.
[430] Boyd Cohen, "The 10 Smartest Asia/Pacific Cities", (21 November 2013), online: *Fast Company* <https://www.fastcompany.com/3021911/the-10-smartest-asia-pacific-cities>.
[431] Boyd Cohen, "The 8 Smartest Cities in Latin America", (3 December 2013), online: *Fast Company* <https://www.fastcompany.com/3022533/the-8-smartest-cities-in-latin-america>.
[432] Boyd Cohen, "The 10 Smartest Cities In Europe", (13 January 2014), online: *Fast Company* <https://www.fastcompany.com/3024721/the-10-smartest-cities-in-europe>.
[433] Samantha North, "Do city rankings really matter?", (7 December 2015), online: *CityMetric* <https://www.citymetric.com/politics/do-city-rankings-really-matter-1628>.
[434] Justine Brown et al, "2016 Digital Cities: Winners Focus on Transparency, Security, Infrastructure", (9 November 2016), online: *Government Technology* <http://www.govtech.com/dc/articles/Digital-Cities-Survey-2016.html>.
[435] Chris Weller, "These are the 25 most high-tech cities in the world", (16 August 2017), online: *World Economic Forum* <https://www.weforum.org/agenda/2017/08/these-are-the-25-most-high-tech-cities-in-the-world/>.
[436] Jeff Desjardins, "This is how the world's smartest cities are being built", (5 September 2017), online: *World Economic Forum* <https://www.weforum.org/agenda/2017/09/this-is-how-the-worlds-smartest-cities-are-being-built/>.

data available that allows it to happen,[437] nonetheless most of the superior sources of information come directly from communities and the best technologies to obtain them turn out to be quite unsophisticated.[438] Even so, when following the news and many public administration forums, it would seem that there is no other solution than accepting to spend more than 400 billion dollars on data dashboards and street sensors to make better decisions.[439] After all, collecting, synthesizing and communicating massive digital data is said to be the key ingredient to improve quality of life in the not-so-distant future.[440] If more is data what makes cities smarter and more technology is what makes them *cooler*,[441] then the simple formula to make the *smartest of all smart cities*[442] would be to maximize data and technology on the streets—an ovesimplified way of explaining an idea that has often been taken into consideration too lightly.

Underlying the idea of the data-tech-driven city, there is an enlightened *demi-reason-demi-belief* saying that more data leads to more information and more information leads to more wisdom, so all it would take to develop smart cities would be setting parameters, finding patterns and revealing what to do to make cities less messy and dumb.[443] Probably no one (certainly, no mayor) wants their city to be called dumb, but some of the urban smartness formulas and beliefs

[437] Stephen Goldsmith & Susan Crawford, "Good data make better cities", (18 November 2014), online: *Boston Globe* <https://www.bostonglobe.com/opinion/2014/11/18/good-data-make-better-cities/K2XvjUnA1lQqPg4bu9Nf8N/story.html>.
[438] Adam Greenfield, "The smartest cities rely on citizen cunning and unglamorous technology", *The Guardian* (22 December 2014), online: <https://www.theguardian.com/cities/2014/dec/22/the-smartest-cities-rely-on-citizen-cunning-and-unglamorous-technology>.
[439] Bernard Marr, "How Big Data And The Internet Of Things Create Smarter Cities", (19 May 2015), online: *Forbes* <https://www.forbes.com/sites/bernardmarr/2015/05/19/how-big-data-and-the-internet-of-things-create-smarter-cities/>.
[440] Jennifer Formichelli, "Making cities smarter", (1 June 2016), online: *MIT News* <http://news.mit.edu/2016/making-cities-smarter-0601>.
[441] Ryan McCauley, "Cool Cities Rely on Technology; Smart Cities Rely on Data and Partnerships", (9 November 2016), online: *Future Structure* <http://www.govtech.com/fs/Cool-Cities-Rely-on-Technology-Smart-Cities-Rely-on-Data-and-Partnerships.html>.
[442] Elizabeth Woyke, "A smarter smart city", (21 February 2018), online: *MIT Technology Review* <https://www.technologyreview.com/s/610249/a-smarter-smart-city/>.
[443] Usman Haque, "Usman Haque: 'Messiness will inevitably arise in spite of smart cities'" *Wired UK* (31 July 2013), online: <https://www.wired.co.uk/article/in-praise-of-messy-cities>.

are creating some new (and dangerous) kinds of dumbness for cities.[444] In this sense, keeping some forms of old and known forms of *stupidity* in cities could be wiser than importing some data-based solutions for policy problems that are so widely accepted in the so-called *smart city movement*.[445] Considering this from a distance, many *smart solutions* seem to be like magical dust thrown over city pictures that do not make them more intelligent,[446] and yet many imaginable smart infrastructures are being deployed everywhere to *save humanity* from the dumb cities.[447]

It might be possible that the *over-tech-clever* cities are to be feared as incontestable projects wherever they go, transforming *city-zens* into *city-consumers* of ever-improving systems being integrated into systems.[448] There is justified worry that the ultimate vision of a hyper efficient city can lead to too-smart cities which would not be desirable places to live, even so, most critics of the smart city models do not advocate shunning technology[449] but opening the debate and dealing with their possible consequences with all those who will suffer from them. Even by the fact that *efficient city solutions* can become urban problems when not well discussed, it is advisable to properly ask the questions for which technology could be the answer.[450]

There is no shortage of old questions and new answers in the increasingly connected

[444] Adrian Bridwater, "Smart cities still dumb enough to be hacked", (25 April 2016), online: *SC Magazine* <https://beta.scmagazineuk.com/article/1477459>.
[445] Ester Fuchs, "Smart Cities, Stupid Cities, and How Data Can Solve Urban Policy Problems", (25 August 2017), online: *Tech at Bloomberg* <https://www.techatbloomberg.com/blog/smart-cities-stupid-cities-and-how-data-can-be-used-to-solve-urban-policy-problems/>.
[446] Valentín Muro, "Entre ciudades inteligentes y tonterías tecnológicas", (8 May 2018), online: *La Nación* <https://www.lanacion.com.ar/2132586-entre-ciudades-inteligentes-y-tonterias-tecnologicas>.
[447] Emily Wright, "The smart infrastructure that will save us from our dumb cities" *Wired UK* (3 June 2018), online: <https://www.wired.co.uk/article/building-the-megacities-of-the-future>.
[448] Daniel Kaplan, "Ta ville, trop smart pour toi", (2 October 2012), online: *InternetActu.net* <http://www.internetactu.net/2012/10/02/ta-ville-trop-smart-pour-toi/>.
[449] Jason Koebler, "Madrid's New Parking Meters Are Too 'Smart' For Anyone's Good", (2 July 2014), online: *Motherboard* <https://motherboard.vice.com/en_us/article/wnjxmw/madrids-new-parking-meters-are-too-smart-for-anyones-good>.
[450] Cristina Galindo, "El futuro de las ciudades: ¿demasiado inteligentes?", (1 July 2015), online: *La Nación* <https://www.lanacion.com.ar/1806358-el-futuro-de-las-ciudades-demasiado-inteligentes>.

city,[451] but it is also necessary to question to whom and for what purpose those answers are more favourable in the end.[452] The descriptions of the automated city reveal public services are provided by more and more "efficient" autonomous systems and less and less "unreliable" human beings, building a paradox of increasing budget cuts and expanding expensive IT contracts.[453] Beyond what seems to be the wild dreams of those who would become more privileged by the (discussable) replacement of humans by machines, the success of future cities might rely more on the connection between people for collaboration and mutual empowerment than on automation,[454] providing more suitable *networked dreams* of collaboration for work and play and for maximizing freedom of urban residents[455]—with digital technologies as instruments for it.

2.1.2. Technologies Getting Smarter in the Urban Laboratory

Most of the publications on smart cities, as an implicit rule drawing an easily detectable pattern, are all about describing or advocating a few "essential" digital technologies that promise to deliver some *high-tech dream* at a given time. [456] At the time of considering a first project draft for this research, the move from municipal systems based on local data centres to shared systems hosted on cloud computing facilities was all the rage, with IBM[457] and Cisco[458] providing

[451] Glen Martin, "The emergence of the connected city", (8 January 2014), online: *O'Reilly Radar* <http://radar.oreilly.com/2014/01/the-emergence-of-the-connected-city.html>.
[452] Dia Kayyali, "Cidades Inteligentes: conectadas para a injustiça", (1 March 2016), online: *Oficina Antivigilância* <https://antivigilancia.org/pt/2016/03/cidades-inteligentes-conectadas-para-a-injustica/>.
[453] Duncan Jefferies, "The automated city: do we still need humans to run public services?", *The Guardian* (20 September 2016), online: <https://www.theguardian.com/cities/2016/sep/20/automated-city-robots-run-public-services-councils>.
[454] Mike Cooray & Rikke Duus, "Technology is not enough to create connected cities – here's why", (23 August 2017), online: *The Conversation* <http://theconversation.com/technology-is-not-enough-to-create-connected-cities-heres-why-82740>.
[455] Cory Doctorow, "My short story about better cities", (28 February 2018), online: *Boing Boing* <https://boingboing.net/2018/02/28/fill-your-boots.html>.
[456] Teena Maddox, "Smart cities: 6 essential technologies", (1 August 2016), online: *TechRepublic* <https://www.techrepublic.com/article/smart-cities-6-essential-technologies/>.
[457] Um KyungSoon, "Big data, cloud and Smarter Cities", (3 May 2012), online: *IBM* <https://www.ibm.com/blogs/cloud-computing/2012/05/03/big-data-cloud-and-smarter-cities/>.
[458] Ashok Kumar, "Creating Cities of the Future", (31 January 2012), online: *Cisco* <https://www.cisco.com/c/en_in/about/knowledge-network/creating-cities.html>.

much of the input for city halls. Consequently, the perspectives were much more based on the IT industry than on those from city officials or residents,[459] but there were some key roles that the cloud has been playingfor the cities[460]—but not necessarily for the functions and scale that were first imagined. Smaller city halls were pushed by vendors to migrate most of their municipal systems to offshore datacentres run by private companies, gaining scalability and efficiency of systems, sharing resources with other municipalities and achieving economy of scale.[461] Despite some success with smaller municipalities, the results of *municipal clouds* are more modest than any cloud company will admit, indicating that companies needed cities as clients even more than the contrary:[462] the data centre business tends to grow in major smart city projects.[463]

While *cloud computing* soon got into what the company *Gartner* calls the "trough of disillusionment,"[464] especially when dealing with cities, *Big Data* has been at the top of interest for city planning and management of smart cities.[465] At one time considered prodigal in their data practises, cities all of a sudden become hungry to obtain and retain all kinds of data for experiments on Big Data,[466] announcing ambitious projects that attracted a lot more public attention than concrete and reproducible results a few years later.[467] Entire cities were planned

[459] Gordon Feller, "Cloud and the Smart City", (8 May 2013), online: *Government Technology* <http://www.govtech.com/e-government/Industry-Perspective-Cloud-and-the-Smart-City.html>.
[460] Sean Kinney, "The key role of cloud computing in a smart city", (21 November 2016), online: *RCR* <https://www.rcrwireless.com/20161121/telco-cloud/key-role-cloud-computing-smart-city-tag17>.
[461] Ashu Kajekar, "Why Indian smart cities need solid cloud computing foundation", (17 May 2017), online: *The Week* <https://www.theweek.in/content/archival/news/sci-tech/indian-smart-cities-cloud-computing-foundation.html>.
[462] David Linthicum, "Smart cities need the cloud—and vice versa", (3 April 2018), online: *InfoWorld* <http://bit.ly/CitiesNeedCloud-ViceVersa>.
[463] Danny Mohr, "Data centres to become rising investment class amid Hong Kong's smart city bid", (21 August 2018), online: *South China Morning Post* <http://bit.ly/DataCentreHK>.
[464] Alain Bastide, "La désillusion du cloud computing", (12 September 2012), online: *Indexel.net* <http://www.indexel.net/actualites/la-desillusion-du-cloud-computing-3640.html>.
[465] Jane Wakefield, "Tomorrow's cities: How big data is changing the world", *BBC News* (27 August 2013), online: <https://www.bbc.co.uk/news/technology-23253949>.
[466] Estefania Vega, "Big Data y Smartcities: ¿Cómo adquirir información de las Ciudades Inteligentes?", (17 September 2014), online: *Reporte Digital* <https://reportedigital.com/iot/big-data-smartcities-gestionar-informacion-recolectada-dispositivos/>.
[467] Nick Rojas, "Chicago And Big Data", (22 October 2014), online: *TechCrunch* <http://social.techcrunch.com/2014/10/22/chicago-and-big-data/>.

and even built around the central idea of Big Data as a master key for urban knowledge, like Songdo,[468] while other cities sought to change policymaking to produce and analyze sheer quantities of data for very diverse finalities.[469] Urban Big Data has become a practical synonym for smart cities, in a dissociable movement around the world that seemed faster to be implemented faster than "terms and conditions" were thought and applied.[470]

Despite being used as a *buzzword* applied to all sorts of things for smart cities, including some that had nothing to do with data analytics, [471] the potential of Big Data is obvious for interpreting urban dynamics in ways that were never possible before.[472] The all-new tools for a "science of where"[473] still have much to show in action,[474] as they are still kept very recluse from the view of the general public and while city departments, even in the most advanced smart cities, still operate within silos.[475] Not only will new data practices be necessary to change the immanent resistance on behalf of data compartmentalization in city halls, it will also take new kinds of professionals and skills that are very hard to obtain, train, and maintain,[476] knowing that

[468] Kaushik Pal, "How Big Data Helps Build Smart Cities", (October 2015), online: *KDnuggets* <https://www.kdnuggets.com/2015/10/big-data-smart-cities.html>.
[469] Katie Allen, "The UK big data project playing Moneyball to build smarter cities", *The Guardian* (3 January 2016), online: <https://www.theguardian.com/business/2016/jan/03/big-data-project-counts-smarter-stats-build-smarter-cities>.
[470] Chye Shu Wen & Tanvi Mani, "Do We Need Big Data to Create Smart Cities?", (21 January 2016), online: *Fair Observer* <https://www.fairobserver.com/culture/do-we-need-big-data-to-create-smart-cities-42108/>.
[471] Daniel Newman, "Big Data and The Future Of Smart Cities", (15 August 2016), online: *Forbes* <https://www.forbes.com/sites/danielnewman/2016/08/15/big-data-and-the-future-of-smart-cities/>.
[472] Òscar Canalís Hernández, "La ciudad como escritura: de la piedra al Big Data", *El País* (21 December 2016), online: <https://elpais.com/elpais/2016/12/14/seres_urbanos/1481712218_265655.html>.
[473] Desirée Jaimovich, "El Big Data en las ciudades inteligentes", (12 May 2017), online: *Infobae* <https://www.infobae.com/tecno/2017/05/12/el-impacto-del-big-data-en-las-ciudades-inteligentes/>.
[474] Maria Fernanda Ziegler, "Las ciudades inteligentes requieren que el 'big data' se convierta en 'big action'", (31 August 2017), online: *Agência FAPESP* <http://agencia.fapesp.br/las-ciudades-inteligentes-requieren-que-el-big-data-se-convierta-en-big-action/26031/>.
[475] Matthew Reitman, "'Smart Cities' of the Future Will Require More than Big Data", (11 August 2017), online: *RealClearLife* <http://www.realclearlife.com/technology/screens-and-sensors-will-create-a-smart-city-only-if-theyre-useful/>.
[476] Amen Ra Mashariki, "Your Smart City Needs a Chief Analytics Officer", (17 January 2018), online: *Esri* <https://www.esri.com/about/newsroom/publications/wherenext/smart-city-and-the-chief-analytics-officer/>.

it may become even more expensive (and risky) for world-class cities if they do not properly operate the "urban brains" that will feel and decode their streets.[477]

Feeling the streets for extracting data through electronic devices became the motto in *smart cities' agenda* in the last years,[478] when lampposts provide not only light but collect the maximum of measurements of streets to feed hungry Big Data systems.[479] The complex and diverse constellation of all-seeing sensors[480] that goes by the name of the *Internet of Things* (IoT) is treated as a *game changer* of national economies that has been deployed in urban areas, even before policymakers considered responsible evaluations about it.[481] Smart cities represent a major part of the billions of sensors expected to fill streets, buildings, vehicles and all sorts of utilities in a very short period of time and they might cost hundreds of billions of dollars,[482] contrasting with public declarations from the IT industry that urban IoT will ease municipal budgets.[483] Big and dense cities are no longer the places where it was easy for people to get lost or to be anonymous like they could in a relatively recent past,[484] or to remain unnoticed by cities: smart city projects are fully committed to finding and analyzing as many relationships as possible,

[477] Winnie Tang, "Why building a 'city brain' is key to becoming a world-class Smart City: OPINION", (22 January 2018), online: *ITU News* <https://news.itu.int/city-brain-hong-kong/>.
[478] Victoria Turk, "City sensors: the internet of things is taking over our cities" *Wired UK* (24 July 2013), online: <https://www.wired.co.uk/article/city-sensors>.
[479] Lecompte Francis, "Objets connectés : flux de data sur la ville", (15 September 2014), online: *Capital* <https://www.capital.fr/economie-politique/objets-connectes-flux-de-data-sur-la-ville-961942>.
[480] Emma Stewart, "A truly smart city is more than sensors big an all-seeing internet", *The Guardian* (21 November 2014), online: <https://www.theguardian.com/sustainable-business/2014/nov/21/smart-city-sensors-big-data-internet>.
[481] Chad Vanderveen, "Smart Cities and the Internet of Things – Do Policymakers Help? Or Hurt?", (4 December 2014), online: *Government Technology* <http://www.govtech.com/fs/news/Smart-Cities-and-the-Internet-of-Things--Do-Policymakers-Help-Or-Hurt-.html>.
[482] Natalie Gagliordi, "Smart cities will house 9.7 billion IoT devices by 2020", (18 March 2015), online: *ZDNet* <https://www.zdnet.com/article/smart-cities-will-house-9-7-billion-iot-devices-by-2020-gartner/>.
[483] Matthew Finnegan, "'IoT, drones and smart city tech will ease pressure on public sector budgets', says Amey CIO", (30 September 2015), online: *Techworld* <https://www.techworld.com/data/how-internet-of-things-drones-smart-city-tech-can-ease-pressure-on-public-sector-budgets-3626449/>.
[484] Marcus Foth, "Why we should design smart cities for getting lost", (7 April 2016), online: *The Conversation* <http://theconversation.com/why-we-should-design-smart-cities-for-getting-lost-56492>.

from individuals to environments, through urban systems and sensor-packed streets.[485]

While the urban environment is being measured like never before by an expanding *ecosystem* of sensors (temperature, sunlight, sound, vibration, humidity, air composition, etc.) that are supposed to help improve quality of life in cities, energy and other resources consumed by them, the consequent data collection, storage, and processing are becoming a growing part of the initial problem that they were supposed to solve.[486] The environmental contradiction is one of the many semi-technical-semi-social questions that arise when walking the uneasy path of the "urban Internet of objects,"[487] which have been revealed in the ongoing (useful and speculative) debates that should be better known in cities engaging IoT projects.[488] Far from being received as the *Messiahs* saving cities,[489] IoT devices have been received by residents as threats to freedom that can lead to the degradation of basic civil rights,[490] and have being rightfully criticized for only telling the least important part of the urban stories unfolding: limited to measuring the *physical city*, sensors cannot perceive the purposes, motivations, and experiences of the *social city;* it takes *human sensors* for it.[491]

[485] Don Deloach & Brenna Berman, "Why Smart City Development Relies on Relationships", (21 September 2016), online: *Government Technology* <http://www.govtech.com/fs/infrastructure/Why-Smart-City-Development-Relies-on-Relationships.html>.
[486] Dyani Lewis, "Will the internet of things sacrifice or save the environment?", *The Guardian* (11 December 2016), online: <https://www.theguardian.com/sustainable-business/2016/dec/12/will-the-internet-of-things-sacrifice-or-save-the-environment>.
[487] Susan Crawford, "Concrete steps towards an urban Internet of Things", (12 April 2017), online: *Knight Foundation* <https://knightfoundation.org/articles/concrete-steps-towards-an-urban-internet-of-things>.
[488] John Soldatos, "Internet of Things and smart cities: Seven things you need to know", (6 February 2017), online: *The Internet of All Things* <https://www.theinternetofallthings.com/internet-of-things-and-smart-cities-seven-things-you-need-to-know-622017/>.
[489] Liliana Ochoa, "El big data y el internet de las cosas: los próximos mesías de las ciudades", (22 November 2017), online: *Vozpópuli* <https://www.vozpopuli.com/altavoz/tecnologia/big-data-internet-IoT-mesias-ciudades-inteligentes-smart-cities_0_1083492858.html>.
[490] Matthew Braga, "Welcome to the neighbourhood. Have you read the terms of service?", (16 January 2018), online: *CBC News* <https://www.cbc.ca/news/technology/smart-cities-privacy-data-personal-information-sidewalk-1.4488145>.
[491] Alison Heppenstall & Nick Malleson, "How to make smart cities human again", (31 January 2018), online: *The Conversation* <http://theconversation.com/how-to-make-smart-cities-human-again-88453>.

The smart city may not be a very human city—at least not what a human would consider smart—if it does not emulate aspects of human cognition and decision-making, which may be one of the reasons to explain why *artificial intelligence* has been added to the "heart"[492] of smart city projects, hoping that cities may soon become *responsive* even to the voice of their residents.[493] Although the smart city still does not answer urban demands with its own *voice*, artificial intelligence (AI) has already been put to work hand-to-hand with the data gathered by IoT sensors and structured by Big Data for urban planning[494]—and much more is expected from AI, still. There are many projections for AI applications in the smart city, with driverless cars producing the highest expectations,[495] and predictive security is the most immediate one, with the goal of watching the city through a billion electronic eyes soon to be achieved.[496]

It would be unwise to assume that *CCTV cameras* could only support mobility and security objectives, as AI applications based on *machine learning* have been used to put urban theories to test at a scale that would be unviable for human observation alone.[497] There is much to learn about cities with the help of AI-based technologies, which are hungry for data for further development, and which may explain why AI companies appear so interested in accessing residents' data in smart cities.[498] Questions related to corporative control of AI are less exciting

[492] Gary Hawkins, "The Heart and Soul of Smart Cities", (16 October 2016), online: *Meeting of the Minds* <https://meetingoftheminds.org/heart-soul-smart-cities-17270>.
[493] Celine Deluzarche, "Quand les chatbots dirigeront la smart city", (27 October 2016), online: *Maddyness* <https://www.maddyness.com/2016/10/27/quand-les-chatbots-dirigeront-la-smart-city/>.
[494] Ryan McCauley, "Artificial Intelligence Helps Cities Get Smarter About Infrastructure Planning", (5 December 2016), online: *Government Technology* <http://www.govtech.com/fs/Artificial-Intelligence-Helps-Cities-Get-Smarter-About-Infrastructure-Planning.html>.
[495] Richard Florida, "When Artificial Intelligence Rules the City", (16 May 2017), online: *CityLab* <https://www.citylab.com/life/2017/05/when-artificial-intelligence-rules-the-city/509999/>.
[496] Jon Walker, "Smart City AI Applications and Trends", (8 August 2017), online: *TechEmergence* <https://www.techemergence.com/smart-city-artificial-intelligence-applications-trends/>.
[497] Katharine Schwab, "AI Reshaping What We Know about Cities", (12 July 2017), online: *Fast Company* <https://www.fastcompany.com/90132501/how-ai-is-transforming-our-understanding-of-cities>.
[498] Emily Middleton, "Who Will Own the Smarts in Smart Cities?", (20 March 2018), online: *Kennedy School Review* <http://ksr.hkspublications.org/2018/03/20/who-will-own-the-smarts-in-super-smart-cities/>.

than the usual references to *evil-AI-overlords* taking over the world;[499] nonetheless, they are far more relevant and must be faced as other, harder challenges for AI in smart cities are set to rise: social policies for the impacts from the first waves of unemployment form automation by AI; machine ethics embedded in the algorithms in autonomous cars; the prevention of *algorithmic bias* in municipal databases used for machine/deep learning are some of the examples.[500]

More recently, other technologies have been called the new wave (or the new black) for smart cities, such as *blockchain* and *5G*. The trust-based interactions provided by blockchain are potentially applicable to a diversity array of urban systems,[501] with initial projects for smart cities already involving governments and international companies in areas such as energy, health, and logistics,[502] for example. The ledger and audit capabilities of the blockchain may contribute to empowering functions and addressing vulnerabilities of *paperless* systems and sensor networks,[503] allowing a composition with other technologies that are being put to test in municipal governments,[504] despite there being aspects of blockchain that still need to mature. Finally, on the matter of promising technologies that are still far from being *fully ready* for smart cities, the next generation of telecommunications will multiply connectivity a hundredfold—at the

[499] Abhishek Chaudhary, "Artificial Intelligence: A smarter way to build smart cities - The Financial Express", (12 June 2018), online: *Financial Express* <https://www.financialexpress.com/opinion/artificial-intelligence-a-smarter-way-to-build-smart-cities/1202358/>.
[500] Tom Vander Ark, "How Cities Are Getting Smart Using Artificial Intelligence", (26 June 2018), online: *Forbes* <https://www.forbes.com/sites/tomvanderark/2018/06/26/how-cities-are-getting-smart-using-artificial-intelligence/>.
[501] Hussein Dia, "The future of our cities? It could be blockchain", (15 December 2016), online: *World Economic Forum* <https://www.weforum.org/agenda/2016/12/this-is-how-blockchain-will-change-the-face-of-our-cities/>.
[502] Damian Radcliffe, "Could blockchain run a city state? Inside Dubai's blockchain-powered future", (5 October 2017), online: *ZDNet* <https://www.zdnet.com/article/could-blockchain-run-a-city-state-inside-dubais-blockchain-powered-future/>.
[503] Rudy Takala, "Blockchain will be key to security for 'smart cities' of the future", (21 March 2018), online: *The Hill* <http://thehill.com/opinion/cybersecurity/379575-blockchain-will-be-key-to-security-for-smart-cities-of-the-future>.
[504] Julia Magas, "Smart Cities and Blockchain: Four Countries Where AI and DLT Exist Hand-in-Hand", (17 June 2018), online: *Cointelegraph* <https://cointelegraph.com/news/smart-cities-and-blockchain-four-countries-where-ai-and-dlt-exist-hand-in-hand>.

cost of great impacts in urban infrastructure[505]—which will imply a game-changing situation for smart city applications based on IoT, cloud computing and AI, as autonomous vehicles.[506] 5G technologies and services are expected to become fast neuronal connections for the smart urban brain,[507] but also a policy (and political) minefield for municipal decision makers.[508]

2.1.3. Being Aware of and Cautious with the Eyes and Thoughts of the City

All the above-mentioned technologies are, in one way or another, taken and feared as potential tools for a "Big Brother City"[509] with sensors installed everywhere in the urban furniture,[510] tracking and intruding into residents' lives, notably after the revelations from Edward Snowden of online monitoring by governments.[511] The *cyborg* inhabitants and their digital devices uninterruptedly produce geotagged data that feeds most of the urban applications of the *senseable city*,[512] in a relationship more based more on ignorance than trust.[513] The all-seeing *Big Brother* powers seem to be the imposed price to pay for the gains of the smart city,[514] which

[505] Guy Daniels, "Cities must become more telco-friendly for 5G to make them 'Smart'", (13 January 2017), online: *TelecomTV* <https://www.telecomtv.com/content/5g/cities-must-become-more-telco-friendly-for-5g-to-make-them-smart-14292/>.
[506] George Anadiotis, "Is 5G the missing link for autonomous vehicles, smart cities, and a brave new world?", (26 February 2018), online: *ZDNet* <https://www.zdnet.com/article/is-5g-the-missing-link-for-autonomous-vehicles-smart-cities-and-a-brave-new-world/>.
[507] Qian Li, "The brain center of the smart city", (24 July 2017), online: *Shanghai Daily* <https://archive.shine.cn/district/jing-an/The-brain-centerof-the-smart-city/shdaily.shtml>.
[508] Rob Pegoraro, "Why 5G Internet Is a Policy Minefield for Cities", (2 October 2018), online: *CityLab* <https://www.citylab.com/life/2018/10/fcc-5g-wireless-broadband-regulations-city-government/571921/>.
[509] Maxime Delmas, "Big Brother City (Partie 1/3)", (15 March 2010), online: *YouTube* <https://youtu.be/eLGQFaWOkGY>.
[510] Joe Miller, "Halt called to London tracking bins", *BBC News* (12 August 2013), online: <https://www.bbc.com/news/technology-23665490>.
[511] Nick Carney, "Big Data Without the Fear of Big Brother", (17 January 2014), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/big-data-without-the-fear-of-big-brother-370>.
[512] Carlo Ratti, "Faut-il avoir peur de la ville des cyborgs ?", (31 July 2016), online: *La Tribune* <https://www.latribune.fr/opinions/tribunes/faut-il-avoir-peur-de-la-ville-des-cyborgs-589507.html>.
[513] Celine Deluzarche, "La ville intelligente, un futur big brother ?", (28 September 2016), online: *Maddyness* <https://www.maddyness.com/2016/09/28/ville-intelligente-futur-big-brother/>.
[514] Anthony King, "Is Big Brother on the dark side of the smart city?", (20 October 2016), online: *The Irish Times* <https://www.irishtimes.com/news/science/is-big-brother-on-the-dark-side-of-the-smart-city-1.2836981>.

has been triggering demands for regulations in government and public spaces[515] to face an age of ubiquitous computing when city dwellers cannot truly consent to the use of their data.[516]

If not a Big Brother, the smart city may have become a "Big Mother" that keeps all its children under its wings of *surveillance*,[517] collecting their data with brand-new sensorial powers under insufficient legal constraints,[518] and indiscriminately keeping them all under continuous watch with *panoptic eyes*.[519] Taken as a requirement for convenience, surveillance can serve to tighten control over citizens using urban systems,[520] which might be useful for urban administrators seeking efficiency gains but still a questionable trade-off.[521] Any hypothetical balance seems to be related to degrees of increasing surveillance[522] and not as much to privacy concerns[523] in the smart cities that are being designed to never forget[524] each step taken on their streets and to forever retain as much data possible from each movement.[525]

[515] Arthur P B Laudrain, "Big Smart Brother: How Smart-Cities May Redefine the Right to Privacy in Europe", (19 March 2018), online: *The Market Mogul* <https://themarketmogul.com/smart-city-projects/>.
[516] David W Smith, "Big data and Big Brother in the modern smart city", (3 May 2018), online: *Eureka* <https://eureka.eu.com/gdpr/smart_city_big_brother/>.
[517] Sabine Blanc, "La ville intelligente, une big mother en puissance ?", (4 April 2014), online: *La Gazette des Communes* <http://www.lagazettedescommunes.com/228554/la-ville-intelligente-une-big-mother-en-puissance/>.
[518] Surabhi Agarwal & Aditi Divekar, "Smart cities or wiretap ones?", *Business Standard India* (12 July 2014), online: <https://www.business-standard.com/article/economy-policy/smart-cities-or-wiretap-ones-114071200897_1.html>.
[519] Mark Wilson, "The Surveillance City That's Always Watching You", (29 November 2016), online: *Fast Company* <https://www.fastcompany.com/3066012/the-surveillance-city-thats-always-watching>.
[520] Katrina Yu, "China's smart city plan to boost surveillance", (19 August 2017), online: *SBS News* <https://www.sbs.com.au/news/china-s-smart-city-plan-to-boost-surveillance>.
[521] Chris Mellor, "Smart cities? Tell it like it is, they're surveillance cities", (7 September 2017), online: *The Register* <https://www.theregister.co.uk/2017/09/07/smart_cities_are_surveillance_cities/>.
[522] Rohit Talwar, Steve Wells & Alexandra Whittington, "The future of cities – balancing surveillance and data capture", (18 September 2017), online: *International Business Times UK* <https://www.ibtimes.co.uk/future-cities-balancing-surveillance-data-capture-1639776>.
[523] Barclay Ballard, "As mass data collection becomes the norm, concerns about surveillance are growing", (10 November 2017), online: *The New Economy* <https://www.theneweconomy.com/business/as-mass-data-collection-becomes-the-norm-concerns-about-surveillance-are-growing>.
[524] Geoff Manaugh, "The City That Remembers Everything", (23 February 2018), online: *The Atlantic* <https://www.theatlantic.com/technology/archive/2018/02/james-joyce-as-police-operation/553817/>.
[525] Sara Degli-Esposti & Siraj Ahmed Shaikh, "With smart cities, your every step will be recorded", (17 April 2018), online: *The Conversation* <http://theconversation.com/with-smart-cities-your-every-step-will-be-recorded-94527>.

In the name of maximizing urban efficiency, sacrificing (part of) *privacy*[526] is taken as the first cost to pay for measuring resource consumption and individualizing municipal services,[527] raising other related concerns about smart cities—with a broader range of risks involved.[528] In spite of the many available recommendations to deal with the panoply of data-gathering *smart innovations*,[529] the competition between cities seems to involve those which are more willing to compromise the privacy of residents as we know it,[530] while promoting an undefined "smarter privacy" to supposedly conciliate all concerns.[531] The "dumber privacy" has been presented as a privilege and an obstacle that must be balanced with innovations for smart cities,[532] as the once presumed right to anonymous mobility through the city in a vehicle[533] has become an uneasy debate that is set to define new lines in the frontiers of *data protection*.[534]

All good-willing borders of data protection are permeable in *hackable cities* with poorly implemented *information security*,[535] a problem more easily explained than solved: a smart device or system can be secured in isolation and still become hackable when interconnected to

[526] Siraj Datoo, "Smart cities: are you willing to trade privacy for efficiency?", *The Guardian* (4 April 2014), online: <https://www.theguardian.com/news/2014/apr/04/if-smart-cities-dont-think-about-privacy-citizens-will-refuse-to-accept-change-says-cisco-chief>.
[527] Andrew Stewart, "'Smart City' knows who needs power, and when", (19 February 2015), online: *CNN* <https://www.cnn.com/2015/02/19/tech/smart-grid-mannheim/index.html>.
[528] Tod Newcombe, "Security, Privacy, Governance Concerns About Smart City Technologies Grow", (7 June 2016), online: *Government Technology* <http://www.govtech.com/security/Security-Privacy-Governance-Concerns-About-Smart-City-Technologies-Grow.html>.
[529] Brendon Bosworth, "6 tips to help a 'smart' city navigate around privacy issues", (8 June 2017), online: *Citiscope* <http://archive.citiscope.org/story/2017/6-tips-help-smart-city-navigate-around-privacy-issues>.
[530] Claudia Geib, "Smart cities may be the death of privacy as we know it", (7 November 2017), online: *Futurism* <https://futurism.com/privacy-smart-cities/>.
[531] Marin Ivezic, "A Smarter Privacy - The Future of Privacy in our Smart Cities", (3 December 2017), online: *Marin Ivezic* <http://ivezic.com/iot-smart-cities/smarter-privacy-future-of-privacy-in-smart-cities/>.
[532] Scott Ikeda, "Smart Cities – Not So Smart Privacy", (16 February 2018), online: *CPO Magazine* <https://www.cpomagazine.com/2018/02/16/smart-cities-not-so-smart-privacy/>.
[533] Kris Cheng, "Privacy concerns as Hong Kong gov't proposes installing 1,070 traffic detectors", (25 April 2018), online: *Hong Kong Free Press* <https://www.hongkongfp.com/2018/04/25/privacy-concerns-hong-kong-govt-proposes-installing-1070-traffic-detectors/>.
[534] Eugene Daniels, "Smart Cities Are the Next Frontier in the Data Protection Debate", (1 May 2018), online: *The Denver Channel* <https://www.thedenverchannel.com/newsy/smart-cities-are-the-next-frontier-in-the-data-protection-debate>.
[535] Lorenzo Franceschi-Bicchierai, "All the Ways To Hack a Smart City", (8 April 2015), online: *Motherboard* <https://motherboard.vice.com/en_us/article/5394e5/all-the-ways-to-hack-a-smart-city>.

others.[536] Cybersecurity is one of the (most nervous) elephants in the room of the smart cities—which is deploying increasingly complex, diverse, interdependent systems[537]—and that is gaining a massive scale while cyber attacks to municipal governments increase in frequency and sophistication.[538] As a matter of fact, it is not feasible to prevent all possible security breaches in a smart city, yet it is possible to manage the inevitable vulnerabilities[539] by preparing contingencies for security nightmares and making data security a priority.[540] With the proliferation of IoT devices based in 5G connectivity, the security breaches tend to expand exponentially,[541] aggravating the present problems—cities are already under near-constant attack and facing damages—and part of the solutions pass through making the public aware of this (huge) *Achilles' heel* that smart city projects have much trouble admitting.[542]

In order to bring citizens into the conversation about what takes to change cities, the idea of opening of urban data to the fullest extent possible for full-public access has been one of the greatest hopes to fuel the "smart revolution"[543] and enter a next phase of *government transparency*.[544] This "new transparency" is supposed to allow people outside the city hall to use

[536] Steve Durbin, "Building Smart City Security", (12 September 2015), online: *TechCrunch* <http://social.techcrunch.com/2015/09/12/building-smart-city-security/>.
[537] Jason Hiner, "The smart city security nightmare: How cities can stay awake", (7 December 2016), online: *TechRepublic* <https://www.techrepublic.com/article/the-smart-city-security-nightmare-how-cities-can-stay-awake/>.
[538] Stephen Pritchard, "Securing the Smart City", (28 December 2016), online: *Infosecurity Magazine* <https://www.infosecurity-magazine.com:443/magazine-features/securing-the-smart-city-1/>.
[539] Donal Power, "Can smart cities protect their IoT Achilles heel from hackers?", (19 January 2017), online: *ReadWrite* <https://readwrite.com/2017/01/19/can-smart-cities-protect-iot-achilles-heel-hackers-cl4/>.
[540] Todd Thibodeaux, "Smart Cities Are Going to Be a Security Nightmare", (28 April 2017), online: *Harvard Business Review* <https://hbr.org/2017/04/smart-cities-are-going-to-be-a-security-nightmare>.
[541] Mark Eggleton, "Smart cities and IoT: Technology's potential huge but security concerns remain", (30 April 2018), online: *Financial Review* <https://www.afr.com/news/special-reports/acs-2018/technologys-huge-potential-but-security-concerns-remain-20180429-h0zegq>.
[542] Donald Norris et al, "Why Cities Are So Bad at Cybersecurity", (1 May 2018), online: *CityLab* <https://www.citylab.com/life/2018/05/why-cities-are-so-bad-at-cybersecurity/559334/>.
[543] Oliver Balch, "Can open data power a smart city revolution?", *The Guardian* (3 June 2013), online: <https://www.theguardian.com/sustainable-business/open-data-power-smart-city>.
[544] Sean Thornton, "The Next Phase of Transparency", (21 October 2013), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/the-next-phase-of-transparency-327>.

municipal data in other contexts,[545] with the aim of making city data more available, accessible, combinable and "searchable."[546] In fact, the open data initiatives often form a central pillar of numerous smart city strategies, by opening several datasets for citizens, businesses, and even (though not surprisingly) other city departments,[547] which gives some hints to developers and researchers who try to decode the workings of algorithmic black boxes running city services.[548]

To reduce the limitations of transparency due to lack of technical capacity to analyze *open data*, some cities have been promoting the access of user-friendly applications that can help residents when visualizing complex data in a map-based format,[549] recognizing location-based open data as the most useful and engaging source of innovative data resources for city departments and communities.[550] These internal and external users of open data form part of the public advocacy for a new government culture of *data sharing by default*,[551] as well as the interest of cities in generating new streams of revenue and mitigating raising technology costs.[552] By far, the most valuable (and polemic) location-based datasets in the cities have been related to *transit data*,[553] which sometimes indistinctly benefits individual developers and big tech

[545] Josh Taylor, "Chicago's smart city: From open data to rat control", (15 October 2014), online: *ZDNet* <https://www.zdnet.com/article/chicagos-smart-city-from-open-data-to-rat-control/>.
[546] Areeb Kamran, "Use open data to make smart cities searchable", (6 March 2015), online: *CityMetric* <https://www.citymetric.com/horizons/we-can-use-open-data-make-smart-cities-searchable-813>.
[547] Jon Card, "Open data for London's transition into a smart city", *The Guardian* (3 August 2015), online: <https://www.theguardian.com/media-network/2015/aug/03/open-data-london-smart-city-privacy>.
[548] Manu Fernández González, "Cidades inteligentes e caixas-pretas", (1 March 2016), online: *Oficina Antivigilância* <https://antivigilancia.org/pt/2016/03/cidades-inteligentes-e-caixas-pretas/>.
[549] Sean Thornton, "OpenGrid for Smart Cities", (26 May 2016), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/opengrid-for-smart-cities-842>.
[550] Sari Ladin-Sienee, "Location and LA's Open Data", (9 August 2016), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/location-is-driving-the-value-of-l.a.s-open-data>.
[551] Stephen Goldsmith, "Data Sharing Should Be Default", (21 September 2016), online: *Governing* <http://www.governing.com/blogs/bfc/gov-departmental-data-sharing-government-default.html>.
[552] Divina Paredes, "Gartner predicts more smart cities will generate revenue through open data by 2020", (16 December 2016), online: *CIO New Zealand* <https://www.cio.co.nz/article/611712/gartner-predicts-more-smart-cities-will-generate-revenue-through-open-data-by-2020/>.
[553] David Zipper, "Who Owns Transit Data", (9 April 2017), online: *CityLab* <https://www.citylab.com/transportation/2017/04/who-owns-transit-data/522444/>.

companies,[554] but is a sensible resource that should be explored in a responsible way to improve the lives of urban populations, while also respecting their collective choices.[555]

A new generation of smart cities has been opening up more information than ever, yet the participation feedback from citizens is not keeping up with the announced expectations,[556] revealing that the *citizen-centric smart city* might still be far from reality despite all the marketing around the idea.[557] The apparent failure of *participation* is not necessarily a failure of smart cities themselves. For a long time citizens have remained excluded from decision-making,[558] but a renewed public transparency is now seen as an opportunity to engage citizens through more knowledge and confidence regarding city data.[559] There are many recipes for increasing citizen participation in cities with technological ingredients—with a growing availability of platforms, open software, and applications created by and for it—and experiences that have been exchanged about them,[560] which includes the recipes of unsuccessful projects, as those that include only citizens who are already motivated and online.[561] As citizen participation has

[554] Emily Mertz, "Apple Maps adds Edmonton Transit to app using Open Data information", (6 September 2017), online: *Global News* <https://globalnews.ca/news/3721994/apple-maps-adds-edmonton-transit-to-app-using-open-data-information/>.
[555] Lionel Bry, "La donnée territoriale, or vert de la Smart City", (3 January 2018), online: *Les Echos* <https://www.lesechos.fr/03/01/2018/lesechos.fr/0301098283358_la-donnee-territoriale--or-vert-de-la-smart-city.htm>.
[556] Tim Smedley, "The smart city: from sensors to social innovation", *The Guardian* (26 November 2013), online: <https://www.theguardian.com/sustainable-business/smart-cities-sensors-social-innovation>.
[557] Francis Pisani, "Villes : la tension clé entre intelligence et participation", (28 November 2013), online: *La Tribune* <https://www.latribune.fr/blogs/aux-coeurs-de-l-innovation/20131128trib000798330/villes-la-tension-cle-entre-intelligence-et-participation.html>.
[558] Julian Agyeman & Duncan McLaren, "'Smart Cities' Should Mean 'Sharing Cities'", (29 September 2014), online: *Time* <http://time.com/3446050/smart-cities-should-mean-sharing-cities/>.
[559] Mike Steep, "Smart Cities Will Need Smart Leaders and Even Smarter Citizens", (13 November 2014), online: *Forbes* <https://www.forbes.com/sites/forbesleadershipforum/2014/11/13/smart-cities-will-need-smart-leaders-and-even-smarter-citizens/>.
[560] Elsa Soro & Mercè Moreno, "Menú para la participación en una democracia real: redes, datos, plataformas, ciudadanía", (15 May 2015), online: *El Diario* <https://www.eldiario.es/colaboratorio/Menu-participacion-democracia-plataformas-ciudadania_6_388171211.html>.
[561] Tom Saunders, "Power to the people: how cities can use digital technology to engage and empower citizens", (6 July 2016), online: *Nesta* <https://www.nesta.org.uk/blog/power-to-the-people-how-cities-can-use-digital-technology-to-engage-and-empower-citizens/>.

become a *benchmark* for smart cities rankings,[562] engaging "off-line" city residents may need more investment in already existing structures built for them, as the mixed analogical/digital public services of libraries for increasing *accessibility*[563]—if achieving "successful" levels of participation is really to become a key factor for smart city initiatives.[564]

Increasing transparency in urban development is supposed to lead to increasing *accountability*, but not necessarily if the decision-making remains mainly market-oriented.[565] Bottom-up citizen engagement and demands for accountability need to play a bigger role in *smart model* options.[566] However, because accountability starts being an essential part of *city transformation* models of major international institutions,[567] there is also a top-down pressure for new generations of open data portals that can improve access to raw data and data analysis that may assist the public priority toward improved accountability.[568] Smart city projects are known as (too) ambitious and controversial when made in large scale; thus accountability is becoming a key element in some smart urban templates,[569] in a counterbalance movement from other political formats highly favourable to corporate interests.[570] In this sense, setting public,

[562] Raymond Yeung & Harminder Singh, "Why Singapore is a much smarter city than Hong Kong?", (8 November 2017), online: *South China Morning Post* <https://www.scmp.com/news/hong-kong/economy/article/2118934/why-singapore-much-smarter-hong-kong-city-left-trailing-rival>.
[563] Hannah Kaner, "True 'Smart Cities' should invest in libraries", (24 April 2018), online: *CityMetric* <https://www.citymetric.com/horizons/true-smart-cities-should-invest-libraries-3860>.
[564] Keri Allan, "Citizen engagement key to successful smart cities", (26 April 2018), online: *IDG Connect* <https://www.idgconnect.com/abstract/30256/citizen-engagement-key-successful-smart-cities>.
[565] Dan Hill, "The smart city; Or, a manifesto for smart citizens", (1 February 2013), online: *City of Sound* <http://www.cityofsound.com/blog/2013/02/on-the-smart-city-a-call-for-smart-citizens-instead.html>.
[566] Lavasa Voice, "The Smart Option", (14 August 2014), online: *Forbes India* <http://www.forbesindia.com/article/lavasavoice/the-smart-option/38475/1>.
[567] Alice Charles, "Can India make smart cities a reality?", (16 November 2015), online: *World Economic Forum* <https://www.weforum.org/agenda/2015/11/how-can-india-make-smart-cities-a-reality/>.
[568] Brian Platt, "The Journey to Build Jersey City's Data Portal", (23 October 2015), online: *Government Technology* <http://www.govtech.com/dc/articles/The-Journey-to-Build-Jersey-Citys-Data-Portal.html>.
[569] Ryan Patrick, "How should a Smart City be created? Why India is setting a template for others to follow", (19 May 2016), online: *IT World Canada* <https://www.itworldcanada.com/article/how-should-a-smart-city-be-created-why-india-is-setting-a-template-for-others-to-follow/383448>.
[570] Diane Davis & Lily Song, "Gov't. in Making Cities Smarter", (29 August 2016), online: *NextCity* <https://nextcity.org/daily/entry/smart-cities-local-government-big-data-private-sector-collaboration>.

accessible, and long-term goals for smart cities may help to bolster municipal accountability,[571] establishing conditions to put the city under the responsibility of fair access and quality of government data, while keeping people and businesses accountable for data they put online.[572] One of these conditions may require a data broker acting as a neutral third party for managing data from the numerous new technology companies dealing with urban datasets,[573] since there is no simple way to *opt in* or *opt out* of smart cities—but guarding the guardian of data also demands other accountability mechanisms, creating a feedback loop.[574]

Finally, to respond to the sheer forces acting on accountability, participation, transparency, security, and privacy in the digital cities, new forms of governance seem to be on the rise in order to orchestrate these and top fill other pre-existing gaps,[575] although there is much to discuss (and dispute) about what aspects the new governance models are prioritizing and who they will benefit in the first place.[576] In the increasingly complex smart city projects comprising of many players, a "smart governance" is the order of the day or,[577] at least, the boasted general policy for operating and maintaining smart services with different companies,

[571] Zack Quaintance, "'Imagine Boston 2030' Dashboard to Bolster City Government Accountability", (22 August 2017), online: *Government Technology* <http://www.govtech.com/civic/Imagine-Boston-2030-Dashboard-Seeks-to-Bolster-City-Government-Accountability.html>.
[572] Sarah Wray, "Data needs accountability: Here's how it could happen", (7 April 2017), online: *TM Forum Inform* <https://inform.tmforum.org/featured-videos/2017/04/smart-city-data-needs-accountability-heres-happen/>.
[573] Tyler Hamilton, "With connected communities on the rise, we must be smart about managing data", *The Globe and Mail* (29 May 2018), online: <https://www.theglobeandmail.com/business/commentary/article-with-connected-communities-on-the-rise-we-must-be-smart-in-managing/>.
[574] Theo Bass, "Why it's time for councils to reclaim the smart city", (31 July 2018), online: *CityMetric* <https://www.citymetric.com/horizons/data-people-people-why-it-s-time-councils-reclaim-smart-city-4097>.
[575] Klaus Philipsen, "Sane Governance in the Digital City", (16 August 2013), online: *Smart Cities Dive* <https://www.smartcitiesdive.com/ex/sustainablecitiescollective/governance-digital-city-adjunct-todays-webinar-smart-cities/1063276/>.
[576] Adie Tomer & Rob Puentes, "Here's the Right Way to Build the Futuristic Cities of Our Dreams" *Wired* (23 April 2014), online: <https://www.wired.com/2014/04/heres-the-right-way-to-build-the-futuristic-cities-of-our-dreams/>.
[577] Shahana Chattaraj, "India: smart cities need smart governance", (27 November 2014), online: *CityMetric* <https://www.citymetric.com/horizons/india-smart-cities-need-smart-governance-522>.

managing institutional infrastructure, and communicating with citizen interfaces.[578]

In spite of this plurality, a *data-driven governance* based on technology solutions tends to be overly shaped by the corporate interests of tech vendors,[579] which is hard (or near impossible) to conciliate with a citizen-centric governance based on informed and democratic decision-making.[580] It is right to suppose that the existing municipal governance could change for the better in a smart city—technology can help a lot by integrating city-level agencies to operate in a coordinated action—but a "disruptive" e-governance[581] may also hide problems that cannot be dealt with only through technology, but with more democratic urbanism to be a truly "smart governance."[582] There is much being said nowadays about governance in the smart city, and one of the hard lessons is that democratic decisions about data governance in the city are crucial—the stakes of smart urbanism are too high and have too many consequences to leave it to the eventual good intentions of corporations.[583]

2.1.4. A Democratic, Civic-Tech, People-Centric, Shared City – or So They Tell

Will the higher-tech smart city be an upgraded democratic city? It is well known that mobilizing greater participation of city residents can work better with cheaper technology than

[578] Sandeep Singh, "Smart Cities: Governance first", (27 June 2015), online: *The Indian Express* <http://indianexpress.com/article/india/india-others/smart-cities-governance-first/>.
[579] Alice Tang, "Questioning Smart Urbanism: Is Data-Driven Governance a Panacea?", (2 November 2015), online: *Chicago Policy Review* <http://chicagopolicyreview.org/2015/11/02/questioning-smart-urbanism-is-data-driven-governance-a-panacea/>.
[580] Raina Singh, "Smart cities need smart urban governance", (1 May 2016), online: *Cities Today* <https://cities-today.com/smart-cities-need-smart-urban-governance/>.
[581] Arindam Guha, "Smart City mission: E-governance to transform municipal governance", (2 November 2017), online: *Financial Express* <https://www.financialexpress.com/india-news/smart-city-mission-e-governance-to-transform-municipal-governance/916109/>.
[582] Bianca Wylie, "Smart communities need smart governance", *The Globe and Mail* (5 December 2017), online: <https://www.theglobeandmail.com/opinion/smart-communities-need-smart-governance/article37218398/>.
[583] Blayne Haggart & Zachary Spicer, "What Quayside has taught us about smart cities and data governance", (3 April 2018), online: *National Post* <https://nationalpost.com/pmn/news-pmn/what-quayside-has-taught-us-about-smart-cities-and-data-governance>.

with many expensive "citizen solutions" sold by tech corporations.[584] If it doesn't depend on higher tech, why insist on the idea of smart cities as paragons of democracy, even when knowing that they can potentially turn into electronic panopticons of the urban population?[585] This questioning finds some answers in the technological solutionism that glorifies concepts of disruption and efficiency—and their new governance champion, *algorithmic regulation*—that is at odds with democracy,[586] competing to change the "politics-as-usual," with a vision of cities that hold *enough* data not to bother asking the opinion of their residents.[587]

The *automatized-governance-for-efficiency* narrative is already, in fact, dispensing democracy and the rule of law (as we know it) in some experiences,[588] as if the smart city only had a technocratic function and did not need to be made with the people, their communities, and networks.[589] In contrary senses of opening democracy for more participation,[590] companies have been proposing platforms to *digitize democracy*[591] and also, citizen initiatives backed by local governments have been experimenting with digital tools to change the ways of influencing urban politics.[592] Depending on who is describing them, smart cities are turning into vibrant new *Agora*

[584] Alec Appelbaum, "Techs and the City", *The New York Times* (31 May 2013), online: <https://www.nytimes.com/2013/06/02/opinion/sunday/the-limits-of-big-data-in-the-big-city.html>.
[585] The Economist, "The multiplexed metropolis - Clever cities", (5 September 2013), online: *The Economist* <https://www.economist.com/briefing/2013/09/05/the-multiplexed-metropolis>.
[586] Evgeny Morozov, "The rise of data and the death of politics", *The Guardian* (19 July 2014), online: <https://www.theguardian.com/technology/2014/jul/20/rise-of-data-death-of-politics-evgeny-morozov-algorithmic-regulation>.
[587] Steven Poole, "The truth about smart cities: 'In the end, they will destroy democracy'", *The Guardian* (17 December 2014), online: <https://www.theguardian.com/cities/2014/dec/17/truth-smart-city-destroy-democracy-urban-thinkers-buzzphrase>.
[588] Shruti Ravindran, "Is India's 100 smart cities project a recipe for social apartheid?", *The Guardian* (7 May 2015), online: <https://www.theguardian.com/cities/2015/may/07/india-100-smart-cities-project-social-apartheid>.
[589] Patrick Russell, "The Smart City—Technocratic or Democratic?", (16 December 2015), online: *City Smarts* <https://medium.com/city-smarts/the-smart-city-technocratic-or-democratic-394119b04ff7>.
[590] Rowan Conway, "The digital city: the next wave of open democracy?", (7 September 2017), online: *RSA* <http://bit.ly/TheDigitalCityNextWaveOpenDemocracy>.
[591] Clayton Moore, "Can democracy be digitized?", (3 October 2017), online: *Digital Trends* <https://www.digitaltrends.com/computing/can-democracy-be-digitized-vets-at-polco-say-yes/>.
[592] Joshua Jacobs, "The world watches Reykjavik's digital democracy experiment", (23 November 2017), online: *Financial Times* <https://www.ft.com/content/754a9442-af7b-11e7-8076-0a4bdda92ca2>.

labs or guinea-pig experiments for democracy,[593] setting the *smart urban areas* as the arenas where the governance and liberal democracy of the future will be decided.[594]

To democratize smart cities, according to some of the most influential critics of them, it would take democratizing technology itself through a *civic hacking* movement[595] and a new *civic toolkit* for identifying city problems; residents need to help find these city solutions.[596] If software developers will be the builders laying the foundation stones of the smart cities, software solutions should not come only from public employees and private companies,[597] but also through *city hackathons* and other models of collaboration with the civil society that require adequate funding and long-term sustainability.[598] Public funding and collaboration with civic tech initiatives—as the *FabLab* experiences in Sao Paulo and Barcelona—does not necessarily mean lining up with city authorities' visions of smart cities;[599] instead, it may come to support broad grassroots movements of *civic hackers* that might use e-gov city data to develop reliable services which better align with the interests of citizens than of their governments.[600] Among the matters of greatest interest is the issue of inequality, which can be addressed by bringing underrepresented

[593] Antony Funnell, "Google plan for data-driven 'smart city' sparks privacy, democracy concerns", (31 May 2018), online: *ABC News* <http://www.abc.net.au/news/2018-05-31/concerns-over-google-city-in-toronto/9815446>.
[594] Ivo Daalder, "The battle for liberal democracy will be waged in cities", (5 June 2018), online: *Financial Times* <https://www.ft.com/content/f6422018-68a5-11e8-b6eb-4acfcfb08c11>.
[595] Brady Dale, "Anthony Townsend on Hacking Into 'Smart Cities'", (14 October 2013), online: *Next City* <https://nextcity.org/daily/entry/interview-anthony-townsend-on-hacking-into-smart-cities>.
[596] Anthony Townsend, "Anthony Townsend: 'Smart cities need a new civic code to succeed'" *Wired UK* (7 November 2013), online: <https://www.wired.co.uk/article/smart-cities-need-a-new-civic-code-to-succeed>.
[597] Himanshu Sareen, "Software Developers Will Be the Future Masons of the Smart City", (25 October 2013), online: *Huffington Post* <https://www.huffingtonpost.com/himanshu-sareen/software-developers-will-_b_4155780.html>.
[598] Sean Thornton, "Funding Civic Technology: A Look at the Smart Chicago Collaborative Model", online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/funding-civic-technology-521>.
[599] Adrian Smith, "Tooling Up: Civic visions, FabLabs, and grassroots activism", *The Guardian* (4 April 2015), online: <https://www.theguardian.com/science/political-science/2015/apr/04/tooling-up-civic-visions-fablabs-and-grassroots-activism>.
[600] David Fine, "Civic technology and the cities of our future: Part I", (31 May 2016), online: *Organizer Sandbox - Medium* <https://medium.com/organizer-sandbox/civic-technology-and-the-cities-of-our-future-part-i-7bce94c83364>.

groups to the development of civic tech[601] and creating different solutions from those of *commercial tech*, customizing them to each social context in the cities with the support of civic tech movements,[602] and turning them into opportunities to enlist all kinds of residents and their talents to improve smart city projects.[603]

It is indisputable that smart city projects are usually packed with technology provided by big tech firms, yet since grassroots movements have engaged in community-based and citizen-led projects,[604] a new *citizen-centric approach* has emerged, with European and North American cities providing the templates. The car-centric culture has long set vehicles at the centre of city planning, a scenario that has been changing in smart cities by deploying more technology resources for a *mobile pedestrianism*,[605] an example of a mindset shift by citizen-centric services that can improve quality of life and urban mobility for fast-growing urban populations.[606] Technology-centric solutions for smart cities, such as autonomous vehicles, may even result in more intense traffic, while renewed *old people-centric technologies*, like bicycle sharing,[607] are becoming a standard to change how urban dwellers move around in "happier cities," and a

[601] Stephen Goldsmith, "How Civic Tech Can Address Urban Inequality", (5 October 2017), online: *Governing* <http://www.governing.com/blogs/bfc/col-civic-technology-urban-inequality.html>.
[602] Luke Simcoe, "How civic tech groups can contribute to Canada's Smart Cities Challenge", (20 December 2017), online: *Code For Canada* <https://medium.com/code-for-canada/how-civic-tech-groups-can-contribute-to-canadas-smart-cities-challenge-dd66eabf0deb#9e1f>.
[603] Jason Shueh, "San Antonio announces 7 challenges in civic tech residency program", (8 January 2018), online: *StateScoop* <https://statescoop.com/san-antonio-seeds-startup-and-tech-talent-solutions-with-16-week-residency-program>.
[604] Jane Wakefield, "Building cities of the future now", *BBC News* (21 February 2013), online: <https://www.bbc.com/news/technology-20957953>.
[605] Michael Scott, "Smart Cities and the Technology of Walking", (25 March 2014), online: *Government Technology* <http://www.govtech.com/local/Smart-Cities-and-the-Technology-of-Walking.html>.
[606] Smriti Kak Ramachandran, "Modi wants parameters identified for Smart Cities", *The Hindu* (29 December 2014), online: <https://www.thehindu.com/news/national/narendra-modi-chairs-meeting-on-smart-city-initiative/article6735341.ece>.
[607] Dario Hidalgo, "People-centric smart cities: five ways technology can support better urban living", (1 April 2015), online: *TheCityFix* <http://thecityfix.com/blog/people-centric-smart-cities-5-ways-technology-expo-world-congress-montreal-dario-hidalgo/>.

common practice being absorbed by smart cities and the tech industry.[608]

A frequently used *smart* term in tech industry advertisement, the *citizen-people-or-human-centric* can be translated as a *smart translation* of the *user-centric approach*[609] for consuming services, therefore the collaboration with citizens can be limited to evaluating the experience of speeding up time-consuming day-to-day routines—and not being necessarily understood as democratic and equitable practices.[610] Equity would be a primary goal if smart cities were really to be centred on the needs of people,[611] but it is more likely to respond to market hungers for a *people-location-centric* priority that obeys economic agendas.[612] Economic-centric approaches to the city (and market) of the future have been used as synonymous to what should be understood as human-centric,[613] but meeting the tech industry priorities can bring negative and unintended consequences if city authorities are not guided to guard the interest of the most vulnerable residents[614] and to encourage citizens to be an essential part of the "innovation-centric" initiatives—by designing, building and operating innovative urban solutions that include all residents, not only part of them.[615]

[608] Katie Bird, "Happy cities for happy people", (13 November 2015), online: *ISO* <http://www.iso.org/cms/render/live/en/sites/isoorg/contents/news/2015/11/Ref2021.html>.
[609] Salomon Salinas & Kira Gidron, "The Smart Way to Build a Smart City (Industry Perspective)", (12 July 2016), online: *Future Structure* <http://www.govtech.com/fs/perspectives/the-smart-way-to-build-a-smart-city.html>.
[610] Nick Ismail, "The smart nation: Singapore's citizen-centric drive", (11 October 2016), online: *Information Age* <https://www.information-age.com/singapores-citizen-centric-drive-123462586/>.
[611] Brooks Rainwater & Nicole DuPuis, "Smart cities must be people-centered, equitable cities", (24 February 2017), online: *TechCrunch* <http://social.techcrunch.com/2017/02/24/smart-cities-must-be-people-centered-equitable-cities/>.
[612] Cate Lawrence, "Is location intelligence the key to citizen-centric smart cities?", (6 July 2017), online: *ReadWrite* <https://readwrite.com/2017/07/05/location-intelligence-key-citizen-centric-smart-cities-cl1/>.
[613] Naveen Rajdev, "Smart cities are great. Human-centric cities are (again) the future", (27 September 2017), online: *Quartz* <https://qz.com/1088012/smart-cities-are-great-human-centric-cities-are-again-the-future/>.
[614] Tanvi Misra, "Can London Become a People-Centric Smart City?", (19 March 2018), online: *CityLab* <https://www.citylab.com/equity/2018/03/can-london-become-a-people-centric-smart-city/555704/>.
[615] Soumik Roy, "Why citizen-centric innovation helps build better smart cities", (25 June 2018), online: *Tech Wire Asia* <https://techwireasia.com/2018/06/why-citizen-centric-innovation-helps-build-better-smart-cities/>.

There have been many *manifestos* from activists and politicians declaring that the whole idea of urban smartness should be focusing on the citizens themselves and on giving them the right tools[616] to collect, understand, and engage with the data generated by them, helping to design better city policies and operations.[617] It contrasts with the smart city paradigm, often pictured as an inhuman city built for business and sold by tech companies to mayors in closed-door meetings[618] falling closer into the idea of a "smart suburb" that provides all comforts of urban life—a paradigm of *Taylorist hyper-efficiency*—which is far from what truly smart citizens would prefer to call home.[619] The real needs of citizens in cities that are targeted to become "smarter" can substantially differ from the ambitious plans of the official authorities and,[620] despite all the government and exciting big business announcements, the so-called smart citizens might have been left behind[621] by being treated primarily as customers of city services, rather than smart people who understand key issues of their cities.[622] The intelligence of the city should be distributed among its residents, making it more responsive to their shared knowledge, requests and decisions,[623] more connected to the citizens, more connected to each other, and inform the

[616] Tim Smedley, "Stupid mayors are putting the wrong things at the heart of smart cities", *The Guardian* (26 November 2013), online: <https://www.theguardian.com/local-government-network/2013/nov/26/smart-cities-future-local-government>.
[617] Alicia Rouault, "A Bottom-Up Smart City?", (20 December 2013), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/a-bottom-up-smart-city-355>.
[618] Mathieu Lefevre, "Moving Beyond the 'Smart City' Paradigm", (9 July 2014), online: *NewCities* <https://newcities.org/moving-beyond-smart-city-paradigm/>.
[619] Evgeny Morozov, "Ciudades y ciudadanos inteligentes", *El País* (30 August 2014), online: <https://elpais.com/elpais/2014/08/27/opinion/1409161467_120842.html>.
[620] Rama Lakshmi, "Indian officials want 100 'smart cities.' Residents just want water and power.", (26 June 2015), online: *Washington Post* <https://www.washingtonpost.com/world/asia_pacific/india-wants-to-build-100-smart-cities-residents-just-want-water-and-power/2015/06/25/9951df1a-0ec6-11e5-a0fe-dccfea4653ee_story.html>.
[621] Donal Power, "Are smart citizens getting lost in the rush to build smart cities?", (11 April 2016), online: *ReadWrite* <https://readwrite.com/2016/04/11/smart-citizens-lost-rush-make-smart-cities-cl4/>.
[622] Lauren Marinaro, "Building smart cities starts with smart people", (5 July 2016), online: *ReadWrite* <https://readwrite.com/2016/07/05/building-smart-cities-starts-with-smart-people/>.
[623] Ronaldo Lemos, "'Inteligência' de 'smart cities' precisa se distribuir entre seus cidadãos", (13 February 2017), online: *Folha de São Paulo* <http://www1.folha.uol.com.br/colunas/ronaldolemos/2017/02/1858150-inteligencia-de-smart-cities-precisa-se-distribuir-entre-seus-cidadaos.shtml>.

city through them.[624] If connecting and engaging citizens is necessary for the development of a smart city, it should not be designed only for an idealized and unrealistic model citizen, but should include real people,[625] therefore bridging the digital divide to connect every citizen and reaching all communities still excluded by unequal access to smart urban services.[626]

Many *community applications* for smart cities have been developed toward pulling together citizens based on geolocation and individual interests but still exclude segments of the population based on socioeconomic elements,[627] favouring market interests instead of shared or communal quests of well-being. The term *intelligent communities* as an alternative to *smart cities* came to be known by its emphasis on effective collaboration among all players in the community,[628] benefiting the quality of life of all urban residents (not just a privileged few) and pursuing their needs as a shared end goal.[629] In order to thrive and develop into intelligent communities, smart cities are stimulated to emphasize their efforts in connecting, committing, and collaborating with different communities,[630] which should combine the expertise of diverse people, like the research and education capabilities from academic communities.[631]

[624] Randy Ksar, "Podcast: It's Not Smart Cities, It's Connected Citizens", (20 September 2017), online: *DZone IoT* <https://dzone.com/articles/podcast-its-not-smart-cities-its-connected-citizen>.
[625] Andrew Ross, "Designing for 'everyone' is not the path to an inclusive smart city", (24 August 2018), online: *Information Age* <https://www.information-age.com/inclusive-smart-city-123474406/>.
[626] Sarah Wray, "Smart cities can't exist while there's a digital divide", (11 July 2018), online: *Smart Cities World* <https://www.smartcitiesworld.net/special-reports/special-reports/smart-cities-cant-exist-while-theres-a-digital-divide>.
[627] Jeff Jackel, "Smart Communities are the Heart of the Smart City Machine", (28 June 2013), online: *Huffington Post* <https://www.huffingtonpost.com/jeff-jackel/smart-communities-are-the_b_3513397.html>.
[628] Bill Hutchison & Anchan Srivatsa, "Smart city: Not just a tech project; community goals count", (24 March 2015), online: *Moneycontrol* <https://www.moneycontrol.com/news/business/personal-finance/smart-city-not-justtech-project-community-goals-count-1485801.html>.
[629] Kendra L Smith, "How to ensure smart cities benefit everyone", (31 October 2016), online: *The Conversation* <http://theconversation.com/how-to-ensure-smart-cities-benefit-everyone-65447>.
[630] Theo Douglas, "'4 Cs' — Commitment, Collaboration, Consistency, Community — Crucial for Smart Cities", (13 March 2017), online: *Future Structure* <http://www.govtech.com/fs/4-Cs-Collaboration-Community-Consistency-Community-Crucial-For-Smart-Cities.html>.
[631] Fred Popowich, "The importance of the 'human factor' in relation to smart-city data", (1 October 2018), online: *Business in Vancouver* <https://biv.com/article/2018/10/importance-human-factor-relation-smart-city-data>.

Universities can provide the qualified analysis and independent validation that smart city programs often lack, engaging and sharing ideas and transferring technical knowledge,[632] and becoming part of the key elements in projects to improve urban living.[633] Beyond participating as concerned residents raising civic issues, students and professors may be called to propose innovative ideas[634] and work together with their cities to face complex urban problems by developing and deploying tech projects at lower costs.[635] Universities have been associated with companies to evaluate and experiment smart city platforms,[636] academic literature has found more practical implications for policies on smart technologies affecting city dwellers,[637] and research has been mobilized in public-private-academic partnerships—however, the emphasis seems to remain on the economic interests of its main sponsors.[638]

2.1.5. The Innovative, Disruptive—and not to Mention—Neoliberal City

Technology corporations, since the start of the idea, have been the true sponsors of the smart city models and face a delicate balance with mayors who try to keep them in check for the

[632] Hugh Aldridge, "How academics help make cities smart", (17 April 2013), online: *Meeting of the Minds* <https://meetingoftheminds.org/how-academics-help-make-cities-smart-6868>.
[633] Amanda Lucidi, "Smart City: BU researchers work to improve urban living – The Daily Free Press", (2 October 2014), online: *The Daily Free Press* <https://dailyfreepress.com/blog/2014/10/02/smart-city-bu-researchers-work-to-improve-urban-living/>.
[634] Tamil Nadu, "Students, academic heads offer suggestions on 'Smart City'", *The Hindu* (27 September 2015), online: <https://www.thehindu.com/news/national/tamil-nadu/students-academic-heads-offer-suggestions-on-smart-city/article7694294.ece>.
[635] Jenn Stanley, "Cities and Universities Will Work Together in New MetroLab Network", (15 September 2015), online: *Next City* <https://nextcity.org/daily/entry/obama-smart-cities-program-cities-university-partnerships>.
[636] Alex Koma, "Va.-funded nonprofit, D.C. university team up on smart city experiments", (16 August 2016), online: *StateScoop* <https://statescoop.com/va-funded-nonprofit-d-c-university-team-up-on-smart-city-experiments/>.
[637] Chris Bousquet, "From Research to Results: The Substance Behind Smart Cities", (12 July 2017), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/from-research-to-results-the-substance-behind-smart-cities-1074>.
[638] Rene Millman, "Industry, government, academia to create global smart city roadmap", (17 April 2018), online: *Internet of Business* <https://internetofbusiness.com/industry-government-and-academia-join-forces-to-explore-smart-city-impact/>.

control of city data.[639] This balance is getting more uneven because the big tech companies associated with the smart model,[640] the usual city infrastructure providers in business transition,[641] and the heavy new players in the smart city game[642] are all looking for a market share in this US$1.5 trillion opportunity.[643] When even titanic corporations like Google are getting into the game—using other nomenclature and with a different way to play—and intend to scale it to cities around the world,[644] municipal governments are pressured to increasingly mirror the private sector needs, approaches, and even organograms.[645] The valuable data from smart cities have become a source of dispute for profitable partnerships, including financial institutions,[646] under a corporate blueprint that envisions a centralized informational control, always accessible to the private partners.[647] There is a public narrative, frequently ready and never far from being deployed, that cities should be run like companies such as Amazon when providing efficient services to its citizens and,[648] in fact, metropolises have attracted and been attracted by partnerships with tech corporations that reproduce this narrative—putting public/private urban

[639] Greg Lindsay, "The Battle for Control of Smart Cities", (16 December 2010), online: *Fast Company* <https://www.fastcompany.com/1710342/battle-control-smart-cities>.
[640] Phoebe Magdirila, "IBM Helps Philippines' City to Transform into Smart City", (7 June 2013), online: *Tech in Asia* <https://www.techinasia.com/ibm-helps-philippines-city-transform-into-smart-city>.
[641] Jeff St John, "Schneider Brings Smart Tech to Boston", (18 September 2013), online: *GreenTech* <https://www.greentechmedia.com/articles/read/schneider-electric-brings-smart-city-tech-to-boston>.
[642] Rutrell Yasin, "Microsoft gets into the smarter city game", (11 July 2013), online: *GCN* <https://gcn.com/articles/2013/07/11/smart-cities-microsoft-citynext.aspx>.
[643] Sarwant Singh, "Smart Cities - A $1.5 Trillion Market Opportunity", (19 June 2014), online: *Forbes* <https://www.forbes.com/sites/sarwantsingh/2014/06/19/smart-cities-a-1-5-trillion-market-opportunity/>.
[644] Miguel Helft, "Google's Newest Moonshot: Improve Life in Cities", (10 June 2015), online: *Forbes* <https://www.forbes.com/sites/miguelhelft/2015/06/10/googles-newest-moonshot-improve-life-in-cities>.
[645] Lauren Hepler, "The smart city C-Suite? 5 jobs that could save cities", (13 July 2016), online: *GreenBiz* <https://www.greenbiz.com/article/smart-city-c-suite-5-jobs-could-save-cities>.
[646] Hassein Rahnama, "Smart cities need bank-driven data", (18 November 2016), online: *Payments Source* <https://www.paymentssource.com/opinion/smart-cities-need-bank-driven-payments-data>.
[647] Justin O'Connor & Mark Andrejevic, "Creative cities and smart cities are nothing but a corporate taming of creativity", (3 October 2017), online: *CityMetric* <https://www.citymetric.com/business/creative-cities-and-smart-cities-are-nothing-corporate-taming-creativity-3105>.
[648] Stephen Goldsmith & Neil Kleiman, "Cities Should Act More Like Amazon to Better Serve Their Citizens", (23 January 2018), online: *Next City* <https://nextcity.org/daily/entry/cities-should-act-more-like-amazon-to-better-serve-their-citizens>.

relations in a new technocapitalist age.[649]

"Less government and more governance" is one of the strong mottos in the new public-private relations proposed for the development of smart cities around the world,[650] frequently translated as public-private partnerships (PPPs or P3s) which are known for their difficult adaptability and high costs for urban collectivity in municipal experiences.[651] Still, P3s are taken as economically viable for smart urban projects, supposedly generating funds through efficiency and savings,[652] and have been attracting private partners interested in replicating this model in a smart city market that keeps growing with no signs of slowing down.[653] In fact, the industry advocates for P3s as the only solution for smart cities,[654] an essential (and profitable) ingredient for successful projects,[655] despite the many doubts about the many P3 models out there that city officials and mayors are having to deal as a result of the hungry tech market pushing them forward too quickly.[656] 5G implementation is an example of a market pressure over cities to force P3 collaboration, allegedly for the benefit of smart projects, while attending the interests of telecom corporations—in a context in which connectivity is a main utility, multiplayer partnerships

[649] Farhad Manjoo, "How Tech Companies Conquered US Cities", *The New York Times* (30 July 2018), online: <https://www.nytimes.com/2018/06/20/technology/tech-companies-conquered-cities.html>.
[650] Udit Misra, "P4: Modi's New Mantra for Governance in India", (9 April 2013), online: *Forbes India* <http://www.forbesindia.com/blog/uncategorized/p4modis-new-mantra-for-governance-in-india/>.
[651] Emmanuelle Durand-Rodriguez, "Toulouse veut devenir une ville intelligente globale", (16 December 2014), online: *La Tribune* <http://bit.ly/Toulouseveutdevenirunevilleintelligenteglobale>.
[652] Maya Sinha, "The PPP route to smart urban living", (4 August 2015), online: *The Hindu Business Line* <http://bit.ly/ThePPPRouteToSmartUrbanLiving>.
[653] Donal Power, "More partners join Microsoft in DC area's first smart city", (16 August 2016), online: *ReadWrite* <https://readwrite.com/2016/08/15/partners-join-microsoft-dc-areas-first-smart-city/>.
[654] Laetitia Gazel Anthoine, "Why P3s Are the Brains Behind Smart Cities (Industry Perspective)", (12 April 2017), online: *Government Technology* <http://www.govtech.com/opinion/Why-P3s-Are-the-Brains-Behind-Smart-Cities-Industry-Perspective.html>.
[655] Mike Barlow & Cornelia Lévy-Bencheton, "Smart cities are futuristic but they must also learn from the past", (19 November 2018), online: *Smart Cities World* <https://www.smartcitiesworld.net/special-reports/special-reports/smart-cities-are-futuristic-but-they-must-also-learn-from-the-past>.
[656] Gordon Feller, "For Smart City Tech, What's the Best Public-Private Partnership Model?", (6 January 2018), online: *RTInsights* <https://www.rtinsights.com/for-smart-city-tech-whats-the-best-public-private-partnership-model/>.

are a pathway to follow, with the government (not only governance) as one of the players.[657]

Among the multitude of players trying to improve urban life through tech, small businesses known as *start-ups* have been revealing creative and ambitious solutions,[658] getting into the game not as contesters of big tech companies but as potential collaborators,[659] and are being praised by municipal officials for helping to smart up their cities.[660] Start-ups have been encouraged to tackle city government problems because of their ability to catalyze not obvious (and uncertain) tech solutions[661] and for the variety of mechanisms to partner with IT corporations—often expecting for an acquisition by them—and venture capital firms,[662] as well as their greater flexibility in engaging in municipal programs for technological incubation.[663] Start-ups used to be understood as independent and fast private entities formed by young and informal people without a clear business model, but now they are becoming almost indistinguishable from corporations in many ways,[664] by inextricably associating themselves with governments as *partners* in cities engaged in the *start-up city idea* of "ultimate innovation"[665] and getting aligned

[657] Sue Lebeck, "How strategic public-private partnerships are shaping up in cities", (26 June 2018), online: *GreenBiz* <https://www.greenbiz.com/article/how-strategic-public-private-partnerships-are-shaping-cities>.
[658] Jennifer Diamond, "How 3 Startups Are Improving Urban Life Through Tech", (29 June 2012), online: *Mashable* <https://mashable.com/2012/06/29/global-innovation-startups/>.
[659] Ashley Lapin, "With IBM, Montpellier asks citizens to 'author' a smart city", (27 June 2013), online: *GreenBiz* <https://www.greenbiz.com/blog/2013/06/27/montpellier-france-invites-citizens-author-smart-city>.
[660] Tracey Lindeman, "Startup City: Smarten up Montreal", (2 December 2014), online: *Montreal Gazette* <https://montrealgazette.com/technology/tech-biz/startup-city-smarten-up-montreal>.
[661] Ben Schiller, "5 Startups Taking on Big, Unsexy City Problems", (8 June 2015), online: *Fast Company* <http://bit.ly/StartupsTakingBigUnsexyProblemsCityGovernment>.
[662] Jason Shueh, "How Startups Are Transforming the Smart Movement", (1 September 2015), online: *Government Technology* <http://www.govtech.com/How-Startups-Are-Transforming-the-Smart-City-Movement.html>.
[663] Lauren Marinaro, "San Francisco proves that city-startup collaboration can work", (27 September 2016), online: *Readwrite* <https://readwrite.com/2016/09/27/sf-startup-stir-startups-cl1/>.
[664] Paula Clemente, "Las 'start ups' que construyen la ciudad inteligente", (21 November 2017), online: *El Mundo* <http://www.elmundo.es/cataluna/2017/11/21/5a14004846163f79058b45cd.html>.
[665] Emily Badger, "Tech Envisions the Ultimate Start-Up: An Entire City", *The New York Times* (27 February 2018), online: <https://www.nytimes.com/2018/02/24/upshot/tech-envisions-the-ultimate-start-up-an-entire-city.html>.

to P3 models adopted by smart city projects.[666]

Innovation, more than a tendency for labelling everything related to technology, constitutes a pillar of the smart city discourse[667] and an element for competition between cities, with each one trying to create the most "innovation-driven" urban environment.[668] The urban innovation discourse has been associated with performance and management, using the term in biased and impoverished forms[669] that can be indiscriminately applied to all new or renewed (or merely increased) city systems related to smart projects.[670] Any potentially new forms of delivering the same old municipal services have been brought into the spotlight,[671] with the label *innovation* being exhaustively used as tech innovations were top priority solutions for city problems.[672] Most cases of smart city innovation are not exactly exciting for the average urban dwellers, and the data extracted from them is still only a promise of better services in the future;[673] nevertheless those cases are building the perspective of an urban transformation through a digital revolution[674] that is setting cities at the centre of "geographies of innovation"—the global

[666] Sue Lebeck, "From Cape Town to Charlotte, there's a partner for every purpose", (18 July 2018), online: *GreenBiz* <https://www.greenbiz.com/article/charlotte-portland-partner-every-purpose>.
[667] Julien Damon, "Les quatre piliers et les dix tendances de la smart city", (5 December 2013), online: *Slate.fr* <http://www.slate.fr/monde/79518/quatre-piliers-dix-tendances-smart-city>.
[668] Peter Hirst, "Is London Becoming the World's Greatest City for Innovation?" *Wired* (3 December 2014), online: <https://www.wired.com/insights/2014/12/london-innovation/>.
[669] Pablo Sanchez Chillon, "20 tips para quienes perdieron la fe (y el norte) en las smart cities", (6 July 2015), online: *Urban 360º* <https://urban360.me/2015/07/06/manual-para-fieles-de-la-innovacion-urbana-what-i-talk-about-when-i-talk-about-urban-innovation-smart-cities/>.
[670] Laura Adler, "The Urban Internet of Things: Surveying Innovations Across City Systems", (31 August 2015), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/the-urban-internet-of-things-727>.
[671] Cara McGoogan, "7 smart city innovations you need to know about" *Wired UK* (16 August 2016), online: <https://www.wired.co.uk/article/smart-cities-start-ups>.
[672] Boyd Cohen, "7 Reasons Why European Cities Are Going To Beat U.S. Cities As Hubs For Innovation", (6 June 2016), online: *Fast Company* <https://www.fastcompany.com/3060446/7-reasons-why-european-cities-are-going-to-beat-us-cities-as-hubs-for-i>.
[673] Cate Lawrence, "Smart data exchange will bring value to smart city innovation", (6 October 2017), online: *ReadWrite* <https://readwrite.com/2017/10/06/smart-data-exchange-smart-city/>.
[674] Gil Press, "6 Lessons From Tel-Aviv For Successful Digital Transformation Of Smart Cities", (22 March 2018), online: *Forbes* <https://www.forbes.com/sites/gilpress/2018/03/22/6-lessons-from-tel-aviv-for-successful-digital-transformation-of-smart-cities/>.

points of collaboration where the future is supposed to be unfolded.[675]

In spite of all innovation discourse, the urban revolution proposed by tech players is still a *mini digital* revolution[676] composed by many major (and smaller) disruptions that seem very promising but are leaving smart cities quite buggy and brittle.[677] It is frequently said that this "smart city revolution" is all about the technological revolutions of software and hardware, like Big Data[678] or the Internet of Things,[679] but it may fail if not well coupled with the mass urbanization revolution.[680] The convergence of technologies and city expansion is innovating municipal structures and evolving their governance,[681] for example, by adding new digital ranks to the city hierarchy in charge of facing disruption challenges taking place in all levels of government.[682] However, what many might call *disruption* could also be understood as a spectacularization of technologies that have been quieter and more peaceful while building the smart cities in the last couple of decades[683] rather than the whole discourse of an *unprecedented*

[675] Bas Boorsma, John Baekelmans & Bob Bennet, "The power of collaboration for the digital innovations of Smart Cities", (31 May 2018), online: *GreenBiz* <https://www.greenbiz.com/article/power-collaboration-digital-innovations-smart-cities>.
[676] Jean-Pierre Gonguet, "Révolution numérique : bienvenue dans les villes 3.0", (10 June 2013), online: *La Tribune* <https://www.latribune.fr/technos-medias/electronique/20130607trib000769116/revolution-numerique-bienvenue-dans-les-villes-3.0.html>.
[677] Anthony Townsend, "Smart Cities: Buggy and Brittle" (2013) Places Journal, online: <https://placesjournal.org/article/smart-cities/>.
[678] Dave McGinn, "How the big-data revolution can help design ideal cities", (12 May 2014), online: *The Globe and Mail* <https://www.theglobeandmail.com/life/home-and-garden/architecture/how-the-big-data-revolution-can-help-design-ideal-cities/article20767073/>.
[679] Shawn DuBravac, "'Smart' Cities and the Urban Digital Revolution", (31 December 2014), online: *Recode* <https://www.recode.net/2014/12/31/11634094/smart-cities-and-the-urban-digital-revolution>.
[680] Francis Pisani, "Mais d'où vient cette idée bizarre de « ville intelligente » ?", (16 January 2015), online: *La Tribune* <https://www.latribune.fr/blogs/aux-coeurs-de-l-innovation/20150116trib4e9bdc2e1/mais-d-ou-vient-cette-idee-bizarre-de-ville-intelligente.html>.
[681] Francis Pisani, "Deux approches, pas si contradictoires, de la ville intelligente", (13 May 2015), online: *La Tribune* <https://www.latribune.fr/opinions/blogs/aux-coeurs-de-l-innovation/deux-approches-pas-si-contradictoires-de-la-ville-intelligente-475873.html>.
[682] Bonnie Gardiner, "Melbourne appoints first chief digital officer", (30 September 2015), online: *CIO* <https://www.cio.com.au/article/585689/melbourne-appoints-first-chief-digital-officer/>.
[683] Manu Fernández, "Smart cities: a quiet revolution", (12 May 2016), online: *Ciudades a escala humana* <https://www.ciudadesaescalahumana.org/2016/05/smart-cities-quiet-revolution.html?m=1>.

digital revolution changing cities through the use of data.[684] Related to cities or not, the revolutionary nature of digital technologies is announced more often than analyzed,[685] whereas, if there is a revolutionary element in the takeover of cities by tech companies, it is less technological and more financially oriented.[686] Redesigning cities may seem to be all the rage among tech companies, but the end of their agenda negates any notion of organic city building, seeking instead to replace it thorugh an algorithmic regime of control[687]—the *disruptive innovation* of cities is a business and the replacement of core urban infrastructure is underway.[688]

Big tech companies are engaged in their aim of planning and building smart cities—even if it means leaving urbanists and architects behind,[689] despite the discourse to the contrary—replacing usual models of urban infrastructure by *tech-smarter* versions, as it has been taking place with water,[690] energy,[691] and sanitation.[692] This new *smart infrastructure* has been built and adapted not only with the aim of improving services, but also to acquire, store and use personal

[684] Carlos Moreno, "Will data change the face of our cities? : Prêts pour la révolution de la resource", (14 June 2016), online: *Ready for The Resource Revolution* <http://www.ready-for-the-resource-revolution.com/en/will-data-change-the-face-of-our-cities/>.
[685] Antoine Courmont, "Le numérique et la ville, une révolution ?", (1 December 2017), online: *Revue Urbanisme* <https://www.urbanisme.fr/qui-gouverne-la-smart-city/dossier-407>.
[686] Evgeny Morozov, "Google's plan to revolutionise cities is a takeover in all but name", *The Observer* (21 October 2017), online: <https://www.theguardian.com/technology/2017/oct/21/google-urban-cities-planning-data>.
[687] Joel Kotkin, "From Disruption to Dystopia: Silicon Valley Envisions the City of the Future", *Daily Beast* (19 February 2018), online: <https://www.thedailybeast.com/from-disruption-to-dystopia-silicon-valley-envisions-the-city-of-the-future>.
[688] Mark Thomas, "The business of smart city disruption", (4 August 2018), online: *The Spinoff* <https://thespinoff.co.nz/business/04-08-2018/the-business-of-smart-city-disruption/>.
[689] Rory Stott, "Without Architects, Smart Cities Just Aren't Smart", (2 April 2013), online: *ArchDaily* <http://www.archdaily.com/353281/without-architects-smart-cities-just-aren-t-smart/>.
[690] Giulio Boccaletti, "The world's new megacities must be the drivers of the 'smart' water revolution", *The Guardian* (12 November 2013), online: <https://www.theguardian.com/sustainable-business/megacities-drive-smart-water-revolution>.
[691] Sue Lebeck, "How to build a smart city? Energy, tech, water", (14 May 2014), online: *GreenBiz* <https://www.greenbiz.com/blog/2014/05/14/how-do-you-build-smart-city-start-ict-energy-and-water>.
[692] Elie Dolgin, "Smart Sewers Will Reveal What's in Cambridge Citizens' Guts", (10 April 2015), online: *IEEE Spectrum* <https://spectrum.ieee.org/the-human-os/biomedical/diagnostics/smart-sewers-will-reveal-whats-in-cambridge-citizens-guts>.

data[693] gathered on streets and inside houses.[694] Even housing is treated as an expensive supply problem to be changed by technology in smart cities,[695] one more urban utility to be transformed like any other and get *brand new labels*, such as *smart power*,[696] *connected lighting,*[697] and smart water metering.[698] The list goes on with stormwater systems,[699] smart apartments,[700] combined sewers,[701] urban fibre optics,[702] transit innovations,[703] and smart grids[704] fully filled with sensors—all available for P3 megadeals in infrastructure projects hoping to relax urban regulations.[705]

A meaningful element of the relaxation of regulation in smart urban models comes from the sharing economy which proclaims a "natural habitat" for "collaborative consumerism,"[706] often described as the future of work and life at city scale despite the widely varying motivations of the

[693] Holger Schnädelbach, "Smart Cities: The Built Environment as the Interface to Personal Data", (9 June 2015), online: *SCL* <https://www.scl.org/articles/3387-smart-cities-the-built-environment-as-the-interface-to-personal-data>.
[694] James Purtill, "Future 'smart cities' sound great, but who owns the houses?", (21 June 2016), online: *ABC* <http://bit.ly/FutureSmartCitiesSoundGreat>.
[695] Dan Laufer, "Technology will change where we live", (2 July 2016), online: *TechCrunch* <http://social.techcrunch.com/2016/07/02/technology-will-change-where-we-live/>.
[696] Nick Ismail, "The future of smart power in the smart city", (15 November 2016), online: *Information Age* <https://www.information-age.com/future-smart-power-smart-city-123463203/>.
[697] Ben Rossi, "4 ways connected lighting enable smart cities", (15 November 2016), online: *Information Age* <https://www.information-age.com/4-ways-connected-lighting-will-enable-smart-cities-123463210/>.
[698] Adam Stone, "Making a Case for Water as a Key Component in the Smart City", (10 January 2017), online: *Future Structure* <http://www.govtech.com/fs/infrastructure/Making-a-Case-for-Water-as-a-Key-Component-in-the-Smart-City.html>.
[699] Sean Thornton, "How a Smart City Tackles Rainfall", (3 January 2017), online: *Data-Smart City Solutions* <https://datasmart.ash.harvard.edu/news/article/how-a-smart-city-tackles-rainfall-956>.
[700] Ashlee Clark Thompson, "When a smart apartment meets a smart city...", (23 January 2017), online: *CNET* <https://www.cnet.com/news/when-a-smart-apartment-meets-a-smart-city/>.
[701] T R Goldman, "Why Smart Cities Are Turning Themselves into Sponges", (20 April 2017), online: *Politico Magazine* <https://www.politico.com/magazine/story/2017/04/20/innovative-infrastructure-storm-water-system-215055>.
[702] Katharine Schwab, "The Smart City Already Exists–Under Our Streets", (1 June 2017), online: *Fast Company* <https://www.fastcompany.com/90127670/the-smart-city-already-exists-under-our-streets>.
[703] Ken Steif, "'Smart City' Tech Should Tackle More Than Transit and Energy", (30 August 2017), online: *Next City* <https://nextcity.org/daily/entry/smart-city-tech-tackle-more-than-transit-energy>.
[704] Gary Eastwood, "How a smart grid can empower a city", (6 November 2017), online: *DigiCity* <http://bit.ly/HowSmartGridCanEmpowerSmartCity>.
[705] Clyde Crews, "Who Will Own the Infrastructure in the Smart City?", (11 July 2018), online: *Forbes* <http://bit.ly/WhoWillOwnInfrastructureSmartCity>.
[706] Nick Carney, "Smart Cities and the Sharing Economy", (24 June 2013), online: *Data-Smart City Solutions* <http://bit.ly/Data-SmartCitiesSharingEconomy>.

engaging forces involved.[707] First taken as a new tendency, then as a business like any other, now the sharing economy is taken as a concept about to change not only the way of living and consuming in cities,[708] but potentially capitalism as we know it.[709] If capitalism is based on private ownership, the sharing economy is based on access—which may sound appealing to consumers—but the many sharing start-ups[710] are turning into growing corporations, like Uber and Airbnb, which are challenging city authorities in core municipal issues and blurring the lines between public and private domains.[711] The tense framework of collaboration between municipalities and sharing economy companies are developing "partnerships" to share data collected by both sides in the name of planning and providing better services,[712] especially in urban mobility—even if the practical results of improving its efficiency can be questionable.[713]

In smart city projects all over the world, improving urban mobility appears to be the priority above all others, either by reducing congestion, managing transportation,[714] or improving parking[715] through ambitious promises of sensors and algorithms.[716] The dream of congestion-

[707] Rick Robinson, "The sharing economy and the future of movement in smart, human-scale cities", (11 November 2013), online: *The Urban Technologist* <https://theurbantechnologist.com/2013/11/12/the-sharing-economy-and-the-future-of-movement-in-smart-human-scale-cities/>.
[708] La Tribune, "La 'sharing economy', bien plus qu'une mode ?", (14 October 2014), online: *La Tribune* <http://bit.ly/LaSharingEconomyBienPlusMode>.
[709] David Thorpe, "Will the Sharing Economy Replace Capitalism?", (30 July 2015), online: *Smart Cities Dive* <http://bit.ly/WillSharingEconomyReplaceCapitalism>.
[710] Nooshin Mohtashami, "What Makes a City Suitable for a Sharing Economy?", (1 August 2016), online: *Techvibes* <https://techvibes.com/2016/08/01/city-suitable-sharing-economy>.
[711] Brooks Rainwater & Nicole DuPuis, "Do cities still want a sharing economy?", (9 November 2017), online: *TechCrunch* <http://social.techcrunch.com/2017/11/09/do-cities-still-want-a-sharing-economy/>.
[712] Jin-young Cho, "Growth of Sharing Economy Facilitates Smart City Development", (22 November 2017), online: *BusinessKorea* <http://www.businesskorea.co.kr/news/articleView.html?idxno=19899>.
[713] Megan Rose Dickey, "Uber and Lyft are responsible for about half of SF's rise in traffic since 2010, SFCTA says", (16 October 2018), online: *TechCrunch* <http://social.techcrunch.com/2018/10/16/uber-and-lyft-are-responsible-for-about-half-of-sfs-rise-in-traffic-since-2010-sfcta-says/>.
[714] Lena Smirnova, "'Smart' Solutions to Reduce Congestion", (6 June 2013), online: *The Moscow Times* <http://themoscowtimes.com/news/smart-solutions-to-reduce-congestion-24701>.
[715] Greg Fiorindo, "Parking: Can Technology Tackle the Great Unsolved Urban Challenge?", (23 July 2013), online: *Meeting of the Minds* <http://bit.ly/CanTechnologyTackleGreatUnsolvedUrbanChallenge>.
[716] Nick Carney, "The Parking Revolution Will Be Digitized", (4 October 2013), online: *Future Structure* <http://www.govtech.com/fs/news/The-Parking-Revolution-Will-Be-Digitized.html>.

free cities run by transportation systems using driverless technologies,[717] reproduces the expectation of technology as salvation from the "commuting hell,"[718] principally when combined with infrastructure and frameworks projected by architects and urbanists to maximize time and space for urban dwellers.[719] A plethora of new and personalized transport solutions—electric bikes, motorized scooters, and other personal mobility devices—have been added to the disruptions already challenging cars and public transport,[720] all using digital technologies to tackle traffic from the first to the last mile problems.[721]

Considering all the urban problems that smart solutions are supposed to solve, traffic is subject to most of the comprehensive and large-scale innovative experiments[722] and is dealt with as the universal issue for cities to facilitate the movement of commuters by enabling public and private entities and engaging with them in real time.[723] The imagined daily life of the smart city commuter would consist of a series of seamless interconnections and logistics for the movement of people, things and services[724] which would be all very dependent on the leveraging of previously existing and new data for navigation and resource allocation decisions.[725] The best example of (a sum of) technologies with high dependency on urban data would be the driverless

[717] Jane Wakefield, "Will our cities be congestion-free?", (2 October 2014), online: *BBC* <https://www.bbc.com/news/technology-28106814>.
[718] Jane Wakefield, "Can we escape urban commuting hell?", (23 February 2015), online: *BBC* <https://www.bbc.com/news/business-30981226>.
[719] Becky Quintal, "Smart Moves for Cities: The Urban Mobility Revolution Will Start With These 3 Projects", (25 November 2015), online: *ArchDaily* <http://www.archdaily.com/777791/smart-moves-for-cities-the-urban-mobility-revolution-will-start-with-these-3-projects>.
[720] Robyn Dowling, "Smart cities: does this mean more transport disruptions?", (9 August 2016), online: *The Conversation* <http://bit.ly/SmartCitiesDoesThisMeanMoreTransportDisruptions>.
[721] Bianca Nogrady, "Smart city: using technology to tackle traffic and social isolation in Melbourne", *The Guardian* (18 June 2017), online: <http://bit.ly/smart-city-traffic-social-isolation-melbourne-technology>.
[722] Colin O'Donnell, "In the smart city race, we're betting on transit", (18 April 2017), online: *TechCrunch* <http://social.techcrunch.com/2017/04/18/in-the-smart-city-race-were-betting-on-transit/>.
[723] Laetitia Gazel Anthoine, "Building a 'smart city' starts with mass transit systems", (3 March 2017), online: *Metro Magazine* <http://bit.ly/BuildingSmartCityStartsWithMassTransitSystems>.
[724] Marcin Budka, "A day in the life of a smart-city commuter – and why it's not so far from reality", (8 June 2017), online: *The Conversation* <http://bit.ly/DayLifeSmartCityCommuter>.
[725] Nancy Torres, "How Data and Cities Can Shape the Future of Mobility", (12 December 2017), online: *Data-Smart City Solutions* <http://bit.ly/HowDataCitiesCanShapeFutureMobility>.

cars, which paradoxically need the city to transform itself first in order to transform the city traffic later[726]—it may make one think that the *magic pill solution* for mobility is more related to investment and funding than to specific new technologies.[727]

More than pure technological endeavours, smart cities are announced and pursued as promises of investment for sparking a *city renaissance*[728] that would save billions of dollars for cities and bring even more money to their economies, however, this has not yet happened in most cases, and now costs are their biggest challenge.[729] Taking this as a common fact, the return of investment (ROI) of smart cities should be examined with more prudence and awareness of the limits of *technosolutionism*,[730] although the pressing interests of *smart investors* targeting smart urban projects make it harder to be accomplished.[731]

Big tech companies' interests are at the origin of the main economic model of smart cities,[732] which needs to evolve to include more stakeholders now implicated in the *smart innovation* initiatives, and improve their funding strategies and arrangements.[733] Funding is a fundamental discussion because smart tech for cities may represent costs of trillions of US

[726] Saber Fallah, "Driverless cars are forcing cities to become smart", (24 April 2018), online: *The Conversation* <http://theconversation.com/driverless-cars-are-forcing-cities-to-become-smart-94707>.
[727] Ted Smith, "The problem with most 'Smart City' projects is they're vitamins instead of painkillers", (31 October 2018), online: *TechRepublic* <http://bit.ly/SmartCityProjectsVitaminsInsteadPainkillers>.
[728] Jeff Siegel, "Smart City Investment Opportunities", (24 January 2013), online: *Energy & Capital* <https://www.energyandcapital.com/articles/smart-city-investment-opportunities/3013>.
[729] Thom Patterson, "Hey Internet, where's my talking city?", (26 May 2014), online: *CNN* <https://www.cnn.com/2014/05/26/tech/city-of-tomorrow-smart-cities/index.html>.
[730] Sabine Blanc, "Retour sur investissement : la smart city est-elle une bonne affaire ?", (20 May 2014), online: *La Gazette des Communes* <https://www.lagazettedescommunes.com/235118/retour-sur-investissement-la-smart-city-est-elle-une-bonne-affaire/>.
[731] Sanjay Dutt, "Smart Cities, Smart Investors", (26 April 2015), online: *Business Today* <http://bit.ly/SmartCitiesSmartInvestors>.
[732] Sabine Blanc, "La Smart city à la recherche de modèles économiques", (13 May 2016), online: *La Gazette des Communes* <https://www.lagazettedescommunes.com/441803/la-smart-city-a-la-recherche-de-modeles-economiques/>.
[733] Gary Hawkins, "Money Matters: Who Pays for the Smart City?", (19 October 2016), online: *Meeting of the Minds* <https://meetingoftheminds.org/money-matters-pays-smart-city-17258>.

dollars for upgrading urban infrastructure over the next two decades[734] and all (smart or not) projects and works about to happen in cities need to include technology in one way or another, even while there are many other areas (e.g. housing) historically lacking public investment.[735] It is necessary to question if the ROI is worthwhile to municipalities, what other "prices" will be imposed on citizens—new taxes and personal data appropriation in *freemium* and premium services—to pay,[736] and who will be most privileged with the control of and profit from the models being set in place for monetizing smart cities.[737] So far, the ROI of the *tech city* is more clear for big tech companies trying to monetize urban data for post-marketing objectives,[738] even if only 10% of smart city projects are exclusively supported by private financing, which can lead to questioning who the actual beneficiary of the public financing of smart cities really is.[739]

After a millennium of the "dumb city," companies like IBM, Cisco, Intel, Siemens, Microsoft and Google are underwriting a new digital version of the city that would run like a well-oiled machine,[740] orchestrating public investments at the service of their strategic projects and thus generating monopoly rents for the private capital: in fewer words, the neoliberal model of the smart city.[741] Neoliberal states have been pushing for the adaptation and creation of smart

[734] Aneri Pattani, "Spending on smart cities around the world could reach $41 trillion", (25 October 2016), online: *CNBC* <https://www.cnbc.com/2016/10/25/spending-on-smart-cities-around-the-world-could-reach-41-trillion.html>.
[735] Bianca Wylie, "On Smart Cities, Capitalism, Procurement, and Funding", (8 May 2017), online: *Medium* <http://bit.ly/OnSmartCitiesCapitalismProcurementFunding>.
[736] Isabelle Baraud-Serfaty, Clément Fourchy & Nicolas Rio, "La smart city, à quel prix ?", (6 November 2017), online: *La Gazette des Communes* <http://bit.ly/LaSmartCityQuelPrix>.
[737] Kurtis McBride, "Monetizing Smart Cities: Framing the Debate", (28 March 2018), online: *Centre for International Governance Innovation* <https://www.cigionline.org/articles/monetizing-smart-city-data>.
[738] Romain Mazon, "La ville intelligente, une smart city post marketing", (28 May 2018), online: *La Gazette des Communes* <https://www.lagazettedescommunes.com/565659/la-ville-intelligente-une-smart-city-post-marketing/>.
[739] Kristin Musulin, "Planning a smart city, weigh funding vs. financing", (4 June 2018), online: *Smart Cities Dive* <https://www.smartcitiesdive.com/news/smart-city-funding-vs-financing-deloitte/524894/>.
[740] Jathan Sadowski, "Civics for a Digital Age", (19 September 2013), online: *The Atlantic* <https://www.theatlantic.com/technology/archive/2013/09/civics-for-a-digital-age/279829/>.
[741] Ivan Miró, "¿Ciudades cooperativas versus 'smart cities'?", (19 September 2013), online: *El Diario* <https://www.eldiario.es/catalunya/opinions/Ciudades-cooperativas-versus-smart-cities_6_177142290.html>.

cities as “ideal cities”—with all urban systems controlled by command centres that reduce traffic and pollution—which are, at least on paper,[742] an idealization of a city that may better correspond to the expectations of infrastructure corporations (Schneider Electric, EDF, Alstom Grid, Veolia, Suez) competing to assume profitable municipal services in larger and smaller cities.[743]

While national institutions and political parties are being discredited, local governments have been revalued by neoliberal policies advertising the transfer of (unassuming) competencies from cities, and favouring privatization of their services by tech companies.[744] In order for local governments to exercise an extended and centralized control, running like a “God game” of urban spaces, tech companies soon realized that this could only be built under a neoliberal model that erodes the democracy of today’s city-government structures.[745] The neoliberal model of smart city sets the conditions for aggressive forms of privatization, reducing the actual city in the name of corporate interests[746] that see urban spaces as pieces of machinery that need better oiled parts to work properly in the name of utilitarian efficiency.[747]

Tech companies already have massive amounts of data about city dwellers, giving them a huge leverage for merging their digital services with city utilities in a “privatized

[742] Ayona Datta, “India’s smart city craze: big, green and doomed from the start?”, *The Guardian* (17 April 2014), online: <https://www.theguardian.com/cities/2014/apr/17/india-smart-city-dholera-flood-farmers-investors>.
[743] Jean-Pierre Gonguet, “Mais où est passé le modèle économique de la ville connectée ?”, (19 November 2014), online: *La Tribune* <https://www.latribune.fr/regions/smart-cities/20141119trib1ffef2812/mais-ou-est-passe-le-modele-economique-de-la-ville-connectee.html>.
[744] Jordi Borja, “El mito de la ‘Smart City’”, *El País* (7 September 2015), online: <https://elpais.com/ccaa/2015/09/06/catalunya/1441571126_766131.html>.
[745] Paul Mason, “We can’t allow the tech giants to rule smart cities”, *The Guardian* (25 October 2015), online: <https://www.theguardian.com/commentisfree/2015/oct/25/we-cant-allow-the-tech-giants-to-rule-smart-cities>.
[746] Reinier de Graaf, “The smart city is the ultimate free-for-all”, (4 December 2015), online: *Dezeen* <https://www.dezeen.com/2015/12/04/reinier-de-graaf-opinion-smart-city/>.
[747] Feargus O’Sullivan, “The Problem With ‘Playable’ Cities”, (7 November 2016), online: *CityLab* <http://www.citylab.com/design/2016/11/playable-cities-projects-crosswalk-party/506528/>.

Keynesianism"[748] that sustains the hype of the smart city lobby which represents (and benefits) the business opportunities for tech titans.[749] With a projected value of US$ 775 billion 2021, and one of the fastest growing segments of government, the smart city market has only been reinforced by recent political changes (Trump, Brexit),[750] and fuels the private delirium of the almighty tech giants engaged in the reformulation of cities under neoliberal guidelines that put governments and citizens at risk in the contemporary context.[751]

2.1.6. The Smart-Eco-Habitat and its Inconvenient Risks

Balancing the pressures of increasing environmental demands and shrinking budgets, smart cities have been set to act as (testing) platforms for the delivery of services,[752] in a dispute between standardized global platforms for mass control and collaborative local platforms for social development.[753] The approach of cities as platforms that collect, generate, and share data—similarly to platform companies like Facebook and Google—conceive cities as laboratories for change,[754] where integrated technologies might deliver a "Smart-City-in-a-Box" for multiple customizable applications and dashboards to monitor, plan and manage cities.[755] The common theme of the city-as-a-platform generally promotes the idea of the city as a digital

[748] Evgeny Morozov, "The 'Smart City' as a transition point towards the 'Private City'", (17 March 2017), online: *Master of Design* <http://bit.ly/MasterOfDesignWithMorozov>.
[749] Paul Marks, "Who will really benefit from the coming smart-city revolution?", (27 November 2017), online: *New Scientist* <https://www.newscientist.com/article/2154414-who-will-really-benefit-from-the-coming-smart-city-revolution/>.
[750] Teena Maddox, "Smart city market set to reach $775 billion", (15 August 2017), online: *TechRepublic* <https://www.techrepublic.com/article/smart-city-technology-market-set-to-reach-775-billion-by-2021/>.
[751] Ekaitz Cancela, "Radiografía del Madrid del futuro desde el presente: 'Smart City' significa 'ciudad privada'", (27 September 2018), online: *El Salto* <https://www.elsaltodiario.com/ciudad-marca/radiografia-madrid-futuro-smart-city-ciudad-privada>.
[752] Sarah Murray, "Smart cities: Urban areas set to be test beds", (21 May 2013), online: *Financial Times* <https://www.ft.com/content/4101db54-5e50-11e2-a771-00144feab49a>.
[753] Jean-Pierre Gonguet, "Dans le cerveau de la ville intelligente", (17 November 2014), online: *La Tribune* <http://bit.ly/DansCerveauVilleIntelligente>.
[754] Gerard Grech, "Cities As Platforms", (7 August 2015), online: *TechCrunch* <http://social.techcrunch.com/2015/08/07/cities-as-platforms/>.
[755] Calvin Hui, "New platform for city planners launched", (11 July 2016), online: *Channel News Asia* <https://www.channelnewsasia.com/news/singapore/new-platform-for-city-planners-launched-7918200>.

innovation hub for job creation, economic growth, and international investment[756] that relies on metropolis platforms based on private cutting-edge technologies, like always-on surveillance of urban areas and machine learning for pattern and behaviour analysis of the urban masses.[757] This multibillionaire market-oriented way of thinking the city mobilizes the dispute of sophisticated and proprietary platforms from tech titans,[758] but it also mobilizes resistance in cities that have been building open and collaborative platforms for more inclusive, compatible, and participative use of data for/by citizens.[759] It indicates that local governments acting as a "platform" should be careful about their urban planning of the tech industry and should include their residents who are the cultural fabric of what becomes known as a city.[760]

Too frequently, urban master plans project (or fantasize) smart cities in green field sites and by scraping away "informal" parts of cities rather than upgrading them,[761] but these plans should take into account how and what people are already building in the locations of future megacities that will become home to over half of the world's population by 2025.[762] Modifying existing infrastructure in already congested cities may be more difficult and expensive, especially in developing countries that need substantial investment, and should require some "smart

[756] Aoun Charbel, "How To Transform Your City To A Digital Platform", (22 March 2017), online: *Smart & Resilient Cities* <https://www.smartresilient.com/how-transform-your-city-digital-platform>.
[757] Loz Blain, "Nvidia's slightly terrifying Metropolis platform paves the way for smarter cities", (9 May 2017), online: *New Atlas* <https://newatlas.com/nvidia-metropolis-video-analytics-ai-smart-city/49435/>.
[758] Roger Dooley, "Is The City A Platform Worth Billions?", (18 October 2017), online: *Forbes* <https://www.forbes.com/sites/rogerdooley/2017/10/18/city-platform/>.
[759] Aran Noden, "DECODE linked to Barcelona's CityOS big data infrastructure", (24 August 2018), online: *Government Europa* <https://www.governmenteuropa.eu/decode-cityos-big-data-infrastructure/90063/>.
[760] Gabriela Barkho, "Are You Already Living in a 'Smart City'?", (29 October 2018), online: *New York Magazine* <http://nymag.com/developing/2018/10/what-is-a-smart-city.html>.
[761] Vanessa Watson & Babatunde Agbola, "Who will plan Africa's cities?", (12 September 2013), online: *Africa Research Institute* <https://www.africaresearchinstitute.org/newsite/publications/who-will-plan-africas-cities/>.
[762] Margaret Rhodes, "Urban Planning Ideas for 2030, When Billions Will Live in Megacities" *Wired* (21 November 2014), online: <https://www.wired.com/2014/11/urban-planning-ideas-2030-billions-will-live-megacities/>.

planning"[763] to avoid the too frequent (and more expensive) approach of multiple municipal agencies implementing smart infrastructure without working with each other and their citizens.[764] Fortunately, there are also good examples of city authorities gauging public opinion through digital tools to include residents in interactive and transparent urban planning,[765] leveraging their creativity for co-constructed smart city projects and strategies that need to work differently in each community.[766] Environmental protection and sustainability are examples of key drivers for global smart cities that require specific planning according to local conditions,[767] even if certain best practices associated with smart cities may work across distinct urban areas—there is no unique blueprint for a smart city, and each city has its own challenges.[768]

An increasingly common challenge to cities engaged in building the future with today's technology is the goal of *sustainability*,[769] especially when considering the issues related to resources management, and the pressure caused by climate disruption that would require significative changes to the present urban systems of water, energy and transportation to address.[770] The "smartest cities," all very expensive to run, have recently focused on how to

[763] Charan Singh & Tarun Mittal, "Smart cities require smart planning", (19 February 2015), online: *Tribune India* <http://bit.ly/SmartCitiesRequireSmartPlanning>.
[764] Teena Maddox, "How not to do a smart city: Let a thousand flowers bloom instead of having a plan", (26 October 2016), online: *ZDNet* <https://www.zdnet.com/article/how-not-to-do-a-smart-city-let-a-thousand-flowers-bloom-instead-of-having-a-plan/>.
[765] Oliver Wainwright, "Tinder for cities: how tech is making urban planning more inclusive", *The Guardian* (24 January 2017), online: <https://www.theguardian.com/cities/2017/jan/24/tinder-cities-technology-making-urban-planning-interactive>.
[766] Martine Courgnaud & Del Ry, "Villes de France publie une étude encourageante sur le développement des smart cities dans les villes moyennes", (22 January 2018), online: *Actualité fonction publique territoriale* <http://bit.ly/EtudeSmartCitiesDansVillesMoyennes>.
[767] Clay Nesler, "From planning to partnerships: What's driving smart city initiatives around the world", (6 March 2018), online: *GreenBiz* <https://www.greenbiz.com/article/planning-partnerships-whats-driving-smart-city-initiatives-around-world>.
[768] Frank Landman, "The Blueprint for Building a Smart City", (30 July 2018), online: *ReadWrite* <https://readwrite.com/2018/07/30/the-blueprint-for-building-a-smart-city/>.
[769] Oliver Balch, "Getting smart with cities to build a sustainable future", *The Guardian* (6 March 2013), online: <https://www.theguardian.com/sustainable-business/smart-cities-sustainable-future>.
[770] Emma Stewart, "Urban sustainability: what will a smart city be in the future?", *The Guardian* (28 June 2013), online: <https://www.theguardian.com/sustainable-business/urban-sustainability-smart-city-future>.

sustain themselves in a near future with less resources,[771] so the *smart city vision* is merging with the *green city vision* in projects all over the world, engaging smart technologies to tackle environmental challenges like greenhouse gas emissions.[772] The goal of *smart-eco-self-sufficient cities*, although it conjures some Huxleyesque visions of the future, is already sold as a viable accomplishment today that serves as a showcase[773] for larger-scale solutions for sustainability to be applied to megacities, relying heavily on IoT technologies.[774] The (supposedly) self-sufficient city considers information as the main intertwining flow for optimizing vital urban elements—water, energy, waste, transportation—and turns cities into sustainable spaces,[775] using sensors in all urban systems to enable smart cities with critical data in real time on the use of resources.[776]

All the promised data awareness for decision-making regarding the best use of space, energy and other resources in smart cities now emphasizes sustainability,[777] despite the evident need of achieving goals far beyond "sustaining" future demands of the cities while the present environmental and social indicators are getting worse every day.[778] The techno-optimism wave of ecosmart cities seems to be an unrealizable promise turned into an asset for cities' brands but

[771] Bruce Rogers, "Building the City of the Future: Smart and Sustainable", (13 September 2013), online: *Forbes* <https://www.forbes.com/sites/brucerogers/2013/09/13/building-the-city-of-the-future-smart-and-sustainable>.
[772] James Murray, "Are our cities about to get a lot smarter (and greener)?", (10 December 2014), online: *GreenBiz* <https://www.greenbiz.com/article/are-our-cities-about-get-lot-smarter-and-greener>.
[773] Chris Haslam, "Welcome to Fujisawa, the self-sufficient Japanese smart town" *Wired UK* (1 May 2015), online: <https://www.wired.co.uk/article/smart-town>.
[774] Michael Kanellos, "Making the megacity sustainable through IoT", (22 July 2016), online: *Readwrite* <https://readwrite.com/2016/07/22/making-megacity-sustainable-cl1/>.
[775] Alejandro López-Lamia, "To be or not to be Smart Cities", (18 November 2016), online: *Ciudades Sostenibles* <https://blogs.iadb.org/ciudadessostenibles/2016/11/18/to-be-or-not-to-be-smart-cities/>.
[776] Nick Ismail, "IoT and smart cities: sustainable development goals", (10 February 2017), online: *Information Age* <https://www.information-age.com/iot-smart-cities-sustainable-goals-123464394/>.
[777] Rohit Talwar, Steve Wells & Alexandra Whittington, "Will the city of the future be sustainable?", (20 September 2017), online: *Green Building* <http://greenbuilding.co.uk/will-the-city-of-the-future-be-sustainable/>.
[778] Tom Dallessio, "Smart City Expert Says 'Sustainable' Shouldn't Be the Goal", (9 January 2018), online: *Next City* <https://nextcity.org/daily/entry/smart-city-expert-says-sustainable-shouldnt-be-goal>.

that has not yet improved the lives of their inhabitants facing local and global challenges[779] which demand rethinking and reshaping urban areas—it takes not only becoming more efficient with urban resources, but promoting equity for residents to be resilient to climate change.[780]

Resilience has become a popular buzzword for cities in the last few years, as it became clear that emergent climate change would put a lot of pressure on urban systems in the near future,[781] not merely allowing smart cities to better recover from natural disasters, but also serving to strengthen the shape of the social and environmental fabric of urban spaces and communities.[782] Beyond the initial focus on climate, resiliency has become an increasingly frequent used term and parameter to evaluate the competitiveness, sustainability and smartness of a city,[783] creating a whole new generation of city professionals, chief resiliency officers[784] who quickly achieved a place in the public debate and began to impact the internal policies related to technology and the governance of cities.[785] Despite the co-optation by the global smart city project that sets resilience under its short-term, unequal and tech-based perspectives,[786] resilience is becoming a requirement for the smart city ecosystem by moving beyond technology

[779] Antoni Gutiérrez-Rubí, "Las mobile cities y el futuro de los objetivos de desarrollo sostenible", *El País* (4 April 2018), online: <https://elpais.com/elpais/2018/04/03/planeta_futuro/1522755004_684051.html>.
[780] Henry Gordon-Smith, "Strategies for Sustainable Food Systems in Smart Cities", (16 August 2018), online: *Meeting of the Minds* <https://meetingoftheminds.org/strategies-for-sustainable-food-systems-in-smart-cities-28028>.
[781] Adam Sneed, "What SimCity Teaches Us About Real Cities of the Future", (6 March 2013), online: *Slate Magazine* <https://slate.com/technology/2013/03/simcity-2013-what-the-urban-planning-game-tells-us-about-future-cities.html>.
[782] Sue Lebeck, "Building smart cities: secrets for climate, community, resilience", (29 May 2014), online: *GreenBiz* <https://www.greenbiz.com/blog/2014/05/28/smart-cities-carbon-climate-resilience-community>.
[783] Jennifer Baljko, "The next-generation city: Resilient, smart and sustainable", (7 December 2015), online: *Devex* <https://www.devex.com/news/sponsored/the-next-generation-city-resilient-smart-and-sustainable-87412>.
[784] Federico Guerrini, "From Helsinki To San Francisco: The Smart City's Quest For New Professionals", (26 July 2016), online: *Forbes* <https://www.forbes.com/sites/federicoguerrini/2016/07/25/from-sustainability-chief-to-resilience-officer-top-5-new-roles-for-a-smart-city-dream-team/>.
[785] Lauren Hepler, "What's really holding smart cities back? (it's not tech)", (22 September 2016), online: *GreenBiz* <https://www.greenbiz.com/article/whats-really-holding-smart-cities-back-hint-its-not-tech>.
[786] Ian Babelon, "The smart, resilient city: cliché or oxymoron?", (2 December 2016), online: *AESOP Young Academics* <https://aesopyoungacademics.wordpress.com/2016/12/02/the-smart-resilient-city-cliche-or-oxymoron/>.

to allow it to survive, adapt and grow when facing environmental and social shocks.[787] The environmental policies are obviously central for a resilient governance of cities, though not more important than the social and economic elements of resilience that tackle fragile urban issues,[788] adding concepts and strategies that converge but are not yet fully assimilated by smart city policies.[789] The hopes for a resilient future that will benefit cities by preparing them for expected and unexpected threats must move beyond the dominant claims that technology will be enough to answer them[790] if *green* smart city policies are to be taken all over the world as an antidote to climate change.[791]

Making existing urban infrastructure smarter has been the main answer in the recent years of rising populations and environmental changes,[792] under the known rhetoric that the upgrade to a networked city, a data gatherer clothed in code, is easy to use,[793] and would be more efficient and democratic for the benefit of the residents and the collectivity.[794] Full of new promises of improvement and collaboration with high-tech companies, and replete of renewed

[787] Michael Berkowitz & Robert Muggah, "Opinion: The smartest cities are resilient ones", (13 March 2017), online: *Devex* <https://www.devex.com/news/sponsored/opinion-the-smartest-cities-are-resilient-ones-89476>.
[788] Talia Smith, "Opinion: How to build a 'smart city' in a fragile and conflict-affected context", (24 March 2017), online: *Devex* <https://www.devex.com/news/sponsored/opinion-how-to-build-a-smart-city-in-a-fragile-and-conflict-affected-context-89552>.
[789] Herman van den Bosch, "Smart cities or resilient cities. Does it make any difference?", (16 August 2017), online: *Smart City Hub* <http://smartcityhub.com/collaborative-city/smart-cities-resilient-cities-make-difference/>.
[790] Lisa Brown, "Smart cities for a stronger, resilient future", (15 January 2018), online: *TechTarget* <https://internetofthingsagenda.techtarget.com/blog/IoT-Agenda/Smart-cities-for-a-stronger-resilient-future>.
[791] Eli Meixler, "The Philippines Plans a Green 'Smart City' as an Antidote to Manila's Traffic and Pollution", (11 April 2018), online: *Fortune* <http://fortune.com/2018/04/11/philippines-new-clark-city/>.
[792] Tim Smedley, "Are smart cities the answer to rising populations?", *The Guardian* (28 January 2013), online: <https://www.theguardian.com/sustainable-business/blog/smart-cities-answer-population-fewer-resources>.
[793] Bruce Sterling, "Adam Greenfield: The city is here for you to use, one hundred easy pieces" *Wired* (5 February 2013), online: <https://www.wired.com/2013/02/adam-greenfield-the-city-is-here-for-you-to-use-one-hundred-easy-pieces/>.
[794] Sabine Blanc, "Les promesses à double tranchant de la ville intelligente", (28 February 2014), online: *La Gazette des Communes* <https://www.lagazettedescommunes.com/223137/les-promesses-a-double-tranchant-de-la-ville-intelligente/>.

promises from more traditional private players,[795] the smart city models have not yet demonstrated that they are able to solve the environmental challenges such as carbon emissions, air quality, and water management.[796] Some will understand that cities are still in a transition state for a more sustainable urban living, more easily achieved in smaller communities than larger cities,[797] but there is a growing criticism of the human problems created by what was proclaimed to be the solution to all urban illnesses and due to questioning about who wins and loses in the smart city.[798] The ambitious smart city plans are already bringing much development for urban areas, and so far, the direct benefits of investments frequently are limited to smaller percentages of the population;[799] even so, there are still high expectations of the benefits derived from the development of applications based on shared data by cities and citizens.[800]

The answer to delivering the expected quality-of-life benefits of smart cities to citizens, at least according to the tech industry, depends on accelerating the successful applications,[801] making it all work together by heavily investing in smart technologies to improve city infrastructure and services.[802] The alluring benefits of smart cities are optimistically described as

[795] Jean-Pierre Gonguet, "Les nouvelles promesses de la ville intelligente", (11 October 2014), online: *La Tribune* <https://www.latribune.fr/regions/smart-cities/20141011trib2a8fd90bb/les-nouvelles-promesses-de-la-ville-intelligente.html>.
[796] David Thorpe, "Smart City Tech is Not Yet Living Up to its Promise to Solve Environmental Problems", (4 December 2014), online: *Smart Cities Dive* <http://bit.ly/SmartCityPromiseSolveEnvironment>.
[797] Branka Dimitrijevic, "From Transition Towns to Smart Cities: Opportunities and Challenges", (June 2015), online: *SCL* <https://www.scl.org/articles/3406-from-transition-towns-to-smart-cities-opportunities-and-challenges>.
[798] Ayona Datta, "Three big challenges for smart cities and how to solve them", (9 June 2016), online: *The Conversation* <http://theconversation.com/three-big-challenges-for-smart-cities-and-how-to-solve-them-59191>.
[799] Ramnani Vandana, "Just a small percentage of population to benefit from Smart Cities Mission", (11 July 2016), online: *Hindustan Times* <http://bit.ly/HindustanTimesSmartCities>.
[800] Duncan Weldon, "Who benefits from smart cities?", (10 September 2017), online: *Prospect Magazine* <https://www.prospectmagazine.co.uk/politics/who-benefits-from-smart-cities>.
[801] Philippe Guillemette, "How can we accelerate the development of smart cities?", (22 November 2017), online: *TechTarget* <https://internetofthingsagenda.techtarget.com/blog/IoT-Agenda/How-can-we-accelerate-the-development-of-smart-cities>.
[802] Radim Cmar, "Less traffic, better infrastructure: How urban mobility will advance", (10 July 2018), online: *Smart Cities World* <https://www.smartcitiesworld.net/opinions/opinions/less-traffic-better-infrastructure-how-urban-mobility-will-advance>.

countless—frequently ignoring the lack of confidence in them shown by residents—and so the countless consequential challenges they will bring should be pessimistically considered beyond technology, extending to legislation and education as well;[803] otherwise, these *smart places* risk being more beneficial to those who are the *entrepreneurs* of the smart cities than those who are supposed to live in them.[804]

The justification for closely monitoring city life with a digital observatory—constantly collecting and analyzing urban data—is frequently related to a discourse of managing risk,[805] especially the discourse of the risk of cities becoming too big to manage.[806] At the same time, contradictorily, the connected hardware and software that characterize the *smart city solution* has brought unprecedented forms of risk to be managed by governments.[807] The goal of mitigating risk through algorithmic quantification and finely grained control by using technical capabilities of the smart city might sound like a futurist's dream town,[808] but what kind of risks does it bring and for whom? There are many new or increased risks involving the smart city strategies that amplify the role of private companies and capital in the transformation of cities with an oversimplified and stereotyped vision of technology.[809] It may help to explain the frequent emphasis on risks regarding the investments (construction, operation, and finance-related risks) represented in the smart city discourse in the name of the ever-present justification of the soon-

[803] Norman Akhtar & Kevin Hasley, "Smart cities face challenges", (25 July 2018), online: *ComputerWeekly* <https://www.computerweekly.com/opinion/Smart-cities-face-challenges-and-opportunities>.
[804] Mike Montgomery, "Smart Cities Are Smart Places for Entrepreneurs", (24 July 2018), online: *Forbes* <https://www.forbes.com/sites/mikemontgomery/2018/07/24/smart-cities-are-smart-places-for-entrepreneurs>.
[805] Steve Lohr, "City life under a microscope", (3 October 2013), online: *China Daily* <http://www.chinadaily.com.cn/sunday/2013-03/10/content_16294906.htm>.
[806] Leo Johnson, "Petropolis now: Are cities getting too big?", (14 November 2013), online: *New Statement America* <https://www.newstatesman.com/2013/11/petropolis-now>.
[807] Shawn McCarthy, "Government IT in 2014: More connections, more exposure, more risk", (17 December 2013), online: *GCN* <https://gcn.com/articles/2013/12/17/government-it-predictions.aspx>.
[808] Annalee Newitz, "The Dark Side of the 'Smart City'", (30 January 2014), online: *io9* <https://io9.gizmodo.com/the-dark-side-of-the-smart-city-1512608758>.
[809] Alberto Vanolo, "Whose smart city?", (14 November 2014), online: *openDemocracy* <http://www.opendemocracy.net/opensecurity/alberto-vanolo/whose-smart-city>.

to-be overpopulation risks for cities.[810]

While the smart city investors sell the seductive promise of making the city safer and more efficient in all its operations (traffic, energy, waste), by collecting and producing more data, cities now must (hire people to) manage greater risks generated by all kinds of information.[811] Despite all the clear advantages (repeated *ad nauseam* is most articles) of smart cities, it is necessary to move away from the reward discourse in order to weigh the many different levels of data exposure and threats to infrastructure and public safety that are inherited risks associated to connecting the city, even beyond more obvious cybersecurity aspects.[812] The most connected cities (the smartest?) are also the most vulnerable to cyber attacks and data breaches—representing real and immediate dangers that must not be ignored—as well other dangers ranging from (the most referred) privacy to other rights of city inhabitants that can be sensitive to data leaks (most of them) and that may be valuable in public or private hands.[813]

City mayors have adhered to big tech arguments linking risks to innovation and innovation to good outcomes for the city,[814] so the risks associated with them would be worth taking for the political and business classes. However, it is clear that the risks of smart cities may produce bad outcomes, such as technology outpacing regulations for cybersecurity and privacy,

[810] Rick Robinson, "What's the risk of investing in a Smarter City?", (8 June 2014), online: *The Urban Technologist* <https://theurbantechnologist.com/2014/06/08/whats-the-risk-of-investing-in-a-smarter-city/>.
[811] Troy K Schneider, "Securing the smart city", (13 October 2015), online: *GCN* <https://gcn.com/articles/2015/10/13/nascio-smart-city-security.aspx>.
[812] Chris Rouland, "Smart Cities: Weighing the Risks and Rewards of Connecting Communities", (1 December 2015), online: *Risk Management Magazine* <http://www.rmmagazine.com/2015/12/01/smart-cities-weighing-the-risks-and-rewards-of-connecting-communities/>.
[813] Kalev Leetaru, "Do Smart Cities Pose Data Dangers? When Governments See Value In Data", (14 May 2016), online: *Forbes* <https://www.forbes.com/sites/kalevleetaru/2016/05/14/do-smart-cities-pose-data-dangers-when-governments-see-value-in-data/>.
[814] Sam Liccardo, "Innovation Is a Risk Worth Taking", (20 April 2016), online: *Huffington Post* <https://www.huffingtonpost.com/sam-liccardo/innovation-is-a-risk-wort_b_9730806.html>.

and even worse, aggravated outcomes such as growing inequality of life in the city.[815] The risks related to cybersecurity in smart services and infrastructure can lead to loss of life—as in transportation and energy, with threatening consequences to individuals or crowds—and the risks related to *smart data* linked to personal data and data accuracy might also affect the life of city dwellers in innumerable ways.[816] The extensive coverage of the benefits of innovation (as rhetoric) and the self-interested incentives of policymakers in smart city tools may lead to the implementation of new technologies with(out) meaningful improvement of the quality of service delivery in the city, but policymakers should be mindful of the increased risks of the smart city.[817]

There are many risks in the smart city, and some of them are frequently less emphasized, like the danger of making the citizens more dependent on city tech and less resilient, and other more obvious dangers, such as the tendency of privileging those who have access to technology.[818] The population with less access to technology can be excluded from smart city initiatives, as in the case of apps for public transportation that tend to exclude seniors, but some of the greatest risks mean threats to democratic accountability and control.[819] These risks might increase with the advancement of newer technologies into city halls, for example, with the mass adoption of AI in several systems integrated to municipal services and infrastructures, which tend to aggravate the dangers of cascading systems failures, violating the privacy of city dwellers, discriminating segments of people through biased databases, eliminating jobs faster than creating new ones, and disengaging citizens from democratic decision-making by adopting top-

[815] Dan Lohrmann, "Smart Cities: The Good, the Bad and the Ugly", (2 July 2016), online: *Government Technology* <http://www.govtech.com/blogs/lohrmann-on-cybersecurity/smart-cities-the-good-the-bad-and-the-ugly.html>.
[816] Eleanor Dallaway, "Smart City Risks Could Lead to Loss of Life", (20 October 2016), online: *Infosecurity Magazine* <http://bit.ly/ISC2CongressEMEA>.
[817] Emily Hamilton, "The Benefits and Risks of Policymakers' Use of Smart City Technology", (31 October 2016), online: *Mercatus Center* <http://bit.ly/BenefitsRisksPolicymakers>.
[818] Vincent Lucchese, "« La smart city n'aime pas les pauvres ! »", (17 February 2017), online: *Usbek & Rica* <https://usbeketrica.com/article/la-smart-city-n-aime-pas-les-pauvres>.
[819] Daniel Munro, "Is it okay for a city to track what's in your poop?", (16 March 2017), online: *Macleans* <https://www.macleans.ca/society/technology/is-it-ok-for-a-city-to-track-whats-in-your-poop/>.

down solutions of automated management.[820] Despite the obvious problems, press coverage from dozens of publications describes the smart city as a place where data is supposed to eliminate dangers and injustices,[821] and even when it is mentioned in the headlines that there are risks involved, many times the description of the risks can reduced by implementing (insufficient) policies and regulations (hard) to implement new city tech.[822] The rise of smart city technologies also means the rise of all their related risks,[823] especially the "hyper-technization" of urban management, the depoliticization of urban life and the widening of gaps between the displayed intentions and realities of the smart city,[824] while only the risks to privacy and security have received significant public attention so far.[825]

Despite not being one of the most glamorous aspects of public attention (or appealing to tech companies), when operating tech projects in cities, properly dealing or creating regulations, as well as being on top of contractual relationships, it is essential to manage risk in smart projects[826] because the fear of failure has good reason to exist when concerning smart cities.[827] Far beyond the inherent privacy risks, the massive quantities of information gathered about

[820] Peter Williams, "Smart Cities and Artificial Intelligence: Balancing Opportunity and Risk", (21 June 2017), online: *Meeting of the Minds* <https://meetingoftheminds.org/smart-cities-artificial-intelligence-balancing-opportunity-risk-21706>.
[821] Hatem Zeine, "The Problems With Smart Cities", (19 June 2017), online: *Forbes* <https://www.forbes.com/sites/forbestechcouncil/2017/06/19/the-problems-with-smart-cities/>.
[822] Sylvie Albert, "Smart cities present risks, opportunities", (30 November 2017), online: *The Conversation* <http://theconversation.com/smart-cities-present-risks-opportunities-80665>.
[823] Charles Pauka, "The rise and risks of smart cities", (21 September 2017), online: *Government News* <https://www.governmentnews.com.au/rise-risks-smart-cities/>.
[824] Martine Courgnaud & Del Ry, "Smart city : 'L'hyper-technicisation laisse peu de place au citoyen'", (1 December 2017), online: *La Gazette des Communes* <https://www.lagazettedescommunes.com/538579/smart-city-lhyper-technicisation-de-la-gestion-urbaine-laisse-peu-de-place-au-citoyen/>.
[825] Marin Ivezic, "Becoming Smarter About Smart Cities – Recognizing Smart City Privacy Risks", (31 December 2017), online: *LinkedIn* <https://www.linkedin.com/pulse/becoming-smarter-smart-cities-recognizing-city-privacy-marin-ivezic/>.
[826] Ingrid Silver & Alex Mackay, "Smart Cities – seizing opportunities and managing risk", (23 January 2018), online: *IT Pro Portal* <https://www.itproportal.com/features/smart-cities-seizing-opportunities-and-managing-risk/>.
[827] Harminder Singh, "Hong Kong's Smart City goal stymied by fear of risks, lack of tech graduates", (29 January 2018), online: *South China Morning Post* <https://www.scmp.com/news/hong-kong/economy/article/2131038/fear-risks-and-too-few-tech-graduates-stalling-hong-kongs>.

urban dwellers in smart cities present new risks to civil liberties[828] and threats of massive disruption by vulnerable municipal services that are already critical to urban life emerge.[829] The dematerialization of urban services and administrative procedures by digital systems in cities can be materialized into different risks for the population—ranging from those which are getting more excluded by technology to those which are becoming more dependent[830] on them—that will demand new forms of risk assessment and management frameworks to keep pace with the growth of smart cities.[831] Despite all those risks, governments, industries and universities tend to describe them as possible failures that are part of successful projects,[832] and consequently getting far less attention than the futuristic promises of smart cities like those in *The Jetsons*—— all while the *Black Mirror* dystopias do not seem too far away.[833]

This first subchapter of the literature review established the initial context for the most relevant topics of the public debate on smart cities present in mass media. The topics were inferred from extensive readings in all the mentioned websites in the dissertation, as well as from a selection and grouping of the terms that most frequently emerged and correlated from the text analytics process used by the research. Only smaller portions of the consulted websites made it to the final list.

[828] Randy Billings, "Smart Cities Come with Inherent Privacy Risks, ACLU Says", (26 February 2018), online: *Future Structure* <http://www.govtech.com/fs/Smart-Cities-Come-with-Inherent-Privacy-Risks-ACLU-Says.html>.
[829] Marin Ivezic, "The Overwhelming World of Smart Cities – Cyber-Kinetic and Privacy Threats in Smart Cities", (22 May 2018), online: *Smart Cities Privacy* <http://smartcitiesprivacy.com/privacy/smart-city-cyber-kinetic-privacy-risks/>.
[830] Laetitia Van Eeckhout & Claire Legros, "« La smart city dessine une ville à plusieurs vitesses »", *Le Monde* (7 May 2018), online: <https://www.lemonde.fr/smart-cities/article/2018/05/07/la-smart-city-dessine-une-ville-a-plusieurs-vitesses_5295706_4811534.html>.
[831] Jon Shende, "The Future Smart City and the impact on risk, availability, security and privacy", (3 August 2018), online: *Information Age* <https://www.information-age.com/future-smart-city-123473926/>.
[832] Sim Shuzhen, "The smart city – no risk, no reward", (20 November 2018), online: *Singapore Management University* <https://research.smu.edu.sg/news/2018/nov/20/smart-city-no-risk-no-reward>.
[833] Carlton Reid, "Between the Jetsons and Black Mirror: Google Reveals New Plan for Smart City", (2 December 2018), online: *Forbes* <https://www.forbes.com/sites/carltonreid/2018/12/02/between-the-jetsons-and-black-mirror-google-reveals-new-plan-for-smart-city/>.

Detailed information about the processes of text analysis and their results are presented in the third chapter. These are the used groups of keywords that guided the development of this subchapter, in order of appearance: future, tomorrow, 21st century, beyond, need, necessary, new, rise, emerge; world, Barcelona, London, New York, Paris, Singapore, Songdo, Masdar, Neom, China, Hong Kong, India, Global South, Africa, Latin America, ranking, smartest, best, top, dumb, stupid, too smart, too intelligent, automated cities, connected cities, networked cities, digital cities; cloud computing, Big Data, data analytics, data driven, Internet of Things, IoT, sensors, artificial intelligence, machine learning, blockchain, 5G; Big Brother, surveillance, privacy, personal data protection, information security, transparency, open data, openness, participation, engagement, accountability, governance; democracy, civic tech, people-centric, human-centric, citizen-centric, citizens, communities, universities, academics; corporations, PPP, start-ups, innovation, revolution, disruption, infrastructure, building, sharing economy, traffic, transportation, vehicles, mobility, investment, funding, costs, privatization, neoliberal; platform, urban planning, urban development, sustainable, sustainability, resilient, resilience, opportunity, benefit, promise, answer, risk, truth.

Some other frequent terms (e.g., regulation, law, standards, science fiction) were mostly left to be used in the texts of following subchapters and the third chapter.

2.2. The Rising Tides of the Algorithmic City

It was crucial to perceive what the key elements of the smart city are brought up by the big (and smaller) media that ultimately inform the public which includes scientists and legal scholars who investigate the cities of the near future. This subchapter is dedicated to the contributions from their work on science and law related to smart cities.

The general topics previously presented are redirected to the subjects of academic discussions and publications, ranging from *harder* to *softer* sciences and from considerations on public policy to recommendations on regulation. The academic publications referred to here contain plentiful hints of science fiction in their texts—which is only fully approached in the (experiments of) next chapter—thus, literature also underlines the debate presented here.

"Cities are the defining artifacts of a civilization"[834] and, unsurprisingly, they are the birthplaces of science, law, and literature as we (can) understand and produce them today. Still, cities refuse to be explained or controlled[835] by those reasoning achievements (also artifacts?) that are entwined with the idea of the smart city that would tame its future through algorithms.

The previous subchapter chapter provided a glimpse of the many images of the *future-yet-contemporary* algorithmic city.[836] The present subchapter deepens into the many rising tides in the scientific and legal academic production on the city of the near future.

This second subchapter of the literature review seeks to focus on the convergent efforts to explain and illustrate the essence, relevance, and controversy of smart cities. It is divided in

[834] John Reader, *Cities* (Atlantic Monthly Press, 2004) at 1.
[835] Lawrence Norfolk, "Review: Cities by John Reader", *The Guardian* (11 September 2004), online: <https://www.theguardian.com/books/2004/sep/11/highereducation.history>.
[836] Kevin Hamilton et al, "The image of the algorithmic city: A research approach" (2014) 2014:20 Interaction Design and Architecture(s) 61–71; Martin Tironi & Tomás Sánchez Criado, "Of Sensors and Sensitivities. Towards a Cosmopolitics of 'Smart Cities'?" (2015) 6:1 Tecnoscienza: Italian Journal of Science & Technology Studies 89–108.

three parts for approaching this goal—always pursued but never fully achievable.

The first part briefly presents some of the many attempts of definition and conceptualization of smart cities in academic publications, an abundant element indirectly spread through the whole literature review. This initial step is a mandatory element in virtually all texts used in the following analysis based on scientific perspectives on smart cities.

The second part of the subchapter was shaped by extensive readings about the subjects, directly and indirectly, related to the subjects of the dissertation, and combined with the most recurring topics accentuated in the data analysis of about 750 academic publications. Following the same guiding logic of the previous subchapter, the selection of the following content and works cited used a combination of numerical frequency of keywords and data visualization techniques for analysis. Inevitably, the selection of journal articles, book chapters, conference papers, theses, dissertations, and other academic documents were subject to extensive readings (or, at least, reasonable skimming of texts) used here.

The scientific perspective is combined into the third part of the subchapter, which is dedicated to a review of the appointed matters of utmost concerns for regulation by law and public policy and the most relevant legal literature on smart cities. It starts with the elements for legal concern appointed by the scientific production from which legal scholarship can draw much for its own analysis. Finally, the literature review concludes with considerations from legal scholars who have written about the subjects related to smart cities and have most influenced the development of the present dissertation.

The present literature review can be seen as an exhaustive synthesis of the ever-evolving

state-of-the-art on smart cities,[837] although it is not intended to be universal or conclusive. There are three reasons for it: first, the literature is far too vast to be fully exhausted, as explained in the beginning of the third chapter; second; the content is highly varied and not reconcilable enough to be brought together from the intended perspectives here; and third, only a smaller part of the literature that could be included here were used in the next chapter.

Some of the works of other legal authors and scientists are not mentioned here. Their focus on specific topics and their notes for future research were intentionally left for the last experiment in the research. Their legal and scientific contributions can be found in the next chapter, mixed with data analytics and science fiction. But before getting there, the eventual reader should go throughout this chapter which condenses the central nodes connecting the whole research or, at least, the next and short subchapter.

2.2.1. The Digital, Connected, Intelligent, Smart, Technoscientific Cities

During the full period of the doctoral program, there was a very common and increasingly hard question faced whenever explaining (or mentioning) the proposed research among colleagues, friends, and family: “OK, but what is a smart city?” The doubt or provocation was understandable: the term *smart city* has been spread in the media as a popular buzzword suggesting an idea with many images and without any clear content.

In fact, one of the main risks, acknowledged since the beginning of the research, was that the expression *smart city* would reveal itself as a fading *buzzword* composed by

[837] In a concurrent sense, it was very exhausting to prepare, write and review this synthesis, but it may be almost equally exhausting to read and evaluate it. There are too many references pointing to too many works to access and consult, too long phrases with too much content to board and absorb, and too much content for times when everybody has too much to do in not enough time. I’m sorry for who reads it.

buzzphrases,[838] a "doctoral fear" that was constantly reinforced by reading many publications and listening to several conferences affirming this. To the frustration of several authors and lecturers (who do not need to be exposed), with the passing of time, the term only stepped up its use in the media, tech industry, and city politics everywhere in the world. Still, the *buzzword* reference is still relevant to understand the peculiar time and context of the *smart city movement*, and to speculate about what a doctoral dissertation could contribute to its understanding.

A doctoral dissertation is expected to perform a scientific approach with the support of well-defined elements of research; consequently, the search for a definition of *smart city* should be the first stop in the expected path to be followed here. There are some expected difficulties and solutions related to explaining conceptions and selecting definitions, which are a common departure of academic works and debates. One of the most used and forward-looking ways of overcoming them could be decomposing and analyzing the words of the term: *city* and *smart.*

While there is an overall understanding of the *city* being a supposedly well-understood, general idea, there is no established universal definition of a *city* in urban and legal studies.[839] There is a lot of literature regarding the contrasting ideas of the city under the lens of many forms of reasoning from social sciences and humanities studies, and comparing them could easily (and unnecessarily) fill some colourful pages here (but it is not going to).[840] Many of the

[838] Igor Calzada, "(Un)Plugging Smart Cities with Urban Transformations: Towards Multi-Stakeholder City-Regional Complex Urbanity?" (2016) Revista de Estudios Urbanos y Ciencias Sociales Journal; Jenny McGrath, "Becoming a smart city takes more than sensors and buzzwords", (3 August 2017), online: *Digital Trends* <https://www.digitaltrends.com/home/cities-looking-become-smart-need-look-beyond-adding-sensors/>; Fine, *supra* note 600.

[839] See: Robert Bevan, "What makes a city a city - and does it really matter anyway?", (8 May 2014), online: *The Guardian* <https://www.theguardian.com/cities/2014/may/08/what-makes-city-tech-garden-smart-redefine>; Brendon Bosworth, "Is a universal definition of the 'city' on the horizon?", (6 April 2017), online: *Eco-Business* <http://www.eco-business.com/news/is-a-universal-definition-of-the-city-on-the-horizon/>; Jonn Elledge, "What is a city, anyway?", (4 August 2014), online: *CityMetric* <https://www.citymetric.com/what-city-anyway>.

[840] Rather, it is recommendable to point towards one of the best sources for any interested reader. See: Lloyd Rodwin & Robert M Hollister, *Cities of the mind : images and themes of the city in the social sciences* (New York: Plenum Press, 1984).

conceptualizations about cities are taken accordingly to fields of knowledge (geography, economics, political science, sociology, anthropology, architecture, history), national legislations,[841] technical standards,[842] and even individual experiences—as some urbanists often mention, every person perceives and comprises a city in a different perspective, because people feel, understand, and anticipate the (same?) city in different ways.[843]

Any attempt at finding an academic consensus about *smart* can get even more confusing, probably because this term is still very *soft* in the *hard* sciences, despite all the attempts by scholars and institutions to change it. The term *smart* is a flexible adjective frequently applied to all sorts of technologies[844] with a great variety of meanings—such as *efficient*, *intelligent*, *capable,* or *adaptive*—which are as flexible and variable as *smart*, thus creating a closed loop of definitions. Once applied to a city, *smart* becomes an add-on term for almost any area of municipal services: smart energy, smart water, smart transportation, smart parking, smart education, smart health, smart safety, smart economy, etc. Dozens of other city-related terms are currently used as *smart XYZ*, mentioned by hundreds of publications from industries, governments, media and academia.[845] Therefore, the etymological approach to explaining *smart* and *city* can be a useful and enriching method for debate—many introductory pages of articles

[841] To compare definitions of "urban" in national legislations around the world, see: *Demographic Yearbook 2005, Table 6*, by UN Habitat (Geneva: United Nations, 2005).
[842] As in "city is an urban community falling under a specific administrative boundary" or "city is a system of systems with a unique history and set in a specific environmental and societal context." See: *Sustainable development of communities — indicators for city services and quality of life*, by ISO, ISO 37120:2014(E) (International Standards Organization, 2014); *Smart cities - Preliminary Report 2014*, by ISO/IEC (International Standards Organization, 2015); *Smart sustainable cities: An analysis of definitions*, by ITU (International Telecommunications Union, 2014); *Setting the framework for an ICT architecture of a smart sustainable city*, by ITU (International Telecommunications Union, 2015).
[843] And so does theory. See: Rama Krishna Reddy Kummitha & Nathalie Crutzen, "How do we understand smart cities? An evolutionary perspective" (2017) 67 Cities 43–52; José-Miguel Fernández-Güell et al, "Incorporating a systemic and foresight approach into smart city initiatives: the case of Spanish cities" (2016) 23:3 Journal of Urban Technology 43–67.
[844] Smart devices, smartphones, smartwatches, smart grids, smart cards, smart sensors, smart materials, smart homes, smart buildings, smart lights, smart surfaces, smart textiles, etc.
[845] For a more technical approach, see: Leonidas G Anthopoulos, *Understanding Smart Cities: A Tool for Smart Government or an Industrial Trick?* (New York: Springer, 2017).

and openings of conferences are dedicated to this exercise—yet it may get confusing and frustrating for a more pragmatic conceptualization as usually needed for a doctoral dissertation in law such as the present one. In addition, it can be affirmed that most academic publications in recent years have abandoned the etymological approach for other more utilitarian options.

Finding a minimal scientific consensus in the academic literature could be another form of stating what a smart city consists of. Exhaustive research[846] has been done to establish a definition of *smart city* or to propose another more appropriate term for the same general idea. In fact, attempts to conceptualize the smart city have always been done in the most referred academic works about the topic. Out of respect to the lengthy, available work done by numerous authors, and being fundamentally against the waste of experience,[847] this dissertation does not intend to fill dozens of pages with lists of definitions and terms, neither to point toward a better one. It might be the easier option for an author to get more pages written, but it would be a boring experience for the reader who would still have to get through to the core of the question, and it is of pointless use of a dissertation if it is supposed to contribute to the debate on smart cities.

Verifying what is currently used in practice would be another obvious option of approaching the meanings of the smart city. There are already numerous other terms[848] used in

[846] See: Vito Albino, Umberto Berardi & Rosa Maria Dangelico, "Smart Cities: Definitions, Dimensions, Performance, and Initiatives" (2015) 22:1 Journal of Urban Technology 3–21; Arkalgud Ramaprasad, Aurora Sánchez-Ortiz & Thant Syn, *A Unified Definition of a Smart City* (Cham: Springer, 2017); Mircea Eremia, Lucian Toma & Mihai Sanduleac, "The Smart City Concept in the 21st Century" (2017) 181 Procedia Engineering 12–19; *La ville intelligente: origine, définitions, forces et limites d'une expression polysémique*, by Sandra Breux & Jérémy Diaz (Montreal: Institut national de la recherche scientifique, Centre - Urbanisation Culture Société, 2017).

[847] "Only thus will it be possible to create the time-space needed to know and valorize the inexhaustible social experience underway in our world today. In other words, only thus will it be possible to avoid the massive waste of experience we suffer today." Boaventura de Sousa Santos, "A Critique of Lazy Reason: Against the Waste of Experience" in IM Wallerstein, ed, *The Modern World-system in the Longue Durée* (Paradigm Publishers, 2004). The chapter is available for download at the author's website: <https://www.ces.uc.pt/bss/documentos/A%20critique%20of%20lazy%20reason.pdf>.

[848] Michael Batty, "Big data, smart cities and city planning" (2013) 3:3 Dialogues in Human Geography 274–279.

a competitive sense, sharing similar concepts yet each highlighting some peculiar aspect of interest. As a quick *Google search* will indicate, “smart city” (about 48,100,000 results) is, by far, the most used term between the many expressions with similar idea: “future city” (about 4,800,000 results), “sustainable city” (about 3,040,000 results), “digital city” (about 1,340,000 results), “knowledge city” (about 890,000 results), “livable city”/"liveable city" (about 800,000 results), “connected city” (about 750,000 results), “information city” (about 400,000 results), “network city” (about 300,000 results), “innovative city” (about 280,000 results), “intelligent city” (about 200,000 results), “responsive city” (about 51,000 results), “networked city” (about 50,000 results), “wired city” (about 40,000 results), among other common labels.[849]

The choice of a defining adjective for a city is an omnipresent element of discussion in the introduction of publications, conferences, and even podcasts about the use of digital technologies by cities. Frequently, it will be a matter of marketing needs or a simple question of cultural context. For example, it may appear surprising that the designation *intelligent* for cities is far less used in English publications while other languages centralize their expressions on it: “ciudad inteligente” (in Spanish, about 1,180,000 results), “ville intelligente” (in French, about 625,000 results), “cidade inteligente” (in Portuguese, about 400,000 results).[850] About this peculiar (but not unimportant) subject, there are many mentions in academic literature and commercial reports about the semantic differences in applying the adjectives *intelligent* or *smart* to cities.[851] The present research was done looking over documents in the four languages mentioned above where *the-best-name-debate* was regularly present, yet the relevance of the rich terminology discussion plays a minor factor for a legal dissertation.

[849] Google results based on algorithm recurrence. Search done in February 02, 2020.
[850] Google results based on algorithm recurrence. Search done in February 02, 2020.
[851] See: Mark Deakin & Husam Al Waer, “From intelligent to smart cities” (2011) 3:3 Intelligent Buildings International 140–152.

In fact, there is an increase in the use of the English expression *smart city*, present in thousands of academic papers[852] and practically all the researched literature in the four languages of work for this dissertation. The multilanguage effort tried to include as much academic, legal, and cultural diversity from different countries, but the dissertation came to reflect on the production on the area, mostly done in English, even by non-anglophone authors from several countries. The consolidation of the term “smart city" around the world (and even between *nonconformist academics*), since its dissemination more than twenty years ago,[853] is due to the marketing efforts made around it and this has become an accepted fact for most people.[854]

Time plays a major factor when discussing the relations between digital technologies and cities. For the people who have kept up with this debate since the nineties, *digital cities*[855] was once the main term used, only to later move to *connected cities* and *networked cities*[856] as supposedly more evolved expressions[857] for the same subject. The semantic move from

[852] Stephan Barthel & Johan Colding, “The Smart (Cyborg) City Needs Smarter Ecological Resilience Thinking”, (2 July 2017), online: *The Nature of Cities* <https://www.thenatureofcities.com/2017/07/02/smart-cyborg-city-needs-smarter-ecological-resilience-thinking/>.

[853] Rick Robinson, “Why Smart Cities still aren’t working for us after 20 years. And how we can fix them”, (1 February 2016), online: *The Urban Technologist* <https://theurbantechnologist.com/2016/02/01/why-smart-cities-still-arent-working-for-us-after-20-years-and-how-we-can-fix-them/>.

[854] “Tracing the genealogy of the word smart in the label smart city can contribute to an understanding of how the term smart is being loaded. In marketing language, smartness is centred on a user perspective… smart serves better than the more elitist term intelligent. Smart is more user-friendly than intelligent, which is limited to having a quick mind and being responsive to feedback.” Taewoo Nam & Theresa A Pardo, *Conceptualizing smart city with dimensions of technology, people, and institutions* (College Park: ACM, 2011).

[855] For most of the time of my work experience in a city hall, ‘digital city’ was the current used term, with an emphasis on the digitalization and digitization of the city management. See: Toru Ishida & Katherine Isbister, *Digital cities: technologies, experiences, and future perspectives* (Berlin: Springer, 2000).

[856] As the efforts of updating and expanding municipal networks are perennial tasks for any public administration, the terms ‘connected cities’ and ‘networked cities’ are commonly used as a synonym or even a required pre-stage to smart cities. Cisco and other companies in network infrastructure business encourage (and sponsor) the use of ‘connectivity’ terms as they are more associated to those technologies. See: *Innovation Trends Report: Networked Smart Cities*, by Weber Shandwick (Weber Shandwick, 2015); Cisco, “Focus Magazine: Connected Cities”, (July 2017), online: *Cisco* <https://newsroom.cisco.com/focus/2017/connectedcities>; BBC, “Connected cities”, online: *BBC* <http://www.bbc.com/future/sponsored/connected-cities>.

[857] Careful not to confuse with another sense of “networked”: Emmanouil Tranos & Drew Gertner, “Smart networked cities?” (2012) 25:2 Innovation: The European Journal of Social Science Research 175–190.

digital/connected cities to *intelligent cities*[858] (maybe even *wise*)[859] was supposed to mean a move from a technocentric approach to a more *humancentric* approach,[860] which is not mutually excluding opposites. *Sustainable city*, once a far more used term than any other listed above, has lately been combined with the younger *smart cousin*,[861] and became "a new techno–urban phenomenon."[862] Finally, it is typical to hear that all these terms are related[863] and that a *truly smart city* is simultaneously a digital, connected, networked, intelligent, sustainable, and resilient city—which is jargon in the field, but a jargon that should not be taken for granted.

The term *smart city* is supposed to gather different types of smartness[864] and many forms of intelligence,[865] following the idea that, if there are different kinds of intelligence in a person, then there should be different forms of intelligence acting and developing a city. This is a common

[858] A lot of bibliography is available about 'intelligent cities' and it is still being produced. About the subject, see: Nicos Komninos, "Intelligent cities: The emergence of the Concept" in *Intelligent cities and globalization of innovation networks* (London : Routledge, 2008) 110; Nicos Komninos, "Intelligent cities: Variable geometries of spatial intelligence" in *From Intelligent to Smart Cities* (Routledge, 2015) 46.
[859] Robin Hambleton, "From smart cities to wise cities" in *Leading the inclusive city: Place-based innovation for a bounded planet* (Policy Press, 2014); Robert F Young & Katherine Lieberknecht, "From smart cities to wise cities: ecological wisdom as a basis for sustainable urban development" (2018) Journal of Environmental Planning and Management 1–18.
[860] It would mean ignoring that all technology is inherently human, "since technology is society and society cannot be understood or represented without its technological tools." Castells, *supra* note 217.
[861] Mattias Höjer & Josefin Wangel, *Smart Sustainable Cities: Definition and Challenges* (Springer, 2015); Evelin Priscila Trindade et al, "Sustainable development of smart cities: a systematic review of the literature" (2017) 3:1 Journal of Open Innovation: Technology, Market, and Complexity 11; *Smart Sustainable Cities: Reconnaissance Study*, by Elsa Estevez, Nuno Lopes & Tomasz Janowski (United Nations University, 2016); Bhagya Nathali Silva, Murad Khan & Kijun Han, "Towards sustainable smart cities: A review of trends, architectures, components, and open challenges in smart cities" (2018) 38 Sustainable Cities and Society 697–713.
[862] Simon Elias Bibri & John Krogstie, "Smart sustainable cities of the future: An extensive interdisciplinary literature review" (2017) 31 Sustainable Cities and Society 183–212 at 193.
[863] Martin de Jong et al, "Sustainable–smart–resilient–low carbon–eco–knowledge cities; making sense of a multitude of concepts promoting sustainable urbanization" (2015) 109 Journal of Cleaner Production 25–38.
[864] Anastasia Stratigea, Chrysaida-Aliki Papadopoulou & Maria Panagiotopoulou, "Tools and Technologies for Planning the Development of Smart Cities" (2015) 22:2 Journal of Urban Technology 43–62.; J Ramon Gil-Garcia, Jing Zhang & Gabriel Puron-Cid, "Conceptualizing smartness in government: An integrative and multi-dimensional view" (2016) 33:3 Government Information Quarterly 524–534; Sam Allwinkle & Peter Cruickshank, "Creating Smart-er Cities: An Overview" (2011) 18:2 Journal of Urban Technology 1–16.
[865] "There is a difference between what being 'intelligent' in one city means and what being 'intelligent' means in another": Gonçalo Santinha & Eduardo Anselmo de Castro, "Creating More Intelligent Cities: The Role of ICT in Promoting Territorial Governance" (2010) 17:2 Journal of Urban Technology 77–98.

analogy (again not to be taken lightly) often used to describe *intelligent cities*, which is also applied to different kinds of knowledge and information in *knowledge cities*, *information cities*, *informational cities* and *learning cities*.[866] As a matter of fact, investigating the evolving terms and sense of what is predominantly known as *smart and digital city* has become a field of research on its own,[867] with a vast bibliography produced in the last 25 years, and it would be a good topic for applying text mining tools, as was done in this research.

In the plethora of terms, premises,[868] and conceptions about the relations of cities and technologies, the rhetoric of smart cities typically encompasses three different dynamics: regulation and efficiency for the better management of cities, by involving IT infrastructure and data-driven decision-making; economic development based on IT for the transformation of cities, by dealing with innovation and entrepreneurial initiatives; and social innovation and civic engagement for a better governance of the cities, through IT tools for government transparency and public empowerment.[869] Most of the smart cities projects involve a combination of those

[866] For more about the concepts and analogies, see: Samuel David Martínez, "A Comparative Framework for Knowledge Cities" in Francisco Javier Carrillo, ed, *Knowledge cities : approaches, experiences and perspectives* (New York: Elsevier Butterworth Heinemann, 2006) 17; Sabine Blanc, "Les intelligences de la smart city", (21 February 2014), online: *La Gazette des Communes* <http://www.lagazettedescommunes.com/222064/les-intelligences-de-la-smart-city/>; Marina Van Geenhuizen & Peter Nijkamp, eds, *Creative Knowledge Cities: Myths, Visions and Realities* (Cheltenham: Edward Elgar, 2012); Ana María Fernández-Maldonado, *Combining design and high-tech in knowledge cities: the case of Eindhoven* (2010); Wolfgang G Stock, "Informational cities: Analysis and construction of cities in the knowledge society" (2011) 62:5 Journal of the American Society for Information Science and Technology 963–986; Mark E Hepworth, "Planning for the Information City: the Challenge and Response" (1990) 27:4 Urban Studies 537–558.

[867] We cannot recommend enough the research conducted from Cocchia, at the same time that it is worth imagining how much complex the subject became after this publication: Annalisa Cocchia, "Smart and Digital City: A Systematic Literature Review" in *Smart City* Progress in IS (2014) 13.

[868] See: Tali Hatuka et al, "The Political Premises of Contemporary Urban Concepts: The Global City, the Sustainable City, the Resilient City, the Creative City, and the Smart City" (2018) 19:2 Planning Theory & Practice 160–179.

[869] See: Rob Kitchin, Tracey P Lauriault & Gavin McArdle, "Smart cities and the politics of urban data" in Andres Luque-Ayala et al, eds, *Smart urbanism : utopian vision or false dawn?* (London; New York: Routledge, 2016) 16.

logics, and "where the emphasis is placed depends on what the city authority is prioritizing."[870]

Every city pursues a different techno-social agenda of *smartness* which can vary a lot from one to another,[871] with singular combinations of the three dynamics and the technologies related to them, making it easier to point to common characteristics than a general concept. Reading from the most referred to authors and their pioneer works about smart cities,[872] the factual existence of some shared features is clear,[873] despite the inexistence of a standardized definition of smart city, so it can be more useful to recognize their ecosystem through main characteristics.[874] In turn, characteristics can vary depending on the authors and their references, some pointing toward one sense (networked infrastructure, business-led urban development, social inclusion, high-tech and creative industries, social and relational capital, and social and environmental sustainability)[875] and others toward another (smart economy, smart mobility, smart governance, smart governance, smart environment, smart living, smart people).[876] In sum, looking for common dynamics, features and characteristics of the smart city in the academic

[870] EUSPchannel, "Rob Kitchin. Reframing, Reimagining and Remaking Smart Cities", (1 February 2017), online: *YouTube* <https://youtu.be/1t3HANiAk6U?t=240> at 4min00s. For the text used in the presentation, see: Rob Kitchin, "Reframing, reimagining and remaking smart cities" (2016) SocArXiv, online: <https://osf.io/preprints/socarxiv/cyjhg/>.

[871] See: Jathan Sadowski, *Selling Smartness Visions and Politics of the Smart City* Arizona State University, 2016) [unpublished]; Robert G Hollands, "Beyond the corporate smart city? Glimpses of other possibilities of smartness" in Simon Marvin, Andrés Luque-Ayala & Colin McFarlane, eds, *Smart Urbanism: Utopian vision or false dawn?* (London: Routledge, 2015) 184; Michal Postránecký & Miroslav Svítek, *Assessment method to measure smartness of cities* (2017).

[872] Here are some of the most quoted academic authors and works published in the period prior to this doctoral research: Andrea Caragliu, Chiara Del Bo & Peter Nijkamp, "Smart Cities in Europe" (2011) 18:2 Journal of Urban Technology 65–82; Patrizia Lombardi et al, "Modelling the smart city performance" (2012) 25:2 Innovation: The European Journal of Social Science Research 137–149; Robert G Hollands, "Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?" (2008) 12:3 City 303–320; Amanda Coe, Gilles Paquet & Jeffrey Roy, "E-governance and smart communities: A social learning challenge" (2001) 19:1 Social Science Computer Review 80–93; Alberto Vanolo, "Smartmentality: The Smart City as Disciplinary Strategy" (2013) 51:5 Urban Studies 883–898.

[873] Roberta de Santis et al, *Smart city: fact and fiction* (University Library of Munich, 2014).

[874] Claude Rochet & Juan David Correa, "Urban lifecycle management: A research program for smart government of smart cities" (2016) 7:2 Revista de Gestão e Secretariado 1–20.

[875] As in the seminal research of Caragliu, Del Bo, and Nijkamp, based on the research about seventy smart city projects in Europe. In: Caragliu, Del Bo & Nijkamp, *supra* note 872.

[876] As Vanolo, inspired by the works of other authors, including Caragliu, Del Bo, and Nijkamp. *In* Vanolo, *supra* note 872. Their publications are cross-referenced with aforementioned works.

literature indeed helps to create a profile (more like a silhouette) of the subject, and it can be very useful in pragmatic terms; nevertheless, it does not deliver a definition.

Finally, despite all the significative efforts already made by many researchers, there is not enough academic consensus in the scientific literature toward a comprehensive definition of a smart city. In fact, if there is no easy agreement on *what a smart city is*, the same goes for a shared understanding of when one city can be finally called smart.[877] Even so, there are an abundance of cities being praised as *very smart* cities in events all over the world. A common saying in the mentioned smart city events may help establishing a minimum ground: there are so many smart city definitions as there are cities, researchers, and companies working on smart city projects. What may seem only like a bad joke in many presentations, could also mean a sincere recognition that the flexible term *smart city* expresses whatever elements the interlocutor wants to emphasize in the potential combinations of code,[878] cities, and data.[879]

The present research has opted to keep the most internationalized and meaningful expression, *smart city*, exactly as has been in the departing doctoral project of 2013, focusing on the usages "rather narrowly to data and theory that bring more immediacy to our urban understanding."[880] As a coherent continuity[881] of this work mainly concerned with the legal

[877] Emine Mine Thompson, *Smart City: Adding to the Complexity of Cities - A Critical Reflection* (Oulu: University of Oulu, 2016); Emine Mine Thompson, "What makes a city 'smart'?" (2016) 14:4 International Journal of Architectural Computing 358–371; Amy Glasmeier & Molly Nebiolo, "Thinking about Smart Cities: The Travels of a Policy Idea that Promises a Great Deal, but So Far Has Delivered Modest Results" (2016) 8:11 Sustainability 1122.
[878] For the best insights on the relation between city and code, see: *From a single line of code to an entire city: reframing thinking on code and the city*, by Rob Kitchin, The Programmable City Working Paper 4 (2014).
[879] Another *must read*: Rob Kitchin, "Data-driven, networked urbanism" (2015).
[880] Batty, *supra* note 848.
[881] The initial concept of smart city used for the doctoral project referred to a definition by the Brazilian professor André Lemos published in 2013, later partially translated to English: "*Cidade inteligente refere-*

questions generated by information technologies (in special, Big Data) applied in urban management and planning, here it will be used in the following smart city definition:

> We can define "smart city" as a city in which infrastructure and services are sensitive to the environment (cloud computing and the Internet of Things), producing, consuming and distributing a huge volume of digital information in real time (Big Data), enabling human actors and objects to make decisions, produce actions that affect others and modify their own behaviours (constituting an informational sensitive—or 'smart'—environment for urban management and citizen participation).[882]

Much criticism is possible regarding the chosen definition for what it may seem to leave out or to overemphasize,[883] by excluding people and prioritizing technology.[884] It may seem a more technocentric definition because it is useful to recognize the fact that the subject is most often considered from a technological approach—and often under a market-oriented approach—not that it should be as it is. The tone in the *smart city* discourse is more emphatic on the *smart*[885] (and the individual/user) and less on the *city*[886] (and the collectivity/platform) where *smart* "is shorthand for the generation and analysis of data from sensor-laden cities."[887]

Up to this point, despite the proven difficulties in agreeing on a concept and definition, it should be almost self-evident that the previously cited academic publications recognize the existence and relevance of what became known as *smart city*, thus no longer considered merely

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se a processos informatizados sensíveis ao contexto, lidando com um gigantesco volume de dados (Big Data), redes em nuvens e comunicação autônoma entre diversos objetos (Internet das Coisas). Inteligente aqui é sinônimo de uma cidade na qual tudo é sensível ao ambiente e produz, consome e distribui um grande número de informações em tempo real." André Lemos, "Cidades inteligentes" (2013) 12:2 GV-executivo 46–49.

[882] André Lemos & Adelino Mont'Alverne, "Smart Cities in Brazil. Experiences underway in Búzios, Porto Alegre and Rio de Janeiro" (2015) 10:3 Revista Comunicação Midiática 21–39.

[883] Every definition comes from a point of view and "every point of view is a view from a point."

[884] There are attempts on centring a definition of smart city on 'smart citizens', but people and social relations should not be dissociated from the technologies of their culture. See: Castells, *supra* note 217.

[885] Nam & Pardo, *supra* note 854.

[886] *Smart Cities as Innovation Ecosystems sustained by the Future Internet*, report, by Hans Schaffers et al, hal.inria.fr, report (2012).

[887] Teresa Scassa, "Smart Cities: Data Ownership and Privacy Issues", (14 February 2017), online: *Teresa Scassa Blog* <http://www.teresascassa.ca/index.php?option=com_k2&view=item&id=241:smart-cities-data-ownership-and-privacy-issues&Itemid=81>.

a buzzword in the scientific fields.[888] As a whole, the academic literature review on smart cities states the idea of science and technology as major sources of knowledge and tools for the construction and transformation of the cities of the past, present, and future. As precedents from a relatively recent past, the development of automobiles and electricity shaped many elements that comprise the modern city and, by analogy, the technologies associated to smart cities are expected to shape many elements of the *technoscientific city of the near future*.

Through the process of selecting sources, recollecting materials, and analyzing texts about smart cities, "future" was one of the main keywords that clearly emerged during the research for this dissertation. In fact, in the text analysis to be presented, the word "future," along with "new," came in the 6th position for most frequent words in all the titles of media publications—among other expected words such as "smart" (1st), "cities" (2nd), "city" (3rd), "data" (4th), "technology" and "urban" (5th). Once highlighted by the text analytics, it became necessary to explore the ideas related to the imaginaries of the future when describing and discussing the relations between cities and technology for the ends of the research. A *bright and renewed future* is the underlying promise of the scientific approach of the city that can be seen next.

The promise of a mythical (brave) new world built by knowledge lies on cities, as stated by a line of philosophers, from the *Republic* of Plato to *Newtown* of Michel Serres. The "transformation of the ways of inhabiting the city is not simply about the extension of the built environment and population management,"[889] as advised by Serres. It is the *world city* being built at the centre of everything: "Newtown is an unimaginable mediator, invisible and all-embracing,

[888] In fact, the reference to the smart city as a *buzzword* is still current, especially in the media and neophytes on the subject, even if the subject already moved beyond a point of general acceptance and adoption. See: Alexandre d'Anjou, *La ville intelligente : Au-delà du buzzword* (Master's thesis, HEC Montréal, 2016) [unpublished].
[889] Marcel Hénaff & Anne-Marie Feenberg, "Of Stones, Angels and Humans: Michel Serres and the Global City" (1997) 26:2 SubStance 59–80 at 59.

informatic, pedagogic, stable in its rapid intercommunications."[890] Serre's Newtown embodies the *smart city myth* whence conceptions and definitions come, so it is crucial to bear in mind that "[t]here is no pure myth except the idea of a science that is pure of all myth."[891]

The (relative) brevity of this first part of the subchapter working on concepts and definitions of the smart city was purposeful, with the hopeful aim of synthesizing the content in a more accessible form for a non-specialist public, due to the more hermetic nature of the academic papers and in line with the theoretical principles and practical intentions discussed in the first chapter of the dissertation. Other researchers may make better use of the referred works quoted here that are also included in the more comprehensive text analysis displayed in the third chapter. Unfortunately for the reader, the following subchapter could not keep up with similar (attempts of) brevity, due to the essential role of exhaustiveness in the literature review.

2.2.2. The Mighty, Global, and Utopian City on the Digital Telescope

The academic bibliography in this dissertation, mostly composed of works from *hard* and *soft* sciences,[892] presents a common denominator of *technoscience*[893] as the driving force of the smart cities. There is a shared background of technological utopianism[894] in urban management

[890] Michel Serres, *Angels: a modern myth* (Paris: Flammarion, 1995) at 71.
[891] Michel Serres, *Michel Serres with Bruno Latour: conversations on science, culture and time* (University of Michigan Press, 1995) at 162.
[892] Social and natural sciences are getting closer: "The observed facts are beginning to break out of the solitary confinement to which science had subjected them. The frontiers of objects are less and less clear; the objects themselves are like rings interlocked in such complex chains that they end up being less real than the relations between them." In Santos, *supra* note 23 at 21.
[893] The term is to be understood here as "about *science in practice* rather than *science is theory*". See: John Law & Annemarie Mol, "Situating technoscience: an inquiry into spatialities" (2001) 19:5 Environment and planning D: society and space 609–621 at 610.
[894] For further information, see: Amir Ganjavie, "Role of utopia for design of future cities: Utopia in urban planning literature" (2012) 5:3 Studies in Literature and Language 10–19; Jean-François Soupizet, "Les villes intelligentes, entre utopies et expérimentations" (2016) 414 Futuribles 95–110; Leonidas Anthopoulos, "Smart utopia VS smart reality: Learning by experience from 10 smart city cases" (2017) 63

and planning represented in the dominant scientific imaginary about the city of the near future, a self-realizing ideal[895] that keeps thriving in a consistent narrative in the growing number of scientific publications about smart cities. Frequently present in the literature review, the crystallized "image of a technology-led urban utopia permeated with centrally controlled technological infrastructures"[896] also represents the bureaucratization of utopia (post-utopian by itself),[897] which can be expressed by a data-driven urbanism that instrumentalizes cities for capturing, controlling and managing big urban data.[898] Many problematic issues can be raised from data-driven studies when framing the city as a complex system of data that can be captured, stored, shared, analyzed, predicted, and controlled by urban tech.[899]

The topics of this subchapter were discovered, filtered and classified through (the usual) extensive searching in 15 academic databases and a process of text analysis of over 750 scientific publications on smart cities, all gathered and selected during the doctoral research. The main order and composition of themes follow the results that emerged from the numerical and visual analysis of keywords, as well as from the information and insights provided by the extensive readings that consumed most of the time committed to this dissertation. The academic

Cities 128–148; Ayona Datta, "A 100 smart cities, a 100 utopias" (2015) 5:1 Dialogues in Human Geography 49–53; Giuseppe Grossi & Daniela Pianezzi, "Smart cities: Utopia or neoliberal ideology?" (2017) 69 Cities 79–85; Justin Cranshaw, *Whose "City of Tomorrow" is It? On Urban Computing, Utopianism, and Ethics* (2013); Tariq Jazeel, "Utopian urbanism and representational city-ness: On the Dholera before Dholera smart city" (2015) 5:1 Dialogues in Human Geography 27–30; Gabriel Pironcelli Kazukas, "Cidades inteligentes: da utopia ao concreto" (2017) 7:1 URBS: Revista de estudios urbanos y ciencias sociales 155–159; Stephan Hügel, "From the Garden City to the Smart City" (2017) 2:3 Urban Planning.

[895] See : Antoine Picon, *Smart cities : théorie et critique d'un idéal auto-réalisateur*, Collection actualités ; 22 (2013).

[896] Vasilis Niaros, Vasilis Kostakis & Wolfgang Drechsler, "Making (in) the smart city: The emergence of makerspaces" (2017) 34:7 Telematics and Informatics 1143–1152 at 1143.

[897] See: Nathaniel Coleman, *Utopias and architecture* (Routledge, 2007); Julie Billaud, "The Bureaucratization of Utopia – a Report", (14 July 2017), online: *Allegra Lab* <http://allegralaboratory.net/bureaucratization-utopia-report/>.

[898] Rob Kitchin, "Data-driven urbanism" in Rob Kitchin, Tracey P Lauriault & Gavin McArdle, eds, *Data and the City* (London: Routledge, 2017) 44.

[899] Jianquan Cheng et al, *Big Data for Urban Studies: Opportunities and Challenges: A Comparative Perspective* (2016).

perspective used here accommodates different biases of a *critic-but-also-enthusiast* science geek, a tech-savvy legal scholar, and an avid reader of near-future science fiction.[900]

The sequence of subjects intends to (imperfectly) conform them to their relative weight in the literature review and to a (minimally) coherent systematization: the first part of this subchapter will focus on the technologies that have been used by smart cities, not surprisingly the most frequent terms used in the data queries, complying with a common logic of a techno-centric subject as smart cities; it will be followed by the components of the *urban hardware*, *urban software* and *urban humanware*; finally, the main goals of the urban recoding embedded in the previous components will be presented.

2.2.2.1. Cities as Smart Users of Tech or Cities Used by Smart Tech

The (big) visions of researchers all over the world who consider Big Data[901] as a feasible instrument for changing cities[902] are fuelled by expectations of potential knowledge discovery from sensed urban data that could enable real-time systems for monitoring, management and anticipation in smart cities.[903] Indeed, cities have found many fitting applications for the characteristic *3 V's*—volume, velocity, and variety—of the different types of technologies that came to be labelled as Big Data,[904] enabling access to new information and insights (and open issues) for city decision makers and citizens.[905] Nevertheless, it is essential to consider the historical perspective that urban data has always been considered *too big* when considering the

[900] Without hypocrisy or modesty, it is as the interpretation and writing of this dissertation should be.
[901] This specific subject will be object of a wider discussion in a further subchapter.
[902] Ibrahim Abaker Targio Hashem et al, "The role of big data in smart city" (2016) 36:5 International Journal of Information Management 748–758.
[903] M Victoria Moreno, Antonio F Skarmeta & Antonio J Jara, *How to intelligently make sense of real data of smart cities* (2015).
[904] Michael Batty, "Big data and the city" (2016) 42:3 Built Environment 321–337; Mao Chen et al, *A Preliminary Discussion on the Application of Big Data in Urban Residents Travel Guidance* (2015).
[905] Ahmed M Shahat Osman, Ahmed Elragal & Birgitta Bergvall-Kåreborn, *Big Data Analytics and Smart Cities : A Loose or Tight Couple?* (IADIS, 2017).

means and ends to gather and interpret data, and even what now could be considered *small urban data* has been very useful until the present day—the big change comes from the new means for pooling, scaling and linking all kinds of small data into larger datasets that will require new data infrastructures and proper conditions for them.[906]

The large numbers of mashups of combined data from several sources, pose challenges for bandwidth, network and storage capabilities meeting the needs of diverse demands from smart cities, therefore requiring powerful platforms that cloud computing models have been deployed to perform.[907] The cloud has grown into a paradigm for smart cities, with different cloud schemes being operationalized to attend the diverse conditions of municipalities—in particular, medium and small ones—that find in their shared resources a way of disengaging from some technical and financial constraints.[908] Furthermore, the cloud has become essential for managing big geotagged data collected and integrated by an increasing number of urban sensors from different IoT ecosystems, allowing smart city projects to build and enhance services in the *Clouds of Things* that can also host Big Data systems for quasi-real-time processing and analysis.[909]

[906] Michael Batty, "Data about cities: redefining big, recasting small" in Rob Kitchin, Tracey P Lauriault & Gavin McArdle, eds, *Data and the City* (London: Routledge, 2017) 31; Rob Kitchin & Tracey P Lauriault, "Small data, data infrastructures and big data" (2014) 80:4 GeoJournal 463–475.
[907] Manfred Sneps-Sneppe & Dmitry Namiot, *On mobile cloud for smart city applications* (2016); Aseel Alkhelaiwi & Dan Grigoras, *Data Reduction as a Service in Smart City Architecture* (2017); Chiung-I Chang & Chih-Cheng Lo, "Planning and Implementing a Smart City in Taiwan" (2016) 18:4 IT Professional 42–49.
[908] See: Christina Kakderi, Nicos Komninos & Panagiotis Tsarchopoulos, "Smart cities and cloud computing: lessons from the STORM CLOUDS experiment" (2016) 2:1 Journal of Smart Cities 4–13; Trevor Clohessy, Thomas Acton & Lorraine Morgan, *Smart City as a Service (SCaaS): A Future Roadmap for E-Government Smart City Cloud Computing Initiatives* (2014); Panagiotis Tsarchopoulos, Nicos Komninos & Christina Kakderi, "Accelerating the uptake of smart city applications through cloud computing" (2017) 11:1 World Academy of Science, Engineering and Technology, International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering 129–138.
[909] See: Nathalie Mitton et al, "Combining Cloud and sensors in a smart city environment" (2012) 2012:1 EURASIP Journal on Wireless Communications and Networking 247; Wang Tao, "Interdisciplinary urban GIS for smart cities: advancements and opportunities" (2013) 16:1 Geo-spatial Information Science 25–34; Taewook Heo et al, "Escaping from ancient Rome! Applications and challenges for designing smart cities" (2014) 25:1 Transactions on Emerging Telecommunications Technologies 109–119; Ciro Formisano et al, *The Advantages of IoT and Cloud Applied to Smart Cities* (2015).

Sensors and other devices of the Internet of Things (IoT) are becoming major producers of input for Big Data applications, and with the aid of cloud infrastructures, are growing a market evaluated at over US$500 billion over 10% per year that targets cities as primary users.[910] The use of IoT gadgets (with RFID, IR, GPS, laser scanners, etc.) everywhere and for everything in cities, has developed into a brisk (and profitable) source of data that is supposed to provide real-time information about the urban environment to enhance and deliver municipal services.[911] By connecting billions of sensors in smart cities, the IoT centric approach to urban issues expects to deliver vast amounts of different types of data for applications to be created by governments, entrepreneurs and community groups, thus allowing efficient resource awareness and management through *ubiquitous computing* (everywhere and anytime).[912] The pairing of IoT and Big Data promises to make smart cities efficient and responsive, although it fully depends on being supported by advanced communication technologies to deliver the pledge: in order to be instrumented and intelligent, the city needs to be integrated and skilled,[913] and mobile technologies are set to provide (at least) part of it.

[910] Roberto Ferrero, Elizabeth Beattie & Joanne Phoenix, "Sensor city- A global innovation hub for sensor technology" (2018) 21:1 IEEE Instrumentation & Measurement Magazine 4–16; Dijana Capeska Bogatinoska et al, *Advanced sensing and internet of things in smart cities* (2016); Furqan Alam et al, "Data Fusion and IoT for Smart Ubiquitous Environments: A Survey" (2017) 5 IEEE Access 9533–9554.

[911] Jiong Jin et al, "An Information Framework for Creating a Smart City Through Internet of Things" (2014) 1:2 IEEE Internet of Things Journal 112–121; Tai-hoon Kim, Carlos Ramos & Sabah Mohammed, "Smart City and IoT" (2017) 76 Future Generation Computer Systems 159–162; Himadri Nath Saha et al, *IoT solutions for smart cities* (2017); Preeti Yadav & Sandeep Vishwakarma, *Application of Internet of Things and Big Data towards a Smart City* (2018).

[912] Kenji Tei & Levent Gürgen, *ClouT : Cloud of things for empowering the citizen clout in smart cities* (2014); Charith Perera et al, "Sensing as a service model for smart cities supported by internet of things" (2014) 25:1 Trans Emerg Telecommun Technol, online: <https://doi.org/10.1002/ett.2792>; Rodger Lea & Michael Blackstock, *Smart cities: An iot-centric approach* (ACM, 2014); Matthew Claudel, Alice Birolo & Carlo Ratti, "Government's Role in Growing a Smart City" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (London: Palgrave Macmillan UK, 2015) 23; Tie Qiu et al, "A Data-Driven Robustness Algorithm for the Internet of Things in Smart Cities" (2017) 55:12 IEEE Communications Magazine 18–23.

[913] Saraju P Mohanty, Uma Choppali & Elias Kougianos, "Everything you wanted to know about smart cities: The Internet of things is the backbone" (2016) 5:3 IEEE Consumer Electronics Magazine 60–70; Andrea Zanella et al, "Internet of Things for Smart Cities" (2014) 1:1 IEEE Internet of Things Journal 22–32; Stefano Bresciani, Alberto Ferraris & Manlio Del Giudice, "The management of organizational ambidexterity through alliances in a new context of analysis: Internet of Things (IoT) smart city projects" (2018) 136 Technological Forecasting and Social Change 331–338.

Mobile technologies are part of the current debate of what constitutes a smart city, playing a vital role for accessing and offloading data through IoT sensors, cloudlet servers and Big Data tasks, coupled with the increasing importance of smartphones and app services in smart city business models.[914] Cellular networks are considered essential to provide seamless information for real-time environment sensing in cities, as well as for collecting a rich amount of data on the moving patterns of people and who/where/when they meet.[915] Moreover, from homes to public spaces, smartphones and mobile apps are enabling the general population with increased access to city services, wider interaction with urban environments, and richer dialogues with municipal maintenance.[916] The pathway for the mobile technology agenda in smart cities—despite worries about civil liberties—above all other elements, points toward supporting the harvesting of large quantities of data over IoT devices and smartphones for mobile crowdsensing which is expected to develop new city applications.[917]

In terms of new smart city applications, Artificial Intelligence (AI) is all the rage as an ultimate solution to analyze the ubiquitous flood of data from IoT sensors—applied to water, energy, lighting, transportation, environment—and their combination is expected to become the

[914] Nils Walravens, "Mobile city applications for Brussels citizens: Smart City trends, challenges and a reality check" (2015) 32:2 Telematics and Informatics 282–299; Asma Enayet et al, "A Mobility-Aware Optimal Resource Allocation Architecture for Big Data Task Execution on Mobile Cloud in Smart Cities" (2018) 56:2 IEEE Communications Magazine 110–117; Nils Walravens & Pieter Ballon, "Platform business models for smart cities: from control and value to governance and public value" (2013) 51:6 IEEE Communications Magazine 72–79; Nils Walravens, *Validating a Business Model Framework for Smart City Services: The Case of FixMyStreet* (2013).

[915] Kayalvizhi Sundarraj Chandrasekar, Bhishna Bajracharya & Daniel O'Hare, *A comparative analysis of smart city initiatives by China and India-Lessons for India* (Canberra, 2016); Christian Quadri, Sabrina Gaito & Gian Paolo Rossi, *Big-Data Inspired, Proximity-Aware 4G/5G Service Supporting Urban Social Interactions* (2016); Pan Hui et al, "Mobile Big Data for Urban Analytics" (2018) 56:11 IEEE Communications Magazine 12–12.

[916] T Guelzim, M S Obaidat & B Sadoun, "Introduction and overview of key enabling technologies for smart cities and homes" in *Smart Cities and Homes* (2016) 1; David Lee et al, *CityEye: Real-time visual dashboard for managing urban services and citizen feedback loops* (2015).

[917] Antonio Corradi et al, *Smartphones as smart cities sensors: MCS scheduling in the ParticipAct project* (2015); Jason Miklian & Kristian Hoelscher, "Smart Cities, Mobile Technologies and Social Cohesion in India" (2017) 11:1 Indian Journal of Human Development 1–16.

most used high-tech gear for smart cities.[918] In fact, with the lowering cost of sensors and availability of city systems, large quantities of urban data being produced end up wasted without proper platforms for extracting patterns and finding potentially useful information for smart projects: a combination of Big Data analytics and AI is due to change this common scenario in the near future.[919] However, despite the expectations of ubiquitous sensors feeding intelligent analysis for smart cities, there is the substantial possibility of AI systems learning from the mistakes encoded into databanks of flawed urban models and making them efficiently more flawed—the dominant techno-optimistic approach for cities always needs to be questioned when applying new technological solutions to *disrupt* cities.[920]

Smart city projects embrace several dimensions of what could be called *smart* and possible layers of new technologies that could be applied to support them. For instance, the emergent *blockchain* is the most recent solution that may contribute to this.[921] Blockchain *evangelists* and researchers have been promoting the idea of cities applying distributed ledger technologies for altering transaction costs of municipal data and systems, creating and protecting digital identities for inhabitants, as well as reporting the performance of city government and

[918] İbrahim Kök, Mehmet Ulvi Şimşek & Suat Özdemir, *A deep learning model for air quality prediction in smart cities* (2017); Bhawani Shankar Leelar, E S Shivaleela & T Srinivas, *Cognitive Sensing in Smart Cities Using Optical Sensors* (2015); Amal Ben Rjab & Sehl Mellouli, *Smart cities in the era of artificial intelligence and internet of things: literature review from 1990 to 2017* (Delft, The Netherlands: ACM Press, 2018).
[919] Mehdi Mohammadi & Ala Al-Fuqaha, "Enabling Cognitive Smart Cities Using Big Data and Machine Learning: Approaches and Challenges" (2018) 56:2 IEEE Communications Magazine 94–101; Valentina-Camelia Bojan et al, *Architecture design of pattern detection system for Smart cities datasets* (2016).
[920] Yi Wei et al, *Street object detection / tracking for AI city traffic analysis* (2017); Daniela Inclezan & Luis I Pradanos, "Viewpoint: A Critical View on Smart Cities and AI" (2017) 60 Journal of Artificial Intelligence Research 681–686.
[921] Jianjun Sun, Jiaqi Yan & Kem Z K Zhang, "Blockchain-based sharing services: What blockchain technology can contribute to smart cities" (2016) 2:1 Financial Innovation 26.

improving local democracy.[922] Similarly, if there are assumptions that the interaction of blockchain and smart contracts may be the answer to issues such as privacy and security, despite the numerous blockchain initiatives in cities around the world, this industry is still at an infancy stage, and there are severe gaps of knowledge about its capabilities.[923]

2.2.2.2. The Urban Hardware or the Test-bed for Smart Technologies

Urban infrastructures around the world have been connected with sensors and telecommunication devices, following the *smart* plan of digitizing buildings, streets and whole cities to transform them into multifunctional informational platforms.[924] The proposition of embedding IoT tech into all urban infrastructures, connecting everything from the underground up to the clouds, is supposed to provide data and smart services for better use of resources.[925] The increasingly interconnected urban infrastructures are often considered to be engineering feats—from civil, electrical, electronic and telecommunication engineering, and other areas—enabling cities as testbeds for experimentation highly dependent on integrated networks.[926]

In order to be able to attend the requirements of the smart city, the increasingly complex "hard" infrastructure of broadband is becoming the equivalent of the *human nervous system* for

[922] Chris Speed, Deborah Maxwell & Larissa Pschetz, "Blockchain City: Economic, social and cognitive ledgers" in Rob Kitchin, Tracey P Lauriault & Gavin McArdle, eds, *Data and the City* (London: Routledge, 2017); Jason Potts, Ellie Rennie & Jake Goldenfein, "Blockchains and the crypto city" (2017) 59:6 it-Information Technology 285–293; Rogelio Rivera et al, *How digital identity on blockchain can contribute in a smart city environment* (2017).
[923] Charles Shen & Feniosky Pena-Mora, "Blockchain for Cities—A Systematic Literature Review" (2018) 6 IEEE Access 76787–76819; Regio A Michelin et al, *SpeedyChain: A Framework for Decoupling Data from Blockchain for Smart Cities* (New York: ACM, 2018) event-place: New York, NY, USA.
[924] Ricardo Alvarez, "The relevance of informational infrastructures in future cities" (2017) Special Issue 17 Field Actions Science Reports The journal of field actions 12–15; Andrew Crooks et al, "Creating Smart Buildings and Cities" (2017) 16:2 IEEE Pervasive Computing 23–25.
[925] Chi-Sheng Shih et al, *Data-driven IoT applications design for smart city and smart buildings* (2017); Héctor Suárez, Li Yang & Dalei Wu, *Securing GPR Data for Use in Smart Cities* (2018).
[926] Oreste Andrisano et al, "The Need of Multidisciplinary Approaches and Engineering Tools for the Development and Implementation of the Smart City Paradigm" (2018) 106:4 Proceedings of the IEEE 738–760; Aksel Ersoy, "Smart cities as a mechanism towards a broader understanding of infrastructure interdependencies" (2017) 4:1 Regional Studies, Regional Science 26–31.

cities, while constantly adapting to provide ubiquitous communication under any forms.[927] With all smart technologies depending on efficient communications and communication protocols to work (e.g. IoT, mobile, cloud computing), urban networks need to deliver data to city systems with a high degree of scalability and reliability under the pressure of an urban environment with harsh conditions and growing demands.[928] The individual and collective necessity of connection to networks to access and provide city services explains (part of the reasons of) the spread of public Wi-Fi hotspots in cities, which later came to perform a second task as sensors for large-scale mobility data of pedestrians and vehicles.[929] Still, Wi-Fi and 3G/4G networks have not been capable of delivering enough broadband for the data-hungry smart cities, therefore, aspiring municipalities and telecom companies all over the world are engaged in the imminent installation of high-performing 5G small cells to be installed into the urban furniture, integrated to IoT devices, and necessarily backboned by fibre-optic networks, all in the hope to harvesting (data and) results from smart projects—in particular, the highly expected projects of smart parking, traffic, and transportation.[930]

In many major cities around the world, the attempts of technological solutions for *smarter*

[927] Sarah Barns et al, "Digital Infrastructures and Urban Governance" (2017) 35:1 Urban Policy and Research 20–31; Noelia Uribe-Pérez & Carles Pous, "A novel communication system approach for a Smart City based on the human nervous system" (2017) 76 Future Generation Computer Systems 314–328.

[928] Jean-Philippe Vasseur & Adam Dunkels, "Smart Cities and Urban Networks" in *Interconnecting Smart Objects with IP* (Elsevier, 2010) 335; Imad Jawhar, Nader Mohamed & Jameela Al-Jaroodi, *Networking and communication for smart city systems* (2017).

[929] Chen Yan et al, *Visualizing Wi-Fi accesses from city-scale population for urban analysis* (2017); Vassilis Kostakos, Timo Ojala & Timo Juntunen, "Traffic in the Smart City: Exploring City-Wide Sensing for Traffic Control Center Augmentation" (2013) 17:6 IEEE Internet Computing 22–29; D Rahul Naik, Lyla B Das & T S Bindiya, *Wireless Sensor networks with Zigbee and WiFi for Environment Monitoring, Traffic Management and Vehicle Monitoring in Smart Cities* (2018).

[930] Wided Boubakri, Walid Abdallah & Noureddine Boudriga, *An Optical Wireless Communication Based 5G Architecture to Enable Smart City Applications* (2018); Aleksandar Karadimce & Ninoslav Marina, *Smart Mobile City Services in the 5G Era* (2018); Bahareh Gholampooryazdi et al, *Scenario planning for 5G light poles in smart cities* (2017); Attahiru Sule Alfa et al, "The Role of 5G and IoT in Smart Cities" in Muthucumaru Maheswaran & Elarbi Badidi, eds, *Handbook of Smart Cities: Software Services and Cyber Infrastructure* (Cham: Springer, 2018) 31.

parking were the very start of their successive smart projects. A problem that, at first, may seem simple to solve, parking is becoming an expensive and scarce resource in urban areas: the basic act of heuristic circling in the streets, searching for parking spots increases collective burdens of city congestion and air pollution, aggravated by individual costs of time and fuel of drivers who have been subjects of pilot projects of many sorts of smart parking systems in the last years.[931] The process of finding free parking spaces when going to work and other activities now usually include registering the occupation of spots by vehicles, paying for the space-time slots and sending parking data gathered by IoT devices or mobile applications to city platforms, with different levels of automation, cost, effort and value.[932] So far, the advanced experiments of smart parking have been very useful, by involving work from multiple disciplines, to learn more about the relationships of urban mobility from multi-sourced data analysis (car parking data, pedestrian data, car traffic data) and the possibilities of real-time prevention and prediction of congestion by employing computational capabilities.[933]

Mobility is one of the most central, expensive and difficult issues for metropolitan areas, intrinsically connected with the distribution and quality of all sorts of urban activities, and there are great expectations that Big Data and other technologies will overcome the limits of the current

[931] Rosamaria Elisa Barone et al, "Architecture for parking management in smart cities" (2014) 8:5 IET Intelligent Transport Systems 445–452; Cristian Roman et al, "Detecting On-Street Parking Spaces in Smart Cities: Performance Evaluation of Fixed and Mobile Sensing Systems" (2018) 19:7 IEEE Transactions on Intelligent Transportation Systems 2234–2245; Tanmoy Mukherjee et al, *Go-Park: A Parking Lot Allocation System in Smart Cities* (Springer Singapore, 2018).

[932] Alessio Bechini, Francesco Marcelloni & Armando Segatori, "Low-Effort Support to Efficient Urban Parking in a Smart City Perspective" in Salvatore Gaglio & Giuseppe Lo Re, eds, *Advances onto the Internet of Things: How Ontologies Make the Internet of Things Meaningful* (Cham: Springer, 2014) 233; Claudia Di Napoli, Dario Di Nocera & Silvia Rossi, *Using Negotiation for Parking Selection in Smart Cities* (Springer International Publishing, 2014); Ilhan Aydin, Mehmet Karakose & Ebru Karakose, *A navigation and reservation based smart parking platform using genetic optimization for smart cities* (2017).

[933] Walaa Alajali, Sheng Wen & Wanlei Zhou, *On-Street Car Parking Prediction in Smart City: A Multi-source Data Analysis in Sensor-Cloud Environment* (Springer, 2017); Trista Lin, Hervé Rivano & Frédéric Le Mouël, "A Survey of Smart Parking Solutions" (2017) 18:12 IEEE Transactions on Intelligent Transportation Systems 3229–3253; Pradeep Tomar, Gurjit Kaur & Prabhjot Singh, "A Prototype of IoT-Based Real Time Smart Street Parking System for Smart Cities" in Nilanjan Dey et al, eds, *Internet of Things and Big Data Analytics Toward Next-Generation Intelligence* (Cham: Springer, 2018) 243.

traffic management systems that do not satisfy the needs of municipalities.[934] The major unaccomplished promise of the smart city, the improvement of city logistics by eliminating traffic congestion, remains to be seen realized by the combination of IoT-driven detection of vehicles, real-time streaming of interconnected urban objects, resource pooling of massive geotagged data in the computational cloud, Big Data analytics for predictive trajectories and routes, and data mining for unveiling city logistics.[935] Besides the more traditional modalities of urban mobility, smart cities are carriers of expectations for new forms of mobility combining virtual and actual travel, as innovative systems for a more sustainable and healthier traffic (e.g. bike lanes and bike sharing), and solutions for an improved *mobile citizenship* for those who are often excluded from regular city journeys (e.g. people with disabilities).[936] By analyzing patterns of human mobility with multi-source location-based data, much can be learned from the social-economic dynamics (and exclusions) in cities, as ways of improving the efficiency of public transportation for their residents—a factor that may contribute to reducing the number of vehicles and achieve the long-awaited reduction of traffic congestion.[937]

[934] Clara Benevolo, Renata Paola Dameri & Beatrice D'Auria, *Smart Mobility in Smart City* (Springer, 2016); Patan Rizwan, K Suresh & M Rajasekhara Babu, *Real-time smart traffic management system for smart cities by using Internet of Things and big data* (2016); Romano Fistola, Marco Raimondo & Rosa Anna La Rocca, *The smart city and mobility: The functional polarization of urban flow* (2017).
[935] Xiaoxia Wang & Z Li, *Integrated platform for smart traffic big data* (2016); Abida Sharif et al, *Internet of things — smart traffic management system for smart cities using big data analytics* (2017); S Appavu Alias Balamurugan, J Felicia Lilian, & S Sasikala, *The Future of India Creeping up in Building a Smart City: Intelligent Traffic Analysis Platform* (2018); Katarzyna Nowicka, "Smart City Logistics on Cloud Computing Model" (2014) 151 Procedia - Social and Behavioral Sciences 266–281; Ling Hu & Qiang Ni, "IoT-Driven Automated Object Detection Algorithm for Urban Surveillance Systems" (2018) 5:2 IEEE Internet of Things Journal 747–754.
[936] Barbara Adkins, Marianella Chamorro-Koc & Lisa Stafford, "New mobilities for accessible cities: Toward scenarios for seamless journeys" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (Springer, 2015) 200; Martín Tironi & Matías Valderrama, "Unpacking a citizen self-tracking device: Smartness and idiocy in the accumulation of cycling mobility data" (2017) 36:2 Environ Plan D 294–312; GG Graham & Lihong Zhang, *Smart cities and digital technologies: the case of bike sharing* (Leeds, 2015); Federico Chiariotti et al, *Bike sharing as a key smart city service: State of the art and future developments* (2018).
[937] Feng Xia et al, "Exploring Human Mobility Patterns in Urban Scenarios: A Trajectory Data Perspective" (2018) 56:3 IEEE Communications Magazine 142–149; Neus Baucells Aletà, Concepción Moreno Alonso & Rosa M Arce Ruiz, "Smart Mobility and Smart Environment in the Spanish cities" (2017) 24 Transportation Research Procedia 163–170; Cristina Olaverri-Monreal, "Intelligent technologies for mobility in smart cities" (2016) 71 Hiradastechnika Journal 29–34.

Digitized transportation systems have been producing huge amounts of (real-time and *too-late*) detailed traffic data—facing huge technical issues to communicate, aggregate, interpret and maintain them—of all kinds of multimodal transportation modes, from the public to *alternative* options, powered by smartphones and apps, and potentially useful to understand and improve urban services.[938] Already being generated by sensors and systems in an exponential rate and scale, public transportation data can be used to monitor, analyze and predict the movement of people and resource consumption and allocation (e.g. energy, carbon emissions) by combining Big Data and AI techniques.[939] The continuous monitoring of traffic in cities by digital devices is supposed to be limited to managing and improving all mobility-related services, but even so, it has also disclosed substantial potential for revealing useful information from other complex self-organizing systems which, in return, can also benefit the mobility systems—energy systems and electric vehicles are examples of this.[940]

Smart energy and electricity networks are crucial components of smart cities, performing under a wide perspective of multiple environmental and social aspects, and playing double roles of production and consumption of (big) data.[941] On the one hand, energy efficiency and safety

[938] Barbara Lenz & Dirk Heinrichs, "What Can We Learn from Smart Urban Mobility Technologies?" (2017) 16:2 IEEE Pervasive Computing 84–86; Samiksha Shukla, Balachandran K, & Sumitha V S, *A framework for smart transportation using Big Data* (2016); Jacqueline Klopp et al, "Informal 2.0: Seeing and Improving Urban Informal Practices through Digital Technologies The Digital Matatus case in Nairobi" (2017) Special Issue 16 Field Actions Science Reports The journal of field actions 39–43.
[939] Patrik Horažďovský, Vojtěch Novotný & Miroslav Svítek, *Data-driven management of dynamic public transport* (2018); Moneeb Gohar, Muhammad Muzammal & Arif Ur Rahman, "SMART TSS: Defining transportation system behavior using big data analytics in smart cities" (2018) 41 Sustainable Cities and Society 114–119; Xiangyong Lu et al, "Predicting Transportation Carbon Emission with Urban Big Data" (2017) 2:4 IEEE Transactions on Sustainable Computing 333–344; Paul Davidsson et al, *Towards a prediction model for people movements in urban areas* (2013).
[940] Jally Sahoo & Mamata Rath, *Study and Analysis of Smart Applications in Smart City Context* (2017); Jianghui Yan, Jinping Liu & Fang-Mei Tseng, "An evaluation system based on the self-organizing system framework of smart cities: A case study of smart transportation systems in China" (2018) Technological Forecasting and Social Change.
[941] Marcelo Masera et al, "Smart (Electricity) Grids for Smart Cities: Assessing Roles and Societal Impacts" (2018) 106:4 Proceedings of the IEEE 613–625; Boyang Li et al, "Big Data Analytics for Electric Vehicle Integration in Green Smart Cities" (2017) 55:11 IEEE Communications Magazine 19–25.

are key factors for the deployment of all sorts of smart projects in cities that rely on Big Data because much depends on *good energy*; on the other hand, traditional methods of data analysis of energy consumption are considered insufficient to supply the information needed for planning smart projects.[942] The paradoxical element of (*data-equal-to-*)energy in the smart city is well represented in the projects that demand energy consumption and complex components (IoT sensors, energy modules, data centre nodes) to pursue goals of energy saving and system optimization; this double sideness is evident in projects of street lighting and energy-efficient scheduling in smart homes, with investment costs and equipment replacements which result in financial expending and the material waste of resources for the city.[943]

Urban waste systems are used to evaluate smart cities because they involve elements of infrastructure, transportation and surveillance (e.g. IoT devices in trash bins and waste trucks) oriented toward objectives of optimization of performance, costs efficiency, and the datafication of the environment.[944] A challenging issue for the environment, the mounting increase in solid waste generation and collection in cities is developing into a (difficult) priority for smart projects, as IoT embedded bins that identify fullness, which are synched to smart garbage trucks whose paths adapt in real-time according to the status of trash, all managed by systems designed to monitor, classify and predict waste in urban areas.[945] There are many questions about the costs and efficiency of this kind of project, especially when they put aside the many other possible

[942] M Victoria Moreno et al, "Applicability of Big Data Techniques to Smart Cities Deployments" (2017) 13:2 IEEE Transactions on Industrial Informatics 800–809; Vasylyna Horban, *A multifaceted approach to smart energy city concept through using big data analytics* (2016).
[943] Gustavo Rostirolla et al, "ElCity: An Elastic Multilevel Energy Saving Model for Smart Cities" (2018) 3:1 IEEE Transactions on Sustainable Computing 30–43; Waleed Ejaz et al, "Efficient Energy Management for the Internet of Things in Smart Cities" (2017) 55:1 IEEE Communications Magazine 84–91.
[944] Dung D Vu & Georges Kaddoum, *A waste city management system for smart cities applications* (2017); Yasue Kishino et al, *Datafying city: Detecting and accumulating spatio-temporal events by vehicle-mounted sensors* (2017).
[945] Fachmin Folianto, Yong Sheng Low & Wai Leong Yeow, *Smartbin: Smart waste management system* (2015); Vu & Kaddoum, *supra* note 944; Sangita S Chaudhari & Varsha Y Bhole, *Solid Waste Collection as a Service using IoT-Solution for Smart Cities* (2018); Swapan Das & Bidyut Kr Bhattacharyya, *Municipal solid waste characteristics and management in Kolkata, India* (Springer, 2013).

solutions in the complex chains of entities and stakeholders involved in the subject—producers of waste, individual consumers, city governments, waste industries—and their different levels of engagement.[946] Moving beyond intelligent sensor-based infrastructure for on-time collection, optimized transportation and appropriated disposal of separated waste, the future of the issue points toward facilitating the visibility of the entire lifespan of products—from the origin, arrival, distribution, use and final disposal of the resources—as it already happens with other services like water and sewage.[947]

Human settlements are built around water sources, a key resource for life that has a unique set of factors for each city, and the automation and management of water cycles, from supply to disposal, is a common blueprint for smart cities.[948] Water has been reduced to a mere commodity and a *resource management problem*, a shortage and efficiency challenge for growing urban populations, and a question of water-in-and-out-flow for measurements and distribution under a tech approach of sensor networks and data analytics.[949] Sensor-based systems are replacing manual collecting of data for water quality and sewer conditions, reporting real-time data to analysis and operation management for monitoring and predicting the urban

[946] Mohammad Aazam et al, *Cloud-based smart waste management for smart cities* (2016); Massimo Marchiori, *The Smart Cheap City: Efficient Waste Management on a Budget* (2017); Theodoros Anagnostopoulos, Arkady Zaslavsky & Alexey Medvedev, *Robust waste collection exploiting cost efficiency of IoT potentiality in Smart Cities* (2015).
[947] Theodoros Anagnostopoulos et al, "Challenges and Opportunities of Waste Management in IoT-Enabled Smart Cities: A Survey" (2017) 2:3 IEEE Transactions on Sustainable Computing 275–289; Behzad Esmaeilian et al, "The future of waste management in smart and sustainable cities: A review and concept paper" (2018) 81 Waste Management 177–195.
[948] D Vakula & Y K Kolli, *Waste water management for smart cities* (2017); Anna Strzelecka et al, "Integrating water, waste, energy, transport and ICT aspects into the smart city concept" (2017) 186 Procedia Engineering 609–616.
[949] Linnet Taylor & Christine Richter, "The Power of Smart Solutions: Knowledge, Citizenship, and the Datafication of Bangalore's Water Supply" (2017) 18:8 Television & New Media 721–733; Parag Kulkarni & Tim Farnham, "Smart City Wireless Connectivity Considerations and Cost Analysis: Lessons Learnt From Smart Water Case Studies" (2016) 4 IEEE Access 660–672.

flows of water – specifically useful for timely flooding alerts.[950] Furthermore, due to faster urbanization and climate change, there is much to research about the possible *smarting* underground infrastructures of the urban subsurface, which are expected to be put to the test in a near future of unprecedented shortages of potable water, increased flood events, and challenging consequences to human health in cities.[951]

To face the consequences of an ever-increasing influx of people into environment-challenged cities and overcrowded hospitals, the bets on *smart health* projects are placed on mobile and ambient devices for generating massive volumes of fine-grained and health-related data about residents, which are to be captured and distributed by ubiquitous clouds to be then analyzed by healthcare systems powered by Big Data and AI, all supposed to deliver improved, personalized and less expensive services.[952] For example, monitoring patients with personal mobile wearables in their *smart homes* and measuring air quality with sensors on streets, then looking for crossed relations when processing "Big Healthcare Data" to guide more intelligent decisions toward health actions with the geotagged individuals and their communities.[953] There are several urban experiments on healthcare that seem to ignore some of the multiple

[950] Yiheng Chen & Dawei Han, "Water quality monitoring in smart city: A pilot project" (2018) 89 Automation in Construction 307–316; Vikki Edmondson et al, "A smart sewer asset information model to enable an 'Internet of Things' for operational wastewater management" (2018) 91 Automation in Construction 193–205; Daniel Granlund & Robert Brännström, *Smart city: the smart sewerage* (IEEE, 2012).
[951] Ekkehard Holzbecher, *Tools for managing the subsurface: An approach for smart cities* (2016); Alexandra Georgiana Ioan & Anton Anton, *Sewer system calibration for smart cities* (2017).
[952] Abdulsalam Yassine, Shailendra Singh & Atif Alamri, "Mining Human Activity Patterns From Smart Home Big Data for Health Care Applications" (2017) 5 IEEE Access 13131–13141; Thaha Muhammed et al, "UbeHealth: a personalized ubiquitous cloud and edge-enabled networked healthcare system for smart cities" (2018) 6 IEEE Access 32258–32285; Diane J Cook et al, "Using Smart City Technology to Make Healthcare Smarter" (2018) 106:4 Proceedings of the IEEE 708–722; Sofia Ouhbi, Ali Idri & José Luis Fernández-Alemán, "Standards-Based Sustainability Requirements for Healthcare Services in Smart Cities" in Zaigham Mahmood, ed, *Smart Cities: Development and Governance Frameworks* (Cham: Springer, 2018) 299.
[953] Mofijul Islam et al, "Mobile Cloud-Based Big Healthcare Data Processing in Smart Cities" (2017) 5 IEEE Access 11887–11899; Min Chen et al, "Urban Healthcare Big Data System Based on Crowdsourced and Cloud-Based Air Quality Indicators" (2018) 56:11 IEEE Communications Magazine 14–20; Jaganathan Venkatesh et al, "Modular and Personalized Smart Health Application Design in a Smart City Environment" (2018) 5:2 IEEE Internet of Things Journal 614–623.

dimensions impacting human health—education about health being one of them.[954]

Despite the relative scarcity of research on the subject, education plays a major role in the sustainable development of smart cities, and their need to become learning environments to connect creativity and to enable citizens to overcome the needs and conflicts of these reimagined urban spaces.[955] There is much anticipation that, on the one hand, the pervasive computing in the city may help the teaching-learning process by using huge datasets in favour of their residents; and, on the other hand, new skills (e.g., understanding how to work with big urban datasets) will be necessary to have active citizens who are able to develop the smart city itself.[956] There are several experiments in this sense—new trends such as *smart learning*, *smart teaching*, and *interactive online classrooms*—are already on the move, with *personalized learning* in evidence for the use of the smart urban capabilities of data collection, analysis and prediction to provide *key performance indicators* (KPIs) for monitoring and profiling students, all in the name of their *best interests* of orientation and improvement.[957] In this emerging *future of education*, data-driven and software-mediated educational institutions are in charge of anticipating and shaping students and citizens, so they can develop skills for the connected urban environment (as *learning to code*) and thus become the engaged *smart citizens*

[954] Agusti Solanas et al, "Smart health: A context-aware health paradigm within smart cities" (2014) 52:8 IEEE Communications Magazine 74–81; Anu Ramaswami et al, "Meta-principles for developing smart, sustainable, and healthy cities" (2016) 352:6288 Science 940.
[955] Rawad Hammad & David Ludlow, *Towards a Smart Learning Environment for Smart City Governance* (2016); Dejian Liu, Ronghuai Huang & Marek Wosinski, "Development of Smart Cities: Educational Perspective" in *Smart Learning in Smart Cities* Lecture Notes in Educational Technology (Singapore: Springer, 2017) 3.
[956] Fernando Gaffo et al, *Edukas environment: Towards an integrated dashboard for education management in smart cities* (2017); Annika Wolff, Gerd Kortuem & Jose Cavero, *Towards smart city education* (2015).
[957] Jing Tian & Zongling Zheng, *Smart education in Yunnan, China: Present situation and construction measures* (2017); Everton Gomede et al, "Application of Computational Intelligence to Improve Education in Smart Cities" (2018) 18:1 Sensors 267.

responsible for computing the future of the city.[958] The instrumentalization of education in order to adapt and prepare the population displays the hard lesson that the smart city will create new social disadvantages for those who are more excluded from formal educational opportunities, making it more relevant to involve other institutions, like public libraries, which are already socially responsive and proactive in including people with essential access to information and digital technologies in expanding cities that do not seem to leave fair places for the ones who cannot pay for them.[959]

Despite housing being one of the most important challenges for major cities, the academic literature still pays a lot less attention to the possible materializations of *smart housing* than it should, considering the many conflicting interests of the smart city stakeholders in this matter that involves real state markets, social housing organizations, sharing economy players, and local governments.[960] The growth of major cities and the development of *smart districts* and *smart renovations* knowingly affect housing prices, undermining the conditions of urban livability for the most disadvantaged part of the population, and some governments have been trying to condition the projects to their local socioeconomic needs.[961] Housing represents a central sustainable dimension that should figure in among the top priorities for smart cities, but it still

[958] Ben Williamson, "Educating the smart city: Schooling smart citizens through computational urbanism" (2015) 2:2 Big Data & Society 2053951715617783; Michelle Selinger & Tony Kim, "Smart City Needs Smart People: Songdo and Smart + Connected Learning" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (London: Palgrave Macmillan, 2015) 159.
[959] Eva Aguaded-Ramírez, "Smart City and Intercultural Education" (2017) 237 Procedia - Social and Behavioral Sciences 326–333; Ellen P Goodman, "Smart Cities Meet Anchor Institutions: the Case of Broadband and the Public Library" (2013) 41 Fordham Urb LJ 1665; Dale Leorke, Danielle Wyatt & Scott McQuire, "'More than just a library': Public libraries in the 'smart city'" (2018) 15 City, Culture and Society 37–44.
[960] Caroline Duvier, PB Anand & Crina Oltean-Dumbrava, "Data quality and governance in a UK social housing initiative: Implications for smart sustainable cities" (2018) 39 Sustainable Cities and Society 358–365.
[961] John V Winters, "Why are smart cities growing? Who moves and who stays" (2011) 51:2 Journal of Regional Science 253–270; Naomi Morishita et al, "EU-GUGLE: A Sustainable Renovation for Smarter Cities from a Pilot Project" in Adriano Bisello et al, eds, *Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2015* (Cham: Springer International Publishing, 2017) 353.

lags far behind in most *smart policies* and resists technological applications: despite Big Data and blockchain applications being frequently proposed for it, most cities commonly suffer from data conditions (quality, sharing, interoperability) to put them in practice, depending a lot on the (uneasy) collaboration among governments, market actors and communities.[962] By understanding the limits and integrating strategies for housing policies and smart policies, the most basic urban challenges (mobility, sanitation, environment, slums/favelas) might be faced by prioritizing an emancipatory and community-shared "right to the city" for all citizens, different from the dominant *smart model* of state power and interests in financial capital that prioritizes surveillance and control over urban populations—supposedly for their security and safety.[963]

Last but not least, the foremost promise of many smart cities lies in enhanced public security and safety services by monitoring, forecasting, and managing emergency situations (accidents, disasters, crimes) with sensors and systems, from streets to social networks.[964] Emergency services requiring availability in minimum response time (e.g., ambulances, firefighters, police) capture the representation of *smart platforms* empowering local services with technologies for capturing the live location of incidents, connecting them to tasked officials, and generating on time (re)actions.[965] On the whole, the smart city paradigm is largely sold by the idea of *smarter security and safety* systems—enhanced and interconnected by IoT, Big Data and AI—for identifying and preventing crimes and emergency systems, with all data standardized

[962] Donatella Radogna & Manuela Romano, *Resilience in Housing Regeneration for a Smart City Model* (Springer, 2019); *Understanding the disruptive technology ecosystem in Australian urban and housing contexts: a roadmap*, by Christopher Pettit et al, 304 (Melbourne: Australian Housing and Urban Research Institute, 2018).
[963] Ashok Kumar & Pradip Kumar Sarkar, "Making Delhi a Smart City: Economic Buoyancy with Spatial Justice" in T M Vinod Kumar, ed, *Smart Economy in Smart Cities: International Collaborative Research: Ottawa, StLouis, Stuttgart, Bologna, Cape Town, Nairobi, Dakar, Lagos, New Delhi, Varanasi, Vijayawada, Kozhikode, Hong Kong* (Singapore: Springer, 2017) 495; Kitchin, Cardullo & Di Feliciantonio, *supra* note 242.
[964] G Bartoli et al, "A novel emergency management platform for smart public safety" (2015) 28:5 International Journal of Communication Systems 928–943.
[965] Jay Lohokare et al, *Emergency services platform for smart cities* (2017).

under the form of performance indicators for official management and public awareness.[966] These expectations are based on the highly disseminated premise that smart urban systems will provide (technological and pastoral) powers for detecting and monitoring all kinds of urban events—in a broad sense of unpredicted emergencies and programmed activities, like car accidents, house fires, air pollution threats, music concerts, public gatherings—preventing and *designing out* unwanted behaviours in the city, and ultimately simulating and ordering safe and secure services on the *urban hardware* for citizens.[967]

This section intended to short-but-full list and condense the most discussed techno-powered public services and attributions of the smart city: infrastructure, urban furniture, communication, mobility, traffic, transportation, energy, waste, water, sewerage/sanitation, health, education, housing, safety, and security. Considering the availability of tens of thousands of academic publications on these topics, other developing *smart services* provided by municipalities (e.g., tourism,[968] social services, cultural heritage, sports events, taxes and licenses) were purposely left out, yet following similar conditions and views discussed on the

[966] Enrico di Bella et al, "Smart Security: Integrated Systems for Security Policies in Urban Environments" in Renata Paola Dameri & Camille Rosenthal-Sabroux, eds, *Smart City: How to Create Public and Economic Value with High Technology in Urban Space* (Cham: Springer International Publishing, 2014) 193; Shweta Srivastava, Aditya Bisht & Neetu Narayan, *Safety and security in smart cities using artificial intelligence—A review* (IEEE, 2017); Luca Cagliero et al, *Monitoring the citizens' perception on urban security in Smart City environments* (2015).

[967] Marc Schuilenburg & Rik Peeters, "Smart cities and the architecture of security: pastoral power and the scripted design of public space" (2018) 5:1 City, Territory and Architecture 13; Wenbo Li, Peixia Wang & Kaifei Yang, *Visualizing City Events on Search Engine: Tword the Search Infrustration for Smart City* (2015); Julio Borges et al, *Event detection for smarter cities* (2017); Li, Wang & Yang, *supra* note; Jussi Parikka, "The Sensed Smog: Smart Ubiquitous Cities and the Sensorial Body" (2017) 29 The Fibreculture Journal; Maroš Lacinák & Jozef Ristvej, "Smart city, safety and security" (2017) 192 Proc Eng, online: <https://doi.org/10.1016/j.proeng.2017.06.090>; Shuo Wan et al, "To Smart City: Public Safety Network Design for Emergency" (2018) 6 IEEE Access 1451–1460.

[968] "Smart city tourism" is definitely a growing subject in the literature despite being appealing to fewer cities. See: Carlos Lamsfus et al, *Smart Tourism Destinations: An Extended Conception of Smart Cities Focusing on Human Mobility* (Springer International Publishing, 2015); José Álvarez-García et al, "Smart City and Tourism: An Analysis of Development of Caceres (Spain) as a Smart City" in Marta Peris-Ortiz, Dag R Bennett & Diana Pérez-Bustamante Yábar, eds, *Sustainable Smart Cities: Creating Spaces for Technological, Social and Business Development* (Cham: Springer, 2017) 199; Ulrike Gretzel, Juyeon Ham & Chulmo Koo, "Creating the City Destination of the Future: The Case of Smart Seoul" in Ying Wang et al, eds, *Managing Asian Destinations* (Singapore: Springer Singapore, 2018) 199.

aforementioned elements of the smart environment, with "greater perspectives of future development."[969] Overall, all these elements form the *smart urban hardware* set to be run by the (pre)scripts and commands of the *smart urban software* existent in practically all the scientific literature on smart cities analyzed by the research.

2.2.2.3. The Urban Software or What it is Supposed to Run For

Urban informatics is positioned to usher in a new era of Big Data and pervasive computing, based on novel sources of data and data analytics techniques, which will offer insights about the complex urban processes and change how municipalities are governed.[970] Consequently, analytics is becoming a common requirement for a smart city, well symbolized in the municipal dashboards in charge of reducing the complex urban data to understandable formats for explaining the city in dynamic numbers and visualizations.[971] In contrast with the simplistic postulations of presenting urban data in purely technical and neutral terms, the complex assemblage of city dashboards involves political and technological choices, social and economic constraints, as well institutional and analytical conditions that need to be critically known when making decisions based on them.[972] In essence, *Big Urban Data* analytics is now able to combine data from system datasets, street sensors, and social media, applying deductive and inductive reasoning techniques in order to extract insights and hidden correlations able to produce recommendations for city officials—hopefully, their *informed decisions* will also be

[969] Daniel Pérez González & Raimundo Díaz Díaz, "Public services provided with ICT in the smart city environment: the case of spanish cities." (2015).
[970] Sarah Barns, "FCJ-214 Visions of Urban Informatics: From Proximate Futures to Data-Driven Urbanism" (2017) 29: Computing the City The Fibreculture Journal; Jo Bates, "Data Cultures, Power and the City" in Rob Kitchin, Tracey P Lauriault & Gavin McArdle, eds, *Data and the City* (London: Routledge, 2017) 109.
[971] Catalin-Constantin Usurelu & Florin Pop, "My City Dashboard: Real-time Data Processing Platform for Smart Cities" 1:2017 JTIT 89–100.
[972] Rob Kitchin, Sophia Maalsen & Gavin McArdle, "The praxis and politics of building urban dashboards" (2016) 77 Geoforum 93–101; Rob Kitchin & Gavin McArdle, "Urban data and city dashboards: Six key issues" in Rob Kitchin, Tracey P Lauriault & Gavin McArdle, eds, *Data and the City* (London: Routledge, 2017).

informed about the limits of the knowledge on the screens.[973]

In general, the major point of benchmarking the city through interactive dashboards with geographic information lies in the purpose of measuring urban indicators, understanding municipal dynamics in real time and, therefore, supporting better decision-making.[974] By extracting useful knowledge from urban data streams, city administrators and citizens would be enabled, for example, with real-time decision support systems for response in the short term (e.g. eventual disruptions of critical infrastructures of energy or mobility) and in the long term (zoning inputs and outputs for projects in particular urban areas).[975] Although dashboard-like-systems are turning into a central requirement for smart cities—notably, in large urban projects affecting massive numbers of people, data visualization techniques are a *must have* for communication management—the expected gains of time, costs, and quality from decision support systems usually demand huge amounts of time and continuous resources for their (never fully ending) development: the decision of making these ongoing systems should always take this contradiction into account.[976] Provided that, introducing decision-making models beyond a simplistic technological approach may assist the establishment of collaborative and continuous learning processes in smart cities, what might be a *should have* requirement when planning

[973] Marco Balduini et al, *A Case Study of Active, Continuous and Predictive Social Media Analytics for Smart City*. (2014).
[974] Rob Kitchin, Tracey P Lauriault & Gavin McArdle, "Knowing and governing cities through urban indicators, city benchmarking and real-time dashboards" (2015) 2:1 Regional Studies, Regional Science 6–28; Javier Morales & Manuel Garcia, *GeoSmart cities: Event-driven geoprocessing as enabler of smart cities* (2015).
[975] Giuseppe D'Aniello, Matteo Gaeta & Francesco Orciuoli, "An approach based on semantic stream reasoning to support decision processes in smart cities" (2018) 35:1 Telematics and Informatics 68–81; Sadeeb Ottenburger et al, *Enhancing urban resilience via a real-time decision support system for smart cities* (2017); Hassan Arif, Roland J Cole & Isabel A Cole, "Experiments with Smart Zoning for Smart Cities" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (London: Palgrave Macmillan, 2015) 173.
[976] Satyendra Singh, Günter Wenzel & Frank Brettschneider, "Visualization for Decision-Making in Smart Cities" in T M Vinod Kumar, ed, *Smart Economy in Smart Cities: International Collaborative Research: Ottawa, StLouis, Stuttgart, Bologna, Cape Town, Nairobi, Dakar, Lagos, New Delhi, Varanasi, Vijayawada, Kozhikode, Hong Kong* (Singapore: Springer Singapore, 2017) 317.

urban infrastructures and areas which affect the socioeconomic conditions of cities.[977]

Contrasting with the lack of meaningful and timely information about what urban planning was until a very recent past; urban planners now face the challenge of a growing abundance of data (e.g. from home, mobility and environment IoT devices) and analytical tools (like Big Data analytics) for the continuous spatial planning of smart cities.[978] By adding more accurate and novel data applications to traditional forms of urban planning, new forms of *e-planning* are expected to be enabled with more holistic views of cities and more efficient outcomes, as long as new e-skills for planners and citizens are also achieved for it.[979] There is an explicit pretension of understanding urban areas under a holistic and integrative perspective, by deploying sensors and data mining as tools for designing cities under a centralized, organized, and expanded form of urban planning.[980] This *top-down* tendency of urban planning may seem state-controlled, but it is potentially problematic because this tends to favour an ontology centered around the efficiency/effectiveness of the smart city and the interest of private corporations and political actors, to the detriment of traditional technologies of planning and the concerns of large parts of

[977] Jean-Pascal Foucault & Yann Moulier-Boutang, *Towards economic and social "sensors": Condition and model of governance and decision-making for an organological Smart City* (2015); Adriana Galderisi, "The Smart City Metaphor to Foster Collaborative and Adaptive Decision-Making Processes in the Face of Climate Issues" in Adriana Galderisi & Angela Colucci, eds, *Smart, Resilient and Transition Cities* (Elsevier, 2018) 3.

[978] Emine Mine Thompson et al, "Planners in the Future City: Using City Information Modelling to Support Planners as Market Actors" (2016) 1:1 Urban Planning, online: <https://www.cogitatiopress.com/urbanplanning/article/view/556>; M Mazhar Rathore et al, "Urban planning and building smart cities based on the Internet of Things using Big Data analytics" (2016) 101 Computer Networks 63–80.

[979] Johannes M Schleicher et al, "Application Architecture for the Internet of Cities: Blueprints for Future Smart City Applications" (2016) 20:6 IEEE Internet Computing 68–75; Steve Curwell et al, "Citizens' expectations of information cities: implications for urban planning and design" (2005) 33:1 Building Research & Information 55–66.

[980] Aija Staffans & Liisa Horelli, "Expanded Urban Planning as a Vehicle for Understanding and Shaping Smart, Liveable Cities" (2014) 10:3 JoCI; Hermann Haken & Juval Portugali, "Smart Cities: Distributed Intelligence or Central Planning?" in Stamatina Th Rassia & Panos M Pardalos, eds, *Smart City Networks: Through the Internet of Things* (Cham: Springer, 2017) 65.

the population.[981] All things considered, the new urban planning paradigms and smart tools are already changing communities, territories, and the metabolism of cities, which are being backed by the constant interaction of physical actions and digital feedbacks, and the shifting from the previous (data) limitations of short-term thinking to longer-term strategic planning—and the management of the city to succeed in getting there.[982]

In the ontology of smart cities, management is a central domain of (very scattered) knowledge and operations that needs to be orchestrated to cope with the complexities of massive data analysis, decision-making and urban planning, in order to achieve the *smart goals* of meeting the needs regarding the increase of resource consumption in the present and future generations, not to mention, the increased demand for management itself.[983] First of all, entire new sets of capabilities, skills and frameworks are necessary to manage all the new and lower-level complexities from the massive amounts of data produced by IoT urban devices and analytical systems if these are ever to be useful. Once past that, there is much to be understood about the wise and efficient management of urban utilities and natural resources in the hope that smart city models reproduce best practices and attend the decision-making accordingly to the plan(ning).[984] At last, the *augmented reality* of smart city management has to evolve from the monitoring of flows and controlling of events to also become a platform for informing citizens

[981] Maurizio Carta, "Smart Planning and Intelligent Cities: A New Cambrian Explosion" in Eleonora Riva Sanseverino et al, eds, *Smart Rules for Smart Cities: Managing Efficient Cities in Euro-Mediterranean Countries* (Cham: Springer International Publishing, 2014) 123; Robert Cowley & Federico Caprotti, "Smart city as anti-planning in the UK" (2018) Environ Plan D 0263775818787506.
[982] Carta, *supra* note 981; Batty, *supra* note 848.
[983] Beniamino Murgante & Giuseppe Borruso, "Smart Cities in a Smart World" in Stamatina Th Rassia & Panos M Pardalos, eds, *Future City Architecture for Optimal Living* (Cham: Springer, 2015) 13; Tong Lee Chung et al, *Constructing City Ontology from Expert for Smart City Management* (Springer, 2014); Wei Qi & Zuo-Jun Max Shen, "A Smart-City Scope of Operations Management" (2019) 28:2 Production and Operations Management 393–406.
[984] David Rebollo-Monedero et al, "Reconciling privacy and efficient utility management in smart cities" (2014) 25:1 Transactions on Emerging Telecommunications Technologies 94–108; Tan Yigitcanlar, "Smart cities: an effective urban development and management model?" (2015) 52:1 Australian Planner 27–34; Anushri Gupta, Panos Panagiotopoulos & Frances Bowen, *Towards a Capabilities Approach to Smart City Management* (Springer International Publishing, 2017).

(and city employees) about what it takes to operate and maintain municipalities, so they can engage in careful planning and increase the well-being of every city resident, too.[985]

Given the prior points about analytics, decision-making, management, and planning that provide the data levers for steering cities, it is crucial to wrap them up in the equally fourfold problem of the usual *technical approach* of the smart city: it reduces the data complexities of cities and people to relatively simple components and agents, exacerbating what technology can measure and diverting from what it cannot (e.g. politics and values); it frames the urban issues in ways that are merely instrumental and pragmatic as if they could be treated in "neutral" and objective forms, rather than in normative frameworks (e.g. fairness and justice); it assumes that all urban problems can be fixed by technological solutions, instead of acknowledging that some critical issues demand sociopolitical interventions (e.g. collective actions); and it produces "sticking plaster solutions" to superficially address short-term problems, instead of focusing on deep-rooted problems that demand long-term political decisions (e.g. citizen-centred deliberative democracy).[986] For these "human factors," the citizen-centred and community-centred approach of smart cities has been highly acclaimed and reinforced in the academic literature as the smartest dimension where cities should invest in their projects.

2.2.2.4. The Urban Peopleware or the Users Operating Cities (And Vice Versa)

The *smart citizen* (or resident, inhabitant, dweller) is a typical denominator in much of the academic literature about smart cities. As it also happens in mass media and science fiction, the citizen is positioned (and transformed) within different imaginaries of the smart city. Some of the

[985] Antoine Picon, "The Advent of the Smart City, from Flow Management to Event Control" in *Smart Cities* (John Wiley & Sons, Ltd, 2015) 23; N Perez et al, *IntelCity, comprehensive management platform for smart cities* (2014); David Wiseli, Ryanarta Tanusetiawan & Fredy Purnomo, "Simulation Game as a Reference to Smart City Management" (2017) 116 Procedia Computer Science 468–475.
[986] Katja Schechtner, "Bridging the Adoption Gap for Smart City Technologies: An Interview with Rob Kitchin" (2017) 16:2 IEEE Pervasive Computing 72–75.

most frequent imaginaries about this citizen can be identified in four visions of the smart city: first, the city thought and ran without citizens because they are considered almost *stupid* and should be fully guided and cared for, which is an image frequently associated with the cities designed and built *from scratch* (Songdo as an icon); second, the dystopian and totalitarian city that watches and subjugates citizens because they need to be turned into subaltern subjects, ruled under a rigid order imposed by technology run-out-of-control, which is associated with the all-seeing-eyes of urban control centres (as the one in Rio de Janeiro); in contrast with the first but not with the second, the third type of smart city is based on a full-time data communication with *smart citizens* or *inhabitants-as-sensors* because their smartphones and other ways of providing data feedback are essential to run urban services, which can be very limiting for a civic agency (the former smart city model of Barcelona is a reminder); and the fourth imaginary turns around the idea of the *city of tomorrow* that needs to be actively adapted by *citizens of the future* because they will have to cope with environmental and sociopolitical change (a supposedly non-existent city, or already existent in the urban slums of the Global South).[987] Therefore, the so-called *citizen-centric smart city* might mean a lot of different things.

Much was present in the literature review about the imaginary of smart cities being centralized around their citizens—an argument present in all sorts of publications and conferences from academia, IT corporations, governments, and mass media—by enabling the expression of their thoughts and willingness, empowering their urban decisions and avoiding purely technocratic and top-down approaches from the usual political leadership.[988] This empowerment of smart citizens could be interpreted as a data-driven awareness (assisted by

[987] Alberto Vanolo, “Is there anybody out there? The place and role of citizens in tomorrow’s smart cities” (2016) 82 Futures 26–36.
[988] R D Desai et al, “Preparation of Town Planning Schemes—An E-Democracy Framework for Citizen Centric Planning” in TM Vinod Kumar, ed, *E-Democracy for Smart Cities* (Singapore: Springer, 2017) 281; Pablo Branchi, Carlos Fernández-Valdivielso & Ignacio Matias, “Analysis matrix for smart cities” (2014) 6:1 Future Internet 61–75.

interactive dashboards, for example) and the data collection and analysis of their dynamics and demands for engaging their collaboration.[989] This movement, away from bureaucratic perspectives and toward citizen centricity in smart cities, is supposed to deliver transformative and interactive services that contrast with the automated and passive services that characterize the imaginary of the city that governs its citizens.[990]

The urban citizenship of the smart city is often outlined by the monitoring and management of data from governable individuals and populations who would have their civic experiences redefined and technological capabilities upgraded for improving municipal services for everyone.[991] So, this *tech-skilled-and-data-experienced smart citizen* would be the main producer of distributed *civic intelligence* to cities, either by passively providing input about their lives from built-in sensors of smart devices, or by actively crowdsensing useful urban data under reputation-based and game-motivated factors.[992] Despite the spreading use of IoT sensors and gamification techniques for collecting data from citizens for building smart city projects, there are many shortcomings from relaying only on this approach; therefore, there is also much motivation in promoting *citizen science* for an inclusive and commons-oriented vision of the smart city, where local communities have agency, control, and spaces for plural citizen-oriented urban

[989] Josep-Ramon Ferrer, "Barcelona's Smart City vision: an opportunity for transformation" (2017) Special Issue 16 Field Actions Science Reports The journal of field actions 70–75; Mirko Marras et al, *BarcelonaNow: Empowering Citizens with Interactive Dashboards for Urban Data Exploration* (International World Wide Web Conferences Steering Committee, 2018); Carlos Costa & Maribel Yasmina Santos, *BASIS: A big data architecture for smart cities* (2016).
[990] Jungwoo Lee & Hyejung Lee, "Developing and validating a citizen-centric typology for smart city services" (2014) 31 Government Information Quarterly S93–S105.
[991] Jennifer Gabrys, "Programming Environments: Environmentality and Citizen Sensing in the Smart City" (2014) 32:1 Environment and Planning D: Society and Space 30–48; *Smart cities, citizenship skills and the digital agenda: The grand challenges of preparing the citizens of the future*, by Theo Tryfonas & Tom Crick (London: British Government Office for Science, 2015).
[992] Annika Wolff, Gerd Kortuem & Jose Cavero, *Urban Data Games: Creating Smart Citizens for Smart Cities* (2015); Douglas Schuler, "Smart Cities + Smart Citizens = Civic Intelligence?" in Grazia Concilio & Francesca Rizzo, eds, *Human Smart Cities: Rethinking the Interplay between Design and Planning* (Cham: Springer International Publishing, 2016) 41; Maryam Pouryazdan & Burak Kantarci, "The Smart Citizen Factor in Trustworthy Smart City Crowdsensing" (2016) 18:4 IT Professional 26–33.

transformations,[993] instead of the private business-oriented more commonly found.

In spite of the discourse of citizen involvement and control in smart city projects, there is less space for real participation of individuals than of collectives; consequently, it is in the community-based actions where more social uses of new technologies can be observed for the common good.[994] Indeed, smart projects are supposed to be *customized* according to the different dimensions and potentials of urban communities, which need to be developed with the support of their own views, ideas and decisions if they are to be called *smart*.[995] *Smart communities* are better suited to address their needs by remembering their past, understanding their present and planning their future: for example, when evaluating the growing energy needs for the development of their city, provided that without increasing the pollution already affecting their populations, smart communities may plan to create cooperative platforms for inducing citizen-producers to harvest clean energy sources.[996]

Smart communities are referred to as the communities which are conscious of advanced technologies and can apply them as catalysts to solve (any kind of) problems, in accordance with the smart city ideals of planned, integrated, ecological, and business driven infrastructures

[993] Mordechai Haklay, "Beyond quantification: A role for citizen science and community science in a smart city" in Rob Kitchin, Tracey P Lauriault & Gavin McArdle, eds, *Data and the City* (London: Routledge, 2017) 213; Mihaela Zica, Andreea Cristina Ionica & Monica Leba, "Gamification in the context of smart cities" (2018) 294 IOP Conference Series: Materials Science and Engineering; Niaros, Kostakis & Drechsler, *supra* note 896.
[994] Robert G Hollands, "Critical interventions into the corporate smart city" (2014) 8:1 Cambridge Journal of Regions, Economy and Society 61–77; Sergei Zhilin, Bram Klievink & Martin de Jong, "Community Self-Governance in the Smart City: Towards a Typology" in Manuel Pedro Rodríguez Bolívar & Laura Alcaide Muñoz, eds, *E-Participation in Smart Cities: Technologies and Models of Governance for Citizen Engagement* (Cham: Springer, 2019) 81.
[995] Anastasia Stratigea, "The concept of 'smart cities'. Towards community development?" (2014) 2012–2:26 Netcom 375–388; Gustavo Zurita, José A Pino & Nelson Baloian, *Supporting Smart Community Decision Making for Self-governance with Multiple Views* (Springer, 2015).
[996] Yunchuan Sun et al, "Internet of Things and Big Data Analytics for Smart and Connected Communities" (2016) 4 IEEE Access 766–773; *Networking Clean Energy: Smart Cities and the Rise of Cooperative Communities*, by Daniel Araya & Keith Taylor (2016).

and services.[997] These tech-empowered smart communities—social communities with territorial attachment, aware of local social relations and structures, and conscious of potential opportunities—would be better suited to develop new peer-to-peer organizations in their economy and society, while enhancing the quality of urban environment and preserving their cultural heritage and identity.[998] Then again, who are the people who integrate the *smarter* communities that will make those choices? The urban community, when understood as only one, is considered a collective of citizens, business firms, knowledge institutions, and municipal agencies collaborating with one another, with complex interrelationships and conflicting interests; on the other hand, when recognizing the diverse communities within this larger community and their (under)representation (and narratives) in the smart city projects, the term *stakeholder* is more and more used to describe some of the most involved actors (e.g. technologists, policymakers, leaders, companies) in their implementation.[999]

Among the several challenges related to Big Data platforms for smart cities, one of the hardest is leveraging ties and compromises between all of the main actors of interested communities, who have been collectively grouped under the term *stakeholders*: engaged citizens, private companies, non-profit and civil organizations, government leaders, public

[997] Caroline Covell, *A City Built on Information Technology and Wisdom: The Roles of the Government in the Establishment of the Smart Cities, Smart Communities* (2016).
[998] Antonio Caperna, Guglielmo Minervino & Stefano Serafini, "Smart Cities, Local Community and Socioeconomic Development: The Case of Bologna" in T M Vinod Kumar, ed, *Smart Economy in Smart Cities: International Collaborative Research: Ottawa, StLouis, Stuttgart, Bologna, Cape Town, Nairobi, Dakar, Lagos, New Delhi, Varanasi, Vijayawada, Kozhikode, Hong Kong* (Singapore: Springer, 2017) 601.
[999] Tim McGinley & Keiichi Nakata, "A Community Architecture Framework for Smart Cities" in Marcus Foth, Martin Brynskov & Timo Ojala, eds, *Citizen's Right to the Digital City: Urban Interfaces, Activism, and Placemaking* (Singapore: Springer, 2015) 231; Charles C Snow, Dorthe Døjbak Håkonsson & Børge Obel, "A Smart City Is a Collaborative Community: Lessons from Smart Aarhus" (2016) 59:1 California Management Review 92–108; Katherine Axel & Inas S Khayal, *Modeling 'Thriving Communities' using a Systems Architecture to Improve Smart Cities Technology Approaches* (2018).

administration staff, city councils, and academics.[1000] This pool of stakeholders gathers an *epistemic community* of the smart city which includes new sets of *urban technocrats* from different but related fields and priorities—technology officers, project managers, engineers, designers, civil servants, consultants, academics—who share sets of values and practices in a multiscale formation and operate in distinct advocacy coalitions.[1001] All different groups of key stakeholders (including citizens, universities and research centres) should be involved in the design, strategy, and implementation of smart cities, by combining the top-down dynamics of technology diffusion in city halls with the complementary collaboration of bottom-up dynamics from smart citizens and their communities.[1002]

In sum, in spite and because of the inevitable conflicting values between the diverse stakeholders, there is a need for establishing codesign and coproduction processes for the complex implementation of *citizen-centric-smart-communities*, otherwise the so-declared objectives of social innovation for cities can be simply not smart enough.[1003] Next, these objectives are put under review to see if they are worth it.

[1000] Claudio Bergamini et al, "LocalFocus: A Big Data Service Platform for Local Communities and Smarter Cities" (2018) 56:7 IEEE Communications Magazine 116–123; Diego López-de-Ipiña et al, *Citizen-Centric Linked Data Apps for Smart Cities* (Springer, 2013); Unai Aguilera et al, "Citizen-centric data services for smarter cities" (2017) 76 Future Generation Computer Systems 234–247.

[1001] *Smart cities, urban technocrats, epistemic communities and advocacy coalitions: The Programmable City Working Paper 26*, by Rob Kitchin et al (2017); Stéphane Roche et al, "Are 'Smart Cities' Smart Enough?" (2012) Spatially Enabling Government, Industry and Citizens: Research Development and Perspectives 215–236.

[1002] Louise Mullagh, Lynne Blair & Nick Dunn, *Beyond the "Smart" City: Reflecting Human Values in the Urban Environment* (2014); Ignasi Capdevila & Matías I Zarlenga, "Smart city or smart citizens? The Barcelona case" (2015) 8:3 Journal of Strategy and Management 266–282; Victoria Fernandez-Anez, José Miguel Fernández-Güell & Rudolf Giffinger, "Smart City implementation and discourses: An integrated conceptual model. The case of Vienna" (2018) 78 Cities 4–16.

[1003] Walter Castelnovo, Gianluca Misuraca & Alberto Savoldelli, "Smart Cities Governance: The Need for a Holistic Approach to Assessing Urban Participatory Policy Making" (2015) 34:6 Social Science Computer Review 724–739; Akemi Takeoka Chatfield & Christopher G Reddick, "Smart City Implementation Through Shared Vision of Social Innovation for Environmental Sustainability: A Case Study of Kitakyushu, Japan" (2015) 34:6 Social Science Computer Review 757–773.

2.2.2.5. Smart Goals of Urban Coding or the Alibi for All the Trouble

Urban technological innovation has been popularized under the smart city label, under various perspectives that highlight the interactions between the social and technological dimensions of innovation, the process of development, and the deployment of solutions addressing the most challenging problems of cities, as systemic social issues that could mobilize bottom-up processes from communities.[1004] Still, the technological focus of smart cities and their usual top-down solutions largely ignore the role of citizens, communities, and external actors (e.g., research institutions, third sector organization) who could actively collaborate in urban innovation to address the needs and opportunities of cities.[1005] Innovation in city governments, despite the prevailing association with the data-driven innovations of smart cities and Big Data, does not necessarily come from IT systems but from *smartening* governments more through policies than technologies, such as engaging with the inputs from citizens and from inside the government.[1006] Incidentally, the knowledge and leadership of public servants can play important roles for the adoption of e-government services and there is much use for their abilities and experiences for undertaking challenging tasks, as would be the case when integrating multiple public policies and institutional initiatives to support urban transformation and local innovation in

[1004] Igor Calzada, "Critical social innovation in the smart city era for a city-regional european horizon 2020" (2013) 6 P3T Journal of Public Policies & Territories, Social Innovation and Territory 1–20; Albert Meijer & Marcel Thaens, "Urban Technological Innovation: Developing and Testing a Sociotechnical Framework for Studying Smart City Projects" (2016) 54:2 Urban Affairs Review 363–387.
[1005] Daniel Gooch et al, *Reimagining the role of citizens in smart city projects* (ACM, 2015); Jukka Ojasalo & Heini Kauppinen, "Collaborative innovation with external actors: an empirical study on open innovation platforms in smart cities" (2016) 6:12 Technology Innovation Management Review.
[1006] Leonidas G Anthopoulos & Christopher G Reddick, *Smart City and Smart Government: Synonymous or Complementary?* (2016); Alberto Abella, Marta Ortiz-de-Urbina-Criado & Carmen De-Pablos-Heredero, "A model for the analysis of data-driven innovation and value generation in smart cities' ecosystems" (2017) 64 Cities 47–53.

cities.[1007] Cities have already assumed a critical role of innovating society in general; what remains to be seen is if its *smarter versions* are willing to promote innovation in more open, collaborative and inclusive models for all kinds of stakeholders or if they will only prioritize and benefit a few of them.[1008]

There are experiences of smart cities fostering collaboration between the public and private sectors to engage in the sharing of activities and resources for open innovation platforms, creating frameworks where civic-oriented living labs and business-driven technology districts can work together in complementary dynamics for the development of the city.[1009] This *experimental city* means an innovation from the hegemonic approach of the smart city, able to bring together governments, the private sector, entrepreneurs, academia, and grassroots civil movements to engage with new models of business and society that collaborate to innovate from the top (e.g. IT companies) and from the ground (e.g. civic *FabLabs*).[1010] Collaboration is a key point for creating an innovative environment in cities which can be enhanced by clusters integrating many factors: territorial systems of innovation (mostly known as technology districts), routines of social cooperation enabling local knowledge sharing (citizen workshops and civic labs), and industrial-

[1007] Pei-Hsuan Hsieh, Wen-Sung Chen & Chi-Jui Lo, "An Investigation of Leadership Styles During Adoption of E-government for an Innovative City: Perspectives of Taiwanese Public Servants" in Manuel Pedro Rodríguez-Bolívar, ed, *Transforming City Governments for Successful Smart Cities* (Cham: Springer, 2015) 163; Sarbeswar Praharaj, Jung Hoon Han & Scott Hawken, "Urban innovation through policy integration: Critical perspectives from 100 smart cities mission in India" (2018) 12 City, Culture and Society 35–43.

[1008] Hans Schaffers et al, *Smart Cities and the Future Internet: Towards Cooperation Frameworks for Open Innovation* (Berlin: Springer, 2011).

[1009] Jung Hoon Lee, Marguerite Gong Hancock & Mei-Chih Hu, "Towards an effective framework for building smart cities: Lessons from Seoul and San Francisco" (2014) 89 Technological Forecasting and Social Change 80–99; Ellie Cosgrave, Kate Arbuthnot & Theo Tryfonas, "Living Labs, Innovation Districts and Information Marketplaces: A Systems Approach for Smart Cities" (2013) 16 Procedia Computer Science 668–677.

[1010] Igor Calzada, "From Smart Cities to Experimental Cities?" in Vincenzo Mario Bruno Giorgino & Zack Walsh, eds, *Co-Designing Economies in Transition: Radical Approaches in Dialogue with Contemplative Social Sciences* (Cham: Springer, 2018) 191; Bernardo Gaeiras, "Fablab Lisboa: When a municipality fosters grassroots, technological and collaborative innovation" (2017) Special Issue 16 Field Actions Science Reports The journal of field actions 30–35.

university-territorial partnerships (engagement with research centres), all promoting urban transformation together.[1011] As shown above, smart city policies may promote local proximity and identity for innovation that are able to build close collaborative relationships between local public authorities, local companies, local communities that may translate into general technological solutions attending local needs—if (and it is a *big if*) the right conditions are well set for mutual development and the development of the city.[1012]

Urban development is a broad and flexible term regularly found in the literature review, where smart cities are presented as an innovative concept and model for combining people and technology for the enhancement of prosperity in urban agglomerations.[1013] For the shaping up of urban environments that produce a balanced and prosperous development, governments are betting on smart city projects to put public and private entities together to design innovative solutions and ideas and create competitive and productive urban models.[1014] Competitiveness and survival are components of the emergent (and fast-tracked) policies of smart cities, after all, they promise to alleviate the pressure for renewed basic infrastructures, new forms of funding, and better life in cities, shifting urban development away from the need of direct government intervention.[1015] This kind of shift of spaces and flows in times of financial crisis in cities reinforces a general understanding in the literature review that there is a new phase of sociospatial

[1011] Nicos Komninos, *The architecture of intelligent clities: Integrating human, collective and artificial intelligence to enhance knowledge and innovation* (2006); Laurent Dupont, Laure Morel & Claudine Guidat, "Innovative public-private partnership to support Smart City: the case of 'Chaire REVES'" (2015) 8:3 Journal of Strategy and Management 245–265.
[1012] Hoon Han & Scott Hawken, "Introduction: Innovation and identity in next-generation smart cities" (2018) 12 City, Culture and Society 1–4.
[1013] Margarita Angelidou, "Smart city policies: A spatial approach" (2014) 41 Cities S3–S11.
[1014] Ana María Fernández-Maldonado, "Designing: Combining Design and High-tech Industries in the Knowledge City of Eindhoven" in (Cheltenham, UK, 2012); Raffaella Riva Sanseverino, "Competitive urban models" in *Smart Rules for Smart Cities* (Springer, 2014) 1.
[1015] Chintan Vadgama et al, "Smart Funding Options for Developing Smart Cities: A Proposal for India" (2015) 8:34 Indian Journal of Science and Technology; Russell M Smith, Prasad Avinash Pathak & Girish Agrawal, "India's 'smart' cities mission: A preliminary examination into India's newest urban development policy" (2018) 0:0 Journal of Urban Affairs 1–17.

development in cities, but it remains unclear how exactlythis occurs, perhaps because of the research shortcoming in comparing the development process of smart cities in different locals—urban development is a process, not an end for cities, as it is for economic development.[1016]

The emphasis on economic development, often combined with innovation policies, has been driving governments toward several smart city projects articulated with new forms of job creation and economic recovery post-global financial crisis, encouraging the "tertiarization" of urban economy (service society) and providing opportunities for entrepreneurship.[1017] One of the driving forces behind the *smart economic restructuring* is the deindustrialization and loss of jobs in manufacturing in major cities, thus, the local response for *smartness* is to present the city through *narratives of enterprise* as a privileged space-time for economic growth and entrepreneurial urbanization.[1018] Many authors in the interdisciplinary field of smart city research note that cities with smart projects have advantageous properties for entrepreneurship and so they can improve their position within the world economy—although this may be true, performance indicators have been pointing the *competitive factor* of smart cities more toward their *smart people* than the *smart PPPs* for urban infrastructure.[1019]

[1016] Bill Cope & Mary Kalantzis, "ExtraUrbia, or, the Reconfiguration of Spaces and Flows in a Time of Spatial-Financial Crisis" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (London: Palgrave Macmillan, 2015) 219; Luca Mora & Roberto Bolici, "How to Become a Smart City: Learning from Amsterdam" in Adriano Bisello et al, eds, *Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2015* (Cham: Springer, 2017) 251.

[1017] Claudio Coletta, Liam Heaphy & Rob Kitchin, "From the accidental to articulated smart city: The creation and work of 'Smart Dublin'" (2018) European Urban and Regional Studies 0969776418785214; David Ménascé, Charles-Edouard Vincent & Mathilde Martin Moreau, "Smart Cities and new forms of employment" (2017) Special Issue 16 Field Actions Science Reports The journal of field actions 16–21.

[1018] Ari-Veikko Anttiroiko, "Smart Cities: Building Platforms for Innovative Local Economic Restructuring" in Manuel Pedro Rodríguez-Bolívar, ed, *Transforming City Governments for Successful Smart Cities* (Cham: Springer International Publishing, 2015) 23; Ayona Datta, "The smart entrepreneurial city: Dholera and 100 other utopias in India" in *Smart Urbanism* (Routledge, 2015) 52.

[1019] Chris Richter, Sascha Kraus & Pasi Syrjä, "The Smart City as an opportunity for entrepreneurship" (2015) 7:3 International Journal of Entrepreneurial Venturing 211–226; Ronald Wall et al, "Evaluating the Performance of Smart Cities in the Global Economic Network" in Manuel Pedro Rodríguez-Bolívar, ed, *Transforming City Governments for Successful Smart Cities* (Cham: Springer, 2015) 87.

Generally speaking, smart city PPPs can positively support the economic regeneration of cities when successful in building public-private coalitions that adapt and support the development of new urban services and technologies, not only for multinational high-tech firms, but also for start-ups linked to them.[1020] It may be the case of, for a positive example, tech companies involved in the *sharing economy* that interact and complement the dynamics of smart cities by providing services that match local needs and goals (i.e., start-ups of bike, car, food, stuff sharing) to enhance the urban economy; or, in a negative example, unsuccessful collaborations between municipalities with high-scale *sharing business* that may undermine local businesses (i.e., in recurrent cases involving Airbnb and Uber).[1021] In one case or another, city governments are willing to induce economic regeneration through smart policy interventions that reinvent themselves as high-tech variations of an *entrepreneurial city*, which is much inspired by Hayekian social and political philosophies that guide Silicon Valley's smart cities under a form of overhauled "neoliberal urbanism."[1022]

The neoliberal discourse and ideals limit the citizen role to a *consumer* or *user* of services, while the neoliberal urbanism sets the urban growth under the aegis of the market, which explains why the (Western and Global North) smart city blueprint is known as promoting neoliberal citizenship under dogmas of competitive economic development and efficiency.[1023] The smart city discourse is part of a more general neoliberalization of urban political economy

[1020] Ugo Rossi, "The Variegated Economics and the Potential Politics of the Smart City" (2015) 4:3 Territory, Politics, Governance 337–353; Francesco Domenico Sandulli, Alberto Ferraris & Stefano Bresciani, "How to select the right public partner in smart city projects" (2017) 47:4 R&D Management 607–619.
[1021] Paula Gori, Pier Luigi Parcu & Maria Stasi, "Smart cities and sharing economy" (2015) 96 Robert Schuman Centre for advanced studies research paper no RSCAS; Lucie Zvolska et al, "Urban sharing in smart cities: the cases of Berlin and London" (2018) Local Environment 1–18.
[1022] Hollands, *supra* note 872; Gary Graham et al, "The Smart City Production System" in *Smart Cities* (John Wiley & Sons, Ltd, 2017) 755; Elvin Wyly et al, "Hayek in the cloud : Conservative cognition and the evolution of the smart city" (2018) 22:5–6 City 820–842.
[1023] Paolo Cardullo & Rob Kitchin, "Smart urbanism and smart citizenship: The neoliberal logic of 'citizen-focused' smart cities in Europe" (2018) Environment and Planning C: Politics and Space, online: <https://doi.org/10.1177/0263774X18806508>.

that advocates for private-led technocratic solutions for city development, the marketization of public services, benchmarking of city performance indicators, and (in practice, contradictory) austere urbanism in terms of city growth.[1024] Indeed, the neoliberal discourse normalized the marketing language for *cities' potential*, nonetheless, the *smart city label* is a discursive umbrella for multiple narratives which may keep an intrinsic neoliberal logic but manifests itself into different characteristics and dynamics in each society, as in the Global South.[1025] Despite sharing many characteristics (strong intervention by states is a constant one even in the Global North), the growing trend of smart cities in many countries (China, India) and regions (the Persian Gulf) do not totally fit the neoliberal pattern of Western societies, yet the convergence can be understood in terms of shared goals (competition for global talent) and mentalities (as in the dogma of efficiency), exerting mutual influences on different blueprints.[1026]

On the one hand, smart cities are all about innovative technologies and prosperous markets for urban and (neoliberal) economic development; on the other hand, smart cities are taken as a promise of resource efficiency and social sustainability based on advanced technologies capable of running the city as a well-oiled, fast-paced machine for the benefit of its people.[1027] Efficiency as a goal is everywhere in the literature of smart cities: high-tech upgrades that will scale and contextualize urban data, improve city logistics and operations, allow fast decision-making, and perform timely actions and deliveries for all sorts of municipal services.[1028]

[1024] Kitchin, Lauriault & McArdle, *supra* note 869; Paolo Cardullo, Rob Kitchin & Cesare Di Feliciantonio, "Living labs and vacancy in the neoliberal city" (2018) 73 Cities 44–50.
[1025] Ezra Ho, "Smart subjects for a Smart Nation? Governing (smart)mentalities in Singapore" (2016) 54:13 Urban Studies 3101–3118; Nancy Odendaal, "Smart City: Neoliberal Discourse or Urban Development Tool?" in Jean Grugel & Daniel Hammett, eds, *The Palgrave Handbook of International Development* (London: Palgrave Macmillan UK, 2016) 615.
[1026] Remah Gharib, M Evren Tok & Mohammad Zebian, "Neoliberal Urbanization and Smart Cities in The Gulf Region: The Case of Abu Dhabi's Masdar City" in Mehran Kamrava, ed, *Gateways to the world: port cities in the Persian Gulf* (2016).
[1027] Margarita Angelidou, "Smart cities: A conjuncture of four forces" (2015) 47 Cities 95–106.
[1028] Ali Yavari, Prem Prakash Jayaraman & Dimitrios Georgakopoulos, *Contextualised service delivery in the Internet of Things: Parking recommender for smart cities* (2016); Liu Shuai & Wang Hong-chun, *Discussion on the problems and countermeasures of smart city logistics system* (2017).

Responding to the increasing consumption (as of energy) and waste (like pollutants) from growing populations, cities are seeking the desired scenario where efficient and connected technologies will be able to optimize the resource usage and consumption which will, in turn, enable improved or new services.[1029] As a good exemplification, the challenge of developing more efficient cities is present in the numerous projects of *smart energy* (as smart grids and smart lighting) all over the world, not only to achieve energy efficiency to reduce consumption, but also to increase the cost efficiency of electric systems that may allow the integration and expansion of other related smart projects (as CCTV municipal networks).[1030] As a consequence of the efficiency-led guidelines of the smart city, it is not surprising that many propositions of *key performance indicators* (KPIs) for cities have been emerging, putting the *safety*, *health*, *comfort,* and *satisfaction* of citizens as benchmarks: efficiency has been turned into a measurable (?) factor for the improvement of quality of life for the city inhabitants.[1031]

Quality of life appears as an ultimate goal for optimizing cities, economically and sustainably, with the support of data and high technologies to rationally manage urban resources, provide efficient services, and pay attention to people's needs.[1032] The data used as input for urban analytics and decision-making should attend a comparable quality and efficiency in order to attend the objectives, but despite data sources being abundant and diverse in smart

[1029] Vasilis Kostakis, Michel Bauwens & Vasilis Niaros, "Urban Reconfiguration after the emergence of peer-to-peer infrastructure: Four future scenarios with an impact on smart cities" in *Smart Cities as Democratic Ecologies* (Springer, 2015) 116; Murat Akcin et al, *Opportunities for energy efficiency in smart cities* (2016).
[1030] Christoph Rat-Fischer et al, *Smart City: Energy Efficiency in a New Scope* (Netherlands: Springer, 2012); Muhammad Alif Akbar & Tauhid Nur Azhar, *Concept of Cost Efficient Smart CCTV Network for Cities in Developing Country* (2018).
[1031] Minako Hara et al, "New key performance indicators for a smart sustainable city" (2016) 8:3 Sustainability 206.
[1032] Aymen Abid, Abdennaceur Kachouri & Adel Mahfoudhi, *Data analysis and outlier detection in smart city* (2017); Pierpaolo Girardi & Andrea Temporelli, "Smartainability: A Methodology for Assessing the Sustainability of the Smart City" (2017) 111 Energy Procedia 810–816.

cities, real-time data is usually imprecise, uncertain, incomplete, and ambiguous.[1033] With this in mind, data sources are always expanding and integrating more elements coming from traditional sources (like government systems), and several other more heterogeneous sources (street sensors, news, social media, etc.) that are allowing citizens to share their data and opinions, which are being included as an important reference into the standards of what should be considered as quality of life (of all people).[1034]

Numerous aspects of life in a city are to be observed if its smart counterparts' intend to promote the well-being of all citizens; for doing so, there is the need to move away from a technical vision of the city and to embrace the real problems under the perspective of their communities in order to achieve the desired quality of services for them.[1035] Considering that smart city concepts tend to favour technological solutions over the quality of life of their *end users*—IT does not mean better cities, consequently the number of smart initiatives is not an indicator of urban performance—it is crucial to include indicators for analyzing the main elements in the citizens' perception of quality of life of their cities, which should be included in the agenda and guidelines that define and drive strategies and actions of their policymakers.[1036] Finally, considering the scientific production on life quality and sustainability in urban areas and populations, policymakers and city managers will have to consider and plan for much more

[1033] Jose Aguilar, *Tutorial: Data analytics in the domain of smart cities and e-Government* (2016); Hatem Ben Sta, "Quality and the efficiency of data in 'Smart-Cities'" (2017) 74 Future Generation Computer Systems 409–416.
[1034] Namp Sridharan, "Can Smart City Be an Inclusive City? Spatial Targeting (ST) and Spatial Data Infrastructure (SDI)" in T M Vinod Kumar, ed, *E-Governance for Smart Cities* (Singapore: Springer Singapore, 2015) 233; Vladimir Zdraveski et al, "ISO-Standardized Smart City Platform Architecture and Dashboard" (2017) 16:2 IEEE Pervasive Computing 35–43.
[1035] Umberto Rosati & Sergio Conti, "What is a Smart City Project? An Urban Model or A Corporate Business Plan?" (2016) 223 Procedia - Social and Behavioral Sciences 968–973; Hsiaoping Yeh, "The effects of successful ICT-based smart city services: From citizens' perspectives" (2017) 34:3 Government Information Quarterly 556–565.
[1036] Paolo Neirotti et al, "Current trends in smart city initiatives—some stylized facts" (2014) 38 Cities, online: <https://doi.org/10.1016/j.cities.2013.12.010>; Janaina Macke et al, "Smart city and quality of life: Citizens' perception in a Brazilian case study" (2018) 182 Journal of Cleaner Production 717–726.

innovative and effective ways to cope with sustainability issues, if smart cities are to become an answer to the many socioeconomic and environmental challenges ahead.[1037]

In order to achieve the intergenerational goal of balancing urban quality and sustainable development—cities are the main producers of greenhouse gases (80% of CO2 emissions) and energy consumers (75% of the world energy supply)—smart projects should move beyond the usual discourses and experiences to encompass the (intermingled) environmental, social, and economic dimensions of urban life.[1038] The quest for a smart and eco-friendly city has been boosted by the damning evidence of energy and environmental dangers exposed by Big Data, as if smart cities and green cities could be combined despite their very different and independent concepts and measurements.[1039] In effect, the globalization-driven agenda of economic competitiveness, pumping smart city policies with the motto of *compete or perish*, interprets *sustainability* in a more narrow focus toward *greenness* with urban tech making ambiguous impacts that are supposed to promote both goals, when it is known that approaching one can make the other hard to reach.[1040] Altogether, smart city discourses and practices maintain contradictions and conflicts under their rhetorical and managerial umbrella by not providing a clear picture of how the *smart agenda* will actually contribute to sustainability and, even worse,

[1037] Amador Durán-Sánchez et al, "Sustainability and Quality of Life in Smart Cities: Analysis of Scientific Production" in Marta Peris-Ortiz, Dag R Bennett & Diana Pérez-Bustamante Yábar, eds, *Sustainable Smart Cities: Creating Spaces for Technological, Social and Business Development* (Cham: Springer International Publishing, 2017) 159.
[1038] Domenico Costantino, "Urban Smartness: Tools and Experiences" in Eleonora Riva Sanseverino et al, eds, *Smart Rules for Smart Cities: Managing Efficient Cities in Euro-Mediterranean Countries* (Cham: Springer International Publishing, 2014) 45; Ali Komeily & Ravi Srinivasan, "Sustainability in Smart Cities: Balancing Social, Economic, Environmental, and Institutional Aspects of Urban Life" in *Smart Cities* (John Wiley & Sons, Ltd, 2017) 503.
[1039] Kevin Stolarick & Olga Smirnova, "Are Creative and Green Cities Also Smart and Sustainable?" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (London: Palgrave Macmillan, 2015) 87; Rebecca Northfield, "Greening the smart city" (2016) 11:5 Engineering & Technology 38–41.
[1040] Tassilo Herrschel, "Competitiveness AND Sustainability: Can 'Smart City Regionalism' Square the Circle?" (2013) 50:11 Urban Studies 2332–2348; Tannaz Monfaredzadeh & Umberto Berardi, "Beneath the smart city: dichotomy between sustainability and competitiveness" (2015) 6:3 International Journal of Sustainable Building Technology and Urban Development 140–156.

by depoliticizing the public debate about urban redevelopment and environmental challenges.[1041]

The "Frankenstein urbanism" of the so-called smart and eco-cities, reflecting fragmented cities forced into the union of incongruous pieces and incompatible elements, can be found in the academic literature that usually emphasizes the (confusing and conflicting) support of information technologies to certain aspects of sustainability (energy consumption, carbon emissions) while eclipsing other (cultural, social, economic) aspects of it.[1042] Smart cities should not be conceived of as "isolated islands" because they are evolving according to an ever-changing context, so the (relatively recent) incorporation of environmental sustainability and the consequent morphing into new faces should also comprise the social factors of sustainability (as equity, i.e. access to services, facilities and opportunities), and ensure that social-spatial justice has a return in the smart plans and projects.[1043] The smart sustainable cities of the near future are required, not only to represent the discourse—which they do too well—but to process a change in the strategic approach of urban development to achieve long-term goals of sustainability and retain the balance of socio-ecological systems; otherwise, the growth in the management of complexity and the ensuing resource consumption (e.g. energy) of smart city

[1041] Hug March & Ramon Ribera-Fumaz, "Smart contradictions: The politics of making Barcelona a Self-sufficient city" (2014) 23:4 European Urban and Regional Studies 816–830; Håvard Haarstad, "Constructing the sustainable city: examining the role of sustainability in the 'smart city' discourse" (2017) 19:4 Journal of Environmental Policy & Planning 423–437.

[1042] Federico Cugurullo, "Exposing smart cities and eco-cities: Frankenstein urbanism and the sustainability challenges of the experimental city" (2017) 50:1 Environ Plan A 73–92; Rasha F El-Gazzar & Rania F El-Gazzar, *Smart Cities, Sustainable Cities, or Both? A Critical Review and Synthesis of Success and Failure Factors* (2017).

[1043] Tannaz Monfaredzadeh & Robert Krueger, "Investigating Social Factors of Sustainability in a Smart City" (2015) 118 Procedia Engineering 1112–1118; Simon Elias Bibri, "Transitioning from Smart Cities to Smarter Cities: The Future Potential of ICT of Pervasive Computing for Advancing Environmental Sustainability" in Simon Elias Bibri, ed, *Smart Sustainable Cities of the Future: The Untapped Potential of Big Data Analytics and Context–Aware Computing for Advancing Sustainability* (Cham: Springer International Publishing, 2018) 535.

development may risk urban resilience by the rising costs of sustaining itself.[1044]

The propagated dream of a *green city* with a competitive low-carbon economy and smart planning tools has been shifting to avoid the anticipated nightmares of environmental, economic, and social hazards that will hit cities that are vulnerable to climate change, a shifting reality that has been incorporating resiliency strategies and actions to the smart city paradigm.[1045] Hundreds of natural disasters with thousands of deaths and millions of affected people (and billions of US dollars in economic losses) are already registered every year, numbers that tend to keep growing each year and have been justifying the development of approaches, technologies and benchmarks of resiliency for the prevention, mitigation, response and recovery of smart cities.[1046] Resiliency is basically the capacity of coping with shocks and transformations; therefore, the concept of *disaster* also includes economic and social crises, so resiliency strategies have been used to adapt cities and their metropolitan regions to changing conditions that affect their core and peripheric dynamics and landscapes.[1047] Smart cities are powerful but also vulnerable in many ways, and they need to keep pace with the emerging risk landscape. As a result, resiliency policies have been moving beyond their environmental elements to relate with other factors to maintain the ability to (smartly) react while undergoing change—safety, security, and privacy are

[1044] Simon Elias Bibri, "Approaches to Futures Studies: A Scholarly and Planning Approach to Strategic Smart Sustainable City Development" in Simon Elias Bibri, ed, *Smart Sustainable Cities of the Future: The Untapped Potential of Big Data Analytics and Context–Aware Computing for Advancing Sustainability* (Cham: Springer, 2018) 601; Johan Colding, Magnus Colding & Stephan Barthel, "The smart city model: A new panacea for urban sustainability or unmanageable complexity?" (2018) Environment and Planning B: Urban Analytics and City Science, online: <https://doi.org/10.1177/2399808318763164>.
[1045] Derek Antrobus, "Smart green cities: from modernization to resilience?" (2011) 4:2 Urban Research & Practice 207–214; Francesca Moraci et al, "Making Less Vulnerable Cities: Resilience as a New Paradigm of Smart Planning" (2018) 10:3 Sustainability.
[1046] Chuanjie Yang, Guofeng Su & Jianguo Chen, *Using big data to enhance crisis response and disaster resilience for a smart city* (2017); Y Arafah & H Winarso, "Redefining smart city concept with resilience approach" (2017) 70 IOP Conference Series: Earth and Environmental Science 012065.
[1047] Alberto Vanolo, "The Fordist city and the creative city: Evolution and resilience in Turin, Italy" (2015) 6:3 City, Culture and Society 69–74; Stefano de Falco, Margarita Angelidou & Jean-Paul D Addie, "From the 'smart city' to the 'smart metropolis'? Building resilience in the urban periphery" (2018) 26:2 European Urban and Regional Studies 205–223.

some of the related factors[1048] with intrinsic legal aspects to be discussed in the next subchapter.

This second subchapter presented several topics on smart cities as they were mentioned in titles, abstracts, and keywords of academic publications. The topics were inferred from extensive readings in the mentioned publications during the doctoral research, as well from a selection and grouping of the most frequent terms emerged from text analytics.

More detailed information about the text results are presented in the third chapter, but for the purposes of this subchapter, the used terms, in order of apparition: Big Data, cloud computing, Internet of Things, mobile, artificial intelligence, machine learning, deep learning, blockchain; infrastructure, networks, traffic, mobility, parking, transportation, energy, waste, water, sewerage, health, education, housing, security, safety, emergency, social services, tourism, culture, taxes; analysis, decision making, planning, management; citizen, community, stakeholders; innovation, urban development, economic development, competitivity, sharing, entrepreneurial, neoliberal; efficiency/efficient, quality, sustainability, resilience.

Some other frequent terms more directly related to law (e.g. regulation, law, standards) were left for the following subchapter.

[1048] Henrik Hult & Hannes Granath, *The smart city – powerful but frightfully vulnerable? A study of resilience building in high-tech societies* Swedish University of Agricultural Sciences, 2018) [unpublished]; Azadeh Sarkheyli & Elnaz Sarkheyli, “Smart Megaprojects in Smart Cities, Dimensions, and Challenges” in Danda B Rawat & Kayhan Zrar Ghafoor, eds, *Smart Cities Cybersecurity and Privacy* (Elsevier, 2019) 269.

2.3. The Perils of Smart Cities in the Imaginary of Law

As reflected in the consulted scientific literature, "code is law"[1049] in the projected cities of the near future, when the coding of urban systems will run algorithmic regulation for an engineer-designed urban environment. *Regulation-by-automation* shines at the horizon of the technoscientific imaginary of cities, where law and judicial institutions are often absent from the main discourse or relegated to role of assisting and enforcing smart technologies. But once the debate gets into the normative domain, legal scholars and practitioners should imagine wherever this self-declared ideal of modern science will be self-realized in the smart city.

An urban future scientifically regulated and technologically deployed necessarily enters into the normative domain and the imaginary of modern law, as previously exposed *ad nauseum*. Despite the common (and deceiving) allegory popularized in media that "law doesn't keep up with technology"[1050] or that "law has to wait new social conflicts come into courts"[1051], once the perception of danger around smart cities became more evident in the media, legal scholars

[1049] See: Lawrence Lessig, *Code and other laws of cyberspace* (New York: Basic Books, 1999); Samer Hassan & Primavera De Filippi, "The Expansion of Algorithmic Governance: From Code is Law to Law is Code" (2017) Special Issue 17-Artificial Intelligence and Robotics in the City Field Actions Science Reports The journal of field actions 88–90; Bianca Wylie, "Governance Vacuums and How Code is Becoming Law", (13 March 2018), online: *Centre for International Governance Innovation* <https://www.cigionline.org/articles/governance-vacuums-and-how-code-becoming-law>.

[1050] Just for an allegory exercise, here are some of the many available examples: Bruce Schneier, "Can laws keep up with tech world?", (21 December 2015), online: *CNN* <https://www.cnn.com/2015/12/21/opinions/schneier-whatsapp-blocked-brazil/index.html>; Kevin Maney, "The Law Can't Keep Up With Technology…and That's a Very Good Thing", (31 October 2015), online: *Newsweek* <http://www.newsweek.com/2015/11/13/government-gets-slower-tech-gets-faster-389073.html>; Manav Tanneeru, "Can the law keep up with technology?", (17 November 2009), online: *CNN* <http://www.cnn.com/2009/TECH/11/17/law.technology/index.html>; Vivek Wadhwa, "Laws and Ethics Can't Keep Pace with Technology", (15 April 2014), online: *MIT Technology Review* <https://www.technologyreview.com/s/526401/laws-and-ethics-cant-keep-pace-with-technology/>.

[1051] Both arguments (and similar others), despite being thoroughly discussed by IT law professors and frequently deconstructed as deceiving arguments, remain very alive and still demand continuous efforts in the academy and, in special, the media. For a better discussion on the "urge" of changing laws for technological change, see: Vincent Gautrais, *Neutralité technologique: rédaction et interprétation des lois face aux changements technologiques* (Éditions Thémis, 2012); Alan Davidi, "People overstate the extent to which the law must change for new technology", (11 February 2015), online: *The Guardian* <https://www.theguardian.com/media-network/2015/feb/11/laws-change-new-technology>.

started composing scientific and legal approaches to illustrate and prevent the inherent risks of the *future in the present* of the cities. The legal approach to smart cities and other techno-social matters operates transversally[1052] with science, and consequently it is largely guided by the dominant scientific imaginary that gets partially *translated* in its fractal reflections on the mass media. To illustrate it, the previous subchapters were dedicated to presenting and illustraing the technological and social elements and issues according to media and science before moving to a legal perspective about smart cities.

Correspondingly, the scientific production on smart cities shows many references to legal matters and challenges that were significantly revealed during the literature review. It can be understood either as an intent of providing scientific guidance to policy makers and legislators, or as a request for more legal guidance about smart city issues. One way or the other, the findings in the literature review pinpoint possible axes and factors for legal research on smart cities which will be shortlisted and presented next.

Transitioning away from the scientific rationality, a literature review on legal authors and their publications on smart cities will follow. The main contributions from the legal academic production that came to support the present dissertation are intrinsically related to all previously mentioned texts. They will also maintain resonance with what will follow in the next chapter. Part of the legal literature on smart cities is not presented here because it was purposely left for an experiment of *law & (science fiction) literature* analysis later in this dissertation that did not exactly fit in the present molds of literature review – but it might one day.

[1052] A transversal approach is very usual for legal scholars in law and technology. In special, using this approach is necessary in the case of smart cities, when there is still not much legal content written about the subject, as described by Jean-Bernard Auby: “Je comprends, pour avoir fait un certain nombre de lectures pas juridiques parce que je n’ai pas trouvé, en tout cas, pas en langue française et très très peu en anglaise en vérité.” Forum Montesquieu, “Étude transversale - Les villes intelligentes”, (29 April 2014), online: *YouTube* <https://youtu.be/G6CPhTzHpMY> at 8min26s.

The imaginary of law is not only formed by the "images" derived from the formal, primary or secondary sources of law, because it is as networked as law itself. As far as the memory of literature goes—the Greek tragedies as the classic example—legal scholars and practitioners have been drawing ideas, shaping institutions, and conciliating legal theory by referring to Western myths, as best described by François Ost.[1053] This is one of the reasons that explains the use of literature in this dissertation. Nevertheless, the imaginary of law in the postmodern transition is also composed by the torrential *images and myths* provided by science and mass media that were previously discussed, among other networked sources not treated here. Therefore, a review on the imaginary of law on smart cities had also to include elements from the *hyperscientificization* and the *videosphere*. Fortunately, there is a lot more than this.

2.3.1. Possible Elements for Legal Research on Smart Cities – an Informed Guess

When approaching the subject of smart cities, a legal researcher/practitioner will find a broadening discussion about the need of new laws to protect *citizen-users*[1054] that are claimed by scholars and other experts in the domain.[1055] In general, legislators are still getting into the smart city debate, more interested in political gains than in facing regulatory dilemmas concerning technologies.[1056] Therefore, there is work for legal scholars to do about it.

What would the first sources of information for a legal researcher or a legal practitioner be when facing a novel techno-social dilemma that demands a legal answer or at least a

[1053] Ost, *supra* note 313.
[1054] Laura Bliss, "It's Time to Regulate 'Smart City' Technology, Too", (12 April 2018), online: *CityLab* <https://www.citylab.com/transportation/2018/04/regulating-tech-companies-is-also-about-cars-streets-and-cities/557738/>.
[1055] Emily Haws, "More data regulation needed as smart cities develop, say some experts", (9 April 2018), online: *The Hill Times* <https://www.hilltimes.com/2018/04/09/data-regulation-needed-smart-cities-develop-say-experts/139873>.
[1056] Chris Teale, "Lawmakers kick off Congressional Smart Cities Caucus", (14 March 2018), online: *Smart Cities Dive* <https://www.smartcitiesdive.com/news/lawmakers-congressional-smart-cities-caucus/519091/>.

minimum normative guidance? For starters, takind a look on the first results from a query in a search engine would be considered advisable and understandable to check the surface of the subject and its possible legal entwinements. Legislation and jurisprudence constitute primary sources of (information for) law, but legal doctrine may help to fill the void when those lack clear prevision or minimal interpretation in a recent technological subject. Therefore, this movement could be followed by the retrieval and appreciation of publications on the specific matter produced by legal peers in the domain of law and technology. Nevertheless, when even legal doctrine is revealed to be scarce and far from clarifying of the demanding topics related to a tech matter, a legal researcher must go through paths in other fields of knowledge and look deeper into the subject to understand it under an external perspective: it is not a concession to go through research in other areas, it is rather a part of the legal scholarship on technology.

For this intent, the next subchapter focuses on privacy and information security in the smart city, as both subjects were frequently discussed together in the literature review,[1057] forming the first axis for legal research in the dissertation. Since the very beginning of the research project, privacy standards[1058] and e-gov measures for personal data protection in smart cities[1059] formed the main front of investigation by considering reiterated references to these issues in the bibliographic survey and the public concerns on enhanced urban surveillance.[1060] Even if the research project substantially changed to incorporate other elements, privacy and security remain as the most mentioned issues with references to law in the (non-legal) academic

[1057] Brian Nussbaum, "Smart Cities – The Cyber Security and Privacy Implications of Ubiquitous Urban Computing", (9 February 2016), online: *The Center for Internet and Society - Stanford Law School* <http://cyberlaw.stanford.edu/blog/2016/02/smart-cities-%E2%80%93-cyber-security-and-privacy-implications-ubiquitous-urban-computing>.
[1058] Zack Quaintance, "Public Opinion Often Sets Privacy Standards for Smart City Tech", (18 December 2017), online: *Government Technology* <https://www.govtech.com/civic/Public-Opinion-Often-Sets-Privacy-Standards-for-Smart-City-Tech.html>.
[1059] Richard Henderson, "Is Your City Smart Enough to Tackle GDPR?", (21 March 2018), online: *Infosecurity Magazine* <https://www.infosecurity-magazine.com:443/opinions/city-smart-tackle-gdpr/>.
[1060] David Mukarani Wood, "Smart City, Surveillance City", (1 July 2015), online: *SCL* <https://www.scl.org/articles/3405-smart-city-surveillance-city>.

publications on smart cities. The (disputable) choice of "opacity" to name the axis seemed appropriated to describe the general goal of keeping eyes (and sensors) from seeing (or processing) what they should not have access to (or understanding of).

2.3.1.1. Opacity in the Urban Systems – Privacy and Security

Smart city projects are very dependent on human context sensing to capture location, lifestyles, mental states, and physical conditions of individuals for practical uses in urban systems, all with privacy implications.[1061] More specifically, location-based services fed by IoT sensors and mobile devices display great application potential in smart projects, showing even greater potential for open problems in privacy preservation.[1062] Ubiquitous surveillance powered by smart sensors records the mobility of people and objects in cities—tons of data every second—for detecting urban patterns and sudden changes, even if it is very difficult for the operators to extract meaningful information from all big urban data.[1063] Urban inhabitants, consciously or not, leave digital traces of themselves everywhere in smart cities, fragmenting individuality into "dividual data"[1064] associated with urban infrastructures and systems which might be *re-assembled* by public authorities to exercise social control of individuals and crowds.[1065] This level of exercisable control over citizens' data, despite all the usefulness for urban management and planning, gives place for imagining the smart city as an "apocalyptic

[1061] Juhi Ranjan, Erin Griffiths & Kamin Whitehouse, "Human Context Sensing in Smart Cities" in *Smart Cities* (John Wiley & Sons, Ltd, 2017) 311.
[1062] Shengling Wang et al, "Privacy Preservation in Location-Based Services" (2018) 56:3 IEEE Communications Magazine 134–140.
[1063] Ning Chen & Yu Chen, "Smart City Surveillance at the Network Edge in the Era of IoT: Opportunities and Challenges" in Zaigham Mahmood, ed, *Smart Cities: Development and Governance Frameworks* (Cham: Springer, 2018) 153.
[1064] The term is really "dividual data," it is not a typing error, please see next reference.
[1065] Kurt Iveson & Sophia Maalsen, "Social control in the networked city: Datafied dividuals, disciplined individuals and powers of assembly" (2018) 37:2 Environ Plan D 331–349.

scenario such as in the Orwellian novel 1984 (1948),"[1066] the ultimate privacy imagery in postmodern society.

Privacy in smart cities is as complex as the multiple interactions between technologies (Big Data, IoT), participants (municipal departments, companies, citizens), and personal data (location, behaviour, social life, media) in cities, which can result in innumerable forms of discrimination and social sorting with no easy solution to simplify it.[1067] Recent developments in IT systems for cities have been concentrating their sensitive datasets in the cloud under the promise of synergy and balance of different privacy models, but the increasing complexity makes it challenging in terms of accomplishment.[1068] When considering the many possible dimensions of privacy (i.e. identity, query, location, footprint, ownership), it is evident that citizens are the weakest link in the smart city chain of participants who have their data gathered in unprecedented amounts and subjected to privacy breaches.[1069] Citizens' privacy can be affected under many forms, depending on how much data the smart city keeps on them: more information, systems, and infrastructures operate with personal data, more technical solutions (e.g. cryptography, blockchain) are needed to mitigate their risks (never to solve them), adding more complexity to the privacy equation.[1070]

The attacks meant to breach sensitive information in smart cities—specifically, those

[1066] Rosaria Battarra et al, "Planning in the era of Information and Communication Technologies. Discussing the 'label: Smart' in South-European cities with environmental and socio-economic challenges" (2016) 59 Cities 1–7.
[1067] David Eckhoff & Isabel Wagner, "Privacy in the Smart City—Applications, Technologies, Challenges, and Solutions" (2018) 20:1 IEEE Communications Surveys & Tutorials 489–516.
[1068] Allan Cook et al, "Internet of Cloud: Security and Privacy Issues" in Bhabani Shankar Prasad Mishra et al, eds, *Cloud Computing for Optimization: Foundations, Applications, and Challenges* (Cham: Springer International Publishing, 2018) 271.
[1069] A Martínez-Ballesté, P A Pérez-Martínez & A Solanas, "The pursuit of citizens' privacy: aprivacy-aware smart city is possible" (2013) 51 IEEE Commun Mag, online: <https://doi.org/10.1109/MCOM.2013.6525606>.
[1070] Longzhi Yang, Noe Elisa & Neil Eliot, "Privacy and Security Aspects of E-Government in Smart Cities" in Danda B Rawat & Kayhan Zrar Ghafoor, eds, *Smart Cities Cybersecurity and Privacy* (Elsevier, 2019) 89.

related to social links and location privacy—are countered by high-tech protection methods like cryptography, biometrics, and game theory, but they also demand nontechnological countermeasures like regulations, policies, and education programs.[1071] Technological measures can be part of the solution or of the problem, as in the case of the convenient choice of smartphones for storing credentials for smart health projects in cities, while also contributing to potential security hazards of data over-collection.[1072] Thus, adding more technologies is not enough for providing privacy solutions in smart cities: it takes evolving techniques and matching laws and policies in building new forensic models and establishing privacy standards, as intended by the General Data Protection Regulation (GDPR) in the European Union.[1073]

Municipal governments are facing interlinked privacy and security challenges of smart cities: identifying the absence, presence, and emergence of privacy concerns for their citizens; identifying how the collected data and the concerns are subject to regulation, as in the EU data protection regulation; and how cities could regulate specific policies to accommodate all of them.[1074] In a European-centric perspective of smart cities, these challenges find *social legal principles* through Privacy Impact Assessment (PIA) procedures according to the GDPR: compliance with General Data Processing Principles, data protection by default (Art. 5, 25); lawfulness of personal data processing (Art. 6, 7) & content; lawfulness of processing special categories of data (Art. 9); compliance with the right to be informed (Art. 14); compliance with transparency rights (Art. 15); compliance with rights to rectification, erasure and restricting data

[1071] Greg Stromire & Isaac Potoczny-Jones, *Empowering Smart Cities with Strong Cryptography for Data Privacy* (Portland: ACM, 2018).
[1072] Yibin Li et al, "Privacy Protection for Preventing Data Over-Collection in Smart City" (2016) 65:5 IEEE Transactions on Computers 1339–1350; Jose Maria de Fuentes et al, "Attribute-Based Credentials for Privacy-Aware Smart Health Services in IoT-Based Smart Cities" (2018) 51:7 Computer 44–53.
[1073] Xiaohua Feng, Edward Swarlat Dawam & Saad Amin, *A New Digital Forensics Model of Smart City Automated Vehicles* (2017); Waleed Ejaz & Alagan Anpalagan, "Blockchain Technology for Security and Privacy in Internet of Things" in Waleed Ejaz & Alagan Anpalagan, eds, *Internet of Things for Smart Cities: Technologies, Big Data and Security* (Cham: Springer, 2019) 47.
[1074] Liesbet van Zoonen, "Privacy concerns in smart cities" (2016) 33:3 Government Information Quarterly 472–480.

processing (Art. 16, 17, 18); compliance with the right to object (Art. 21, 22); security of processing (Art. 25, 32).[1075] But despite these legal dispositions, there is no lack of technical opinions advocating that privacy regulations are still inappropriate to protect citizens in smart cities from technologies able to invade even their most secure and intimate spaces with real-time surveillance for habits identification and detailed data collection on their lives.[1076]

Smart cities (and their citizens) are considered more vulnerable to cyber-attacks than other governmental entities and private organizations due to the diversity and connectivity of infrastructure and services that can suffer substantial losses (causing even urban chaos), which requires policy instruments to prevent and respond to them.[1077] The high level of complexity and interdependency between systems and communications exposes information and the networks of municipalities to unbounded attacks, which can accidentally or intentionally affect data security through technical failures and malicious activities.[1078] Information security is pivotal to the operation of smart cities, grounded on several socioeconomic and technological factors, and must regard policies stablishing best practices and appropriated responsibilities from smart solution manufacturers and decision-making authorities to face the security threats.[1079]

There are several works which describe security issues in smart cities—mostly involving threats on availability, integrity, confidentiality, authenticity, and accountability—focusing on the

[1075] Leonardo A Martucci et al, "Privacy and Social Values in Smart Cities" in Vangelis Angelakis et al, eds, *Designing, Developing, and Facilitating Smart Cities: Urban Design to IoT Solutions* (Cham: Springer, 2017) 89.
[1076] Andrea Bartoli et al, *On the ineffectiveness of today's privacy regulations for secure smart city networks* (Tainan City, 2012).
[1077] Zhen Li & Qi Liao, "Economic solutions to improve cybersecurity of governments and smart cities via vulnerability markets" (2018) 35:1 Government Information Quarterly 151–160.
[1078] Anwaar AlDairi & Lo'ai Tawalbeh, "Cyber Security Attacks on Smart Cities and Associated Mobile Technologies" (2017) 109 Procedia Computer Science 1086–1091.
[1079] Sidra Ijaz et al, "Smart cities: A survey on security concerns" (2016) 7:2 International Journal of Advanced Computer Science and Applications 612–625.

known techniques, possible (yet uncertain) solutions, and mandatory policies to face them.[1080] In terms of information security, a smart city is understood as a *system of systems* where the security issues present risks ranging from the individual citizen to the entire city system: access to information from applications, information tracking, citizen tracking, user/citizen data loss, crossed access to information in data centres, crossed access on the client side, lack in depth of security, viral effects in urban environment, infection traceability and recovery.[1081] The perspective on information security of smart cities will remain as a complex problem with challenging engineering characteristics (i.e., hyperconnectivity, messy complexity, industrialised hacking) without the adequate and necessary tools to identify and solve the weaknesses of their unbounded systems in the foreseen future.[1082]

In the absence of consolidated models for smart projects, municipal governments can learn much from the security standards and certifications in cloud computing, since they share many elements and challenges, but should consider the different requirements and responsibilities in cloud service models (IaaS, PaaS or SaaS) that can be combined in smart cities.[1083] Despite the similarities of elements, solutions and concepts—i.e., system interoperability, applications, and frameworks/platforms—smart city infrastructures and systems deal with a much higher level of concern than those from cloud computing; therefore, the security policies and practices of the former should not be reduced to the latter.[1084] Smart cities introduce several challenges to cloud applications (e.g. Big Data for healthcare) even when technology

[1080] Kamanashis Biswas & Vallipuram Muthukkumarasamy, *Securing Smart Cities Using Blockchain Technology* (2016).
[1081] Felipe Silva Ferraz & Carlos André Guimarães Ferraz, *Smart city security issues: depicting information security issues in the role of an urban environment* (IEEE, 2014).
[1082] M St John-Green & T Watson, *Safety and security of the smart city – when our infrastructure goes online* (2014).
[1083] Alkiviadis Giannakoulias, "Cloud computing security: protecting cloud-based smart city applications" (2016) 2:1 Journal of Smart Cities 66–77.
[1084] Felipe Ferraz et al, *Towards a Smart City Security Model Exploring Smart Cities Elements Based on Nowadays Solutions* (Venice, Italy: IARIA, 2013).

and legislation (GDPR) are supposedly well developed enough to prevent and deal with cyberstalking and cybercrime—digital forensic toolkits and security policies are still far from carrying out proper investigations and remedies for smart cloud-based Big Data.[1085]

Notwithstanding the differences, security and privacy issues go hand in hand to design a *secure smart city*, requiring measures of a technical nature (for communication, identification, and access control) along with resolutions of a normative nature (personal data protection), like government policies for increasing transparency and balancing benefits and security risks.[1086] For example, connected cars will impose security and privacy challenges for smart cities to the extent that urban standards and regulations for new vehicular technologies are expected to change in response to ubiquitous connectivity and data collection, demanding preventive and responsive solutions from policy makers.[1087] There is quite an abundance of references to legal complications, regulatory matters, and public policy prospects for smart cities that are found in the publications from researchers in the field: they reflect a general scientific acknowledgment of the need of engaging and advancing in technical norms and legislation to improve information security and exercise the benefits of smart cities.[1088]

The subchapter aimed to contextualize privacy and information security in academic publications about smart cities. It has also tried to present main concerns, proposed solutions, and made references to legal matters in these topics during the review of literature of publications from technological areas and social sciences. They are similar in that they have pointed to

[1085] Xiaohua Feng & Yuping Zhao, *Digital Forensics Challenges to Big Data in the Cloud* (2017).
[1086] Mehdi Sookhak, Helen Tang & F Richard Yu, *Security and Privacy of Smart Cities: Issues and Challenge* (2018).
[1087] Habeeb Olufowobi & Gedare Bloom, "Connected Cars: Automotive Cybersecurity and Privacy for Smart Cities" in Danda B Rawat & Kayhan Zrar Ghafoor, eds, *Smart Cities Cybersecurity and Privacy* (Elsevier, 2019) 227.
[1088] Lata Nautiyal, Preeti Malik & Amit Agarwal, "Cybersecurity System: An Essential Pillar of Smart Cities" in Zaigham Mahmood, ed, *Smart Cities: Development and Governance Frameworks* (Cham: Springer, 2018) 25.

techno-legal knowledge and procedures as an essential element of privacy and security.

Considering that opacity is to be applied in smart cities to avoid too much *light* over the personal data of citizens and over weaknesses of urban systems and infrastructures, a lot more light is needed in another perspective. Improved transparency and participation should be essential smart elements, if citizens are supposed to better understand and engage with cities. Therefore, they form the second axis of intelligibility, the factor of openness and engagement that was (expected to be) found in the literature review of scientific publications on the topic.

2.3.1.2. Intelligibility of the Urban Life – Transparency and Participation

Despite being a relatively recent movement in cities, opening municipal data has been a way for governments to create services which embrace the needs and requirements of citizens by sharing linked and diverse information extracted from them.[1089] The multiple movements for rights on public data—open data, transparency, openness (there are many names)—have created new paradigms that present research opportunities and create new applications for smart cities by combining public and private datasets.[1090] The choice for open data in smart cities comes from two main presumptions: the democratising potential for collective decision making and development of holistic smart solutions; and the innovative and enabling effect of opening and crossing public and private data for new services that can create cross-silo synergies.[1091]

Enabling open data of platforms and infrastructures, by means of a commons-oriented approach, could be the only way of constructing *truly smart cities*, by linking the smart projects

[1089] Ruben Mulero, Vladimir Urosevic & Aitor Almeida, *Linked open data management in ambient assisted cities* (2017).
[1090] Victoria Lopez et al, *Big+Open Data: Some applications for a Smartcity* (2015).
[1091] Mikkel Thordal Andersen & Santosh Bhandari, *Assessment and Normative Guidance of the Collective Mindset Maturity Regarding Open Data in Smart Cities - A Grounded Theory Approach to the Understanding of Open Data as an Enabler of Strategic Cross-Sector Open Innovation and Long-Term Smart City Sustainability* Aalborg University, 2015) [unpublished].

to the needs of city dwellers and their engagement in the decision-making processes for urban solutions.[1092] For example, policies of openness in government data and public access have been allowed the creation of *citizen apps,* addressing myriads of urban issues: public transportation, public utilities, transparency and corruption, information awareness and access, health and recreation, public safety, and housing and zoning.[1093] Smart cities with open data initiatives would share a *wealth of information* to create local ecosystems of public and private actors for innovation, undeterred by the known challenges associated with them.[1094]

The open data movement conveys an efficient and open-minded image of governments, sustained by transparency and accessibility, even if there are many challenges in practice like institutional constraints on data distribution, hesitation from data holders', and heterogeneity between datasets.[1095] Data is at the center of smart city projects, but even with all the propaganda around open data, many governments provide no guarantee about their quality issues—veracity, precision, fidelity, reliability, continuity—allowing the sharing of data with errors absences and biases that can compromise (government, private, citizen) applications, and force data scientist and developers to play janitorial roles to mitigate the problem.[1096] More often than admitted, the problem of data quality hides in the closed solutions of proprietary hardware and software which prevent interoperability, compatibility and assessment of algorithms and databases—the adoption of open standards would be useful not only for developers, but also for

[1092] Vasilis Niaros, "Introducing a taxonomy of the 'smart city': Towards a commons-oriented approach?" (2016) 14:1 tripleC: Communication, Capitalism & Critique Open Access Journal for a Global Sustainable Information Society 51–61.
[1093] Kevin C Desouza & Akshay Bhagwatwar, "Citizen Apps to Solve Complex Urban Problems" (2012) 19:3 Journal of Urban Technology 107–136.
[1094] Nils Walravens, Jonas Breuer & Pieter Ballon, "Open data as a catalyst for the smart city as a local innovation platform" (2014) 96 Communications & Strategies 15.
[1095] Yulun Zhou & Ying Long, "SinoGrids: a practice for open urban data in China" (2016) 43:5 Cartography and Geographic Information Science 379–392.
[1096] Gavin McArdle & Rob Kitchin, "Improving the veracity of open and real-time urban data" (2016) 42:3 Built Environment 457–473.

better decision making from governments, companies, and citizens.[1097]

The lack of openness and interoperability in smart cities needs to be counterposed by open data policies that enforce open standards (including protocols and interfaces) to avoid vendor lock-in, enable third-party innovation in new services, and increase transparency.[1098] Policies of interoperability in smart cities are expected to follow national and international frameworks to ensure the exchange of data for enabling information, innovation, and solutions between public and private organizations.[1099] Policies of (fiscal) transparency are also necessary for one to understand (and follow) the flows of decision making (and money) and their implied choices in governments, which are frequently seen as domains of political secrecy, backroom deals, and personal interests over the common good.[1100] Yet, an open government process cannot be limited to opening databases—as relevant a component as open data can be, it does not establish collaboration and engagement by itself—but must meet citizens' needs to provide information and value to foster participation in cities.[1101]

City governments all over the world (claimed to) have promoted many forms of participation to involve citizens in public decision taking, with several e-participation have been tools developed and made available to engage the population, even if they might seem more similar to a legitimizing process of consolidated power than to what should be a consulting

[1097] Sergio Trilles et al, "Deployment of an open sensorized platform in a smart city context" (2017) 76 Future Generation Computer Systems 221–233.
[1098] Bengt Ahlgren, Markus Hidell & Edith C-H Ngai, "Internet of Things for Smart Cities: Interoperability and Open Data" (2016) 20:6 IEEE Internet Computing 52–56.
[1099] Pouria Amirian & Anahid Basiri, "Sharing and analysing data in smart cities" in Rob Kitchin, Tracey P Lauriault & Gavin McArdle, eds, *Data and the City* (London: Routledge, 2017) 127.
[1100] Nina David, Jonathan Justice & John G McNutt, "Smart Cities Are Transparent Cities: The Role of Fiscal Transparency in Smart City Governance" in Manuel Pedro Rodríguez-Bolívar, ed, *Transforming City Governments for Successful Smart Cities* (Cham: Springer, 2015) 69.
[1101] Dimitri Gagliardi et al, "Information and communication technologies and public participation: interactive maps and value added for citizens" (2017) 34:1 Government Information Quarterly 153–166.

process of concerned citizens.[1102] Participation systems and applications for fostering civic engagement have been employed with different incentives (monetary, social, etc.) and technologies (websites, smartphones, etc.) to collect crowd sensed urban data and to promote direct citizen actions in smart cities.[1103] But more than often, citizen-centric cities with a smart participation projects confuse the signifiers of citizenship with stewardship, keeping the top-down and market-led mode of governmentality unchanged while marketing that they are promoting a bottom-up and common good-led smart government.[1104] Even so, digital tools can provide opportunities for increased participation in urban issues and decision-making when they match more traditional forms of interaction with the public at large (and not only with the people who work with the systems).[1105]

Researchers argue that genuine participation in city making processes rarely comes from traditional community engagement activities—because they are guided by top-down, non-inclusive, and fragmented means—so hybrid approaches to digital and analogue channels open up new ways to give a voice to citizens and communities in the city making process.[1106] As life in cities becomes increasingly individualistic and citizens lack the interest (and time) to take part in local debates, the combination of social media and online tools has become a hope of reshaping the relationship of cities with the support and potential capabilities of their inhabitants

[1102] Laura Alcaide Muñoz & Manuel Pedro Rodríguez Bolívar, "A Walk for e-Participation in the Smart City's Era. New Organizational Challenges and New Models of Governance" in Manuel Pedro Rodríguez Bolívar & Laura Alcaide Muñoz, eds, *E-Participation in Smart Cities: Technologies and Models of Governance for Citizen Engagement* (Cham: Springer, 2019) 205.
[1103] Giuseppe Cardone et al, "Fostering participaction in smart cities: a geo-social crowdsensing platform" (2013) 51:6 IEEE Communications Magazine 112–119.
[1104] Paolo Cardullo & Rob Kitchin, "Being a 'citizen' in the smart city: up and down the scaffold of smart citizen participation in Dublin, Ireland" (2019) 84:1 GeoJournal 1–13.
[1105] Kristene Unsworth, Andrea Forte & Richardson Dilworth, "Urban Informatics: The Role of Citizen Participation in Policy Making" (2014) 21:4 Journal of Urban Technology 1–5.
[1106] Joel Fredericks et al, "Blending pop-up urbanism and participatory technologies: Challenges and opportunities for inclusive city making" (2018) 12 City, Culture and Society 44–53.

to address urban challenges.[1107] An example of this could be smart cities that support citizens to become active participants by improving the urban infrastructure with the creation of decentralized and independent networks for social interaction that preserve their right to privacy and data protection.[1108] Barcelona and Madrid are developing smart city models that have evolved to support these kinds of citizen-based initiatives and also show it is possible to develop e-government requirements and e-administration mechanisms while improving e-participation—even when in institutional contexts dependent of organizational capabilities, political leadership, and legal constraints.[1109]

There is much hope expressed in the academic literature that smart cities will enable participation in city-making and enable the right to city to be put into practice, but these will never happen without the necessary resources to achieve tangible results, even if citizens are motivated and the law (only) grants them permission to participate.[1110] There are several challenges related to this: limited municipal resources that depend on many factors, such as the characteristics and capabilities of organizations, communities and technologies; the abundance of municipal experiences and online participatory tools that help but do not make the public engagement in one city easily reproducible in another city; web-based tools and social networks that are already being massively used for participatory planning despite not being designed for public engagement; and the possible distractions from the main goals of smart cities that

[1107] Robin Effing & Bert P Groot, *Social Smart City: Introducing Digital and Social Strategies for Participatory Governance in Smart Cities* (Springer, 2016).
[1108] Primavera De Filippi, "Community Mesh Networks: Citizens' Participation in the Deployment of Smart Cities" in Andrea Vesco & Francesco Ferrero, eds, *Handbook of Research on Social, Economic, and Environmental Sustainability in the Development of Smart Cities* (Hershey: IGI Global, 2015) 298.
[1109] Enrique José Varela-Álvares, Xosé María Mahou-Lago & Mónica López Viso, "Do Smart Cities Really Provide Opportunities for Citizen Participation? A Case Study of the RECI Cities in Spain (2017)" in Manuel Pedro Rodríguez Bolívar & Laura Alcaide Muñoz, eds, *E-Participation in Smart Cities: Technologies and Models of Governance for Citizen Engagement* (Cham: Springer, 2019) 37.
[1110] Irina Anastasiu, "Unpacking the Smart City Through the Lens of the Right to the City: A Taxonomy as a Way Forward in Participatory City-Making" in Michiel de Lange & Martijn de Waal, eds, *The Hackable City: Digital Media and Collaborative City-Making in the Network Society* (Singapore: Springer, 2019) 239.

participatory tools may represent to urban planners and decision makers.[1111] Considering this array of complex challenges which need to be addressed to make e-participation work, it is necessary that citizen and community expressed needs are addressed as a proper *stakeholder engagement* (which involves several individuals and communities in public and private institutions) to share and co-produce the expected outcomes and sought impacts.[1112] Ultimately, when there is a need for establishing partnerships between citizens, public, and private organizations for the co-production of services based on socially responsible and innovative practices, public policies are expected to set "middle ground" organizations in the institutional role to assist them with the required expertise and conditions to make it work.[1113]

Enabling the public to effectively engage in the elaboration of urban policies is a public policy of participation in and of itself from which the open (government) data movement has evolved to establish new techno-civic imaginaries about partnership and citizenship in data-driven cities.[1114] Therefore, specific public policies are necessary to enact roles (and limits) of professionals and intermediaries who will be responsible for developing data literacy and digital skills among (new generations of) citizens, and to organize them around urban issues and innovative solutions which they will lead.[1115] Research has pointed out that local communities should play a central role in urban innovation, but this is not reflected in practice as, despite all the *citizen-centric discourse*, smart cities are still being led by the vision of municipal authorities

[1111] Nader Afzalan, Thomas W Sanchez & Jennifer Evans-Cowley, "Creating smarter cities: Considerations for selecting online participatory tools" (2017) 67 Cities 21–30.
[1112] Krassimira Paskaleva et al, "Stakeholder Engagement in the Smart City: Making Living Labs Work" in Manuel Pedro Rodríguez-Bolívar, ed, *Transforming City Governments for Successful Smart Cities* (Cham: Springer, 2015) 115.
[1113] Carlo Francesco Capra, *The smart city and its citizens: Governance and citizen participation in Amsterdam Smart City* Erasmus University Rotterdam, 2014) [unpublished].
[1114] Sandeep Mertia, "Socio-Technical Imaginaries of a Data-Driven City: Ethnographic Vignettes from Delhi" (2017) 29 The Fibreculture Journal.
[1115] Annika Wolff et al, "Removing Barriers for Citizen Participation to Urban Innovation" in Michiel de Lange & Martijn de Waal, eds, *The Hackable City: Digital Media and Collaborative City-Making in the Network Society* (Singapore: Springer, 2019) 153.

and specialized staff in collaboration with experts from universities and businesses.[1116] The priority for top-down decisions using urban tech is justified by frameworks of rational, quantitative, analytical and legal logics embedded in the government; yet, this ongoing situation is still not excusable: civic hackathons, participatory workshops and other experiences of openness and engagement have proven that the tensions and disagreements (and hopes and dreams) of citizens and communities need to have their place in debates and actions if they are to move out of the smart "black box" city to prototype alternative possible futures.[1117]

Finally, it is very important to reflect on the generalized use of the term *citizen* in the academic publications: in the strict terms of citizenship as understood by law, this term does not include all the people living in, residing in or passing by cities; research in smart cities is supposed to include many people who would not fit the legal requirements to be identified as *citizens*; other terms such as *user*, *resident*, *local*, are not necessarily much better or inclusive. In the absence of other terms, using the term *people* would be more advisable whenever possible in research and public policies.[1118] Originating from the Latin *civitas*, the term *citizen* is used here to refer to those who make use of the spaces and flows of the *city*—it is absolutely not a reference to a country or any legal form of national citizenship—and the term emphasizes the centrality of cities as the basis of the modern society and law in the paradigmatic transition.

This subchapter aimed to present and contextualize openness and participation in academic publications about smart cities. It has also tried to describe the advantageous usages,

[1116] Yannis Charalabidis et al, "A 360-Degree Model for Prioritizing Smart Cities Initiatives, with the Participation of Municipality Officials, Citizens and Experts" in Manuel Pedro Rodríguez Bolívar & Laura Alcaide Muñoz, eds, *E-Participation in Smart Cities: Technologies and Models of Governance for Citizen Engagement* (Cham: Springer, 2019) 123.
[1117] Laura Forlano & Anijo Mathew, "From Design Fiction to Design Friction: Speculative and Participatory Design of Values-Embedded Urban Technology" (2014) 21:4 Journal of Urban Technology 7–24.
[1118] Vanessa Thomas et al, "Where's Wally? In Search of Citizen Perspectives on the Smart City" (2016) 8:3 Sustainability.

main challenges, and recommendations for public policies in these topics during the literature review of publications from technological areas and social sciences. The referred research pointed toward legal interfaces in public policies as an essential element for more transparency and engagement in smart cities.

The related terms of openness and transparency, as with participation and engagement, were not treated here as synonyms, but as intertwined subjects to be gathered under the axis of intelligibility. Intelligibility communicates directly with many subjects under the axis of opacity as presented earlier, so it was only expected to find studies contrasting transparency versus privacy referring to sociotechnical and legal aspects. The literature review has also shown legal issues of that did not fit into opacity and intelligibility. The rights and obligations of both axes are related, but they do not keep a wide balance between them without introducing other elements of legal concern that were expressed by the authors from non-legal domains of knowledge. Once it became apparent that both axes were not enough to balance each other under the (classic) vision of the modern scale of law, a third axis was incorporated into the research: compliancy.

Compliancy here is to be understood as regulatory compliance in smart cities, concerning the conformity, responsibility, and adaptability related to laws, policies, and standards. There are vectors of conformity in the axes of opacity and intelligibility, as compliancy also borrow heavily from elements of theirs in a networked-based balance with each other. In the third axis of compliancy, the aspects of accountability and governance will be presented as they were (more than expected) found in the literature review of scientific publications on smart cities.

2.3.1.3 Compliancy of the Urban Collective – Accountability and Governance

Accountability in smart cities is sustained by the pillars of transparency and participation (as a necessary condition for intelligibility, previously presented), and the pillars of responsibility

and assessment: responsibility outlines who is responsible for whom, for what, by which means and forms; assessment implies collection, measurement, verification, and evaluation of data according to expected goals.[1119] Accountability sets roles, duties and measures to make clear who is responsible for which activities, results and consequences in smart projects, by designing: divisions of power, loggings of decision making, controls for public interest, behaviours for risk reduction, forms of collaboration between stakeholders, conformity to norms and procedures, and sanctions for cases of rule violation.[1120] Going further, policies of accountability are seen to be the main efforts against corruption, making it riskier and less attractive, enhancing the responsibility of public officials, disabling privilege over resources, fighting opportunism, and strengthening social trust.[1121]

Transparency and participation are essential to support accountability as a policy of "sousveillance" by the population over the city officials, using open data to see when and where money is being spent in cities, and engaging communities to understand decision making based on the reasons outside the view of urban sensors that are turned toward citizens.[1122] It all depends on mechanisms of democratic accountability that are set to ensure that elected representatives are accountable for how public resources are used and how public money is spent, but (neoliberal) models of smart cities promote a business-led utopia of transferring public infrastructures, services, and data to private actors which has major implications in terms of accountability.[1123] Transparency alone is not enough to build trust for public and private

[1119] Cathrin Zengerling, "Action on climate change mitigation in German and Chinese cities – A search for emerging patterns of accountability" (2018) 75 Habitat International 147–153.
[1120] Nikander Arno Hartemink, *Governance Processes in Smart City Initiatives* (Master's thesis, Delft University of Technology, 2016) [unpublished].
[1121] Leonidas G Anthopoulos, "Smart Government: A New Adjective to Government Transformation or a Trick?" in Leonidas G Anthopoulos, ed, *Understanding Smart Cities: A Tool for Smart Government or an Industrial Trick?* (Cham: Springer, 2017) 263.
[1122] Richard Beckwith, John Sherry & David Prendergast, "Data Flow in the Smart City: Open Data Versus the Commons" in Michiel de Lange & Martijn de Waal, eds, *The Hackable City: Digital Media and Collaborative City-Making in the Network Society* (Singapore: Springer Singapore, 2019) 205.
[1123] Grossi & Pianezzi, *supra* note 894.

partnerships, so enhancing traceability of data usage in smart cities is a key control element for information accountability, which is complementary to the privacy of citizens and the security of systems[1124]—thus, there is also a relationship between accountability and policies of opacity.

In order to make the smart city accountable to citizens, it takes the acknowledgment that no single person, organization, or entity can deliver or be responsible for all the aspects relative to services and data, so layered and multi-level concepts are necessary to set up frameworks focused on transparency and accountability.[1125] New managerial practices and social trends have a role in the increase of citizen participation and governmental operational transparency, regulations (as the Sarbanes-Oxley Act of 2002 in the US) and accountability models have transformed IT departments, and (mostly bigger) cities have appointed officials as Chief Information Officers (CIO) or other similar titles to set clear roles and responsibilities for managing technology lifecycles.[1126] In contrast, many institutional changes are still necessary when only formal authorities (politicians, judges, ombudsmen) can hold organizations accountable: for example, in cases of suspicion of fraud and corruption detected by the use of municipal data dashboards, it is hard for concerned citizens to take any action, because they would formally depend too much on the same institutions that they would report.[1127]

The issues of ("ex-ante" and "ex-post") accountability remain a contentious discussion about the centrality (and lack) of power and control of algorithms and information in smart cities.

[1124] Quyet H Cao et al, "Policy-based usage control for a trustworthy data sharing platform in smart cities" (2017) Future Generation Computer Systems, online: <https://www.sciencedirect.com/science/article/pii/S0167739X1731107X>.
[1125] PB Anand & Julio Navío-Marco, "Governance and economics of smart cities: opportunities and challenges" (2018) 42:10 Telecommunications Policy 795–799.
[1126] Manuel De Tuya et al, "The leading role of the government CIO at the local level: Strategic opportunities and challenges" (2017) Government Information Quarterly.
[1127] Ricardo Matheus, Marijn Janssen & Devender Maheshwari, "Data science empowering the public: Data-driven dashboards for transparent and accountable decision-making in smart cities" (2018) Government Information Quarterly, online: <http://www.sciencedirect.com/science/article/pii/S0740624X18300303>.

Consider the consequences of when systems fail to perform and databases become systematically biased, especially because the generated outcomes in decision making might not be predictable at all.[1128] Consequently, the limited transparency and the fragmented accountability in the smart city demand political and legal components to tackle compliance issues: innovation must come not only from technologies but also from law and policy making to become the fulcrum for growth and development.[1129] To implement such policies of transparency, participation and accountability in accordance with laws, administrative rules, judicial rulings, and practices—which include personal data protection and information security—smart cities initiatives have been implementing integrative frameworks and policies of smart governance.[1130]

The many different perspectives offered by the literature review on smart city governance are dominated by a vision of government as a technical or managerial issue, pointing toward a complex process of institutional change through innovative administration methods, decision-making, or even collaboration.[1131] There are various definitions of smart governance available in the literature on the subject, with their variances depending on contextual factors, measurement techniques and outcomes.[1132] In accordance with each case, the dominant sociotechnical vision highlights the interaction between people, processes, and technology in smart cities as a universal dynamic for the formation of new models of open, participatory, inclusive, and integrated governance.[1133] Distinct governance regimes can be put into practice—e.g., polycentric, motivational, environmentally embedded, adaptive, political—with combinations,

[1128] Marijn Janssen & George Kuk, "The challenges and limits of big data algorithms in technocratic governance" (2016) 33:3 Government Information Quarterly 371–377.
[1129] Sujata Joshi et al, "Developing Smart Cities: An Integrated Framework" (2016) 93 Procedia Computer Science 902–909.
[1130] Hafedh Chourabi et al, *Understanding Smart Cities: An Integrative Framework* (2012).
[1131] Albert Meijer & Manuel Pedro Rodríguez Bolívar, "Governing the smart city: a review of the literature on smart urban governance" (2015) 82:2 International Review of Administrative Sciences 392–408.
[1132] Robert Wilhelm Siegfried Ruhlandt, "The governance of smart cities: A systematic literature review" (2018) 81 Cities 1–23.
[1133] Firman Anindra, Suhono H Supangkat & Raymondus Raumond Kosala, *Smart Governance as Smart City Critical Success Factor (Case in 15 Cities in Indonesia)* (2018).

influences and juxtapositions among them.[1134] Those differences can emerge at many points during the development of a smart government strategy to achieve an innovative government, which will demand different and adaptative governance models to achieve it.[1135]

The dominant ideology behind the smart city is based on the modern premises of manageability, differentiation, specialization, and rationalization to create new governance models for economic revitalisation and social change; even so, these new governance models must react to the postmodern tendencies of increasing unpredictability, decentralization, deconcentration and fragmentation in cities.[1136] The role of information technologies in the new governance model is to prepare cities for the global and changing conditions of societal reform and reorganization processes that will continue in the coming decades.[1137] The neoliberal urban governance circulating European (and global) cities is part of the (neoliberal) reaction to the economic crisis, when the smart city paradigm offers technological solutions to the challenges in the provision of urban services and the financing of local welfare, like new spaces of potential profitability for private companies.[1138] The (d)evolution of smart projects runs under this background of techno-politics that is the key to understanding the adaptation of governance policies to each city and region.[1139]

Cities all around the world are trying to face shared struggles and learn from each other's smart projects and techno-governance practices (e.g. open data policies vary a lot), and every

[1134] Mark Hartswood et al, "Towards the ethical governance of smart society" in *Social Collective Intelligence* (Springer, 2014) 3.
[1135] J Ramon Gil-Garcia, Natalie Helbig & Adegboyega Ojo, "Being smart: Emerging technologies and innovation in the public sector" (2014) 31 Government Information Quarterly I1–I8.
[1136] Gerard Wigmans, "Contingent governance and the enabling city" (2010) 5:2 City 203–223.
[1137] Enrico Ferro et al, *The role of ICT in smart cities governance* (2013).
[1138] Patrizia Lombardi & Alberto Vanolo, "Smart City as a Mobile Technology: Critical Perspectives on Urban Development Policies" in Manuel Pedro Rodríguez-Bolívar, ed, *Transforming City Governments for Successful Smart Cities* (Cham: Springer, 2015) 147.
[1139] Igor Calzada, "The Techno-Politics of Data and Smart Devolution in City-Regions: Comparing Glasgow, Bristol, Barcelona, and Bilbao" (2017) 5:1 Systems.

approach needs to be contextualized according to each specific urban context because there is no one-size-fits-all arrangement for smart city governance.[1140] The shifting and locally inflected conception of smart cities channels multiple policy agendas—modelled by ideas, practices, discourses, and technical innovations—that reflect broader changes to urban spaces and forms of governance specific to particular contexts.[1141] For example, the platforms for urban data management, often simply called *city dashboards*, may serve as strategic elements to understand and differentiate the new models of governance for smart cities, because the implied choices in the design of each dashboard can mean different developments of smart governance.[1142] However, despite the evident differences, networks of smart cities have been exchanging experiences and promoting goals of interoperability and replicability in urban technologies and smart governance that help to bring cities closer to one another.[1143]

Innovative forms of governance have been integrating urban information and technological instruments (i.e., open data portals and social media applications) to connect initiatives from governments and citizens while keeping decision making processes transparent and the channels of engagement between them open.[1144] The governance model to achieve such integration in smart cities may be comprised of a network of stakeholders (a self-governance model) where the municipal government serves as a network broker, or a leading

[1140] Albert Meijer, "Smart city governance: A local emergent perspective" in J Ramon Gil-Garcia, Theresa A Pardo & Taewoo Nam, eds, *Smarter as the New Urban Agenda: A Comprehensive View of the 21st Century City* 11, 1st ed (Springer, 2016) 73.
[1141] Robert Cowley et al, "Ordinary Chinese Smart Cities: The Case of Wuhan" in *Inside Smart Cities* (London: Routledge, 2018) 45.
[1142] Sarah Barns, "Smart cities and urban data platforms: Designing interfaces for smart governance" (2018) 12 City, Culture and Society 5–12.
[1143] Álvaro Palomo-Navarro & Julio Navío-Marco, "Smart city networks' governance: The Spanish smart city network case study" (2018) 42:10 Telecommunications Policy 872–880.
[1144] Gabriela Viale Pereira, Gregor Eibl & Peter Parycek, *The Role of Digital Technologies in Promoting Smart City Governance* (International World Wide Web Conferences Steering Committee, 2018).

organization that centralizes and manages all of the development (a bureaucratic model).[1145] In one way or another, governance in smart cities encompasses policies for collaboration, as in the case of open data policies that have demonstrated the potential of overcoming knowledge asymmetries, facilitating joint fact finding and enabling trust building.[1146] Adopted by both *open governments* and *entrepreneurial governments*, open data programs have been conciliating transparency and engagement in decision making with the creation of marketplaces for software entrepreneurship using public data assets to attract private investment—conciliating open access to what used to be done behind closed doors—thus, smart governance has already created a legacy by (re)constituting a government role.[1147] All things considered, smart cities have to do more than simply copy good practices from others, they must engage in governance models that link the different levels of municipal organizations to the social fabric of the city to conciliate the *big-picture visions* and smart projects of the city hall with the real needs and local practices of neighborhoods—a desired fit between city wide strategies and bottom-up initiatives that remains a key challenge for all cities, smart or not.[1148]

Technological determinism underlines the whole idea of smart cities advancing into new forms of governance that would be able to change key challenges and address multiple needs in the globalized and knowledge-driven economy: by increasing local efficiency; by promoting citizen and government interaction; by mobilizing people in policy design; by supporting

[1145] Manuel Pedro Rodríguez Bolívar, "Smart Cities: Big Cities, Complex Governance?" in Manuel Pedro Rodríguez-Bolívar, ed, *Transforming City Governments for Successful Smart Cities* (Cham: Springer, 2015) 1.
[1146] Martin Bartenberger & Verena Grubmüller, "The Enabling Effects of Open Government Data on Collaborative Governance in Smart City Contexts" (2014) 6:1 JeDEM, online: <https://jedem.org/index.php/jedem/article/view/289>.
[1147] Sarah Barns, "Mine your data: open data, digital strategies and entrepreneurial governance by code" (2016) 37:4 Urban Geography 554–571.
[1148] Albert J Meijer, J Ramon Gil-Garcia & Manuel Pedro Rodríguez Bolívar, "Smart City Research: Contextual Conditions, Governance Models, and Public Value Assessment" (2015) 34:6 Social Science Computer Review 647–656.

economic development; and by promoting social and territorial cohesion.[1149] Local governments would need to go through a non-linear evolutionary process of acquiring new capabilities and adopting models of e-government to develop an effective (e-)governance that, in its turn, could maturate into smart city initiatives and solutions to urban issues. The literature on e-governance that represents this technocratic view is dominated by authors from computer sciences and IT areas—which could be explained by the several technological issues involved—but it will take specialists from more areas to advance to models that are capable of rearranging governance into the aspirations of smart cities.[1150] It will take interdisciplinary approaches and collaboration from all sorts of experts from backgrounds in technology, urbanism and public policy (this includes law) to move from reductionist doctrines and incompatible public administration tools which still characterize mainstream urban governance approaches to smart cities.[1151]

This subchapter focuses on accountability and governance as the main components of the axis of compliancy, keeping a close relation with the two previous axes: opacity and intelligibility, and their regulatory aspects. They are divided here by the questions which guided the study of the texts: *what* their concepts and understandings are; *when* their conditions and backgrounds are set; *where* their diversities and differences are located; *which* their institutions and instruments are considered; *who* is involved in them; and *why* are their challenges and reasonings relevant. Beyond the fact that the questions were neither fully answered nor explained in the present text, the literature review left the subsequent question of *how* to make accountability and governance work in the smart city open. This remains a subjacent question for the rest of the research.

[1149] Santinha & de Castro, *supra* note 865.
[1150] T M Vinod Kumar, "E-Governance for Smart Cities" in T M Vinod Kumar, ed, *E-Governance for Smart Cities* (Singapore: Springer, 2015) 1.
[1151] Mohammad Razaghi & Matthias Finger, "Smart Governance for Smart Cities" (2018) 106:4 Proceedings of the IEEE 680–689.

The literature review up to this point—based on publications of authors mainly from technological areas, urban studies and social sciences—has revealed a abundance of legal references. This may be explained by the fact that most of the publications on smart cities came to be during the research period and that they have expanded their considerations into normative aspects beyond technology. For this reason, they pave the way for the next part of the literature review, which presents the main contributions on the subject from the works of legal researchers on smart cities which set the guidelines of this doctoral dissertation.

2.3.2 But How Hard Could Legal Research on Smart Cities Be? Guides and Trails

When the initial project for the doctoral program in law at Université de Montréal was being prepared, the scientific literature concerning smart cities was considered quite limited, and no legal production could be found to closely corroborate the proposition. Beyond a mere personal perception, this "bibliographic challenge" for the initial project in the spring of 2013 was supported by an endnote in an article by Alberto Vanolo, a major researcher on the subject, from around the same period:

> "A simple search on Google Scholar (accessed November 2012) will come up with 35 citations, a very large number given the limited literature on the subject. Most of the references concern 'grey' literature (mostly papers presented at conferences)".[1152]

By the time this dissertation was finished, a similar search on Google Scholar (accessed February 2020) would yield about 1,300,000 results. Significative legal research is finally available, even if it still does not keep up with the rapid pace of publications in other areas.

Rewinding again to the period after the doctoral seminars, the search for relevant academic references for this research seemed arduous and not very fruitful. It was a laborious

[1152] Vanolo, *supra* note 872 at 895.

effort to gather a few dozens of academic documents to evolve the initial project and prepare it for the comprehensive exam,[1153] with many of them produced by scientists affiliated with IT corporations working on the smart cities market,[1154] and very articles written by legal scholars. By the time this dissertation was being finished, the subject of smart cities had turned into the central hub of a complex ecosystem of research, consisting of more articles, papers, books and other publications than any individual could humanly keep up with, let alone, read them all.[1155]

It is not only the quantity of publications on smart cities that has increased, but also the diversity of topics that have been explored.[1156] Any legal scholar starting a research now with access to the publications from the last several years would probably have very different research possibilities, and have very different perspectives than those originating from the time of the initial research project.[1157] The booming scientific production on smart cities is as recent

[1153] The support of the librarian Stéphanie Phan-Dang from UdeM's law faculty in the "programme de jumelage avec une bibliothécaire" brought a significative improvement to the research. Even with her help, the quantity of concerning articles and books remained rather limited up to the winter of 2015, when the text for the "examen de synthèse" was delivered for evaluation.

[1154] Notably from IBM and Cisco, the two companies most recognized for leading and popularizing the concepts of smart cities (the term *smarter cities* is even an IBM trademark) have engaged considerable numbers of scientists and academic institutions. Later, other companies followed close their leadership, as Siemens and Schneider Electric. About IBM, Cisco, and other the companies leading the smart cities market, see: Adam Greenfield, *Against the smart city (The city is here for you to use)*, kindle edition ed (New York: Do Projects, 2013); Sotirios Paroutis, Mark Bennett & Loizos Heracleous, "A strategic view on smart city technology: The case of IBM Smarter Cities during a recession" (2014) 89 Technological Forecasting and Social Change 262–272; Daniel van den Buuse & Ans Kolk, "An exploration of smart city approaches by international ICT firms" (2018) Technological Forecasting and Social Change, online: <http://www.sciencedirect.com/science/article/pii/S0040162518303214>; Donald McNeill, "IBM and the visual formation of smart cities" in *Smart Urbanism* (Routledge, 2015) 34; Anita Podsiadlo, "IBM, Cisco Score Highest in Navigant Research Assessment of Smart City Technology Providers", (24 November 2014), online: *IoT Now* <https://www.iot-now.com/2014/11/24/27609-ibm-cisco-score-highest-navigant-research-assessment-smart-city-technology-providers/>; SmartCitiesWorld, "Cisco and Siemens named top smart city vendors", (6 November 2017), online: *Smart Cities World* <https://www.smartcitiesworld.net/news/news/cisco-and-siemens-named-top-smart-city-vendors-2273>.

[1155] More information about the increasing availability of academic material on research databases are available in the next chapter.

[1156] The quality of the publications did not necessarily follow the increasing numbers. A lot of research time was spent in selecting publications with some minimal meaningful contribution for the dissertation.

[1157] Of course, a researcher "lucky" enough to be enrolled in academic institutions with enough keys for unlocking the gateways of academic knowledge behind the expensive paywalls of the major publishers.

as it is evident:

> Evidence of this trend can be found by analyzing Google Scholar's data. Following a request to identify the literature produced between 1992 and 2015 in which the term "smart city" is included in the singular or plural form, the scholarly engine developed by Google has sourced 25,770 documents. Data shows that the annual production of publications on smart cities has increased by 600 times within 24 years, moving from 16 in 1992 to 9,494 in 2015.[1158]

The multiplication of academic publications about smart cities has also assisted to fuel many of the growing concerns expressed in mass media, as the news referred to in the previous subchapters can attest. The word is out. Far from the prevision that *smart city* would be a fading buzzword, the *smart city trend* in academia and media publications unfolded a legitimate involvement of legal scholars and practitioners in the public debate.

Social concerns about risks to privacy, security, and democracy often appear in the many articles mentioned in the literature review—frequently in the introduction and conclusion of publications, not as much in the discussion—from academic areas such as computer science, engineering, urban studies, social sciences, and humanities. Even so, these publications have avoided getting into more detail about how to proceed in regulating the *shady areas* of smart cities. Despite the efforts to address smart cities in a broader normative dimension, the regulatory aspects seem to remain under an expectative for a preponderant legal reasoning, and this is reflected in the many calls for *further research* and *government action* in the scientific and media publications—but unfortunately, there are still more calls than thre are legal answers for them.

Despite the rising tide of scientific and social callings, the legal literature about smart cities remains relatively limited, and this is displayed in the usual sources of modern law. The first reflex of a legal practitioner or scholar could be looking for legislation of reference, but there

[1158] Luca Mora, Roberto Bolici & Mark Deakin, "The First Two Decades of Smart-City Research: A Bibliometric Analysis" (2017) 24:1 Journal of Urban Technology 3–27 at 4.

are practically no specific laws about smart cities (despite some social actors recurrently claiming new regulations for them)[1159] because most of their legal concerns already find place in different areas of law,[1160] or because they simply exist under the form of public policies, which also have *legal DNA* involved. The second legal reflex could be looking for court decisions (sometimes the first reflex in common law systems) explicitly centering on arguments about smart cities, but there is not much jurisprudence addressing the subject either.[1161] Legal theory (legal doctrine) stands as one of the only (and lonely) sources for legal research material about smart cities, even if it still in a contained scope with a limited range of action.

The goal was that the legal literature review would be done like a broad composition of all sorts of contributions from legal scholars that should provide answers to the main regulatory issues raised by smart cities. Nevertheless, the legal doctrine was unfortunately scarce and limited to relatively few legal researchers for most of the doctoral research, and it would not cover the initial goal. The initial scarcity refers to the volume of publications, not their relevance: this paradigm changed a bit later, and so has the dissertation.

The choice here was to tell an short version of this long story, of what happened during the dissertation process. A story about how a few legal authors guided the trails of the research.

[1159] Their main points of concern are covered here. See: Alison DeNisco Rayome, "Legislation is needed for smart cities, say 90% of US companies", (28 June 2017), online: *TechRepublic* <https://www.techrepublic.com/article/legislation-is-needed-for-smart-cities-say-90-of-us-companies/>; Haws, *supra* note 1055; Malcolm Dowden & Gareth Jones, "Smart cities need smart laws", (14 July 2016), online: *Wombledon Dickinson* <https://www.womblebonddickinson.com/uk/insights/articles-and-briefings/smart-cities-need-smart-laws>.

[1160] A few municipal bills were found expressly referring to smart cities, but no relevant national laws. The lack of specific laws can be a good thing, as expressed in Gautrais, *supra* note 1051.

[1161] Some cases can be used as a reference to the municipal use of smart devices, as in South Africa, in "the Mazibuko v. City of Johannesburg case, in which the High Court and subsequently the Supreme Court supported the claim and declared as unlawful, discriminatory and unfair the city policy of implementing prepayment water meters" and in The United Kingdom, where "the Water Industry Act 1999, s.1, definitely prohibited the disconnection for non-payment and the use of prepayment metering devices, after an application for judicial review". Tiago de Melo Cartaxo, Miguel de Castro Simões Ferreira Neto & Vânia Vassalo, *Smart Legal Mechanisms for Sustainable Cities* (ICSD, 2017) at 166.

During the first two-thirds of the research, the legal guidelines for this dissertation followed a much clearer path in pursuit of the expected results. The last third of the research period has seen some drastic changes of context and perspectives for smart cities—more specifically, in the scenarios and perceptions of the two cases study presented in the third chapter of this dissertation—which have echoed through the inputs of information and, consequently, the outcomes that would be expected to come from them. If the research had finished in the regular period of four years, the result would have been a very different dissertation from the present one, and it would have become obsolete faster than the first urban IoT sensors: from the initial request for proposals and procurement by a city hall, to until the eventual installation and deployment of IoT on the streets, sensors are frequently considered outdated. In sum, the previous research project would not have contributed as much if it had been concluded "in time."

Research is a product of its time. So, as time changes, the research must change with it. Nevertheless, all the previous work became even more essential to understand the change, and the legal publications from that period turned into the building blocks for a broader legal reasoning for all researchers in law. After all, the pioneering publications on the legal dimensions of smart cities provided the vocabulary for what would come later in the field.

It was only after the first year of legal research for this dissertation that the first traces of legal inquiry on smart cities would appear under the form of two academic events: one transdisciplinary event in France promoted by a research chair in law with a panel on smart cities, Big Data, and privacy,[1162] and another event in the US, mostly dedicated to legal scholars and

[1162] Both events took place in the same month, the first being the colloquium "Ville intelligente, ville démocratique ?", organized by the "Chaire Mutations de l'action publique et du droit public" at *Science Po* in Paris, France. Other details about the event and its developments can be found at: <https://www.sciencespo.fr/chaire-madp/content/smart-cities.html>.

experts debating *Smart Law for Smart Cities*.[1163] In February 2014, the symposium in the US, organized by the Fordham School of Law, would result in the first publications directly relating law and smart cities, through the Fordham Urban Law Journal.[1164] Until that moment, many publications made limited references to the need of legal development for the risks related to smart cities, but none used law as the main guiding area of expertise. To be fair, the colloquium at *Sciences Po* also produced an interesting publication based on the presentations and debates at the event, including one that had a legal approach, but its influence in the incumbent legal field of smart cities remained limited and, unfortunately, it is rarely quoted.[1165]

Among the selected works in the ground-breaking edition of the Fordham Urban Law Journal about smart cities, two articles in particular should be recognized here as exerting a major influence for the reasonings in this research,[1166] as both touch some of the most sensible and relevant areas for legal research. The close relations between privacy and surveillance, data ownership and open data, urban public policies and data analytics were the initial matters of central concern in the present research, and these articles paved part of the way for it.

The article “Welcome to the Metropticon: Protecting Privacy in a Hyperconnected

[1163] The symposium “Smart Law for Smart cities Regulation, Technology and the Future of Cities”, held by Fordham University, in February 2014. The original website of the event is no longer functional, yet many websites describing the objective and programming of the event are still accessible as: <http://www.smartcitiesoftomorrow.com/event/smart-law-for-smart-cities-regulation-technology-and-the-future-of-cities/>.

[1164] “As far as the organizers knew, no one had written about or gathered together experts to set out an agenda for the law and smart cities.” Annie Decker, “Smart Law for Smart Cities” (2016) 41:5 Fordham Urban Law Journal 1491 at 1492.

[1165] Probably because the content was not easily available on the Internet. Acquiring a copy in paper was far less difficult than the e-book version (it required an address in France, a national ID and some more geolocalized data in the European Union). It was also expensive and time-consuming to acquire and receive this book in paper by mail services but worth it. *See*: Colloque Berger-Levrault - Chaire MADP de Sciences Po et al, eds, *Ville intelligente, ville démocratique ?: [actes des rendez-vous annuels de la Cité des “smart cities”] : colloque du 13 février 2014* (Paris: Berger-Levrault, 2015).

[1166] There are other interesting articles in the same edition, dealing with law and civic participation, policies for climate mitigation, municipal broadband, public Internet access, which may be referenced in this dissertaion, but not with the same influential relevance for the literature review.

Town,"[1167] by Kelsey Finch and Omer Tene,[1168] describes the urban utopia that is pursued by deploying connected sensors and data analysis for city efficiency, contrasting it with a possible urban dystopia of automated surveillance over its residents, disregarding their privacy in the name of data-driven urban decision making for the management of their lives. The text successfully handles the technologies more frequently associated with innovation for cities (Internet of Things, Big Data, Cloud Computing), their inherent perils (surveillance by default, algorithmic discrimination, vulnerability of urban systems), public policies for coping with them (access, open data, participation), and possible solutions for legal implementation (privacy compliance, accountability mechanisms, enhanced transparency). The conclusions of this article pointed toward what was initially expected to be a main dissertation challenge:

> Smart cities contain worlds of potential. They hold promise of urban utopia; at the same time, they also carry the seeds of a dystopian panopticon. The technology giving life to either option is now firmly within our grasp, as cities and citizens grow ever more responsive to our information-driven society. Nevertheless, those technologies necessitate cameras and sensors throughout the urban landscape, constantly monitoring and mining city-dwellers' personal behaviors and tendencies. Ubiquitous urban surveillance demands equally robust privacy protections, in order to preserve the balance of power between the people and their city governments, and to ensure that citizens' data does not become a tool of inequality and oppression.[1169]

This article shared many of the main elements of concern within the initial research project, such as looking to "strike a reasonable balance between the public benefits of big data and the loss of individual privacy"[1170] in smart cities. There is no doubt that this is an article that aged well, addressing most of the key topics in the research agenda that were previously described (and over repeated) in this dissertation. Despite being the most fundamental text on

[1167] Kelsey Finch & Omer Tene, "Welcome to the metropticon: Protecting privacy in a hyperconnected town" (2014) 41 Fordham Urb LJ 1581–1759.
[1168] I'm very grateful for the fact that the author Omer Tene was kind in sharing his article by email even before its publication, so I could used it in time for the project submitted to the comprehensive examination ("examen de synthèse").
[1169] Finch & Tene, *supra* note 1167 at 1615.
[1170] *Ibid* at 1607.

smart cities from the perspective of legal doctrine so far, after some rereading and conducting data analysis experiments, gaps in the areas of openness and governance became evident, and pointed to the need to look further into these aspects which other legal scholars have been calling attention to.

The same authors would keep seeking similar paths for "balancing transparency and privacy"[1171] in a later work on *Smart Cities: Privacy, Transparency, and Community*[1172] that highlights their competing benefits, risks, and proposes. Full of valuable recommendations for privacy policies in smart cities, the article proposes that city officials "need to act as data stewards, diligently and faithfully protecting the personal data that the city and its partners collect"[1173] The search for *balance* that is described in these two articles, deploying risk mitigation strategies to reduce privacy risks without inhibiting beneficial uses of data[1174] (as in Big Data and open data applications), again converged with the initial proposition of the research project Instead of just pushing the research toward a similar framework based on *Privacy Risk Management* and the recommendations of *Privacy Impact Assessments* (PIA) for smart cities, these articles pushed it far beyond that.

As the doctoral research followed the leads of these and other articles and authors, it became clear that the classic scale of modern law with two opposing polarities (e.g. transparency versus privacy) would hardly accomplish the task of balancing risks and benefits.[1175] A dynamic, reflexive, and networked balance of (postmodern) law for smart cities would demand more

[1171] As in this conference of Kelsey Finch,: NYU School of Law, "Big Data @ Smart Cities", (10 November 2017), online: *YouTube* <https://youtu.be/fuabZ2elfEo?t=1972> at 32min52s.
[1172] Kelsey Finch & Omer Tene, "Smart Cities: Privacy, Transparency, and Community" in Evan Selinger, Jules Polonetsky & Omer Tene, eds, *The Cambridge Handbook of Consumer Privacy* Cambridge Law Handbooks (Cambridge: Cambridge University Press, 2018) 125.
[1173] *Ibid* at 140.
[1174] *Ibid* at 131.
[1175] To be fair, I should confess that this preliminary conclusion was helped by some observations from professor Karim Benyekhlef, at the comprehensive exam, about the limitations of the classic scale as a modern representation for justice. The balance needed to be pushed beyond the modern model.

policies in perspectivea which cover many other legal dimensions, beyond open data and privacy policies. This argument will be brought back for further analysis later in the text.

A less general and more focused approach to legal (and very practical) issues of smart cities came to be in a second article from the Fordham Urban Law Journal, in a way that complemented the work of the above-mentioned authors and touched base with the dissertation. The closing article in the journal edition, *Public Transit Data Through an Intellectual Property Lens: Lessons About Open Data*,[1176] by University of Ottawa professor Teresa Scassa, touches a fundamental legal dimension of open data by analysing the strategic role of intellectual property (IP) in the sharing of municipal transit data. It is strategic because mobility and transportation are the top priorities in most smart projects around the world,[1177] known for being the most institutionally challenging, technically complex, and legally sensitive (despite being politically convincing) front of smart cities, made clear by the massive numbers of publications and global events dedicated to smart mobility.[1178] Consequently, public transit data is now considered the most valuable data in town, and this has everything to do with data ownership because "the evolution in the complexity and commercial value of transit data also came after the first successes of open data."[1179] Therefore, the legal conditions applied to the policies and contracts of transit data are major conditions of success or failure for any public expectations on open data (and smart cities):

> The promises of open data are many, and they include transparency and accountability, improved efficiency in the delivery of services, and in planning activities, greater citizen engagement, better uptake of government services,

[1176] Teresa Scassa, "Public transit data through an intellectual property lens: Lessons about open data" (2013) 41 Fordham Urb LJ 1759.
[1177] "[O]ne of the most important topics in smart city, that is, smart mobility. Mobility is one of the most important facilities to support the functioning of the urban area."Benevolo, Dameri & D'Auria, *supra* note 934 at 14.
[1178] For a fast glimpse on the subject, see: Colin O'Donnell, "In the smart city race, we're betting on transit", (18 April 2017), online: *TechCrunch* <https://techcrunch.com/2017/04/18/in-the-smart-city-race-were-betting-on-transit>; Anthoine, *supra* note 723.
[1179] Scassa, *supra* note 1176 at 1808.

> and the stimulation of innovation and economic growth. The challenges posed by open data are also significant.[1180]

Between the many challenges related to the institutional cultural shifts necessary for open data implementation, Scassa highlights the issues of information control, quality and liability of data bases, the stablished agreements in public-private relationships, inexperience and lack of resources in municipalities, as well the possible lost opportunities for revenue generation for the city. Those elements are connected to IP issues, as are the use of proprietary or non-proprietary data standards, interoperability of data licenses, and data ownership in municipal contracts for real-time GPS data collected by private sector companies.[1181]

All of those elements are directly interrelated to the data ownership model adopted by cities,[1182] a matter of high concern for municipal IT teams for a long time,[1183] that is finally getting the deserved institutional and legal attention. This legal matter surfaced at a strategic time when it became a key condition[1184] for creating public-private partnerships for smart cities[1185] and defining limits to private appropriation of urban data commons. One of the most troublesome emerging legal issues in this context that demands improved regulation is the gray area of data

[1180] *Ibid* at 1761.
[1181] Teresa Scassa, "Emerging Legal Issues in the Smart Cities Context", (28 September 2015), online: *Centre for Law, Technology and Society - uOttawa* <https://techlaw.uottawa.ca/news/emerging-legal-issues-smart-cities-context>.
[1182] See: Teresa Scassa, "Who owns all the data collected by 'smart cities'", (23 November 2017), online: *The Star* <https://www.thestar.com/opinion/contributors/2017/11/23/who-owns-all-the-data-collected-by-smart-cities.html>.
[1183] Jean-Bernard Auby refers to the ambiguity of data property as a present problem: Forum Montesquieu, *supra* note 1052 at 31min02s.
[1184] See: Pamela Robinson, "New Toronto Smart City Project Has To Be Open Too", (24 October 2017), online: *Huffington Post* <https://www.huffingtonpost.ca/pamela-robinson/new-toronto-smart-city-project-has-to-be-open-too_a_23251913/>; Bill Bean, "The world is watching as data drives Toronto's Smart City experiment", (30 October 2017), online: *Communitech News* <http://news.communitech.ca/the-world-is-watching-as-data-drives-torontos-smart-city-experiment/>.
[1185] See: Romi LeLevine, "U of T, Toronto experts offer insight into the 'promise and peril' of building smart cities", (29 January 2018), online: *University of Toronto* <https://www.utoronto.ca/news/u-t-toronto-experts-offer-insight-promise-and-peril-building-smart-cities>; Molly Sauter, "Google's Guinea-Pig City", (13 February 2018), online: *The Atlantic* <https://www.theatlantic.com/technology/archive/2018/02/googles-guinea-pig-city/552932/>.

protection in the case of "hybrid regimes" of data ownership, control, and liability in the public-private partnerships that remain too often under the NDA (Non-Disclosure Agreements) shadows of municipal documents with technology private partners.[1186]

The open questions and unclear policies about mobility data ownership in smart cities are potentially harmful not only in the case of big IT contracts and partnerships, but also at the grassroots level[1187] of innovation and community participation. For example, intellectual property claims are too often used against developers (frequently individuals) and mobility apps using public mobility data.[1188] Cities under more restricted budget conditions (all claim to need more money)[1189] and handling large volumes of data are often pushed "to share or sell that data in exchange for either money or services"[1190] for IT corporations, which makes data ownership and data sovereignty legal issues for urgent research and institutional action,[1191] especially when dealing with the valuable and sensitive data related to mobility.

Therefore, data governance must be a major part of the legal questioning about smart cities. As was well explained by Scassa, "data governance goes to the question of how data will

[1186] See: Bianca Wylie, "Sidewalk Toronto: Critical Governance Document Not Open for Public Consultation", (8 July 2018), online: *Medium* <https://medium.com/@biancawylie/sidewalk-toronto-the-next-critical-governance-document-plan-development-agreement-not-open-for-c81c0c492ef4>.

[1187] "[S]olutions to issues of a basic level can be made when communities get together to focus on innovation. The effectiveness of grassroots innovation can be similar to that of technology innovations, which normally require more resources (Capel, 2014). Smart cities can use grassroot innovations to provide solutions to issues confronting their cities. This helps smart cities to focus on bigger innovation problems, whilst the grassroots innovations can focus on micro and smaller sized issues." Vanessa Ratten, *Entrepreneurship, Innovation and Smart Cities*, Routledge Frontiers of Business Management (Routledge, 2017) at 70. See: Aurora López-Fogués, Álvaro Fernández-Baldor, & Alejandra Boni, "Grassroot digital innovation and public administration in the Smart City milieu" (2017) 18 Gestión y Análisis de Políticas Públicas.

[1188] Many examples are presented in Teresa Scassa's presentation at: Internet Society Chapters Webcasting, "Smart Law for Smart Cities 5 - Resident Engagement", (3 March 2014), online: *YouTube* <https://youtu.be/gp0RoCQG2no> at 39min40s.

[1189] The discourse of "municipal revenue generation" is a common denominator in smart city events.

[1190] Scassa, *supra* note 887.

[1191] Teresa Scassa, "Smart planning for smart cities", (9 April 2018), online: *The Hill Times* <https://www.hilltimes.com/2018/04/09/smart-planning-smart-cities/139411>.

be stewarded (and by whom) and for what purposes" and it is related to smart city governance because they may share elements, but they are not to be confounded.[1192] In municipal governments, data governance models should be shaped by legislation, regulations, and government policies, and in the case of smart cities projects working in "partnership" with private companies, data governance will also involve standards, industry practices, and private law instruments.[1193] In fact, smart city standards are being set up and put in motion by industrial entities,[1194] international institutions,[1195] and national entities[1196] more than any other form of regulation from democratic deliberation. Therefore, such standards and practices should be addressed by public policies. For this reason, the data governance of smart projects should be compatible with and attend to the visions and regulations of a broader smart city governance—it is not always the case, as seen with the Sidewalk Toronto project—otherwise data governance may not necessarily include citizen participation to deliberate on the privacy concerns that those projects bring with them.[1197]

Scassa's referred article and other aforementioned works highlight the complexity of IP

[1192] Teresa Scassa, "Some thoughts on Smart Cities and Data Governance", (25 November 2018), online: *Teresa Scassa* <http://www.teresascassa.ca/index.php?option=com_k2&view=item&id=293:some-thoughts-on-smart-cities-and-data-governance&Itemid=80>.
[1193] *Ibid*.
[1194] Sue Lebeck, "The 'smart city' movement: From experimentation to standardization", (28 February 2014), online: *GreenBiz* <https://www.greenbiz.com/blog/2014/02/28/smart-city-movement-experimentation-standardization>; Linda Poon, "How Smart Is Your City? Can Bloomberg Philanthropies establish a national standard for data-driven governments?", (28 March 2017), online: *CityLab* <https://www.citylab.com/tech/2017/03/in-search-of-the-smartest-city/521019/>.
[1195] George Karayannis, "Dissecting ISO 37120: Why this new smart city standard is good news for cities", (30 July 2014), online: *Smart Cities Council* <https://smartcitiescouncil.com/article/dissecting-iso-37120-why-new-smart-city-standard-good-news-cities>; Rodger Lea, "Making Sense of the Smart City Standardization Landscape", (10 November 2016), online: *IEEE Standards University* <https://www.standardsuniversity.org/e-magazine/november-2016-volume-6-issue-4-smart-city-standards/making-sense-smart-city-standardization-landscape/>.
[1196] Colin Marrs, "Smart cities data standards released", (11 November 2014), online: *Public Technology* <https://www.publictechnology.net/articles/news/smart-cities-data-standards-released>; Carlos Esteban, "Las normas de las ciudades inteligentes", (18 October 2017), online: *El Mundo* <https://www.elmundo.es/economia/2017/10/18/59e653b3e5fdea597d8b4643.html>.
[1197] Michael McKiernan, "Development project raises questions around smart cities", (15 April 2019), online: *Law Times* <https://www.lawtimesnews.com/news/focus-on/development-project-raises-questions-around-smart-cities/263507>.

of public data and its importance for the (data) governance of smart cities beyond the "usual suspects" of privacy and transparency, more than from any other author in law. Consequently, by filling the gaps of the initial research project, the publications from the uOttawa professor had a reverberating effect through the research and helped it to move beyond the projected goals by relating them to data ownership and, above all, governance.

Governance exerts such a central role for the smart city that, for Jean-Bernard Auby, professor at *Institut d'Études Politiques de Paris* (Sciences Po), it forms its essence:

> the intelligent city is a certain state of governance of the city, and this state it is potentially something that will transform, which may already be transforming, our relationship of citizens with the city and the governance of the city.[1198]

For the professor of public law and researcher of urban law, the smart city transforms the functioning of the city in the political sense of the term: the public actions and the private actions (and what they mix to become) in the city, and what may be called the governance of the city.[1199] It will represent great challenges for the horizontal and vertical forms of urban governance (a multilevel governance that has not worked well yet) because of the many dimensions that the integration of public infrastructures, sensors, data and systems will involve and transform. Back in 2014, the director of the *Chaire Mutation de l'Action Publique et du Droit Public* previewed several legal problems from the digitalization of the city flows would bring to personal data protection (data collection, processing and sharing), intellectual property (open data policies, economic value of public data, licenses), and public procurement (integration of databases, innovative services and public contracts). For example, Auby was the first legal scholar in the literature review to point out how hard it would be to break the silos of data in city halls to integrate databases because public law requires the compartmentalization of contracts and their results.

[1198] Forum Montesquieu, *supra* note 1052 at 9min30s. My translation.
[1199] Colloque Berger-Levrault - Chaire MADP de Sciences Po et al, *supra* note 1165 at 126.

So, it would also require a lot of innovation from and for law. In sum, several delicate (legal) questions would be raised while transforming (the law for) the city.[1200]

Despite the general assumption that public data should be free and accessible, much disagreement was to be expected about data ownership because of legal public condition and contracts. The French researcher points out that a lot of personal data is usually held by many (smart) city players beyond the municipal government, such as delegated public service operators (water, electricity, gas, transport, etc.), and private companies (e.g., telecommunications) operating integrated smart services within a territory. There is "a far more general conversation that is far from being over, about whether data can be the subject of copyright"[1201] and who can hold that copyright in the smart city complex ecosystem, especially when related to technological innovation.

In a more recent collective work,[1202] after years of research on the topic,[1203] Auby draws some uncertainties about the distinction between personal data and non-personal data, the turbulences affecting personal urban data, and the (far from over) debate on non-personal urban data. After all, there is the debate on private and public data ownership produced in the smart cities in competition with a vision of "data commons" for collective use, in which there is a conflict over the status of urban data and the management of systems dealing with urban data:

> The main problems seem to arise from the inevitable interconnection of data. One of the essential characteristics of smart cities is that it is infinitely more

[1200] Jean-Bernard Auby, "Ville intelligente et questions juridiques", (25 February 2015), online: *Les Echos* <https://www.lesechos.fr/2015/02/ville-intelligente-et-questions-juridiques-200435>.
[1201] Edouard Geffray and Jean-Bernard Auby, "The political and legal consequences of smart cities" (2018) Special Issue 16 Field Actions Science Reports, online: <http://journals.openedition.org/factsreports/4281>.
[1202] Jean-Bernard Auby, "Quelques questions pour le futur" in Vincenzo De Gregorio & Jean-Bernard Auby, eds, *Données urbaines et smart cities* Au fil du débat (Boulogne-Billancourt: Berger-Levrault, 2017) 207.
[1203] Anyone interested on law and cities should read this excelent book that goes far beyond French law: Jean-Bernard Auby, *Droit de la ville: du fonctionnement juridique des villes au droit à la ville* (Paris: LexisNexis, 2013).

> interconnected than is the classical urban operation, much more segmented, organized into "silos". It should be understood here that the different segments of urban infrastructure and urban services will increasingly work together […] and that various private entities and services will be in constant co-action with public entities and services to produce urban operations.[1204]

This increasingly blurred line between *public and private* and *personal and non-personal* urban data gets even more complex and contradictory when trying to pinpoint the existing legal difficulties and inadequacies[1205] involving the many well-known struggles[1206] between the usual rules of public procurement and the smart cities initiatives related to innovation.[1207] There is a shared sense among those who work closely to municipalities that "[e]stablishing the infrastructure of smart cities requires and will continue to require changes to public contract law,"[1208] which exposes a legal concern already expressed by European reports[1209] and generates recommendations for public policies.[1210] Public procurement norms and systematic processes are designed and practiced in order to achieve the most favorable conditions for the public administration in contracting by the State, but inflexible, dominant models can frustrate any institutional will for engaging innovative technologies for municipalities.

Even the best intentions can be deceiving when hiring services for municipal governments, so the State supposedly should have efficient rules for technology contracts (e.g.,

[1204] My translation. Auby, *supra* note 1202 at 200.
[1205] Forum Montesquieu, *supra* note 1052 at 19min38s.
[1206] There is a lot of doctrinal critique for the improvement of public procurement, yet the difficulties of promoting innovation through procurement are well known by legal professionals working in government.
[1207] See: Alberto Savoldelli, Cristiano Codagnone & Gianluca Misuraca, "Understanding the e-government paradox: Learning from literature and practice on barriers to adoption" (2014) 31 Government Information Quarterly S63–S71; Elvira Uyarra et al, "Barriers to innovation through public procurement: A supplier perspective" (2014) 34:10 Technovation 631–645.
[1208] Auby, *supra* note 1201.
[1209] *Analysing the potential for wide scale roll out of integrated Smart Cities and Communities solutions - Public procurement models for SCC solutions*, by Directorate-General for Energy (European Commission, 2016).
[1210] "Public procurement rules need to be reformed to ensure procurement based on results becomes possible, including lifecycle costs and benefits." *The making of a smart city: policy recommendations for decision makers at local regional, national and EU levels*, by Jorge Nunez Ferrer et al (2017) at 3.

avoiding locked-in conditions)[1211] while also allowing advantageous innovation for its services. Instead, despite having been recognized as critical[1212] and a challenge for government for quite a long time,[1213] technology procurement remains prone to mistakes[1214] and dependent on providers[1215] in smart cities projects. Too often, the city government is unable to engage innovation through traditional procurement, while the *innovation entrepreneur*[1216] is unable to deliver innovative models without compromising IP assets, which creates the need for creative efforts from both sides.

By following the timeline of contributions from professor Auby, many reflexive observations were brought to the doctoral research. They represent visions and lessons from a legal scholar who was already a celebrated author in all kinds of urban debates before he moved to technology topics (in special, Big Data and open data) and their applications in emergent

[1211] Elena Veronelli, "Smart cities vs 'locked-in' cities", (5 September 2016), online: *Youris.com* <http://www.youris.com/energy/ecocities/smart-cities-vs-locked-in-cities.kl>.
[1212] "Some still think that technology is a 'sector' in government which can be delegated to a public company or department. They are wrong: in the world of today, technology is government." Ronaldo Lemos, "Governos são plataformas tecnológicas", (18 June 2018), online: *Folha de São Paulo* <https://www1.folha.uol.com.br/colunas/ronaldolemos/2018/06/governos-sao-plataformas-tecnologicas.shtml>. My translation.
[1213] "[T]he key aspect of information technology that makes a fair and competitive procurement even more difficult than other procurements is the problem of compatibility between old and new systems." *Federal government information technology. Management, security, and congressional oversight*, by Office of Technology Assessment USA (Washington: US Government Printing Office, 1986) at 20.
[1214] "[S]mart cities is coming at us faster than procurement reform, which means we are set up for more mistakes in tech purchasing." Wylie, *supra* note 735.
[1215] As described by Francesca Bria, Chief Technology and Digital Innovation Officer of Barcelona: "Every vendor has a vertical business model so in Barcelona we ended up with problems such as sensors in the pavement that didn't talk to the lighting or connect with other sensors so there was inoperability, yes, but we also had business model lock-in. You end up outsourcing critical urban services to big providers without being able to shift from one provider to another and without being able to be in control of the data, and even knowing who owns what." Richard Forster, "How Barcelona's smart city strategy is giving 'power to the people'", (3 April 2018), online: *ITU News* <https://news.itu.int/how-barcelonas-smart-city-strategy-is-giving-power-to-the-people/>.
[1216] Jean-Bernard Auby: "D'abord parce qu'innovation et marches publics marchent couci-couça pour des raisons que peut-être vous connaissez […] sûrement si vous avez travaillé un peu sur le droit des marchés publics […] l'Europe réfléchit aux façons de mieux adapter le droit des marches publics à l'innovation. L'un des problèmes c'est que lorsqu'on mélange marchés publics et innovation il y a facilement y en a facilement un qui se fait avoir qui c'est l'innovateur, parce que c'est difficile d'organiser les choses de façon à ce qu'il ne fasse pas cadeau de ses innovations à tout le monde." Forum Montesquieu, *supra* note 1052 at 20min41s.

smart cities. On one side, Auby warns the smart city community about the *harder* problems that neither legislators nor judges have addressed yet (e.g., bias in algorithms) for algorithmic governance, and which are expected to grow.[1217] On the other side, his (quite optimistic) legal analysis and projections bring more light to the perspectives of urbanists and technocrats—placing more emphasis on the *city* and less on the *smart*, as proposed by Scassa—than the inherited point of view, which departs from technology and that characterized most of the literature review and the initial research project. As an effect of his texts and conferences, this dissertation has become less centered on urban tech and law, and more expansive, encompassing the many subjects about cities.

At any rate, proper legal advice is crucial to assuring public agents that (some) creativity is possible even under the rigid legal terms of public procurement (even in the procurement process itself),[1218] thus, encouraging innovation in the public sector. Two legal authors have been promoting this creative attitude by describing the internal efforts for innovation in city halls through their book "Responsive Cities: Engaging Communities Through Data-Smart Governance,"[1219] and through many of their articles[1220] and conferences[1221] all over the U.S. in an effort to address the lack of a broad legal approach to smart cities. Professors Stephen Goldsmith and Susan Crawford have dedicated themselves to the laborious effort of describing

[1217] Jean-Bernard Auby, "Algorithmes et Smart Cities : Données Juridiques" (2018) Etudes et réflexions 2018 Revue générale du droit.
[1218] See: Lisa Abeyta, "How Urban Tech Is Disrupting Government Procurement Policies", (29 April 2015), online: *Huffington Post* <https://www.huffingtonpost.com/lisa-abeyta/how-procurement-policies-_b_7152630.html>; Stephen Goldsmith, "Smart Procurement for Smart Cities", (21 November 2017), online: *Governing* <http://www.governing.com/commentary/col-smart-procurement-cities-digital-infrastructure.html>.
[1219] Stephen Goldsmith & Susan Crawford, *The responsive city: Engaging communities through data-smart governance* (San Francisco: John Wiley & Sons, 2014).
[1220] Dozens of articles and news related to the book and the projects derived from it, covering the areas related to smart cities, are available here: <https://datasmart.ash.harvard.edu/responsive-city>.
[1221] After reading the book from Stephen Goldsmith and Susan Crawford, it is very valuable to check some of their conferences and hear the authors' drivers and propositions that are not necessarily in the text. Available at: <https://www.youtube.com/playlist?list=PL9rQqvIeHwU4eohv6hWVyGz5dX5frA7wL> and <https://datasmart.ash.harvard.edu/news/article/the-responsive-city-videos-547>.

the innovative practices in cities by interviewing *empowered employees*[1222] and by analysing public policies for *responsiveness*[1223] in municipal governments—most of which are still very difficult to implement through regular procurement processes because of the legal limitations:

> Current state procurement laws in the United States slow or prohibit most of these new approaches. Therefore, it's not enough to innovate at the edges of the system and win over its lawyers. Legal reform—actually rewriting state statutes—is required. Just as with employee empowerment, so too with procurement can we have both more discretion and more accountability.[1224]

Despite their book being directed toward public servants and municipal politicians rather than to a legal audience, their work vividly describes successful cases of implementing smart cityies projects in municipalities (Boston, Chicago, New York, among others)[1225] despite unideal conditions for innovation, while also providing a normative perspective.[1226] Very pertinent for legal research, the cases illustrate the frequent confrontations between the rule-driven structures of the public sector and the new data-driven governance promoted by the "digitization-

[1222] Goldsmith & Crawford, *supra* note 1219 c 5.
[1223] The authors do not provide a clear definition of what a responsive city is, but the descriptions in the book are illustrative of the practical meaning of the term. "As we recount their stories, we look beyond the beginning of this digital revolution to consider its ultimate end: a new age of responsiveness in city government, where public servants perform truly valuable work in conjunction with those they govern. Unleashing the power of data and analytics will bring about the crack-up of the age of bureaucracy, allowing government to move from a compliance model to a problem-solving one that truly values the intelligence and dedication of its employees and the imagination and civic spirit of its citizens." *Ibid* at 16.
[1224] *Ibid* at 154.
[1225] 'Cases' is a "magical" keyword in the field. See: Tuba Bakıcı, Esteve Almirall & Jonathan Wareham, "A Smart City Initiative: the Case of Barcelona" (2013) 4:2 Journal of the Knowledge Economy 135–148.
[1226] Crawford frequently critiques the use of the term *smart city* (used only once in her book) in her many conferences available on the internet, as "simplistic, mechanistic, ahistorical, reductive and tautological": MIT Comparative Media Studies/Writing, "Susan Crawford: 'The Responsive City'", (6 June 2018), online: *YouTube* <https://www.youtube.com/watch?v=2wkgB0e42Ac> at 4min06s. Others authors also tried to differentiate responsive cities and smart cities, see: Colin O'Donnell, "Smart cities are boring. Give us responsive cities.", (14 October 2017), online: *TechCrunch* <http://social.techcrunch.com/2017/10/14/smart-cities-are-boring-give-us-responsive-cities/>; Ronaldo Lemos, "A cidade tecnológica", (2 December 2014), online: *Folha de São Paulo* <https://www1.folha.uol.com.br/colunas/ronaldolemos/2014/12/1555952-a-cidade-tecnologica.shtml>.

digitalization-digital" transformations in municipal government.[1227] Government lawyers in city halls are constantly challenged to interpret complicated mazes of laws when consulted about innovative projects that do not easily fit in consolidated practices, and the overapplication and overinterpretation of the law can lead to the lockdown of smart projects.[1228]

Goldsmith and Crawford demonstrate that the interest in protecting *responsive cities* and their administrations from legal risks in smart projects is not exclusive to lawyers who will say *no* too often when facing any legal doubts: it takes a team of engaged city workers and municipal leaders (often, with a legal background) to weigh policy progress, respect the law governing their departments, cope with the fear of sanctions (personal liabilities, indemnities), and overcome procurement as the barrier to innovation. Both authors have their premises and draw conclusions from an internal point of view of government, as they have had experience in public administrations and have experienced similar conditions and dynamics in technology projects. Their findings on innovation in cities are compatible with the ones from previous authors in this subchapter, including the primacy of their analysis on public policies for government, governance and citizens over a stricter vision of conformity to positive law.

This book about the "Responsive City" contributed a lot to revealing all of the initial key elements of legal analysis in this dissertation (privacy, transparency, participation, information security, accountability, governance) as juggling objects (or spinning plates) being equilibrated by the busy hands of municipal employees in charge of smart projects. The subsidies from the authors were providential for the approval of the project in the comprehensive exam, but also,

[1227] See: Jeanne Ross, "Don't Confuse Digital with Digitization", (29 September 2017), online: *MIT Sloan Management Review* <https://sloanreview.mit.edu/article/dont-confuse-digital-with-digitization/>; Jason Bloomberg, "Digitization, Digitalization, And Digital Transformation: Confuse Them At Your Peril", (29 April 2018), online: *Forbes* <https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confuse-them-at-your-peril/>.
[1228] Goldsmith & Crawford, *supra* note 1219 at 143.

above all, to reinforce the growing relevance (and the inevitable uncertainty) of thinking about law from the practical experiences (similarly) conducted by city halls around the world.

New models of "e-government," "public administration 2.0" and "government 3.0"[1229] (and other upgrades) are translated into smart cities projects supported by the intelligence of their users for efficiency gains and not only by using technological tools. Nevertheless, this takes "a major revision of the bureaucratic mentality and compartmentalized organization in silos."[1230] Pierre Trudel, more than any other legal author in the bibliographic revision, stressed the need to change the bureaucratic culture based on paper in a way that would demand more than just updating technologies to accomplish the so-called *open and intelligent government*. Considering that, on the one hand, most of the technologies for the smart city are already available to offer access to improved services,[1231] and on the other hand, public authorities overinterpret the law to deny access to necessary information, there is a need to rethink the law:

> These transformations require a rereading or reinterpretation of several fundamental legal principles governing the determination of the rights and obligations of public administration and citizens. Cultures, bureaucratic reflexes and the hierarchies that accompany them are obstacles to the development of online services. Not only must we consider the updating of laws, but we must

[1229] There is massive literature about these subjects and the research initially approached them, but with the increasing academic production on smart cities, the dissertation moved from those nomenclatures to focus on other specific narratives. About those initial concerns, see: Ryad Titah & Henri Barki, "E-government adoption and acceptance: A literature review" (2006) 2:3 International Journal of Electronic Government Research (IJEGR) 23–57; Richard Heeks & Savita Bailur, "Analyzing e-government research: Perspectives, philosophies, theories, methods, and practice" (2007) 24:2 Government information quarterly 243–265; Miriam Lips, "E-Government is Dead: Long Live Public Administration 2.0" (2013) 20 Innovation in the Public Sector 30–41; EunHyung Park & Jea-Wan Lee, "A study on policy literacy and public attitudes toward government innovation-focusing on Government 3.0 in South Korea" (2015) 1:1 Journal of Open Innovation: Technology, Market, and Complexity 23; David Valle-Cruz & Rodrigo Sandoval-Almaz, *E-gov 4.0: a literature review towards the new government* (2612788: ACM, 2014).

[1230] Pierre Trudel, "« Gouvernement intelligent »: quelques conditions", (6 November 2014), online: <http://www.journaldemontreal.com/2014/11/06/gouvernement-intelligent--quelques-conditions>. My translation.

[1231] Glen Martin, "Most Of What We Need For Smart Cities Already Exists", (1 May 2014), online: *Forbes* <https://www.forbes.com/sites/oreillymedia/2014/05/01/most-of-what-we-need-for-smart-cities-already-exists/>.

above all ensure changes in reflexes and mentalities.[1232]

Without such a change of the legal and institutional paradigm, the professor of information law from Université de Montréal advocates that the law will be used against the goals of the new "e-gov x.0" systems. Public transparency and openness are the most notorious guidelines of "Smart Cities 2.0"[1233] projects (presupposed to be included in their respective 3.0 versions),[1234] but researchers such as Trudel are used to finding municipal data bases unavailable for consultation even under information access laws,[1235] often because the public authorities invoke personal data protection to deny access to public documents. In a time when most privacy scholars would repeatedly postulate increasing data protections for residents over the smart cities projects, this article encouraged the present research to think differently, and to consider that the law should "regulate the re-use of the mass of information that administrations already possess,"[1236] rather than asking their residents for the same data again and again.

[1232] Trudel, *supra* note 1230. My translation.
[1233] See: Barns et al, *supra* note 927; Donald McNeill et al, "From Smart Cities 1.0 to 2.0: it's not (only) about the tech", (3 April 2017), online: *The Conversation* <http://theconversation.com/from-smart-cities-1-0-to-2-0-its-not-only-about-the-tech-73851>; Alicia Asín, "Smart Cities 2.0: What Works Today", (3 November 2015), online: *Meeting of the Minds* <http://meetingoftheminds.org/smart-cities-2-0-what-works-today-14314>.
[1234] See: Herman van den Bosch, "Smart Cities 1.0, 2.0, 3.0. What's next?", (4 July 2017), online: *Smart City Hub* <http://smartcityhub.com/collaborative-city/smart-cities-1-0-2-0-3-0-whats-next/>; Ara Margossian & Webb Henderson, "The role of innovation, partnering and open standards in delivering the next generation of smart cities", (June 2018), online: *Webb Henderson* <https://webbhenderson.com/wp-content/uploads/2018/06/Smart-Cities-3.0-June-2018.pdf>; Daniele Loffreda, "Smart Cities 3.0: 5G, Edge Computing and Citizen Engagement", (5 June 2018), online: *StateTech* <https://statetechmagazine.com/article/2018/06/smart-cities-30-5g-edge-computing-and-citizen-engagement>; Boyd Cohen, "The 3 Generations Of Smart Cities", (10 August 2015), online: *Fast Company* <https://www.fastcompany.com/3047795/the-3-generations-of-smart-cities>; Jackie Snow, "The progression toward smart cities 3.0 is 'an evolution, not a revolution'", (13 July 2017), online: *Smart Cities Dive* <https://www.smartcitiesdive.com/news/the-progression-toward-smart-cities-30-is-an-evolution-not-a-revolution/447021/>.
[1235] "*« Souvent, dans un souci de centralisation et pour contrôler le message, on force tout le monde à passer par l'accès à l'information pour obtenir un document public. Ça augmente donc le nombre de demandes », explique Pierre Trudel, chercheur en droit de l'information à l'Université de Montréal*." Marie Christine Trottier, "Montréal manquerait de «transparence»", online: *TVA Nouvelles* <http://www.tvanouvelles.ca/2016/11/15/montreal-manquerait-de-transparence>.
[1236] Trudel, *supra* note 1230.

This position would be followed in a later publication,[1237] when Trudel reinforced his position of rethinking the law for the governance of the intelligent city by pointing out that there is a need to conciliate transparency and privacy beyond the legal institute of consent. Amongst the global waves caused by the implementation of the General Data Protection Regulation in the European Union,[1238] there came a renewed investment in the institute of consent as a legal master key for personal data protection and data ownership for the urban dwellers in smart cities. This illusion (and fixation) on consent as *the solution*,[1239] even if it is now more complex in the new privacy world standard set by the European Union, may reveal itself to be deceitful or incomplete because such laws do not offer protection against profiling and other arbitrary processes.[1240] Without disregarding the risks related to data protection for individuals who have their data collected under these conditions, Trudel proposes to think and regulate aggregated data as a collective resource[1241] on which smart cities (run and) depend to work.[1242] This reasoning relates with the ideas of data stewardship, governance, licenses and experiments from the previous authors and was immensely thought provoking along the research.

The publications from professor Trudel (the advisor of this dissertation, by the way)

[1237] Pierre Trudel, "Les villes intelligentes", (21 November 2017), online: *Le Devoir* <https://www.ledevoir.com/opinion/chroniques/513506/les-villes-intelligentes>. My translation.
[1238] Dan Swinhoe, "Why GDPR means Smart Cities need to move on from an 'Open Data' approach", (1 February 2018), online: *IDG Connect* <https://www.idgconnect.com/abstract/29380/why-gdpr-means-smart-cities-open-data-approach>; Henderson, *supra* note 1059.
[1239] "*À l'heure actuelle tant en Europe qu'en Amérique du Nord le consentement fait l'affaire de tout le monde finalement on l'exige, tout le monde le donne de façon machinale, on clique tous "j'accepte"… Voilà un exemple d'un mécanisme juridique qu'on a importé sans trop de réflexion et qu'on a érigé en espèce de dogme dans certains cas et qui ne protège absolument plus rien finalement parce que il est devenu tellement banalisée.*" CRDP UdeM, "Pierre Trudel | Objets connectés : Un état des lieux canadien", (9 October 2015), online: *YouTube* <https://youtu.be/pOJg6vr6rgg> at 18min 34s.
[1240] Pierre Trudel, "La valeur de nos données personnelles", (13 March 2018), online: *Le Devoir* <https://www.ledevoir.com/opinion/chroniques/522496/la-valeur-de-nos-donnees-personnelles>.
[1241] *Ibid*.
[1242] "In data-intensive projects, data is the whole game," a hard lesson repeatably learn by many smart city projects. Blayne Haggart & Zachary Spicer, "What Toronto's Quayside project has taught us about smart cities and data", (13 July 2018), online: *CityMetric* <https://www.citymetric.com/horizons/toronto-quayside-project-smart-cities-and-data-google-sidewalk-labs-3815>.

induced the initial research to follow paths beyond the usual set of recommended and generally accepted legal solutions (such as *informed choice* and *meaningful prior consent*) for smart cities issues, and also encouraged it to question those solutions. Also important, his publications on the press (his *published blog*) set a valuable example of working in innovative narratives that can be communicated beyond the legal community to sensitize other communities and to foster social and legal change—and this was taken as a goal for this dissertation.

Another article fostered a change of mind by bringing a more European legal perspective on smart cities,[1243] in which professor Lilian Edwards raises a strong suspicion about the effectivity of consent as a generic remedy for privacy in the smart city. Edwards seems to find similar obstacles like the ones found here in the legal literature review, since "there is only in the beginnings of an academic literature on smart cities and privacy, with very little of it coming from legal, as opposed to information sciences, scholars."[1244] This did not prevent her from making an important contribution to a debate that seemed destined to be "sliced" into legal topics:

> [W]hy discuss privacy and smart cities? Why not privacy and the IoT, or privacy and big data, or even privacy and the collapse of the private/public spaces demarcation? Each of these now has a steadily growing literature. There are a number of answers to this. First, smart cities represent the synthesis of all of these problems. In this sense they are a unique and important use case, which deserves special, bespoke attention.[1245]

Evidently, it is necessary to take advantage of the availability of legal inputs about personal data protection in Big Data, IoT, and cloud computing, but the legal concerns and answers for the smart city are more than the sum of their (technological) parts, especially when "a number of key challenges so far appears relatively insuperable by legal regulation alone."[1246]

[1243] Lilian Edwards, "Privacy, security and data protection in smart cities: A critical EU law perspective" (2016) 2 Eur Data Prot L Rev 28 at 40.
[1244] Edwards, *supra* note 1243. This difficulty has been overcome since then, but remains challenging.
[1245] *Ibid* at 35.
[1246] *Ibid* at 29.

This includes the most recent legal developments, such as the GDPR, and the case of consent (also called "notice and choice") in the ubiquitous ambient intelligence of the smart city.[1247] IoT devices and data analytics become more useful and efficient for measured and pre-emptive services of a city when they do not depend on the consent of city dwellers—the experience shows that smart cities do not usually ask them for it. Even if it were required, as some privacy enthusiasts expect it to be, "[u]sers, as has been proven over and over again, have neither the resources, opportunity, inclination, or motivation to give meaningful consent."[1248]

Despite Lilian Edwards' recommendations for algorithmic transparency and privacy impact assessment for smart city data flows, there is still much self-assumed pessimism[1249] manifested by her regarding the usual privacy tools for the smart city.[1250] Yet, the researcher hopes that moving at least partially away from the *generic solution* of consent will allow other forms to "code solutions" to the legal concerns of the smart city. Her article gives another hint of hope for (fighting pessimism in) research by explicitly using science fiction[1251] for imagining a "total privacy society"[1252] as a projection for what law should and should not seek to implement. In fact, looking further into Edwards' work and finding out about the events that she organizes with *GikII* (Geek Law),[1253] a series of conferences on technology law and popular culture, helped to shape the final form of the research explained by this dissertation.

The aforementioned article may have concluded its arguments with a reference to

[1247] Mireille Hildebrandt & Bert-Jaap Koops, "The Challenges of Ambient Law and Legal Protection in the Profiling Era" (2010) 73:3 The Modern Law Review 428–460.
[1248] Edwards, *supra* note 1243 at 55.
[1249] The Scottish academic is not alone. See: Laboratoire de Cyberjustice, *supra* note 245.
[1250] As often done in this research, I would recommend combining the articles with the available conferences of the researchers. See: Universität Göttingen, "Prof. Lilian Edwards - 'The death of data protection'", (5 July 2013), online: *YouTube* <https://www.youtube.com/watch?v=wCeDrmvzAs4> at 54min30s.
[1251] For example, when the researcher refers to Hannu Rajaniemi's novel "The Quantum Thief"..
[1252] Edwards, *supra* note 1243 at 57.
[1253] Gikii, "GikII - About us", (4 April 2012), online: *GikII* <http://www.gikii.org/sample-page/>.

science fiction, but it was a book of law and technology which begins with a short fictional narrative that finally captured the attention of the research(er) for the possibilities of combining literature with law and technology for the methodology of this dissertation. The book "Smart Technologies and the Ends of Law"[1254] from Mireille Hildebrandt, a Dutch research professor at the Faculty of Law and Criminology at Vrije Universiteit Brussel, is not about smart cities *per se*, but about the smart environments that make the city the main scenario of this short story. Her short narrative describes the fictional life of Diana, the many applications of smart devices in the activities of her family, and their exchange of data with commercial and government systems. The personal data assistants of the family members interact with urban systems of traffic and public transportation, as well as with healthcare and school systems, providing background services for an integrated management of their lives through a continuous engagement of smart technologies and smart environments. In sum, this short (science and legal) fiction tries to present the life of a middle-class family in a smart city of the near future.

The smart city represents the ultimate smart environment portraying "the visions of ubiquitous computing, Ambient Intelligence, autonomic computing and the Internet of Things"[1255] that fills narratives of the future that were expected to happen and prepare "for the promise of smart technologies and for their potentially disruptive influence on democracy and the Rule of Law."[1256] The word *smart* here should be carefully considered in terms of meaning and purpose,[1257] because the term could be understood as *high-tech* or *data-driven agency* in the city, but also as the learning from the interaction of people with data-driven agents, changing

[1254] Mireille Hildebrandt, *Smart technologies and the end(s) of law : novel entanglements of law and technology* (Cheltenham: Edward Elgar, 2016).
[1255] *Ibid* at 27.
[1256] *Ibid* at 21.
[1257] "The word smart should not be hijacked as if the city can only be smart if there is high-tech." Centre for Ethics - University of Toronto, "Ethics in the City: Mireille Hildebrandt, Interacting with Non-Human Agents", (5 March 2018), online: *YouTube* <https://youtu.be/t4jwhw0pasg?t=243> at 5min50s.

urban relations. The city and the *smart agents* carried by citizens are expected to be embedded with artificial intelligence and their algorithms, fed by too much data from "forests of sensors,"[1258] which may find patterns that do not exist in real life that they will invisibly manage, unnoticed by the users.[1259] People have not only been using smart tech; city dwellers are also becoming aware of the fact that they are being used by the data driven environment of the smart city:

> "because that is how it becomes smart, gathering our data and analysing them. […] Yes, we are using these technologies and that is clear. Yes, they are using us, maybe that is what we want. The question is always who is 'we' in all these sentences. But maybe we must also learn to interact with these technologies. because they are anticipating us, they are pre-empting our behaviour, so maybe we should learn to turn the table."[1260]

For turning the tables in favor of citizens and local democracy, governments need to lead the collaboration between public and private sectors and establish the control and distribution of data to promote transparency and access. Law must reflect those goals, otherwise, legal instruments such as contracts can be used against them. "We want smart cities for the people who live in these cities and the word *smart* should not be hijacked,"[1261] and the normative force of law is needed to achieve this,[1262] not the forces of technology acting in the name of ethics.[1263]

Endorsing the warnings of Professor Hildebrandt after witnessing how much suitable storytelling can do for a legal analysis, the initial research project of this dissertation was one of the tables turned by her book. As a consequence of her book and all the aforementioned authors consulted and publications read, the dissertation ended up integrating more elements and

[1258] Using an expression by Auby, *supra* note 1200 at 25.
[1259] Pranav Srikanth, "Mireille Hildebrandt speaks on the ethics of smart cities", (24 February 2018), online: *The Varsity* <https://thevarsity.ca/2018/02/24/mireille-hildebrandt-speaks-on-the-ethics-of-smart-cities/>.
[1260] Centre for Ethics - University of Toronto, *supra* note 1257 at 6min45s.
[1261] *Ibid* at 5min52s.
[1262] Mireille Hildebrandt, "Legal and technological normativity: more (and less) than twin sisters" (2008) 12:3 Techné: research in philosophy and Technology 169–183.
[1263] Mireille Hildebrandt, "Closure: on ethics, code and law", (29 May 2019), online: *Law for Computer Scientists* <https://lawforcomputerscientists.pubpub.org/pub/nx5zv2ux>.

methodologies than previewed. Other legal authors and sources were also found in the hundreds of hours spent searching databases—a lesser part of the usual thousands of reading hours in a doctorate program—and looking for sense and pattern recognition for the dissertation.[1264] But because the above-mentioned works are the ones that have caused a greater impact in the research and established the main pattern of legal reference, the remaining sources compatible with the dissertation were left for the following chapter.

Other legal scholars are quoted in the subchapter 3.3 of this dissertation, in the experiment that combines law and science (and) fiction. Any reader willing to focus only in the stricter sense of legal research produced by this doctoral research may move directly to the subchapter 3.2 of the next chapter, where the public policies of two study cases references are related to primary sources of law.

The literature review of this subchapter used the following keywords that were identified and classified in the text mining process that is discussed in the subchapter 3.1 of the next chapter: privacy, personal data protection, information security, cyber security; transparency, openness, participation, engagement; accountability, accountable, data/city/smart governance.

By the end of this chapter, it is worth emphasizing that the keywords and expressions used here represent only the *corpus* of texts consulted by the research and not the entire universe of publications on the subject of smart cities. The following chapter details the choices made for the research that oriented the textual experiment in the literature review.

[1264] "Pattern recognition seems pivotal for all this, as it entails more than executing a fixed series of steps in response for a fixed series of perceptions. Pattern recognition thus stands for more than detecting regularities; it rather refers to the capability to detect correlations for what is perceived." Hildebrandt, *supra* note 1254 at 22.

3. A Triple Approach for Legal Research on Smart Cities

There are many stories behind all research, with multiple personal and academic perspectives to tell or understand them. This doctoral research is no different. Among the many possible choices, the story described here may be neither the most advisable nor the most interesting, because it may not appear impersonal enough for a scientific work, while it is not engaging enough for a fictional story. Yet, somehow, it may have some of both of these characteristics in it, because this research takes elements from science and fiction to approach the subject of smart cities through a legal perspective. There are ongoing debates about law and its close relationships with science (law as a normative science or a social science?)[1265] and fiction (law as a fiction or as authoritative fiction?)[1266] that point toward aspects of both dimensions in legal theory, so they might keep some compatibility as seen in the first chapter. The literature review might have demonstrated how much smart cities are presented as a *scientific subject* to the general public,[1267] despite the amount of *fictional storytelling* the concept carries with it.[1268] For these reasons, this dissertation is a story about smart cities which combines science, law, and literature.

This chapter contains the central plot of this dissertation, describing where the facts were exposed, how the main concerns were developed—that is, how *matters of fact* became *matters*

[1265] See: Stanley L Paulson & Bonnie Litschewski Paulson, eds, *Normativity and norms: critical perspectives on Kelsenian themes* (Oxford; New York: Clarendon Press; Oxford University Press, 1998); Nicoletta Bersier Ladavac, “Jurisprudence as Normative Science” in Mortimer Sellers & Stephan Kirste, eds, *Encyclopedia of the Philosophy of Law and Social Philosophy* (Dordrecht: Springer, 2019) 1; Geoffrey Samuel, “Is law really a social science? A view from comparative law” (2008) 67:2 The Cambridge Law Journal 288–321; Malcolm M Feeley, “Three voices of socio-legal studies” (2001) 35:2–3 Israel Law Review 175–204.

[1266] Geoffrey, *supra* note 2; Andrei Marmor, “Law as Authoritative Fiction” (2018) 37:5 Law and Philosophy 473–497.

[1267] Arden Phillips, “At NYU Tandon, middle schoolers learn the science of smart cities”, (29 July 2018), online: *The Bridge* <https://thebridgebk.com/highlight_post/nyu-middle-schoolers-learn-science-smart-cities/>.

[1268] Cynthia Ghorra-Gobin, “Smart City:" fiction" et innovation stratégique. Avant-propos” (2018) 96 Quaderni Communication, technologies, pouvoir 5–15.

of concern[1269] in the research—and to what conclusions they may lead. Also, this chapter explains the *Ouroboros*[1270] background logic that transformed the research over time (and pushed it into overtime) and the "self-referential recursive process with alternating phases of data acquisition and evaluation"[1271] embedded in the *research-governing algorithm* that may continue similar enquiries even after the expected end of the research.

In order to clarify this process, it may be advisable to follow the timeline of the story (almost) as it happened in the research that is reflected in the dissertation. The first chapter was dedicated to the theoretical frameworks in which all the research was based, including the premises about science, law, and literature that initially guided the triple approach experiment in this third chapter. Nevertheless, during the whole process of research, the references in the *theory chapter* were under continuous reassessment informed by the observed results. The second chapter was lengthily built to contextualize the research, to conceptualize the main subject, to explain its multiple technological components, to present the state of the art for legal research, and to establish the basis for the analysis in the third chapter. Yet, the whole initial structure of the *literature review* was redesigned and recomposed by the building blocks of several publications that appeared in the patterns revealed by the third chapter.

This third chapter represents an attempt at contributing to legal research on smart cities and, if possible, a chance of providing some feedback to other areas of knowledge (and the research communities) that were essential for getting to this point of the dissertation. The

[1269] Latour, *supra* note 22.
[1270] "What is of interest for the purposes of this study are the ideas that the *Ouroboros* represents. The *Ouroboros*, generally, symbolizes ideas of cyclicality, unity or even the vicious circle. The most famous representation of the *Ouroboros* is the one found in the text 'The Chrysopoeia of Cleopatra' dating to 2nd century Alexandria. In this drawing, the *Ouroboros* encloses the words *ἕν, τὸ πᾶν*, which is translated as 'one, the all', i.e. 'All is one', referring us back to the idea of unity, cyclicality and integration.". Panos Merkouris, "Debating the Ouroboros of International Law: The Drafting History of Article 31(3)(c)" (2007) 9:1 International Community Law Review, online: <https://brill.com/view/journals/iclr/9/1/article-p1_1.xml> at 2.
[1271] Knud Thomsen, *The Ouroboros Model, Selected Facets* (Springer New York, 2011) at 239.

(hundreds of) references and each mention in the previous chapter almost self-explain the relevance of their research, which were mostly published during the duration of this doctoral research, and their *raison d'être* in this dissertation will be demonstrated next.

The first part of this chapter is dedicated to describing the *text analytics experiments* that were conducted to build a scientific approach to the subject of smart cities through a systematic review of literature. The second part of the subchapter applies relational results of the experiments to the legal analysis and considerations about the regulatory environments of two smart city projects: the cases of Rio de Janeiro and Montréal. The third and last subchapter will combine other results from the data analytics, part of the sociolegal concerns expressed earlier, and the outcomes of the second subchapter to integrate them in a *law & science fiction* approach.

3.1. Prototyping Emergent Knowledge With Building Blocks From Text Analytics

The first chapter of the doctoral dissertation was not set merely for the required *show-and-tell of theory*: it is essential for the understanding and development of all the research presented here in a (believe it or not) synthesized form of academic text. First, it analyzes the exhaustion of the paradigm of modernity and the emergence of a postmodern paradigm manifested in the rationalities related to science, law, and literature. Finally, the chapter presents theories and works that, directly or not, collaborate with the initial assumptions or, at least, are coherent enough with them. The theoretical chapter may seem to be focused on descriptions and not to conclude with prescriptions, but they are always implied: "Descriptions, for postmodern emancipatory knowledge, are both prescriptions and proscriptions, whose prescribed or proscribed content is widely accepted as a matter of fact."[1272]

The second chapter of the doctoral dissertation was not conceived as the usual *flyby of*

[1272] Santos, *supra* note 23 at 38.

the literature on the subject: it is (an attempt to get) a proof of the concept of the descriptions and prescriptions of the paradigmatic transition discussed before. In order to write it as it is, with hundreds of references from media and academic publications, it took multiple and extensive efforts of data collection, selection, examination, classification, and composition. Many of those efforts were done through data analytics routines, which could portray the same symptoms of automatic utopianism of science and technology from the modern paradigm that prioritized *knowledge-as-regulation*.[1273] However, the *test-drive* on the second chapter followed a postmodern guidance toward *knowledge-as-emancipation*, by accepting and reassessing *chaos* and *solidarity* for building prudent knowledge and community reciprocity.

This third chapter of the doctoral dissertation was neither designed to establish a *new order over a previous unknown,* nor to affirm a *closed statement over a collective problem*: it takes unfinished representations of modernity to expose the inherent incompleteness of knowledge that requires prudence; it reassesses risk by feeding on (and not fighting) the deficit of scientific foresight that fears chaos as ignorance; it assumes solidarity as a form of knowing and transforming through (neo)communities and it opens its contents to intersubjective webs of reciprocity. As odd as it may seem for this to be in a legal research, those are the goals here.

This legal dissertation was conceived, built, and presented in an academic institution. So, it is always expected that part of it would make a scientific and legal contribution that must be scrutable by both cognitive-instrumental and moral-practical rationalities. This contribution needs to remain coherent with the premises set in the opening of this dissertation, ergo, the proposition is to move forward and away from the usual scientific and legal approaches, but not too much. The immeasurable contributions of modern science and law are not to be thrown in the dumpster

[1273] *See Ibid* at 25.

of history since, after all, it is not *the end of history.*[1274] The goal is to approach science and law by recognizing them as emancipatory knowledge able to form *a new common sense*:

> Postmodern knowledge tries to rehabilitate common sense, for it recognizes in this form of knowledge some capacity to enrich our relationship with the world. Commonsense knowledge, it is true, tends to be a mystified and mystifying knowledge, but in spite of that, and in spite of its conservative quality, it does have a utopian and liberating dimension that may be enhanced by its dialogue with postmodern knowledge. This utopian, liberating quality may be seen to flourish in many different characteristics of our commonsense knowledge.
> Common sense collapses cause and intention; it rests on a worldview based on action and on the principle of individual creativity and responsibility. Common sense is practical and pragmatic… it asserts that this link to group experience renders it reliable and reassuring. Common sense is self-evident and transparent. It mistrusts the opacity of technological objectives and the esoteric nature of knowledge, arguing the principle of equal access to discourse, to cognitive and linguistic competence. Common sense is superficial, because it disdains structures that cannot be consciously apprehended, but, for the same reason, it is expert at capturing the horizontal complexity of conscious relations, both among people and between people and things. Commonsense knowledge is nondisciplinary and nonmethodical. It is not the product of a practice expressly devised to create it; it reproduces itself spontaneously in the daily happenings of life. Common sense favors actions that do not provoke significant ruptures in reality. Common sense is rhetorical and metaphorical; it does not teach, it persuades or convinces. Finally, common sense, in Dewey's words, fuses use with enjoyment, the emotional with the intellectual and the practical.
> These characteristics of common sense hold the virtue of foreknowledge. Left to itself, common sense is conservative. However, once transformed by postmodern emancipatory knowledge, it may be the source of a new rationality—a rationality comprised of multiple rationalities.[1275]

In times of crisis *for/in/by* science and law, it may seem dangerous to call the forbidden name of the modern foe to engage with them. The following subchapters try to contribute to a new, informed, prudent, and aesthetic common sense that re-enchants science and law.

3.1.1. Data Analytics "Because It is 2020" and the Topic Asks for It

As with any other research, it all began with the usual steps: searching sources of data concerning a chosen subject; collecting publications that seemed more relevant to the research

[1274] I'm (not) sorry, Fukuyama. *See* Timothy Stanley & Alexander Lee, "It's Still Not the End of History", (1 September 2014), online: *The Atlantic* <https://www.theatlantic.com/politics/archive/2014/09/its-still-not-the-end-of-history-francis-fukuyama/379394/>.
[1275] Santos, *supra* note 23 at 47.

questions and hypothesis; reading and note-taking on as much of meaningful data from the texts as possible; classifying the content into sets of subcategories of interest; considering the research objectives to identify the most useful ones and discard the less relevant ones. Repeat.

The plan was to keep looping this process until there was enough *critical mass* to go back and forth between the analysis stage and the synthesis stage,[1276] and to eventually reach a point of accumulation for writing down the results for an evaluation from the pairs. It was supposed to be a simple (and laborious) process for a doctoral legal research. Yet, the difficulty in finding sources and relevant information thwarted the initial plans, as was explained in the previous chapter. The most relevant productions on smart cities, in several areas of knowledge, were published during the period of the doctoral research, and the initial conditions of the proposed cases substantially changed during this period, as well.

"Be careful what you wish for": the research suddenly unveiled far more publications than were expected in an intense, short period, and this demanded challenging the initial project of 2013–2014 with new adjustments. The *state-of-the-art* research on smart cities moved from a few dozens of sources—as mentioned before in the literature review by quoting urban issues researchers Alberto Vanolo and Jean-Bernard Auby—to thousand of publications by hundreds of researchers from dozens of countries in a period of few years. The compressed time-space of publications reflected the emergence of the subject and produced an earthquake effect on the basis of the research project, with some aftershocks still demanding adjustments.

Not to forget, the two most relevant smart city projects for the research (Rio de Janeiro and Montréal) changed their local and national political directions and so did their smart city projects. To be fair, similar political changes occurred in other cities that were initially considered

[1276] Admittedly, sometimes coming temporary back to the first loop because I would find some gaps and new relevant publications to cover them (enough for the moment).

for analysis—Barcelona, Madrid, San Francisco, New York, Toronto, and São Paulo—but were soon discarded due to the lack of a budget for accomplishment. When significative changes occurred in the academic and techno-social contexts, the research also had to change.

To accomplish the goals of the research while preserving the questions and hypothesis, it was necessary to reduce the emphasis on accessory elements (cloud computing, for example) and increase the focus on the main subject (smart cities). The academic production during the research period provided enough elements for this decision, but they would only become evident after the first results from the text analytics experiments. Incorporating data analytics as a research method for social and humanities studies was also a recent contribution found in the period of doctoral research and, despite some initial resistance to adopting this approach in a legal dissertation, it was progressively incorporated into the project.

Since the research was initially focused on data-driven decision-making in cities, it was only logical to try some tools for data analytics and get to know them better. Some of the tools required some investment in online courses (mainly Coursera and EdX) and, above all, several months of training to acquire the minimal skills for operating basic functions in the most frequently mentioned *toolkits* for data-driven decision-making: more specifically, *Hadoop* (for Big Data), *IBM Watson* (for machine learning) and *Tableau analytics* (for data visualization). Even if most of those efforts did not prove fruitful for the main research, they assisted in what came next: a beneficial *downgrading* to simpler and cheaper solutions that proved to be useful for incorporating a *small data* approach to analyze the growing databases of the research.

It is necessary to mention the support of the library services from Université de Montréal that supplied part of the necessary (physical and online) access to technical publications on text

analytics and visualization tools of which even a law doctoral candidate could make good use.[1277] It is also worth acknowledging that doctoral candidates from other areas of knowledge also supported this incursion in narrative and technical grounds by discussing conditions, recommending publications and presenting online tools for instrumental use.[1278] Indispensably, the research director was open and supportive for the new approach using data analysis. If raising a child takes a village, developing a research takes a community.

After several attempts and much learning by trial and error in numerous tools recommended by the Canadian-supported project *TAPoR 3*,[1279] four different text analytics online tools were selected to be used in the research: *Word Count Tools*,[1280] *Textalyzer*,[1281] *Sketch Engine*[1282] and *Voyant Tools*.[1283] Three of them are free and one offers a free trial of 30 days (*Sketch Engine*) and an affordable cost for researchers. These tools are relatively simple to use for any intermediate level user of information technologies. *Word Count Tools* and *Textalyzer* were used for simpler analysis, such as counting words and finding the most recurrent expressions in texts, which proved to be adequate for the first stage of data analysis and recommended for beginners, before moving to the next two online tools.

Sketch Engine is a far more powerful tool than the others and is used for retrieving word

[1277] Many works were consulted for this task, but some of them came to help more in the departing point. *See*: Tom Reamy, *Deep text : using text analytics to conquer information overload, get real value from social media, and add big(ger) text to big data* (2016); Charu C Aggarwal & ChengXiang Zhai, "An Introduction to Text Mining" in Charu C Aggarwal & ChengXiang Zhai, eds, *Mining Text Data* (Boston: Springer, 2012) 1; Guo-Dao Sun et al, "A Survey of Visual Analytics Techniques and Applications: State-of-the-Art Research and Future Challenges" (2013) 28:5 Journal of Computer Science and Technology 852–867.

[1278] Namely, Julia Salles (UQAM) and Luciano Frizzera (Concordia) who spent much time and coffee exploring ideas and sharing books and tools for this research. *Obrigado, meus amigos e compas*.

[1279] "TAPoR has been supported by the University of Alberta, McMaster University, the Canada Foundation for Innovation, Compute Canada and the Social Science and Humanities Research Council of Canada." TAPoR, "About TAPoR 3.0", online: <http://tapor.ca/pages/about_tapor>.

[1280] It is available online at https://wordcounttools.com/.

[1281] It is available online at http://textalyser.net/.

[1282] It is available online at https://www.sketchengine.eu/.

[1283] It is available online at https://voyant-tools.org/.

frequency and keyword statistics to identify the most recurrent nouns, verbs and adjectives in the databases, and to identify their collocations and (visual) relations to each other. The tool was found after a reference in a publication mentioned data mining applications for "different Humanities and Social Science disciplines (and also the legal profession),"[1284] as the one used in a doctoral dissertation to identify crime patterns in crime news through text analytics,[1285] as well in other studies.[1286] *Sketch Engine* was then incorporated in a deeper analysis of media and academic publications mostly used in the second chapter.

Voyant Tools is an open-sourced kit of tools that does not require the programming skills required by most of the applications at *TAPoR 3* website. After some recommendations and successful trials, it was selected for several reasons better described by Ian Milligan:

> Programming is not the be all and end all. Information visualization in the humanities is a growing international field, with Canadian scholars heavily involved. The most important and accessible example is *Voyant Tools*. It is a powerful suite of textual analysis tools. Uploading one's own text or collection of texts, drawing on a webpage, or analyzing existing bodies of work, one sees the following: a "word cloud" of a corpus, click on any word to see its relative rise and fall over time (word trends), access the original text, and click on any word to see its contextual placement within individual sentences. It ably facilitates the "distance" reading of any reasonably sized body of textual information and should be a beginning point for those interested in this field. The only downside is that *Voyant* can choke on very large amounts of information, as it is a textual analysis rather than robust data mining tool.[1287]

Fortunately, the *Voyant* toolkit has evolved and did not *choke* on the *not-so-small-data* from the academic database used in the research, a different result than the first two online tools (*Word Count Tools* and *Textalyzer),* which actually indeed faced processing issues (they *choked*

[1284] Dawn Archer, "Data Mining and Word Frequency Analysis" in Gabriele Griffin & Matt Hayler, eds, *Research methods for reading digital data in the digital humanities* Research methods for the arts and humanities (Edimburgh, 2016) 72.
[1285] Meshrif Alruily, *Using Text Mining to Identify Crime Patterns from Arabic Crime News Report Corpus* (Doctoral dissertation, De Montfort University, 2012) [unpublished].
[1286] Steven Hofstede, *Visualization for Text-based Research in Philosophy* (Master's thesis, Eindhoven University of Technology, 2018) [unpublished].
[1287] Ian Milligan, "Mining the 'Internet Graveyard': rethinking the historians' toolkit" (2012) 23:2 Journal of the Canadian Historical Association/Revue de la Société historique du Canada 21–64 at 39.

indeed). This free online tool is frequently mentioned in other studies, that served as parameters for developing a specific approach for the research,[1288] and it was further explored for data visualization purposes. There are several visualization models that could be applied and other applications with more sophisticated capabilities for text analysis that would be more graphically appealing, but the choices made were based on who would revise this dissertation, and who could try to engage with the mentioned data analytics tools.

This research has expressed the commitment to prioritizing accessible tools to guarantee that its content would be more available, especially for those interested in reproducing similar results with text analytics tools as presented in the next subchapters. In fact, the most difficult (and time-consuming) task was not the software portion, but the data collection itself, which is also fully available for those evaluating this work and partially for the general public.

3.1.1.1. Data Collection About Smart Cities (Or an Academic Cherry-Picking?)

The construction of an appropriate bibliography is a required step for any research and the first challenge for most academic projects. In the present case, dealing with this appropriately was challenging until the end. When starting this doctoral research, as mentioned before, there was a relative scarcity of academic sources; therefore, many other sources were collected and examined along with whatever could be found relative to the subject of smart cities.

Since the beginning, as a reflection of what has been done by other researchers, publications from media outlets, blogs, and other online publications were consulted and registered in databases for later use. *News* are frequently referred to in academic publications

[1288] Jeffrey Drouin, “Close- and Distant-Reading Modernism: Network Analysis, Text Mining, and Teaching the Little Review” (2014) 5:1 The Journal of Modern Periodical Studies 110–135; Elisabeth Günther & Thorsten Quandt, “Word Counts and Topic Models: Automated text analysis methods for digital journalism research” (2016) 4:1 Digital Journalism 75–88.

and, in reflection, many researchers have their works on smart cities referred to by media outlets. Some researchers used academic blogs and mass media for publishing academic contributions to interested communities beyond universities, and this has helped amplify and qualify the debate on smart cities. Much of what is said about the topic in the news and blogs frequently gets more critical emphasis, broad accessibility and direct language than it does when showcased in academic publications; even if media publications lack the same level of scientific objectivity and other requirements, they might provide verifiable facts, social concerns, and other elements that are valuable for researchers and legal scholars, specifically.

For these reasons, a continuous effort to collect data on websites mentioning smart cities was done throughout the research period. More than a thousand news articles and posts on websites were collected in the process—after an evaluation to verify if they offered any contribution to the *state-of-the-art*—and they are all available for anyone interested in the service called *Raindropio*.[1289] The creation of such list began with active *Google* searches, then the *key phrase smart city* was set to trigger Google Alerts and to send daily Google News to the profile linked to the research. What started as an active search, could now be seen as a passive search, receiving notifications and links by email and mobile apps every day.

To avoid depending solely on *Google's* algorithms in order to follow the most recent news and publications on smart cities, a profile on *Twitter* was created (*@OpenLegalThesis*)[1290] to keep up with the growing flow of publications from profiles of media outlets and blogs, local governments and municipal departments, researchers and research centres, companies and *think tanks*, activists and NGOs, and other people and organizations that contributed to the public debate on smart cities. These also helped to compose a smaller part of the database with news

[1289] It is available online at https://raindrop.io/collection/4568718.
[1290] It is available online at https://twitter.com/OpenLegalThesis.

and posts in French, Spanish, and Portuguese—languages in which an equivalence in English had not yet been found. The *Raindropio* online list has received fewer updates in the last year because it was determined that there should be a limit to the inclusion of websites in the database up to the end of the year 2018—otherwise it would never end.

As previously mentioned in a quote by Alberto Vanolo, many publications on smart cities were initially pushed by private companies in many areas (IT, consulting, infrastructure) of the *smart city business*, frequently called *white papers* that form a *grey literature* that was, in fact, the most available and richest in content until recently. These studies, reports, presentations and other corporate publications are still largely used by media outlets and even academic publications as information references. For these reasons, the research selected around 60 *shades-of-grey* publications[1291] during the first years of research by active searches on Internet engines, shared materials in a research group, and links to documents shared in Twitter. Most of the documents were read (at least, skimmed) and are still available for those evaluating this dissertation, but they were barely used or even referred to in the research, except for when indirectly mentioned by media outlets. The corporate reports were useful for grasping the smart cities narrative coming from big tech corporations, but they are not within the scope of analysis here: there are researchers who have produced well-known studies on the corporate narratives, which are mentioned in the literature review, who have already achieved this goal.

In contrast, a set of governmental, academic, and other institutional studies and reports formed another major source of bibliographic materials that were extensively collected during the whole research period. Several of these studies and reports on smart cities were produced by governmental agencies in partnership with research centres and universities, keeping some

[1291] There is a lot more of corporate documents easily available on Internet, but the materials collected by are quite representative of their content. It is available online at http://bit.ly/SmartCityCorporateDocs.

similitude with academic publications, but using distinctive formatting and content. Other studies were produced by civil and international organizations in similar conditions. The themes of these institutional publications on smart cities are very diverse, as they follow different patterns and have heterogeneous goals that are not always clear to be perceived. The studies and reports were collected by active searches on Internet engines, shared material with researchers, linked materials on Google Alerts/News, and links in Twitter posts. More than 170 of these documents were selected for possible reference, and a few of them were directly consulted for the research and referred to in this work. They were not a part of the experiments with text analysis for similar reasons as those of the corporate documents. All these documents collected by the research are available for further consultation by anyone, except in cases of copyright restrictions.[1292]

Gathering narrative characteristics of all the publications above, online videos are a growing resource for research, allowing one to access past events, presentations, and recordings that may have a lot to say about smart cities. Academic conferences, presentations at *Smart City EXPOs*, *TED talks,* and other institutional and corporate videos formed a secondary source of information that was frequently enriched and consulted during the research period.[1293] During the first few years of doctoral research, some of those videos formed a lonely source of legal reference on smart cities: more specifically, some videos from the events *Smart Law for Smart Cities* (only half of the conferences are online) and *Ville intelligente, ville démocratique* (no longer available online). Therefore, online videos left a lasting influence on the directions of this dissertation, in both direct and indirect ways, and they might have more use in the future.

One of the results of this influence was an assembly of open playlists on YouTube that well represent the distinct discourses about smart cities: a playlist of over 200 conferences on

[1292] It is available online at http://bit.ly/InstitutionalStudiesAndReports.
[1293] A major source of individual entertainment during hundreds of cooking experiments for my family.

smart cities, from multiple academic and non-academic publishers;[1294] a very popular playlist of over 160 *TED Talks* about smart, future, sustainable cities, and similar nomenclature;[1295] another list of 30 videos from media outlets or those using a documentary approach;[1296] and, for a more *big-tech-corporative* approach on smart cities, a final playlist that gathers about 80 videos.[1297] None of those playlists include videos from the most important commercial event in the area, the *Smart City Expo World Congress*, because its own playlists are more practical to navigate.[1298] Dozens of their hundreds of keynotes and sessions were appreciated during the doctoral research period. Last but not least (and probably best), many of the 146 videos of "The Programmable City" project[1299] were essential for bringing a more analytical and critical approach to the research. It is an ever-growing list that will likely have gotten longer by the end of the dissertation process, since Google services continues to send notifications.

It seems hard to believe that these sheer numbers of videos—practically impossible to be fully watched by any researcher, with duration totaling hundreds of hours—were very low by the time the doctoral research began. At that time (2013–2014), it was quite easy to watch most of the relevant content with *smart city* in the name or tag online, even considering the four languages registered in the playlists. But as more smart city related content was produced, a Google search for online videos with the term "smart cities" would soon come back with more than a million results.[1300] These unexpected numbers were one of the motivations for trying to use text analytics methods to find patterns of words and expressions on YouTube subtitles extracted from dozens of videos, such as *TED Talks* and keynotes from the *Smart City Expo.*

[1294] It is available at: http://bit.ly/PlaylistConferencesSmartCities.
[1295] It is available at: http://bit.ly/PlaylistTEDTalksSmartFutureCities.
[1296] It is available at: http://bit.ly/PlaylistSmartCitiesMediaDocumentaries.
[1297] It is available at: http://bit.ly/PlaylistSmartCitiesCorporativeVideos.
[1298] It is available at: https://www.youtube.com/user/SmartCityExpo/playlists.
[1299] It is available at: https://vimeo.com/progcity.
[1300] For an update on the numbers, direct access is available at: http://bit.ly/OnlineVideosOnSmartCities.

Yet, for attending matters of practicality of execution and for better delimiting the object of research, the initial text databases from the video playlist were left for possible further research.

The list of reference materials collected for further research also includes podcasts and radio programs,[1301] and address even more specific subjects on smart cities, such as municipal broadband.[1302] There is much out there to be explored, as production is mounting in smart cities, and the timing of these observed changes in documentation was a privilege for this research. Nevertheless, when considering the evidence of the growing number of publications, it was the growth of the academic literature that deserved the most attention in this research that, in its very basis, is dedicated to the relations of science, technology, and law in the cities of the near future.

A selected list of 750 academic publications were assembled put together during the period of the doctoral research. This list was composed of journal articles, book chapters, conference papers, master's theses and doctoral dissertations. At least fifteen different scientific databases were regularly consulted for this task, proividing access to thousands of academic documents flagged with some content related to smart cities. A smaller part of the publications was shared by other researchers, some of them by their authors under express request. Each selected document has been verified regarding its pertinence to the subjects of the research, classified by type and content, and downloaded in PDF format and archived for local and remote access. The electronic format was a requirement because all documents needed to be accessible and readable by text analytics tools if and when necessary. All the documents used are available for the researchers charged to evaluate the results and this dissertation. A spreadsheet in Microsoft Excel format describing the data related to the documents was created to be shared with anyone interested.

[1301] It is available at: https://raindrop.io/collection/4636405.
[1302] It is available at: https://raindrop.io/collection/4669022.

In the very beginning—it must be clearly said here—there was no concern about the representativeness of the chosen texts for the databases of the research; it was a simple task of collecting as much data as possible for further analysis of their pertinence to the research subjects and goals. This same task continued for almost four years (2013–2017), when the growing signs of sources became too evident: suddenly, there were too many media sites and blogs to read, too many online videos and podcasts to listen to, too many corporative and institutional documents to check, too many academic publications to analyze. It was not humanly possible to keep up with the production on the subject, despite all of the attempts at reading that continued until the very end. At this point, the data collection task changed.

Once the new research phase, the text analytics approach, began (September 2017), there were constant concerns about the composition of the database, if the chosen *corpus of texts* would represent the totality of the websites and academic publications, if there was a *conscious cherry-picking* of related materials to achieve the aimed results (*p-hacking*), or even if an involuntary bias had manifested in the composition of publications. After all, the first phase of data collection tried to pick up everything through active and regular searches in a number of databases, but had some random elements. And the second phase (until the end of 2018) would have to be more selective in the collection because the sources available in databases were becoming too numerous and unstable to approach. But were these worries removable?

At first, there was an intention of identifying a general number of publications and achieving a *p-value* that could determine if the results were *statistically significant* or *nonsignificant* for the validation of the hypothesis. It seemed an impossible task because, among other reasons, the search algorithms in the academic databases kept changing their results over time. By the end, these concerns were set aside by developing a familiarity with the scientific

debates on p-values and statistical significance.[1303] They are not so relevant for this research.

The research followed the same procedures most of the time, going through the first pages of results on the term *smart cities* in academic databases and Google News. The results correspond to what their algorithms extracted, and they have varied over time. The main goal here is to demonstrate the content of the data, even if the results may remain debatable.

3.1.1.2. Centrifuging the Internet to Extract Some Sense of Smart Cities

To contextualize the main subject and expose the sociolegal concerns about smart cities, the first part of the extensive literature review in the second chapter is based on news from media outlets, posts on blogs, and publications on websites. All of them will be designated here as *Websites*. The procedures below explain how the topics in the subchapter 2.1 were selected and structured, based on a triple-phased method of approaching the content.

This research works in many triple combinations, and so do the methodologies. The methods of approaching the 650 websites fitting the descriptions followed a three-phase procedure: each element of the documentation was first consulted by extensive readings to evaluate the general content (meaningful information, reliable source, pertinence to the theme); afterwards, two applications of automated text analysis were deployed to reveal the frequency of terms and expressions used in the whole set of texts; in a third movement, two data analytics tools produced a series of visualizations for representing the collocations and relations of terms in the databases that could be interpreted as relevant for the research.

The content of the database *Websites* is partially available in *Appendix 1*, where each

[1303] *See*: Daniel J Benjamin et al, “Redefine statistical significance” (2018) 2:1 Nature Human Behaviour 6–10; Valentin Amrhein & Sander Greenland, “Remove, rather than redefine, statistical significance” (2018) 2:1 Nature Human Behaviour 4–4.

entry is described by data detailing the author, title, publisher and date. A spreadsheet named *Websites, blogs, news* is also available online,[1304] in *Microsoft Excel* format, containing the respective *URL* of each publication, as well as abstract notes and subheading associated with them. All the numbers and graphics in this subchapter (and more) are also in the spreadsheet.

The publications follow a timeline from 2012 to 2018, as in *Table 1*:

Year	Number of Publications
2012	8
2013	61
2014	86
2015	89
2016	108
2017	147
2018	151
Total	650

Table 1: Year and number of publications in the *Websites* database

For better visual representations, see *Figures 1 and 2*.

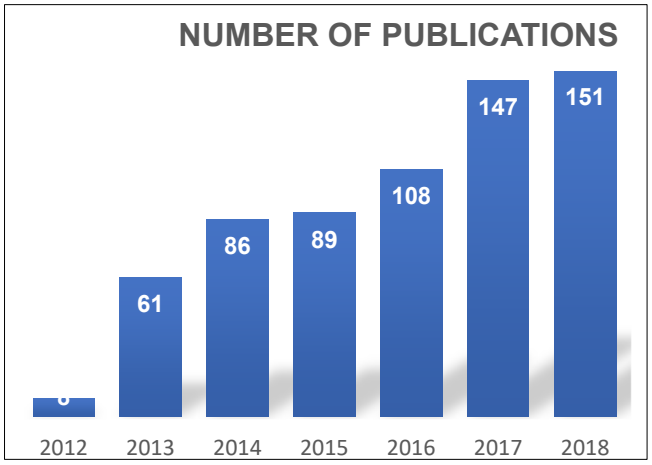


Figure 1: Number of publications of the *Websites* database disposed as columns

[1304] It is available at: http://bit.ly/SmartCitiesResearchDatabases.

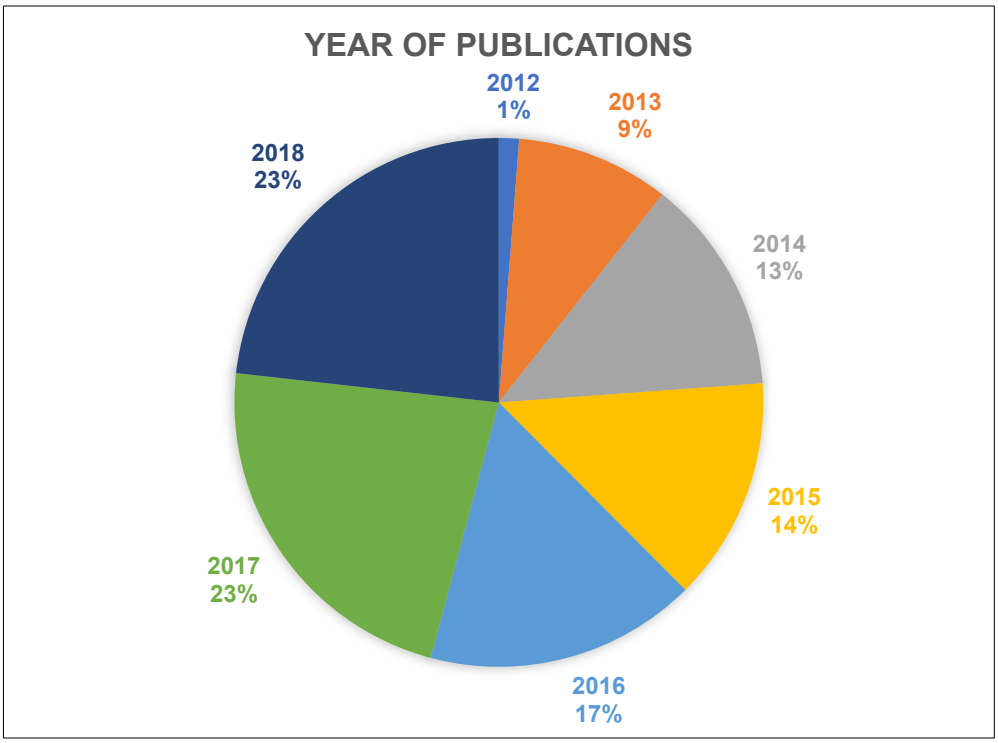


Figure 2: Year of publications of the *Websites* database disposed by percentages

The *Websites* database contains publications from 543 distinct authors or groups of authors, and 302 distinct publishers. The publications were collected and analyzed in four languages, with a distribution as follows in Table 2.

Language	Number of Publications	Percentage
English	574	88%
French	50	8%
Spanish	18	3%
Portuguese	8	1%
Total	**650**	**100%**

Table 2: Language distribution of the content in the *Websites* database

Two different approaches to the data were made during the research process. In the first round, the text analysis on the database *Websites* was deployed over the contents of titles, abstract notes and subheadings, using two different applications, *WordCounter* and *Textalyser*.

Some basic results are displayed in *Table 3* from the application *WordCounter*.

Basic Word Count Statistics	
Words	26797
Characters (including spaces)	168528
Characters (without spaces)	142716
Extra Word Count Statistics	
Syllables	48884
Sentences	1640
Average Word Length (char)	5.3
Average Sentence Length (word)	16.3
Monosyllabic Words (1 syllable)	13475
Polysyllabic Words (≥3 syllables)	5764
Syllables per word	1.8
Paragraphs	762
Reading Time	
Item	**Time**
Estimated Reading Time	134 min.
Estimated Speaking Time	215 min.

Table 3: Basic results of the *Websites* database, using *WordCounter*

The density of the 10 most frequent single words and two-word expressions is displayed in *Table 4*, as produced by *WordCounter*, from a total of 99 words and expressions.

Top Keyword Density				
1 Word			**2 Words**	
1. smart	692 (2.6%)		1. smart cities	277 (1%)
2. cities	584 (2.2%)		2. smart city	266 (1%)
3. city	460 (1.7%)		3. of the	141 (0.5%)
4. de	242 (0.9%)		4. in the	91 (0.3%)
5. data	224 (0.8%)		5. the smart	75 (0.3%)
6. IA	160 (0.6%)		6. the future	61 (0.2%)
7. will	160 (0.6%)		7. cities are	53 (0.2%)
8. urban	132 (0.5%)		8. big data	53 (0.2%)
9. how	120 (0.4%)		9. a smart	51 (0.2%)
10. technology	117 (0.4%)		10. and the	50 (0.2%)

Table 4: Top density results of the *Websites* database, using *WordCounter*

The application *Textalyser* was used to compare the basic results and to apply a manual exclusion of non-essential words for the word count analysis (pronouns, articles, etc.), allowing a much longer analysis of single words (up to a thousand), two-word expressions, and three-word expressions, as presented in a selection of 20 words in *Tables 5, 6, 7 and 8*.

Total word count:	**17025**
Number of different words:	5188
Complexity factor (Lexical Density):	30.50%
Readability (Gunning-Fog Index): (6-easy 20-hard)	11.7
Total number of characters:	167583
Number of characters without spaces:	113995
Average Syllables per Word:	1.85
Sentence count:	1311

Table 5: Basic results of the *Websites* database, using *Textalyser*

1-Word	Occurrences	Frequency	Rank
smart	729	4.30%	1
cities	629	3.70%	2
city	497	2.90%	3
data	224	1.30%	4
urban	131	0.80%	5
technology	121	0.70%	6
how	120	0.70%	6
new	103	0.60%	7
future	96	0.60%	7
big	84	0.50%	8
what	73	0.40%	9
world	66	0.40%	9
need	58	0.30%	10
tech	58	0.30%	10
internet	52	0.30%	10
ville	51	0.30%	10
privacy	50	0.30%	10
smarter	49	0.30%	10
digital	48	0.30%	10
services	47	0.30%	10

Table 6: Most frequent single keywords of the *Websites* database, using *Textalyser*

2-Word Expression	Expression count	Frequency
smart cities	313	1.20%
smart city	288	1.10%
big data	53	0.20%
ville intelligente	29	0.10%
artificial intelligence	21	0.10%
smarter cities	15	0.10%
urban areas	13	0%
open data	12	0%
city technology	12	0%
sharing economy	11	0%
ciudades inteligentes	11	0%
big brother	10	0%
villes intelligentes	10	0%
data collection	9	0%
urban life	9	0%
smartest cities	9	0%
sidewalk labs	8	0%
data driven	8	0%
san francisco	7	0%
high tech	7	0%

Table 7: Most frequent 2-word expressions of the *Websites* database, using *Textalyser*

3-Words Expression	Expression count	Frequency
internet of things	31	0.10%
smart city technology	12	0%
quality of life	7	0%
smart cities data	5	0%
new york city	5	0%
smart city technologies	5	0%
ville intelligente est	5	0%
smart city development	5	0%
global smart city	4	0%
real time data	4	0%
security and privacy	4	0%
information and communication	4	0%

smarter cities environment	4	0%
smart city standard	3	0%
smart city revolution	3	0%
smart cities mission	3	0%
chief analytics officer	3	0%
smart city movement	3	0%
smart city data	3	0%
chief digital officer	3	0%

Table 8: Most frequent 3-word expressions of the *Websites* database, using *Textalyser*

To conclude the first round of analysis, a set of visualizations of keywords was prepared with the tool *Voyant Tools*, the first under the form of a *word cloud*, also known as *tag cloud*:

> Here, tag clouds are used to give an intuitive and visually appealing overview of a text by depicting the words that occur most often within it. Such a summarization is helpful to learn about the number and kind of topics present in a body of text. Typically, this statistical overview is achieved by positively correlating the font size of the depicted tags with the word frequency. When a tag cloud visualization is used this way, the 'tags' are words from a text. For this reason, the term word cloud is often preferred over the term tag cloud in these contexts. […] Word clouds generated for a body of text can serve as a starting point for a deeper analysis. For instance, they help to judge whether a given text is relevant to a specific information need.[1305]

The word cloud is very popular for analyzing, in a single image, a huge quantity of keywords that reveal the main topics of texts, according to their frequency. But some of the best results come from *collocations* that are able to point out the relations among terms:

> There are also several options to study keywords in context: instead of calculating the frequency of single words, the most frequent n-grams can show which two (bi-grams), three (tri-grams), or four words (four-grams) are most often jointly mentioned (so-called collocations).[1306]

By pointing out the relations between words, more meanings can be extracted, and more interpretations are possible, especially for someone who is familiar with the subject. It can also

[1305] Florian Heimerl et al, *Word Cloud Explorer: Text Analytics Based on Word Clouds* (2014) at 1833.
[1306] Günther & Quandt, *supra* note 1288 at 80.

be useful to present visualizations of *word pair co-occurrences* (collocations) to a non-specialist public, in order to demonstrate that some topics go along with one another in a *corpus* of text. The *Word Cloud* displaying the most relevant keywords in *Websites* can be analyzed in *Figure 3*.

Figure 3: Word Cloud 500 words of the *Websites* database in *Voyant Tools*

Two visual demonstrations of the forms of collocations and keywords were produced from the database *Websites*, the first highlighting the links of the terms *smart* (*Figure 4*) and *city* (*Figure 5*), and the second displaying more terms (*Figure 6*). Some classes of words in English, French, Spanish and Portuguese were excluded (articles, pronouns, adverbs) for better clarity.

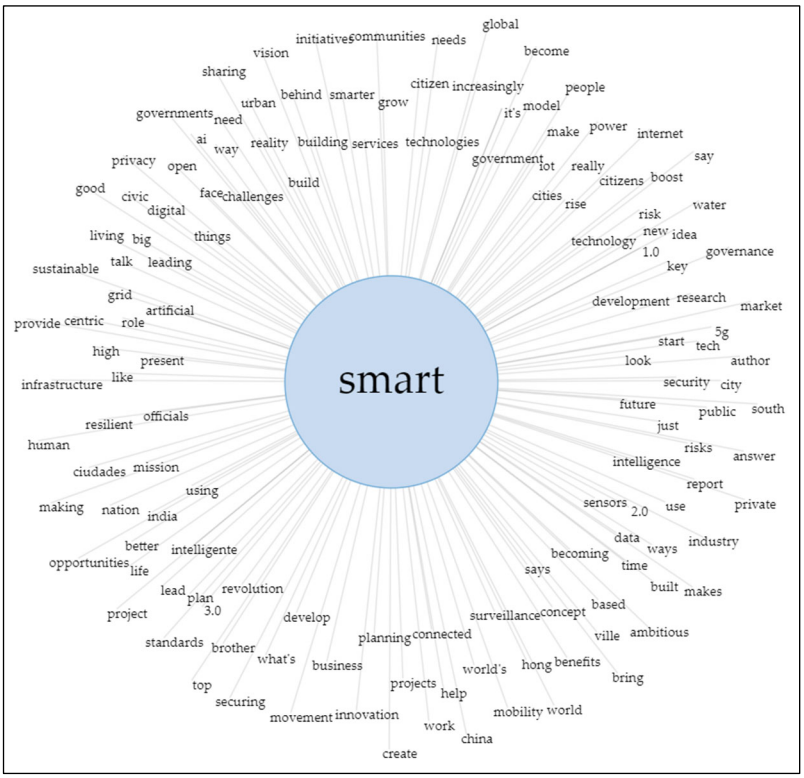


Figure 4: Main links of the term smart in the *Websites* database, using *Voyant Tools*

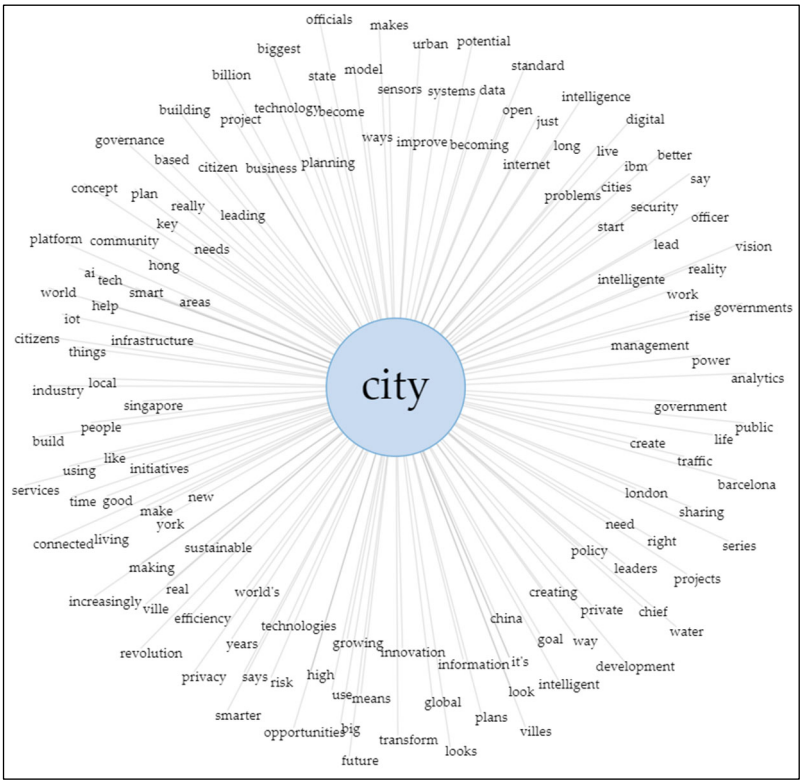


Figure 5: Main links of the term city in the *Websites* database, using *Voyant Tools*

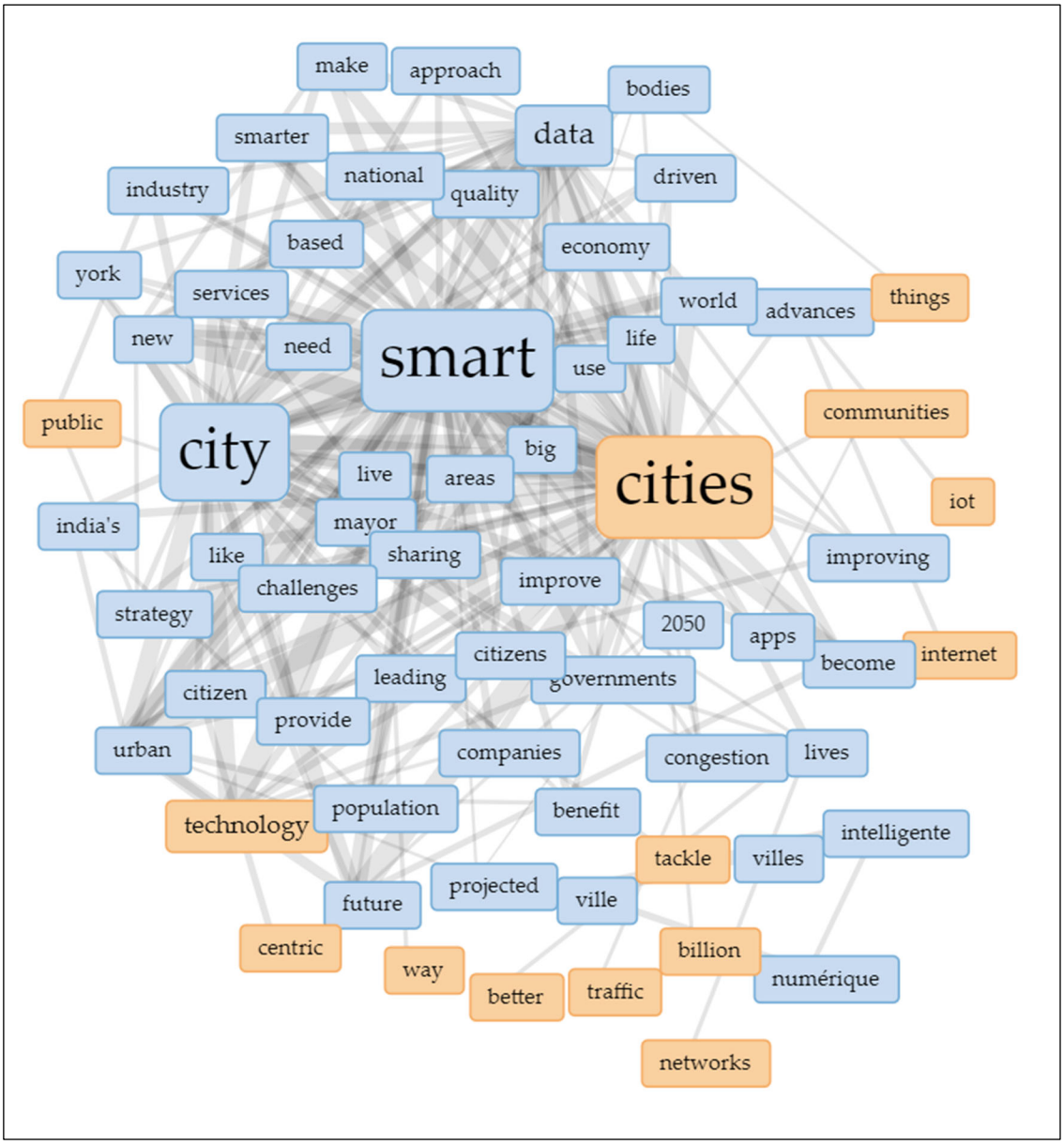


Figure 6: Collocations and keywords of the *Websites* database, using *Voyant Tools*

In the second phase of the procedure, the contents of the English websites were automatically accessed by the online tool *Sketch Engine*, and a more complete and sophisticated text analysis was done using the system. The tool was able to successfully access about 447 websites from the total of 574 websites (around 78%) in the English language. The first two online tools would not be able to process the 600,000 words and 31,000 sentences, which only *Sketch Engine* and *Voyant Tools* were able to analyze.

When using a more complete *corpus* of terms, the density of keywords changed, as can be seen in *Table 8*. The database file has a complete list up to the position 1000.

Single Words	
Term	**Freq**
city	10147
smart	4610
datum	3049
technology	2390
urban	1490
citizen	1277
infrastructure	1055
government	1388
Smart	810
public	1252
City	938
sensor	737
system	1415
project	1094
traffic	661
service	1327
data	612
digital	643
Cities	520
innovation	560

Multi-Words	
Term	**Freq**
smart city	1622
private sector	133
artificial intelligence	91
public safety	82
local government	76
urban planning	71
urban life	70
air quality	68
public transport	68
climate change	75
traffic congestion	63
real time	68
city technology	58
smart city technology	57
smart technology	57
sharing economy	56
public sector	58
economic development	58
economic growth	57
urban development	48

Table 8: Keyword density in the *Websites* database, using *Sketch Engine*

The analysis extracted nouns (*Table 9*), verbs (*Table 10*) and adjectives (*Table 11*) that can help contextualize the terminology used in the documents.

Nouns			
Item	**Freq**	**Item**	**Freq**
city	10147	way	1016
datum	3049	information	1008
technology	2390	company	964
people	1476	year	954
system	1415	City	938
government	1388	world	822
service	1320	Smart	810
citizen	1277	time	803
infrastructure	1055	community	740
project	1048	sensor	737

Table 9: Wordlist of nouns in the *Websites* database, using *Sketch Engine*

Verbs			
Item	**Freq**	**Item**	**Freq**
be	21636	become	785
have	5259	take	767
do	1924	provide	763
say	1797	help	745
use	1760	include	735
make	1634	work	731
need	922	go	676
create	912	see	664
build	869	improve	585
get	802	come	566

Table 10: Wordlist of verbs in the *Websites* database, using *Sketch Engine*

Adjectives			
Item	**Freq**	**Item**	**Freq**
smart	4551	local	632
new	1514	big	595
urban	1490	social	568
more	1144	first	493
public	1109	open	468
other	1043	private	454
such	951	different	442
good	848	large	423
many	813	economic	382
digital	637	global	338

Table 11: Wordlist of adjectives in the *Websites* database, using *Sketch Engine*

Many of the jargon words in text analytics are not of general knowledge for most legal scholars or practitioners, but it is highly important to know the terms that appear in texts to describe a given subject. For this reason, a *word sketch* can be very useful:

> A word sketch is a one-page, automatic, corpus-derived summary of a word's grammatical and collocational behaviour. Word sketches were first introduced by the British corpus linguist Adam Kilgarriff and exploited within the Sketch Engine corpus management system. They are an extension of the general collocation concept used in corpus linguistics in that they group collocations according to particular grammatical relations (e.g. subject, object, modifier etc.).[1307]

[1307] Wikipedia, "Word sketch", (11 March 2019), online: *Wikipedia* <https://en.wikipedia.org/w/index.php?title=Word_sketch&oldid=887232229> Page Version ID: 887232229.

The choice for the English language was due to a need of better uniformity in the results and for extracting more meaningful *word sketches* as seen in *Figures 7 and 8*.

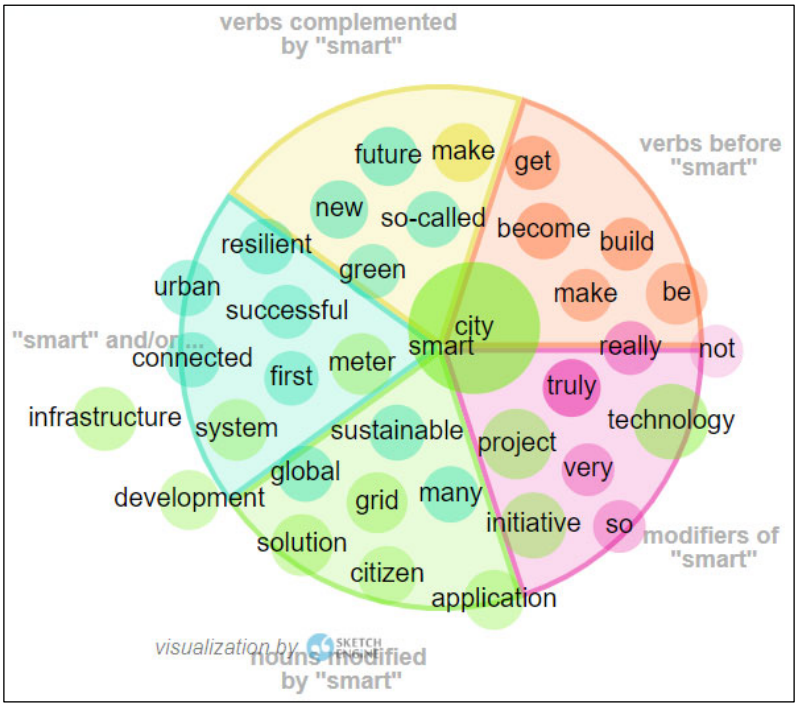


Figure 7: Collocations of the term *smart* in the *Websites* database, using *Sketch Engine*

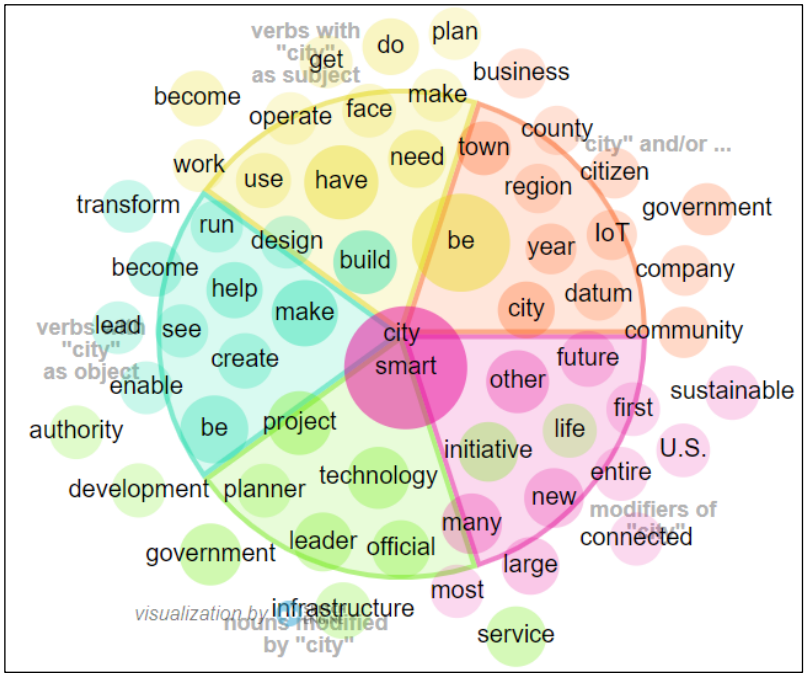


Figure 8: Collocations of the term *city* in the *Websites* database, using *Sketch Engine*

After a series of possible analyses for textual, numerical and visual interpretation in *Sketch Engine*—all with dynamic capabilities that are very difficult to explain on a static media like this printed dissertation—the last stage of analysis was dedicated to producing new visualizations based on the more complete data. The word cloud (*Figure 9*) and the links of the terms smart (*Figure 10*) and city (*Figure 11*) have become more complex and suggestive to new interpretations. The network (*Figure 12*) of main collocations and keywords reveal more interesting topics for a legal scholar and they will be further explored in the text.

Figure 9: Word Cloud of 500 words from 447 websites in the *Websites* database in *Voyant Tools*

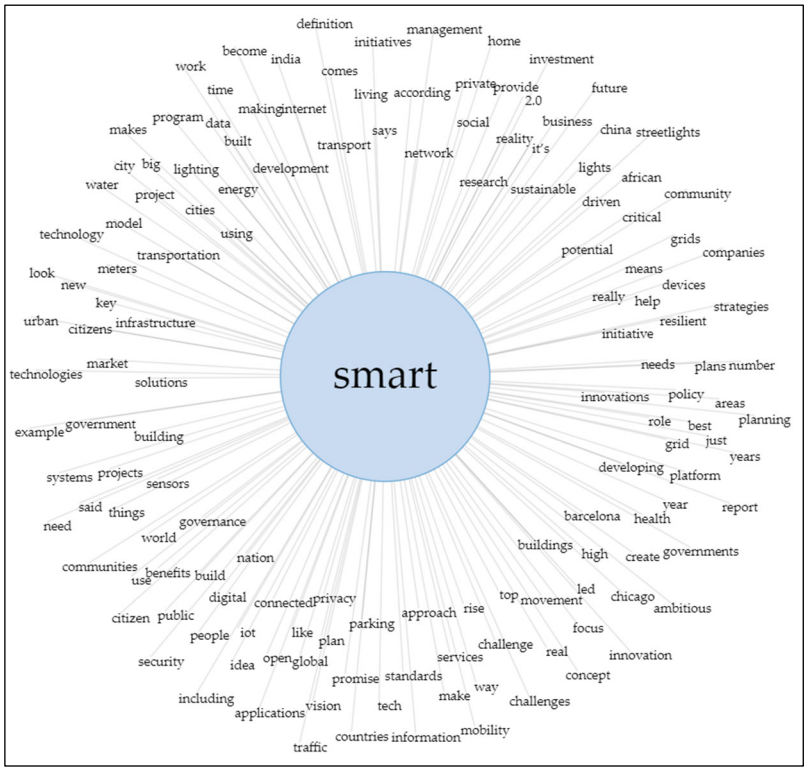


Figure 10: Main links of the term smart in 447 websites from *Websites* database, using *Voyant Tools*

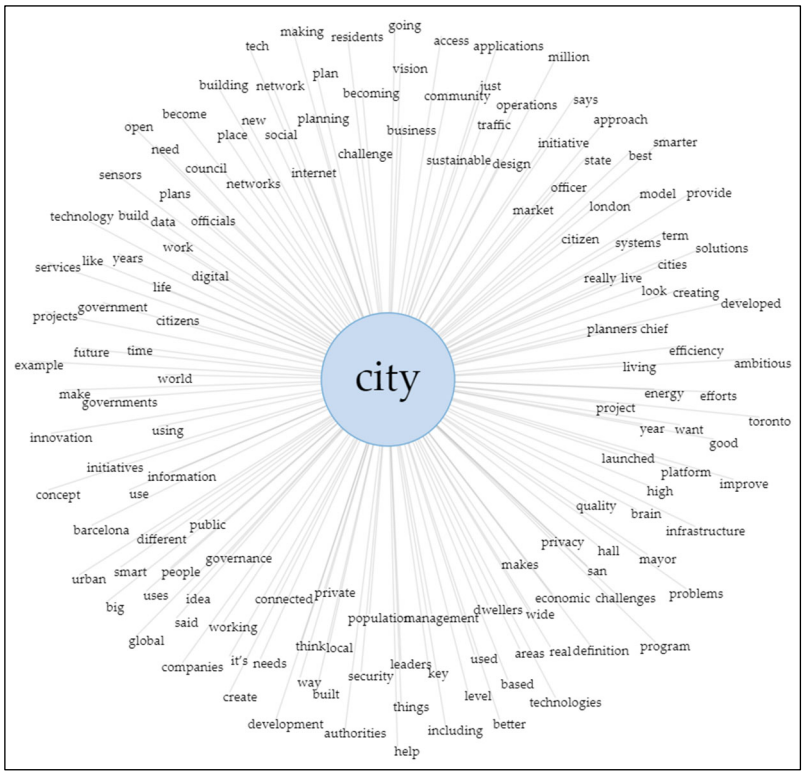


Figure 11: Main links of the term city in 447 websites from *Websites* database, using *Voyant Tools*

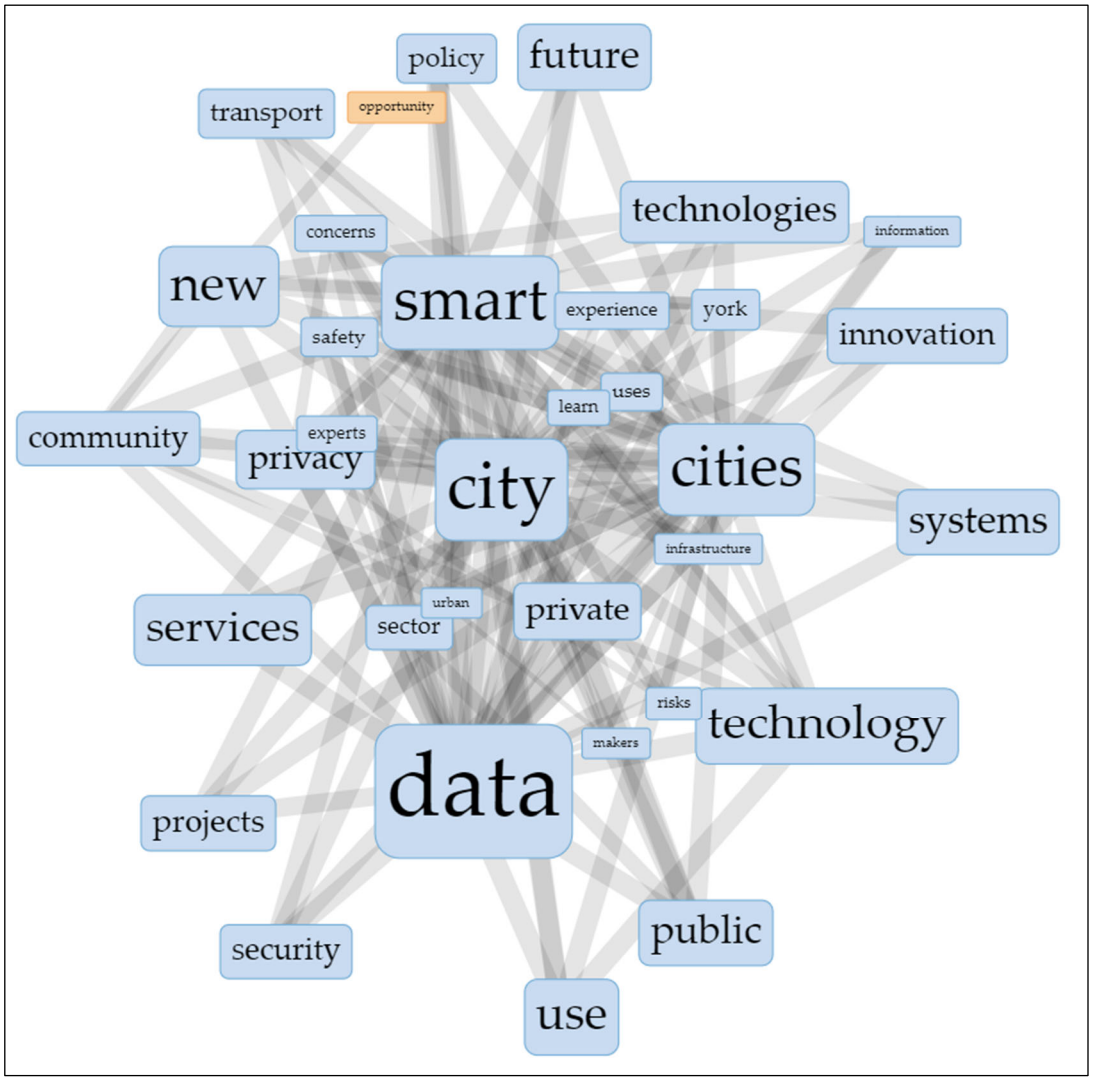


Figure 12: Collocations and keywords in 447 websites from *Websites* database, using *Voyant Tools*

The distribution of words in the last four figures allows a glimpse of the complexity and richness of ideas and debates on the subject of smart cities, even recognizing that the static form on paper does not fully disclose of their dynamic online form. Even so, full articles for media (or academia) could be written by any researcher on smart cities just using the terms presented above. The research recommends deploying the online tools which were used with the provided open databases to better appreciate the data, or to at least access the *Microsoft Excel* files that contain all the tables and figures for better visualization when magnifying the images, and to view the figures that will be used next.

3.1.1.3. Fighting Fire with Fire and Getting More Light in the Process

To deepen and widen the main subject of smart cities and bring the concerns from academic communities to the surface, the second part of the rather extensive literature review is based on academic publications such as journal articles, book chapters, conference papers, masters' theses, and doctoral dissertations. All of them will be designated here as *Academic Publications*. The procedures below explain how the topics in the subchapter 2.2. were selected and structured based on a triple-phased method of approaching their contents.

For approaching the 750 academic publications, three phases were also followed, but with some differences from the 650 websites: for the latter, the search was wider and more diverse than in the former, and the language used is less formal and more intelligible for non-experts than in the former, the documents share similar structures and are all in English. The academic publications are less accessible for a general public, but they allow a deeper understanding of the subject. The text composition based on *Websites* and *Academic Publications* was designed to be complementary and the least redundant possible.

The academic publications were predominantly found by searching the term *Smart Cities* on 15 *academic search engines*: ACM Digital Library,[1308] Google Scholar,[1309] IEEE Xplore,[1310] IOP Science,[1311] JSTOR,[1312] Microsoft Academic,[1313] Sage Journals,[1314] Science Direct,[1315] Semantic Scholar,[1316] Springer Link,[1317] SSRN, Taylor & Francis Online,[1318] Web of Science,

[1308] Give it a try, it is available at: http://bit.ly/SmartCitiesAtACMLibrary.
[1309] Give it a try, it is available at: http://bit.ly/SmartCitiesAtGoogleScholar.
[1310] Give it a try, it is available at: http://bit.ly/SmartCitiesAtIEEEXplore.
[1311] Give it a try, it is available at: http://bit.ly/SmartCitiesAtIOPScience.
[1312] Give it a try, it is available at: http://bit.ly/SmartCitiesAtJSTOR.
[1313] Give it a try, it is available at: http://bit.ly/SmartCitiesAtMicrosoftAcademic.
[1314] Give it a try, it is available at: http://bit.ly/SmartCitiesAtSAGEJournals.
[1315] Give it a try, it is available at: http://bit.ly/SmartCitiesAtScienceDirect.
[1316] Give it a try, it is available at: http://bit.ly/SmartCitiesAtSemanticScholar.
[1317] Give it a try, it is available at: http://bit.ly/SmartCitiesAtSpringerLink.
[1318] Give it a try, it is available at: http://bit.ly/SmartCitiesAtTaylorAndFrancisOnline.

Wiley Online Library,[1319] and World Wide Science. Similar academic engines were also used in the beginning but were left behind as the research progressed—engines such as BASE, CORE, Emerald Insight, MDPI, Research Gate, Scopus—because the results were too redundant, or online access was no longer granted by UdeM library services. Anyhow, the number of results returned ended up being overwhelming.

Any curious reader may try a search to check the results on each academic platform, but she or he must be advised that the numbers, images and impressions might change over time, following the changes in their algorithms and databases. By the end of the redaction of this subchapter (September 2019), a single search of the term *smart cities* displayed ever-growing numbers and some revealing visualizations: ACL Digital Library had 28,021 results (see also *Figure 13*); Google Scholar pointed to more than 1,450,000 results; IEEE Xplore presented 14,776 results; IOP Science would limit to show “only” the top 500 results according to its *relevance filter*; JSTOR had 17,460 results; Microsoft Academic was more selective with 903 results (see also *Figure 14*); Sage Journals had 17,887 results (see also *Figure 15*); ScienceDirect had 48,545 results; Semantic Scholar pointed to more than 351,000 results; Springer Link presented 65,304 results in multiple disciplines (see also *Figure 16*); SSRN had 372 results;[1320] Taylor & Francis Online had 32,078 results; Web of Science displayed 12,074 results;[1321] Wiley Online Library presented 30,160 results (see also *Figure 17*); World Wide Science would point to 2,989 results (See *Figure 18*).[1322]

[1319] Give it a try, it is available at: http://bit.ly/SmartCitiesAtWileyOnlineLibrary.
[1320] By 2013, it was one with the most numerous results. It is available at: https://papers.ssrn.com.
[1321] It is available at: https://www.webofknowledge.com.
[1322] It is available at: https://worldwidescience.org.

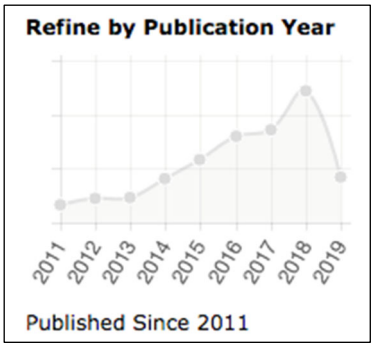


Figure 13: Results at *ACL Digital Library*

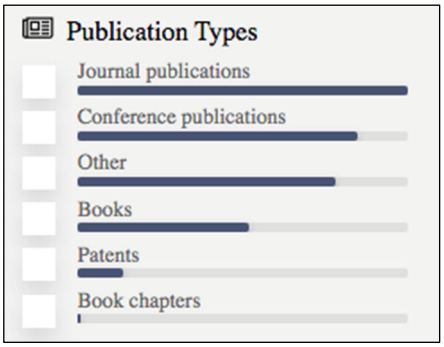


Figure 14: Results at *Microsoft Academic*

Figure 15: Results at *Sage Journals*

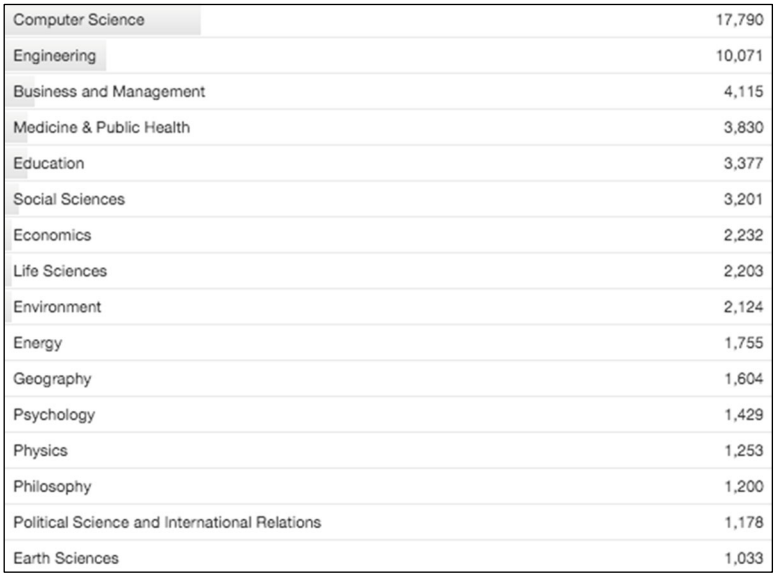


Figure 17: Results at *Springer Link*

Figure 16: Results at *Wiley Online Library*

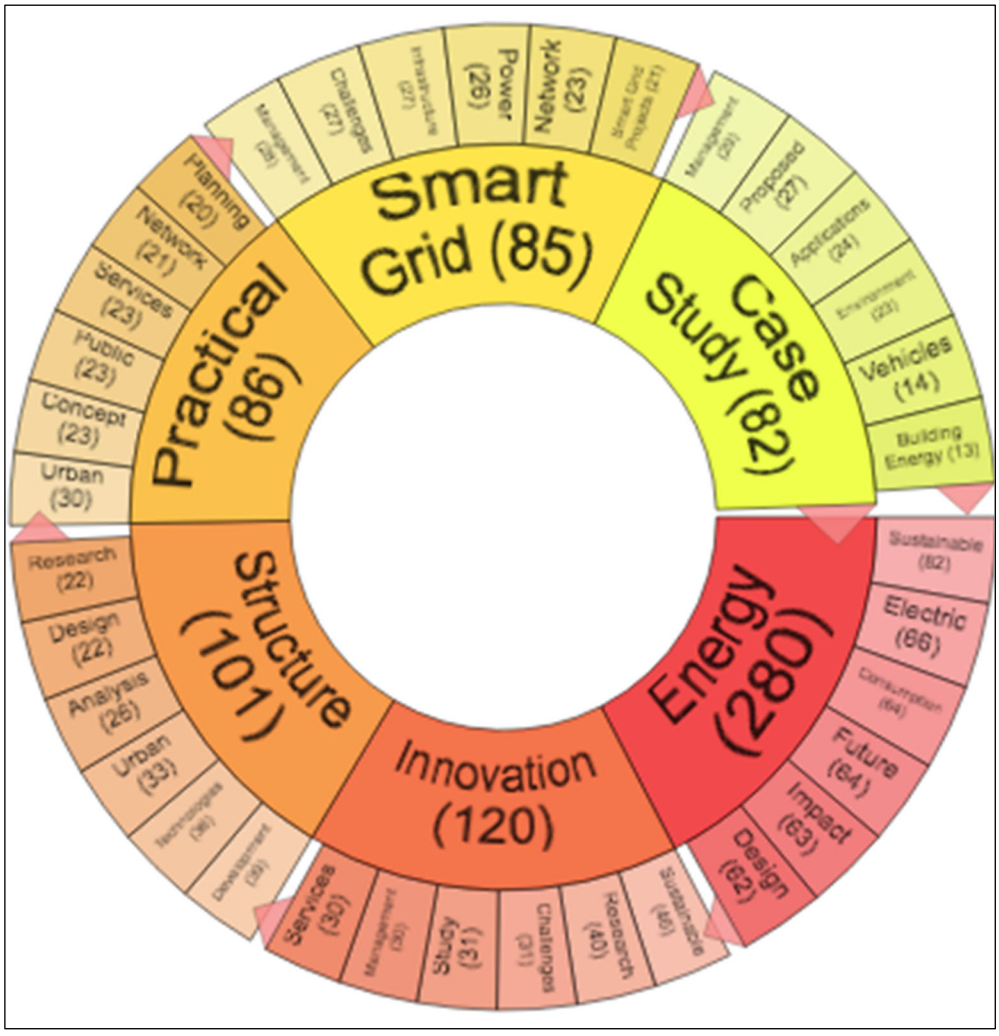


Figure 18: Results at *World Wide Science*

This number of publications were obviously not all used in the research. Frequent consultations of the academic engines were made to the first 10 pages of results to identify and download new publications, determined by the *relevance filter* of their diverse algorithms.

Partial content from the database *Academic Publications* is available in Appendix 2, with each entry being described by data detailing the author, title, and year of publication. A spreadsheet named *Academic Publications* is also available online,[1323] in *Microsoft Excel* format,

[1323] It is available at: http://bit.ly/SmartCitiesResearchDatabases.

containing the abstracts and keywords associated with them. All the numbers and graphics below in this subchapter (and more) are also present in the spreadsheet.

The publications are from years 2006 to 2018, as in *Table 13*, *Figures 19 and 20*:

Year	Number of Publications
2006	1
2007	1
2008	1
2009	0
2010	3
2011	17
2012	13
2013	35
2014	65
2015	111
2016	142
2017	188
2018	173
Total	750

Table 12: Year and number of publications in the *Academic Publications* database

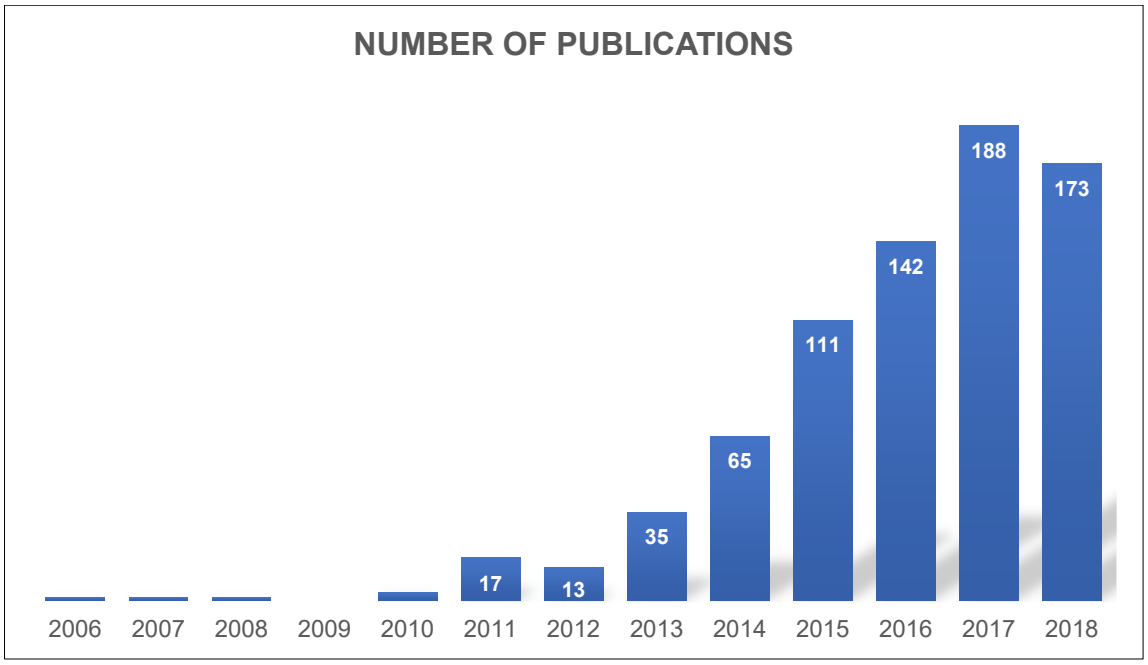


Table 13: Number of publications of the *Academic Publications* database disposed as columns

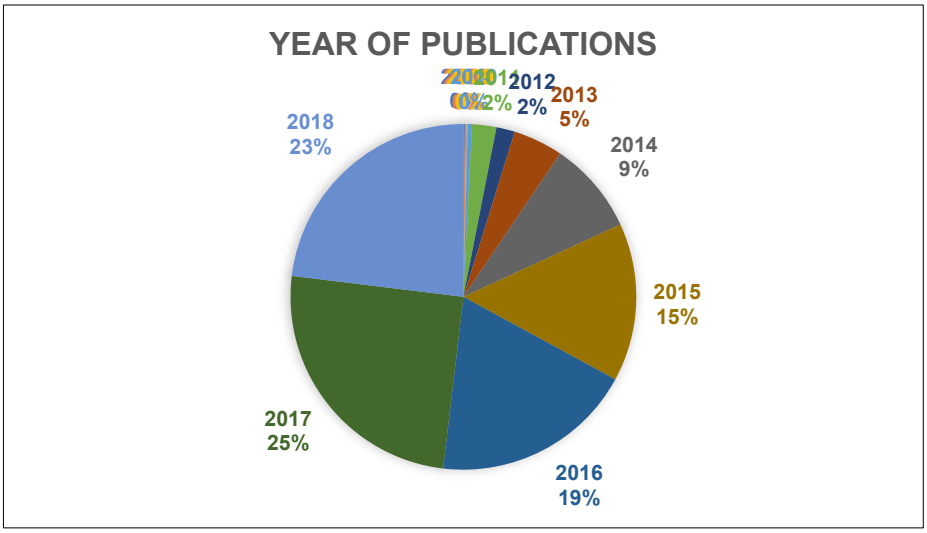


Figure 19: Year of publications of the *Academic Publications* database disposed by percentages

In the first experiments using text analytics, while the *Academic Publications* database was still around 450 documents, the online tools *WordCounter* and *Textalyser* were capable of processing the data from the titles, abstracts, and keynotes of the publications. However, when the database reached around 600 documents, both tools were no longer capable of producing stable results. Still, the first outcomes from their previous deployment remained influential to the research approach by creating outlines of the academic texts by simply counting their most relevant keywords. It motivated the deployment of another tool to replace this function.

The tool *Sketch Engine* was then incorporated into the research to accomplish the task of identifying the most used terms and expressions between the 147,081 words in the database *Academic Publications*. Considering that academic texts are more complex than those in the *Websites* database and an (optimistic) average time of reading 150 words/minute, it would take more than 16 hours to read all its contents. Trying to determine the most used terms in those texts by only using human memory would have limited results and manually counting them would be impractical and nondemonstrable. The main goal of the text analysis here is to assist identifying key subjects in the academic publications consulted by the research and demonstrate

their main content to other people who will not spend so many hours (or days) to read them. Not even the jury responsible for evaluating this dissertation is expected to read all the referred publications in the footnotes, but all are invited to access the databases and experiment with the text analytics online tools like *Sketch Engine*—there is a free 30-day trial with full functions—to verify if the following results are reproducible or not.

Sketch Engine produced about 1000 results in single words and multiple words, both can be fully verified in the database *Academic Publications*. Only 35 results of each are shown below to provide a limited (yet revealing) example of its capabilities in *Tables 14 and 15*.

Keywords - Single Words			
	Term	**Score**	**Freq**
1	city	19,07	3915
2	smart	17,72	2987
3	datum	7,99	1486
4	Smart	7,62	1138
5	urban	7,1	1073
6	technology	4,25	701
7	City	3,91	586
8	paper	3,44	498
9	Cities	3,28	389
10	citizen	3,2	406
11	development	3,11	489
12	Data	3,1	368
13	big	2,9	520
14	governance	2,87	323
15	challenge	2,76	375
16	system	2,65	528
17	IoT	2,62	275
18	Big	2,52	279
19	framework	2,44	257
20	concept	2,37	271
21	sustainable	2,37	245
22	propose	2,36	256
23	analysis	2,36	265
24	management	2,35	296

25	infrastructure	2,34	242
26	Internet	2,3	299
27	data	2,29	234
28	model	2,28	295
29	application	2,27	298
30	service	2,25	442
31	approach	2.25	283
32	network	2.24	266
33	privacy	2.21	217
34	information	2.2	391
35	sensor	2.17	205

Table 14: Frequent keywords/single-words in *Academic Publications* database, using *Sketch Engine*

The term *datum* is used to describe the words not recognized in the English corpus of reference used in Sketch Engine (e.g., names of systems, institutions, and companies).

Keywords - Multi-Words			
	Term	**Score**	**Freq**
1	smart city	7,95	1180
2	urban planning	1,39	66
3	urban development	1,38	65
4	cloud computing	1,35	60
5	case study	1,32	56
6	sustainable development	1,25	44
7	waste management	1,23	40
8	sustainable city	1,21	35
9	city concept	1,2	34
10	literature review	1,2	34
11	smart city concept	1,19	33
12	big data	1,19	32
13	smart urbanism	1,18	31
14	urban governance	1,18	31
15	city development	1,18	31
16	city governance	1,16	28
17	climate change	1,15	31
18	smart government	1,15	26
19	smart parking	1,15	25
20	future research	1,15	25
21	smart grid	1,15	25

22	smart transportation	1,14	24
23	urban sustainability	1,14	23
24	citizen participation	1,13	22
25	urban life	1,13	22
26	smart governance	1,12	21
27	information technology	1,12	22
28	public sector	1,12	22
29	smart city governance	1,12	20
30	decision-making	1,11	20
31	smart city development	1.11	19
32	communication technology	1.11	19
33	environmental sustainability	1.11	19
34	urban space	1.11	18
35	energy consumption	1.1	18

Table 15: Frequent keywords/multi-words of the *Academic Publications* database, using *Sketch Engine*

Knowing the most used terms of a subject can be useful for identifying its main topics, but it takes more than this to build the shared vocabulary of a field of research and reveal its issues and challenges. In this case, text analytics tools can help reveal the nouns, verbs and adjectives which are more related to the academic texts under focus, allowing a wider vision and providing the blocks of language used for building their main expressions and ideas.

The chosen text analytics tool, *Sketch Engine*, provided around 1350 nouns, 448 verbs, and 470 adjectives with a frequency of, at least, five occurrences in the database *Academic Publications*. Any academic text can be written about smart cities by using a fraction of these words. Only 35 results of each are displayed below in *Table 16* to provide a limited overview, but all results can be consulted in the available spreadsheet and verified in the tool.

	Nouns		**Verbs**		**Adjectives**	
	Item	**Freq**	**Item**	**Freq**	**Item**	**Freq**
1	city	3915	be	3653	smart	2961
2	datum	1486	have	753	urban	1073
3	Smart	1138	use	464	big	519
4	technology	701	provide	349	new	380

5	City	586	propose	256	such	272
6	system	528	make	239	public	259
7	paper	498	develop	238	social	256
8	development	489	present	214	sustainable	245
9	service	440	base	210	different	209
10	citizen	406	improve	179	open	168
11	information	391	become	178	future	159
12	Cities	389	discuss	170	digital	153
13	Data	368	enable	143	many	147
14	challenge	349	include	138	other	142
15	governance	323	focus	131	various	139
16	Internet	299	address	131	more	138
17	application	298	identify	130	local	137
18	management	296	explore	130	economic	137
19	Big	279	emerge	128	key	133
20	government	278	support	123	technological	126
21	research	276	build	122	important	119
22	IoT	274	create	122	good	118
23	approach	272	analyze	120	large	118
24	study	272	need	119	current	117
25	concept	271	increase	117	critical	107
26	analysis	265	consider	112	human	104
27	model	265	aim	108	intelligent	102
28	framework	257	generate	106	main	100
29	thing	243	show	105	environmental	94
30	infrastructure	242	do	105	mobile	91
31	network	235	sense	104	real-time	91
32	data	234	offer	96	particular	86
33	policy	229	argue	96	several	84
34	issue	217	take	92	complex	82
35	privacy	217	understand	88	high	78

Table 16: Main nouns, verbs, and adjectives in the *Academic Publications,* using *Sketch Tools*

Once the terms of the *corpus Academic Publications* are known, the collocations can be considered less revealing, as in *Figures 21 and 22*, but more thought-provoking.

In sequence, in order to visualize the top 500 keywords of the academic texts about smart cities used in this dissertation, a word cloud was created using *Voyant Tools* (*Figure 22*).

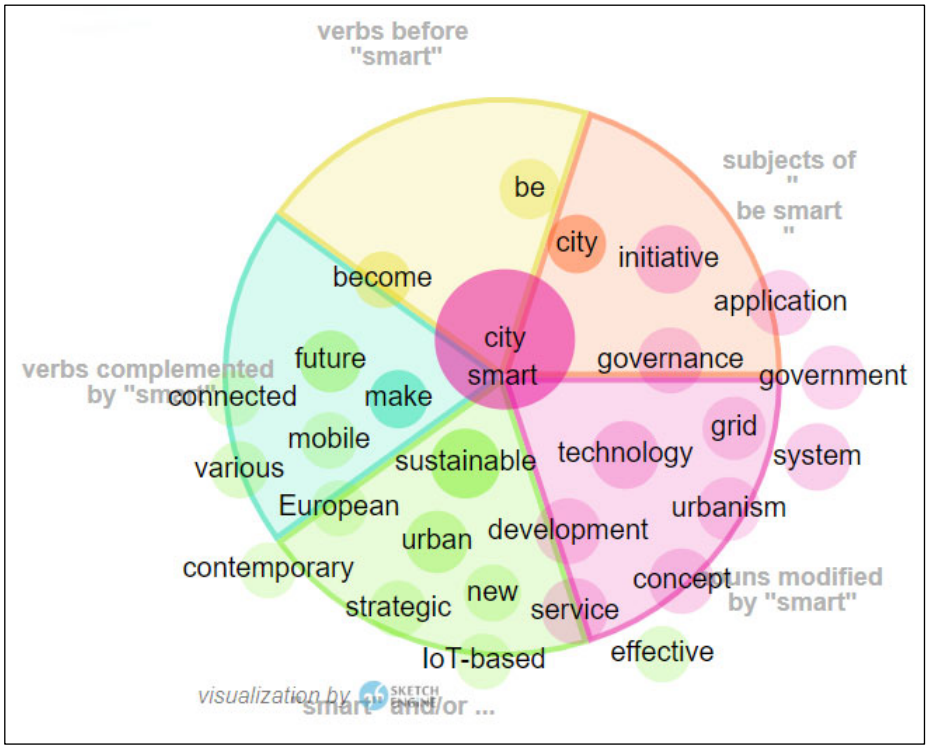


Figure 20: Collocations of the term *smart* in the *Academic Publications* database, using *Sketch Engine*

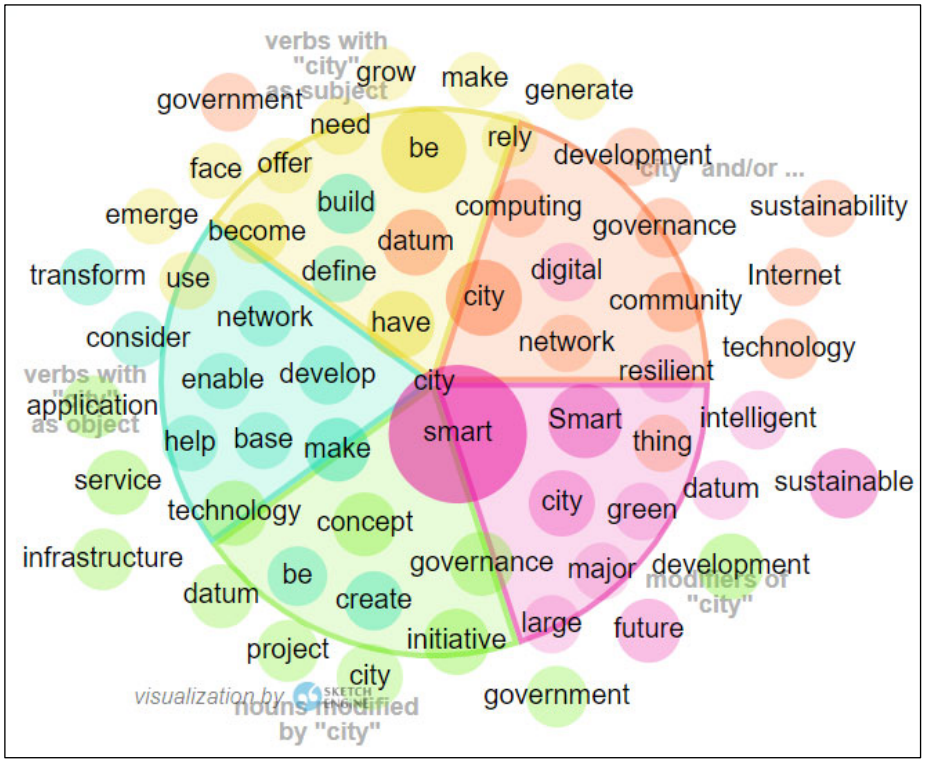


Figure 21: Collocations of term *city* in the *Academic Publications* database, using *Sketch Engine*

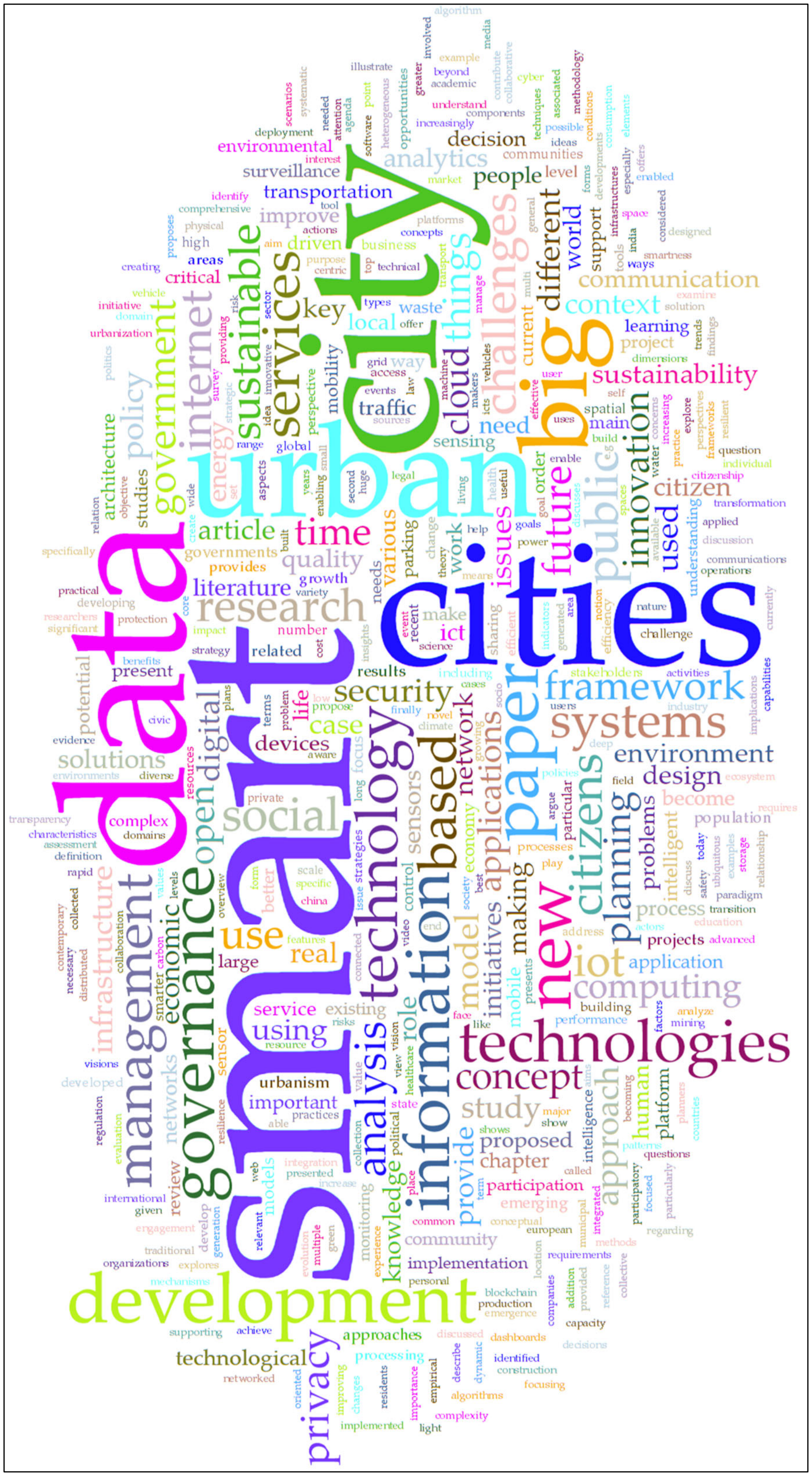


Figure 22: Word Cloud of 500 words from the *Academic Publications* database in *Voyant Tools*

Despite the fact that static paper cannot show the many possibilities for interaction with the visualization of keywords and collocations using *Voyant Tools*, it might give the reader a glimpse of its capacities and provoke the interest of other researchers to try it out. In the case of the *Academic Publications* database, the best use of this visual resource is for observing the dynamic interactions between the main keywords in the hypothesis of the research. Much time was invested in this visual analysis, observing the expected multiple links between the terms and considering the unexpected relations between them. *Figure 23* provides only a photograph of a short moment instead of what should be a movie of a lengthy process.

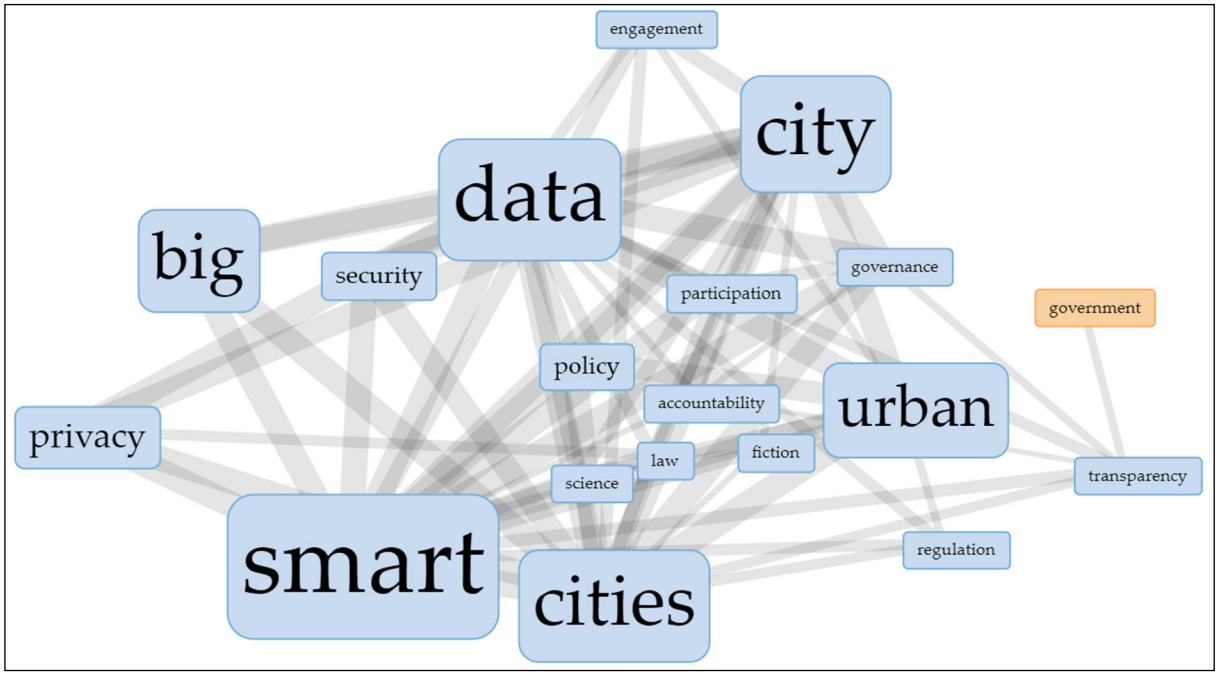


Figure 23: Collocations and keywords of the *Academic Publications* database, using *Voyant Tools*

Finally, when centralizing the visualization of keywords and collocations around a single term, it allows one to appreciate the diversity of subjects connected to the term and the distance between them. When approaching a subject rich in topics and subtopics, as in the case of smart cities, it would be very difficult (not to say improbable) to exhibit so many interlaced ideas in the condensed form of conventional text. There are multiple topics that share references and others

that seem not to relate at all when displayed under a common text. So, using text analytics can support the investigation of these cases. Once there are visual indications that some subjects might show some relations through multiple combinations of terms, it can indicate and suggest specific search in the texts and pre-informed readings of them. *Figures 24 and 25* display images that started some of the extensive investigations that informed the next subchapters.

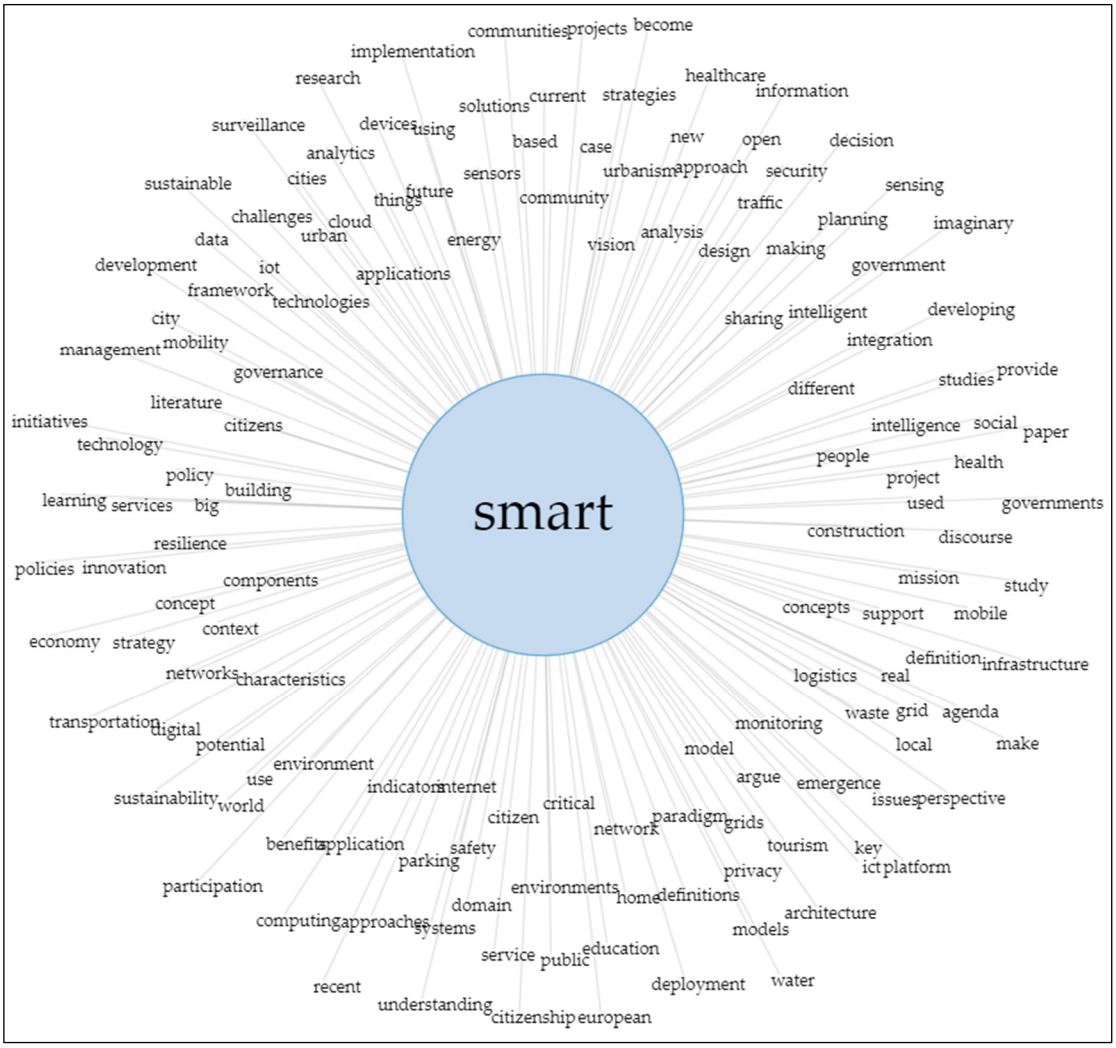


Figure 24: Main links of the term *smart* in the *Academic Publications* database, using *Voyant Tools*

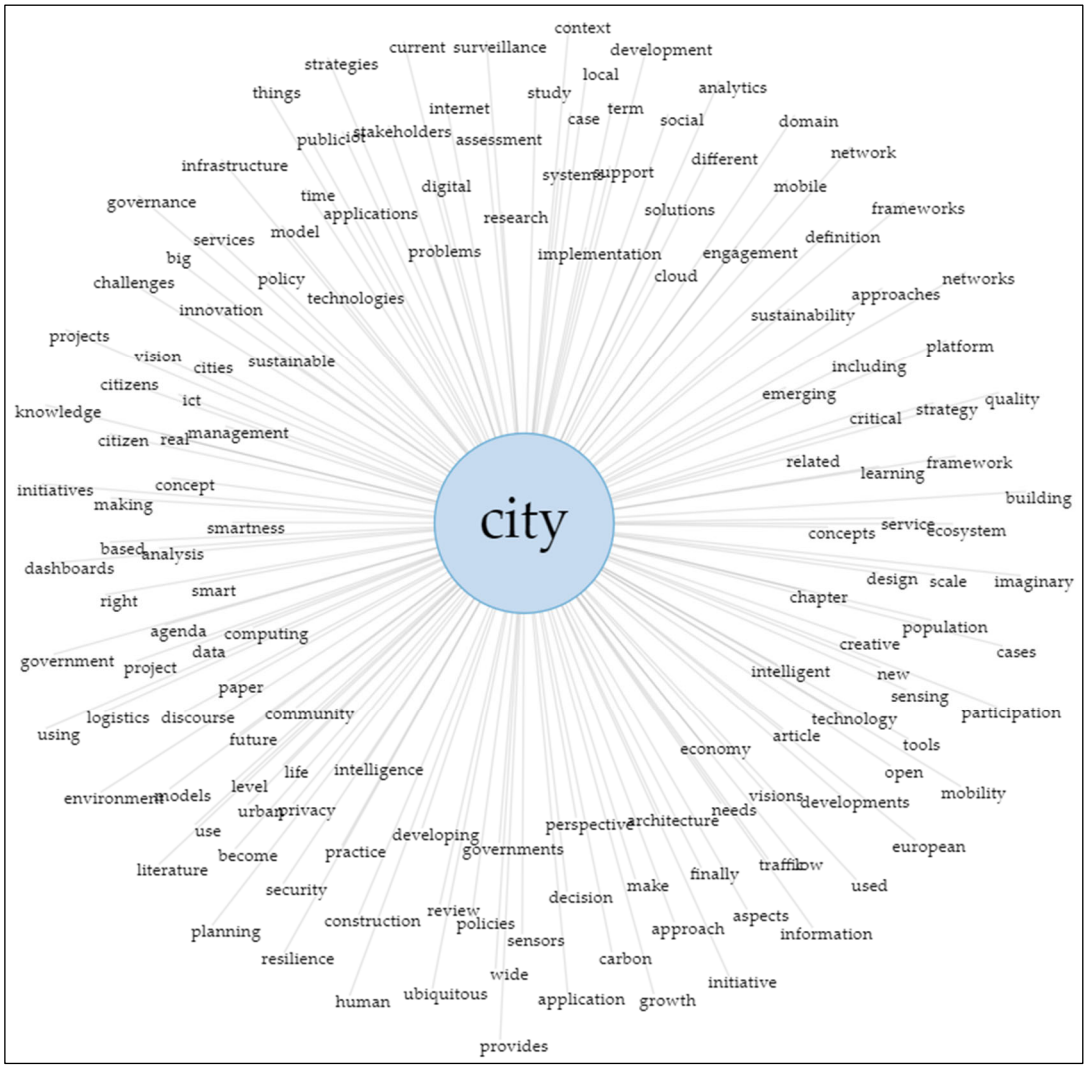


Figure 25: Main links of the term *city* in the *Academic Publications* database, using *Voyant Tools*

3.1.2. Keep Calm and Let the Data Say More Than It Used To

The first part of the subchapter starts with a description of the text analytics approach used to explore the topics that are used to portray smart cities in media outlets and academic publications, to better inform the research. It may appear innovative or experimental for retrieving useful information for this dissertation, yet the text analysis itself is not so different from what legal scholars have been doing for a long time in other forms. The data analysis ultimately demands interpretation of the texts and that is what this last part of the subchapter is dedicated

to, using the point of view of a (*wannabe*) legal scholar.

Any legal research on techno-social issues done by a legal scholar or practitioner would include an attempt at understanding the technological elements and social reality concerning the subject. For achieving this inevitable task, the doctoral research opted for the analysis of several texts that involved software applications to include numbers and visualizations for the textual interpretation. Despite the statistical appearances, this approach did not intend to provide any certitude based on the data. The estimations and graphics are not to be taken as *determinants* of the content of the texts but to serve as *clues* for research on the text.

The data analytics process of the two text databases requires human interpretation, just like IoT sensors and Big Data applications in smart cities. Numbers and visualizations provided by systems cannot provide certitude for neither the understandings and arguments in the texts nor of the facts and events on the streets: both cases need to imply interpretation by those who analyze the processed data from the data analytics systems, always conscious of the limitations of the data that feeds them. Regardless of the ways in which data collection methods improve and databases grow, it is not possible to embrace all of the complexities and heterogeneities of reality; consequently, there will always be gaps in the data and interpretation, and information deficits and excesses always need to be taken into consideration, as well.

Much is said in Big Data and artificial intelligence about the risks of bias in databases because algorithms may enhance and cause distortions in the results. So, this was an inevitable challenge for the research (even if done in a more usual way), and it demanded interpretation. The limitations data collection procedures are inherent to legal dissertations—there are limits of how much description they are capable of reproducing—yet they are valid because elements of interpretation and prescription are present. The next subchapter is set to explore some of the information and interpretation that assisted the doctoral research.

3.1.2.1. Connecting the Dots and Painting the Numbers for the Literature Review

Considering the many ways of analyzing and synthesizing data and knowledge for a doctoral dissertation, the research enjoyed the academic freedom to explore a path less-travelled by legal scholars. The choice to use text analytics should not be understood as a disapproval of other forms of legal research—it could not be further from it—this singular approach hoped to offer a small contribution to the interpretation methods and practices that have built law as it is today and to contribute to what law might become beyond tomorrow. The idea of freely exploring what is available and known today to inform and prevent what might come tomorrow is the basis of this research and one of the emancipatory aspects of the rationality of law itself.

Considering the pragmatic reasoning of law, better decisions (interpretations, choices) are expected when there is more information available and shared through society. The cognitive reasoning of science has made its way into law and (part of) the latter has become inseparable from the former. Therefore, scientific approaches are expected to inform legal scholars and practitioners about what is known about issues not fully engaged by law. At the same time, what is considered *unknown*, *uncertain* and *unimagined* is not the exclusive responsibility of one or the other, they coexist in a shared emancipatory domain for science, law and literature in which this research takes its chances to explore.

The literature review in this legal dissertation is only a partial result of the long process of consideration, preparation, and execution of a text analytics approach to the research subject. Several reasons could be discussed here to justify the choice for this unusual approach for legal research, taking into consideration if the possible benefits were worth the efforts and risks: the greater *amplitude* of work on the topics and subtopics that it could infer; the apparent *coherence* of the method regarding the subject of study; the perceivable *contrast* between elements that could confirm some affinities and reveal unexpected others; the cybernetic *differentiation* that

could show complexities and highlight their connections; the inspiring *intensity* in the focus and the depth to assess the contents of the sources in depth; the implied *orderliness* that it should bring to the work and the resulting texts; the acquired *reliability* of the results that other researchers have been reaching with it; the required *reproducibility* of the experiment for other legal researchers interested in the same or similar paths; the welcomed *systematicity* that it might bring to the entire academic initiative; the possible *validity* that it may add to some aspects of the research. Other less conscious and *not-so-scientific* reasons might also exist.

An attentive reader might notice some expressive and practical reasons for the choices toward text analytics for building the literature review. There are theoretical grounds for this choice that are expressed in the first chapter: the research intended to keep a consonance between the critique of the colonization of science over law and their conversion from emancipatory into regulatory forces. Law has much to contribute to a new paradigm of prudent knowledge for a fairer society when empowered by (the resistance of art and) literature, even more if both are coupled with an emancipatory perspective of science. Altogether, the second chapter containing the literature review was planned with the ambitious goals of providing a well-informed, issue-driven, and good-looking background on the subject of smart cities.

In order to (try to) achieve the goals of setting a supportive basis for the research, the first stage of analysis of the contents in the databases *Websites* and *Academic Publications* identified their most used and significative keywords. The previous subchapter 3.1.1 has more details on the top results in each database, and the respective spreadsheet files bring more complete listings of the researched terms. It is important to notice that not all the terms that appeared on the top of the list were used for further analysis, because only the terms identified with a related topic about smart cities were of direct interest—maybe it is not necessary to mention, but some related words were gathered under a single term.

About 100 results (single words and multi-words) were extracted by the tool *Textalyser* from the titles and subtitles in the database *Websites*, in order to use all the 650 sources in the first part of the literature review: 21st century, 5G, academics, accountability, Africa, answer, artificial intelligence, automated cities, Barcelona, benefit, best, beyond, Big Brother, Big Data, blockchain, building, China, citizen-centric, citizens, civic tech, cloud computing, communities, connected cities, corporations, costs, data analytics, data driven, democracy, digital cities, disruption, dumb, emerge, engagement, funding, future, Global South, governance, Hong Kong, human-centric, inconvenient, India, information security, infrastructure, innovation, Internet of Things, investment, IoT, Latin America, London, machine learning, Masdar, mobility, necessary, need, neoliberal, Neom, networked cities, new, New York, open data, openness, opportunity, Paris, participation, people-centric, personal data protection, platform, PPP, privacy, privatization, promise, ranking, resilience, resilient, revolution, rise, risk, sensors, sharing economy, Singapore, smartest, Songdo, start-ups, stupid, surveillance, sustainability, sustainable, tomorrow, too intelligent, too smart, top, traffic, transparency, transportation, truth, universities, urban development, urban planning, vehicles, and world.

Some frequent terms related to law and science fiction were left out of this list to be used later in the dissertation. Moreover, some specific subjects were less developed because they involve topics reserved for further research in the highly expected new period after this dissertation: Toronto's Waterfront project with Sidewalk Labs is the best example of them.

In the second part of the literature review, the emphasis was placed on extracting the most frequent and relevant nouns in the 750 sources in the database *Academic Publications*. The focus on nouns did not necessarily exclude an exploration of adjectives as used in the database *Websites*, but it intended to conform with the pattern used by the keywords chosen by the publishers or authors of the publications. About 46 results composed the second part of the

literature review: analysis, artificial intelligence, Big Data, blockchain, citizen, cloud computing, community, competitiveness, culture, decision-making, deep learning, economic development, education, efficiency, emergency, energy, entrepreneurial, health, housing, infrastructure, innovation, internet of things, machine learning, management, mobile, mobility, neoliberal, networks, parking, planning, quality, resilience, safety, security, sewerage, sharing, social services, stakeholders, sustainability, taxes, tourism, traffic, transportation, urban development, waste, and water. Some terms were also left aside: for example, the highly frequent term *concept* was kept out of this list to be treated as a topic for the subchapter 2.2.1.

The third part of the literature review was focused on an initial approach to the imaginary of law about smart cities. The two previous parts are strongly related to this imaginary, so here the main keywords in the hypothesis of the research were ready to be explored under a more legal interest by using elements from both databases. The main terms: accountability, engagement, governance, participation, personal data, privacy, security, and transparency.

The second stage of analysis, as explained in the previous subchapter, deployed visualizations to explore the terms and look for correlations and collocations between the terms and looked for issues and concerns for law in smart cities. It is hard to explain in written phrases the process of visual exploration of terms through links, clouds, and bubbles of words: it is much easier done than said. By clicking, hovering or centralizing each term, other terms or relations were highlighted, revealed, or measured in numbers, networks, or texts. Each term of the mentioned results could demand longer or shorter exploration—in fact, too much time was expended on this exercise—so some shortcuts of analysis were also applied to search for elements of legal interest (i.e., looking for troubles), as *Figures 26 to 29* suggest.

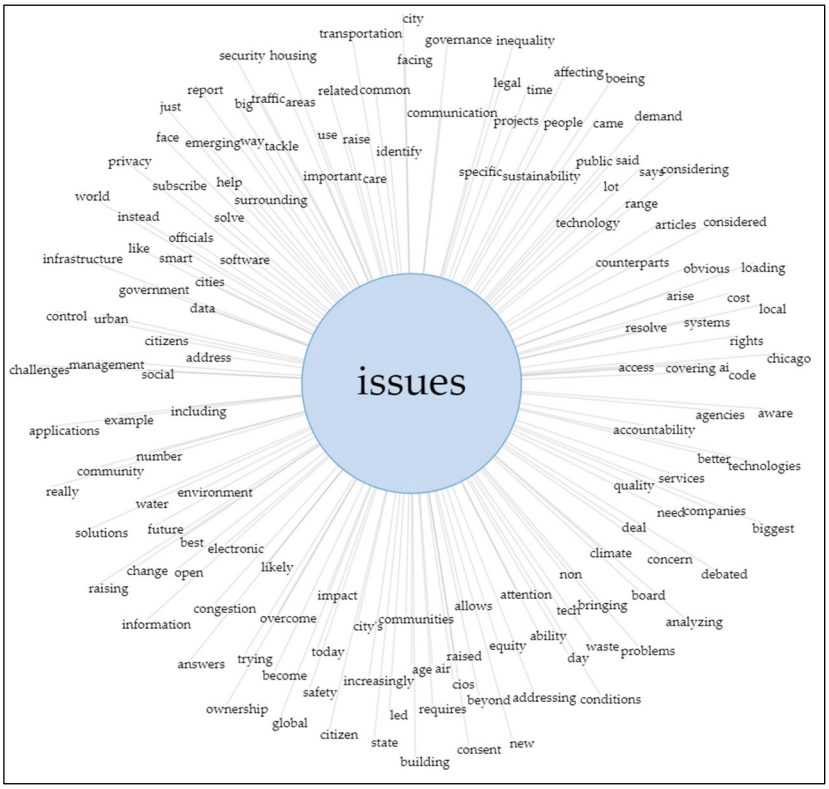


Figure 26: Main links of the term *issues* in the *Websites* database, using *Voyant Tools*

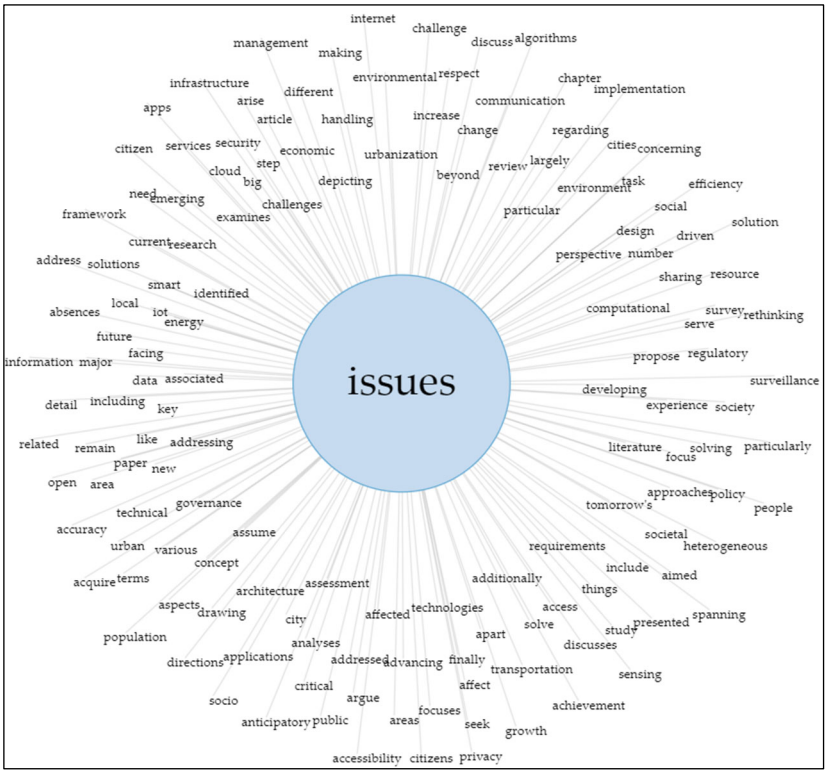


Figure 27: Main links of the term *issues* in the *Academic Publications* database, using *Voyant Tools*

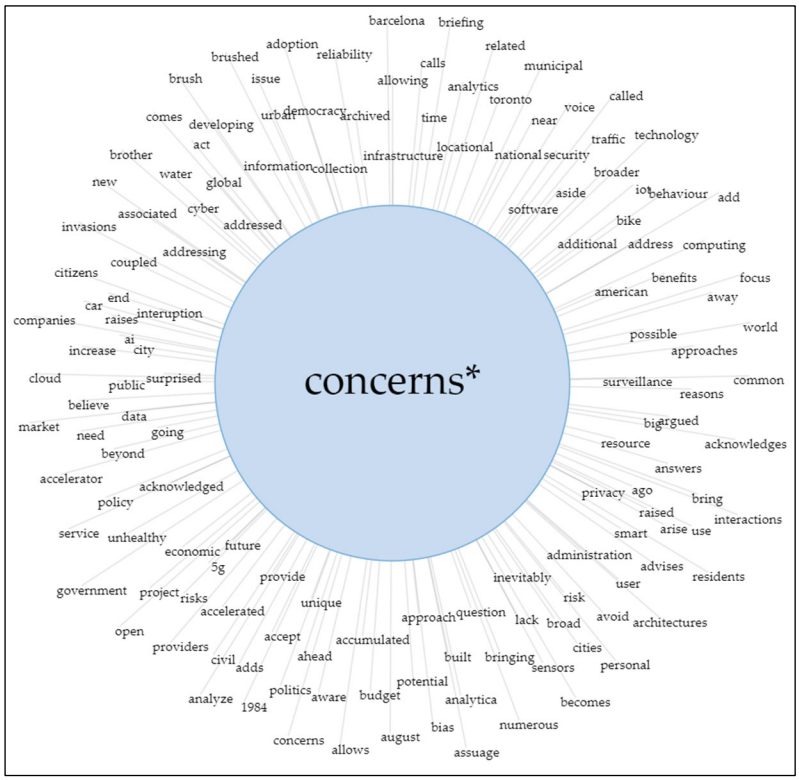


Figure 28: Main links of the term *concerns* in the *Websites* database, using *Voyant Tools*

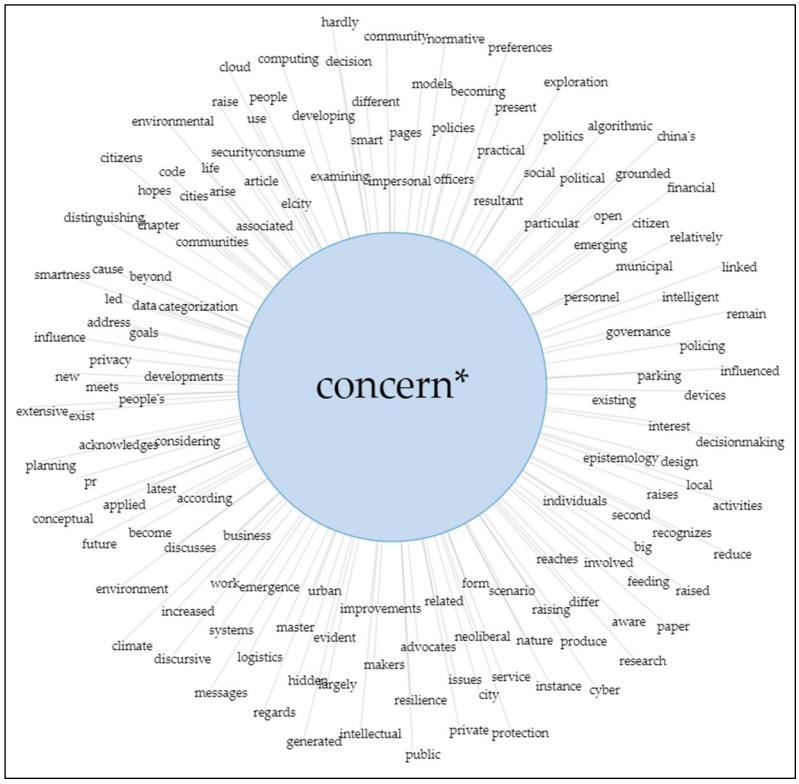


Figure 29: Main links of the term *concern* in the *Academic Publications* database, using *Voyant Tools*

By interacting with each term and its links, the number of occurrences of the word appears, and it may indicate an element for further investigation in the sources. Some of the words highlighted by the visualizations that seemed more related to the goals of the research were the object of further exploration through specific visualizations in the online tool, followed by direct readings in the databases and the documents used as sources. To briefly illustrate this process, *Figures 26 to 29* provide some terms that were explored for the literature review.

Some terms are too common to the subject to be considered, but many suggest topics. Focusing on the term *issues*, *Figure 26* from the database *Websites* suggests the following collocations: accountability, agencies, AI, air, applications, big (data), CIOs, citizens, climate, communication, communities, congestion, consent, control, environment, equity, governance, housing, inequality, infrastructure, management, officials, open, ownership, privacy, rights, safety, security, social, sustainability, traffic, transportation. The same term *issues* in the database *Academic Publication* brings some similar results that are in *Figure 27,* but it also shows other topics for further exploration: absences, accessibility, accuracy, achievement, algorithms, applications, architecture, assessment, big (data), citizen, cloud, communication, critical, economic, efficiency, energy, environment, experience, governance, growth, implementation, infrastructure, IoT, management, open, policy, population, privacy, regulatory, resource, security, services, sharing, solution, surveillance, and transportation. Coinciding results are expected between the databases. Nevertheless, they are not to be treated as the same and comparing their results requires taking them with a grain of salt.

When looking into similar terms, some results would be repeated, and other elements would appear in the results, too. Excluding the duplicated results, the term *concerns* in *Figure 28* from *Websites* suggests: 1984, 5G, accelerated, accept, analytics, Barcelona, benefits, behaviour, bias, bike, (big) brother, budget, car, companies, democracy, economic, interactions,

interruption, invasions, lack, market, personal (data), policy, politics, providers, reliability, risk, sensors, surveillance, Toronto, voice, water. In the same way, *Figure 29* from *Academic Publications* gives new clues for search: aware, business, categorization, China, code, consume, decision-making, design, developments, devices, discursive, emergence, financial, goals, hidden, hopes, impersonal, improvements, increased, influence, intellectual, interest, logistics, messages, nature, neoliberal, normative, officers, parking, people, planning, policing, politics, private, protection, raising, reduce, resilience, systems, and work. The terminology used by media and academia might naturally differ; yet they can be seen as complementary.

Finally, some patterns among the terms start to emerge after continuous visual analysis on collocations and related results, forming *pre-questions* about the use of terms in the available databases and documents. Exploring similar terms to *issues* and *concerns* (challenges, dangers, problems, risks, etc.) can complement the list of topics that form such patterns, along with further navigation through the networks of correlated terms. Most mentioned terms were expected to be found in the collocations, yet many of the results were less obvious and they generated more rounds of searches on the databases and the documents used as sources.

A general *pre-reading* of the topics identified in the texts was one of the benefits of the data analytics approach, often directed by the *pre-questions* brought to the surface by numbers and images that have stimulated interest and structure in the research. Any skeptical reader could ask if similar or even better benefits could not be achieved by the usage of extensive readings, manual notetaking, and subjective identification, which are possible and were not necessarily excluded from the research process. The results from text analytics predisposed the readings to a better comprehension of the texts, they assisted the systematization of several pages with semi-automated notes and, not to forget, provided an objective basis for the subjective choices of topic classification for the literature review. Reflecting on the subject, text

analytics is not a modern panacea, yet it was able to deliver much to the research.

Perhaps the most valuable benefit of the research was to help with the unperceived voids and unconscious misses made in the topics of regulatory relevance that deserved attention in the literature review. A good example would be the subject of *parking*, a term that constantly appeared in the counting of words and the visualizations of collocations, but it was still missing in the first versions of the literature review. The last revision compared the list of terms treated in the second chapter and, despite the resistance,[1324] this important topic was finally included.

Finally, after the extracting of terms forming the data collection, the clustering of topics used in the literature review followed a more common script for doctoral dissertations. The topics were gathered following the choices for narrative purposes that would keep coherence with the texts. The media and academic publications were distributed according to the list of topics and the most significative keywords in the texts. The readings were then done together with the support of highlighted keywords to compose each subchapter of the literature review.

3.1.2.2. Data Analytics Empowering Legal Research (for Public Policy)

The data analytics approach of this legal research was inspired by the proposition of embracing a subject under the perspective of the paradigmatic transition of knowledge. Because it is still a transition, the research combines what may appear contradictory elements: some that were once the standards and, despite not being the standards anymore, are still expected to be respected; some that are now set to become the new models and, being there not yet, still have more to be proven. In sum, this is a research that tries to attend to the homogeneity, simplicity, and symmetry of modern science while also acknowledging the heterogeneity, complexity, and

[1324] A personal resistance surely caused by some unpleasant professional experiences in a city hall.

multiversity of postmodern emancipatory knowledge by combining science, law, and literature.

The first inspiration for presenting a complex subject in a simple manner—the smart city is the kind of subject that allows an explanation in the 160 characters of a *tweet* or in thousands of pages—came from the paths long explored by other researchers using text analytics. The problem to do with the abundance of scientific information is hardly new and, to face it, methods and tools have been developed to approach scientific topics with heterogeneous sources.[1325] The challenge of swiftly understanding, summarizing, and exposing vast collections of scientific documents remained until the end of the research,[1326] and it remained possible because there were enough experiences and resources made available by others for this endeavour.

Despite the balance of curious numbers and pleasant images from visualizations, there are still asymmetries in the applied approach with text analytics, which should be still considered a *work in progress*. It should not be understood as a weakness but as a condition of the state-of-the-art, as well as an invitation to increase the usage of text analytics in areas that could be more resistant to experimentation—legal research is not necessarily one of them.

Data analytics has progressed into research on legal documents all over the world.[1327] Studies using data analytics and applications for text mining are deployed to analyze legislation, jurisprudence, contracts, and all sorts of legal texts. The complex ecosystems of research centres, judicial institutions and private companies (some are called *legal start-ups*)[1328] are developed around the field of *legal analytics* and are gaining momentum. Legal analytics is

[1325] *See* Filipi N Silva et al, "Using network science and text analytics to produce surveys in a scientific topic" (2016) 10:2 Journal of Informetrics 487–502.
[1326] *See* Cody Dunne et al, "Rapid understanding of scientific paper collections: Integrating statistics, text analytics, and visualization" (2012) 63:12 Journal of the American Society for Information Science and Technology 2351–2369.
[1327] *See* Rupali Sunil Wagh, "Knowledge discovery from legal documents dataset using text mining techniques" (2013) 66:23 International Journal of Computer Applications; Erick Gomez-Nieto et al, *Understanding large legal datasets through visual analytics* (2015).
[1328] Daniel W Linna Jr, "What we know and need to know about legal startups" (2015) 67 SCL Rev 389.

certainly not new,[1329] its services have been available for a long time (e.g., LegalMetric),[1330] and search engines are full of results about the subject.[1331] Several publications have been written about this topic which have traveled from a long road and still have a long way to go.

With that said, it is appropriate to confess the last push of inspiration for experimenting data analytics for legal research came from *The Meaning and the Mining of Legal Texts*, by Mireille Hildebrandt.[1332] In this work, the author investigates "to what extent the law can be understood in terms of calculation and measurement,"[1333] acknowledging that pattern recognition will require interpretation of the findings from *techniques of not-reading*, and she discusses recommendations toward the assumptions of data mining. Such recommendations are crucial for researchers of all areas, not only for law, and they influenced this dissertation.

To elaborate on the mining of legal texts, Hildebrandt indicates that one should "focus on the difference between interpreting text and interpreting the results of data mining,"[1334] providing much basis for a legal research about mining nonlegal texts as well. The Dutch professor presents the plurality of methods and their assumptions about the pattern of recognition of texts, the capacity of visualizations of data mining processes "(e.g., dynamically, also showing the development and transformation of the patterns mined)"[1335] bringing meaning and significance to them, and the inevitability of bias that "should be under scrutiny to fine-tune or even disrupt the direction it implies."[1336] The author is "concerned with software machines capable of detecting patterns in legal texts that should help… legal scholars to develop, attune, or reject doctrinal

[1329] I have been following the subject since the time I was the academic supervisor of experiences of text decision models and statistical reports during the first pilot project of *paperless courts* in Ceara, Brazil.
[1330] At least since 2002, says the website (and my memory). It is available at: https://www.legalmetric.com.
[1331] Try http://bit.ly/GoogleScholarLegalAnalytics and http://bit.ly/MicrosoftAcademicLegalAnalytics.
[1332] Mireille Hildebrandt, "The meaning and the mining of legal texts" in David M Berry, ed, *Understanding Digital Humanities* (London: Palgrave Macmillan, 2012) 145.
[1333] *Ibid* at 146.
[1334] *Ibid* at 147.
[1335] *Ibid* at 150.
[1336] *Ibid* at 152.

theories,"[1337] a concern also shared by this research, which extrapolates the possibilities of legal research in the interpretation of data mining for elaborating public policies.

Hildebrandt concludes her work with valuable recommendations for this research:

> Sculley and Pasanek formulated a set of five recommendations for a critical appraisal of the data mining of literary texts. These recommendations could be further developed and adapted to the context of legal texts. First, assumptions about the scope, function, and meaning of the relevant legal texts should be made explicit. Second, a multiplicity of representations and methodologies must be used to prevent the appearance of objectivity that is so often attached to computing. Third, when developing a legal knowledge system all trials should be reported, whether they confirm or refute a designer's original expectations. Fourth, the public interest requires transparency about the data and the methods used. Fifth, a sustained dialogue about different mining methods should enrich doctrinal debates. I would add a sixth recommendation that requires legal theory and legal and political philosophy to engage with the implications of the not-reading of legal texts. Instead of deferring to data scientists or resisting any kind of automation, there is an urgent need for research into the epistemological, practical and political implications of different types of mining methods.[1338]

The six recommendations above were taken into consideration for the research because they should also be followed by legal researchers data mining non-legal texts. Concerning the first suggestion, this dissertation tries to make the limited scope of the publications analyzed clear, the main function of bringing topics and subtopics to attention, and the possible meanings that need to be interpreted from the texts. The second recommendation was followed as much as possible, and a few different text mining tools were used, so the results would not depend on a single one. The third and most important one, other tools and databases were deployed and most of them are reported here, and the *experimenter's bias* and *cherry-picking* are dealt with as possibilities under scrutiny, mitigated by search routines and communicated to the reader. The fourth is more an imperative than a recommendation; there is a commitment to transparency since the beginning of the research that only concludes with making the data and methods

[1337] *Ibid* at 153.
[1338] *Ibid* at 157.

available for the community of researchers. The fifth recommendation, which implies a peer review of the methodologies of mining text for the research, is already part of the doctoral process through a dialogue with the jury. Regarding the last recommendation, this research is an example of the belief that legal research must engage with the implications of data analytics being deployed to detect patterns by "different ways of 'reading' in texts, images, movements, and life events."[1339] It is doubtful that the research met the six warnings, but it was not for lack of trying.

Anyhow, a doctoral dissertation is all about doubts and choices, with or without sophisticated tools for mining significative information for research. Before choosing the few accessible online tools used in this research, other more complex and powerful (and expensive) AI-based search tools were given a try—mostly with limited functions or in a free trial period—to *tame the scientific literature* that grows at a rate of one million publications each year.[1340] The doubts were not only technical[1341] but also legal: the majority of the documents referred to in the *Academic Publications* database come from publishers that explicitly limit their access for any other form of analysis other than conventional reading. Even considering copyright exceptions for scientific research, the text mining on *protected PDF* files[1342] leaves too many grey areas for academic discussion with legal scholars (and sure disagreement with publishers' lawyers),[1343] so the more intensive and extensive forms of data analytics with machine learning were soon set aside.[1344] In the end, the technical, financial, and legal choices set the conditions for the data analytics methods deployed and, consequently, they set the limits for the results presented here.

[1339] *Ibid* at 150.
[1340] *See* Andy Extance, "How AI technology can tame the scientific literature" (2018) 561 Nature 273–274.
[1341] Some technical doubts were solved by the financial aspects: there was a certitude that there was not enough budget for using most of the powerful machine learning tools with beautiful visualizations.
[1342] Please consider the so-called *PDF security* more like a public statement than real protection of the contents. It is so easy now to *unprotect* PDF files that it is almost useless to try to lock their content.
[1343] Maarten Truyens & Patrick Van Eecke, "Legal aspects of text mining" (2014) 30:2 Computer Law & Security Review 153–170.
[1344] Still, it was very interesting to try the functions of the tools with a few dozen of open publications.

Speaking of conditions, the limitations of access of academic publications set by the publishers deserve one more observation. When the big private publishers set economic and legal barriers to use texts produced by authors who do not receive financial benefit from these limitations, they can greatly limit innovative research with text analytics for the advancement of knowledge. By limiting the input of data, it necessarily limits the outcome of data—there is no tools that can solve this problem, no matter how advanced they can be.

The deployed tools are not sophisticated enough to detect the patterns of arguments or ideas in the databases, but the "mere information retrieval, based on simple indexing on the basis of word frequency, which has been around for many decades,"[1345] was enough to highlight key elements for the research. Many publications about smart cities from nonlegal authors make reference to regulatory issues, assisting in a deeper look into the documents used as sources. Just as was stressed before, the final goals of applied text tools were not that different from more traditional legal research, they assisted with pre-readings and induced pre-questions of the contents by pointing out terms that any legal scholar could identify and look further into.

The media and scientific publications on smart cities often refer to law in several ways: the many implied legal aspects, the possible concerns for regulation, and the issues to be treated by public policies, etc. *Table 17* gives some hints about terms of legal interest on the subject.

Websites			**Academic Publications**	
Term	**Frequency**		**Term**	**Frequency**
privacy	556		governance	323
policy	484		policy	229
security	442		privacy	217
governance	284		security	172
law	182		participation	89
engagement	141		law	61
regulation	135		engagement	47
transparency	133		participatory	41
crime	125		legal	40

[1345] Hildebrandt, *supra* note 1332 at 153.

cybersecurity	77		regulation	33
ownership	65		crime	29
legal	64		transparency	26
participation	64		responsibility	18
accountability	46		accountability	15

Table 17: Wordlist of terms more related to law in both databases, using *Sketch Engine*

Despite the data being rather straightforward and remembering that the research tried to collect all the publications about smart cities from authors in the legal domain, the interpretation of the results must be prudent. Based on *Table 17*, the information retrieval is able to induce reasoning about the relevance of the terms and the ideas with which they are usually associated. Then again, most of the terms had already been previewed in the hypothesis of the research; consequently, this could be understood as a confirmation from a deductive reasoning based on the text analytics experiment. Still, bias in the data collection and analysis must always be under careful scrutiny, for such scrutiny must "not be understood as entailing an objectivist view from nowhere, but neither must it be downplayed as a subjectivist illusion."[1346] For these reasons, acknowledging the incompleteness of the observations and looking for the more plausible explanation for available information, abductive reasoning is also taken in consideration when interpreting data through visualizations.

The terms presented above in *Table 17* were taken for further investigation through dynamic visualizations with *Voyant Tools*, and all of them were addressed in the literature review and are further explored in this chapter, with a few exceptions.[1347] For the objectives of this subchapter, *Figures 30 to 35* may assist some useful examinations.

[1346] *Ibid*.

[1347] The research potential in the topic of *crime in smart cities* is evident, and it was mostly set aside for future research after the doctoral degree. It is tempting to combine it with science fiction and specific subgenres like mystery, detective, ultra-weird etc. A *spoiler* about the narrative capabilities of exploring the subject of crime is explored in the law & literature and science & literature subchapter.

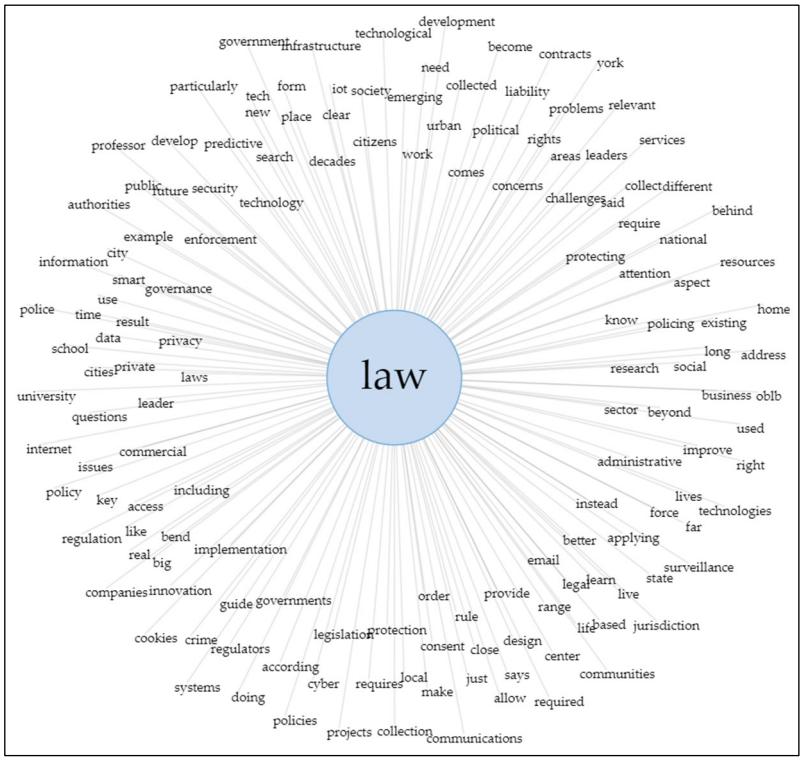


Figure 30: Main links of the term *law* in the *Websites* database, using *Voyant Tools*

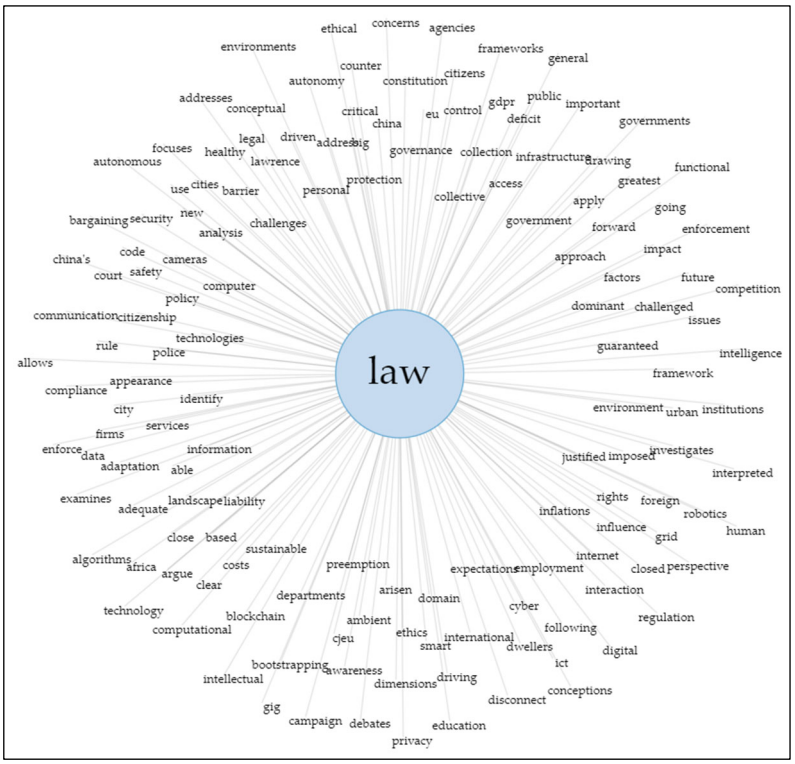


Figure 31: Main links of the term *law* in the *Academic Publications* database, using *Voyant Tools*

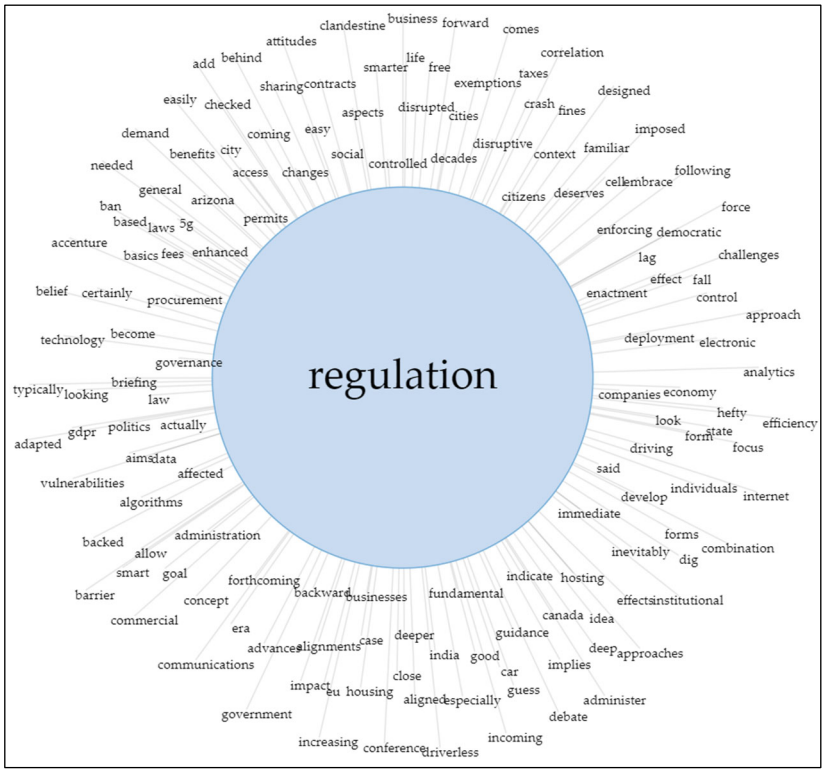


Figure 32: Main links of the term *regulation* in the *Websites* database, using *Voyant Tools*

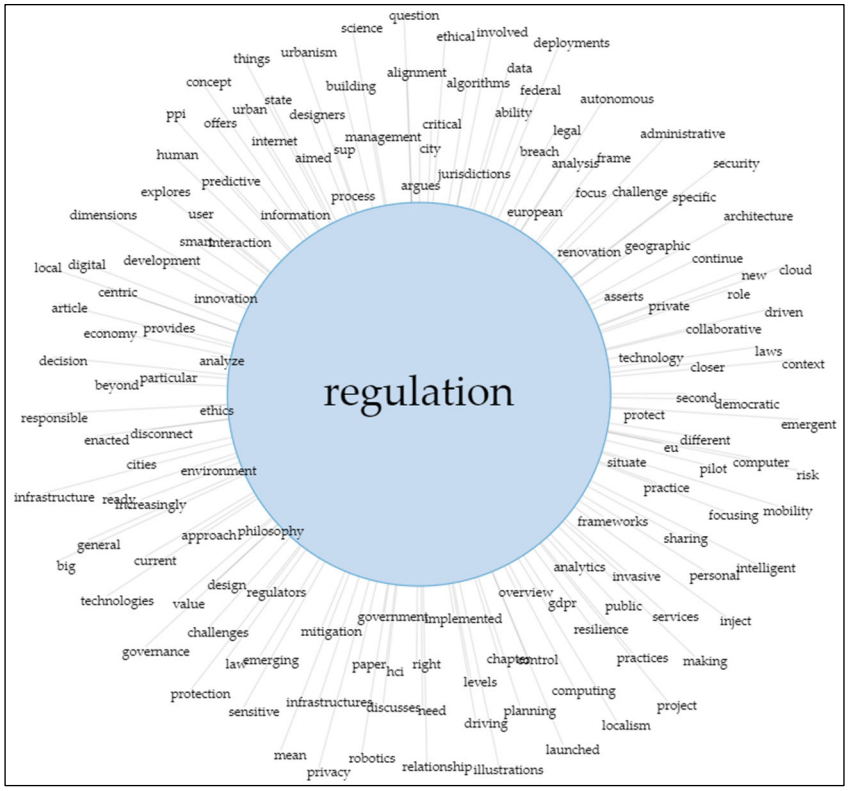


Figure 33: Main links of the term *regulation* in the *Academic Publications* database, using *Voyant Tools*

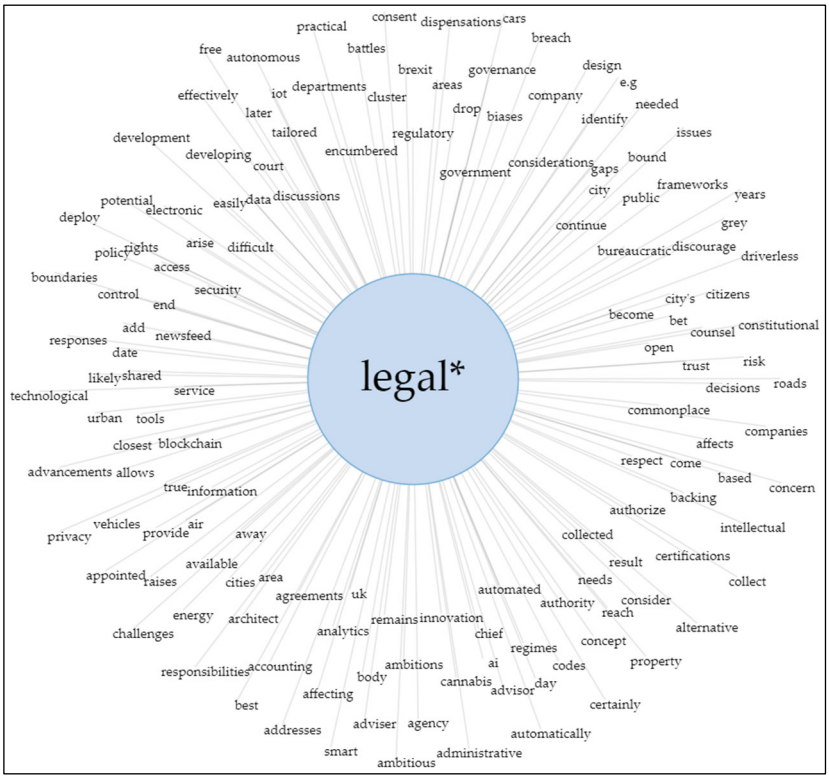


Figure 34: Main links of the term *legal* in the *Websites* database, using *Voyant Tools*

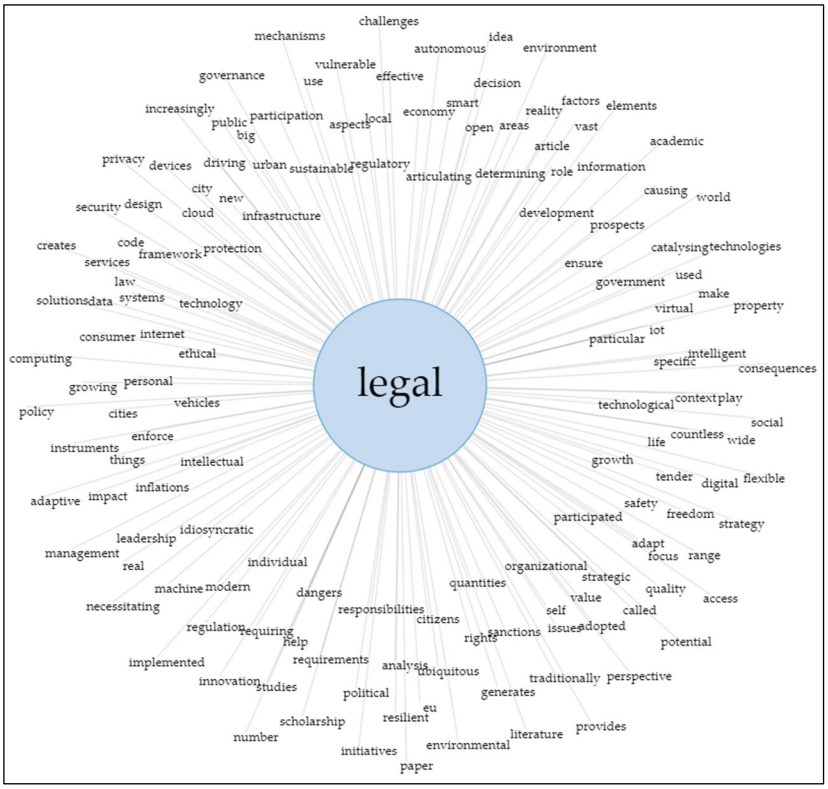


Figure 35: Main links of the term *legal* in the *Academic Publications* database, using *Voyant Tools*

Once the information retrieval identified terms to be further explored, the visualization of collocations of the terms *law*, *regulation*, and *legal* were particularly useful for analyzing a web of relations and issues for legal research in the texts. Despite the risk of sounding redundant, the images in *Figures 30 to 35* do not do justice to the experience of interacting with the online visualizations. The choice here was for only displaying the visualization of centralized links in *Voyant Tools*—the online tool offers other graphic interfaces, *Sketch Engine* also has a few—because it shows more elements with more clarity for printed paper and it takes less effort to communicate part of the possible results from further investigation on the links.

When exploring the term *law*, a series of terms related to it form networks of words pointing to both general and specific topics that can be followed in more visualizations and directly on the documents used as sources. In *Figures 30 and 31*, these are the most useful terms: agencies, authorities, challenges, citizenship, code, constitution, contracts, competition, compliance, consent, crime, GDPR, governance, institutions, issues, jurisdiction, legislation, liability, protection, police, policy, problems, privacy, rights, rule, and security. After following the links, the term *intellectual* is clearly linked to *property* and the term *collection* to *data*.

Regulation is a major subject in publications on smart cities, following the same pattern of digital technology as a whole. When excluding the terms already stressed above, other words in *Figures 32 and 33* allow more granular analysis: barrier, breach, democracy, ethics, fees, force, local, permits, practices, procurement, risk, role, sensitive, state, taxes, and vulnerabilities. The term *protection* is predominantly linked to the term *data*.

All the three terms in the previous figures are closely related. Yet, they should not be assumed to be interchangeable or uniformly used in the publications, ergo, exploring collocations demands following a plurality of terms to cover subtopics. The term *legal*, for example, might be more frequently used by some authors and less from others, so it will be more associated with a

few different terms than to those from *law* and *regulation*. *Figures 33 and 34* suggest that such diversity might be taken into account: agreements, bias, boundaries, consumer, control, court, gaps, instruments, open, requirements, responses, and responsibilities. The term *property*, when further explored from there, can be linked to *intellectual* and *ownership*.

The terms (public) *policy* and *policies* appear intertwined with law in the visualizations, as displayed earlier and in *Figures 36 and 37*, providing complementary elements for the research and suggesting possible support for a hypothesis in the doctoral project.

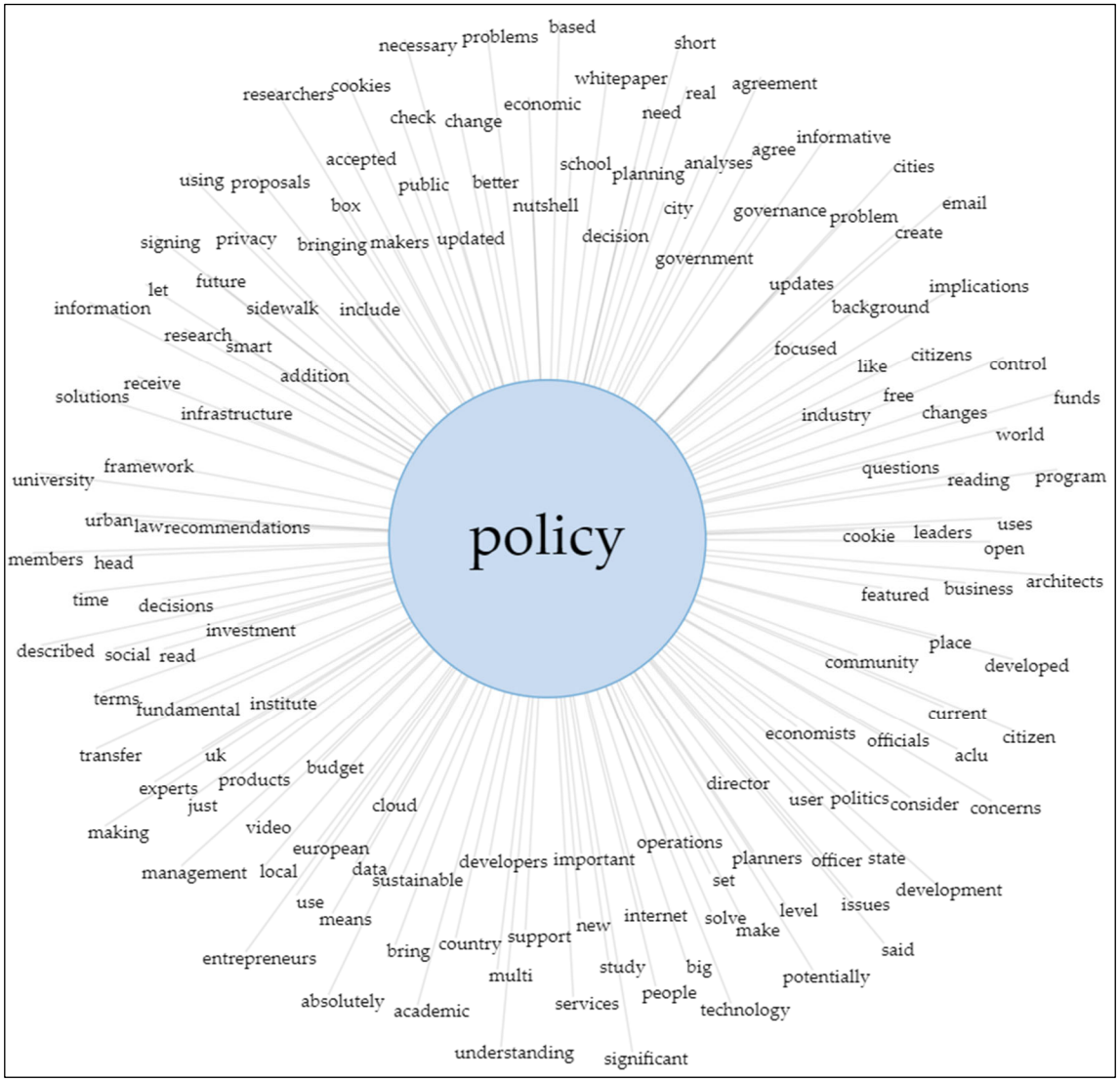


Figure 36: Main links of the term *policy* in the *Websites* database, using *Voyant Tools*

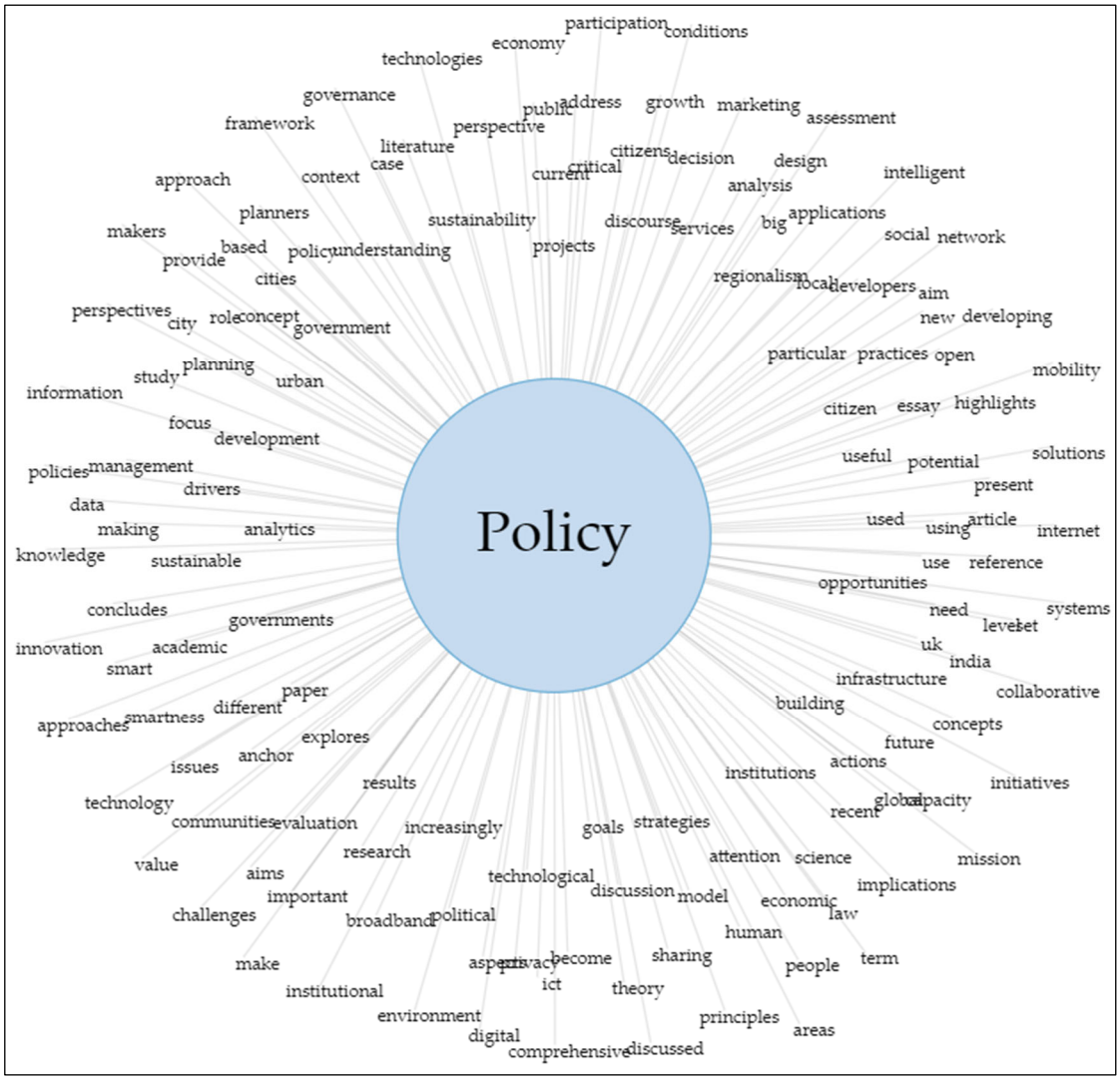


Figure 37: Main links of the term *policy* in the *Academic Publications* database, using *Voyant Tools*

After investigating the relations between the more usual terms associated with *law* and those more highlighted by (public) *policy*, different sets of words emerge: budget, community, collaborative, economy, governance, growth, industry, initiatives, investment, innovation, implications, management, operations, opportunities, planning, projects, proposals, questions, solutions, sustainability, and university. These terms are also frequently applied by legal scholars in their publications, blogs and conferences related to smart cities. Therefore, public policies are part of the imaginary of legal scholars and practitioners. But why?

Law has effective ways of searching, understanding and taking a position about the past. Legislation and jurisprudence are excellent for learning about a troubled past, dealing with a challenged present and preventing an unwanted future. Nevertheless, the future is not always a repetition of the facts and values of the past, so the same lenses cannot always be used in legal analysis to focus on the issues that lie further along on the horizon. When (the imaginary of) law is used for probing, framing and projecting itself into the future, it can be called public policy.

Law and public policy are not one and the same, but there are known reasons to explain why legal practitioners and scholars are called to evaluate, propose, and lead public policies. For example, legal research can assess the effects of public policies from what comes into the courts and can invoke legal doctrine to protect fundamental rights that public policies might affect.[1348] This research is about the *present future* so, consequently, it is about public policy.

Public policies are expected to be developed with the support of data analytics,[1349] and the idea of the smart city itself is based on the proposition of data-driven public policies,[1350] which might be continuously adjusted following recommendations from data analysis.[1351] For keeping an *equality of arms* in the debate about public policies for smart cities, legal scholars and practitioners might devote more attention to data analytics for empowering legal research.

3.2. The (Legal) Narratives of Smart City Projects in Rio de Janeiro and Montréal

The doctoral research was proposed knowing that there was not much legislation or

[1348] Vanessa Trindade Bortolon Carvalho, Lucas Medeiros Gomes & Francisco Toniolo de Carvalho, "Metodologia jurídica para análise de jurisprudência sobre políticas públicas", (February 2018), online: *Jus Navigandi* <https://jus.com.br/artigos/63137/metodologia-juridica-e-especificidades-da-pesquisa-jurisprudencial-aplicadas-as-politicas-publicas>.
[1349] Maureen A Pirog, "Data Will Drive Innovation in Public Policy and Management Research in the Next Decade" (2014) 33:2 Journal of Policy Analysis and Management 537–543.
[1350] Marco Anisetti et al, "Privacy-aware Big Data Analytics as a service for public health policies in smart cities" (2018) 39 Sustainable Cities and Society 68–77.
[1351] Laurie A Schintler & Rajendra Kulkarni, "Big Data for Policy Analysis: The Good, The Bad, and The Ugly" (2014) 31:4 Review of Policy Research 343–348.

jurisprudence to support it by simply looking into what happened in the past, finding out the results in the present of smart cities, and then making considerations about their possible future. Even without these common sources for legal research, the doctoral project was accepted because it is supported by legal resources under full work: several legal practices in the technocratic machines of municipalities trying to make the imaginary of smart cities into a future reality. These legal practices are being developed under the form of public policies for smart projects that are carried by specific narratives, conceived in different sociopolitical conditions, and framed by local normative references. The doctoral research takes these public policies and contextual elements into consideration in order to move forward into the legal imaginary.

Considering a more literary approach to law, the legal imaginary has much to do with archetypes, prototypes, and stereotypes.[1352] There are many interpretations about their meanings and relations, and these fertile matters are only explored here to investigate public policies for smart cities. Legal practitioners are constantly called to invoke archetypes of law, project prototypes of public policies, and (re)build legal stereotypes for smart city projects. This subchapter emulates this task as an exercise of the legal imaginary which must always consider peculiar sets of narratives, conditions, and references.

Despite the rich traditions of legal theory, the rationality of law is embedded in practicality and this doctoral dissertation could not ignore it to approach the legal imaginary of smart cities. The projects of cities of the near future are not being built in face of a possible absence of law. On the contrary, smart cities take core normative claims and goals into their *code*, in both technological and legal senses of the term. Both senses depend a lot on elements that cannot be discussed only in abstraction, because they depend on contextual conditions that are to be

[1352] Although very tempting, the meaning sought here does not follow Platonic or Jungian senses.

partially emulated in this subchapter.

Two specific contexts for legal considerations about smart city projects were chosen for analysis: the smart city projects of Rio de Janeiro and Montréal. There are several reasons for this research choice: some of them simply have to do with feasibility (it could be done) and perceptivity (it could be understood), but also with reproducibility (it could be illustrated) and utility (it could be useful). Finally, the narrative contexts of both smart city projects changed in the recent past, so their conditions can be better appreciated with some convenient distance, even if their consequences are still *in progress*—or in other words, *in process*.

It is fundamental to clearly state what the research choices in this subchapter are *not* about: it is not a comparative study and it does not use comparative law, even when it contrasts the projects for illustrative goals; the cases of Rio de Janeiro and Montréal should not be generalized as models for understanding Brazilian and Canadian smart cities because the local elements in their public policies present more premises and consequences than their legal contexts; the research does not perform a deep analysis on applicable legislation and related legal doctrine on the cases and specific projects because it would not contribute to answering the research questions and objectives.[1353] It is advisable to avoid detours and to stay the course.

Three steps are taken here to get to the objectives. First, the public storytelling about the smart city projects of Rio de Janeiro and Montréal is presented in their respective circumstances; this is followed by more specific descriptions about Big Data projects in these cities that represent much of the smart tech archetypes being deployed around the world; lastly, a synthesis of visualizations and legal references presents the background for the prototypes of *smart public policies* and the stereotypes of the cities of the near (fictional) future.

[1353] Legal research on these topics would be easier and more amusing but could become misleading.

3.2.1. The Clever Storytelling Around Two Very Ambitious Smart Cities

The literature review draws much from the North American and European contexts, where most of the smart city research has been done, but the dissertation has also highlighted its global characteristics that are always adapted to local contexts. Therefore, it does not take much to bring the attention to a smart city case *in Latin America*,[1354] knowing that it shares the archetype,[1355] while keeping certain peculiarities. The second case, a city in the capitalist roadmap of the future, presents some singularities from the main North American models.[1356]

Brazilian and Canadian cities have been an important part of the urban debate on intelligence and innovation since the beginning of the research,[1357] and the relevance of the subject has grown and spread to many other cities in these countries until its end.[1358] This long public conversation in Brazil and Canada also involves bragging about smart city rankings,[1359] hosting brand events of the smart city industry,[1360] and keeping ithis *emerging trend* alive like a

[1354] *See How "smart" are Latin American cities?*, Working Papers ECARES 2018-05, by Morgane De Halleux & Antonio Estache, Working Papers ECARES 2018-05 (Université libre de Bruxelles, 2018).
[1355] *See* Raquel Rennó et al, "Ciudades inteligentes en Latinoamérica, el ciudadano vigilado" in Camilo Rios, ed, *¿Nuevos paradigmas de la vigilancia? miradas desde América Latina: Memorias del IV Simposio Internacional Lavits, Buenos Aires*, 1a ed (Córdoba: Fundación Via Libre, 2017) 91.
[1356] John R Kennedy, "'Cities of the Future' list includes many in Canada", (16 April 2013), online: *Global News* <https://globalnews.ca/news/484616/cities-of-the-future-list-includes-four-in-canada/>.
[1357] BBC Brasil, "Cidades do futuro: você gostaria de viver em uma cidade inteligente?", (24 August 2013), online: *G1* <http://g1.globo.com/tecnologia/noticia/2013/08/cidades-do-futuro-voce-gostaria-de-viver-em-uma-cidade-inteligente.html>; Business Insider, "The 18 most innovative cities on Earth", (6 August 2014), online: *Financial Times* <https://financialpost.com/business-insider/the-18-most-innovative-cities-on-earth>.
[1358] Helton Simões Gomes, "Só 18% das prefeituras têm plano de cidade inteligente no Brasil, diz pesquisa", (2 May 2018), online: *G1* <https://g1.globo.com/economia/tecnologia/noticia/so-18-das-prefeituras-tem-plano-de-cidade-inteligente-no-brasil-diz-pesquisa.ghtml>; Eric Emin Wood, "Vancouver, Montreal, Waterloo among 20 finalists for Smart Cities Challenge", (5 June 2018), online: *IT Business* <https://www.itbusiness.ca/news/vancouver-montreal-waterloo-among-20-finalists-for-smart-cities-challenge/102146>.
[1359] Cohen, *supra* note 431; Maclean's, "Canada's smartest cities 2010: overall rankings", (20 May 2010), online: *Maclean's* <https://www.macleans.ca/news/canada/smart-cities-2010-overall-rankings/>.
[1360] MontrealTV, "Smart City Expo Montréal", (8 April 2015), online: *YouTube* <https://youtu.be/uWle6Z3ZeNE>; Prefeitura de Curitiba, "Smart City Expo Curitiba", (3 April 2018), online: *YouTube* <https://youtu.be/keLZR74xKvc>.

novelty on the news[1361]—even if it has been a novelty for over 15 years now.[1362]

Brazilian cities have been engaging with smart prototypes for a long time, the city of Curitiba is still considered a benchmark for urban intelligence and "may be the original smart city."[1363] The former Mayor and architect Jaime Lerner,[1364] brought the world's attention to the innovative projects of Curitiba,[1365] and one of their long-lasting effects is the sustainability aspect of Brazilian urban smartness.[1366] Curitiba is surely the Brazilian icon in smart city projects.[1367]

If Curitiba can be considered one of the oldest experiments of urban tech innovation that got global attention, in contrast, there is no doubt that Toronto occupies most of the international attention as the latest model of smart city.[1368] Despite not using the term itself,[1369] the public-private partnership between Google's Alphabet company and Waterfront Toronto for *reinventing the modern city* is widely reported by media outlets all over the world—providing mixed opinions that result in both of criticism and celebration—and creating high expectancy and apprehension about turning it into a dominant model for smart cities.[1370] Even if Toronto gets more mediatic

[1361] Manuel Manrique, "How's Brazil's Top 5 'Connected Smart Cities' are making progress", (3 July 2018), online: *ITU News* <https://news.itu.int/brazil-top-5-smart-cities/>; CBC Radio, "Are we ready for 'smart' cities?", (7 December 2018), online: *CBC* <https://www.cbc.ca/radio/spark/417-1.4936817/are-we-ready-for-smart-cities-1.4936822>.
[1362] Google search on the term since 2004 can be accessed here: http://bit.ly/SmartCityOnGoogleTrends.
[1363] Ayesha & Parag Khanna, "Intelligent Cities: Long Bus, Short Wait" *Time* (2 May 2011), online: <http://bit.ly/IntelligentCitiesTimeMagazine>.
[1364] TED, "The song of the city - Jaime Lerner", (7 February 2008), online: <https://youtu.be/haKh9mCk3xk>.
[1365] UNESCO, "A city at the service of its citizens", (14 October 2010), online: *YouTube* <https://youtu.be/BtdH0DJkTgI>.
[1366] Celso Machado Junior et al, "Do Brazilian cities want to become smart or sustainable?" (2018) 199 Journal of Cleaner Production 214–221.
[1367] Manuel Manrique, "Curitiba ranked as Brazil's smartest city", (13 September 2018), online: *Cities Today* <https://cities-today.com/curitiba-ranked-as-brazils-smartest-city/>.
[1368] Salmaan Farooqui, "Sidewalk Labs reveals latest plans for Toronto 'smart city' development", *The Globe and Mail* (14 August 2018), online: <https://www.theglobeandmail.com/business/article-sidewalk-labs-reveals-latest-plans-for-toronto-smart-city/>.
[1369] Aarian Marshall, "Alphabet Is Trying to Reinvent the City, Starting with Toronto" *Wired* (19 October 2017), online: <https://www.wired.com/story/google-sidewalk-labs-toronto-quayside/>.
[1370] Jathan Sadowski, "Google wants to run cities without being elected. Don't let it", *The Guardian* (24 October 2017), online: <https://www.theguardian.com/commentisfree/2017/oct/24/google-alphabet-sidewalk-labs-toronto>.

attention now than any other smart city in the world, the city's efforts concerning projects of urban intelligence are not recent.[1371] Therefore, the latest developments in Toronto should not cause so much surprise, especially considering that Canadian cities have a much long past based on technological innovations that also seem to guide their future.[1372]

Althgough the two cities described above dominate the present imaginary of smart cities in Brazil and Canada, the doctoral research chose two other cities in these countries for reasons of feasibility, reproducibility, and utility, as was previously mentioned. Curitiba and Toronto are cases under study by several researchers of many areas of knowledge and both cities remain unavoidable references in one way or another for this dissertation (and what may come after it). However, the smart city projects of Rio de Janeiro and Montréal have more resonance with the main objectives and initial hypothesis of the research project, along with the last results and the new questions that emerged during the writing process of this dissertation.

Rio and Montréal have a lot to show and tell about smart cities, both share various drivers and common narratives. Much was done in both cities in short periods of time and with limited budgets, both were conducted by ambitious and broad projects, and both are led by committed and creative city officials. Nevertheless, their underlying narratives may have done even more.

Building a minimal understanding about the sociopolitical narratives of the smart projects of Rio de Janeiro and Montreal is essential to inquire after the imaginary involved in their public policies. They are set in space-time markers that are well delineated, but their consequences go much further than their physical limits; they brought effective changes to technocratic practices of their municipalities, but the outcome of their propositions is far more powerful to the public

[1371] Valerie Hauch, "Toronto makes the short list of world's most intelligent cities", (12 April 2013), online: *The Star* <http://bit.ly/TorontoMakesTheShortListOfMostIntelligentCities>.
[1372] *See*: David A Wolfe, *21st century cities in Canada: The geography of innovation* (Ottawa: The Conference Board of Canada, 2009).

debate on smart cities than the eventual results of their smart prototypes; their high-tech projects were born to serve local political projects, but the creatures survived their creators by adapting themselves to new political contexts and to the new political powers as well. The use of the metanarratives of modern science and technology in urban areas is not to be taken lightly by legal research when they fulfill emergent designs of postmodern state and regulation.

Because this subchapter deals with narratives that reveal the metanarratives presented in the first chapter, it was designed to briefly point out key elements related to them that are further investigated in the research. Much research about the narrative aspects of smart cities is available, as well as on the general aspects of Brazilian and Canadian smart cities. So, this dissertation would not add much to the state-of-the-art and it was not projected to do that. In particular, thousands of academic publications mention the famous smart project of Rio de Janeiro, which is highlighted here because many of its elements are further developed in the next subchapters and, above all, because it became a recurrent image in all sorts of publications (*Figure 38*) and to the imaginary of law of smart cities as well.

Figure 38: Rio Operations Centre Control Room (*Wikimedia Commons*) [1373]

In December 2010, in the second year of the first mandate of Mayor Eduardo Paes, the *COR – Centro de Operações Rio* (*Rio Operations Centre*) was created to become the headquarters of the management of services of the municipality of Rio de Janeiro. The world-

[1373] Jjsoares, *Sala de Controle do Centro de Operações Rio* (2015). CC Attribution-Share Alike license.

famous *Rio Operations Centre* "integrates, in the same environment, more than 30 local and state agencies and utilities,"[1374] allowing a *24/7 real-time monitoring* of sensors, cameras, and systems of the city hall. The COR is the main hub of information for several services provided by the city hall: traffic, transportation, electricity, lighting, gas, water, telecommunications, weather alerts, disaster responses, major events, public areas, and order. Other smart initiatives were also gathered under the COR's infrastructure—transparency, communication, participation, data mining—and it came to symbolize the concept of smart city itself at the time following its launch, becoming the main paradigm for smart projects all over the world.

The *smart city operations centre* of Rio de Janeiro became a matter of interest of world media,[1375] a model followed by other cities,[1376] and has been recognized as the smart city jewel of the "best smart city of 2013."[1377] The world stage of smart cities found a champion in the Mayor Eduardo Paes,[1378] who professed the emergence of *polisdigitocracy*,[1379] proposing the use of IT to promote public transparency, citizen engagement, and decision-making in cities. These goals were part of the smart public policies in Rio de Janeiro: the open data web portal *data.rio* that

[1374] *International case studies of smart cities: Rio de Janeiro, Brazil*, by Clara Schreiner (Inter-American Development Bank, 2016) at 28.
[1375] Natasha Singer, "I.B.M. Takes 'Smarter Cities' Concept to Rio de Janeiro", *The New York Times* (3 March 2012), online: <https://www.nytimes.com/2012/03/04/business/ibm-takes-smarter-cities-concept-to-rio-de-janeiro.html>; Jenny Soffel, "Rio's 'big brother' control room watches over the city", (29 August 2013), online: *CNN* <https://www.cnn.com/2013/08/29/world/americas/rio-big-brother-control-room/index.html>; Jane Wakefield, "Rio's bid to become a smart city", *BBC News* (9 September 2013), online: <https://www.bbc.com/news/technology-22546490>; Juan Arias, "Río de Janeiro sueña con convertirse en una ciudad inteligente", *El País* (9 November 2013), online: <https://elpais.com/internacional/2013/11/09/actualidad/1384022152_429026.html>.
[1376] Francis Pisani, "Villes intelligentes : 2 questions à se poser", online: *La Tribune* <https://www.latribune.fr/blogs/aux-coeurs-de-l-innovation/20131206trib000799736/villes-intelligentes-2-questions-a-se-poser.html>.
[1377] Folc Lecha, "Smart City Expo World Congress chooses Rio de Janeiro as the best smart city of 2013", (21 November 2013), online: *Smart City Expo* <http://www.smartcityexpo.com/en/the-event/media-center/press/-/prensa/detalle/1677578/clausura-smart-city-expo-world-congress-2013>.
[1378] TED, "Eduardo Paes: The 4 commandments of cities", (26 April 2012), online: *YouTube* <https://youtu.be/B8Z2G7d2kzs?t=542>.
[1379] Eduardo Paes, "Polisdigitocracy", (10 April 2013), online: *HuffPost* <https://www.huffpost.com/entry/polisdigitocracy_b_4044222>.

shared almost a thousand sets of data;[1380] the LAB.Rio,[1381] a laboratory for e-participation like the social network *Rio Ágora* for discussing municipal initiatives;[1382] and the *Pensa Ideas Room,* a Big Data project dedicated to analyzing all sorts of city data and to propose information-driven solutions and preventive measures to urban problems.

These projects reflected the high hopes in the discourses claiming that the combination of open data and Big Data would transform cities like Rio de Janeiro,[1383] and celebrating an idealized image of efficiency and democracy promoted by smart city projects—even when they no longer existed in practice.[1384] This example illustrates the long-lasting references that are present until the present days, despite the fact that the COR and other smart projects of Rio de Janeiro have been transformed, extinguished or simply deviated from their original objectives. Perhaps the best way to represent the long and wide influence of such *command-and-control infrastructure,* which *provides sights that form and perform the city,*[1385] came from the exhibition *Control Syntax* Rio at the *Het Nieuwe Instituut* in Rotterdam:

> As Wasiuta told The Architect's Newspaper (AN), the city's "topography, infrastructure, population distribution, disparities between the formalized and informalized parts" make it difficult to manage. "The International Olympic Committee (IOC) wanted Rio to develop something like the center of operations, in order to demonstrate… that they were capable of managing the metabolism of the city."
> …
> Complicating Farzin and Wasiuta's task was that this system isn't hidden from the public eye: in addition to serving as a management device, the COR is a public relations tool aimed at Rio's residents and the IOC. The COR is how this smart city "sees itself, how it portrays that image of ongoing information extraction and control, how it portrays that image back to its residents and an

[1380] It is available at: http://www.data.rio/.
[1381] It is available at: http://bit.ly/LabRioAtWayBackMachine.
[1382] Juliana Romar, "Prefeitura lança plataforma colaborativa Ágora Rio", (9 September 2014), online: *Prefeitura do Rio de Janeiro* <http://www.rio.rj.gov.br/web/guest/exibeconteudo?id=4949985>.
[1383] Timothy Hwang, "How big and open data can transform Latin America", (14 March 2018), online: *World Economic Forum* <https://www.weforum.org/agenda/2018/03/latin-america-smart-cities-big-data/>.
[1384] In 2018, the publication above from the World Economic Forum pointed to an announcement in 2014 of the project *Desafio Rio Ágora*, which was ended in 2017 by the new city mayor. One registry of the former website of the project is available here: http://bit.ly/DesafioRioAgoraWaybackMachine.
[1385] Laura Talho Ribeiro, *Centro de Operações Rio: olhares que formam e performam a cidade* (Santiago, Chile, 2017).

> international audience…. A representation producing device and mechanism for the city," said Wasiuta.[1386]

This artistic and architectural approach to the COR cannot be translated into words here and the exhibition is no longer available, but fortunately there is a video recording,[1387] in which the curator Mark Wasiuta brings a crucial element to light. Most publications leave aside the fact that the *all-seeing capabilities* of the COR are used by other state entities that are not engaged with democratic goals of transparency and participation.

While the civil smart centre of Rio's city hall incorporates the international narrative of smart city, the militarized smart centre of the state government of Rio de Janeiro that came as a contractual obligation for FIFA's World Cup remains hidden in (convenient) obscurity for most of the critics.[1388] The highly accessible COR, with its (once) open areas for journalists and researchers, shared data and similar *NASA-like-aesthetics* with the recluse CICC - *Integrated Centre of Command and Control* (*Centro Integrado de Comando e Controle*), which has a bunker-style infrastructure only 500 metres away from the former, but the goals of the latter are far more distanced from public scrutiny. The CICC aims to integrate municipal, state, and federal forces of security, and it monitors the city of Rio de Janeiro using more than 4.000 CCTV cameras, including those that feed the COR (even if not vice-versa). In sum, the CICC is primarily a smart security project that significantly drains from smart city structures while it does not have to respond to city officials, municipal councils, and the mayor—it is smart city surveillance without any municipal governance or democratic accountability.

[1386] Zach Edelson, "'Control Syntax Rio' opens at the Storefront for Art and Architecture", (17 April 2017), online: *The Architect's Newspaper* <https://archpaper.com/2017/04/control-syntax-rio-storefront-art-architecture/>.
[1387] Instituut Het Nieuwe, "Curator Mark Wasiuta on Control Syntax Rio", (25 July 2016), online: *Vimeo* <https://vimeo.com/176126682>.
[1388] Christopher Gaffney & Cerianne Robertson, "Smarter than Smart: Rio de Janeiro's Flawed Emergence as a Smart City" (2018) 25:3 Journal of Urban Technology 47–64.

In the postmodern networked state, intense flows of information are determinant to guiding the flows of power and, exactly for this reason, it is essential to map and analyze the (*client-server, peer-to-peer or hybrid*) design of (*simplex, half-duplex or full-duplex*) flows between internal institutions and other governments, engaged citizens and implied communities, major market actors, and private service providers. Municipal governments undergoing smart city projects can provide examples and factors for such network analysis, especially because the projects are frequently transitory and transformable, with effects that can be observed even over the short periods of electoral mandates. The two municipal cases in this research do not provide enough examples to explore such flexible configurations, but both provide enough factors for the purposes of this research, considering the available timeframe.

While Rio's COR was all the rage in the international media and mayors' events, the proposal of creating a *smart Montréal* was raised in the political campaign for the city hall,[1389] an idea that soon evolved into the ambitious goal of becoming the *smartest city of the world*.[1390] In an attempt to achieve this goal in the short span of three years, a new city division was created with an initial budget to build a team and create a smart city strategy for the whole endeavor, a first step that would easily consume the first full year of operation.[1391] The strategy was publicly launched in January 2015,[1392] based on institutional and community consultations and studies of world-class smart city references (i.e., the contenders of the struggle)[1393] in which the city

[1389] Stéphane Rolland, "Denis Coderre veut rendre Montréal plus «intelligente»", (19 June 2013), online: *Les Affaires* <https://www.lesaffaires.com/bourse/nouvelles-economiques/denis-coderre-veut-rendre-montreal-plus-intelligente/558909>.
[1390] Jeanne Corriveau, "Montréal veut devenir la ville la plus intelligente au monde en 2017", (27 March 2014), online: *Le Devoir* <https://www.ledevoir.com/politique/montreal/403807/montreal-veut-devenir-la-ville-la-plus-intelligente-au-monde-en-2017>.
[1391] Patrick Gagné, "Montréal, ville intelligente : un départ solide", (19 November 2014), online: *Les Affaires* <https://www.lesaffaires.com/blogues/patrick-gagne/montreal-ville-intelligente--un-depart-solide/574174>.
[1392] MTLVille, "Présentation - Montréal, ville intelligente et numérique: stratégie montréalaise 2014-2017", (30 January 2015), online: <https://youtu.be/5ZigYqJ9g7A>.
[1393] René Bruemmer, "Montreal's struggle to be smarter", (21 March 2015), online: *Montreal Gazette* <https://montrealgazette.com/news/local-news/montreals-struggle-to-be-smarter>.

traced its priorities: deployment of network infrastructures and technology architectures, development of digital services, release of open datasets, embrace of a culture of transparency and accountability, diffusion of real time data for transportation systems, and community cooperation and inclusion for innovation.[1394] In sum, Montréal would follow some of the most popular (and hardly achievable) smart city projects,[1395] while also adjusting other *diverse smart configurations* to the characteristics and potentialities of the city.[1396]

Between all of the mentioned potentialities of Montréal present in the smart city strategy, two policies deserve to be emphasized here for their pre-conditions and accomplishments: open data and innovation. Montréal was one of the first municipal governments to adopt the (extensive) *CC4 license* from the *Open Knowledge Foundation,*[1397] allowing citizens and companies to access urban data and apply their expertise to a broad range of datasets,[1398] and providing an open data policy that reflects the best practices in public administration.[1399] Shortly after the launch of its strategy, Montréal city hall also launched a plan of action with a central focus on innovation,[1400] which included (citizen, academic, market) community cooperation with the digital platform *Faire Montréal* for stakeholder engagement with city projects,[1401] and the

[1394] See: *Montréal, ville intelligente et numérique: stratégie montréalaise 2014-2017*, by Bureau de la ville intelligente et numérique - Ville de Montréal (Montréal City Hall, 2015).
[1395] Jeremy Hazan, "Montreal Will Be Getting Free Wi-Fi All Over The City", (5 July 2015), online: *MTL Blog* <https://www.mtlblog.com/news/montreal-will-be-getting-free-wi-fi-all-over-the-city>.
[1396] René Bruemmer, "Smart moves in Montreal", (21 March 2015), online: *Montreal Gazette* <https://montrealgazette.com/news/local-news/smart-moves-in-montreal>.
[1397] Portail données ouvertes - Ville de Montréal, "Un avantage pour les citoyens : Montréal disposera de la licence ouverte CC 4. Une première au Canada en matières de données ouvertes", (19 April 2014), online: *Ville de Montréal* <http://donnees.ville.montreal.qc.ca/portail/un-avantage-pour-les-citoyens-montreal-disposera-de-la-licence-ouverte-cc-4-une-premiere-au-canada-en-matieres-de-donnees-ouvertes/>.
[1398] Joelle Pineau & Pierre-Luc Bacon, *Analyzing Open Data from the City of Montreal.* (2015).
[1399] Portail données ouvertes - Ville de Montréal, "Politique de données ouvertes de la Ville de Montréal", (28 October 2015), online: *Ville de Montréal* <http://donnees.ville.montreal.qc.ca/portail/politique-de-donnees-ouvertes/>.
[1400] *Montréal, Ville intelligente et numérique: plan d'action*, by Bureau de la ville intelligente et numérique - Ville de Montréal (Montréal City Hall, 2015).
[1401] Ville de Montréal, "Lancement de la plateforme collaborative « Faire Montréal » : Les Montréalais appelés à participer", (17 June 2015), online: *Ville de Montréal* <http://bit.ly/LancementPlateformeCollaborative-FaireMontreal>.

announcement of the NGO *InnoCité Mtl* to act as a "*pont entre Montréal et les entrepreneurs pour les aider dans le développement de projets pour contribuer au développement d'une 'ville intelligente'.*"[1402] A lot could be said about the other *smart work fronts* that the city proposed, but the two acting vectors of open data and innovation based on engagement are worth being further studied as smart characteristics of Montréal in any eventual comparative studies.

Public policies for sharing urban data and developing an innovative ecosystem remained a signature priority for Montréal,[1403] and they contributed to achieving the goal of getting to the top position of one of the many smart city rankings.[1404] Considering the short period of the whole smart city project, it is safe to affirm that the *intelligent community award* for Montréal in 2016 was due to *intelligent elements* already present in the city and the policies that came to be further developed (or at least publicized) by city officials and the communities involved in the local smart ecosystem.[1405] The enhancement of these specific policies would keep being essential for the smart city strategy[1406]—and for what would come later, as well.

Montréal's smart projects managed to get the attention of the international media over

[1402] Radio-Canada, "Montréal : un accélérateur d'entreprises pour favoriser la ville intelligente", (1 June 2015), online: *Radio-Canada* <https://ici.radio-canada.ca/nouvelle/723409/ville-intelligente-montreal-maison-notman-innocite-mtl-projets>.
[1403] CBC News, "Montreal 1st Canadian city to partner with Waze app", (24 April 2016), online: *CBC* <https://www.cbc.ca/news/canada/montreal/montreal-waze-traffic-partnership-1.3550640>; Business Chief, "InnoCité MTL announces startups chosen for its second smart city cohort", (1 April 2016), online: *Business Chief* <https://canada.businesschief.com/technology/1602/InnoCit-MTL-announces-startups-chosen-for-its-second-smart-city-cohort>.
[1404] Catherine Mathys, "Montréal domine le palmarès mondial des villes intelligentes", (17 June 2016), online: *Radio-Canada* <https://ici.radio-canada.ca/nouvelle/788024/montreal-ville-intelligente>; Laura March, "Montreal named Intelligent Community of the Year", (18 June 2016), online: *Montreal Gazette* <https://montrealgazette.com/news/local-news/montreal-named-intelligent-community-of-the-year>.
[1405] Alexandre Duval, "Données ouvertes : 5 grandes villes du Québec lancent un portail unique", online: *Radio-Canada* <https://ici.radio-canada.ca/nouvelle/773483/donnees-ouvertes-portail-quebec-montreal-laval-sherbrooke-gatineau>; Lauren Jane Heller, "Coopérathon challenges Montreal startup community to make the world a better place through innovation", (9 November 2016), online: *BetaKit* <https://betakit.com/cooperathon-challenges-montreal-startup-community-to-make-the-world-a-better-place-through-innovation/>.
[1406] Mohamed Reda Khomsi, "The smart city ecosystem as an innovation model: lessons from Montreal" (2016) 6:11 Technology Innovation Management Review.

initiatives that were quite a novelty even in the smart communities[1407] while the local media would keep the pressure on the achievable promises,[1408] acknowledging the differences between the optimist discourses and the realist deliveries of smart cities.[1409] Major cities like Montréal are constantly creating, developing, and renewing digital services for internal and external use, these are common facts that barely hit the local news.[1410] But now Montréal has been captured by the imaginary of the smart city in a time of growing concerns about digital surveillance violating fundamental rights and,[1411] important to remember, well-deserved fears of privatization of cities under similar discourses and contexts.[1412]

After the last municipal election, the *smart city brand* took a different turn in Montréal,[1413] keeping the foundations of an openness culture in the city hall,[1414] and claiming to pursue a broader approach to innovation that does not necessarily clash with previous public policies and

[1407] See: Richard van Hooijdonk, "Montreal is pairing the best sensor tech with artificial intelligence", (14 August 2017), online: *Smart City Hub* <https://smartcityhub.com/technology-innnovation/montreal-pairing-best-sensor-tech-artificial-intelligence/>; Matt Hamblen, "Montreal sees its future in smart sensors, artificial intelligence (with video)", (6 February 2017), online: *Computerworld* <https://www.computerworld.com/article/3165403/montreal-sees-its-future-in-smart-sensors-artificial-intelligence-with-video.html>.

[1408] Laurence Houde-Roy, "Ville intelligente: la moitié des projets attendus sont en retard", (12 June 2017), online: *Le Journal de Montréal* <https://www.journaldemontreal.com/2017/06/11/ville-intelligente-la-moitie-des-projets-attendus-sont-en-retard>.

[1409] Valérie Boisclair, "Wi-fi public : comment se compare Montréal? La réponse en carte", (15 July 2017), online: *Radio-Canada* <https://ici.radio-canada.ca/nouvelle/1045076/internet-tokyo-new-york-ville-intelligente-fibre-optique>.

[1410] Ville de Montréal & Cabinet du maire et du comité exécutif, "Plan d'action Montréal, ville intelligente et numérique 2015-2017 - La Ville lance de nouvelles plateformes numériques", (19 September 2017), online: *Cision* <https://www.newswire.ca/fr/news-releases/plan-daction-montreal-ville-intelligente-et-numerique-2015-2017---la-ville-lance-de-nouvelles-plateformes-numeriques-645802953.html>.

[1411] Pierre-André Normadin, "Montréal veut éviter l'effet Big Brother", (23 April 2018), online: *La Presse* <http://www.lapresse.ca/actualites/grand-montreal/201804/22/01-5162062-montreal-veut-eviter-leffet-big-brother.php>.

[1412] Denise Balkissoon, "Toronto, take a lesson from Montreal: Cities are for people", *The Globe and Mail* (2018 2018), online: <https://www.theglobeandmail.com/opinion/article-toronto-take-a-lesson-from-montreal-cities-are-for-people/>.

[1413] Sarah Daoust-Braun, "Le Bureau de la ville intelligente change de vocation", (31 May 2018), online: *Le Journal de Montréal* <https://www.journaldemontreal.com/2018/05/31/le-bureau-de-la-ville-intelligente-change-de-vocation>.

[1414] Sarah Daoust-Braun, "Montréal : une nouvelle politique sur les logiciels libres", (15 May 2018), online: *Le Journal de Montréal* <https://www.journaldemontreal.com/2018/05/15/montreal--une-nouvelle-politique-sur-les-logiciels-libres>.

smart projects.[1415] In effect, paired with the prevalent conditions of a city with academic strengths in education, research, and the development of new technologies,[1416] it was not surprising that Montréal would keep engaging in smart city projects that spread to city halls all over Canada.[1417] The evidence is clear in media publications and governmental reports, which indicate that much has happened in the short period of the *smart city narrative* in Montréal and,[1418] despite all the possible *critiques* that it deserves,[1419] it will continue to remain a part of the local imaginary.[1420]

There are entire theses dedicated to analyzing the smart city discourses and contexts in Montréal,[1421] which will be useful to subsidize future debates on how these narratives can change over time. The effects of change are of interest not only from the perspectives of communication but for law as well, as they are perceived in media and public policies. The changes in the *smart city case* of Rio de Janeiro are particularly useful to demonstrate it.

For the ends of this dissertation, the COR project of Rio de Janeiro is the main illustration of the narrative effects of the public policies of smart cities, of which other cities like Montréal should not lose sight. The “world’s most ambitious integrated urban command centre” that still

[1415] Stéphane Guidoin, “Bilan des activités ville intelligente”, (5 July 2018), online: *Lab d’innovation urbaine de Montréal* <https://medium.com/lab-mtl/bilan-des-activit%C3%A9s-villes-intelligentes-676397977e81>.
[1416] Laura Easton, “Canada’s Artificial Intelligence Ecosystem: Montreal”, (14 August 2018), online: *Real Ventures* <https://medium.com/believing/canadas-artificial-intelligence-ecosystem-4798b0517016>.
[1417] Infrastructure Canada, “Backgrounder: Smart Cities Challenge improving the lives of Canadians through innovation, data, and technology”, (1 June 2018), online: *Government of Canada* <https://www.canada.ca/en/office-infrastructure/news/2018/05/backgrounder--smart-cities-challenge-improving-the-lives-of-canadians-through-innovation-data-and-technology.html>.
[1418] Hélène Roulot-Ganzmann, “Montréal, une ville de plus en plus intelligente”, (22 September 2018), online: *Le Devoir* <https://www.ledevoir.com/societe/537146/montreal-une-ville-de-plus-en-plus-intelligente>.
[1419] Joëlle Gélinas Duquette, “Le discours de la «Ville intelligente et numérique» de Montréal comme actualisation de nouvelles frontières politiques” (2017) 19:2 Commposite 37–62.
[1420] Stéphane Laporte & Jean-Phillipe Warren, “Montréal, ville intelligente ? Pas encore”, (31 December 2018), online: *La Presse* <http://bit.ly/MontrealVilleIntelligentePasEncore>.
[1421] Marianne Côté, *Smart City or How to Go to City Hall through the Cloud* (Master’s thesis, Concordia University, 2017) [unpublished]; Joëlle Gélinas Duquette, *Ce que dit la" ville intelligente" sur la démocratie: analyse discursive de la" ville intelligente et numérique" de Montréal* (Master’s thesis, Université de Montréal à Québec, 2017) [unpublished].

represents the "quintessential smart city project"[1422]—even long past its 15 minutes of fame as the "city's brain" under the global attention of FIFA's World Cup of 2014 and the Olympic Games of 2016[1423]—also came to change a lot in the short span of time of a new political mandate. Moving away from the basic matrix of transparency, participation and decision making for urban mobility, the new city mayor moved the main narrative of the COR to new policies of public order and the prevention of crime ("*políticas públicas voltadas para a manutenção da ordem urbana e a prevenção do delito*"),[1424] under a growing submission to CICC policies since the Olympics.[1425] The changes in the smart city discourse and governance of the COR, with new *chief executives* coming from police and military ranks,[1426] despite all apparent strangeness with municipal functions—public security is a function of state and federal governments, which are responsible for police departments and military forces in Brazil—looked to the Chinese model of smart cities for practices and investments.[1427] In sum, in less than two years, the COR moved from a reference of *polisdigitocracy utopia* in development to a surveillance model in deployment, which warrants concern for more than just Brazilian smart cities researchers.[1428]

[1422] Christopher Frey, "World Cup 2014: inside Rio's Bond-villain mission control", *The Guardian* (23 May 2014), online: <https://www.theguardian.com/cities/2014/may/23/world-cup-inside-rio-bond-villain-mission-control>.
[1423] Aline Batista, "Como funciona o Centro de Operações Rio, o cérebro das Olimpíadas de 2016", (11 July 2016), online: *TechTudo* <http://www.techtudo.com.br/noticias/noticia/2016/07/como-funciona-o-centro-de-operacoes-rio-o-cerebro-das-olimpiadas-de-2016.html>.
[1424] Rio de Janeiro, "Decreto 43533 de 10 de agosto de 2017", (10 August 2017), online: *Leis Municipais* <http://bit.ly/Decreto43533de10Agosto2017>.
[1425] Dia Kayyali, "The Olympics Are Turning Rio into a Military State", (13 June 2016), online: *Vice* <https://www.vice.com/en_us/article/wnxgpw/the-olympics-are-turning-rio-into-a-military-state>.
[1426] Renan Rodrigues, "Tenente-coronel do Exército será o novo chefe executivo do COR", (27 September 2017), online: *O Globo* <https://oglobo.globo.com/rio/tenente-coronel-do-exercito-sera-novo-chefe-executivo-do-cor-21876682>.
[1427] O Dia, "'Queremos iluminação moderna, Wi-Fi e câmeras pela cidade', diz Crivella", (8 November 2017), online: *O Dia - Rio De Janeiro* <https://www.odia.com.br/_conteudo/rio-de-janeiro/2017-11-08/queremos-iluminacao-moderna-wi-fi-e-cameras-pela-cidade-diz-crivella.html>.
[1428] See: Bernardo Ainbinder, "Considerações sobre Regimes Urbanos Opressivos Inteligentes" in Chiara de Teffé, Sérgio Branco & Victor Vicente, eds, *Cidades inteligentes em perspectivas* (Rio de Janeiro:

Such sudden changes indicate that smart city narratives and practices are not only flexible, but fragile. For example, even with all the technological apparatus receiving elevated investments, the COR was neither capable of inhibiting or elucidating the most notorious political crime in Brazil (many CCTV cameras were turned off),[1429] nor capable of preventing or responding to weather emergencies that were once the priority that motivated its creation:

> We have changed the focus of COR. The main problem of the city today is public security. We directed the work toward this. This does not mean that the center of operations is not strategic to face crisis situations in the city caused by problems such as rainfall. When it becomes necessary, we will redirect – said the Secretary of Public Order, Paulo Cesar Amendola, from the department to which the COR is subordinate, who denied that there was inefficiency in the operation – I don't think there were any failures. We have dozens of radio and TV stations with on-call staff in the center to spread the information to the population.[1430] (Translated by the author)

The fragility of public policies addressing smart cities is not clearly present in the narrative of smart cities, and the notorious smart case is of Rio an example of it. The storytelling presents the COR as a partnership between an innovative mayor and a global tech company to respond to rainfall emergencies through direct communication with the population (e.g., text messages, siren alarms), no longer depending on radio or TV.[1431] Despite all the criticism, the *narrative of success of the COR* is still widely diffused in media and academia,[1432] and similar formulas are

Obliq, ITS, 2019); Laura Talho Ribeiro, "Tecnologias inteligentes de vigilância: percepções sobre segurança nos centros urbanos" in *Cidades inteligentes em perspectiva* (Rio de Janeiro: ITS-Rio, 2019); Clarice Nassar Tambelli, "Smart Cities: uma breve investigação crítica sobre os limites de uma narrativa contemporânea sobre cidades e tecnologia" in Chiara de Teffé, Sérgio Branco & Victor Vicente, eds, *Cidades inteligentes em perspectiva* (Rio de Janeiro: ITS-Rio, 2019).

[1429] Gabriel Barreira et al, "Cinco de 11 câmeras da Prefeitura no trajeto que Marielle fez antes da morte estão desligadas", (21 March 2018), online: *G1* <https://g1.globo.com/rj/rio-de-janeiro/noticia/cinco-de-11-cameras-da-prefeitura-no-trajeto-que-marielle-fez-antes-da-morte-estao-desligadas.ghtml>.

[1430] Luiz Ernesto Magalhães & Simone Candida, "Criado para emergências, Centro de Operações não foi capaz de evitar caos", (22 June 2017), online: *O Globo* <https://oglobo.globo.com/rio/criado-para-emergencias-centro-de-operacoes-nao-foi-capaz-de-evitar-caos-21505291>.

[1431] Silverfish Media, "'Smarter Cities - Rio' | IBM", (28 July 2016), online: *YouTube* <https://youtu.be/TwBbWVni5rA>.

[1432] Mark Sawyer, "Technology is making cities 'smart', but it's also costing the environment", (26 July 2018), online: *The Conversation* <http://theconversation.com/technology-is-making-cities-smart-but-its-also-costing-the-environment-99296>.

still sold to governments by corporations as a global solution to local problems.[1433] It is rare to hear that the most important task of IBM in the COR was to put its *Smarter City trademark* on it and to include Rio de Janeiro in its *corporate smart storytelling*;[1434] the stories on the COR during the period between 2012/2016 are present in doctoral dissertations,[1435] but it would be very hard to find critical publications about it after the period of the Olympics.[1436] For all narrative purposes, the COR's mission did not change and Rio is still one of the smartest cities in the world.[1437]

It could seem naive to include and detail the smart city narratives of Rio de Janeiro and Montréal for this dissertation, but observing them before moving forward was relevant. This research does not intend to interpret the semantic and political changes in the local discourses—for example, Montréal would prioritize a resilience approach[1438]—because they do not differ much from the flexible concepts and *boomerang projects* of smart cities.[1439]

At the closing time of this dissertation—which tried to limit the use of publications until the year of 2018 but required mentioning what has happened more recently—after a long period of crisis with several changes of leadership,[1440] Rio's COR signaled a return to its origins by

[1433] Rohit T Aggarwala, Katie Hill & Robert Muggah, "Smart city experts should be looking to emerging markets", (9 October 2018), online: *World Economic Forum* <https://www.weforum.org/agenda/2018/10/how-the-developing-world-can-kickstart-the-smart-cities-revolution/>.
[1434] Herman van den Bosch, "Smart city: smart story?", (29 November 2017), online: *Smart City Hub* <https://smartcityhub.com/governance-economy/smart-city-smart-story/>.
[1435] Ana Jane Benites, *Análise das cidades inteligentes sob a perspectiva da sustentabilidade: o caso do Centro de Operações do Rio de Janeiro* (Doctoral dissertation, UNICAMP, 2016) [unpublished]; João Alcantara de Freitas, *A invenção da cidade inteligente Rio: uma análise do Centro de Operações Rio pela lente das mobilidades (2010-2016)* (Doctoral dissertation, Fundação Getúlio Vargas, 2018) [unpublished].
[1436] Eric Jaffe, "4 lessons from Rio's 'flawed' smart cities initiative", (11 May 2016), online: *Medium* <https://medium.com/sidewalk-talk/4-lessons-from-rios-flawed-smart-cities-initiative-31cbf4e54b72>.
[1437] R7, "Crivella celebra 1º lugar em premiação para cidades inteligentes", (4 September 2018), online: *R7* <https://noticias.r7.com/rio-de-janeiro/crivella-celebra-1-lugar-em-premiacao-para-cidades-inteligentes-04092018>.
[1438] Marian Scott, "Montreal unveils resiliency strategy", (18 June 2018), online: *Montreal Gazette* <https://montrealgazette.com/news/local-news/city-unveils-resiliency-strategy>.
[1439] Luca Barone, "Resilient cities are smarter cities", (31 March 2015), online: *Montreal Gazette* <https://montrealgazette.com/news/local-news/montreal-re-imagined/resilient-cities-are-smarter-cities>.
[1440] O Globo, "Centro de Operações perde o quarto chefe na gestão de Marcelo Crivella", (22 March 2018), online: *O Globo* <https://oglobo.globo.com/rio/centro-de-operacoes-perde-quarto-chefe-na-gestao-de-marcelo-crivella-22514696>.

updating its method of direct communication with the population by utilizing a dedicated mobile app,[1441] and signed into a new *brand-partnership* with NASA "to better understand, anticipate, and monitor hazards and environmental issues, including heavy rainfall and landslides, urban flooding, air quality and water quality in and around the city."[1442] Meanwhile, Montréal won a smart city competition promoted by the Canadian government [1443] in which the city commits itself promoting a series of projects for data-driven decision making.[1444] Therefore, the future of both cities might remain interlaced with the flexible narratives of smart cities and Big Data projects for urban management in particular.

Departing from the contextualization presented above, the next subchapter is dedicated to briefly detailing a few Big Data projects from the city halls of Rio de Janeiro and Montréal. These municipal projects will subsidize the analysis of variables previewed on the research hypothesis that constitute part of the legal imaginary of smart cities.

3.2.2. Cities Thinking Big (with a Lot of) Data

The practicality in the rationality of law needs concrete cases to draw better normative landscapes with ephemeral lines on the drifting sands of institutional contexts,[1445] even if only for imaginary exercises. Legal scholars and practitioners are called upon to declare their opinions, recommendations, and decisions, according to the dialectic relations between norms, facts, and

[1441] Cristina Boeckel, "Prefeitura do Rio lança aplicativo sobre tempo e mobilidade urbana", (30 August 2019), online: *G1* <https://g1.globo.com/rj/rio-de-janeiro/noticia/2019/08/30/prefeitura-do-rio-lanca-aplicativo-que-da-informacoes-sobre-tempo-e-mobilidade-urbana.ghtml>.
[1442] Dalia Kirschbaum, "NASA-Rio de Janeiro Partnership for disaster modeling, crisis response and city management", (21 October 2019), online: *NASA Science* <https://science.nasa.gov/earth-science/applied-sciences/making-space-for-earth/nasa-rio-de-janeiro-partnership>.
[1443] Lynn Greiner, "Montreal wins $50 million from federal government in Smart Cities Challenge", (15 May 2019), online: *IT World Canada* <https://www.itworldcanada.com/article/montreal-wins-50-million-from-federal-government-in-smart-cities-challenge/418024>.
[1444] MTLVille, "Montréal's Finalist Application for the Smart Cities Challenge", (6 March 2019), online: *YouTube* <https://www.youtube.com/watch?v=BmLNKm3hGZY>.
[1445] *Merci*, Savatier. "*Les juristes d'aujourd'hui tracent leurs lignes sur le sable d'institutions mouvantes*" (Le droit et l'accéleration de l'histoire. Dalloz, 1951).

values in given space-times.[1446] In order to access the imaginary of jurists for the investigative exercises in the research, an initial contextualization in the previous subchapter brought some general social facts and prevalent values that are more finely illustrated in the following pages to provide prospective details for the normative perspectives that will follow next.

As presented in the literature review, there are innumerous definitions of smart cities available for choosing, dependent on an uncountable number of perspectives. Once it was certain that no definition would necessarily be the best one, the research kept the initial concept of intelligent city that guided the project genesis: "[s]mart here is synonymous with a city where everything is environmentally sensitive and produces, consumes and distributes a lot of information in real time."[1447] The choice to keep the initial concept, despite acknowledging several definitions that are more popular these days, was also a matter of coherence with the purposes and priorities of the research with the imaginary of data-driven cities of the near future.

Henceforth, the more specific facts that this research investigates are about Big Data projects in Rio de Janeiro and Montréal. Between the predominant technologies associated with smart cities that were twice explored in the literature review—with some eventual superpositions but no over exposition—the *pack of combined technologies associated with data analytics,* conveniently labelled as *Big Data*, is the one that best corresponds to the archetype of well-informed, tech-based, and efficiency-driven urban management and planning. Therefore, investigating *Urban Big Data* also means getting to the core issues of smart cities.

[1446] At least according to Miguel Reale's three-dimensional theory of law. See: Miguel Reale, *Filosofia do Direito*, 20th ed (Editora Saraiva, 2002); Alvaro de Azevedo Gonzaga & Nathaly Campitelli Roque, "Teoria tridimensional do Direito", (April 2017), online: *Enciclopédia Jurídica da PUCSP* <https://enciclopediajuridica.pucsp.br/verbete/64/edicao-1/tridimensional-do-direito,-teoria>.
[1447] Lemos, *supra* note 881. Translated from the Portuguese by the author of the dissertation: "Inteligente aqui é sinônimo de uma cidade na qual tudo é sensível ao ambiente e produz, consome e distribui um grande número de informações em tempo real."

The Big Data projects of Rio de Janeiro and Montréal addressed here have two distinct timeframes for the imaginaries that were built around their cases—considering the imaginary as the image built by people about things—that will be contrasted yet not compared. The first was created in 2013 and, presented impressive results to the world but, even so, ended by the beginning of 2017; the second was initiated by the time the first one ended, took the hard path of pioneers, and the results starting to pour, though most of them are still ahead. The Latin American experience is practically closed, followed by a *locked smart city model*, but it still has much to be understood; the North American experience is still open, set in an *engageable smart city model*, and has much space to evolve (time is never a certain variable). Both projects involve utopic and dystopic elements that are present in the collective imaginaries, with Rio providing algorithmic lessons to be learned by law and Montréal applying law to its numbers.

On June 3, 2013, the municipal decree nº 37215 of Rio de Janeiro created *PENSA – Sala de ideias* (it could be translated as *Think – Room of Ideas*), a small department institutionally located inside the structure of the chief of staff and physically located inside the structure of the COR. The ample objective of PENSA contrasted with its restricted team:

> Art. 2 The PENSA - ROOM OF IDEAS aims at researching, analyzing, evaluating correlations and defining impact actions from the intersection of different databases available inside and outside the City Hall with the objective of improving the provision of services to citizens.[1448]

The creation of PENSA was inspired by the Mayor's Office of Policy and Strategic Planning (New York), "a geek squad of civic-minded number-crunchers working from a pair of cluttered cubicles across from City Hall in the Municipal Building,"[1449] led by the lawyer Michael

[1448] Rio de Janeiro - RJ, "Decreto 37215 de 3 de junho de 2013", (3 June 2013), online: *Leis Municipais* <http://bit.ly/Decreto37215de3junho2013>. Translated by the author.
[1449] Alan Feuer, "The Mayor's Geek Squad", *The New York Times* (23 March 2013), online: <https://www.nytimes.com/2013/03/24/nyregion/mayor-bloombergs-geek-squad.html>.

Flower. There were characteristics shared between the *Geek Squad* and PENSA, such as reduced teams of data scientists, small projects budgets, big data applications for big goals, and lots of open and siloed data waiting for access and analysis.[1450] PENSA was also led by a lawyer, the professor Pablo Cerdeira from FGV-Rio, and this should not be seen as a coincidence.

When Big Data becomes a new public policy in municipalities,[1451] legal knowledge can help a lot in the multidisciplinary efforts related to access, process and distribution of data in the intricate technocracies of governments. Rio's *City Hall nerds*[1452] had even more data and sensors to deal with than their New Yorker counterparts—about 400 Terabytes and more than one million sensor records being added per day—spread across dozens of city departments, in an integration that represented quite the (legal) challenge for composing fast-response studies with Big Data.[1453] The projects supported by PENSA and executed by city departments involved short-term and fast-paced analyses of traffic, transportation, parking, major events, health issues, public emergencies (e.g., floods), among other matters that demanded collaboration and they found convergent conditions in Rio's COR.[1454] Partnerships with private companies aggregated more data from citizens and, according to PENSA'S Chief Data Officer, added "social layers to help a lot the city management"[1455] and more technolegal complexity.

Rio de Janeiro was one of the first cities in the world to sign a partnership with *Waze* to

[1450] O Globo, "'Geeks' ajudam prefeitura do Rio a resolver problemas da cidade", (13 October 2013), online: *O Globo* <https://oglobo.globo.com/rio/geeks-ajudam-prefeitura-do-rio-resolver-problemas-da-cidade-10352787>.
[1451] Leandro Souza, "Big Data vira política pública no Rio", (24 September 2014), online: *Baguete* <https://www.baguete.com.br/noticias/24/09/2014/big-data-vira-politica-publica-no-rio/>.
[1452] O Dia, "Os nerds que planejam o Rio", (11 May 2014), online: *O Dia - Rio de Janeiro* <http://bit.ly/OsNersQuePlanejamORio>.
[1453] CDTV, "Big data vira estratégia de governo na cidade do Rio de Janeiro", (24 September 2014), online: *YouTube* <https://youtu.be/a2w4M-30OpM>.
[1454] Veja, "Rio tem 'Tropa de Elite' para Big Data", (2 June 2017), online: *VEJA Rio* <https://vejario.abril.com.br/cidades/rio-tem-tropa-elite-big-data/>.
[1455] Arq Futuro Brasil, "Technology & the City - Better Government Through Data - Using Data in Rio", (2 April 2018), online: *YouTube* <https://youtu.be/AFh99OWg6Bg?t=142>.

access real-time data fed by its users (drivers) and to integrate it into COR's resources,[1456] combining it with passengers' data from the public-transportation app *Moovit* and the data from bikers using the app Strava.[1457] PENSA'S team added data from Twitter and mobile telecom companies to publish a study about where and when traffic jams occurred in the city[1458] with all the used data previously anonymized, which was not a simple and unquestioned task.[1459]

News and photos of Rio's COR illustrate that there are numerous publications about the dangers of urban big data,[1460] especially when concerning privacy and democracy, the limits of anonymization techniques and consent. Legal and technical uncertainties were always present within the Big Data initiative of Rio, as are always expected when creating data practices capable of reshaping major public policies.[1461] Therefore, it really was not surprising for this research to find legal practitioners with political and technological background composing or leading Big Data teams in governments.[1462] Even projects that do not apparently depend much on personal data (e.g., potential savings from rainwater collection on rooftops)[1463] can imply potential privacy concerns that are often not clearly addresed in terms of regulation. The end of PENSA in 2017

[1456] Waze, "Waze Forms Municipal Partnership with Rio de Janeiro's Centro de Operações", (12 September 2014), online: *YouTube* <https://youtu.be/0eLvjdv9Sv8>.
[1457] Parmy Olson, "Why Google's Waze Is Trading User Data with Local Governments", online: *Forbes* <http://bit.ly/WhyWazeIsTradingUserDataWithLocalGovernments>.
[1458] Simone Candida & Waleska Borges, "Estudo aponta sete gargalos no trânsito do Rio e mostra que retenções começam às 5h", (11 September 2015), online: *O Globo* <https://oglobo.globo.com/rio/estudo-aponta-sete-gargalos-no-transito-do-rio-mostra-que-retencoes-comecam-as-5h-17459303>.
[1459] Isabela Braga, "Big data e os limites do anonimato", (8 June 2015), online: *Vozerio* <http://vozerio.org.br/Big-data-e-os-limites-do-anonimato>.
[1460] Dirk Helbing & Carlo Ratti, "The hidden danger of big data", (19 August 2016), online: *Al Jazeera* <https://www.aljazeera.com/indepth/opinion/2016/08/hidden-danger-big-data-160816140935829.html>; Christopher de Gruben, "Big Data vs Big Privacy", (6 May 2017), online: *degruben.com* <http://www.degruben.com/big-data-vs-big-privacy/>.
[1461] Harriet Loos, "How data is renewing and reshaping Rio de Janeiro", (5 December 2016), online: *Centre for Public Impact* <https://www.centreforpublicimpact.org/how-data-is-renewing-and-reshaping-rio-de-janeiro/>.
[1462] In a not-so-personal (foot)note, I am biased by the a similar work at a city hall: my legal knowledge was very useful when dealing IT contracts, public procurement, data governance, and mediation.
[1463] Quintino Gomes Freire, "Prefeitura lança mapa do potencial de economia com a coleta de água da chuva dos telhados da cidade", (29 December 2016), online: *Diário do Rio de Janeiro* <https://diariodorio.com/prefeitura-lanca-mapa-do-potencial-de-economia-com-a-coleta-de-agua-da-chuva-dos-telhados-da-cidade/>.

by the new administration did not end the Big Data projects for urban mobility in Rio's COR that accessed more than a hundred different databases,[1464] and it left a legacy of techno-legal experiences that deserve to be further documented and researched.

The previous references included from media about COR and PENSA are not to be taken as validated facts by this research, but they are valid elements of the narratives that form the imaginary of law (and other areas of knowledge) about smart cities. Apart from the mentioned academic and institutional research on COR, the Big Data experiences of Rio have also inspired publications on PENSA,[1465] featuring (a recommended) one by its former chief data officer that details some insights into Big Data public policies from an internal perspective.[1466]

One of the desired aims targets of this dissertation was to incorporate internal perspectives on the public policies of smart cities that could be found in documentation from the city halls. Studies and reports for internal usage in governments are rarely available for non-involved partiess and are hardly in sight for the general public—despite the subject of transparency, the research cannot concern itself with looking into this matter—but innovative projects in public administration frequently need reinforcement and approval in order to continue, so they are frequently presented in concise, interesting and reachable ways. It was the PENSA leader, Pablo Cerdeira, who made some documents that were used in his presentations to the public available. The research accessed these documents on his personal blog, after getting in contact with him, and receiving a message pointing toward the files.[1467]

[1464] Everton Lopes Batista, "'Big data' ajuda a gerenciar trânsito e dá pistas sobre políticas públicas", (23 February 2017), online: *Folha de SPaulo* <http://www1.folha.uol.com.br/mercado/2017/02/1861037-big-data-ajuda-a-gerenciar-transito-e-da-pistas-sobre-politicas-publicas.shtml>.
[1465] Antonio Marques Ferreira Neto, *Fatores relevantes na adoção e uso de big data na prefeitura do Rio de Janeiro - o caso do P3NS4* (Master's thesis, UFRJ, 2015) [unpublished].
[1466] Pablo Cerdeira & Renan Medeiros de Oliveira, "Smart cities além dos sensores: o uso de dados para aproximar governo e cidadãos" in Jhessica Reia et al, eds, *Horizonte presente: tecnologia e sociedade em debate* (Belo Horizonte: Casa do Direito e Fundação Getúlio Vargas, 2019) 63.
[1467] They were available at: http://blog.pablocerdeira.me/tags/pensa/. The website is no longer working.

Snapshots with data visualizations of studies conducted by the PENSA team were taken from presentations given to the external public. Most of the figures are self-explainatory in illustrating some of the Big Data projects engaged by the team. All the documents used as sources are available for the jury responsible for evaluating this doctoral dissertation. The visualizations enhanced the results and generated institutional actions with an emphasis on traffic (*Figures 39 and 40*).

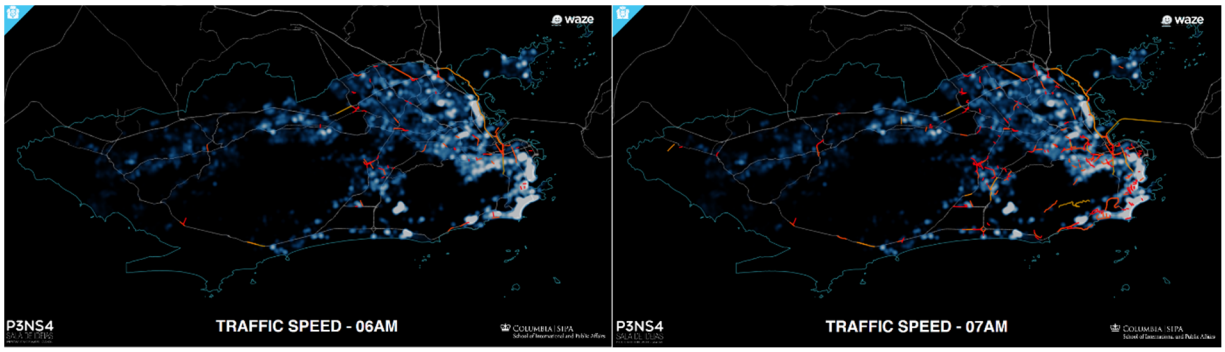


Figure 39: Traffic speed in all urban area of Rio de Janeiro at 6 AM and 7 AM, by PENSA

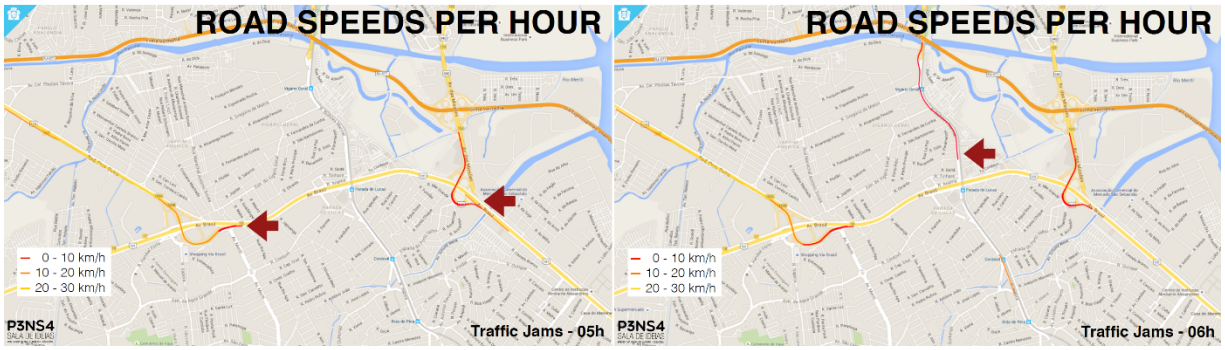


Figure 40: Road speed per hour in specific areas of Rio de Janeiro, by PENSA

Considering previous research from the Inter-American Development Bank on productivity losses caused by time wasted on traffic, analyses were conducted in PENSA to suggest areas of priority for governmental action. The studies qualified projects for some areas considering the return of investment on GDP gains (*Figures 41 and 42*).

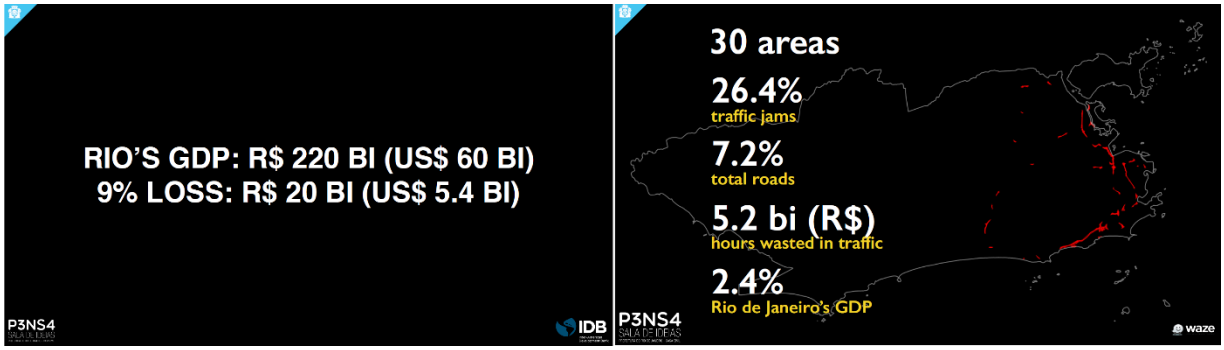


Figure 41: Rio's loss of GDP related to traffic jams, by PENSA

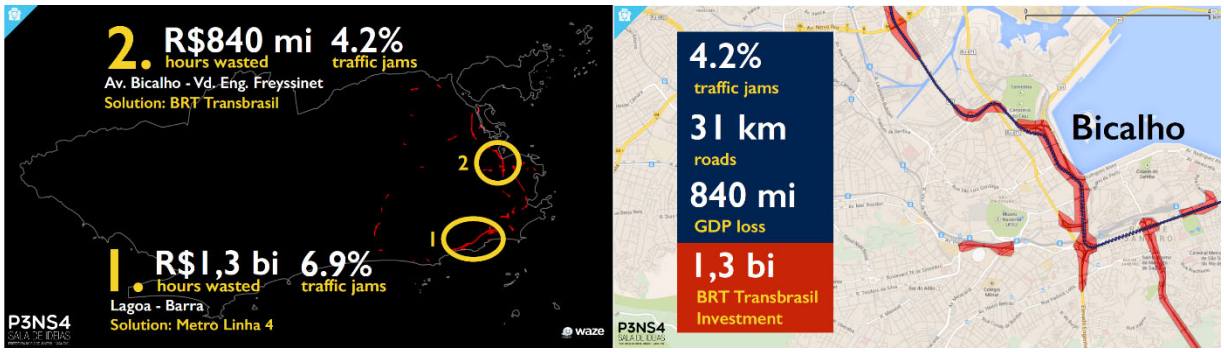


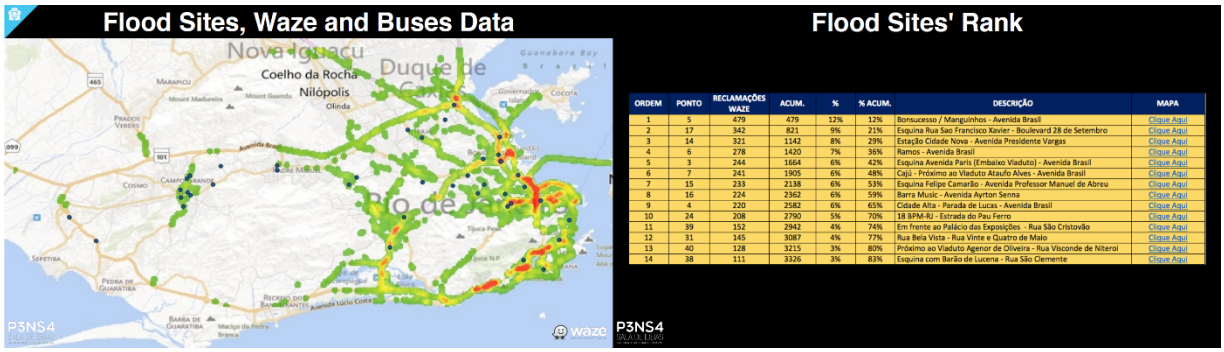
Figure 42: Suggestion of solutions for specific areas with the major impact in GDP loss, by PENSA

PENSA contrasted the traffic accidents reported by Waze's users and the records in the databases of the municipal department of traffic. It allowed a cross-analysis of datasets with other factors and suggestions (e.g., optimizing the timeframe of traffic officers), as in *Figure 43*.

Figure 43: Areas of traffic accidents by Wazers and suggestions of solutions in one area, by PENSA

The cross-analysis of databases from traffic and public transport was also useful for evaluating the major areas of flooding in Rio de Janeiro, providing not only knowledge of their

location but also the areas which generated more reports from individuals. The data from Waze provided a *social layer* to the studies, which was taken into consideration, as seen in *Figure 44*.



ORDEM	PONTO	RECLAMAÇÕES WAZE	ACUM.	%	% ACUM.	DESCRIÇÃO	MAPA
1	5	479	479	12%	12%	Bonsucesso / Manguinhos - Avenida Brasil	Clique Aqui
2	17	342	821	9%	21%	Esquina Rua Sao Francisco Xavier - Boulevard 28 de Setembro	Clique Aqui
3	14	321	1142	8%	29%	Estação Cidade Nova - Avenida Presidente Vargas	Clique Aqui
4	6	278	1420	7%	36%	Ramos - Avenida Brasil	Clique Aqui
5	3	244	1664	6%	42%	Esquina Avenida Paris (Embaixo Viaduto) - Avenida Brasil	Clique Aqui
6	7	241	1905	6%	48%	Caju - Próximo ao Viaduto Ataufo Alves - Avenida Brasil	Clique Aqui
7	15	233	2138	6%	53%	Esquina Felipe Camarão - Avenida Professor Manuel de Abreu	Clique Aqui
8	16	224	2362	6%	59%	Barra Music - Avenida Ayrton Senna	Clique Aqui
9	4	220	2582	6%	65%	Cidade Alta - Parada de Lucas - Avenida Brasil	Clique Aqui
10	24	208	2790	5%	70%	18 BPM-RJ - Estrada do Pau Ferro	Clique Aqui
11	39	152	2942	4%	74%	Em frente ao Palácio das Exposições - Rua São Cristovão	Clique Aqui
12	31	145	3087	4%	77%	Rua Bela Vista - Rua Vinte e Quatro de Maio	Clique Aqui
13	40	128	3215	3%	80%	Próximo ao Viaduto Agenor de Oliveira - Rua Visconde de Niteroi	Clique Aqui
14	38	111	3326	3%	83%	Esquina com Barão de Lucena - Rua São Clemente	Clique Aqui

Figure 44: Flood sites with Waze and buses data, Flood site's ranking, by PENSA

Dozens of other visualizations are available in the documents that were consulted[1468] concerning extensive studies about bus lines, main areas of *dengue* infection, municipal call centre reports, among other topics. The goal here is not to be exhaustive, but to illustrate how the use of Big Data was applied for urban management and planning in Rio de Janeiro. Anyone interested in further information about PENSA studies and experiences can go through the sources mentioned before, others that are available online (e.g., a study on biking paths on Rio de Janeiro),[1469] or get in direct contact with the FGV-Rio professor Pablo Cerdeira.

It was through direct contact with Montréal's city hall that the research accessed other documents that were used as a source for further enquiry, as well as information available on the Internet. Presentations from the team responsible for the city hall's Big Data projects gave the guidelines for the documental analysis presented next. Public visibility of the Big Data projects in the municipal government of Montréal is quite modest in relation to Rio de Janeiro, yet not less relevant for the ends of the research. The Montréal case brought prospective

[1468] All the images were taken from PPT and PDF files available at Pablo Cerdeira's website.
[1469] Pablo Cerdeira, "Rethinking Rio de Janeiro's bike paths using data and scientific knowledge", (8 November 2016), online: *LinkedIn* <https://www.linkedin.com/pulse/rethinking-rio-de-janeiros-bike-paths-using-data-pablo-cerdeira>.

elements that enriched the legal analysis which was set in the time of the data collection but also in the possible extrapolations of the near future that guide this research.

In the very recent past, the result of the research and consultation process for the construction of a strategy for smart city projects in Montréal set urban mobility as its top priority,[1470] ahead such as other priorities of improving digital services, way of life, democracy (transparency) and economic development (innovation). Two years later, the city published a midterm report with the results of the period, when the actions (and the previous conditions) of openness and innovation in the city were outstanding among the five priorities.[1471] Among the more than 30 projects completed or in progress, the projects to do with urban mobility are presented with more emphasis, but it is noticeable that the public policies for open data and innovative environment are evaluated as the headliners by the interested communities.[1472]

Montréal city hall launched its own monitoring centre dedicated to urban mobility in 2014,[1473] the *Centre de gestion de la mobilité urbaine* (CGMU).[1474] As the CGMU shares its responsibilities relating to urban traffic with the *Centre intégré de gestion de la circulation* (CIGC), a provincial division of *Transport Québec*,[1475] it does not have the same level of managerial

[1470] See: MISC McGill, "Digital Issues - The Cities We Need / Les Villes qu'il nous faut", (13 March 2015), online: *YouTube* <https://youtu.be/7yFvgov0lCE?t=2436>.
[1471] *Bilan des réalisations du Bureau de la Ville intelligente et numérique 2015-2017*, by Bureau de la ville intelligente et numérique - Ville de Montréal (Ville de Montréal, 2017).
[1472] See: *Intelligent Community Montréal: Human, Open, and Innovative*, by Robert Bell & Stephane Goyette (Montreal: ICF, 2016); Tracey P Lauriault, Rachel Bloom & Jean-Noé Landry, "Open Smart Cities in Canada: Assessment Report" (2018).
[1473] Jason Magder, "Montreal inaugurates new traffic monitoring centre", (9 September 2014), online: *Montreal Gazette* <https://montrealgazette.com/news/local-news/montreal-inaugurates-new-traffic-monitoring-centre>; Christopher Nardi, "Un centre de surveillance pour améliorer la mobilité urbaine", (8 September 2014), online: *TVA Nouvelles* <https://www.tvanouvelles.ca/2014/09/08/un-centre-de-surveillance-pour-ameliorer-la-mobilite-urbaine>.
[1474] Ville de Montréal, "La Ville de Montréal officialise la mise en service du Centre de gestion de mobilité urbaine (CGMU) : le coeur et le cerveau des systèmes de transport intelligents à Montréal", online: *Newswire* <http://bit.ly/coeur-cerveau-systemes-transport-intelligents-Montréal>.
[1475] Jason Magder, "Traffic-control centre brought up to speed with $11-million update", (1 September 2015), online: *Montreal Gazette* <https://montrealgazette.com/news/local-news/traffic-control-centre-brought-up-to-speed-with-11-million-update>.

capacity as Rio's COR, but even so, the CGMU has significant surveillance power over essential factors that affect the traffic in the city.[1476] The CGMU has access to more than 500 CCTV cameras, traffic lights, buses, and other departments and control centres of partners for the management of *intelligent transport systems*.[1477]

Montréal has become the first Canadian city to access real-time data of Waze users (about 103.000)[1478] to be used by the CGMU, which also counts data from sensors able to detect Bluetooth signals from smartphones of drivers and identify their path in the city.[1479] The integration of Waze data appears in the report "Budget 2019 et Programme triennal d'immobilisations 2019-2021" as an achievement of 2018 (*Figure 45*), along with other applications of interest for urban mobility.[1480] The emphasis on transit and transportation was kept as a priority for Montréal city hall during the transition of the two political mandates, the first, setting the basis and the following, moving into a more data analysis centered approach.

[1476] TVA Nouvelles, "Des yeux partout pour gérer la circulation", (8 June 2016), online: *TVA Nouvelles* <https://www.tvanouvelles.ca/2016/06/08/des-yeux-partout-pour-gerer-la-circulation>.
[1477] Ville de Montréal, "Systèmes des transports intelligents", online: *Ville de Montréal* <https://ville.montreal.qc.ca/portal/page?_pageid=8957,99621711&_dad=portal&_schema=PORTAL>.
[1478] CBC News, *supra* note 1403.
[1479] Bahador Zabihiyan & François Cormier, "Montréal veut améliorer la circulation grâce à l'application Waze et à Bluetooth", (22 April 2016), online: *Radio-Canada* <https://ici.radio-canada.ca/nouvelle/777370/waze-bluetooth-montreal-google-donnees-datas-orangetraffic>.
[1480] *Budget 2019 et Programme triennal d'immobilisations 2019-2021*, by Service des technologies de l'information (Ville de Montréal, 2018). The original PDF file is available for the dissertation jury.

Figure 45: Report of integration of Waze data with systems used by the CGMU

The narrative of understanding and improving the urban dynamics of mobility through data was present during the mandate of Mayor Denis Coderre (2013 to 2017) and is clearly present in presentations and publications—many already referred above—involving the city councilor responsible for the Montréal Smart city project, Harout Chitilian.[1481] Smart city projects are known to be highly consuming in terms of cost and time. They are hardly achievable during the course of a single political mandate, most of the initial actions are usually set to build basic technological structures, and enough human resources and complex studies to advance to more sophisticated projects later.[1482] Montréal's city officials already knew these conditional elements

[1481] Bahador Zabihiyan, "Montréal en quête de données personnelles pour améliorer les transports", (17 October 2016), online: *Radio-Canada* <https://ici.radio-canada.ca/nouvelle/808784/mtl-trajet-app>.
[1482] Another personal note: it is my opinion as a former CIO who spend four years building basis for the successful smart city projects that would be followed in the next municipal administration. But it is well-informed, experience-based, and prudence-focused common sense as explained in the first chapter.

in 2017 (*Figure 46*), as informed by the *Service des technologies de l'information,*[1483] so the municipality had to plan for the longer game that would set more a solid basis for Big Data capabilities (*Figure 47*) in traffic, transportation, and other areas.

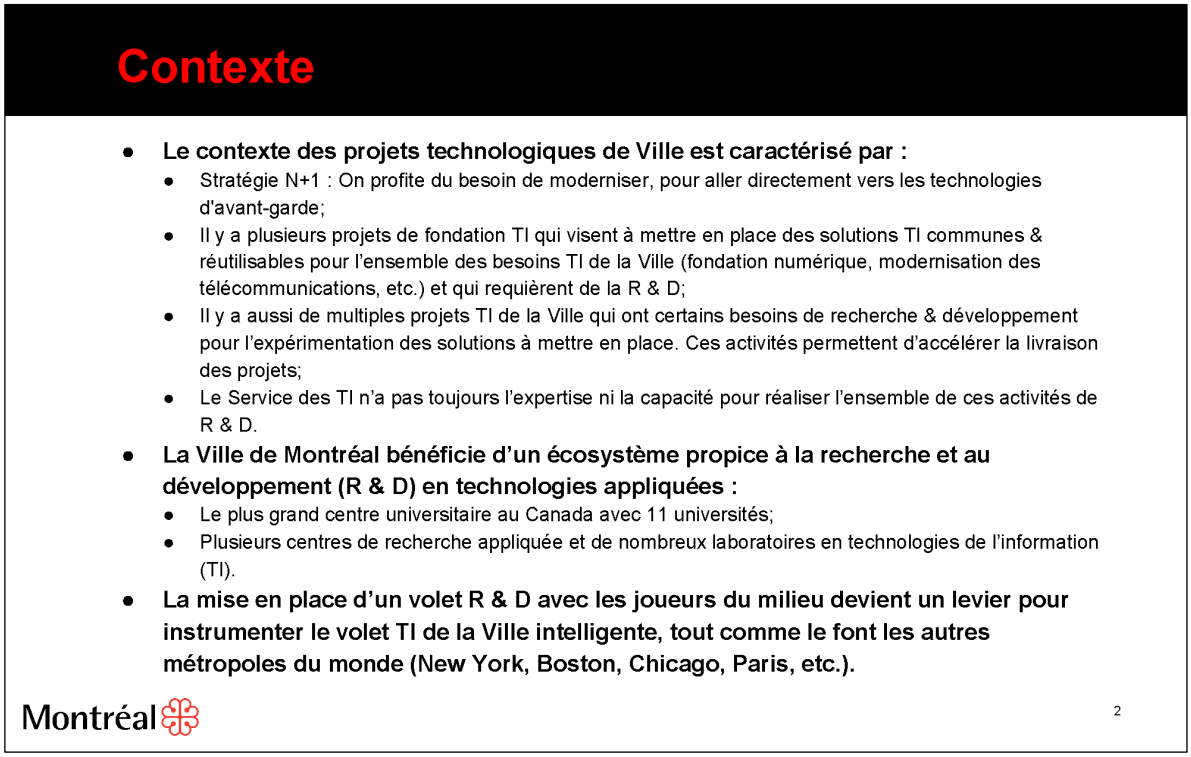


Figure 46: Internal evaluation of contexts and conditions for smart city projects in Montréal

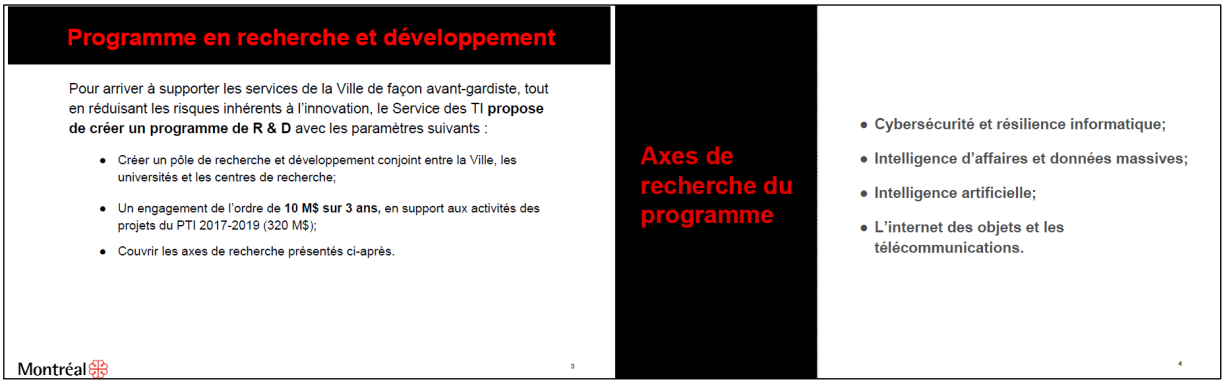


Figure 47: Program for research and development of technological capabilities for Montréal city hall

[1483] *La R & D en technologies de l'information*, by Sylvain Perras & Jean-Martin Thibault (Ville de Montréal, 2017). The original PDF file is available for the dissertation jury.

The research investments with academic partners should point out risks related to smart city projects that include Big Data.[1484] Investments in infrastructure, people, research, and pilot projects of Big Data are being implemented to advance the data analytics agenda, which will move into the budgets and plans for the following political mandate (*Figures 48 and 49*).

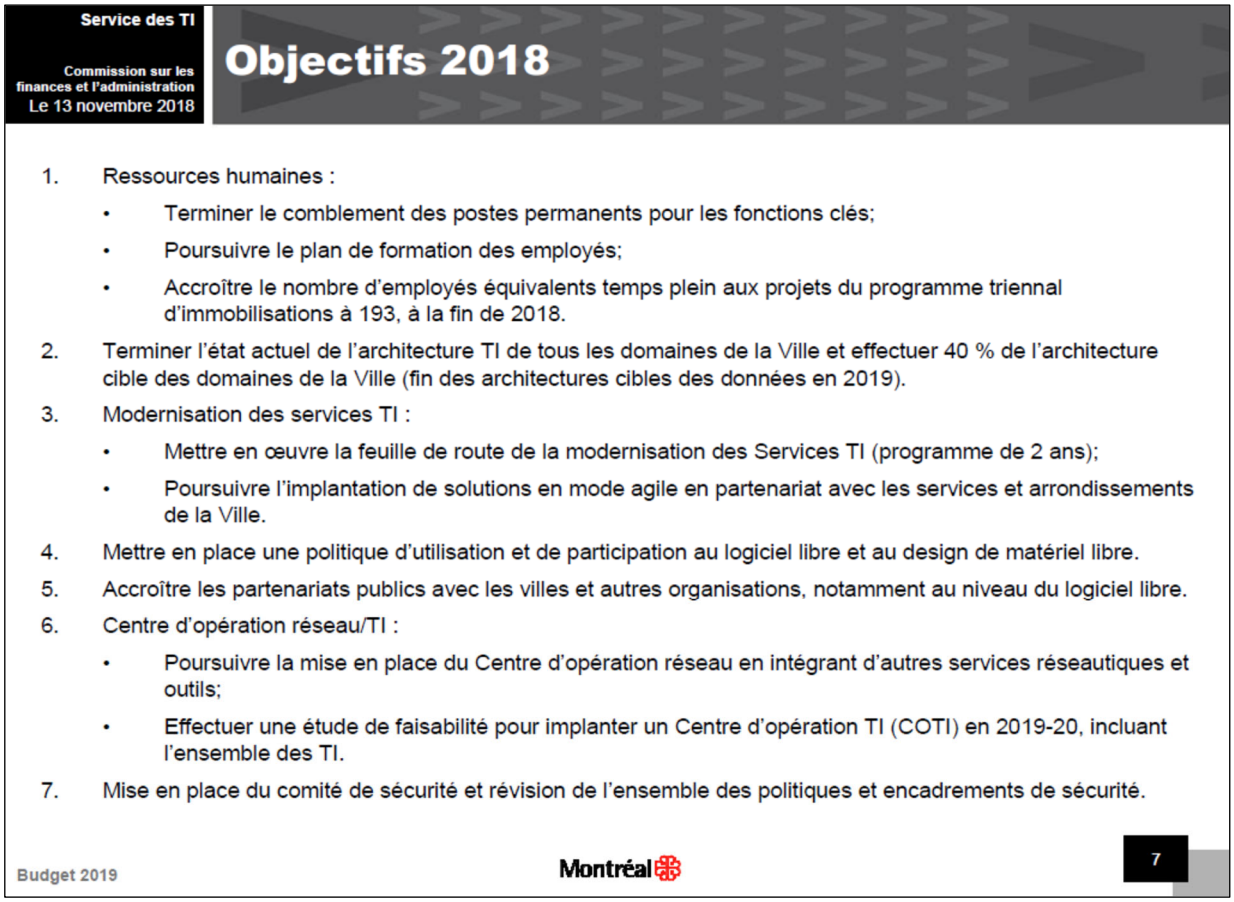


Figure 48: IT objectives of Montréal city hall in 2018

[1484] Marie Christine Trottier, "Montréal investit 10 M$ en recherche pour de nouvelles technologies", (25 February 2017), online: *TVA Nouvelles* <https://www.tvanouvelles.ca/2017/02/15/montreal-investit-10-m-en-recherche-pour-de-nouvelles-technologies-1>.

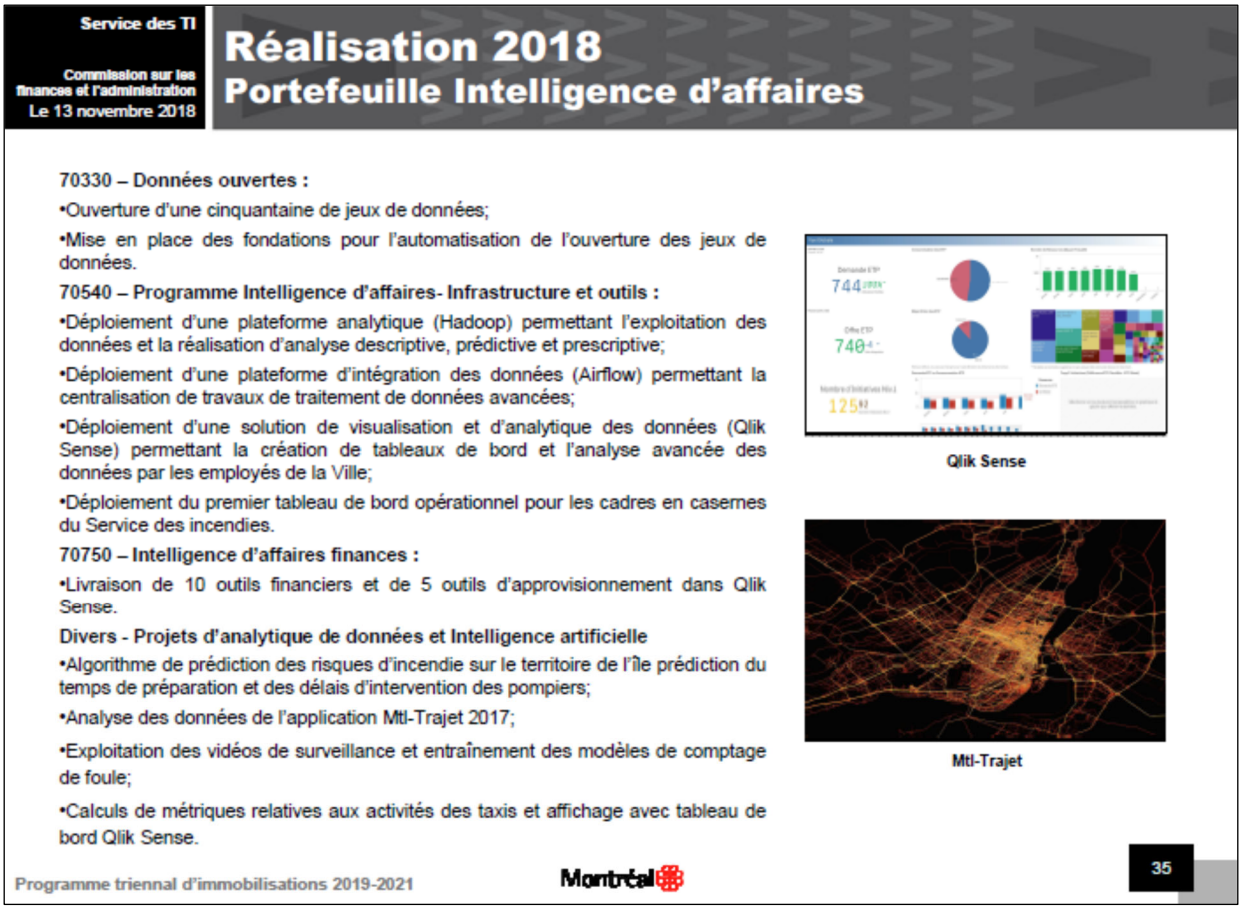


Figure 49: Execution of initial conditions for Big Data projects in 2018

By looking through the pages of Montréal reports, it could seem that Big Data is only one front of the several activities of which the municipal IT teams have taken the responsibility to execute—it would not be wrong to say it—but in the updated imaginary of the smart city, data analytics now occupies its quintessence. If the *smart essence* was once the image of traffic control centres with dozens of screens, the Big Data cases of New York and Rio de Janeiro(!) figure in the first words of the *decision summary* of a major report for smart cities in Québec:

> *New York et Rio de Janeiro se sont dotées de centres de prise de décision en temps réel, alimentés par la collecte et l'analyse de données massives (big data). À Montréal, les données collectées ou acquises par la Ville sont considérées comme ouvertes par défaut et accessibles aux citoyens sur un portail en ligne. La métropole utilise aussi la géolocalisation pour planifier et suivre le trajet de ses déneigeuses, et compte s'en servir prochainement pour observer les déplacements des utilisateurs du transport en commun qui ont*

téléchargé une application mobile à cet effet.[1485]

The same report from the *Commission de l'éthique en science et en technologie* recognizes that there is no consensual definition of smart cities, as most of the best publications on the field state, just as the present research does. Then again, as in this research, the report assumes a concept under a "legal point of view" that highlights the importance of Big Data—up to the (surprising) point of mentioning the term in English—for the accomplishment of the objectives on (the present imaginary state of) smart cities:

> *Le concept de « ville intelligente » fait actuellement l'objet de nombreuses définitions. Une recension de la législation, de la jurisprudence ainsi que de la doctrine universitaire et administrative a néanmoins permis de construire une définition du concept de « ville intelligente » qui offre des balises juridiques suffisantes :*
>
> *Une ville intelligente est un territoire où l'administration municipale et les autres parties prenantes utilisent et favorisent les technologies de l'information et de la communication (TIC), en particulier la collecte, la diffusion et l'utilisation de données massives (big data), afin d'améliorer la qualité de vie des citoyens. Cet objectif se réalise notamment par l'optimisation de la prestation des services publics, de la participation citoyenne, de la mobilité, de la consommation d'énergie, de la gestion des déchets et de la pollution, de la conservation et de la préservation de l'environnement, de la santé publique, de l'entretien des infrastructures et de la mise en valeur du patrimoine.*[1486]

Therefore, the imaginary of (what is flexibly called) Big Data is part of the core paradigm for smart cities, in line with the many objectives that justify innovative urban technologies, whether in Brazil or in Canada. Big Data reinforces the idea of smartness as the capability of perceiving data about the urban environment, processing it into information for decision-making in urban management, and sharing knowledge for improving the quality of life in cities through prudent public policies. It seems appropriate given the complexities of Montréal (*Figure 50*).

[1485] *La ville intelligente au service du bien commun : Lignes directrices pour allier l'éthique au numérique dans les municipalités au Québec*, by Commission de l'éthique en science et en technologie (Gouvernement du Québec, 2017) at x.
[1486] *Ibid* at 3.

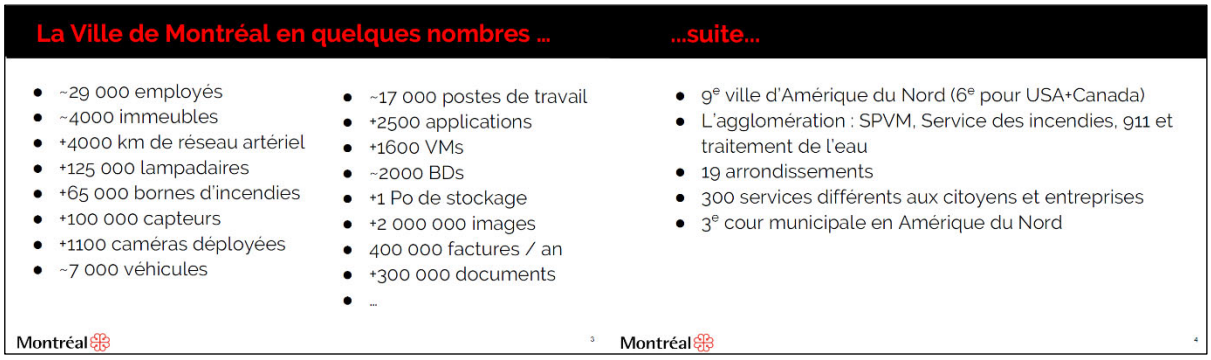


Figure 50: Montréal city hall in numbers

The previous figure was taken from the document *Projets BI et IA à la Ville de Montréal - Survol des technologies et de l'architecture.*[1487] It was produced by the team in charge of data science and business intelligence in the city hall (under the *Direction technologies, architecture, innovation et sécurité - Service des technologies de l'information*) and provided for the research after a presentation of its content.[1488] As it is a presentation for internal use for the evaluation of projects still under development, it is the only document from the city hall used here that was not found online but shared by the municipal team of business intelligence.

Whether calling the applied technologies Big Data, business intelligence, or artificial intelligence, Montréal is developing a set of cases that meet the smart city projects described so far. After a period of preparation, some strategic pilot projects were delivered and major projects of data analytics for many departments are under development. Not surprisingly, applications for intelligent analysis in mobility remain the top priority and the most expected proof of concept for what is to come for the city of Montréal (*Figure 51*).

[1487] *Projets BI et IA à la Ville de Montréal - Survol des technologies et de l'architecture*, by Service des technologies de l'information (Ville de Montréal, 2019).The document is available online for the jury.
[1488] I need to thank the entire team of Montreal City data scientists who made their time available for the presentation and the difficult questions brought by the research. *Merci beaucoup, vraiment !*

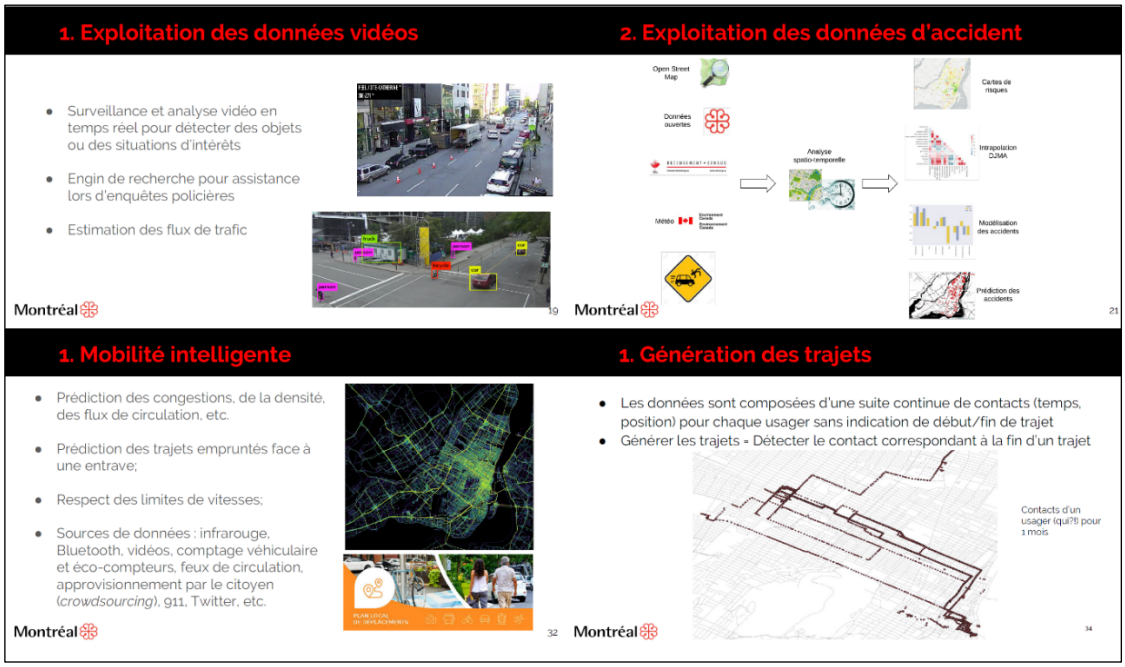


Figure 51: Pilot projects of business intelligence and projects for mobility in Montreal

Other Big Data/BI/AI projects are listed as pilot projects and should remain in the roadmap of their teams for further development, according to the plans for the next few years (*Figure 52*).

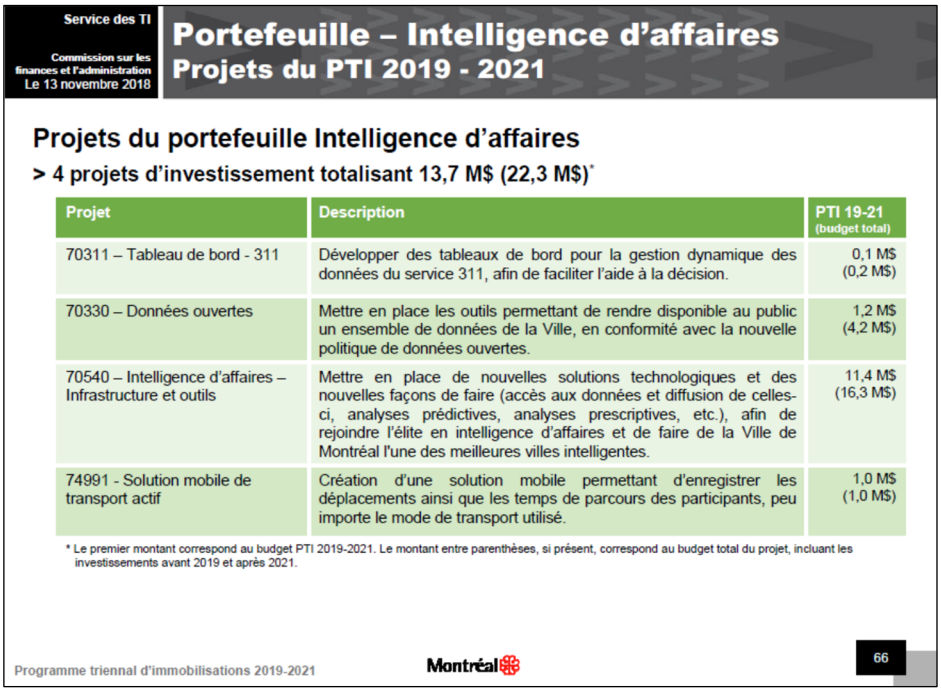


Figure 52: Portfolio of Business Intelligence projects in Montreal City Hall, 2019-2021

Keeping the data analytics projects in the municipal plans—and urban mobility as the top priority—illustrates a continuity of logic between political mandates.[1489] The maturation of IT projects often takes longer than political plans, and changing priorities could have put the prior efforts at risk—as the lessons from Rio's COR and PENSA may indicate—because public policies with technological factors are both powerful and fragile. Fortunately, the political change in the city of Montréal signalled a positive compatibility between continuity and renovation.

The new mayor of Montréal, Valérie Plante, has signalled such compatibility as a priority in the strategy for economic development by stating the relevance of digital technologies and Big Data for the future of the metropolis:

> *La métropole traverse une période charnière. Les nouvelles technologies et les mégadonnées transforment l'économie mondiale. Les modèles d'affaires, les secteurs économiques et le marché du travail — toutes les sphères de l'économie — sont en évolution. Et les villes sont amenées à jouer un rôle plus important dans le nouvel écosystème mondial. La métropole traverse une période charnière. Les nouvelles technologies et les mégadonnées transforment l'économie mondiale.*[1490]

By keeping data analytics in the narrative forefront,[1491] Montréal has doubled its bet on innovation for improving municipal services.[1492] At the same time, Montréal has adopted a political position against the *all-seeing-city model* being adopted by other cities,[1493] by proposing the creation of a *charter for an ethical management of data* collected and generated by the

[1489] Ville de Montréal-Cabinet de la mairesse et du comité exécutif, "Accélérer Montréal - Montréal dévoile sa stratégie de développement économique", (19 April 2018), online: *Newswire* <https://www.newswire.ca/fr/news-releases/accelerer-montreal---montreal-devoile-sa-strategie-de-developpement-economique-680273783.html>.
[1490] *Accélérer Montréal - Stratégie de développement économique 2018-2022*, by Ville de Montréal (Montreal: Ville de Montréal, 2018) at 3.
[1491] Hélène Roulot-Ganzmann, "Montréal veut être à l'avant-garde", (23 February 2019), online: *Le Devoir* <https://www.ledevoir.com/societe/science/548272/montreal-veut-etre-a-l-avant-garde>.
[1492] Pierre-André Normadin, "Services: Montréal misera sur l'intelligence artificielle", (19 March 2019), online: *La Presse* <https://www.lapresse.ca/actualites/grand-montreal/201903/18/01-5218722-services-montreal-misera-sur-lintelligence-artificielle.php>.
[1493] Henri Ouellette Vézina, "Données numériques: Montréal ne veut pas d'une société «Big Brother»", (28 May 2019), online: *Journal Métro* <https://journalmetro.com/actualites/montreal/2328044/donnees-numeriques-montreal-ne-veut-pas-dune-societe-big-brother/>.

municipality, and by calling for the adaptation of the existenting *archaic legislative framework*.[1494] These elements, accomplished or not, make Montréal a promising case for future research.

Research is strategic for the development of smart cities and this requires external collaboration. Therefore, especially when involving data sciences and digital humanities, partnerships are recommended with "Academic Institutions to sustain operational integration, actionable intelligence and, social participation."[1495] As it may be perceived in this subchapter, the smart city cases of Rio de Janeiro and Montréal have been the objects of research of individual researchers and relevant institutions, and the influence of their measured results and public narratives can go far beyond the available numbers and institutional texts.

Rio de Janeiro, despite no longer being described as *the smartest city*, still exerts an influence over global cities that needs to be put under updated perspectives. Rio's COR will remain in need of continuous monitoring by research "for its dominant role within public imagination… as an exemplar 'smart city' initiative."[1496] Rio's COR still brings "a number of delegations from abroad… to analyze it as a role model for similar smart city projects elsewhere in the world."[1497] There is not much doubt that the *control centre model* of Rio de Janeiro is still working as an attractive paradigm for other projects, even if it is moving from a *participatory intelligence rhetoric* to a *surveillance black box discourse* that guides all of COR public policies. The experiences from *Smart Rio* contrast with the perspectives on *Smart Montréal*.

[1494] Elsa Iskander, "Montréal planche sur une Charte des données numériques", (28 May 2019), online: *TVA Nouvelles* <https://www.tvanouvelles.ca/2019/05/28/montreal-planche-sur-une-charte-des-donnees-numeriques-1>.
[1495] *Big Data to Smart City: Recommendations to COR*, by Price School of Public Policy (University of Southern California, 2017) at 12.
[1496] Andrés Luque-Ayala & Simon Marvin, "The maintenance of urban circulation: An operational logic of infrastructural control" (2015) 34:2 Environ Plan D 191–208 at 192.
[1497] Alexander Kuhl, *Developing and applying a smart city for development model: the case of COR in Rio de Janeiro* (Master's thesis, Universidade Católica Portuguesa, Escola Brasileira de Administração Pública, Fundação Getúlio Vargas, 2018) [unpublished] at 29.

Montréal has increased the previous partnerships with research institutions—they now include CEFRIO, CIRAIG, CRIM, ENAP, and SERENE-RISC—to evaluate and guide its public policies concerning data analytics, urban sensors, municipal networks, and cybersecurity.[1498] Montréal has cases that illustrate the principles of transparency and participation that model the democratic dimension of smart cities, setting conditions that are appropriated for approaching and overcoming some concerns related to data-driven technocratic governance.[1499] The proposed *Charte des données numériques* by Montréal could be seen as a deployment of the recommendations from the reports of CIRAG[1500] and CEFRIO, as expressed by Pierre Trudel:

> *En somme, de plus en plus, les données sont une composante essentielle de la maîtrise des activités relevant en tout ou en partie de la Ville. C'est pourquoi la Ville de Montréal doit se doter d'une politique relative aux données qui circulent sur son territoire, notamment par le truchement des installations situées sur son territoire et sur son domaine public.*[1501]

Such transposition from research to public policy instigates the approach on the next subchapter, which concern the legal risks in Big Data projects of Rio de Janeiro and Montréal.

3.2.3. Analysis of Legal Elements on the Imaginary of Big Data Flowing from Cities

Someone could get to this point of the dissertation and ask: "OK, now we know about all these troubles and worries, but where is the law in all of this? What does the law say about smart cities? What could we find to improve the law?"

The subject of smart cities is complex, heterogeneous, and highly dependent on context and purpose. Even considering these factors, legally speaking, there is no full walkthrough guide

[1498] Service des technologies de l'information, *supra* note 1480 at 9.
[1499] Dominic Cliche, Patrick Turmel & Stéphane Roche, "Les enjeux éthiques de la ville intelligente: données massives, géolocalisation et gouvernance municipale" (2016) 20:1 Ethica 223–248.
[1500] *Éthique et acceptabilité sociale de l'Internet des objets dans un contexte de ville intelligente*, by Sara Russo Garrido et al (CIRAIG, 2018).
[1501] *Modèles et enjeux pour le déploiement des réseaux de télécommunication de prochaine génération en contexte municipal*, by Josée Beaudoin et al (Montreal: CEFRIO, 2018) at 20.

in governmental reports, no affordable instruction manual in corporative papers, and no hidden master key solution in academic documents. Still, answers can be provided because they already exist in the legal imaginary of smart cities—which is not exclusively composed by the imaginary of the people with law degrees—offering possibilities that are being put into practice by the public policies adopted by municipalities.

Legal scholars are being requested to contribute to conferences and publications about smart cities, taking on the sociolegal challenges arising from the projects being put into practice. There is always hope that law professors and lawyers will bring enlightening answers from legislation to the shady problems of smart projects. Or, at least, that legal researchers will be able to provide some recommendations for building new legal frameworks that could set up conditions to mitigate the smart city dilemmas. In short, discovering what guidance the law offers for smart cities is *part of the job* that the public (and the) institutions expect jurists to do, but it takes other parts to get there and, from there, to go beyond to see if they can work as intended.

One way of explaining how to get to such destination could be decomposing the legal approach through a three step exercise: contextualization, identification, and justification. This can be found in several texts and presentations from legal researchers, privacy authorities, and (municipal or corporative) lawyers about smart cities: the contextualization of technological issues of smart cities under a narrative that is more accessible by law; the identification of specific concerns that present social risks to the rule of law; and the justification of practical measures required by legislation to protect fundamental rights. As neither law nor technology have been enough to solve the smart city dilemmas affecting fundamental rights, the choices between their undesirable alternatives remain at the centre of social concerns (*Figures 53 to 56*).

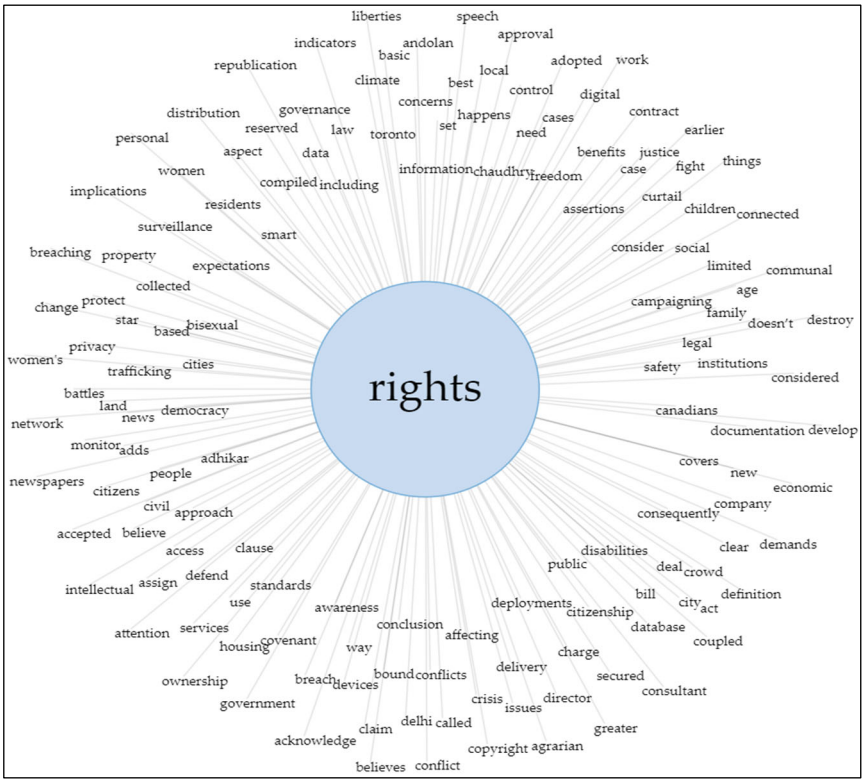


Figure 53: Main links of the term *rights* in the *Websites* database, using *Voyant Tools*

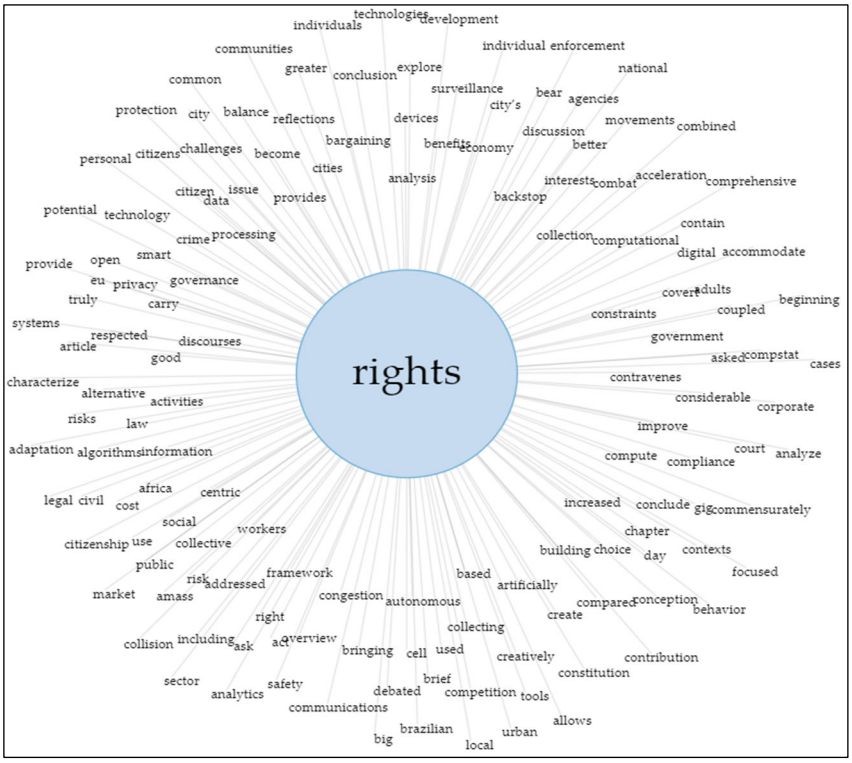


Figure 54: Main links of the term *rights* in the *Academic Publications* database, using *Voyant Tools*

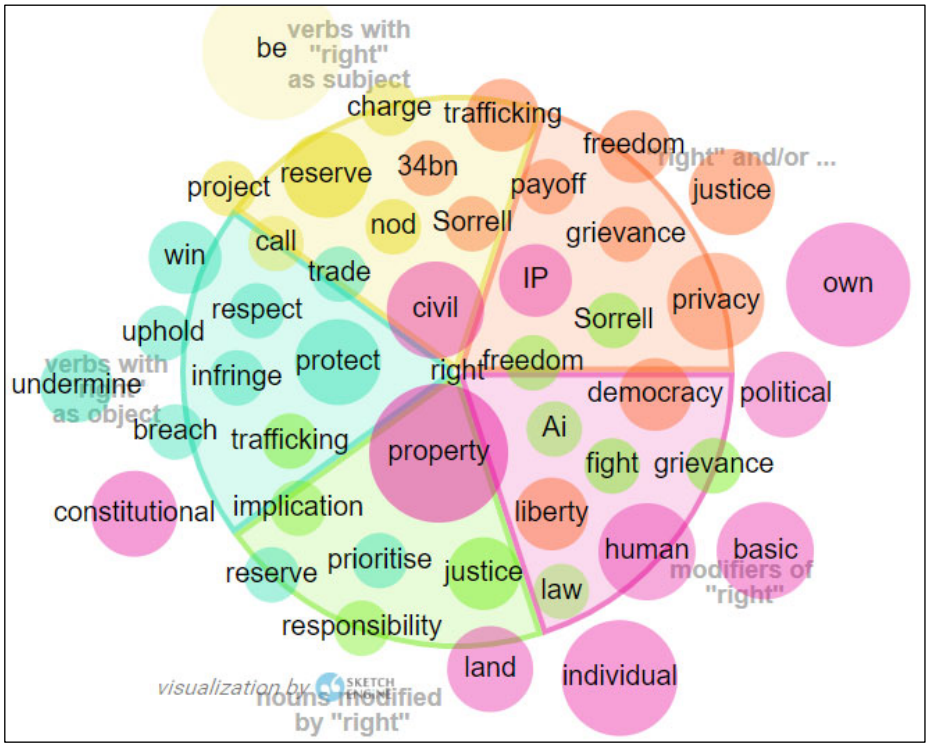


Figure 55: Main correlations of the term *rights* in *Websites*, using *Sketch Engine*

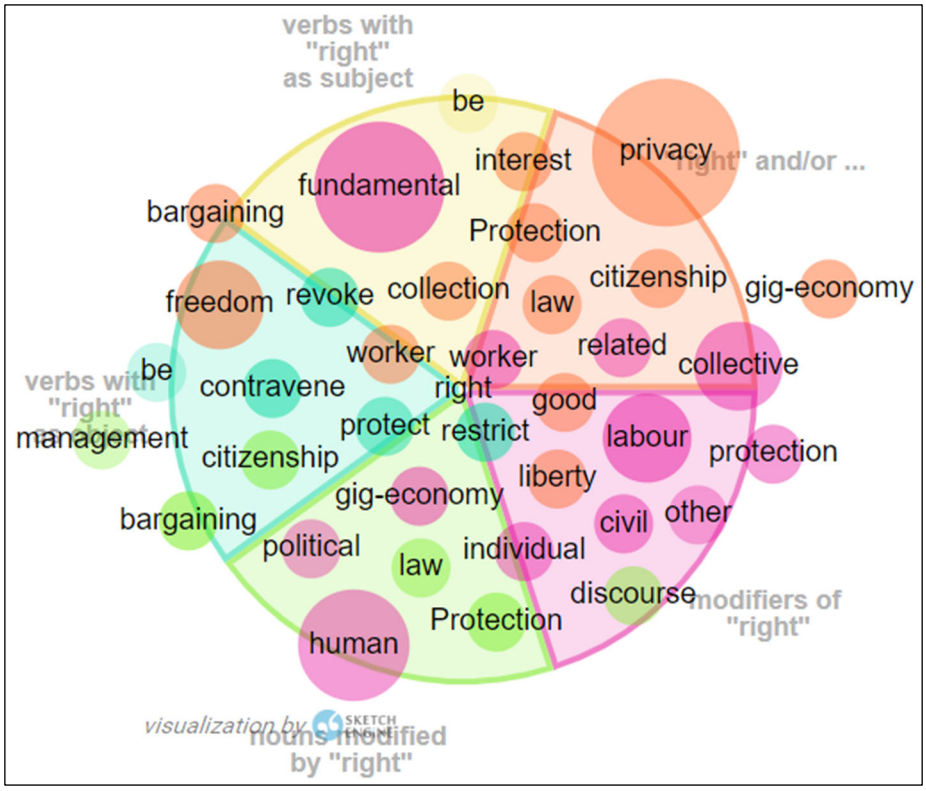


Figure 56: Main correlations of the term *rights* in *Academic Publications*, using *Sketch Engine*

The tools used for analysis provide a large amount of data to consider the context of smart cities. Their aspects were explored before by many articles and publications in the news, bringing attention to the common social challenges and potential legal issues to be approached. New information and communication technologies (e.g., connected devices, Big Data,) create and develop urban services, bringing forward collective benefits and costs to be considered by local and national governments, and affecting the balance of liberties and constraints for their citizens and communities. While the debate about smart cities in newspapers prioritizes the public expectations on smart projects addressing congestion, safety, and (gig-)economy, the main interest of law must be coupled with the respect of the fundamental and human rights protected by constitutions and courts that can be potentially undermined and restricted.

Smart city projects carry several implications to law, addressing conflicting expectations among governments, companies, and civil movements that include data ownership, intellectual property, public contracts, and responsibility clauses. Legal frameworks are called to approach urban algorithms, set privacy standards, protect databases and networks, open access to government information, build data governance, and improve compliance. The cases of the Brazilian and Canadian smart cities are the challenges to be overviewed here.

This subchapter is a hypothetical exercise on the current legal frameworks related to the in-house Big Data projects of Rio de Janeiro and Montréal. The steps of contextualization and justification of the topic were done in the previous subchapters. As part of this exercise, the keywords in the two previous paragraphs used for further identification of legal concerns were exclusively composed by the nouns and verbs extracted from the figures produced by the data mining tools.[1502] This experiment of textual exploration continues in the next subchapters.

[1502] It's not just a process of identifying problems but also of becoming identified with who inform them.

3.2.3.1. The Opacity Axis – Variables of Privacy and Security

The research hypothesis proposed three axes with six variables to discuss the legal imaginary of smart cities. An introduction on them was presented in the subchapter 2.3.1. of the literature review, where the elements of contextualization and identification were thoroughly explored. Above all other variables, privacy is the most highlighted topic of legal concern in all texts, videos, and audio that were consulted during the research. Therefore, it is fair to identify it as the most central element of the debate on smart cities, as reflected in *Figures 57 to 60*.

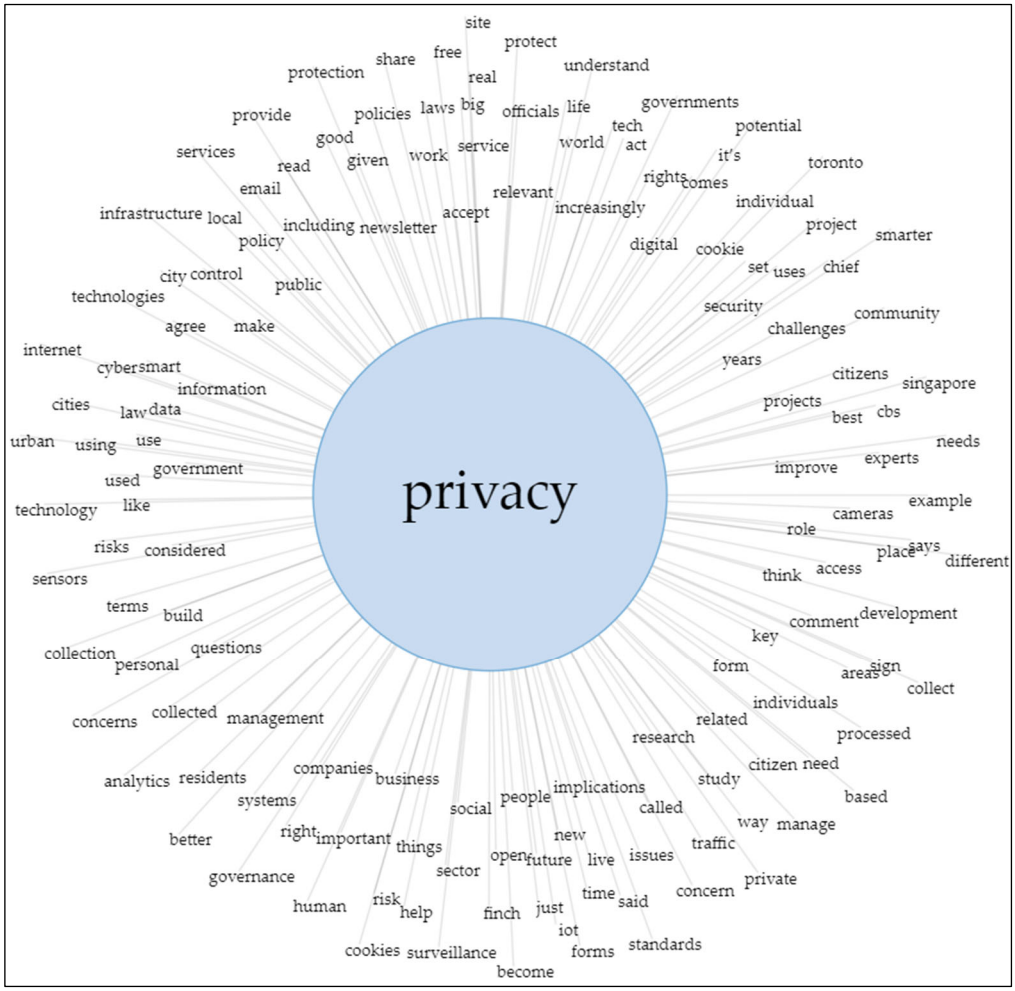


Figure 57: Main links of the term *privacy* in *Websites*, using *Voyant Tools*

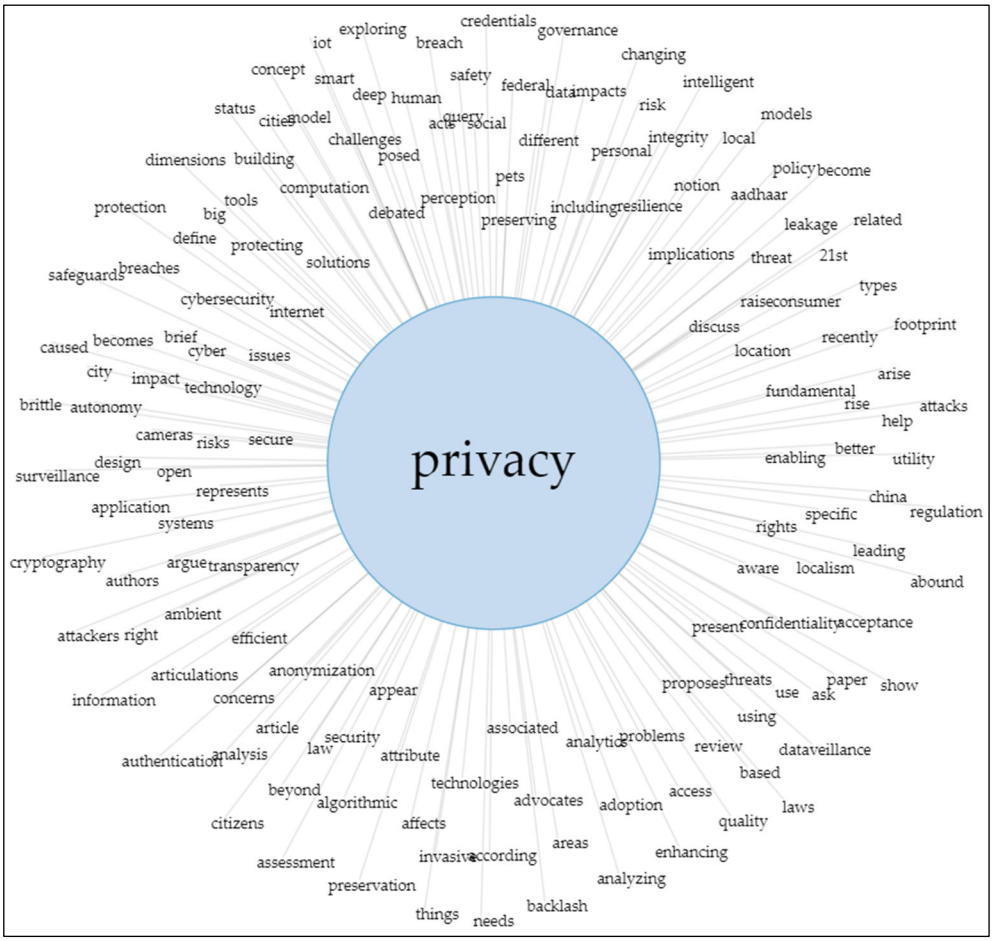


Figure 58: Main links of the term *privacy* in *Academic Publications*, using *Sketch Engine*

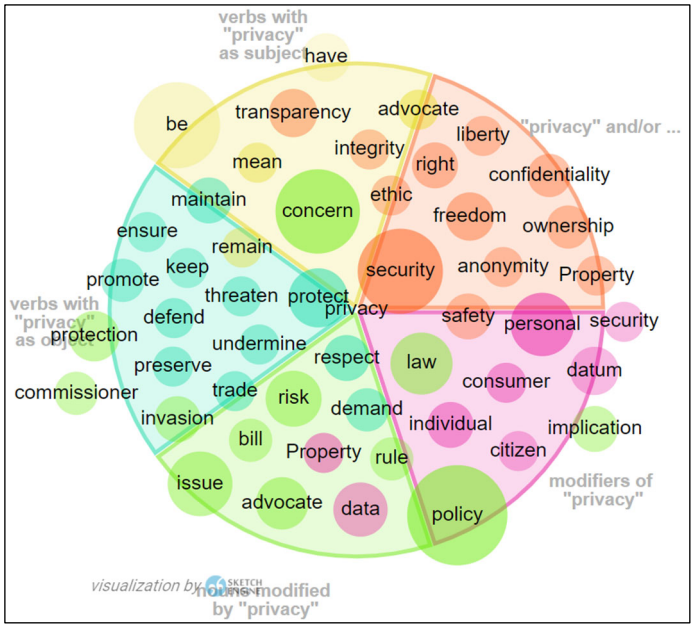


Figure 59: Main correlations of the term *privacy* in *Websites*, using *Sketch Engine*

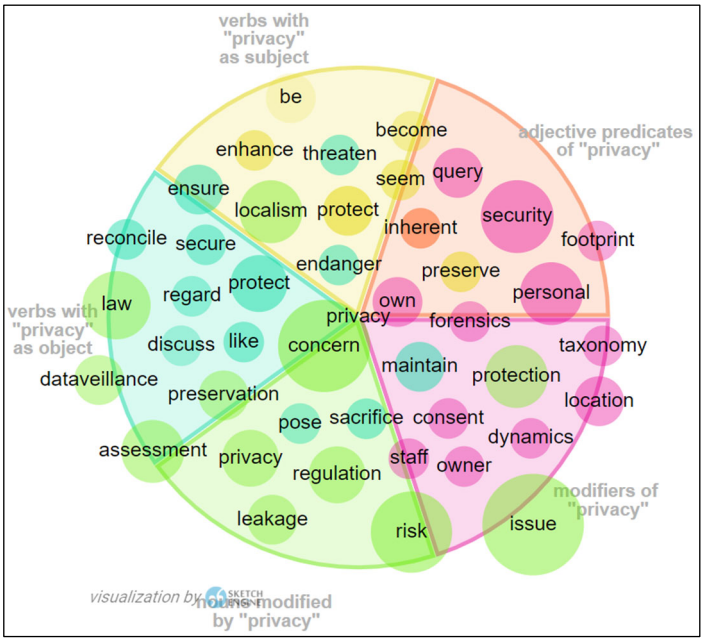


Figure 60: Main correlations of the term *privacy* in *Academic Publications*, using *Sketch Engine*

Privacy provides the best examples of legal concerns related to smart cities. The risks related to personal data in smart projects arise in all of the debates with city officials, experts, citizens, and (even their) advocates because the issues need to be considered and managed. Surveillance cameras and IoT sensors enhance data collection related to the lives of residents in order to be processed by analytics applications and improve city services, but they also entail sacrificing anonymity and endangering civil rights. The rise of invasive urban intelligence poses key challenges to regulation and public policies that cannot be ensured by the present legal models of privacy assessments, anonymization standards, and terms of consent.

All over the world, technologies and laws are being rethought in order to understand and promote ways of protecting personal data and to reconciliate them with smart city applications. Cryptography and other forms of technological safeguards are solutions for some issues concerning the integrity and confidentiality of data from individuals and communities. Good public policies are also needed to enable privacy awareness and preserve freedoms and rights in the present against the potential dataveillance backlashes from the cities of the future.

Despite all the weight on the public debate about privacy in smart cities, the Big Data projects of Rio de Janeiro and Montréal—other global cities do not differ much from them—are able to show that the conformity of projects with legislation does not address all the social concerns and potential risks presented in this dissertation and of the many works referred here.

In the Brazilian case, the personal data protection of the residents of Rio de Janeiro in the Big Data projects of the city hall depends a lot more on the *best practices* adopted by the IT teams of PENSA and municipal departments than on any legislation. Until very recently, the personal data of urban dwellers in smart cities would only be protected by the *right to privacy* under the Brazilian Constitution[1503] and principles from administrative law. In Rio's PENSA, the anonymization measures which were declared and other practices to protect the personal data of citizens came from internal public policies that went beyond the legal requirements at the time, depending on the daily decision-making of their leaders, city officials, and municipal IT teams.

By the end of the present research, a new legislation for personal data protection was promulgated in Brazil and became the normative reference for legal conformity concerning smart cities. The LGPD *(Lei Geral de Proteção de Dados*) will enter into force in August 2020, establishing a legal framework for data protection that was inspired by the GRDP (General Data Protection Regulation) of the European Union (EU), despite bringing a narrower understanding of personal data, smaller fines, and a weaker administrative structure for putting the law into real effect in the country. A predominant culture of arbitrary policies for processing personal data in public administration will have to take the fourth chapter of the LGDP into account,[1504] but the public policies of smart cities will still involve a large measure of discretion implying local choices for city halls. Time and hard cases are needed for Brazilian municipalities and courts to set the

[1503] *Constituição da República Federativa do Brasil de 1988*, art. 5, X and XII.
[1504] *Lei nº 13.709, de 14 de agosto de 2018*, art. 23 to 32.

(currently low) bar of privacy in cities from the interpretation of the LGDP.

In the Canadian case, the growing Big Data projects in Montréal were still in *beta status* and still had more to be proved, but they were being developed by the best technical practices and with an institutional culture of *privacy by design* that also goes beyond the expected conformity with Canadian and provincial law. The technical measures adopted by the municipal data analytics team reflect a shared internal stance of legal caution about privacy which, in turn, goes along with Montréal city hall's public statements claiming the need for new regulation for the development of urban intelligence applications and the protection of rights in smart cities.

The protection of personal data is not explicitly mentioned by the *Canadian Charter of Rights and Freedoms*, yet it is interpreted as part of the rights protected under Section 7.[1505] As the smart project being discussed is in Québec, Québec provincial law is applicable, and the *right to respect for private life* is protected by the *Charte des droits et libertés de la personne*.[1506] More specific to the legal issues related to smart cities, Québec has its own personal data protection laws for provincial institutions and municipalities,[1507] as well for the private sector.[1508] Privacy laws in Canada, especially in Québec, were once considered to be advanced and similar to the EU regulations, but legislative reform is expected to happen soon in response to the techno-social changes in which the Big Data issues of smart cities shall be included.

When dealing with personal data protection, information security is always present. They are twinned subjects in the literature review (*Figures 61 to 64*) and in legal sources.

[1505] Canadian Charter of Rights and Freedoms, s 7, Part 1 of the Constitution Act, 1982, being Schedule B to the Canada Act 1982 (UK), 1982, c 11.
[1506] Charter of Human Rights and Freedoms, CQLR c C-12, s 5.
[1507] Act respecting Access to documents held by public bodies and the Protection of personal information, CQLR c A-2.1.
[1508] Act respecting the protection of personal information in the private sector, CQLR c P-39.1.

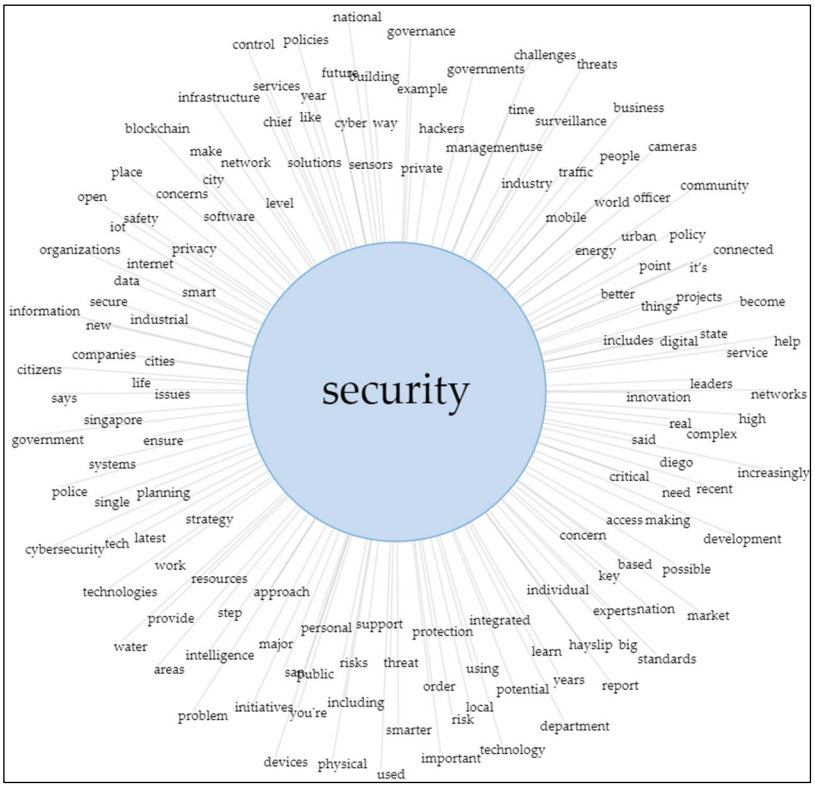


Figure 61: Main links of the term *security* in *Websites*, using *Voyant Tools*

Figure 62: Main links of the term *security* in *Academic Publications*, using *Sketch Engine*

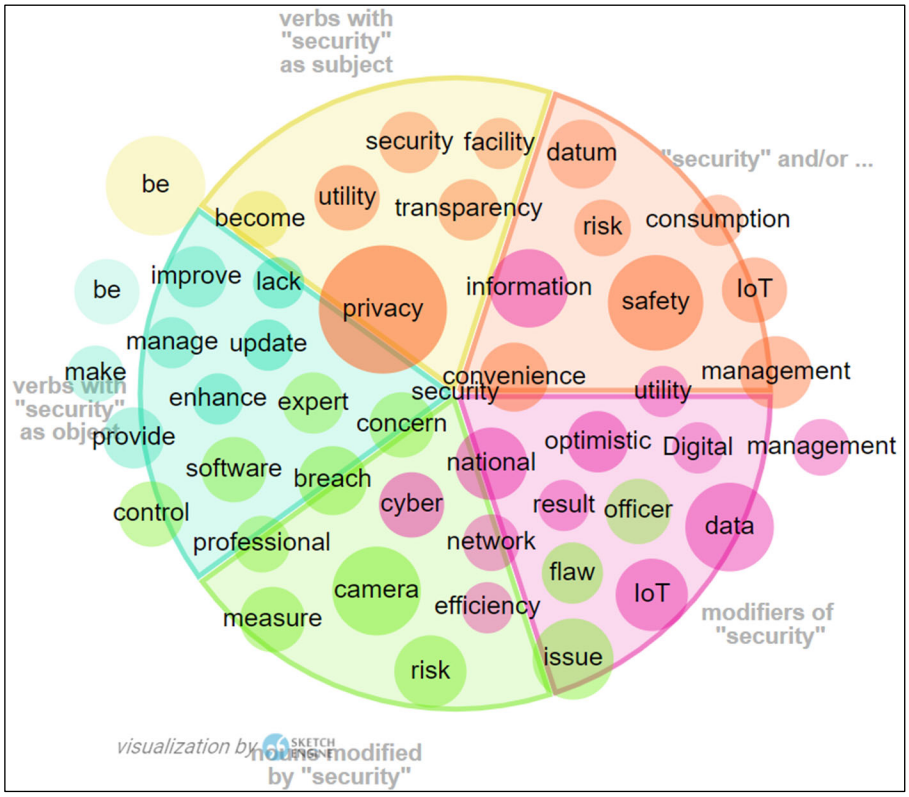


Figure 63: Main correlations of the term *security* in *Websites*, using *Sketch Engine*

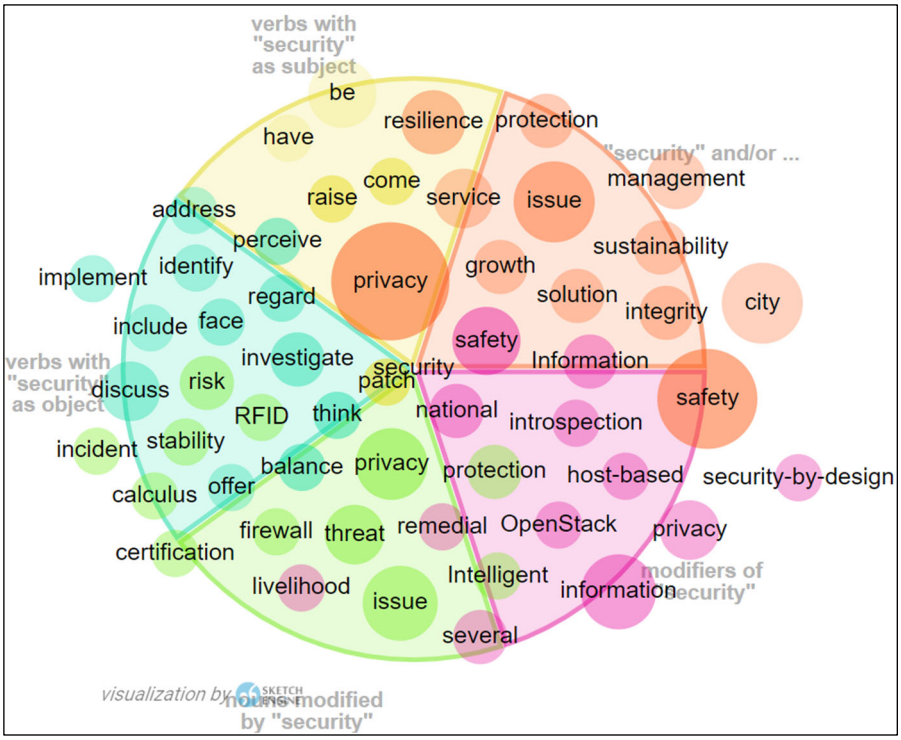


Figure 64: Main correlations of the term *security* in *Academic Publications*, using *Sketch Engine*

Several terms used in privacy and information security circles are the same because their concerns are very connected. Cybersecurity is the most complex and critical issue for smart cities since cyberattacks are no longer only *potential problems*: for they have already caused real incidents in cities all over the world. The threats to urban services—traffic, transportation, energy, water, education, healthcare—are very real and require solutions from technologies and law to address the management of their risks.

The integration of the tech ecosystems of smart cities—IoT sensors, video cameras, mobile networks, cloud computing—enhance the possible vulnerabilities. Many experts and companies believe that technologies such as blockchain can bring better solutions to the security of smart projects, serving as efficient ways of providing integrity, authentication and auditing. But many citizens, city officials and experts believe that by implementing even more monitoring technologies for "safety," the growth of the surveillance of communities raises more concerns of security breaches than "hackers" do. Therefore, smart governance frameworks must ensure standards of *security-by-design* and the respect paid to laws of personal data protection.

Before the LGPD, legal requirements for cyber security in Brazilian cities were restricted to few municipal services due to constitutional dispositions (e.g., tax secrecy) and mostly came from principles of administrative law: efficiency, security, reasonableness, regularity, and continuity. At the time of the activities of Rio's PENSA, there was a municipal ordinance more inspired by the best practices and ISO standards of security than by personal data concerns.[1509] The municipal scenario of cyber security might change with the LGDP, by bringing explicit principles to the Brazilian legislation (art 6) and requiring best practices of security (art 46) to protect personal data—such as anonymization (art 18) and a personal data officer (art 41).

[1509] *Portaria IPLANRIO nº 123 de 28/05/2010*, replaced by the *Decreto RIO nº 44276 de 1/3/2018*.

Security measures are never enough and there is always much to do, but municipalities in Québec may have many (legal) lessons to help Brazilian city halls face security transitions. For example, the Montréal's 2019 IT budget reveals several executed and proposed initiatives for a proactive cybersecurity management. Beyond technical merits, it is due to the dispositions of security spread in provincial laws, as in *Loi sur l'accès aux documents des organismes publics et sur la protection des renseignements personnels* – LADOPPRP (art 63.1).[1510]

More could be said about privacy and security legislation for smart cities in Brazil and Canada. Still, providing detailed descriptions of national laws is not an objective here: exploring legal imaginaries that are also composed by legislation is. Despite the differences between both cases in context and law, this exploration on the Brazilian and Canadian law indicates that they share more convergences than divergences, which always get more attention.

For Brazilians and Canadians consulting this dissertation, detailed information about legislation on the variables of the opacity axis can be found in the bibliography.[1511] A secondary proposition of this subchapter is to give references of Brazilian legislation on personal data protection and cybersecurity to Canadian legal scholars and practitioners, as well as to present Canadian sources for further investigation for their Brazilian pairs. Mutual learning can be useful, especially if Canadian and Brazilian cities keep up the tendency of developing local regulations for smart cities through open and civically engaged public policies that engage on personal data protection and information security.

[1510] *Loi sur l'accès aux documents des organismes publics et sur la protection des renseignements personnels*, RLRQ c A-2.1, art 63.1

[1511] *See*: Commission de l'éthique en science et en technologie, *supra* note 1485; Renato Leite Monteiro, "The new Brazilian General Data Protection Law: a detailed analysis", (15 August 2018), online: *IAPP* <https://iapp.org/news/a/the-new-brazilian-general-data-protection-law-a-detailed-analysis/>; Privacy International & Coding Rights, "The State of Privacy in Brazil", (January 2019), online: *Privacy International* <https://privacyinternational.org/state-privacy/42/state-privacy-brazil>; *Smart City Privacy in Canada*, by Keri Grieman (CIPPIC, 2019).

3.2.3.2. The Intelligibility Axis – Variables of Transparency and Participation

The second axis, at first glance, is taken as oppositional to opacity. While privacy and security try to keep city data out of reach of most unwanted eyes and hands, intelligibility calls everyone to approach urban data and collaborate with it. The variables inviting all to understand cities, also called *openness* and *engagement,* are major topics of research on smart cities, bringing some optimistic perspectives to public policies and local democracy (*Figures 65 to 68*).

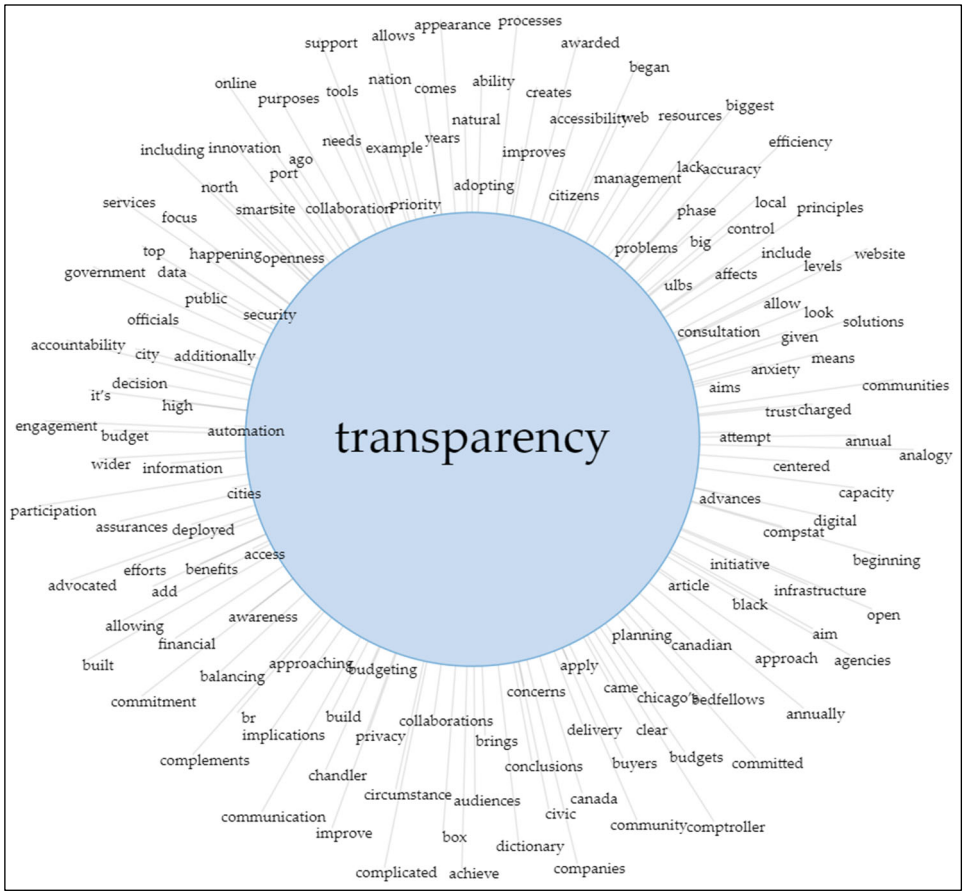


Figure 65: Main links of the term *transparency* in *Websites*, using *Voyant Tools*

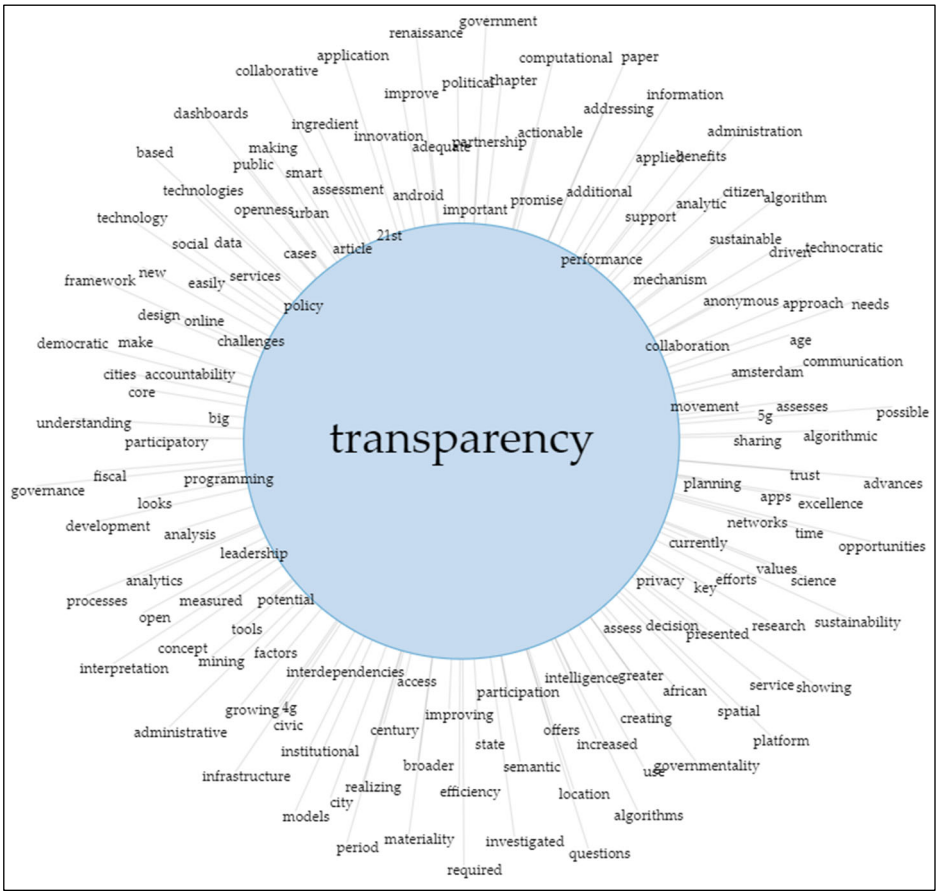


Figure 66: Main links of the term *transparency* in *Academic Publications*, using *Sketch Engine*

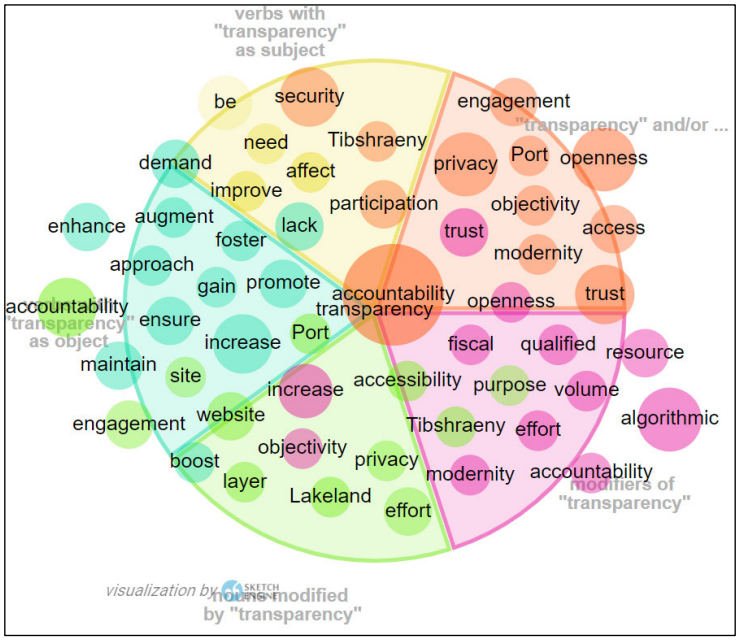


Figure 67: Main correlations of the term *transparency* in *Websites*, using *Sketch Engine*

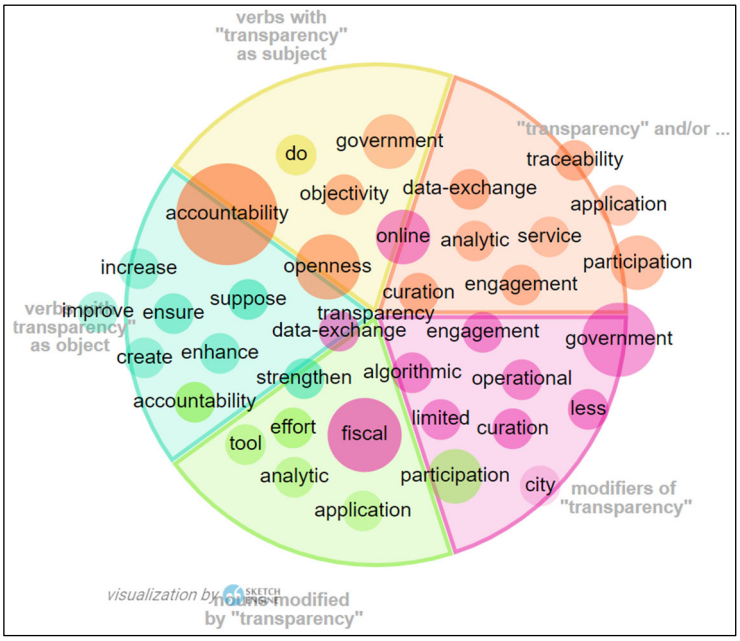


Figure 68: Main correlations of the term *transparency* in *Academic Publications*, using *Sketch Engine*

State transparency is one of the biggest (underachieved) innovations of modernity. It aims at creating and fostering technocratic mechanisms of access and interpretation of information from public administration. Open cities are supposed to promote the awareness of citizens and communities about local infrastructures, services, resources, and problems, increase social understanding about administrative decisions, enhance fiscal assessment of the city budget and public initiatives, and build trust in democratic processes. Several technologies can support such access (e.g., websites, apps, data mining), but opening the data of the *institutional black box* can be neither easy nor adequate: it is complicated and challenging to improve accountability and governance while ensuring privacy and security in smart cities.

At the beginning of the research, the Brazilian government was one of the strongest international advocates for open government, transparency was always present in the political debates of municipalities, and the city of Rio de Janeiro was one of the most vocal promoters. Today, the 2018-2020 action plan for Brazil in the Open Government Partnership includes improving transparency in local governments, where there is a low level of compliance with the

national legislation in the area, with Rio de Janeiro City Hall being one of the underperformers. Rio presents contradictory cases for analysis on openness, despite all the past narratives on COR—where the city promoted policies of data sharing with (social) media and journalists—and the massive open data portal *data.rio*. The fate of Rio's data analytics project shows how fragile public policies of transparency can be, even when justified by legislation: PENSA was able to become a celebrated smart initiative with significative public access to their projects but, despite all the openness, it was unable to replicate its model in the next political mandate.

The Brazilian legal framework on transparency changed with the Law on Access to Public Information (Lei de Acesso à Informação – LAI),[1512] which established the rules to access public information held by governments. Municipalities complained a lot about the short period and the costly efforts to adjust their practices to the law, frequently referring to privacy as a reason to avoid releasing public information, even when they are not related at all.[1513] This argument and the resistance to release data are still present today, despite the years that have passed and the required municipal decrees for transparency,[1514] and the conciliation of practices of personal data protection and transparency in municipalities is still to be seen with the LGPD.

In contrast, Montréal established transparency as the first priority for the smart city plan initiated by the previous political mandate, and the open data practices found continuity in the smart projects under the new mayor. There is a municipal commitment to conciliate openness and Big Data in Montréal's approved proposition for the *Smart Cities Challenge*, with several references having been made to transparency and open data, which finds resonance with the data analytics projects in development in the city hall. The technical preference for open software

[1512] *Lei nº 12.527, de 18 de novembro de 2011*.
[1513] I was right there, moving between external meetings with other cities and internal meetings with city departments and (angry) officials. It was one of the most exhausting activities in my professional life.
[1514] The municipal regulation of the LAI in Rio: *Decreto municipal nº 35.606 de 15 de maio de 2012*.

guiding the Big Data team may bring opportunities for other open policies—*sharing software and methods* with other cities may help to safeguard them from untimely political changes.

There is no legislation regarding access to information that can guarantee the compliance—there is much place for interpretation in each municipality and city department—or the fulfillment of the increasing expectations of straightforward download of public data in digital format. Still, governments in Canada have been dealing with mirrored legislation of freedom of information and personal data protection since the 1980s.[1515] So, the experiences and technologies accumulated over time should have improved the administrative procedures and decreased the delays for an adequate exercise of the rights that depend on such freedom. If a person looks for data that is not yet accessible in the open data portal, access to information in Montréal does not differ much from other Canadian cities. For building a democratic culture of urban participation, transparency based on open data is not enough: better techno-legal mechanisms are needed for easier, faster and cheaper access to *collective-and-personal* connected data that contextualizes and engages people by implicating them.

The second variable of intelligibility, *participation*, is umbilically dependent on transparency, with which it forms a feedback loop in several aspects including the legal one(s), but they should not to be confused. Also called *civic engagement* by many, participation is the most postmodern variable under analysis because it is the most related to the principle of community—in contrast with the most modern transparency, first colonized by the principle of state and then *weaponized* by the principle of market—and resistant to (neoliberal) business-oriented projects trying to be sold as “people-centric” smart cities. Contradictory in/to dominant

[1515] For the Government of Canada, see: Access to Information Act, RSC 1985, c A-1; Privacy Act, RSC 1985, c P-21. For the Government of Québec and municipalties in Québec, see: *Loi sur l'accès aux documents des organismes publics et sur la protection des renseignements personnels*, RLRQ c A-2.1.

smart models, it also disputes the post-democratic senses of state and law (*Figures 69 to 72*).

Participatory crowdsensing, e-participation, and direct digital democracy are some of the forms that public policies of participation can take in smart cities. Multiple and diverse online tools (with an emphasis on social networks and web portals) are currently implemented for consultation programs that are promised to citizens with much enthusiasm and, later, can generate much frustration. Technology-driven solutions facilitate communication, awareness, and collaboration practises, but they are not “the solution” to approaching the urban problems which require active democratic engagement to promote social change. The specific role of legal frameworks in smart cities could be supporting the participation of communities in critical decision-making processes and empowering the digital literacy of its citizens.

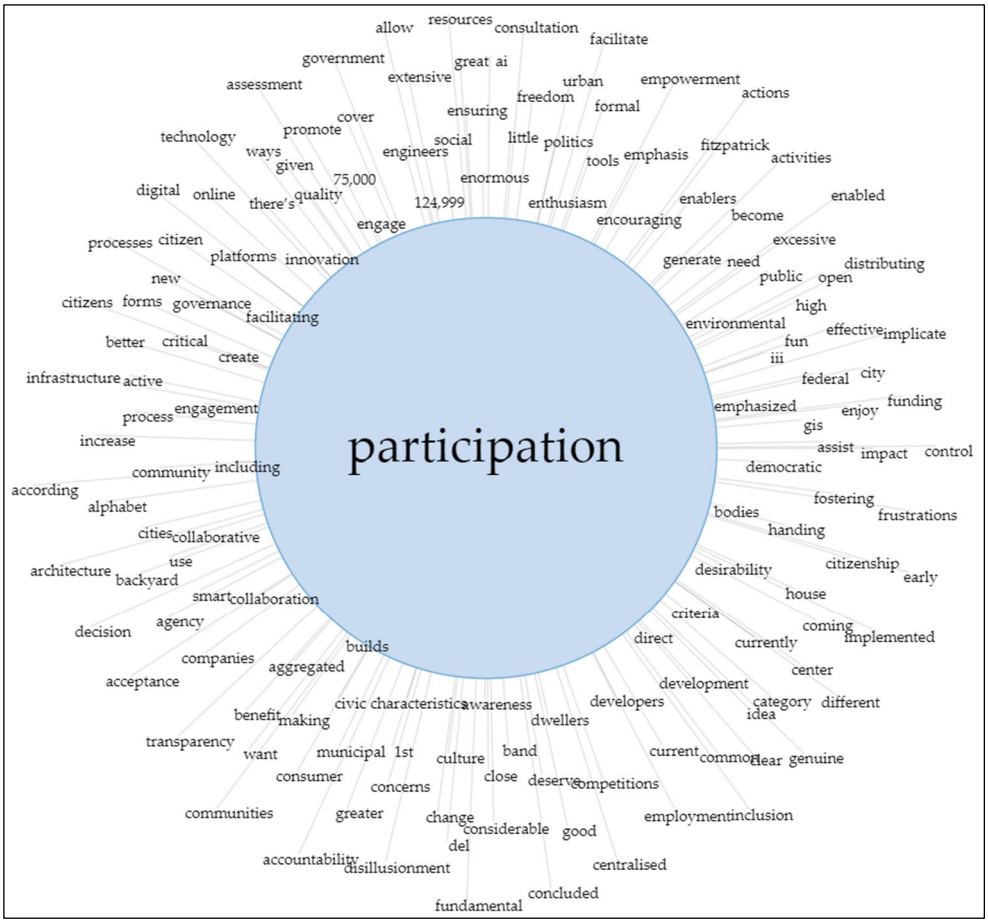


Figure 69: Main links of the term *participation* in *Websites*, using *Voyant Tools*

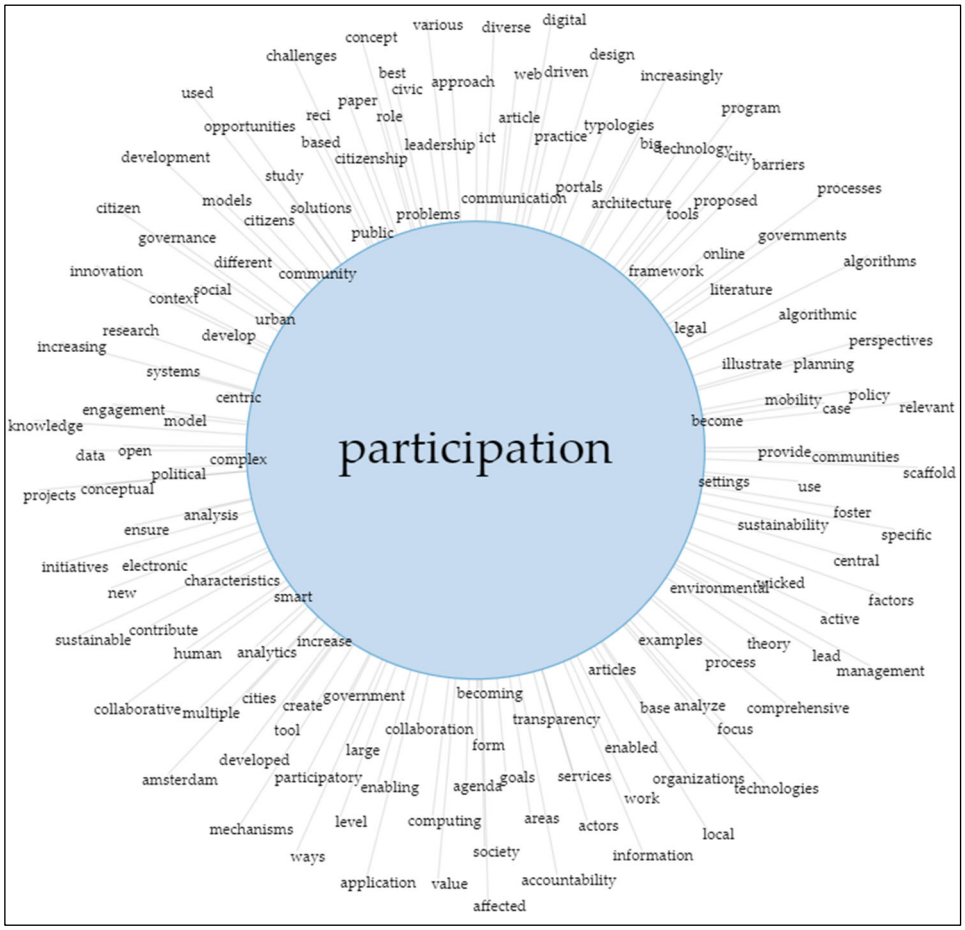


Figure 70: Main links of the term *participation* in *Academic Publications*, using *Sketch Engine*

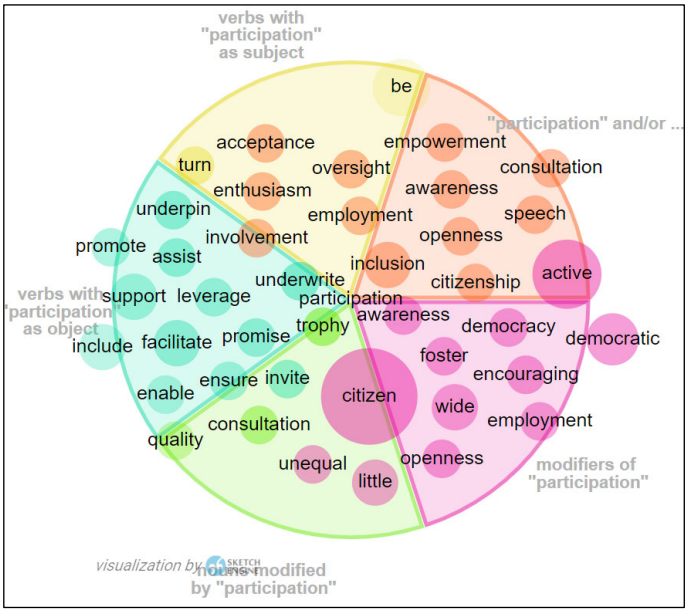


Figure 71: Main correlations of the term *participation* in *Websites*, using *Sketch Engine*

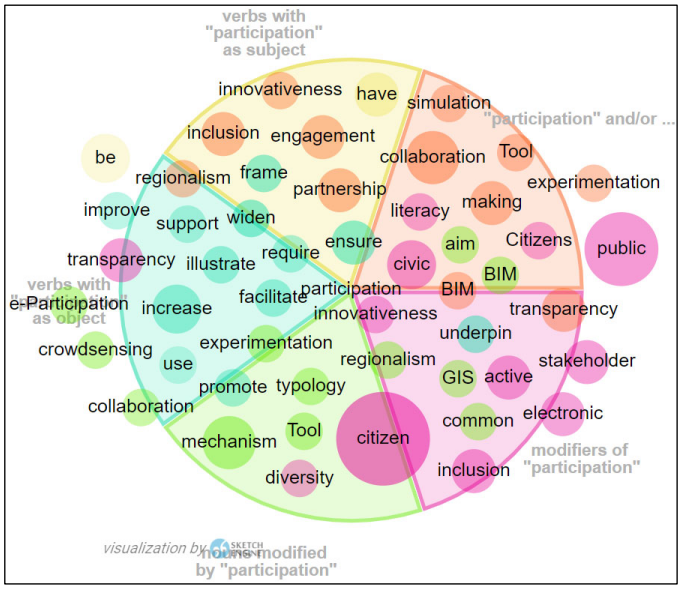


Figure 72: Main correlations of the term *participation* in *Academic Publications*, using *Sketch Engine*

Even when successfully protecting personal data, securing systems and opening data, urban analytics projects might lead to dangerous consequences for participation that democratic states governed by the rule of law are supposed to avoid. The sophistication of detailed numbers and the beauty of well-designed visualizations from urban data processed by Big Data can lead to presumptions that consulting the population for evaluations and decisions would no longer be necessary beyond the (minimal) requirements of law. In a contrary sense, one of the first activities of Rio's PENSA was hosting the *Hackathon 1746,* providing access to municipal databases for more than 80 developers. The creativity empowered by the advanced IT skills of the collectivity of programmers inspired several projects that were later pursued by PENSA. Unfortunately, participation projects are the most fragile of all public policies for smart cities, and the event was discontinued, as well as the participation projects conducted by the *Lab.Rio*.

Participatory processes in Brazilian municipalities should not be fully dependent on political will, according to the law. For example, the federal law which established the *City Statute* determines a *democratic management through the participation of the population* (*Estatuto da*

Cidade, art 2º, II), [1516] including the decisions related to the municipal budget (art 44) and PPPs (art. 32) with a *mandatory and significant participation* (art 45). Even with more legislation like this one and the debates on participation by Urban Law scholars and practitioners—not forgetting urban social movements and urbanists—participation policies in Brazilian smart cities seem to move more toward semi-passive crowdsensing apps than to active democratic engagements.

The proposition of a *smart Montréal* came from political will, no doubt about it, but the debut of the project was marked by several rounds of public consultation, and the city hall would incorporate participation as a principle and a practice for it. Conciliating online platforms and "offline meetings," Montréal also promoted public events like hackathons, and city officials have debated the risks associated with privacy in urban analytics long before the city hall started to really engage in it. The Big Data projects developing in Montréal are still more referred to in general than exposed in detail. Consequently, the lack of awareness about the existence of these projects hinders collaboration with urban communities for their realization. Participation policies may be fragile, but they build networks of people, institutions and ideas which can be strong. Such connections may have helped Montréal to win the Canadian smart city competition, with a final proposition which repeats the terms *participation* and *engagement* dozens of times.

What could be seen as a commitment from a political mandate, finds coherence within the applicable legislation of Québec. The French-Canadian province adopted a law to normalize the functioning of urban areas in 1903, *la Loi sur les cités et villes*,[1517] which is the legal basis for cities like Montréal (most municipalities are under another provincial law).[1518] This law has been signicantly modified to foster local democracy and it needs to be interpreted in conjunction with

[1516] *Lei nº 10.257, de 10 de julho de 2001.*
[1517] *Loi sur les cités et villes*, RLRQ c C-19.
[1518] *Code municipal du Québec*, RLRQ c C-27.1.

other laws and local policies(e.g., elections and referendums)[1519]. A more recent law, known as *Projet de loi nº 122*,[1520] dedicates a whole chapter (Chapitre II.2) to the adoption of public participation policies for decision-making in municipalities. These legal provisions are in line with several references to participation in the *Charter of Ville de Montréal*,[1521] which created a *public consultation office* (Division IX) and *la Charte montréalaise des droits et responsabilités,*[1522] a ground-breaking charter of rights. Montréal has served as an inspiration to the legal imagination on urban participation, and there are reasons to believe that its regulatory innovations might keep up with its smart projects to inspire more democratic smart cities.

For Brazilians and Canadians consulting this dissertation, more detailed information about legislation on the variables of the intelligibility axis can be found in the bibliography.[1523] The research invested considerable time in reviewing legislation because it is a part of normativity and takes a significative part of the legal imaginary, but the dissertation was never intended to delve into the (many) laws applicable to smart city projects. Even so, it can serve as a pragmatic departing point for legal researchers looking for primary sources of law in the Brazilian and Canadian contexts because all of those references to legislation could not be found in just one document during the doctoral studies for this dissertation. The legal references in the next subchapter on the variables of compliancy complete the scenario for this exercise on Big Data projects for smart cities which may be useful for other diverse approaches.

[1519] *Loi sur les élections et les référendums dans les municipalités*, RLRQ c E-2.2.
[1520] *Loi visant principalement à reconnaître que les municipalités sont des gouvernements de proximité et à augmenter à ce titre leur autonomie et leurs pouvoirs,* LQ 2017, c 13.
[1521] *Charte de la Ville de Montréal, métropole du Québec*, RLRQ c C-11.4.
[1522] Ville de Montréal, By-law Nº. 5-56, *Charte montréalaise des droits et responsabilités* (June 20, 2005).
[1523] *See*: Commission de l'éthique en science et en technologie, *supra* note 1485; Schreiner, *supra* note 1374; Lauriault, Bloom & Landry, *supra* note 1472; *Local transparency in Brazil: evaluating compliance with the access to information law in the states and largest cities*, by Gregory Michener (Rio de Janeiro: FGV Rio & Open Society Foundations, 2016); *Case study: open government data in Rio de Janeiro City*, by Ricardo Matheus & Manuella Maia Ribeiro (ODDC, 2014); *Canada's Smart Cities Challenge: Final Application by the City of Montréal*, by Ville de Montréal (Ville de Montréal, 2018).

3.2.3.3. The Compliancy Axis – Variables of Accountability and Governance

The third axis of legal approach on smart cities was incidentally developed during the first year of research, dissolving the image of the modern scale of law that sets a supposed opposition between opacity and intelligibility—privacy versus transparency, security versus participation—and morphs them into a postmodern network of legal possibilities. The axis of compliancy gathers the variables of accountability and governance, which are connected to all the variables of the previous axes. Instead of a simple and homogeneous instrument with a seal of modern science for *measuring the law*,[1524] the research opted for (arduous) coherence with the paradigmatic transition that points to the construction of prudent knowledge as a complex and heterogeneous process.[1525] Modern law is associated with the massive ancient construction of the pyramid—even if, in fact, it is drawn and explained as a big, simple triangle—that could not provide the extra dimensions needed for the analysis of this research: the axis of compliancy brings a transversal dimension of a network-based law to accomplish it.

One of the best examples of the ongoing process of networked law is *accountability*, the most underdeveloped variable of legal analysis on smart cities. Despite the constant presence of the term *accountability* in smart city discourses and in the legal imaginary built on them, accountability still seems to perform more secondary functions in narratives than practical effects in compliance to laws. This variable may appear to be as a utilitarian element in political statements and articles in the mass media, but it becomes even less relevant in academic papers, with a lot less literature dedicated to the topic. When compared to the other interconnected variables, it seems easy to confirm that there is much work to be done and that there is a need to research the topic further, as can be seen in *Figures 73 to 76*.

[1524] By a dominant notion of law that sees it as deterministic, mechanical, divisible and rigorous.
[1525] By a transitional approach to law that feels it as unpredictable, fluid, interconnected, and creative.

Accountability engages with public policies of privacy, cyber security, transparency, and participation, bringing all their blurred values to the core of the administrative duties of smart cities. Many factors of accountability need to be attended to in order to remediate (or at least contain) the dangerous chains of consequences that can emerge from those policies. Smart cities present new technocratic forms to deliver accountability that are brought by Big Data: dashboards showing urban patterns from data analytics can improve not only the decision-making in cities, but also the auditing of costs and performances of governmental actions. Oversight, responsibility, and responsiveness are some of the accountable goals (or utopias) of smart cities.

Figure 73: Main links of the term *accountability* in *Websites*, using *Voyant Tools*

Figure 74: Main links of the term *accountability* in *Academic Publications*, using *Sketch Engine*

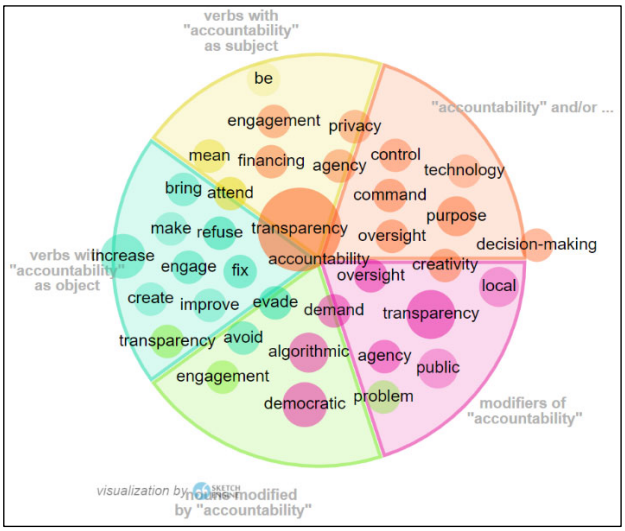


Figure 75: Main correlations of the term *accountability* in *Websites*, using *Sketch Engine*

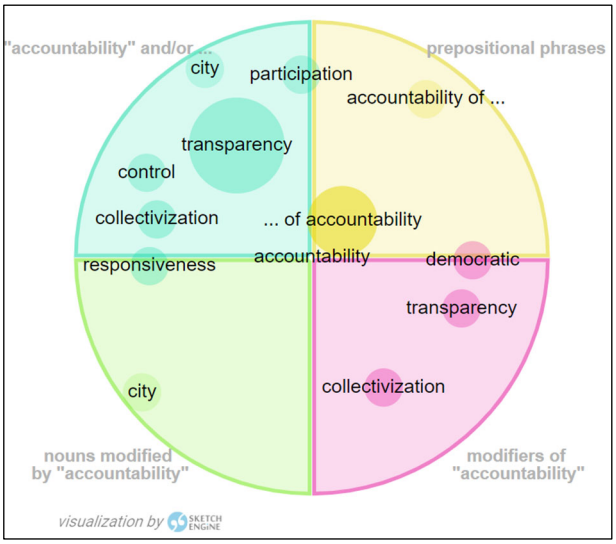


Figure 76: Main correlations of the term *accountability* in *Academic Publications*, using *Sketch Engine*

Accountability is an English term that developed meanings without any exact translations into Portuguese—despite the Latin root, it also happens in other Latin-based languages—but it is increasingly used to discuss government functions, responsibilities and ethics in Brazil. There is a dispute over the conceptions of accountability, reflecting the dispute over the conceptions of public administration; in Brazilian smart cities, the instrumental sense prevails. The imaginary of accountability in Brazilian smart cities is illustrated by municipal dashboards capable of synthesizing massive amounts of public data in real time, presenting simplified maps, accessible numbers, and informative visualizations to examine and manage the surfaces and innards of cities. Rio's NASA-style-room of COR and the well-designed presentations of PENSA form the first and lasting image of instrumental accountability for transparency and decision-making in Brazil. Unfortunately, not much was added to this image since then.

Brazilian law forms a complex web-based system of laws,[1526] institutions, and procedures for ex-post measures addressing Brazilian municipalities under a vertical sense of accountability

[1526] See: *Lei nº 4.320, de 17 de março de 1964; Lei nº 8.666, de 21 de junho de 1993; Lei nº 9.605, de 12 de fevereiro de 1998; Lei complementar nº 101, de 4 de maio de 2000; Lei nº 12.232, de 29 de abril de 2010; Lei nº 12.846, de 1º de agosto de 2013; Lei nº 13.019, de 31 de julho de 2014*.

as a process. Corruption is the main legal concern for accountability in Brazil, and the compliance of transparency practises are taken as a major ex-ante mechanism for it. A municipal law Rio de Janeiro was approved for increasing the transparency in contracts with non-profit organizations,[1527] one of the most challenging vectors for accountability. Such law was not inspired by Rio's COR or PENSA, but since smart city projects are usually part of partnerships with civil organizations, universities and private companies, public policies of accountability should be taken as a priority for ex-ante actions beyond municipal dashboards.

The experience of Montréal with accountability and corruption—two of its former mayors stepped down in the midst of corruption scandals—could teach some lessons of accountability to the Brazilian context, especially, the lesson of compatibility between transparency and personal data protection. Keeping political leaders, city officials, and public contracts under scrutiny while preserving the fundamental right to privacy is not only possible, but required for horizontal accountability in municipalities. Principles of accountability have been present since the first drafts of the smart city plan, notably in policies of transparency and participation, and the technical precautions in the Big Data projects underline them for privacy and security.

As was implied before, cities with smart projects usually claim to be accountable organizations, and several laws are set to call for their responsibility. The bigger the cities are, the bigger the possibilities and consequences which they will have to bear in terms of civil liability.[1528] The responsibility of taking care of digital infrastructure and municipal data includes calling for criminal law whenever necessary, including possible cases of corporate liability.[1529] In the case of Montréal, procurement and public contracts involve a lot of accountability to

[1527] *Lei municipal 6.048, de 2 de março de 2016.*
[1528] Adding to the dispositions in *Loi sur les cites et les villes* and *LADOPPRP*, see: *Code civil du Québec*, RLRQ c CCQ-1991.
[1529] Criminal Code, RSC 1985, c C-46.

comply,[1530] and as an innovative city, it will often face more challenges than municipal regulation can attend.[1531] Finally, even if counting on a vast regulatory arsenal related to accountability, Montréal should not be satisfied because the city cannot be satisfied if its Big Data projects are simply in accordance with legislation: when urban experiments go wrong, (prudent) ex-ante policies may come in too late to avoid (painful) ex-post measures.

Innovation in cities is prone to producing unexpected results beyond pessimistic expectations, but it is not necessarily due to “bad” techno-urban solutions or “hidden” neoliberal agendas. As is rephrased *ad nauseam* in all chapters, modern science and technology have great power to transform the world, but it is not matched by their poor capacity of previewing the consequences of their transformations. In order to provide the expected compliance to the variables in the previous axes (including the transversal accountability), the rule of law needs to leave the modern role of *the second best* (or, in too many cases, *the henchman)* guided by the hyperscientificization of emancipation and the hypermarketization of regulation. To this end, the variable of governance may be up to the job. Maybe.

Governance is the most diffuse of all the research variables presented here, and it is the only variable to show up in the collocations of the five previous variables.[1532] Governance is not exactly a legal term—postmodern law does not need any more claims of *legal purity,* anyway—but it represents ideals and practices of concertation that a networked conception of law can put to good use for smart cities. In consonance with the presented variables, governance can bring more legal elements (e.g., intellectual property, environmental law) and public policies to the table of discussion and negotiation for the cities of the near future (*Figures 77 to 80*).

[1530] *Loi sur les contrats des organismes publics*, RLRQ c C-65.1.
[1531] *Loi sur les compétences municipales*, RLRQ c C-47.1, art 85.
[1532] You may go back some pages to look for *governance* into the visualizations. Or just trust me.

Figure 77: Main links of the term *governance* in *Websites*, using *Voyant Tools*

Figure 78: Main links of the term *governance* in *Academic Publications*, using *Voyant Tools*

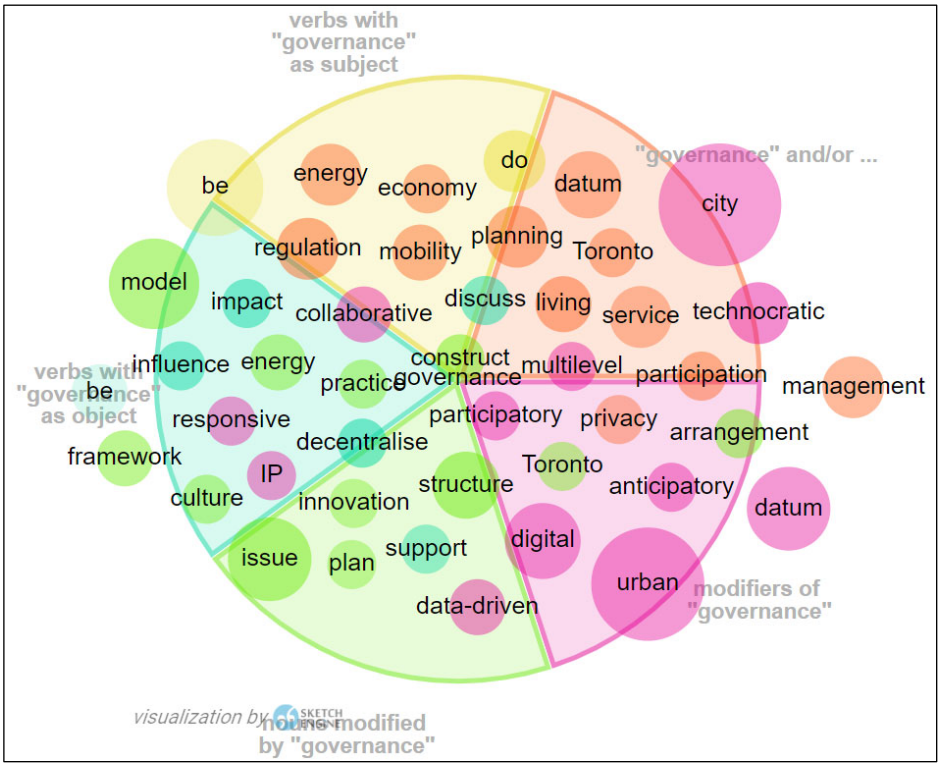


Figure 79: Main correlations of the term *governance* in *Websites*, using *Sketch Engine*

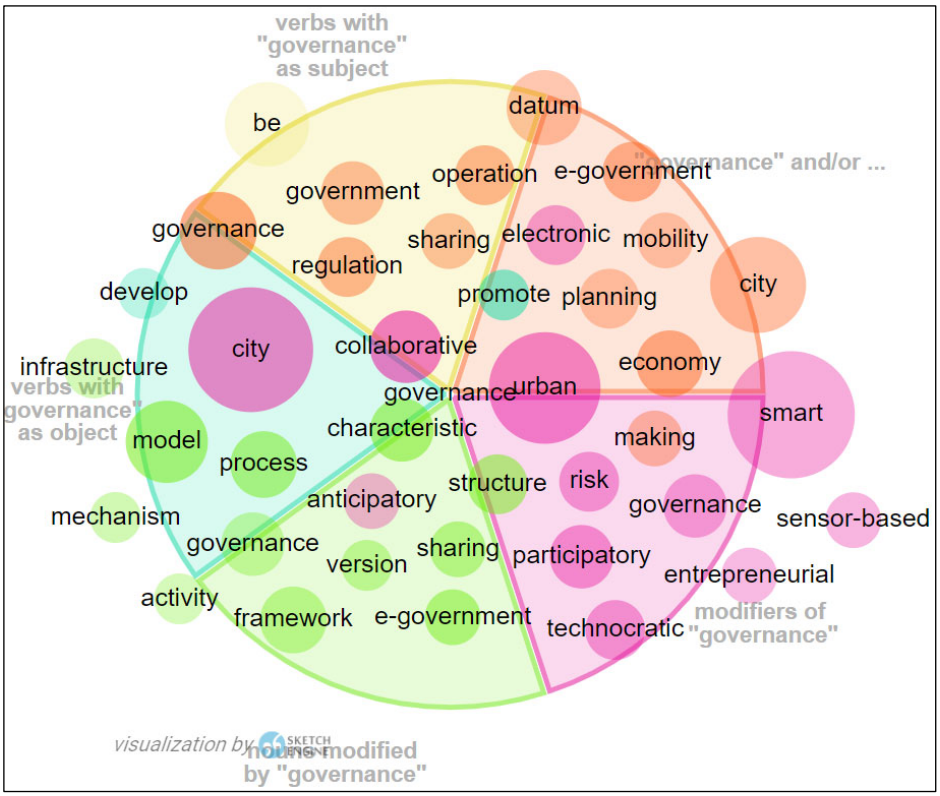


Figure 80: Main correlations of the term *governance* in *Academic Publications*, using *Sketch Engine*

Governance is a multilevel concept that can capture most technical aspects, urban complexities, and social concerns of smart cities. Including governance in the research framework to discuss its key issues (privacy, security, open data, engagement) enabled critical perspectives and new approaches for compliance. Understanding the technocratic, entrepreneurial, and collaborative views on "smart governance" is the best way to set the smart cities models in context, present their outcomes, and project their risks.

Governance is a very popular term for smart cities—it appears hundreds of times in the research data mining—with wide-open definitions that admit distinct views and practices, while also allowing communication and collaboration between them. Such a "clash" of perspectives was present in the governance of the smart projects of Rio de Janeiro, during which the Mayor was presented as an *efficiency-driven CEO* to city officials, a *social visionary* to IT corporations, and a *democratic partner* to civic movements. These *tailored-to-the-customer* narratives incorporated and centralized by Rio's Mayor were reflected in the governance of its smart initiatives, including the Big Data approaches to decision-making, living up to the model inspired and symbolized by New York. Unfortunately, the abrupt end of PENSA precludes observations about the longer-term sustainability of its potentially conflicting instances of governance.

The legal aspects of data analytics projects in municipalities can vary a lot according to the city departments involved—as software developers and (good) lawyers refine customizations to each demand—but *data governance* can be used as a common denominator between them. This transversal variable can deal with one of the most difficult (and often neglected until it is too late) elements of negotiation in public contracts and PPPs: the ownership and sharing of the smart city data. The intellectual property (IP) aspects of *fully in-house projects* are easier to frame, for example, for figuring the ownership of software in Brazilian law.[1533] But in some of

[1533] *Lei nº 9.609, de 19 de fevereiro de 1998*.

PENSA famous cases involving databases from private companies, as in the case of the partnership with Waze, some considerations about the applicable legislation on copyright[1534] (and even consumer law in relation to the users of the Waze app)[1535] need to be involved, which encompasses many concerns of the previous axes of opacity and intelligibility but can go beyond them as well. Drawing clear IP limits in the quicksand of partnerships with IT corporations is neither a simple nor a short-time task, therefore, the choice for a lawyer to lead PENSA may have been useful for it.

While Rio de Janeiro had a centralized model of governance for the smart initiatives, Montréal has (kept) a more decentralized model: a city councillor is the responsible for the smart city projects and the public voice to communicate them to the public; an administrative structure promotes and connects the smart initiatives that are spread in the city hall, keeping some projects of its own; and several city departments develop their specific projects, according to the mayor's office's guidelines and to authorized plans and budgets. It is a more flexible and adaptable governance model, closer to the business units, and thus demands more coordination efforts. So far, the governance narratives in Montréal's smart initiatives have been more in line with the models of *data sovereignty* that are led by Barcelona and Amsterdam, in sharp contrast to what happens in the corporate-led model in the Waterfront Toronto project.

The illustrious corporative experiment of Toronto has collaborated to qualify the public debate on data governance for smart cities, with major contributions from Canadian scholars on the IP aspects involved in the project, the importance fo which goes beyond Canadian borders. Montréal has been involved in partnerships with (small and big) IT companies, thereby it should pay close attention to this debate that is not restricted to the compliance of the same applicable

[1534] *Lei nº 9.610, de 19 de fevereiro de 1998*.
[1535] *Lei nº 8.078, de 11 de setembro de 1990.*

legislation,[1536] but the several other sociolegal dimensions that data governance can imply. A smarter governance for Montréal, if the city resists to the aegis of the post-democratic agenda, would be not be restricted to protecting the *status quo* from the challenges and risks of the technocratic city of the near future. Montréal has the opportunity to contribute in amplifying the debate for the promotion of fundamental rights that will engage other areas of Canadian law, such as consumer law,[1537] competition law,[1538] and, notably, environmental policies—after all, cities are envisioned to lead the necessary efforts to face the environmental crisis.

Accountability and governance cross all legal areas involving smart cities. Consequently, all the references in the two previous subchapters are applicable. Additional information guiding this subchapter can be found in the bibliography,[1539] with the strong recommendation to visit the website of the *Samuelson-Glushko Canadian Internet Policy and Public Interest Clinic* (CIPPIC).[1540] Much of the initial information and continuous inspiration were taken from the CIPPIC project on smart cities in partnership with OpenNorth, an organization that produced highly valuable reports that were also referred in this subchapter.[1541]

The next subchapter takes much from what was explored in the subchapters 3.1. and 3.2. for the third approach in the research. It explores topics of legal relevance that were identified by keywords that emerged in the data analytics experiment, but that did not fit in the usual legal terms and approaches that were developed in this closing subchapter. The third subchapter combines texts from science, law, and literature and takes them for a (centripetal) spin.

[1536] Ranging in several IP subjects: Copyright Act, RSC 1985, c C-42; Patent Act, RSC 1985, c P-4; Trademarks Act, RSC, 1985, c T-13.
[1537] For cities in the province of Québec: *Loi sur la protection du consommateur*, RLRQ c P-40.1
[1538] Competition Act , RSC, 1985, c C-34.
[1539] Bruno Paschoal & Kai Wegrich, “Urban governance innovations in Rio de Janeiro: The political management of digital innovations” (2019) 41:1 Journal of Urban Affairs 117–134.
[1540] David Fewer, “Open Smart Cities”, (November 2017), online: *CIPPIC* <http://bit.ly/SeeCIPPICSmartCities>.
[1541] I would like to dedicate a special thanks to the CIPPIC and OpenNorth teams. Keep up the good work!

3.3. The Law in the Science Fiction City is Here(about) and Now(here)

Many methods have been given (more than) a try over the course of the doctoral research for understanding and *turning the table* of contents. A pure-positivist legal approach was the first attempt to be discarded because it lacked the minimum content for performing the full task even at its very end, although positivist law has always been set on the horizon for reference and direction. Information technologies and their associated hard sciences were kept as companions on the road since the beginning, but they could not accumulate the critical mass required to fill the legal voids. Social sciences, urbanism, communication, and digital studies provided crucial contextualization and interpretation—much needed for the readings of numerous media and corporative publications—yet their tools and theories did not seem to provide the issue-driven guidance for the normative practices and institutional needs of law. Finally, it was in the association of law and literature that this research found an integrative method for composing all those elements on the table, with science fiction as a key factor (of hearts and minds) suited to mobilize law. This is the main task in this dissertation from this point to the end of it.

The chapter of literature review started with a wide contextualization of smart cities using news from (traditional and new) media before moving to an extensive analysis of its elements through relevant scientific publications on the subject. Then, in the third stage of a cumulative process, it revised contributions for legal issues from several researchers, including legal scholars. Some publications that could figure in the literature review were left for later, for a last experiment in this chapter, once they were identified by the text mining process. These publications were left to combine scientific and legal approaches with a literary approach, more specifically, for interfacing elements from *cyberpunk science fiction*.

The aforementioned publications include works from legal scholars on smart cities, all published during the doctoral period, which provided normative substance to move on to an

ambitious (and more pleasing, even if riskier) research stage. This last stage makes use of the previous efforts by composing the diversity identified in the text mining process and presented in the literature review, with topics and approaches of a legal nature explored in the previous subchapter, and with possible contributions from the cyberpunk canon in science fiction.

This is the closing part of this chapter dedicated to experimenting and presenting different ways of exploring the legal imaginary of smart cities. The first chapter laid a theoretical foundation for all experiments in the research, including the challenge of bringing the aesthetic-expressive rationality and the principle of community—here represented by science fiction literature and its respective community of authors and readers—to promote a *reenchantment* of law toward emancipation. The second chapter presented a broad view on the possible elements composing the imaginary of smart cities—with an emphasis on its legal dimension—meaning that many topics will not be revisited here because they are already implied. The third chapter has started by explaining the mining process for bringing the subject topics to the surface of the research, adding a textual element for the second subchapter. It was followed by analysis of public policies in two smart city projects for an exercise of speculation about their sociolegal issues. This last part is a cumulative exercise, gathering pieces of the previous parts to move beyond them.

The first part of this subchapter is dedicated to coupling legal analysis and cyberpunk elements, as well social and urban studies with cyberpunk works, laying the ground for the major part that follows. The second part combines different but convergent contributions from science, law, and literature that might contribute to the imaginary of smart cities.

This *triple helix* approach could seem to be innovation (and a risk) for a dissertation. This has been done for a long time in academia, however, including in *law & technology*. Although it may seem fair that all these elements could work together for the subject, the literature review on smart cities has not identified any similar attempt. So, it seemed a good time to give it a try.

3.3.1 The Sci-Fi City as a Scenario for Legal, Urban, and Social Theories

How can science fiction and the cyberpunk genre could be useful for science and law? Regarding *hard* sciences, there are some passages in this dissertation pointing out how much science fiction inspires scientists for the development of technologies, and cyberpunk is no less influential.[1542] In the case of social sciences, urban studies and humanities in general, there is an extensive bibliography available—over 24,000 results[1543] on a simple search on Google Scholar—but it should be advised that any "relationship between cyberpunk literature and social theory is, if anything, recursive,"[1544] after all, they exchange a lot. For law, it is no different.

In the case of legal theory, according to James Boyle, professor at Duke University School of Law, cyberpunk novels have offered much in terms of conceptual insight:

> Sadly for academics, the best social theorists of the information age are still science fiction writers, and in particular cyberpunks—the originators of the phrase "cyberspace" and the premier fantasists of the Net. If one wants to understand the information age, this is a good place to start.[1545]

In 1996, Walter A. Effross, professor at the Washington College of Law, published the first of two articles examining the ways in which cyberpunk could identify legal concerns arising from digital technologies and their social deployments. In "Piracy, Privacy, and Privatization: Fictional and Legal Approaches to the Electronic Future of Cash,"[1546] Effross explains the cyberpunk canon of replacing traditional forms of currency (bills, coins, cheques) for "a panoply of exotic payment mechanisms such as "'bearer chips', 'credit chips,' 'bearer cards,' debit cards,

[1542] Pat Cadigan, "How Cyberpunk lit influenced technology", (12 March 2001), online: *The Register* <https://www.theregister.co.uk/2001/03/12/how_cyberpunk_lit_influenced_technology/>.
[1543] Give it a try. It is available at: http://bit.ly/CyberpunkOnGoogleScholar.
[1544] Roger Burrows, "Cyberpunk as social theory: William Gibson and the sociological imagination" (1997) Imagining Cities: Scripts, Signs Memory London, UK: Rouiledge 235–248 at 238.
[1545] James Boyle, "A Politics of Intellectual Property: Environmentalism for the Net?" (1997) 47:1 Duke Law Journal 87–116 at 88.
[1546] Walter A Effross, "Piracy, Privacy, and Privatization: Fictional and Legal Approaches to the Electronic Future of Cash" (1996) 46 Am UL rev 961.

'credit disks,' 'cash cards,' and 'credit transactors'"[1547] that could be found in the works of authors such as Pat Cadigan, William Gibson, Richard Paul Russo, Melissa Scott, Lisa Mason, and others. Their cyberpunk novels portray difficulties for balancing rules and standards, perceptions of legal ambiguity for users that could emerge "[a]s today's payments technology nears that of science fiction,"[1548] offering cautionary visions for government authorities and legal scholars.

In a second article, "High-Tech Heroes, Virtual Villains, and Jacked-In Justice: Visions of Law and Lawyers in Cyberpunk Science Fiction Focus on Cyberlaw,"[1549] Effross examines how cyberpunk science fiction describes the possible roles of lawyers in an increasingly corporation-dominated society with huge economic and political powers capable of controlling and overthrowing governments. William Gibson, Neal Stephenson, Bruce Sterling and other cyberpunk authors "reduced the legal fiction of the corporation not to its physical facilities or its employees but to the information that it controlled."[1550] The main asset of the global corporations in cyberpunk is information, and that information is power. Therefore, the control of the intellectual property of massive data provides immense resources and power for enabling "megacorporations in cyberpunk fiction to obtain their version of 'justice' through the law, despite the law, and in place of the law."[1551] Any resemblance to the political, socioeconomic and legal scenarios written in the (nineteen) eighties to the realities of the late (twenty) teens will not be mere resemblance, as this legal scholar realized before the rise of corporations such as Google, Facebook, and Amazon, as well as their foreign tax havens beyond the reach of national law.

By the turn of the century, other legal authors and works were harvesting the power of

[1547] *Ibid* at 963.
[1548] *Ibid* at 695.
[1549] Walter A Effross, "High-Tech Heroes, Virtual Villains, and Jacked-In Justice: Visions of Law and Lawyers in Cyberpunk Science Fiction Focus on Cyberlaw" (1997) 45:3 Buff L Rev 931–974.
[1550] *Ibid* at 940.
[1551] *Ibid* at 946.

(cyberpunk) science fiction to expand the understanding of law through literature, as well as to expand the audience for the *law and literature movement*. In "New Possibilities Symposium: Law, Lecture, and Science Fiction,"[1552] by Bruce L. Rockwood, cyberpunk writers are referred to as those seeing a future of amoral dystopia where the poverty of the "Third World" is everywhere and collapses the "American dream." Thus, it is not surprising that the legal scholar states that SF explores "what is wrong with many possible futures and the institutions, laws, rhetoric and trends that appear to be taking us towards them all too swiftly."[1553]

Despite the usual association with themes of the present and future, in "Lyres against the Law: Orpheus as Cyberpunk Outlaw,"[1554] William Pencak identifies the classic figure of the Greek mythological hero with the recurrent model of the postmodern cyberpunk hero. Gibson's *Neuromancer*, the best cradle of the *noir-hacker-hero*, is recognized as a *masterpiece* by the Pencak and, despite admitting that not all science fiction can boast the same quality, he sees cyberpunk as an expression and exploration of persistent human problems and aspirations that belong to a literary tradition stretching back to the ancient world:

> To be sure, much science fiction does not reach these philosophical heights. We are deluged with inferior material. To be pretentiously theoretical—which may satisfy some literary critics that science fiction is indeed a form of literature worthy of intellectual attention—science fiction is both social commentary and meta-myth, the conscious meditation of writers and film-makers on the relevance of mythology and history for the contemporary world.[1555]

The references and constructions of a *cyberpunk mythology* have continued to appear in the legal scholarship—even if only in an accessory way—more than 35 years after the first publication of *Neuromancer*, in part because this subgenre is still influencing the scientific

[1552] Rockwood, *supra* note 274.
[1553] *Ibid* at 278.
[1554] William Pencak, "Lyres against the Law: Orpheus as Cyberpunk Outlaw Symposium: Law, Lecture, and Science Fiction" (1999) 3 Legal Stud F 293–314.
[1555] *Ibid* at 294.

community and being transformed into new media narratives in cinema, comics, and games to discuss techno-social issues. In return, law scholars have been using these updated inputs and renewed media to advance the debates about regulation for technology. For example, in "From Cyberpunk to Regulation: Digitised Memories as Personal and Sensitive Data within the EU Data Protection Law,"[1556] Krzysztof Garstka uses the typical worldbuilding of a cyberpunk game to "shed a futuristic light on the GDPR."[1557] The choice of the author is due this belief that the *omnipresent network* in cyberpunk, which seemed odd by the times of the pre-commercial Internet, still points beyond what there is today, and might be useful for legal scholarship:

> Among the various genres of science-fiction, the one represented by Gibson is probably the most deserving of IT lawyers' attention. This genre is called cyberpunk and revolves around the visions of a not-so-distant, dystopian, urban future where technology permeates every aspect of human life (not necessarily making it better) and where corporations hold much of the real power in the world. The impact of information technology on both society and the individual often plays a key, underlying role in many cyberpunk novels.

Cyberpunk is still relevant to academia, while it may seem that a majority of voices keep claiming that "cyberpunk is dead," transmuted, on the margins, or simply everywhere.[1558] Privacy and security online, all-powerful tech corporations, systems designed to "fail" for the poor: "the themes of the cyberpunk classics are the vital issues of 2012" and are even more vital years later.[1559] The urban utopias and dystopias speculated by science fiction, which served as inspiration for scientists and urban policies in smart cities,[1560] are being put to test in urban

[1556] Krzysztof Garstka, "From Cyberpunk to Regulation - Digitised Memories as Personal and Sensitive Data within the EU Data Protection Law" (2017) 4 J Intell Prop Info Tech & Elec Com L 293–303.
[1557] *Ibid* at 4.
[1558] Kathryn Allan, "On the Margins, Cyberpunk lives!", (8 September 2011), online: *Academic Editing Canada* <https://www.academiceditingcanada.ca/blog/item/71-cyberpunk-lives>.
[1559] Claire L Evans, "What Happened to Cyberpunk?", (8 June 2012), online: *Vice* <https://www.vice.com/en_us/article/d7734j/what-happened-to-cyberpunk--2>.
[1560] Annalee Newitz, "The Dystopian City and Urban Policy" *Slate* (24 September 2014), online: <http://www.slate.com/articles/technology/future_tense/2014/09/dystopian_city_and_urban_policy_city_planners_should_read_more_sci_fi.html>.

experiments in the present *cyberpunk times*, despite all their warnings.[1561] Dystopias (having been put) aside, cyberpunk is no longer considered just SF, but design theory taken (too) seriously by tech corporations that have been taking their fantastic themes into the reality of streets and the virtuality of networks.[1562] The *cyberpunk city* is well known "since it was first constructed in the 80s by the pioneers of cyberpunk, most notably William Gibson in Neuromancer and Ridley Scott in Blade Runner":[1563] the degraded high-tech city set in a post-national and globalized society, which favours the interests of the tiny elite of super-rich and follows each step of the gargantuan majority of poorer populace. Unfortunately, this city seems to be here to stay, but can hopefully be changed.

More than in law, cyberpunk has for long been used in urban studies. In "The Future of the Future in Planning: Appropriating Cyberpunk Visions of the City,"[1564] the authors explore the urban spaces in cyberpunk writing, their association with social theories, and possible roles in the planning for utopian constructions. The dystopian anticipations of cyberpunk reinterpret "[h]ow already identifiable socioeconomic and technological tendencies could aggregate,"[1565] and reassess the once utopian-like perspectives of the *information age* that was about to come into existence. There is a close relationship between cyberpunk and social theory, forming a *feedback loop*, where innovative concepts from urbanists influenced the writings of cyberpunk authors, who would later expressly influence urbanist publications that, in their turn, would use

[1561] Klint Finley, "Tech Time Warp of the Week: Cyberpunk's Not Dead. In Fact, We're Living It" *Wired* (27 June 2015), online: <https://www.wired.com/2015/06/tech-time-warp-week-cyberpunks-not-dead-fact-living/>.
[1562] John Brownlee, "Cyberpunk isn't just sci-fi — it's Silicon Valley's design theory", (21 December 2017), online: *The Next Web* <https://thenextweb.com/syndication/2017/12/21/cyberpunk-isnt-just-sci-fi-silicon-valleys-design-theory/>.
[1563] Paul Walker-Emig, "Neon and corporate dystopias: why does cyberpunk refuse to move on?", *The Guardian* (16 October 2018), online: <https://www.theguardian.com/games/2018/oct/16/neon-corporate-dystopias-why-does-cyberpunk-refuse-move-on>.
[1564] Robert Warren et al, "The Future of the Future in Planning: Appropriating Cyberpunk Visions of the City" (1998) 18:1 Journal of Planning Education and Research 49–60.
[1565] *Ibid* at 49.

cyberpunk to advance their initial analysis.[1566] Legal scholars (should) do no different.

In the master's thesis "Cyberpunk Visions of the Future City,"[1567] Francisca M. Rojas shows how valuable the analysis of cyberpunk fiction can be to provide cognitive space for urban designers facing the complex social impacts of new technologies. Her detailed study of the *cyberpunk city* demonstrates how the authors of "cyberpunk fiction have extrapolated the present urban condition to expose a cautionary dystopian vision of cities and urban life in the near-future,"[1568] tech-enhanced future cities characterized by urban sprawl, social exclusion, digital surveillance, and environmental degradation. The cyberpunk narrative illustrates cautionary tales of the postmodern urban condition that should be taken into account; "though admittedly based upon contemporary urban conditions, the cyberpunk future city is unlikely to materialize in its full melodramatic glory."[1569] Hopefully, it would also be valid for the legal perspective.

In similar sense, in "Science Fiction or Future Fact: Exploring Imaginative Geographies of the New Millennium,"[1570] Rob Kitchin and James Kneale agree that science fiction is a productive exercise for gazing into the future of cities, aware that it is not for predicting and warning of what cities might become, but for understanding and warning of what cities already are in the present.[1571] In order to achieve this task, the authors applied an impressive analysis of 34 novels and 4 collections of short stories of the most relevant cyberpunk writers and publications to explore the fictional visions of postmodern urbanism. Comparing these visions with "academic analyses of the sociospatial processes shaping present-day urban form and

[1566] *Ibid* at 59.
[1567] Francisca M Rojas, *Cyberpunk Visions of the Future City* (Master's thesis, Massachusetts Institute of Technology, 2000) [unpublished].
[1568] *Ibid* at 2.
[1569] *Ibid* at 105.
[1570] Rob Kitchin & James Kneale, "Science fiction or future fact? Exploring imaginative geographies of the new millennium" (2001) 25:1 Progress in Human Geography 19–35.
[1571] *Ibid* at 31.

spatiality,"[1572] Kitchin and Kneale conclude that cyberpunk provides important insights into the cities of the near future, a resource which geographers are in need of—and the same could probably be said of legal scholars and practitioners dealing with smart cities as well.

In a work published in the following year, "Lost in Space,"[1573] Kitchin and Kneale start their book by asking if there are geographies of science fiction and, right in the first line, they call to William Gibson and his trilogies for some answers. His possible answer, coded in one of his books,[1574] is "that conventional senses of geography and history are 'dead'—geography as a jigsaw puzzle made up out of discrete, bounded spaces, and history as truth rather than narrative."[1575] Despite the centrality of urban spaces to the narratives of science fiction, the authors found it surprising that geographers and other spatial theorists had not explored it much prior to the date of publication.[1576] This impression might have to change in the present times of polarizing narratives that are also reflected on science, law, and (smart) cities.

In the accessible and pleasing article "Cyberpunk Cities: Science Fiction Meets Urban Theory,"[1577] Carl Abbott explains how this specific subcategory of science fiction is embedded in urban theories and that even with all its eventual exaggerations and distortions, cyberpunk gives clues about the understandings under the surface of culture, and even in the scholarship of urban and social studies. For the author, when urbanists investigate the urban world imagined for 2030 and 2050 by cyberpunk authors, they find a familiar global economy under a growing scale of flows of goods, capital and labour centralized by a few world cities working as the communication

[1572] *Ibid* at 19.
[1573] Rob Kitchin & James Kneale, "Lost in Space" in Rob Kitchin & James Kneale, eds, *Lost in Space: Geographies of Science Fiction* (London, New York: Continuum, 2002) 1.
[1574] William Gibson, *All tomorrow's parties* (New York: Ace Books, 2000).
[1575] Kitchin & Kneale, *supra* note 1573 at 1.
[1576] *Ibid* at 9.
[1577] Carl Abbott, "Cyberpunk Cities: Science Fiction Meets Urban Theory" (2007) 27:2 Journal of Planning Education and Research 122–131.

systems of a networked society, befitting the world city theory of Sassen and the network theory of Castells.[1578] The favourite city of dystopian cyberpunk future, the beat-up "Los Angeles is commonly divided even more deeply than Saskia Sassen or Manuel Castells fear, with a protected elite, a marginalized and struggling middle, and the feral poor."[1579] Abbott presents many interesting aspects of cyberpunk cities according to many writers of the genre, all matching the challenges being faced by actual cities and influencing the public imagination about them, while also affirming that those SF images and ideas should not be taken as accurate reflections. Ultimately, the author seems to agree with a set of writers about the possibilities of local systems of civic life depending on direct participation for community-based planning, one of the most popular and challenging public policies of the smart (cyberpunk) cities of today.

In "Looking at the Present Through the Future: Science-Fiction Urbanism and Contingent and Relational Creativity,"[1580] the Irish researcher Rob Kitchin[1581] returns for a third time to intertwine the relations between cyberpunk novelists and urban theorists, as "fiction is a product of its place and time, and in some cases ideas are drawn from contemporary urban theory."[1582] The researcher dives into Gibson's works, demonstrating how cyberpunk delivers powerful social commentary by extrapolating the present into the future while also laying *techno-social blueprints* of a "near world future in which the world has been reconfigured by libertarian capitalism, globalization, and social Darwinism."[1583] The fictional works of William Gibson, Neal Stephenson, and Bruce Sterling are products of the world and of what does work in diverse and unforeseen ways in the world, in a recursive relationship between SF writers, academics (evidently including

[1578] *Ibid* at 125.
[1579] *Ibid* at 127.
[1580] Rob Kitchin, "Looking at the Present Through the Future: Science-Fiction Urbanism and Contingent and Relational Creativity" in Peter Meusburger, Joachim Funke & Edgar Wunder, eds, *Milieus of Creativity: An Interdisciplinary Approach to Spatiality of Creativity* (Dordrecht: Springer, 2009) 245.
[1581] The leading researcher on smart cities and the most referred and consulted author in this dissertation.
[1582] Kitchin, *supra* note 1580 at 245.
[1583] *Ibid* at 250.

legal scholars), and other communities:

> These images are visions of the future that strongly resonate in academic observations of the time. Academics were writing about the new international division of labour; the globalization of trade and labour; deregulation, strategic takeovers and buyouts, backofficing, and teleworking; the growth in neoliberalization and the privatization of state functions; the development of entrepreneurial cities and new, postmodern cityscapes; the new global ordering and connectivity between cities; the fragmentation of cities along wealth lines; the growth in the new poor; the erosion of public space; deterritorialization; the rescaling of politics; and contested spaces from the local level to the global.[1584]

The insights into these urban issues and processes are part of the many reasons that cyberpunk has continued to be a reference to academic scholarship beyond the initial moment of the subgenre, as explained by Natalie Collie in "Cities of the imagination: Science fiction, urban space, and community engagement in urban planning,"[1585] but also because it provides insights and narratives for resistance and participation. In the cyberpunk narrative, integrated urban spaces and networks are saturated by information and surveillance technologies, posing high risks of control and privacy, and inducing new forms of resistance and engagement within the city to circumvent these risks. For example, consider strong communities that are not built by public authorities, "but emerge in the unauthorised and marginal spaces of the street, with people acting as everyday *bricoleurs*."[1586] The practice and expression of *bricolage* that are present in Gibson's novels, in language and meta-structures, can also be used by "planners to engage with communities and connect them through story-telling to both the history and the future of the places in which they live."[1587] Still, in this case, Collie alerts readers that there are questions of privacy and intellectual property to be considered when engaging communities in urban planning. Law is never far from the challenges warned of by researchers on the present cities of the future.

[1584] *Ibid* at 252.
[1585] Natalie Collie, "Cities of the imagination: Science fiction, urban space, and community engagement in urban planning" (2011) 43:4 Futures 424–431.
[1586] *Ibid* at 430.
[1587] *Ibid*.

During the time of the doctoral research, other researchers were inspired by cyberpunk science fiction, and their publications reinforced the idea of this research following a similar path. Three of them gave hope that it could contribute to the work of others in urban (and legal) scholarship, as they did for this research. In “Learning from new millennium science fiction cities,”[1588] Mark C. Childs examines urban landscapes of three more recent science fiction novels, and one of the authors, Ian McDonald (a post-cyberpunk writer), would later be adopted here. Stephen Graham, in “Vertical noir—Histories of the future in urban science fiction,”[1589] analyzes how the *vertical imaginaries* in SF “intersect with the politics and contestations of the fast-verticalising cities around the world,”[1590] reinforcing the visualization of the highly futuristic cityscapes of cyberpunk already set in place far beyond the gritty and decayed city of Los Angeles in *Blade Runner*. Finally, in “Living on the Edge of Burnout: Defamiliarizing Neoliberalism Through Cyberpunk Science Fiction,”[1591] Caroline Alphin centralized her doctoral dissertation around an idea that is embedded in the *firmware* of this research:

> For many cultural critics, the city of cyberpunk is thoroughly postmodern because parallels can be drawn between the cyberpunk city and the postmodern condition. However, very little work has considered the ways in which cyberpunk can defamiliarize the necro-spatial and necro temporal logic of neoliberalism.

The relevance of this idea is evident when realizing that the impact of cyberpunk in the techno-social imaginaries and its influence in urban scholarships is as global as neoliberalism, yet take different forms in each cultural context. For example, several Brazilian authors formed a literature movement that adapted cyberpunk to the Brazilian cultural identities (sometimes abusing of stereotypes) and, more recently, other artists have traced interesting paths for

[1588] Childs, *supra* note 316.
[1589] Stephen Graham, “Vertical noir - Histories of the future in urban science fiction” (2016) 20:3 City 389–406.
[1590] *Ibid* at 389.
[1591] Caroline Grey Alphin, *Living on the Edge of Burnout: Defamiliarizing Neoliberalism Through Cyberpunk Science Fiction* (Doctoral dissertation, Virginia Polytechnic Institute and State University, 2019) [unpublished].

picturing Brazilian cities in a near future with cyberpunk elements.[1592] In the broader Latin American context, many other writers have built similar movements combining "cyberpunk with shamans, controlled exorcisms, military mediums," and urban tribes that leave digital tracks everywhere on the networks and streets of the mega cities of the *Global South*.[1593] In the European context of the *Global North*, even when recognizing that the cyberpunk universe is imagined mostly in the US and Asian cities (e.g., Japan, Singapore), the cyberpunk city is understood as a paradigmatic city-world model that (French) cities of all sizes must work together to avoid creating an alternative urban model, as to not be.[1594]

There is no doubt in academia that the *lingua franca* of (social, urban, legal) research about smart cities is English. The most relevant productions in the field are available in English even when there is an original publication in the national language of the researcher from non-Anglo countries. It is a matter of communication and intermediation of knowledge in the field and not a (neo)colonialist submission to a North American or British dominance in theories or experiences of smart cities.[1595] Even so, the literature review was also done using keywords in Portuguese, Spanish, and French: fortunately, some urban studies published only in these languages also emerged and came to contribute with the research.

An article from Brazilian professor Adriana Amaral presents the cyberpunk city as a

[1592] Lidia Zuin, "The Pursuit of the Brazilian Identity in Cyberpunk", (25 May 2015), online: *Neon Dystopia* <https://www.neondystopia.com/cyberpunk-movies-anime/pursuit-brazilian-identity-cyberpunk/>.
[1593] Marcelo Novoa, "Leaving Behind Reality's Ruins: Following the Digital Tracks of Latin American Cyberpunk", (26 January 2018), online: *Latin American Literature Today* <http://www.latinamericanliteraturetoday.org/en/2018/february/leaving-behind-realitys-ruins-following-digital-tracks-latin-american-cyberpunk>.
[1594] Antoine St Epondyle, "Cyberpunk Reality, La chute des villes", (26 January 2015), online: *Cosmo Orbüs* <https://saint-epondyle.net/blog/societe-technocritique/cyberpunk-reality/cyberpunk-reality-chute-villes/>; Alain Clapaud, "Smart City : entre réelles inventions et gadgets performants...", (September 2016), online: *L'Atelier BNP Paribas* <https://atelier.bnpparibas/smart-city/article/smart-city-reelles-inventions-gadgets-performants>.
[1595] In fact, the second name most quoted in the literature review was *Wang*, a very common name in Chinese families: 22 references.

ubiquitous character in the *technoir* aesthetics, dominated by a dark, rainy, claustrophobic, and terrifying identity, open to crime and disorganization.[1596] In his master's thesis, Diôgo Lemes Martins describes the dystopic scenarios of cyberpunk cities and contrast them with the urban perspectives on the horizon: despite rising poverty, the growth of slums, and social conflicts, the current state of Brazilian cities is not as dark and desperate as in Gibson's books, but their future is expected to be far less welcoming than what is described in Neuromancer and his other works.[1597] The Brazilian academic production relating cities and technologies was already a matter of attention in the chapter about the smart city projects of Rio de Janeiro, but it should be noticed that those publications reflect the urban conditions that are current, expected to be aggravated, and which will have to be faced by public policies in Brazil.

Continuing in the context of the Global South, the Cuban writer Erick J. Mota explains that cyberpunk reflects the North American fears of the Cold War becoming a hot war, fears of urban decay and poisoning, fears of a neo-Great Depression, fears of foreign capitals and corporations, fears of national interferences from foreign powers: in other words, fears of military and economic *post-apocalyptic* conditions and events that Caribbean, Central American, and South American countries are more used to experiencing.[1598] Relating to the interrelated but distinct cultural and socioeconomic context of Latin America, an article by Miguel García presents two cyberpunk stories from Brazilian and Mexican writers and their *hybrid* style considering the foreign premises and "[t]he way in which the Latin American urban space represented in both novels stands as a place of moral and physical decomposition caused by

[1596] Adriana Amaral, "A metrópole e o triunfo distópico: a cidade como útero necrosado na ficção cyberpunk" (2005) 13 Intexto 88–102.
[1597] Diôgo Lemes Martins, *Cenários distópicos de mundos utópicos: cidades cyberpunk e os horizontes ficcionais do urbanismo na globalidade* (Master's thesis, Universidade de Brasília, 2014) [unpublished].
[1598] Erick J Mota, "El cyberpunk, una deconstrucción de la realidad. Apuntes sobre un posible 'neo-ciber-punk cubano'" (2011) 23 ISTMO.

the action of foreign companies."[1599] As in the referred works of the main cyberpunk authors, the heroes of the Latin American novels also want to unmask the plans of the mega-corporations, but they will neither save themselves nor undo the apocalyptic damage caused by the transnational companies. These heroes reflect the urban chaos and the permanent sequels lived from the fulfillment of the North American fears enclosed in cyberpunk. In sum, any urban policies and regulations in Latin America have to take into account that their cities have lived in the past and live in the present, which was supposed to be a warning about future cyberpunk cities.

Part of this research is focused on the North American and Latin American contexts, more specifically, Canada and Brazil, so this subchapter is designed to reflect it. Other consulted publications involving cyberpunk and cities could be presented here from scholars of Portugal,[1600] Spain,[1601] and France,[1602] among other authors who, unfortunately, the research was not able to reach and analyze because it is an ever-growing reading list. Their contribution was valuable by indirectly influencing this subchapter, and they will be of use in further research.

Once the question of academic compatibility is settled, the next subchapter explores the fronts of legal imagination regarding smart cities with the support of science and literature.

3.3.2. Urban Topics for Science, Law and Literature – Utopian/Dystopian Frontiers

Since its very inception, the development of the research faced the topic of *utopia versus dystopia*. In both media and academic publications, there are narrative dualities about smart

[1599] "[L]a forma en que el espacio urbano latinoamericano representado en ambas novelas se erige como un lugar de descomposición moral y física provocado por la acción de compañías extranjeras." My translation. Miguel García, "Urbes corruptoras y visiones apocalípticas en dos novelas ciberpunk latino-americanas" (2015) 44:2 Chasqui 138–148 at 139.
[1600] Jorge Gaspar, "Futuro, cidades e território" (2016) 101 Finisterra-Revista Portuguesa de Geografia 5–24.
[1601] M Peregrina Castaños, "Megapolis y ciberpolis en Snow Crash, de Neal Stephenson, Ángulo Recto" (2012) 4:1 Revista de estudios sobre la ciudad como espacio plural 187–202.
[1602] Yannick Rumpala, "Ce que la science-fiction pourrait apporter à la pensée politique" (2010) 4 Raisons politiques 97–113.

cities as projects of urban utopia and smart cities as projections of dystopian societies. The terms have an outlying literary origin that seems unconsidered by a frequent use that takes their meaning for granted and has a great influence on the public debate on smart cities. Therefore, it makes sense to depart the literary experiment of the research with such topic.

The fiction *Utopia* (1516), a socio-political satire by Thomas More, remains a fundamental reference for the present-day under many different forms and purposes.[1603] From the original sense of the literary term, a *no-place* (nowhere) or *good place* (*Eutopie*), the term *Utopia* evolved to the current use for designating something that "is idealistic but not realistic, or that it is somehow impractical hence there is in fact much misunderstanding and misperception about the idea of a Utopia,"[1604] according to Professor Michael P. Malloy of the McGeorge School of Law. This novel, a precursor of postmodern literature, offers a multiplicity and incertitude of meanings of the term *Utopia*—in the original sense, the literary successors and popular culture—and opens many possibilities for literary and legal debates about society and daily life in this non-existent and/or happy state (considering the many meanings of the term *state*).[1605]

More than 500 years later, one can ask if Utopia is already here,[1606] or underway under the narrative discourses of smart cities that do not really qualify what they mean by Utopia.[1607] This term is used hundreds of thousands of times in the scientific and media publications about

[1603] Terry Eagelton, "Utopias, past and present: why Thomas More remains astonishingly radical", *The Guardian* (16 October 2015), online: <https://www.theguardian.com/books/2015/oct/16/utopias-past-present-thomas-more-terry-eagleton>.
[1604] McGeorge School of Law, "Utopia and the Law and Literature Movement", (22 January 2016), online: *YouTube* <https://youtu.be/knlpCepxLdU> at 17min10s.
[1605] Michael P Malloy, "UTOPIA and the Law and Literature Movement Symposium - UTOPIA500" (2016) 1 McGeorge L Rev 1–28.
[1606] Rachel Lloyd, "500 years on, are we living in Thomas More's Utopia?" *The Economist* (29 December 2016), online: <https://www.economist.com/prospero/2016/12/29/500-years-on-are-we-living-in-thomas-mores-utopia>.
[1607] Alan-Miguel Valdez, Matthew Cook & Stephen Potter, "Roadmaps to utopia: Tales of the smart city" (2018) 55:15 Urban Studies 3385–3403.

smart cities, and a very small part of them used in this research,[1608] mostly without designating a clear meaning to the term. This common understanding may never be reached because what could be considered as a Utopia for one person might be a dystopia for another.[1609]

The term *dystopia,* first used by John Stuart Mill and Greg Webber in 1868, rather than being a simple opposite of Utopia, could mean "bad place" or "sick place," an anti-utopia or a Utopia gone wrong.[1610] Therefore, the term dystopia also carries several debatable meanings for law and literature that are, in particular, very keen to be coupled with science fiction: *Brave New World* by Aldous Huxley, for example, would be a great subject for literary and legal debates about Utopian and dystopian societies.[1611] In a similar sense, "[t]he most important anti-utopian genre in shaping imaginations of both future and contemporary cities has been cyberpunk science fiction,"[1612] fitting the case and the purposes of this research about smart cities.

The technoscientific cities of the imagined near future, coproduced in the present by a culture of neoliberal developmentalism, carry paradoxes of desires and fears,[1613] the challenges of building better urban habitats, and the risks of turning them into even worse versions of what already exists. Such futuristic cities are planned, built, and celebrated as urbanist utopias (the latter meaning of it), yet they can turn into their anti-utopian versions.[1614] In this subchapter,

[1608] Ganjavie, *supra* note 894; Cranshaw, *supra* note 894; Datta, *supra* note 1018; Andres Luque-Ayala et al, *Smart urbanism : utopian vision or false dawn?* (London ; New York : Routledge, 2016); Anthopoulos, *supra* note 894; Grossi & Pianezzi, *supra* note 894.
[1609] Ost, *supra* note 313.
[1610] Chris Arsenault, "Green paradise or data-stealing dystopia? Toronto smart city sparks debate", *Reuters* (11 March 2019), online: <https://www.reuters.com/article/us-canada-cities-privacy-feature-idUSKBN1QS25E>.
[1611] Andityas Soares de Moura Costa Matos, "Law, literature and cinema: an essay on dystopic movies" (2012) 4:1 Revista de Estudos Constitucionais, Hermenêutica e Teoria do Direito 40.
[1612] Stephen Graham, *The cybercities reader* (Psychology Press, 2004) at 389.
[1613] Shiju Sam Varughese, "Cities of Neoliberal Future: Urban Utopia in Indian Science Fiction Cinema" in Tereza Kuldova & Mathew A Varghese, eds, *Urban Utopias: Excess and Expulsion in Neoliberal South Asia* (Cham: Springer, 2017) 97.
[1614] Sylvie Albert, "Smart cities: The promises and failures of utopian technological planning", (21 April 2019), online: *The Conversation* <http://theconversation.com/smart-cities-the-promises-and-failures-of-utopian-technological-planning-114405>.

science, law and literature are deployed together to explore the utopian and dystopian parallels of the smart cities as the final perspective of the research.

There is no lack of science fiction for exploring what have been called dystopias, but the same cannot be said about utopias. So, more dimensions of cyberpunk had to be added to it. For such ends of the research, a selection of cyberpunk and *post-cyberpunk* works from science fiction writers will be engaged along with publications from scientists and legal scholars.

The *Sprawl trilogy* (*Neuromancer*,[1615] *Count Zero*[1616] and *Mona Lisa Overdrive*)[1617] by William Gibson, and *Snow Crash*[1618] by Neal Stephenson are, by far, the most quoted cyberpunk novels in the consulted bibliography for this dissertation, as will be reflected ahead.[1619] Other celebrated writers of the cyberpunk generation—Bruce Sterling, Pat Cadigan, John Shirley, Melissa Scott, Rudy Rucker, and Cynthia Kadohata—had some of their literary works (enjoyed and) analyzed for the research[1620] and they may be indirectly mentioned, but previously mentioned publications do better honour to their contribution to the urban debate.[1621] The novels by Gibson and Stephenson which were mentioned will be used as the main literary references for discussing some elements and characteristics of smart cities in a more dystopian perspective.

Concerning what became known as *post-cyberpunk novels*, written after the *cyberpunk boom* in the 1980s and early 1990s, some novels were selected for their potential relevance for the urban debate: *Company Town* by Madeline Ashby,[1622] *Wilders* by Brenda Cooper,[1623] *Little*

[1615] William Gibson, *Neuromancer* (London: Grafton, 1986).
[1616] William Gibson, *Count Zero* (New York: Ace Books, 1987).
[1617] William Gibson, *Mona Lisa Overdrive* (New York: Bantam Books, 1989).
[1618] Neal Stephenson, *Snow Crash*, Bantam spectra book (New York: Bantam Books, 2008).
[1619] About William Gibson and Neal Stephenson, most of the readings took the research to a same conclusion: “Of the cyberpunk writers, these two authors offer the most descriptive images of space and the future development of the city.” Rojas, *supra* note 1567 at 13.
[1620] Instead of “analized”, it could be *acquired, skimmed, read, noted, thought over, all much appreciated*.
[1621] *See*: Abbott, *supra* note 1577; Kitchin & Kneale, *supra* note 1570.
[1622] Madeline Ashby, *Company Town* (New York: Tor, 2016).
[1623] Brenda Cooper, *Wilders*, Project Earth Book 1 (Amherst, NY: Pyr, 2017).

Brother and *Walkaway* by Cory Doctorow,[1624] *Brasyl* by Ian McDonald,[1625] and *Infomocracy* by Malka Older.[1626] More novels from these and other well-recognized writers—Annalee Newitz, Charles Stross, Daniel Suarez, Ernest Cline, Lauren Beukes, and Paolo Bacigalupiar—were also thoroughly considered for this research,[1627] and they indirectly influenced the whole research. Despite the strong temptation to include more post-cyberpunk works, including a recently concluded trilogy by William Gibson, the works mentioned above were considered to be more than enough for the objectives of the research, which include bits of anti-dystopia perspectives.

The motivations for choosing well-known cyberpunk works for discussing law and smart cities were previously described. So, one could ask the reason for including more works in this genre that came to be produced even 30 years Gibson's after *Neuromancer*. To put it simply, the chosen post-cyberpunk novels were included for presenting specific aspects involving smart cities that are better developed in them, as in the case of more contemporary technologies. Moreover, there is a fundamental aspect that is more related to conditions manifested in the first chapter: considering the rationalities of law and science as part of the pillar of emancipation that became a double for regulation. This aspect may answer by many names, such as re-empowerment, *reenchantment*, or simply *hope;* post-cyberpunk brings it to the debate, without falling for the simplifications of utopia and dystopia—it could be very helpful for law and science.

The following subchapters discuss topics that are identified in the text mining process, presented in the literature review, related to the legal analysis of smart policies, and part of the cyberpunk canon. They are the subjects for a research experiment of law & science & literature.

[1624] Cory Doctorow, *Little Brother* (New York: Tom Doherty Associates, 2008); Cory Doctorow, *Walkaway* (New York: Tor, 2017).
[1625] Ian McDonald, *Brasyl* (Amherst, N.Y: Pyr, 2007).
[1626] Malka Older, *Infomocracy*, 1st ed (New York: Tor, 2016).
[1627] By "considered", it could be assumed as *borrowed, reread, reviewed, reconsidered, left for a next time.*

3.3.2.1. The Future: "You Have Been Warned"

Future was one of the most recurrent keywords in the research, appearing 759 times in the *Websites* database and 261 times in the *Academic Publications* database, according to *Sketch Engine*. The colocations suggest much about how the term *future* is used in the narratives of smart cities, as seen in *Figures 81* and *82*. From this point on, the visualizations will be limited to those extracted from *Voyant Tools* to present more information in fewer pages.

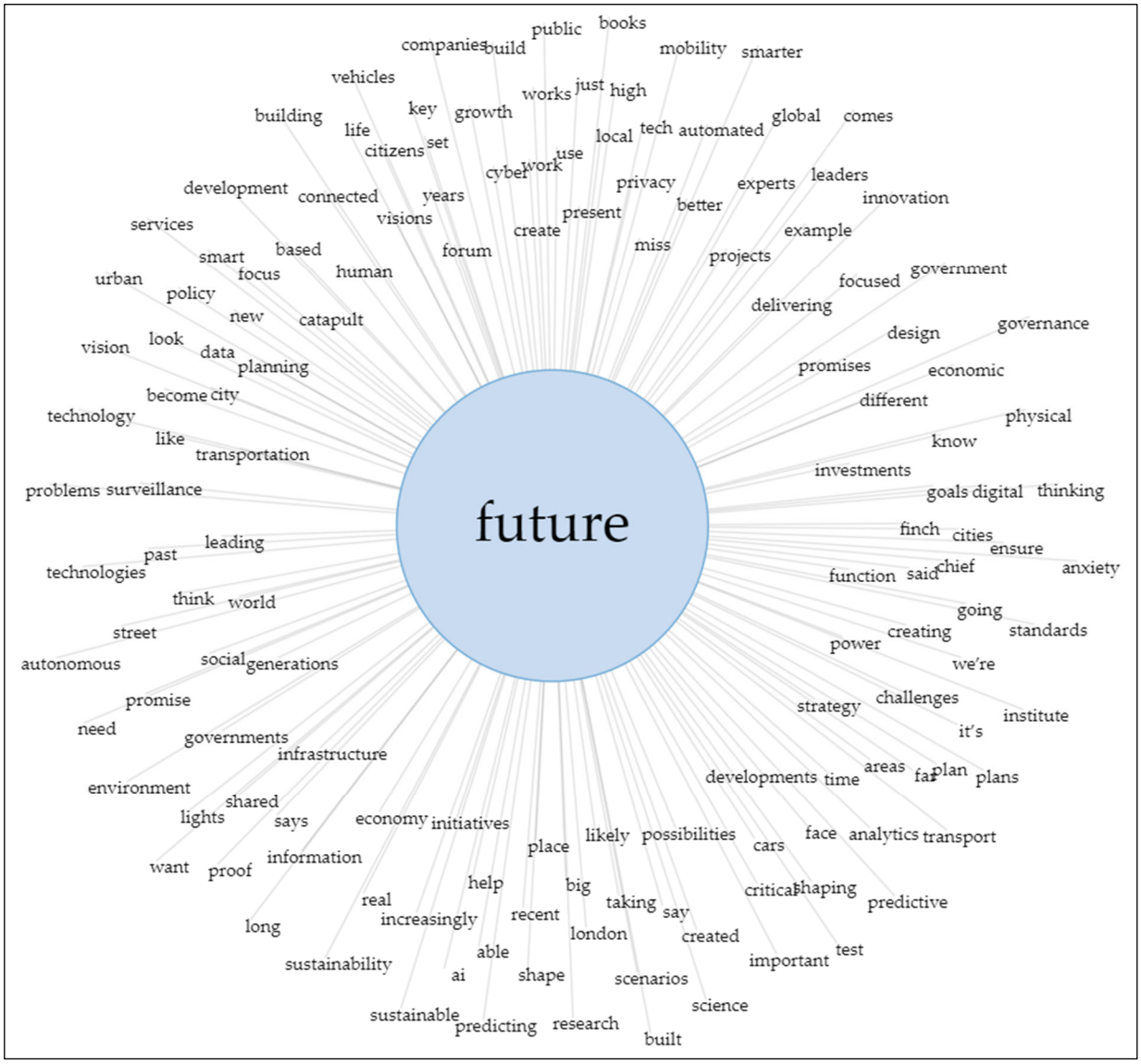


Figure 81: Main links of the term *future* in *Websites*, using *Voyant Tools*

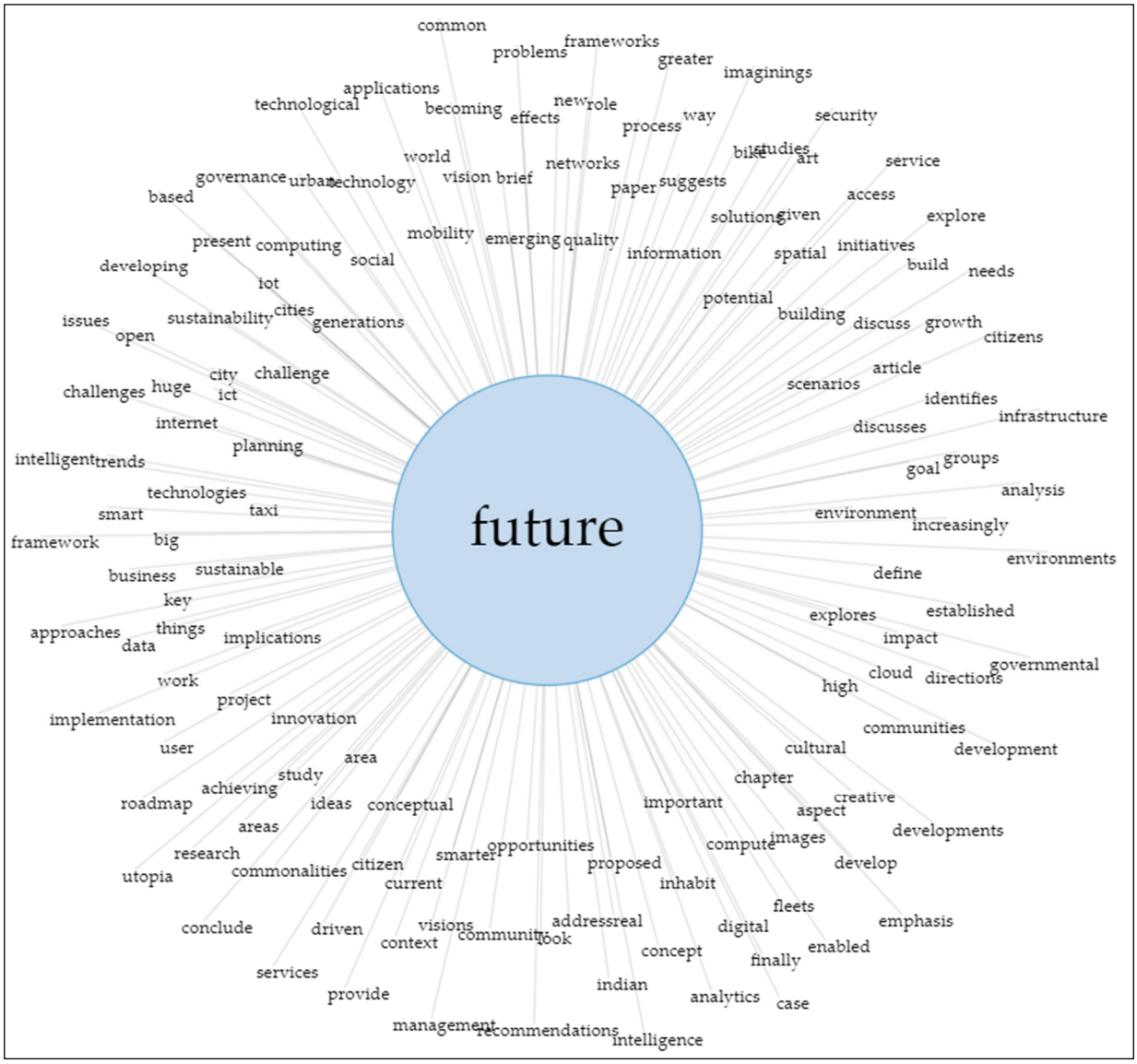


Figure 82: Main links of the term *future* in *Academic Publications*, using *Voyant Tools*

The analytics used in the research suggest that the promises of future cities proposed for the present are based on the past visions of urban utopia, but with the current technological issues. The idea of science enabling digital technologies for achieving intelligent planning and predictive management for cities is not really new, and neither is the social anxiety driven by it. There are problems and challenges in the *roadmaps* of smart cities—and their known emphasis on mobility, cars, transportation, taxis, bikes, etc.—that need to be addressed by public policy.

This dissertation goes through many elements—contextualizations, theories, objectives, questions, hypotheses, methodologies—for achieving one main interest: exploring the legal imaginary of the city of the near future. After some (failed) attempts, the research came to recognize what are now becoming *best practices* for institutions[1628] and companies[1629] in many countries: one of the best ways of exploring the possibilities and uncertainties of "the future of the future"[1630] is to dialogue with science fiction writers and their works. The cyberpunk subgenre seemed the obvious choice for discussing the future through the present[1631] and verifying what could be learned from the urban visions written in their books almost thirty years ago.[1632]

This famous passage in Gibson's *Neuromancer* keeps giving much for discussion:

> Home.
> Home was BAMA, the Sprawl, the Boston-Atlanta Metropolitan Axis.
> Program a map to display frequency of data exchange, every thousand megabytes a single pixel on a very large screen. Manhattan and Atlanta burn solid white. Then they start to pulse, the rate of traffic threatening to overload your simulation. Your map is about to go nova. Cool it down. Up your scale. Each pixel a million megabytes. At a hundred million megabytes per second, you begin to make out certain blocks in midtown Manhattan, outlines of hundred-year-old industrial parks ringing the old core of Atlanta…[1633]

The digital traits of the near future city feel tangible in cyberpunk novels because "Cyberpunk writers are equally attracted to the detail and to the assemblage in their

[1628] Andrew Liptak, "The French Army is hiring science fiction writers to imagine future threats", (24 July 2019), online: *The Verge* <https://www.theverge.com/2019/7/24/20708432/france-military-science-fiction-writers-red-team>.
[1629] Nick Romeo, "Better Business Through Sci-Fi" (30 July 2017), online: <https://www.newyorker.com/tech/annals-of-technology/better-business-through-sci-fi>.
[1630] Douglas Gorney, "William Gibson and the Future of the Future", (14 September 2010), online: *The Atlantic* <https://www.theatlantic.com/entertainment/archive/2010/09/william-gibson-and-the-future-of-the-future/62863/>.
[1631] Daniel Clausen, "Our Cyberpunk Present, Our Cyberpunk Future: What We Can Learn from Neal Stephenson's Snow Crash", (8 April 2019), online: *Diplomatic Courier* <https://www.diplomaticourier.com/posts/our-cyberpunk-present-our-cyberpunk-future-what-we-can-learn-from-neal-stephensons-snow-crash>.
[1632] Paul Dobraszczyk, "Yesterday's tomorrow today: what we can learn from past urban visions", *The Guardian* (11 July 2019), online: <https://www.theguardian.com/cities/2019/jul/11/yesterdays-tomorrow-today-what-we-can-learn-from-past-urban-visions>.
[1633] Gibson, *supra* note 1615 at 43.

representations of urban space,"[1634] and there is always more to find in their sources. The cyberpunk guide for analyzing smart cities emerges from their descriptions of urban spaces. For example, "Gibson's Chiba City incarnates the concept of the postmodern cybercity by uniting digital hi tech and rampant decay."[1635] These representations of the high-tech cities from cyberpunk novels are not pure elements of wild imagination disconnected from reality, instead they are anchored in technical knowledge, social and urban theories, and new forms of common sense: "Gibson's urban spaces, then, are concurrently grounded in dystopian representations of the present and the impending future, and in much older structures of power and knowledge."[1636] The cyberpunk subgenre tells much about what cities already are, and what they may become.

Stephenson's *Snow Crash* illustrates such present/future representation, with people physically stuck in traffic while they seek to virtually connect their minds to their home offices:

> The drive to the scene of the concert is long, made longer by the fact that Vitaly, rejecting the technocentric L.A. view of the universe in which Speed is God, likes to stay on the surface and drive at about thirty-five miles per hour. Traffic is not great, either. So Hiro jacks his computer into the cigarette lighter and goggles into the Metaverse.
> He is no longer connected to the network by a fiber-optic cable, and so all his communication with the outside world has to take place via radio waves, which are much slower and less reliable. Going into The Black Sun would not be practical—it would look and sound terrible, and the other patrons would look at him as if he were some kind of black-and-white person. But there's no problem with going into his office, because that's generated within the guts of his computer, which is sitting on his lap; he doesn't need any communication with the outside world for that.
> He materializes in his office, in his nice little house in the old hacker neighborhood just off the Street.[1637]

There are many useful perspectives that can be drawn from contrasting the cyberpunk urban scenarios running on high-tech corporative power and low-life hopeless inequality, and

[1634] Cavallaro, *supra* note 307 at 138.
[1635] *Ibid* at 150.
[1636] *Ibid* at 151.
[1637] Stephenson, *supra* note 1618 at 106.

the PPP-led cities selling utopian beliefs through neo-cybernetic municipal services and digitally empowered participative citizens. The cyberpunk city and the smart city contain much of what could be a "cyborg-city,"[1638] a city that is an inseparable form of "ever-expanding, ever-changing networks"[1639] and which allows "a better understanding of some aspects of the logic that makes up the urban environment."[1640] The beliefs and representations of a city as a self-upgradable information machine are already present in the immediate future of cities, at least according to the scientific publications guided by the tempting narratives of progressive time.

After all, cities are all about time(scape), more specifically, about compressing space-time, establishing paces, creating rhythms, intersecting tempos: if a city is understood as a space-time machine, smart city algorithms are designed to tune up systems for spatial and temporal management, extending the present into the future and planning futures for the present.[1641] Understanding how cities work, creating toolboxes of knowledge and instruments to operate them, and simulating future urban scenarios build a baseline to act with foresight and build a better tomorrow to make today's cities smart, resilient, and sustainable.[1642] Despite lacking many of these factors, numerous cities around the world are joining smart city initiatives for building such imaginaries of urban future,[1643] offering their space-time (and budgets) for city-scale testbeds for IoT experimentation,[1644] Big Data implementation,[1645] cloud computing, and

[1638] Antoine Picon, *Smart cities: a spatialised intelligence* (John Wiley & Sons, 2015) at 78.
[1639] William J Mitchell, *Me++: the cyborg self and the networked city* (Cambridge, Mass: MIT Press, 2003) at 61.
[1640] Picon, *supra* note 1638 at 79.
[1641] Rob Kitchin, "The Timescape of Smart Cities" (2019) 109:3 Annals of the American Association of Geographers 775–790.
[1642] Phillip Daffara, "Rethinking tomorrow's cities: Emerging issues on city foresight" (2011) 43:7 Futures 680–689; Gerhard Schmitt, "Spatial modeling issues in future smart cities" (2013) 16:1 Geo-spatial Information Science 7–12.
[1643] Nick Taylor Buck & Aidan While, "Competitive urbanism and the limits to smart city innovation: The UK Future Cities initiative" (2015) 54:2 Urban Studies 501–519.
[1644] Evangelos Theodoridis, Georgios Mylonas & Ioannis Chatzigiannakis, *Developing an IoT smart city framework* (IEEE, 2013).
[1645] Guangjie Han et al, "Emerging Trends, Issues, and Challenges in Big Data and Its Implementation toward Future Smart Cities" (2017) 55:12 IEEE Communications Magazine 16–17.

artificial intelligence trends.[1646] Reinforcing those speculative futures, there are several studies affirming that IoT and Big Data will have major roles in the cities-to-come for facing environmental challenges and for deterring urban risks, but there is also much evidence that it may only be possible if they are backed by the (frequently absent) appropriate governance models.[1647]

When dealing with urban governance models—and considering learning from the (still present) past to preparing for the (almost present) future—it is recommended to highlight that they can follow very distinct policy roadmaps. For example, governance may be more guided by private technology companies for prioritizing policies for an *innovation ecosystem* that frequently favour wealthier urban areas; also, governance can be driven by public institutions for developing participatory policies for engaging citizens, even in less dense areas.[1648] Innovation and participation are central elements of the *smart future agenda* for the adaptation and transformation of cities. Therefore, conciliating them is needed to face the challenges and risks of smart cities—all the available creativity and engagement may be required for it.[1649]

Citizens are becoming engaged producers of digital data and their data will be part of the substratum on which cities will run in the future. So, it is reasonable to expect that data

[1646] Guangjie Han et al, "Emerging Trends, Issues, and Challenges in Big Data and Its Implementation toward Future Smart Cities: Part 2" (2018) 56:2 IEEE Communications Magazine 76–77; Nisa Malli, "Public policy for our automated urban future", (8 May 2018), online: *Brookfield Institute* <https://brookfieldinstitute.ca/commentary/public-policy-for-our-automated-urban-future>.

[1647] T M Vinod Kumar, "Smart City E-Governance: Issues and Future" in T M Vinod Kumar, ed, *E-Governance for Smart Cities* (Singapore: Springer Singapore, 2015) 353; Agnieszka Leszczynski, "Speculative futures: Cities, data, and governance beyond smart urbanism" (2016) 48:9 Environ Plan A 1691–1708; Nikhita Reddy Gade, Nishanth Reddy Gade & GJ Ugander Reddy, "Internet of things (IoT) for smart cities: The future technology revolution" (2016) Global Journal of Computer Science and Technology.

[1648] Nicos Komninos, Hans Schaffers & Marc Pallot, *Developing a policy roadmap for smart cities and the future internet* (IMC International Information Management Corporation, 2011); Andrea Caragliu & Chiara F Del Bo, "Do Smart Cities Invest in Smarter Policies? Learning From the Past, Planning for the Future" (2015) 34:6 Social Science Computer Review 657–672.

[1649] M Batty, Michael et al, "Smart cities of the future" (2012) 214 Eur Phys J; Adriana Galderisi & Angela Colucci, "Smart, Resilient, and Transition Cities: Commonalities, Peculiarities and Hints for Future Approaches" in Adriana Galderisi & Angela Colucci, eds, *Smart, Resilient and Transition Cities* (Elsevier, 2018) 29.

governance and (some) regulation of the geo-information datasphere will be part of city governments.[1650] For this future, some rethinking of the relation between privacy and space(-time) will be required because privacy settings may become a major characteristic of the urban space. For example, the (consciously or not) identification by GPS-enable devices or MAC addresses by urban sensors (sidewalks, parks, public transportation) that raise privacy concerns and influence the behaviour of people within such monitored space.[1651] City authorities in the future city will have "to balance two sometimes contradictory rights: people's right to visibility, action and representation, and their right to autonomy and privacy."[1652] Adding complexity to such a balance with multiple (and networked) plates, cities will have to move beyond the legal compliance paradigm in terms of data collection and sharing in their data governance if they want to harvest more understanding from data and to focus more on promoting equity.[1653]

More equity in the access to basic urban services, especially for the poor, is part of the promise from smart cities in the Global South, as reflected in the ambitious Indian plan "Smart cities: Statement and Guidelines" (June 2015).[1654] To reinforce this objective, the national government made a mandatory requirement of an *Internet of Citizens* perspective for all Indian municipal governments interested in participating in the national plan: citywide participation of all citizens in the deployment of each municipal plan, with an emphasis on their visions.[1655] In brief, the Indian government is proposing to solve the "problem of top-down regulation," also known as "the one-size-fits-all approach,"[1656] by rejecting a general model. Each city and their citizens are supposed to elaborate public policies and governance for a smart city project, according to

[1650] Linnet Taylor et al, "Customers, users or citizens? Inclusion, spatial data and governance in the smart city" (2016) Inclusion, Spatial Data and Governance in the Smart City (June 9, 2016).
[1651] *Ibid* at 31.
[1652] *Ibid* at 32.
[1653] *Ibid* at 31.
[1654] Guido Noto La Diega, "The Internet of Citizens: A Lawyer's View on Some Technological Developments in the United Kingdom and India" (2016) 12 Indian JL & Tech 53 at 76.
[1655] *Ibid* at 77.
[1656] *Ibid* at 78.

their local concepts, visions and plans. Considering the high number of smart city projects in India, such an array experiences must be followed closely for the benefit of other cities in the world. These are part of the visions from an Indian lawyer worried about the legal concerns raised by techno-social developments (e.g., driverless cars and vehicle-to-vehicle systems),[1657] concerns which are corroborated by the research with regard to North/South perspectives of urban regulation on the horizon.

Part of this horizon for smart cities comes from *urban robotics.* The perspective on designing local regulation for municipalities might later provide the basis for national legislation on the topic: "institutional change has historically been led by cities… to take advantage of experimentation with a diversity of policies and evaluations of related outcomes."[1658] Cities might have a major role in developing the regulation of autonomous vehicles—drones and robots tend to be a matter of national legislation—and they have been serving as testbeds for tech companies, as policy-making laboratories for fostering urban innovation and for shaping new local markets. This role might include creating "dedicated physical spaces for automated vehicle testing,"[1659] but they should also establish measures to ensure accountability, staying "on the lookout for unintended as well as intended consequences."[1660] Moreover, as autonomous vehicles are packed with internal and external sensors, the collection, processing, and transmission of data will increase citizen demands for accountability, transparency, and privacy that will not be solved by municipalities on their own. Moreover, even when regulatory approaches come from policymakers of all levels, "Cities will feel the impacts and serve as the test beds for new rules."[1661] In sum, cities will have to rely on their "regulatory authority to shape

[1657] *Ibid* at 62.
[1658] Jesse Woo, Jan Whittington & Ronald Arkin, *Urban Robotics: Achieving Autonomy in Design and Regulation of Robots and Cities* (2018) at 41.
[1659] *Ibid* at 80.
[1660] *Ibid* at 42.
[1661] *Ibid* at 56.

the physical space in which the technologies operate,"[1662] and, whenever possible, their authority to form public-private partnerships with tech companies to exert contractual power in projects involving autonomous and connected vehicles.[1663] The topic of the future of urban transportation condenses much of the legal imaginary of smart cities.

Not by chance, automated cars are used to compose the image of futuristic cities:

> The city sang a song of humanity. People and their companions sat in rounded robotic cars and talked together as they sped through the city on smart streets. Others rode a nearly infinite variety of wheeled devices on paths that ran by or between roads and through parks. These they variously pedaled and pushed or simply stood or sat upon. Singles and families alike walked through greenbelts stained orange and red with fall. Many delighted at the controlled chill that pinked their cheeks and the chance to show off their fall wardrobes. Most chose golds and greens and scintillating browns, but others fought the fall with pastel pinks and snowy whites. Some people chatted with other people, while others talked with their companion robots, with their dogs, or with their virtual coaches.[1664]

The novel *Wilders*, by Brenda Cooper,[1665] gives the most detailed and vivid description of what a Utopian version of a smart city would be—it even starts with robotic cars "through the city on smart streets," a dream for many mayors—that could be found among near-future science fiction works, but it will soon be clear that this is not the case. Brenda Cooper is considered a "post-cyberpunk style author"[1666] by some, but has described herself as a *climate fiction writer.*[1667] She has also worked as a technology professional and Chief Information Officer in the City of Kirkland.[1668] Her novel may not be as well-known as the others chosen for the literary

[1662] *Ibid* at 81.
[1663] Susan Fourtané, "Connected Vehicles in Smart Cities: The Future of Transportation", (16 November 2018), online: *Interesting Engineering* <https://interestingengineering.com/connected-vehicles-in-smart-cities-the-future-of-transportation>.
[1664] Cooper, *supra* note 1623 at 7.
[1665] Cooper, *supra* note 1623.
[1666] Marianne de Pierres, "Female Post-Cyberpunk Authors", (9 February 2015), online: *Marianne de Pierres* <http://www.mariannedepierres.com/female-post-cyberpunk-authors/>.
[1667] Brenda Cooper, "Guest post: Climate Fiction is Good for our Genre (and for us!) by Brenda Cooper", (14 June 2017), online: *SFFWorld* <https://www.sffworld.com/2017/06/guest-post-climate-fiction-is-good-for-our-genre-and-for-us-by-brenda-cooper/>.
[1668] Brenda Cooper, "Brenda Cooper's Biography", (30 January 2007), online: *Brenda Cooper* <http://www.brenda-cooper.com/about/>.

analysis, but it provided much food for thought for the research, and she deserves to be better known among researchers and IT professionals of the smart city community.

With automated cars, new matters for regulation may need to be addressed:

> Jacob took the other jump seat and said, "Home." The car waited until they were all seated securely and buckled in before it leapt into traffic. From his vantage the cars around them were melting out of their way.
> "I don't think I've ever traveled this fast in city traffic," he said.
> Jacob gave him a fatherly wink.
> Natalie reached across the large internal compartment and gave her dad a sock in the thigh. "He's showing off. There's custom firmware in these, lets them cut the clearance envelope in half, which makes the other cars back off because we're driving like unpredictable assholes."
> "Is that legal?" Hubert, Etc said.
> "It's a civil offense," Jacob said.
> "The fines are paid by direct-debit."
> "What if you kill someone?" Seth got to the point.
> "That's a criminal matter, more serious. Won't happen, though. There's a lot of game theory stuff going on in the car's lookahead, modeling likely outs and defectors and injecting a huge margin of safety. Really, we're playing it safer than the stock firmware, but only because the car itself has got much better braking and acceleration and handling characteristics than a stock car."
> "And because you're terrifying other cars' systems into getting out of your way," Seth said.
> "Right," Natalie said, before her dad could object. He shrugged and Hubert, Etc remembered what she'd said about his being "old rich," unconcerned by the idea that anyone would resent his buying his way through traffic.[1669]

In terms of urban imaginaries, the most recommended post-cyberpunk novel here has to be Cory Doctorow's *Walkaway*,[1670] which is set in a not-far-future of "a fully-networked quasi-dystopian society where the capitalist 'zottarich' play at being robber barons and are allowed to do whatever they please."[1671] The Canadian author is both a builder and a destroyer of (cyberpunk and post-cyberpunk) Utopian and dystopian futures in his novels. In fact, *Walkaway* is one that shows that their difference is not about how well they work, but it is "about what

[1669] Doctorow, *supra* note 1624.
[1670] *Ibid*.
[1671] Sam Reader, "Walkaway Provides the Blueprints to Build a Better Utopia", (24 April 2017), online: *The B&N Sci-Fi and Fantasy Blog* <https://www.barnesandnoble.com/blog/sci-fi-fantasy/walkaway-deconstructionist-post-cyberpunk-utopia/>.

happens when everything fails,"[1672] according to the author. In this novel, Doctorow builds urban alternatives to the smart cities that will deepen the techno-legal advantages for elites.

Beyond just high-tech cars, algorithmic regulation may hit the streets where they roll:

> But Ken has already crossed the border into the next centenal. The laws, which Ken already knows from his map, are posted in illuminated signs at the junction. Ken wonders whether his pursuers will read them or just plow through. He doesn't dare stop to find out. Then he hears the series of sharp bangs. He ducks and glances back over his shoulder.
> But it's just the tires exploding on the antivehicle protection in the street. This centenal belongs to a green-party government that runs in Jakarta on a radical antitraffic platform, and is pedestrian only. In the dimness (the eco-government of the centenal is experimenting with wind-powered streetlights, and they are on the faint side) the SUV settles, like one of those beetles that gets eaten from the inside out.[1673]

The plot of *Infomocracy*, the first novel of the trilogy *The Centenal Cycle* by Malka Older, is set in the second half of the 21st century, when almost all national states are now divided by *centenals.* Each *centenal* has 100.000 people—so a dense city can have several *centenals* with less than a square kilometre—micromanaged by international, corporate-tied, political parties with very distinct public policies from one to the other. "And you can have two centenals very next to each other, on either side of the street even, where the laws are different,"[1674] making the novel appropriate for contrasting urban policies in mixed high-tech/low-tech governments, as what could be considered small smart cities side by side, disputing the preference for their models at each election. Malka Older, who published the novel during her doctoral program in sociology at Science Po,[1675] recognizes the cyberpunk influence in her work ("Snow Crash,

[1672] Cory Doctorow, "Disasters Don't Have to End in Dystopias" *Wired* (5 April 2017), online: <https://www.wired.com/2017/04/cory-doctorow-walkaway/>.
[1673] Older, *supra* note 1626.
[1674] Gautham Shenoy, "Democracy in the age of Information: A spotlight on Infomocracy, and a Q&A with its author Malka Older", (24 March 2018), online: *FactorDaily* <https://factordaily.com/democracy-in-the-age-of-information-malka-older/>.
[1675] CSO Centre de Sociologie des Organisations, "Malka Older", online: *Science Po - Centre de Sociologie des Organisations* <http://www.cso.edu/cv_equipe.asp?per_id=196>.

William Gibson")[1676] while advancing the genre by picturing political technologies of a future[1677] in interchangeable Utopian/dystopian forms: it is not a matter of crossing a street to a different centenal, one challenge here will be finding what the consequences of doing this are. It is a valid question, for example, when cities are *planning-forming-agreeing-or-supporting* PPPs[1678] for *smart neighbourhoods* with corporations that will have more regulatory *power-by-the-code* over semi-privatized urban areas than any public contract can possibly predict.

The main representation of the future in science fiction lays on images of futuristic cities. Smart city projects all over the world carry part of the same narrative of the SF cities, projecting images of a brighter future in a high-tech, connected, and efficient city. Cyberpunk cities and smart cities present a similar priority to traffic and transportation to describe the possibilities of the near future but approaching them from different perspectives. To illustrate and discuss them some approaches to urban traffic were presented here, combining contributions from science and law under the aegis of literature.

While the scientific literature emphasizes some ways in which new technologies should and could be used to improve life in cities, SF literature explores ways in which these same technologies may be used to challenge life in cities. Legal scholars have much to gain by contrasting those different perspectives to develop the imaginary of law about the future by facing the facts and challenges of smart cities.

[1676] Leah Schnelbach, "Malka Older and Daniel José Older Discuss Infomocracy, Cyberpunk, and the Future!", (10 June 2016), online: *Tor.com* <https://www.tor.com/2016/06/10/malka-older-and-daniel-jose-older-discuss-their-novels-cyberpunk-and-democracy/>.
[1677] Malka Older, "Microdemocracy is the next logical step for the United States", (16 December 2016), online: *Ars Technica* <https://arstechnica.com/tech-policy/2016/12/microdemocracy-is-a-high-tech-solution-to-americas-current-system/>.
[1678] David Rider, "The risks of becoming a Google city", (5 March 2018), online: *The Star* <https://www.thestar.com/news/gta/2018/03/02/the-risks-of-becoming-a-google-city.html>.

3.3.2.2. The Challenge: "Are You Sure You Want to Continue?"

The term c*hallenge* was a very recurrent keyword associated with the cities of the near *future*, appearing at least 510 times in the database *Websites* and 261 times in *Academic Publications*, according to *Sketch Engine*. The collocations related to the term *challenge* can suggest what the subjects to be faced by science and law in the textual context of publications on smart cities are. Using the asterisk at the end of the term (*challenge**) allows both singular and plural forms to be included in the search, as displayed in *Figures 83* and *84*.

Figure 83: Main links of the term *challenge* in *Websites*, using *Voyant Tools*

Figure 84: Main links of the term *challenge* in *Academic Publications*, using *Voyant Tools*

The systematic analysis of the data identified certain issues that are increasingly emerging from the research on smart cities. They are presented as growing urban problems to be faced and tackled by citizens but, at the same time, their complex assumptions also need to be addressed by discussing the smart city models. There are different approaches made by planners, corporations, communities, and academics exploring the great number of advantages and opportunities (and risks) included in the smart solutions for overcoming such challenges.

For quite a while, governments and corporations have been presenting smart cities as solutions for all urban challenges, ranging from the same-old local problems to the brand-new ones produced by global competition.[1679] If there is no common understanding about what smart cities mean, the same goes for what their challenges are, but it did not inhibit the global spread of *informationization* in large urban areas for facing the so-called "city diseases (traffic jam, medical problems and unbalanced education)."[1680] While they do not bring clear answers to the most well-known challenges, new public-private techno-experiments for improving city living are creating challenges of their own,[1681] and law has a part to play in this uncertain scenario.

However, there are some arguments that appear so frequently that they may seem to be consensual, like one about urban population growth which starts many articles, claiming that this challenge is so exceptional that it requires exceptional actions.[1682] The actions to address issues posed by about three quarters of the global population in megacities in a few decades are supposed to justify huge investments in solutions "to address these challenges with minimum human intervention."[1683] Such an argument of exceptionality would also justify rethinking the city in *revolutionary* ways—the term *revolutionary* restricted to technology—and with interdisciplinary efforts with a strong emphasis on hard sciences,[1684] which must be taken into consideration by those designing public policies. The development of modern science and modern law have a direct relation with the growth of urbanization: if it is a problem, it is well known by both.

[1679] Colin Harrison & Ian Donnelly, *A Theory of Smart Cities* (2011).
[1680] Minjie Guo et al, "An overview of smart city in China" (2016) 13:5 China Commun 203–211 at 203.
[1681] Steve Lohr, "Sidewalk Labs, a Start-Up Created by Google, Has Bold Aims to Improve City Living", *The New York Times* (10 June 2015), online: <https://www.nytimes.com/2015/06/11/technology/sidewalk-labs-a-start-up-created-by-google-has-bold-aims-to-improve-city-living.html>.
[1682] Raghunath Nambiar, R Shroff & S Handy, *Smart cities: Challenges and opportunities* (2018).
[1683] Waleed Ejaz & Alagan Anpalagan, "Internet of Things for Smart Cities: Overview and Key Challenges" in Waleed Ejaz & Alagan Anpalagan, eds, *Internet of Things for Smart Cities: Technologies, Big Data and Security* (Cham: Springer, 2019) 1 at 1.
[1684] Nicolas Verstaevel, Jérémy Boes & Marie-Pierre Gleizes, *From smart campus to smart cities issues of the smart revolution* (2017).

The dominant tech-managerial approach of the smart city makes it so that urban challenges are often interpreted as if they were of a technical and organizational nature.[1685] Under such a perspective, even what could be understood as human-related challenges would be treated as data-driven obstacles to achieve the "holy grail of smart cities… to improve the efficiency of the city's operations and the quality of life of citizens."[1686] Urban questions are then taken as data problems to be understood under different approaches, which lead to more questions that may be assisted by science and computation—including those of normative dimensions—but as cities are human constructs, the law and politics ruling cities should not be taken as a given (data).[1687] Therefore, it is not surprising that city officials designated to lead IT departments cannot limit their actions to technical solutions: it takes conciliating smart-related public policies with legal and political conditions to build near future-focused cities.[1688]

Also dependent on political guidance, public policies of privacy and security are known elements of legal concern which seem included in what would be the *technical challenges* to be faced by scientific approaches and technological solutions.[1689] There is no doubt that the subject has multiple technical dimensions, yet such reductionism is part of the smart city paradigm that sees urban problems as technical challenges whatever their social elements may be.[1690] Despite all good intentions and technical resources, even competent IT teams empowered by public policies may not be enough to tackle the privacy and security challenges of smart cities because

[1685] Carlos E Jiménez, Agusti Solanas & Francisco Falcone, "E-Government Interoperability: Linking Open and Smart Government" (2014) 47:10 Computer 22–24.
[1686] Auriol Degbelo et al, "Opening up smart cities: citizen-centric challenges and opportunities from GIScience" (2016) 5 ISPRS Int J Geo-Inf, online: <https://doi.org/10.3390/ijgi5020016>.
[1687] Martijn de Waal, "A city is not a galaxy - Understanding the city through urban data" in *Data and the City* (London: Routledge, 2017) 17.
[1688] Jeremy Coward, "Chief Smart City Officer: A Must-Have For All Future-Focused Cities", (5 June 2017), online: *IoT World Today* <https://www.iotworldtoday.com/2017/06/05/chief-smart-city-officer-must-have-all-future-focused-cities/>.
[1689] Kuan Zhang et al, "Security and Privacy in Smart City Applications: Challenges and Solutions" (2017) 55:1 IEEE Communications Magazine 122–129.
[1690] Lei Cui et al, "Security and Privacy in Smart Cities: Challenges and Opportunities" (2018) 6 IEEE Access 46134–46145.

they also depend on proper legal and political conditions for algorithmic accountability and qualified transparency.[1691] Without ignoring such barriers, a lasting argument for the pure-technical approach to the challenges of smart cities would be gathering the appropriate normative and technological elements under standard bodies,[1692] but would they be enough?

The several efforts toward standardization of urban practices and policies for smart cities have seen normative effects in the last years,[1693] when a series of new standards in national and international levels has been published to guide the challenges to be dealt with by municipal governance.[1694] The ISO 37120:2014 (*Sustainable development of communities—indicators for city services and quality of life*) gets into the details of what should be expected for the governance (and competition) of smart cities,[1695] including many issues that are not part of most smart city projects, such as, the civic engagement of women, convictions for corruption, and citizen representation in municipal elections.[1696] Such *smart citizen regimes* in the *Smart City ISO* could seem strange for a field that is far from basic agreements on concepts, at the same time that it gets more reasonable when acknowledging how much it was based on the British standard.[1697] *Techno-normative global solutions* for technical challenges can be quite political.

Even if the scientific literature-based search for global standards is to be adopted in the

[1691] Julia Powles, "New York City's Bold, Flawed Attempt to Make Algorithms Accountable" (21 December 2017), online: <https://www.newyorker.com/tech/annals-of-technology/new-york-citys-bold-flawed-attempt-to-make-algorithms-accountable>.
[1692] Yasir Mehmood et al, "Internet-of-Things-Based Smart Cities: Recent Advances and Challenges" (2017) 55:9 IEEE Communications Magazine 16–24.
[1693] Simon Joss, "Smart Cities: reflections on efforts to standardise a new concept" (2013) 2 Reflections.
[1694] Simon Joss, "Smart cities: from concept to practice" (2015) 9 Reflections.
[1695] Maria Lazarte, "How does your city compare to others? New standard to measure up", (14 May 2014), online: *ISO* <http://www.iso.org/cms/render/live/en/sites/isoorg/contents/news/2014/05/Ref1848.html>.
[1696] George Karayannis, "Dissecting ISO 37120: How voting, women and corruption figure in the smart city standard", (22 August 2014), online: *Smart Cities Council* <https://smartcitiescouncil.com/article/dissecting-iso-37120how-voting-women-and-corruption-figure-smart-city-standard>.
[1697] Simon Joss, Matthew Cook & Youri Dayot, "Smart Cities: Towards a New Citizenship Regime? A Discourse Analysis of the British Smart City Standard" (2017) 24:4 Journal of Urban Technology 29–49.

future, urban diversity in a world of internetworked urban systems is present in SF literature. The ease of moving between cities and finding high tech services almost everywhere is not to be confused with urban similarity in cyberpunk SF, cities can differ a lot in Gibson's *Neuromancer*:

> "It was like this when we headed for Chiba," Molly said, staring out the train window at blasted industrial moonscape, red beacons on the horizon warning aircraft away from a fusion plant. "We were in L.A. He came in and said Pack, we were booked for Macau. When we got there, I played fantan in the Lisboa and he crossed over into Zhongshan. Next day I was playing ghost with you in Night City." She took a silk scarf from the sleeve of her black jacket and polished the insets. The landscape of the northern Sprawl woke confused memories of childhood for Case, dead grass tufting the cracks in a canted slab of freeway concrete.[1698]

Gibson's extrapolation of Chiba City, a place he never visited but heard of from his wife's Japanese students visiting North Vancouver, could be seen as prescient as it was "a futuristic urban center in the planning—or, in Gibson's own words, as 'a deliberately unsupervised playground for technology itself,'"[1699] even if Ninsei Street was never really there. Ninsei Street in Chiba City plays a seminal role for the imaginary of future cities as the streets of L.A. in *Blade Runner.* Neuromancer's opening phrase about Chiba still echoes for discussing cities of today: "The sky above the port was the color of television, tuned to a dead channel."[1700] The urban sky of today is effectively gray in major cities affected by massive pollution, but also vibrant cloudless blue in those affected by droughts or a threatening *Blade-Runner-2049-orange* in other cities surrounded by fire. But still, "Gibson created a world like none I had ever seen, suturing together disparate pieces of a world we all knew, and returning to us a wholly believable entity."[1701]

Such patchwork also appears in Stephenson's *Snow Crash*, where he draws detailed

[1698] Gibson, *supra* note 1615 at 91.
[1699] Ian Lancashire, "Ninsei Street, Chiba City, in Gibson's 'Neuromancer'" (2003) 30:2 Science Fiction Studies 341–346 at 341.
[1700] Gibson, *supra* note 1615 at 1.
[1701] Gerald Brandt, "Vivid Hopelessness: William Gibson's Neuromancer", (29 February 2016), online: *Tor.com* <https://www.tor.com/2016/02/29/vivid-hopelessness-william-gibsons-neuromancer/>.

urban diversity not only in terms of architecture or culture, but of states and laws:

> Southern California doesn't know whether to bustle or just strangle itself on the spot. Not enough roads for the number of people. Fairlanes, Inc. is laying new ones all the time. Have to bulldoze lots of neighborhoods to do it, but those seventies and eighties developments exist to be bulldozed, right? No sidewalks, no schools, no nothing. Don't have their own police force — no immigration control — undesirables can walk right in without being frisked or even harassed. Now a Burbclave, that's the place to live. A city-state with its own constitution, a border, laws, cops, everything.[1702]

In what used to be California, in a context of the early 21st century, the United States has been broken apart by hypercapitalism into *sovereign bits,*[1703] a territory composed "by 'burbclaves' (relatively well-to-do suburban enclaves), 'franchulates' (franchises that control and compete for territories), narcotribes, city-states, and the rump federal government."[1704] In this techno-legal scenario of *Franchise-Organized Quasi-National Entities* (FOQNEs), Stepherson experiments with several ways in which new technologies can be used to differentiate urban areas from each other rather than be standardized by them. Among the literary experiments in *Snow Crash* feeding the imaginary of *hi-tech-city-states* of the future, one still stands out until today: "Mr. Lee's Greater Hong Kong, the grandaddy of all FOQNEs, handles it in a typically Hong Kong way, with robots."[1705]

There is a growing diversity of social contexts and tech projects forming a *Tower of Babel of institutional challenges*,[1706] which is abundant in the usual surveys on the scientific literature of smart cities;[1707] thus, whatever means smartness in one context should not be expected to

[1702] Stephenson, *supra* note 1618 at 6.
[1703] Ronnie D Lipschutz, *Political economy, capitalism, and popular culture* (Rowman & Littlefield Publishers, 2010) at 92.
[1704] Clausen, *supra* note 1631.
[1705] Stephenson, *supra* note 1618 at 45.
[1706] Zach Noble, "No smart city is an island", (23 October 2015), online: *FCW* <http://fcw.com/articles/2015/10/23/iot-nist-smart-cities.aspx>.
[1707] ChuanTao Yin et al, "A literature survey on smart cities" (2015) 58:10 Science China Information Sciences 1–18.

work for all other cities, especially if the crucial component of *funding* is included (and most times it is not).[1708] The diversity of institutional challenges does not inhibit the several flashy conference titles in *Smart City Expos* that promise to reveal a full working *universal model of smart city* to be followed by mayors,[1709] when they should mean presenting flexible *funding and implementation models* to cope with traditional regulatory and procurement models through PPPs.[1710] Fortunately, the *burbclaves* and *franchulates* in *Snow Crash* are still not a clear option of PPP, but their strange(?) resemblance recommends caution when streamlining public data between cities and the propositions of corporate sponsorship.[1711] New collaborative designs of *private-public-people partnerships* (PPPPs or 4Ps) have suggested conciliations of interests and values through public policies, but it remains to be seen if these potential forms of overcoming institutional challenges can go beyond the pure marketing efforts for privatization.[1712]

The diversity of conceptual, technical, and institutional challenges for rethinking cities for the future does not only exist between distant social contexts and different legal conditions, but it can happen in near cities of the same country, as in Canada.[1713] Canada's largest cities are recognized as important global technology hubs,[1714] and they are constantly in competitions

[1708] Federico Guerrini, "World's Top 7 Smart Cities Of 2015 Are Not The Ones You'd Expect", (28 January 2015), online: *Forbes* <https://www.forbes.com/sites/federicoguerrini/2015/01/28/worlds-top-7-smartest-cities-of-2015-are-not-the-ones-youd-expect/>.
[1709] Robert Álvarez Sastre, "Las #SmartCities: en busca de un modelo", (4 December 2014), online: *i·ambiente CITIES* <http://smartcities.i-ambiente.es/?q=blogs/las-smartcities-en-busca-de-un-modelo>.
[1710] Carlos Oliveira Cruz & Joaquim Miranda Sarmento, "Reforming traditional PPP models to cope with the challenges of smart cities" (2017) 18:1–2 Competition and Regulation in Network Industries 94–114.
[1711] Skip Descant, "Partnership Hopes to Streamline Smart City Data Sharing Between Cities, Industry", (26 September 2018), online: *Government Technology* <https://www.govtech.com/data/Partnership-Hopes-to-Streamline-Smart-City-Data-Sharing-Between-Cities-Industry.html>.
[1712] Urska Starc Peceny, Anita Macek & Rasto Ovin, "Evolution of Marketing in Smart Cities through the Collaboration Design" in Vito Bobek, ed, *Management of Cities and Regions* (Rijeka: InTech, 2017).
[1713] Yury Shupilov, "How Will Cities Look in the Future?", (2 May 2018), online: *Shupilov Real Estate News* <https://news.shupilov.com/section/market/predictions/how-will-cities-look-in-the-future/>.
[1714] Ryan Patrick Jones, "Toronto at the centre of 'smart city' R&D with launch of new technology hub", (20 May 2018), online: *CBC* <https://www.cbc.ca/news/canada/toronto/toronto-at-the-centre-of-smart-city-r-d-with-launch-of-new-technology-hub-1.4666040>.

about which city will become the smartest one.[1715] Despite the international image of a large country with extensive forests and lakes, Canada is predominantly an urban country with (serious traffic jams and) the mayors of major cities constantly announcing varied tools, ideals, and policies for moving their urban sprawls into the 21st century.[1716] Therefore, it should become less surprising to the eventual SF reader that Canada appears quite often in the background scenario of post-cyberpunk works, as in Madeline Ashby's *Company Town*:

> She scowled. "I don't always have the eggs baked in avocado, you know. Sometimes I have green juice." "Not since the cucumbers went out of season." Hwa stared. "You're stalking me." "I'm not stalking you. This is just how Lynch does things. We know what all our people buy in the canteen at lunch, because they use our watches to do it. It helps us know what food to buy. That way everyone can have their favourite thing. The schools here do the same thing—it informs the farm floors what to grow. This is no different."[1717]

Somewhere by the coast of Newfoundland, Canada, a city built on oil rigs is bought by the *Lynch Corporation*, and the company controls the urban logistics with digital sensors and automated actuators.[1718] The American-Canadian author, Madeline Ashby, brings to the book "one flavour of municipal governance by corporation that could conceivably emerge from modern tech-firm campuses, and a brief, rather optimistic take on 'smart city' urban planning."[1719] The detailed descriptions of daily life in a fully privatized smart town in Canada—not by surprise, fully dependent on the extraction of basic commodities—might come partly from the smart city bibliography consulted by the author, but she is able to communicate more about it to the non-

[1715] Jamie Orchard, "Beyond a smart city, is Montreal an intelligent community?", (26 March 2015), online: *Global News* <https://globalnews.ca/news/1903597/beyond-a-smart-city-is-montreal-an-intelligent-community/>.
[1716] Alex Bozikovic, "Expert advice on building the city of the 21st century", *The Globe and Mail* (13 February 2015), online: <https://www.theglobeandmail.com/news/toronto/expert-advice-on-building-the-city-of-the-21st-century/article22998067/>.
[1717] Ashby, *supra* note 1622 at 52.
[1718] Mahvesh Murad, "Live and Let Die: Madeline Ashby's Company Town", (18 May 2016), online: *Tor.com* <https://www.tor.com/2016/05/18/live-and-let-die-madeline-ashbys-company-town/>.
[1719] August C Bourre, "Company Town, by Madeline Ashby", (8 February 2017), online: *Vestige* <http://www.vestige.org/2017/02/07/company-town-by-madeline-ashby/>.

academic reader than any academic book could. Not by coincidence, Ashby was an author whose works provided inspiration and courage to bring cyberpunk into this research: one short story of hers published in a post-cyberpunk collection[1720] was even used as the basis for a first experience with *law & science fiction* as an *epistemological test-drive* for this dissertation.[1721]

Doctorow's *Walkway* was another very inspirational work for this dissertation and for building alternative possibilities for the imaginary of cities in the near future. Doctorow starts his story in a future-but-present Toronto and moves the protagonists to the Canadian countryside to become *walkaways* in an alternative community town using open-and-existent-technologies:

> "What about walkaways?" Hubert, Etc said. "Seems to me that they're doing something that makes a difference. No money, no pretending money matters, and they're doing it right now." Natalie and Seth looked at him. He finished his third slice. "They're weird and sketchy, but that goes with the territory whenever you're talking destroying the world as we know it and putting another one in its place."[1722]

The novel's characters do not have an easy life as *walkways*, but their life is quite idyllic when compared to the unnecessary material precarity for the poor majority in big cities: "in the wake of environmental disaster and political instability, the rich have grown richer… production is largely automated, and those even in the middle of the economic-social ladder have been left behind."[1723] In this context, Doctorow presents alternative ways and policies for urban living in a *post-scarcity world*, powered by open knowledge, social networks, digital blueprints, 3D printers,

[1720] Madeline Ashby, "Panic City" in Jason Heller & Joshua Viola, eds, *Cyber world: tales of humanity's tomorrow* (Erie: Hex Publishers, 2016) 79.
[1721] Cristiano Therrien, "Cidade futurista, inteligência artificial e ficção científica: expectativas, aprendizados e prudências" in Chiara de Teffé, Sérgio Branco & Victor Vicente, eds, *Cidades inteligentes em perspectivas* (Rio de Janeiro: Obliq, ITS, 2019).
[1722] Doctorow, *supra* note 1624 at 38.
[1723] Robert J Wiersema, "'A bravura piece of storytelling': Life in Cory Doctorow's dystopian Toronto hits a little close to home", (1 May 2017), online: *National Post* <http://bit.ly/National-Post-Life-Doctorow-Dystopian-Toronto>.

and recycled materials.[1724] Copyright (or copyleft?) plays major role in this novel, as well.

Just as Doctorow carries on with the best from Gibson's *Sprawl trilogy* to bring hope (and a will to change) to the reader, Older's *Infomocracy* provides a breath of fresh air to the cyberpunk dystopias that are becoming the normalized present, while echoing the better outcomes from the city-states with their own laws and security in Stephenson's *Snow Crash*.[1725] Further than Ashby and Doctorow, Older sets the story out of the cyberpunk Californian axis:

> On her day off, Mishima goes for a long walk. She cuts as straight a path as she can to the river, then turns left and follows its long bend through Paris. … She gets as far as the Île aux Cygnes before she decides to turn back. Tired, she shortens the return by cutting through the city. She crosses six different centenals on her way, and each border is obvious. Sometimes, it is the litter on the sidewalk coming to a sharp end, or the roads suddenly riddled with potholes, or the cluster of teenagers who have clearly crossed into the next centenal to smoke cigarettes before going back to class. One government—she doesn't even bother to check which—has set up sidewalk heaters along the central strip of the Boulevard Pasteur, and old women and unemployed men sit there, feeding the pigeons and drinking from brown paper bags. She passes through a street fair selling delicacies from sister centenals in the provinces, and detours into the shared territory of the Jardin du Luxembourg, restfully free of advids and animations by common treaty.[1726]

Infomocracy is the first book of Malka Older's trilogy, *The Centenal Cycle,* a rare work that allows the reader to think about alternative forms of cities, governments, politics, and law that could short-circuit most legal scholars and practitioners in urban law who were consulted for this research.[1727] In fact, the consultation of media and academic publications on the cities of the future never got as close to provide so many possibilities for urban policies as *Infomocracy*.

[1724] Navneet Alang, "The Post-Scarcity World", (May 2017), online: *Literary Review of Canada* <https://reviewcanada.ca/magazine/2017/05/the-post-scarcity-world/>.
[1725] Leah Schnelbach, "Snow Crash, Infinite Jest, and Our Cyberpunk Present", (2 January 2017), online: *Tor.com* <https://www.tor.com/2017/01/02/snow-crash-and-infinite-jest-predicted-a-cyberpunk-future-which-has-come-to-pass/>.
[1726] Older, *supra* note 1626 at 363.
[1727] Abigail Nussbaum, "A Political History of the Future: State Tectonics by Malka Older", (26 November 2018), online: *Lawyers, Guns & Money* <http://www.lawyersgunsmoneyblog.com/2018/11/political-history-future-state-tectonics-malka-older>.

Considering public policy as a matter shared with law, the legal challenge of smart cities is the last set of challenges to be put into perspective in this subchapter, as limited and open as it might appear. After all the publications on smart cities from legal scholars were convened here for this dissertation—an extensive and exhaustive search, but limited up to the year of 2018—it is now obvious that "the smart city represents a domain in which legal scholarship does not yet have a strong foothold,"[1728] and yet it represents an opportunity for *law and technology* because the subject gathers several techno-social issues and legal approaches (often treated separately) and puts them together under the same multicomplex challenge. The subject of smart cities can be meaningful for Information Technology Law, as it obliges legal scholars to go beyond the traditional boundaries of law. Besides that, it collaborates with other domains and professionals engaging with uncertainty in the regulation of emerging technologies, and addressing questions that are not only legal, but also ethical and essential for the present and the future.[1729]

The urban diversity in the present and future invoked by cyberpunk SF was instrumental for setting a perspective for law in which the challenges for smart cities are as numerous as their projects, contexts, and outcomes. It is not a quest of finding an appropriate legal formula for the "smart city problem" because, even when considering a specific context and a more defined set of technologies, it is evident that "[e]xisting laws and legal and policy frameworks may not be fully adequate to address smart cities challenges."[1730] As stated by Scassa, the multiple governance issues of smart cities might require a "rethinking of the existing law and policy infrastructure almost at pace with the emerging and evolving technologies,"[1731] an endeavour

[1728] Matthew Jewell, "Contesting the decision: living in (and living with) the smart city" (2018) 32:2–3 International Review of Law, Computers & Technology 210–229 at 15.
[1729] Lachlan Urquhart, "Ethical dimensions of user centric regulation" (2018) 47:4 ACM SIGCAS Computers and Society 81–95.
[1730] Teresa Scassa, "Smart cities data - governance challenges", (12 September 2018), online: *Teresa Scassa Blog* <https://www.teresascassa.ca/index.php?option=com_k2&view=item&id=285:smart-cities-data-governance-challenges&Itemid=80>.
[1731] *Ibid*.

that will require more than good legal advice (and reasonable dissertations) from legal scholars.

Whenever legal scholars are called on to provide answers to the challenges related to smart cities, the first expected images of the legal elements composing the collective imaginary of the subject, without a doubt, are evocative of matters of privacy and security. Legislation and jurisprudence might bring solace and shed light on the matter because there are smart-related technologies that have been object of consideration of parliaments and courts,[1732] but more is still left to be discussed than what can be found. Satisfactory judicial solutions and applicable laws targeting these specific elements might not even be able to deal with the "consequences of this huge new data space for our privacy, security and rights of personality and personal autonomy."[1733] Broader and provocative questions on smart cities, the truly paradigmatic challenges, have been brought forward by legal scholars around the world and are converging into public debate,[1734] hopefully to amplify and advance the legal imaginary of the subject.

There are advances for the *opacity* challenges when they are matched with *intelligibility* and *compliancy* policies, which are never the same anywhere. In this sense, the research agrees with Ranchordás and Klop when they affirm that the first legal challenge to face is "the disconnect between law and technology,"[1735] if there is hope to overcome the gaps between traditional legal frameworks and data-driven regulation. A reconnected law is necessary if the *smart citizens* are to become more than consumers of *franchulates* or *walkways* due to lack of choice.

[1732] Adel S Elmaghraby & Michael M Losavio, "Cyber security challenges in Smart Cities: Safety, security and privacy" (2014) 5:4 J Adv Res 491–497.
[1733] Michael M Losavio et al, "The Internet of Things and the Smart City: Legal challenges with digital forensics, privacy, and security" (2018) 1:e23 Security and Privacy.
[1734] Sofia Ranchordás, "Law and Autonomous Systems Series: Cities as Corporations? The Privatization of Cities and the Automation of Local Law", (18 April 2018), online: *Oxford Law Faculty* <https://www.law.ox.ac.uk/business-law-blog/blog/2018/04/law-and-autonomous-systems-series-cities-corporations-privatization>.
[1735] Sofia Ranchordás & Abram Klop, "Data-Driven Regulation and Governance in Smart Cities" in Vanessa Mak, Eric T T Tai & Anna Berlee, eds, *Research Handbook on Data Science and Law* (Chelteham: Edward Elgar, 2018) at 261.

3.3.2.3. The Risk: "Is It Worth All the Trouble?"

As discussed in the first chapter, *risk* is at the core of the (re)production of law, so this dissertation comes back to that subject in all chapters, also reflecting the importance of the term in the consulted literature. *Risk* appears more than 275 times in the database *Websites* and 86 times in *Academic Publications*. The collocations in *Figures 85* and *86* are able to reveal more about the concerns emerging from *future* cities than the smoothed term *challenge* could.

Figure 85: Main links of the term *risk* in *Websites*, using *Voyant Tools*

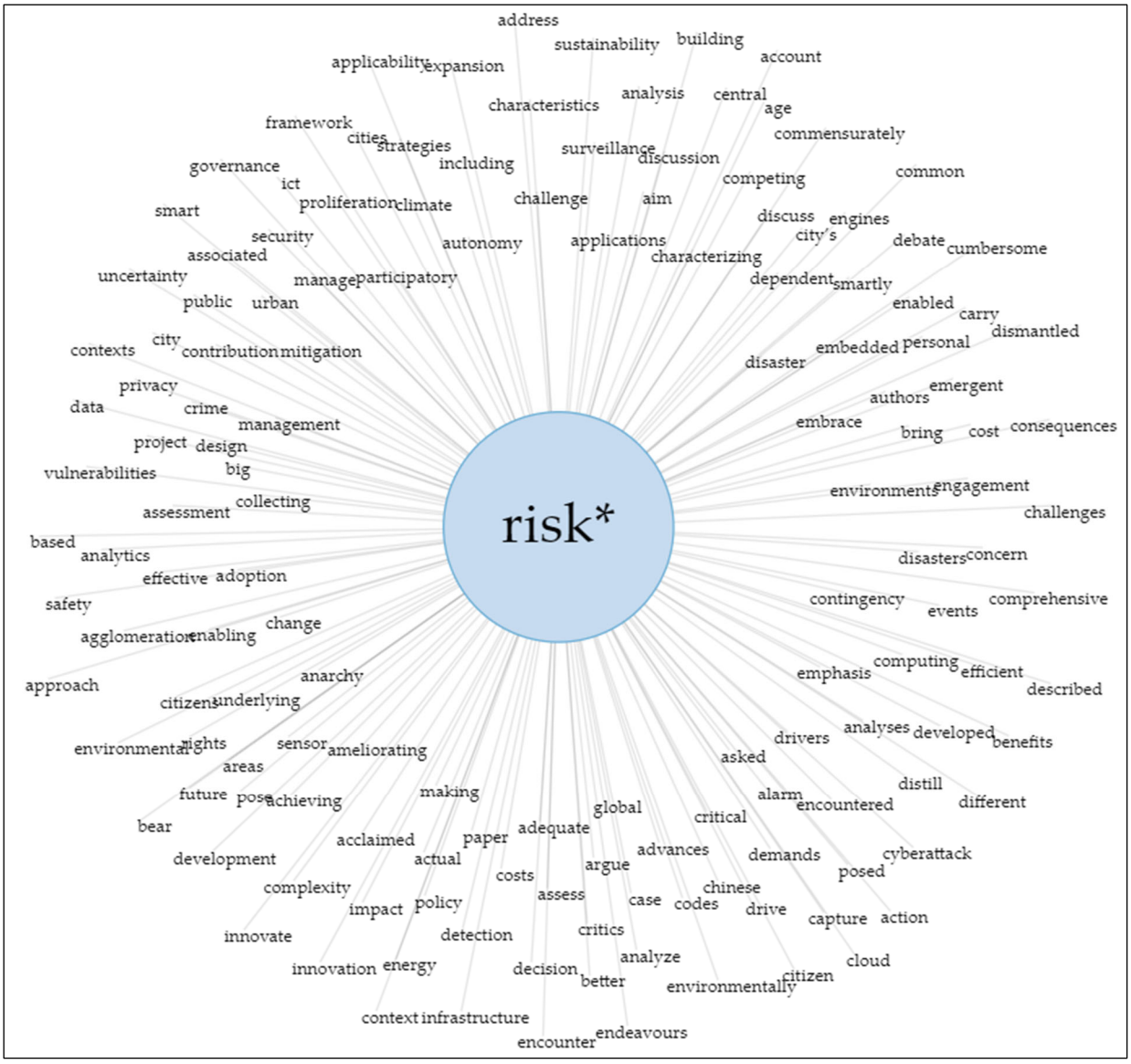


Figure 86: Main links of the term *risk* in *Academic Publications*, using *Voyant Tools*

The assessment and mitigation of risk is the underlying condition for the planning and management of the cities of the future. Governance must be designed to address the threats to urban life, their critical impacts and potential consequences, and to enable efficient decision-making and effective action. There is an emphasis on the detection and reduction of crime, but all issues concerning the city are to be considered, including dangers related to public safety, environmental disasters, security breaches, and attacks to services and infrastructure.

The *smart city discourse* promises control over all urban components, "a return to a more modernist, rational planning tradition centred upon digital technology as standardising process for decision-making,"[1736] as a way of quantifying and mitigating the risks of cities with the support of data analytics.[1737] Such a bold promise has justified tech projects in major cities like New York and Rio de Janeiro, in alignment with corporations such as CISCO and IBM, that neglected "basic concerns related to the social, ethical and human rights implications and risks of smart solutions,"[1738] a promise of doubtful fulfillment. There are inevitable high risks in using innovative technologies which can lead to the total failure of smart projects. They can vary according to each context and demand unique strategies, even if some risks are more likely than others.[1739]

Such strategies are more often associated with the optimistic term *challenge* than to *risk* when referring to *user-generated data* in smart cities and to the data governance that has become a requirement for managing the (relatively unknown) *transformative credentials of smartness*.[1740] Moreover, *data governance* and *risk governance* are becoming one and the same for dealing with the emergent vulnerabilities and systemic risks of smart city projects.[1741] In times when "cities are gradually transformed into living labs,"[1742] it is risky even to pick (or miss) the *right model* of governance for each context among the many models of governance available.[1743]

[1736] Simon Joss, "Smart city: a regressive agenda?" (2016) 15 Reflections at 1.
[1737] Derek Porter, "Why Smart Cities Need Risk Management", (27 November 2018), online: *EfficientGov* <https://efficientgov.com/blog/2018/11/27/why-smart-cities-need-risk-management/>.
[1738] Gemma Galdon-Clavell, "(Not so) smart cities?: The drivers, impact and risks of surveillance-enabled smart environments" (2013) 40:6 Science and Public Policy 717–723 at 722.
[1739] Taewoo Nam & Theresa A Pardo, *Smart City as Urban Innovation: Focusing on Management, Policy, and Context* (New York: Association for Computing Machinery, 2011).
[1740] Krassimira Paskaleva et al, *Data governance in the sustainable smart city* (Multidisciplinary Digital Publishing Institute, 2017).
[1741] Stig O Johnsen, "Risks, Safety and Security in the Ecosystem of Smart Cities" (2018) Risk Assessment 205.
[1742] Anna Berti Suman, "The smart transition: an opportunity for a sensor-based public-health risk governance?" (2018) 32:2–3 International Review of Law, Computers & Technology 257–274.
[1743] Simon Elias Bibri, "Managing Urban Complexity: Project and Risk Management and Polycentric and Participatory Governance" in *Smart Sustainable Cities of the Future* (Springer, 2018) 419.

Picking the riskier subject in the bowl of smart city options, big cities are investing (big) in Big Data analytics for crime detection and prediction.[1744] In short, such initiatives intend "to create a safer city by enabling crime and risk analysis of unstructured crime reports, criminal history of suspects, auto-license data, location-specific data, etc. for crime fighting efforts."[1745] At the same time, expanding the dependence on data for municipal safety and emergency services renders the whole system more susceptible to disruptions. In other words, while trying to mitigate risks, more risks are been created.[1746] Despite this, big cities are still promoting "sci-fi dreams" by combining police departments with researchers from universities to identify potential homicides among networks of people[1747]—someone should warn them how this kind of sci-fi usually ends.

If it is not certain how it will end, at least it is possible to say how it started. *Neuromancer's* protagonist*,* Case, is the first hacker of *cyberspace* (because the term was born with the book):

> Case was twenty-four. At twenty-two, he'd been a cowboy, a rustler, one of the best in the Sprawl. He'd been trained by the best, by McCoy Pauley and Bobby Quine, legends in the biz. He'd operated on an almost permanent adrenaline high, a byproduct of youth and proficiency, jacked into a custom cyberspace deck that projected his disembodied consciousness into the consensual hallucination that was the matrix. A thief, he'd worked for other, wealthier thieves, employers who provided the exotic software required to penetrate the bright walls of corporate systems, opening windows into rich fields of data.[1748]

Neuromancer's publication (July 1, 1984) brought much insight about the elements that were already present at the time.[1749] It could be seen as an early warning that, if there are digital

[1744] Yevgeniy Sverdlik, "Chicago CIO: Big Data for big-city problems", (22 October 2012), online: *DCD* <https://www.datacenterdynamics.com/news/chicago-cio-big-data-for-big-city-problems/>.
[1745] Debopriya Ghosh et al, *Big data-based smart city platform: Real-time crime analysis* (ACM, 2016) at 58.
[1746] Olivera Kotevska et al, "Dynamic Network Model for Smart City Data-Loss Resilience Case Study: City-to-City Network for Crime Analytics" (2017) 5 IEEE Access 20524–20535.
[1747] Shalene Gupta, "Cities dream of a 'smart' sci-fi future", (26 January 2015), online: *Fortune* <https://fortune.com/2015/01/26/kansas-city-smart-city/>.
[1748] Gibson, *supra* note 1615 at 5.
[1749] Mark Sullivan, "Neuromancer turns 25: What it got right, what it got wrong", (1 July 2009), online: *Macworld* <https://www.macworld.com/article/1141500/neuromancer-25.html>.

systems, there will be people and ways to intrude them regardless of their security measures:

> Case shrugged, sipped coffee.
> "You're a console cowboy. The prototypes of the programs you use to crack industrial banks were developed for Screaming Fist. For the assault on the Kirensk computer nexus. Basic module was a Nightwing microlight, a pilot, a matrix deck, a jockey. We were running a virus called Mole. The Mole series was the first generation of real intrusion programs."
> "Icebreakers," Case said, over the rim of the red mug.
> "Ice from ICE, intrusion countermeasures electronics."[1750]

Gibson repeatedly states that he is not a prophet, "that 'science fiction is never about the future' and that 'this whole idea of the predictive capacity of S.F. is so tedious and wrong,'" but he still gets references as "'Oracle Watch: A (Very Partial) List of Everything William Gibson Has Predicted Over the Years,' crediting Gibson with foreseeing Google Glass, normcore, the gentrification of San Francisco, and the rise of 'competitive unpaid internships.'"[1751] Not exactly a "futurist," Gibson also speaks much about a past that needs to be less ignored by cybersecurity:

> "He knows. Knows it's not the same. Hasn't been, not for a long time. I been in the trade forever. Way back. Before the war, before there was any matrix, or anyway before people knew there was one."
> He was looking at Bobby now.
> "I got a pair of shoes older than you are, so what the fuck should I expect you to know? There were cowboys ever since there were computers. They built the first computers to crack German ice. Right? Codebreakers. So there was ice before computers, you wanna look at it that way."[1752]

Count Zero, the second volume of the Sprawl trilogy, had a weaker impact than *Neuromancer,* maybe because the inversions between them are less understood.[1753] In contrast with Case, Bobby is the small-time *cowboy* naïvely hacking databases for self-affirmation and looking for sense with lasting questions: "Then what's the matrix? …what's cyberspace?"[1754] The

[1750] Gibson, *supra* note 1615 at 31.
[1751] Gabriel Winslow-Yost, "William Gibson's Man-Made Future" (8 December 2014), online: <https://www.newyorker.com/books/page-turner/william-gibsons-man-made-future>.
[1752] Gibson, *supra* note 1616.
[1753] Istvan Csicsery-Ronay Jr, "Antimancer: Cybernetics and Art in Gibson's 'Count Zero'" (1995) 22:1 Science Fiction Studies 63–86.
[1754] Gibson, *supra* note 1616.

answer that Bobby gets is not far from what hackers look for until today: *the world*.

As many CIOs could quote about municipal networks and systems exposed in the *matrix*, "if you build it, they will come,"[1755] and they will be far less romantic than Case and Bobby. Kitchin and Dodge expose the risky paradox of smart cities better than anyone. These are "promoted as an effective way to counter and manage uncertainty and urban risks through the effective and efficient delivery of services," while their technologies also "create new vulnerabilities and threats, including making city infrastructure and services insecure, brittle, and open to extended forms of criminal activity."[1756] By all means, there are well-recognized standards and procedures to promote *security and privacy by design*,[1757] but people may remain bothered by smart cities while total solutions for all vulnerabilities remain as fictional as Asimov's city of Trantor.[1758]

The most acclaimed cyberpunk works (and the best hard SF such as those from Isaac Asimov) present neither near nor fail-proof perspectives for security, whatever the technology used. In Older's *Infomocracy*, the most relevant system of all—the one that gives sense to the narrative, the system running over all the systems—is knocked out, despite all of the massive investments and equipment, sophisticated procedures, and high-level skills of the IT team:

> "But Maryam and the other techies keep saying it couldn't be done, because the system is so decentralized. It's easy to knock out, physically I mean, a server in one centenal. But everything else can be routed around it. Knock out one centenal and the system doesn't even notice. Not even the people in the affected centenal would know."
> "What about a virus?"
> "They say it's unlikely. Well, they say it's impossible, but I'm revising that down to unlikely, given that something happened. Essentially, everyone's saying it

[1755] Bob Violino, "Smart cities are here today -- and getting smarter", (12 February 2014), online: *Computerworld* <https://www.computerworld.com/article/2487526/emerging-technology-smart-cities-are-here-today-and-getting-smarter.html>.
[1756] Rob Kitchin & Martin Dodge, "The (In)Security of Smart Cities: Vulnerabilities, Risks, Mitigation, and Prevention" (2017) Journal of Urban Technology 1–19 at 1.
[1757] Yoichi Seto, "Application of Privacy Impact Assessment in the Smart City" (2015) 98:2 Electronics and Communications in Japan 52–61.
[1758] Federico Guerrini, "Are Smart Cities Really Smart?", online: *Forbes* <https://www.forbes.com/sites/federicoguerrini/2014/05/06/the-pros-and-cons-of-smart-cities/>.

> couldn't be done."
> "Couldn't be done without…"
> "Either an army of hackers or … someone on the inside."[1759]

Despite political discourses and IT sales pitches for smart city projects saying otherwise, impenetrable and *risk-free* cyber security is not a feasible goal anytime soon, if ever. Hard science fiction has been saying it for a long time, including warnings about all the high hopes in emerging technologies that are expected to advance the field (for both sides in crime).

In Ian McDonald's *Brasyl*, low-life Gerson has stolen an expensive bag from a high-class Brazilian woman. The bag has an advanced version of the RFID tags that are deployed in transit and security applications for smart cities. Gerson has about 40 minutes before getting killed:

> Senhora Ana Luisa Montenegro de Coelho taps her big ochre I-shades and sends an assalto report and photo through to Austral Insurance and Security.
> Bandana over face. For sure. No plates. Of course. But ten kilometers over São Paulo an Angel of Perpetual Surveillance turns on the back-loop of its eternal holding pattern and logs a stolen handbag. From the snow of ever-moving arfid signatures it identifies and locates the radio frequency identification chips that uniquely tagged the Anton Giorelli Habbajabba handbag recently registered to Senhora Ana Luisa Montenegro de Coelho. It calls up its neuralnet map of São Paulo's two thousand square kilometers and twenty-two million souls; searches through every burb, bairro, downtown, favela, mall, alley, park, soccer stadium, racetrack, and highway; and finds it swinging purpleand-pinkly from the elbow of Gerson João Oliveira de Freitas, hunched over the handlebars of his hand-me-down moped, buzzing like a neon through the home-run along Ibirapuera. A contract goes out. Automated bid systems in the dozen private security companies that can reach the target on budget submit tenders. Fifteen seconds later a contract is issued from Austral Insurance to Brooklin Bandeira Securities.
> …
> "What is it you're trying to tell me? They can't blank the arfid?"
> "It's some new thing they call an NP-chip."
> …
> As Gerson understood it, it was all timing. It took ten minutes average, twenty minutes tops to erase an arfid; the closest the seguranças could get in that time was a five-kilometre circle of confusion, and it would blow their budget to search that large area. Most turned around and headed home as soon as they lost the signal from the arfid.
> …
> Then the door had opened. Mr. Smiles stepped out of the stinky camper.
> He was an IT graduate from the University of São Paulo, the hacker of the outfit. He was a big skinny Cabo Verde with a great and well-tended Afro and dentition that made him look as if he was always smiling. The smile did not sit naturally

[1759] Older, *supra* note 1626.

> with the pump-action shotgun in his hand.
> “Hey hey hey…" cried Gerson, spluttering flakes of sweet roll.
> "Gerson, nothing personal, but you have thirty seconds to get on your bike and depart."
> "What what what?" Gerson said, catching the Habbajabba as Mr. Smiles lobbed it to him.
> "It’s NP-chipped. I can’t touch that."
> "NP what? What shit? You’re the scientist; you should know about these things."
> "I’m an information technologist, majoring in database design. This is quantum physics. Get a physicist. Or just go to the river and throw the thing away. You choose, but I’m not facing off with the Brooklin Bandeirantes.
> And I will shoot you."[1760]

Fortunately for Gerson and his brother Edson (the main protagonist in the 2032 timeline), they are able to meet Kia, a cyber physicist “who dabbles in illegal quantum machinery,”[1761] inside a big truck in the *crazy-even-for-fiction* traffic of a futuristic São Paulo. The high expectations of today on quantum technologies (or artificial intelligence) for improving security and fighting crime are likely not to be met, as advanced by cyberpunks. When it becomes doable and profitable for one side, the same goes for the other side, as the “high-tech criminals who use quantum computers to elude the mass surveillance state of a futuristic cyberpunk Brazil.”[1762]

Crime is a very representative issue for thinking about *risks in the smart city* because it brings together: one of the main justifications for smart projects promoted by governments; one of the maximum representations of risk to be avoided and remedied by law; and one of the areas that will suffer the most consequences due to the technological changes in society. It is a very complex issue that cannot be discussed or solved by the law & technology scholarship alone. Still, legal research (and science) tends to simplify it into *privacy versus transparency* debates.

Such scope reduction about the legal risks in smart cities is not prejudicial. On the

[1760] McDonald, *supra* note 1625 at 27–30.
[1761] Eric Brown, “A brave new world: Brasyl by Ian McDonald”, *The Guardian* (3 August 2007), online: <https://www.theguardian.com/books/2007/aug/04/featuresreviews.guardianreview13>.
[1762] Ted Gioia, “Brasyl by Ian McDonald”, (16 February 2018), online: *Conceptual Fiction* <http://www.conceptualfiction.com/brasyl.html>.

contrary, the debate about balancing privacy and transparency is legitimate, instrumental, and essential. It brings much to the table and adds some secondary effects, such as securing municipal services and infrastructure, as well as engaging all sorts of stakeholders. The debate gets more fruitful when exposing the privacy risks related to public policies for opening municipal data—raw personal data, pseudonymized data, anonymized data, and non-personal data—in accordance with the principles of law.[1763] Also, to debate the risks related to privacy deficiencies and security limits of governments for deploying data analytics on their own—lack of expertise, dependence on private actors, too much opacity of algorithmic processes—it takes promoting public policies of transparency.[1764] All these elements form a fuzzy network of subjects that might appear to be focused on fewer aspects, considering the limits of language and practices of law that tend to reduce it to dualities such as *opaque versus clear*, but it is only apparent.

This research started with the intent of contrasting open data policies and personal data protection in smart city projects under the perspective of balancing benefits and risks of innovation, but it moved to face the (hidden) complexity of the subject. Fortunately, a team of much more capable researchers—including Ryan Calo, a major reference in the law & tech scholarship—developed a broad and transdisciplinary study with the City of Seattle for assessing the risk of their open data policies and practices. The publication is extensive and deserves the attention of all those involved in transparency and privacy policies for smart cities. Their "results suggest the need for more comprehensive measures to manage the risk latent in opening city data" and recommend "ex ante and ex post protocols to govern the push, pull, and spill of

[1763] Frederik Zuiderveen Borgesius, Jonathan Gray & Mireille van Eechoud, "Open data, privacy, and fair information principles: Towards a balancing framework" (2015) 30:3 Berkeley Technology Law Journal 2073–2131.
[1764] Robert Brauneis & Ellen P Goodman, "Algorithmic transparency for the smart city" (2018) 20 Yale JL & Tech 103.

data."[1765] The details in their analysis are abundant, their synthesis of the hopes and concerns of open data may bring more to the field than it has accumulated so far; but equally important are their questions about future research which points to there being a lot more to be asked.

In this sense, what used to be science fiction for a near future has become the accepted present, and the novel *Little Brother* by Cory Doctorow represents this very well. Written in 2006 and distributed under an open license, the book questions the information flows in cities from the point of view of the citizen better than anything analyzed by the research. A good example is the passage about when the young protagonist Marcus is detained and taken home by police officers because his movements in the city using public transportation were *out of pattern*:

> "We identified your son as someone with a nonstandard public transit usage pattern, as part of a new proactive enforcement program. When we spot people whose travels are unusual, or that match a suspicious profile, we investigate further."
> "Wait," Mom said. "How do you know how my son uses the Muni?"
> "The Fast Pass," he said. "It tracks voyages."
> "I see," Mom said, folding her arms. Folding her arms was a bad sign. It was bad enough she hadn't offered them a cup of tea—in Mom-land, that was practically like making them shout through the mail slot—but once she folded her arms, it was not going to end well for them. At that moment, I wanted to go and buy her a big bunch of flowers.
> "Marcus here declined to tell us why his movements had been what they were."
> "Are you saying you think my son is a terrorist because of how he rides the bus?"[1766]

Many years have passed since the publication of *Little Brother*, and headlines about privacy risks from city surveillance do not cause as much noise and legal reactions as they should.[1767] So, the book remains inevitable and appreciated for the goals of the research.[1768]

[1765] Jan Whittington et al, "Push, pull, and spill: A transdisciplinary case study in municipal open government" (2015) 30:3 Berkeley Technology Law Journal 1899–1966 at 1900.
[1766] Doctorow, *supra* note 1624.
[1767] Jesse W Woo, "Smart Cities Pose Privacy Risks and Other Problems, but That Doesn't Mean We Shouldn't Build Them" (2016) 85 UMKC L Rev 953.
[1768] Cory Doctorow, "Ten Years Later, Cory Doctorow's Little Brother Remains Inevitable", (26 April 2018), online: *Tor.com* <https://www.tor.com/2018/04/26/ten-years-of-cory-doctorows-little-brother/>.

3.3.2.4. The Surveillance: "Every Breath You Take, Every Move You Make…"

The most widely recognized *challenge*—it seems lighter than saying *risk*—in near *future* cities is *surveillance*. Therefore, it is not a surprise that the term came up frequently during the research. *Surveillance* appears 227 times in *Websites* and 94 times in *Academic Publications*, often composing expressions such as video surveillance, mass surveillance, and surveillance state. Other associated terms can be found in the collocations displayed in *Figures 87* and *88*.

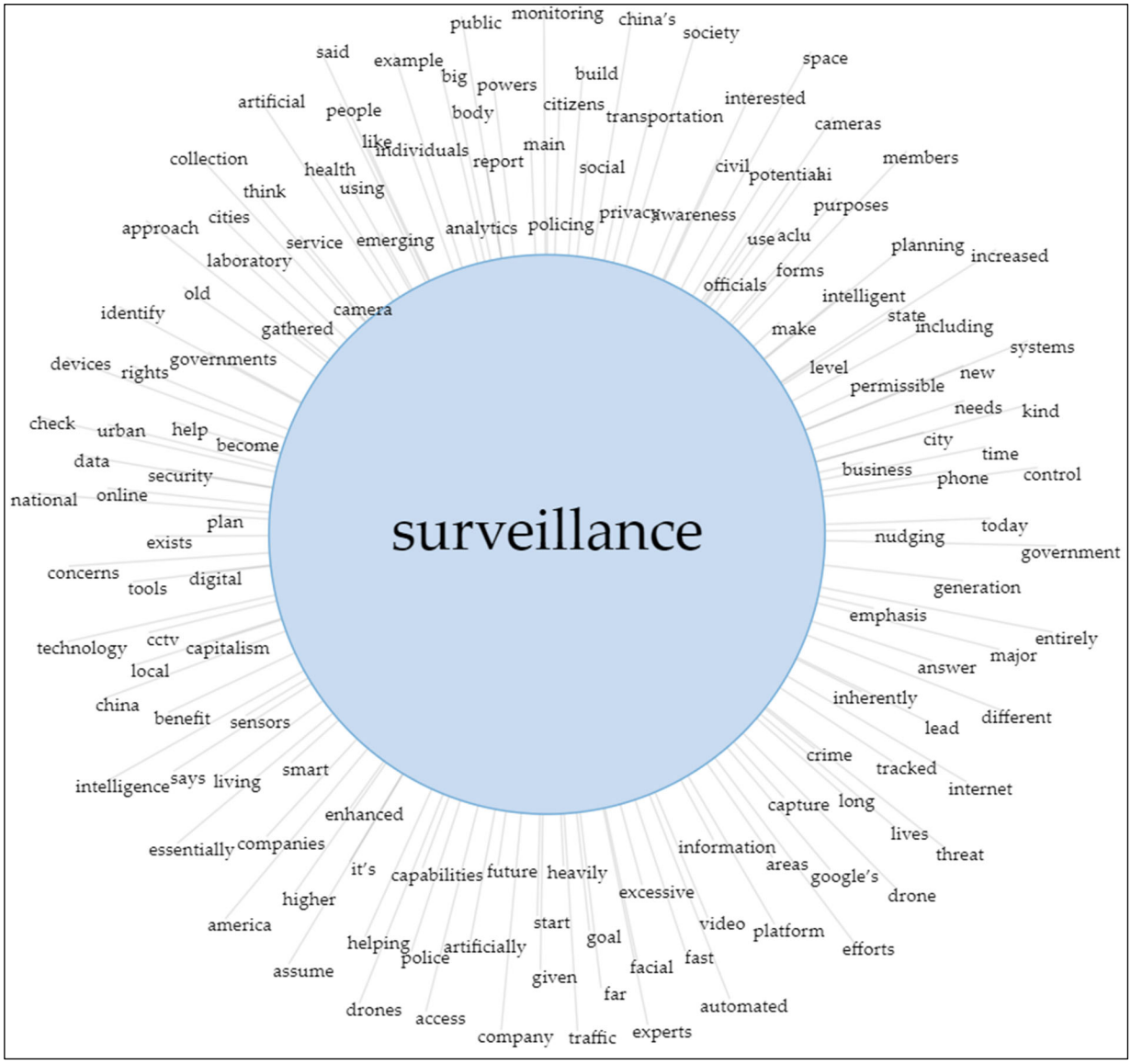


Figure 87: Main links of the term *surveillance* in *Websites*, using *Voyant Tools*

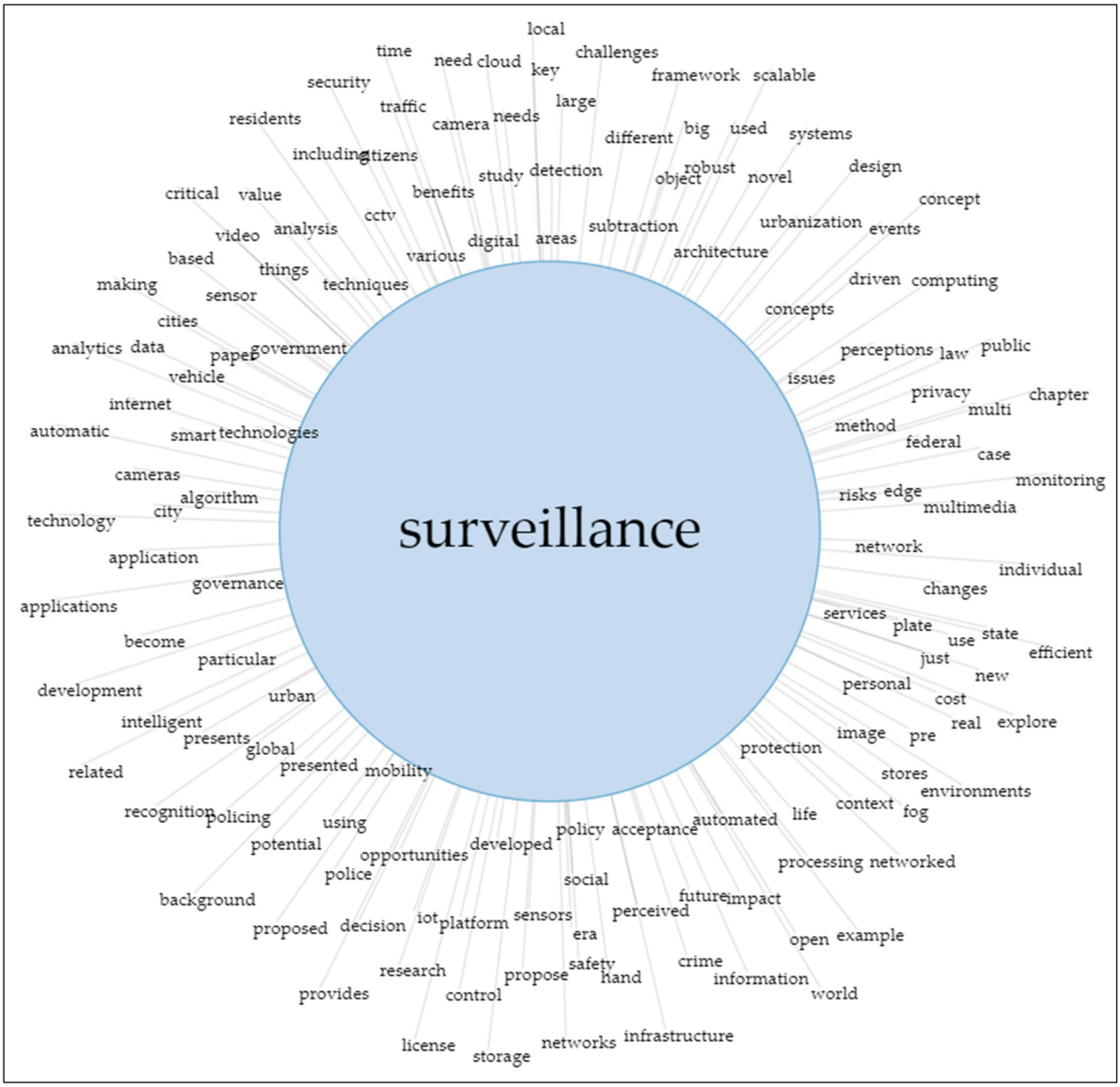


Figure 88: Main links of the term *surveillance* in *Academic Publications*, using *Voyant Tools*

Surveillance capitalism is building the smart city as the big information laboratory for all monitoring technologies related to the capture, analysis and control of data from citizens and governments. CCTV cameras, IoT sensors, social platforms, networked vehicles, and tracked phones are examples of enhanced tech that used to be *threats to privacy and other rights* but are becoming socially accepted for urban mobility and public security. There are many concerns for (the future of) law and few answers on policies for the excessive powers of surveillance.

Powers of ubiquitous government surveillance are (literally) in town, policing is becoming embedded into the urban infrastructure and "relying upon both private and public forms of data collection and response,"[1769] all showcasing rising trends that that are not only due to technology. There is not much doubt that smart city projects are fascinating laboratories for *trial runs* of new technologies and *proof of concept* of applications that may become lucrative patents.[1770] Yet, the centralization of power in smart cities is not an experiment but an imperative that goes beyond technological capabilities and toward "a state of normalized surveillance."[1771]

The utopian visions of the *city of tomorrow* that were largely predominant in the twentieth century and projected benevolent uses for urban computing were replaced at the end of the century by dystopian science fiction that is now possible with today's technologies, enabling "a vast erosion of individual freedoms, and creating innumerable opportunities for abuse."[1772] It goes without saying that the best dystopian science fiction describing urban surveillance came from cyberpunk authors like Gibson, who represented cyberspace (the Internet) as a city:

> Gentry knew a lot about cyberspace, or anyway he talked about it, but Slick couldn't remember anything about getting unconscious and just staying jacked in… People jacked in so they could hustle. Put the trodes on and they were out there, all the data in the world stacked up like one big neon city, so you could cruise around and have a kind of grip on it, visually anyway, because if you didn't, it was too complicated, trying to find your way to a particular piece of data you needed. Iconics, Gentry called that.[1773]

Mona Lisa Overdrive, the last novel of Gibson's *Sprawl trilogy*, follows the same successive timeline alternating passages between the cyberspace and cities in "a world under

[1769] Elizabeth E Joh, "Policing the smart city" (2019) 15:2 International Journal of Law in Context 177–182 at 181.
[1770] Soledad Pellicer et al, *A Global Perspective of Smart Cities: A Survey* (2013).
[1771] Tarun Wadhwa, "Smart Cities: Toward the Surveillance Society?" in *Smart Cities as Democratic Ecologies* (Springer, 2015) 125 at 139.
[1772] Cranshaw, *supra* note 894.
[1773] Gibson, *supra* note 1617 at 16.

constant surveillance."[1774] Kumiko, one of the characters, is a voice used by Gibson to declare his fascination "on how differently *gomi* (waste and trash) figures in the three global metropolises, Tokyo, London, and New York,"[1775] form "a vast generic tumble that was her century's paradigm of urban reality."[1776] Everything, even *gomi,* is surveilled in such urban paradigm.

To a greater or lesser extent, an almighty surveillance could be found in all cyberpunk novels analyzed by the research, including those written long before the Internet or *Google Earth*:

> There is something new: A globe about the size of a grapefruit, a perfectly detailed rendition of Planet Earth, hanging in space at arm's length in front of his eyes. Hiro has heard about this but never seen it. It is a piece of CIC software called, simply, Earth. It is the user interface that CIC uses to keep track of every bit of spatial information that it owns—all the maps, weather data, architectural plans, and satellite surveillance stuff.[1777]

The *CIC* describes "the Central Intelligence Corporation of Langley, Virginia,"[1778] that replaced the CIA—surveillance is still a big part of its business after the crumbling of the US government—and the Library of Congress,[1779] gathering all information available. This virtual reality app *Earth*, described in 1992 by Neal Stephenson, would be less surprising today:

> Hiro looks up, focuses his gaze on Earth, zooms in for a look. As he gets closer, the imagery he's looking at shifts from the long-range pictures coming in from the geosynchronous satellites to the good stuff being spewed into the CIC computer from a whole fleet of low-flying spy birds. The view he's looking at is a mosaic of images shot no more than a few hours ago.[1780]

[1774] Thomas M Disch, "Lost in Cyberspace", *The New York Times* (11 December 1988), online: <https://www.nytimes.com/1988/12/11/books/lost-in-cyberspace.html>.
[1775] Christopher Palmer, "'Mona Lisa Overdrive' and the Prosthetic" (2004) 31:2 Science Fiction Studies 227–242 at 234.
[1776] Gibson, *supra* note 1617 at 160.
[1777] Stephenson, *supra* note 1618 at 106.
[1778] *Ibid* at 21.
[1779] Matthew Panzarino, "Twitter, envisioned in 1992 as a cyberpunk data pool that replaces the CIA and Library of Congress", (30 October 2012), online: *The Next Web* <https://thenextweb.com/twitter/2012/10/31/twitter-envisioned-in-1992-as-a-cyberpunk-data-pool-that-replaces-the-cia-and-library-of-congress/>.
[1780] Stephenson, *supra* note 1618 at 267.

In the near future of *Snow Crash*, there is no perspective of privacy in the physical reality, and surveillance and punishment are the methods of control used by powerful hypercapitalists to rule their privatized world.[1781] In contrast, the only place where Hiro escapes from surveillance is in the *Metaverse*, "a vision of a virtual city that is a working utopia… like Plato's city-state."[1782] Ironically, the near future cities advertised by smart projects present them as functional utopias powered by surveillance technologies very similar to those in the *Sprawl trilogy* and *Snow Crash*.

The most well-known of such technologies, video surveillance, is largely considered "a matured field in terms of deployment and technology," and that "most of the new age cameras are smart enough to embed basic analytics algorithms."[1783] Flexible surveillance platforms of today are capable of integrating huge numbers of cameras, sensors and networks, "even installed on drones that rapidly may change their Internet access point,"[1784] to provide accuracy and performance in real time for urban "situational awareness."[1785] Not coincidentally, terms such as *situational awareness* and *video security* are used by smart city projects to promote the perception of safety and to achieve public acceptance of surveillance devices and policies in urban environments.[1786] As a result, all of the major cities of the world have video surveillance systems with a growing number of cameras,[1787] and there is no lack of video surveillance projects for full urban coverage. For example, "to the whole island of Montreal (almost 506 km^2), it would

[1781] Lisa Swanstrom, "Capsules and Nodes and Ruptures and Flows: Circulating Subjectivity in Neal Stephenson's Snow Crash" (2010) 37:1 Science Fiction Studies 54–80.
[1782] Carl Boehm, "'Hiro' of the Platonic: Neal Stephenson's 'Snow Crash'" (2004) 14:4 (56) Journal of the Fantastic in the Arts 394–408.
[1783] Swarnava Dey et al, *Smart city surveillance: Leveraging benefits of cloud data stores* (2012) at 868.
[1784] Gabriele Baldoni et al, *A dynamic, plug-and-play and efficient video surveillance platform for smart cities* (2017) at 611.
[1785] Ning Chen et al, *Enabling Smart Urban Surveillance at The Edge* (2017).
[1786] Julia van Heek, Katrin Aming & Martina Ziefle, *"How fear of crime affects needs for privacy & safety": Acceptance of surveillance technologies in smart cities* (2016).
[1787] Ryan Miller, "These Are The Most Heavily Surveilled Cities In The World For 2019", (20 August 2019), online: *CEOWORLD magazine* <https://ceoworld.biz/2019/08/20/these-are-the-most-heavily-surveilled-cities-in-the-world-for-2019/>.

require roughly 50,000 cameras, 6000 APs, and 1 Tbps data throughput."[1788] Considering that privately owned CCTV cameras far outnumber publicly owned cameras "operated by the police and local authorities by a factor of somewhere around 70:1,"[1789] and the increasing digital integration of public and private footage, it can be said that *surveillance is already in town*.[1790]

It is easier to agree now that the *future is already here but it's not evenly distributed*,[1791] or to recognize that surveillance represents the most sensible risk in smart cities to be considered by regulation today, but it was not for the lack of warning. For long, Doctorow's *Little Brother* has been saying it *freely and openly,* under an accessible form for all publics but one in particular:

> I'm a senior at Cesar Chavez High in San Francisco's sunny Mission district, and that makes me one of the most surveilled people in the world.[1792]

If it was once a very near future SF written for a younger audience, the paradoxes of protection and surveillance exposed by *Little Brother* should have gotten more attention.[1793] Doctorow's novel could stand on the shelves of the *current affairs* sections in libraries today:

> I moved down the corridor lightly and sprightly, keeping my gait even and measured for the gait-recognition cameras. These had been installed only a year before, and I loved them for their sheer idiocy. Beforehand, we'd had face-recognition cameras covering nearly every public space in school, but a court ruled that was unconstitutional. So Benson and a lot of other paranoid school administrators had spent our textbook dollars on these idiot cameras that were supposed to be able to tell one person's walk from another. Yeah, right.
>
> I got back to class and sat down again, Ms. Galvez warmly welcoming me back. I unpacked the school's standard-issue machine and got back into classroom mode. The SchoolBooks were the snitchiest technology of them all, logging every keystroke, watching all the network traffic for suspicious keywords,

[1788] Nhat-Quang Dao et al, "Management of Video Surveillance for Smart Cities" in Muthucumaru Maheswaran & Elarbi Badidi, eds, *Handbook of Smart Cities: Software Services and Cyber Infrastructure* (Cham: Springer, 2018) 285 at 307.
[1789] Brian Sims, "UK CCTV: Why We Need More Regulation", (22 July 2013), online: *IFSEC Global* <https://www.ifsecglobal.com/video-surveillance/uk-cctv-why-we-need-more-regulation/>.
[1790] About CCTV numbers in global cities, see it here: http://bit.ly/CCTVCamerasByCityAndCountry.
[1791] Misquoting the aphorism from William Gibson. He won't mind, nobody agrees on the exact form of it.
[1792] Doctorow, *supra* note 1624 at 1.
[1793] Felix Larsson, *Paradoxes of Protection: Surveillance and Dystopia in Cory Doctorow's Little Brother* (Student thesis, 2013) [unpublished].

> counting every click, keeping track of every fleeting thought you put out over the net. We'd gotten them in my junior year, and it only took a couple months for the shininess to wear off. Once people figured out that these "free" laptops worked for the man—and showed a never-ending parade of obnoxious ads to boot—they suddenly started to feel very heavy and burdensome.[1794]

The novel provides details and insights for a generation that can better understand (and change)[1795] the *postoptic data-mining systems of surveillance:* "smart cities represented in Little Brother… are contemporaneous with those that many of its readers experience where electronically ticketed transport systems, mobile technologies, and electronic surveillance are part of the fabric of everyday life."[1796] The Foucaultian image of the panopticon, evoked many times to describe the disciplinary powers of smart cities,[1797] is still useful to discuss Orwell's *Big Brother*,[1798] and it is applicable to Doctorow's *Little Brother* as well,[1799] but only if looking at what Orwell have missed and Foucault had better described: the technologies used for surveillance and control by the state can also be used by individuals to deter them,[1800] and that power will always be faced by *sites of resistance*. Smart city tech will be confronted by resistance tech.

Developing social theory on smart cities is essential to imaging alternative public policies to the dominant model of surveillance, and the intellectual friendship of Michel Foucault and Giles Deleuze can offer much assistance for doing so. Inspired by Foucault for advancing surveillance literature, the Deleuzian concept of the *spectrum of control* has much to offer to social theory

[1794] Doctorow, *supra* note 1624 at 6.
[1795] John Baichtal, "Cory Doctorow's Little Brother is a Manual for our Kids to Save the Future" *Wired* (26 September 2008), online: <https://www.wired.com/2008/09/geekdad-revie-3/>.
[1796] Kerry Mallan, "Surviving the Electronic Panopticon: New Lessons in Democracy, Surveillance, and Community in Young Adult Fiction" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (London: Palgrave Macmillan UK, 2015) 142 at 143.
[1797] Francisco R Klauser & Ola Söderström, "Smart city initiatives and the Foucauldian logics of governing through code" in *Smart Urbanism* (Routledge, 2015) 108.
[1798] George Orwell, *Nineteen eighty-four* (London: Penguin, 2008).
[1799] Josh Constine, "Grab Your Cameras, We Are Little Brother", (25 November 2014), online: *TechCrunch* <http://social.techcrunch.com/2014/11/25/little-brother-is-watching-them/>.
[1800] FORAtv, "'Little Brother' and What Orwell Got Wrong - Cory Doctorow", (7 June 2010), online: *YouTube* <https://youtu.be/W2lEZ3tDmHw>.

and legal theory for advancing "normative guidelines for governance of the pervasive surveillance and control mechanisms that constitute an emerging critical infrastructure of the *smart city*."[1801] Such development may also require the assistance of hard science fiction. The city imagined by Félix Guattari, where a person would move through the city "thanks to one's (dividual) electronic card that raises a given barrier… that tracks each person's position,"[1802] has become a lot more powerful and requires a lot more imagination:

> Through the sun-shiver the endless towers of São Paulo recede into half-believed spirits of architecture, their summits orbited by advertisements. Helicopters itch and fidget between rooftop landing pads; there are people up there who have never touched the ground. But higher still are the Angels of Perpetual Surveillance. On any clear-sky day you may catch them, a flicker on the very edge of vision, like stray cells floating in the jelly of the eye, as they turn in their orbits and their vast, gossamer wings catch the light. Sixteen sky-drones, frail as prayers, circle constantly on the borders of the troposphere. Like angels, the robot planes fly endlessly; they need, and can, never touch the ground again; like angels, they see into the hearts and intentions of man. They monitor and track the two billion arfids—radio frequency identity chips—seeded through the cars, clothes, consumer electronics, cash, and cards of the City of Saint Paul's twenty-two million inhabitants. Twenty kilometers above the Angels of Perpetual Surveillance, balloons the size of city blocks maneuver in the tropopause, holding position over their ground datatransfer stations. Exabits of information chatter between them, the seamless weave of communication that clothes not just Brasil but the planet. Higher still, beyond all sense and thought, and global positioning satellites tumble along their prescribed orbits, tracking movements down to a single footstep, logging every transaction, every real and centavo. Highest of all, God on his stool, looking on Brasil and its three hundred million souls, nostalgic for the days when his was the only omniscience.[1803]

Ian McDonald imagines a futuristic Brazil just twelve years away from the closing of this dissertation, when quantum technologies pose a threat to the *public-private state of surveillance* able to follow every movement of people and things on the streets and in the networks. Out of the American-European-Japanese cyberpunk axis, this is a strange but familiar world that is best described by Cory Doctorow: "Remember how you felt the first time you read Neuromancer, the

[1801] Jathan Sadowski & Frank A Pasquale, "The spectrum of control: A social theory of the smart city" (2015) 20:7 First Monday.
[1802] Gilles Deleuze, "Postscript on the Societies of Control" (1992) 59 October 3–7 at 7.
[1803] McDonald, *supra* note 1625.

first time you saw Blade Runner, that feeling of a future that is all glittering promise and thunderous threat."[1804] *Brasyl* is one of those SF novels that can provide more useful *hard & soft* elements for science and law than piles (or gigabytes) of media publications and academic works combined, but it is even better if added to them. Another recommended combination for thinking about surveillance in SF would be reading McDonald's *Brasyl* with his other novels set in India (*River of Gods*), Africa (*Chaga*), and Turkey (*The Dervish House*):[1805] it allows reflections with less postcolonialist elements, a necessary subtraction for better thinking the *present future*.

Above all other possibilities, the best time-space to think about surveillance is in the fast-paced present of China, a very complex sociolegal context where the biggest smart city projects of the world are taking place under an accelerated rhythm. "China's surveillance culture existed long before the rise of big data,"[1806] and the new techno powers for micromanagement are bringing more precise results. They are considered an improvement over the previous situation, and they have been followed by new regulation. This is perhaps best summarized by a key expression in the consulted literature, "cyber security and informatization are two wings of one body."[1807] It may help foreign researchers to better understand the fast-tracked laws and policies—at least considering North American and European Union parameters—that are being set in motion within Chinese smart cities. There are social concerns being generated by the hundreds due to ongoing smart projects in China, and numerous risks (not limited to surveillance) that are reflected in China's Cybersecurity Law, a very detailed set of regulations that could

[1804] Cory Doctorow, "Ian McDonald's Brasyl - mind-altering cyberpunk carioca", (30 April 2007), online: *Boing Boing* <https://boingboing.net/2007/05/01/ian-mcdonalds-brasyl.html>. But it should be "mind-altering *paulista* cyberpunk", because it is not exacly *carioca*. São Paulo is already cyberpunk, by the way.
[1805] Cory Doctorow, "Ian McDonald's DERVISH HOUSE, superb novel of the mystical nano future of Istanbul", (12 July 2010), online: *Boing Boing* <https://boingboing.net/2010/07/12/ian-mcdonalds-dervis.html>.
[1806] Yasheng Huang, "China's use of big data might actually make it less Big Brother-ish", (22 August 2018), online: *MIT Technology Review* <https://www.technologyreview.com/s/611814/chinas-use-of-big-data-might-actually-make-it-less-big-brother-ish/>.
[1807] Max Parasol, "The impact of China's 2016 Cyber Security Law on foreign technology firms, and on China's big data and Smart City dreams" (2018) 34:1 Computer Law & Security Review 67–98.

contribute to the subject in other countries. Still, there are concerns that "China's latest Cybersecurity Law is not adequate to address the risks to citizens' privacy," especially when considering "the growing personal data risks emerging in the smart city campaign."[1808] Considering the approach of literature used here, it would be more fruitful to reflect on the exquisite Chinese SF tradition when considering the specific context of the country.

As was explored in this research, smart cities form a networked ecosystem where the main international experiences set the expectations for all others, and this inevitably includes the legal perspectives on surveillance. Most of the Western world is now paying special attention to the European smart policies related to the GDPR and the possible interpretations from their plural data protection agencies,[1809] as well as to the US court decisions related to smart technologies, such as the cases of connected cars that can potentially impact the global smart city market.[1810] Surveillance technologies are representative examples of how much smart cities could impact several legal areas because they, according to lawyers in the field, go beyond privacy and "touch the full range of communications law and regulation, data law, commercial contracts, tort and product liability, administrative and even constitutional law."[1811] The GRDP is expected to be useful in many ways for European judges facing the *Big Brother perception* of smart cities, but there are also expectations that "sera sûrement nécessaire d'adapter le cadre législatif… afin de trouver un équilibre parfois complexe entre la protection des libertés

[1808] Fan Yang & Jian Xu, "Privacy concerns in China's smart city campaign: The deficit of China's Cybersecurity Law" (2018) 5:3 Asia & the Pacific Policy Studies 533–543 at 540.
[1809] Àngels Barbarà Fondevila, "Smart Cities: videovigilancia, Internet de las Cosas y big data", (15 January 2015), online: *APEP - Asociación Profesional Española de Privacidad* <https://www.apep.es/smart-cities-videovigilancia-internet-de-las-cosas-y-big-data/>.
[1810] Dorothy J Glancy, "Sharing the road: Smart transportation infrastructure" (2013) 41 Fordham Urb LJ 1617.
[1811] Malcolm Dowden & David Berry, "The law of the city - is it smart enough?", (2 February 2016), online: *Lexology* <https://www.lexology.com/library/detail.aspx?g=c2d46d66-e507-433b-8112-44076078c862>.

individuelles et de l'ordre public numérique."[1812] Moreover, as privacy concerns appear only as an afterthought in smart surveillance projects, the ultimate legal concern here is that "the really smart city arrives before the law catches up with it or we realize how powerful the data collection and processing have become."[1813] For the perspectives in the West, smart city surveillance may become the ultimate test-drive for the resilience of privacy in *cities-that-are-not-that-smart-yet*.

To conclude this topic, the research cannot recommend enough the article titled *Smart Cities, Big Data, and the Resilience of Privacy* by Janine S. Hiller and Jordan M. Blanke. They apply multidisciplinary theories and risk models that were once proposed for this research. Regarding surveillance, the research could not agree more with the authors: "individual privacy may not survive in a smart city where every movement is tracked, compared with everyone else's movements, combined with vast troves of individually identified data, and immediately used to 'nudge' behaviors."[1814] The current concepts of privacy, too narrow for the risks brought by Big Data, can *brittle and break*, "ceasing to exist, because of the stresses imposed upon it."[1815] Above all other reasons, climate change may become the perfect alibi for *full-surveillance cities.*

> Cities held most of the world's population. Human computing systems, blood and gut bacteria, vitamins and medicines, workouts, and infinite streams of data and entertainment flowed through the city like the milk of a mother's teat. Objects customized themselves to meet every whim and need of the city's many inhabitants.[1816]

The smart eco-city in Cooper's *Wilders* may help to give law some heads-up about it.

[1812] Myriam Quéméner, "Enjeux juridiques et perspectives de la smart & safe city", (14 April 2017), online: *S&D Magazine* <https://sd-magazine.com/smart-safe-cities/enjeux-juridiques-perspectives-de-smart-safe-city>.
[1813] Albert Gidari, "'Smart Cities' Are Too Smart for Your Privacy", (20 February 2017), online: *Center for Internet and Society at Stanford Law School* <http://cyberlaw.stanford.edu/blog/2017/02/smart-cities-are-too-smart-your-privacy>.
[1814] Janine S Hiller & Jordan M Blanke, "Smart Cities, Big Data, and the Resilience of Privacy" (2016) 2 Hastings LJ 309–356 at 312.
[1815] *Ibid* at 354.
[1816] Cooper, *supra* note 1623 at 8.

3.3.2.5. The Climate (Change): "We Will Never Forgive You"

Despite the indisputable popularity of *surveillance* as a *risk* for the cities of the *future*, *climate* change should be seen as the most critical *challenge* for humanity in the present. The two-word term shows up in all sorts of publications, at least 75 times in the *Websites* database and 31 times in *Academic Publications*. Other climate-related expressions are used with similar meaning, so the term *climate* in *Figures 89* and *90* represents the general issue well.

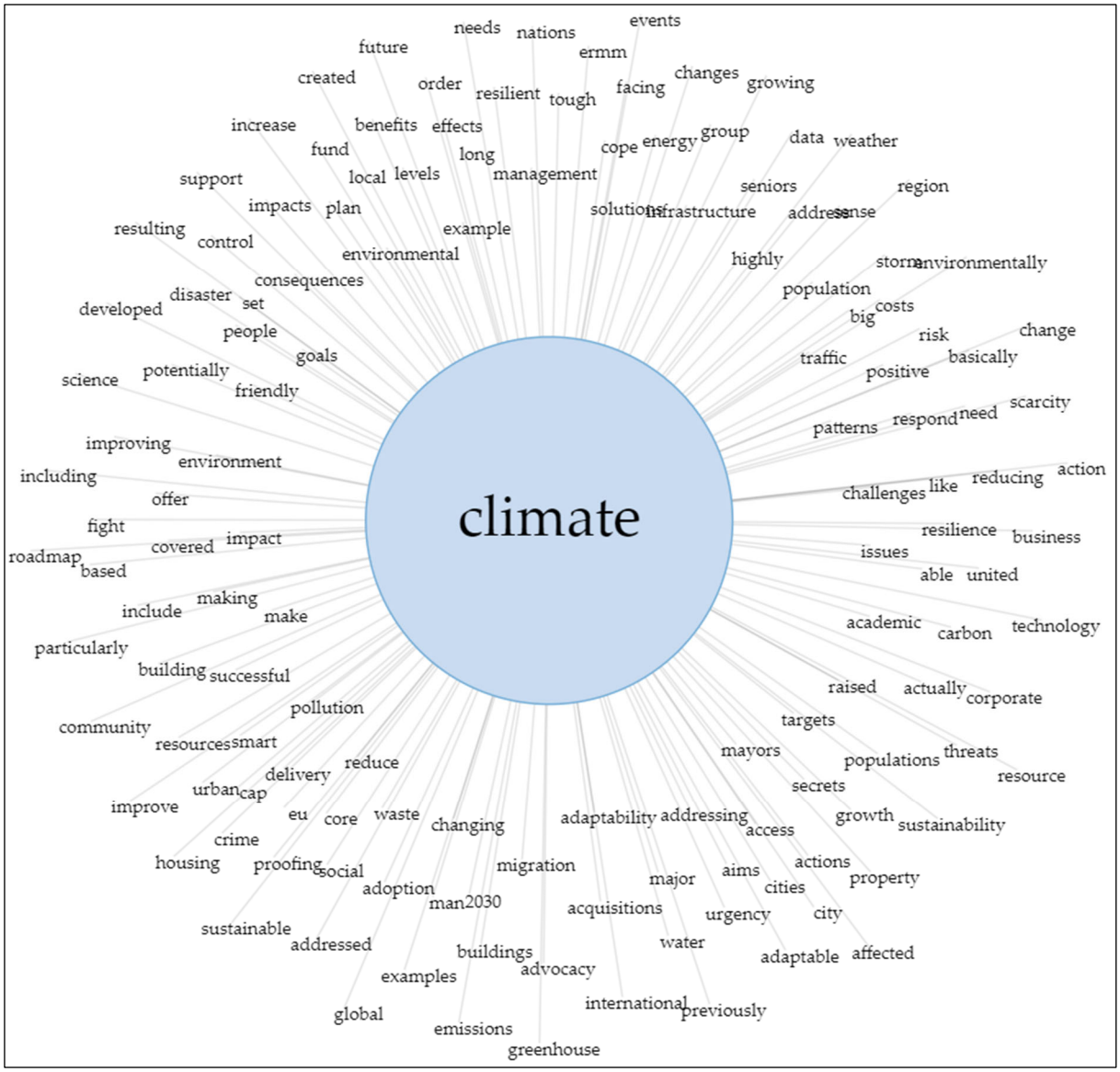


Figure 89: Main links of the term *climate* in *Websites*, using *Voyant Tools*

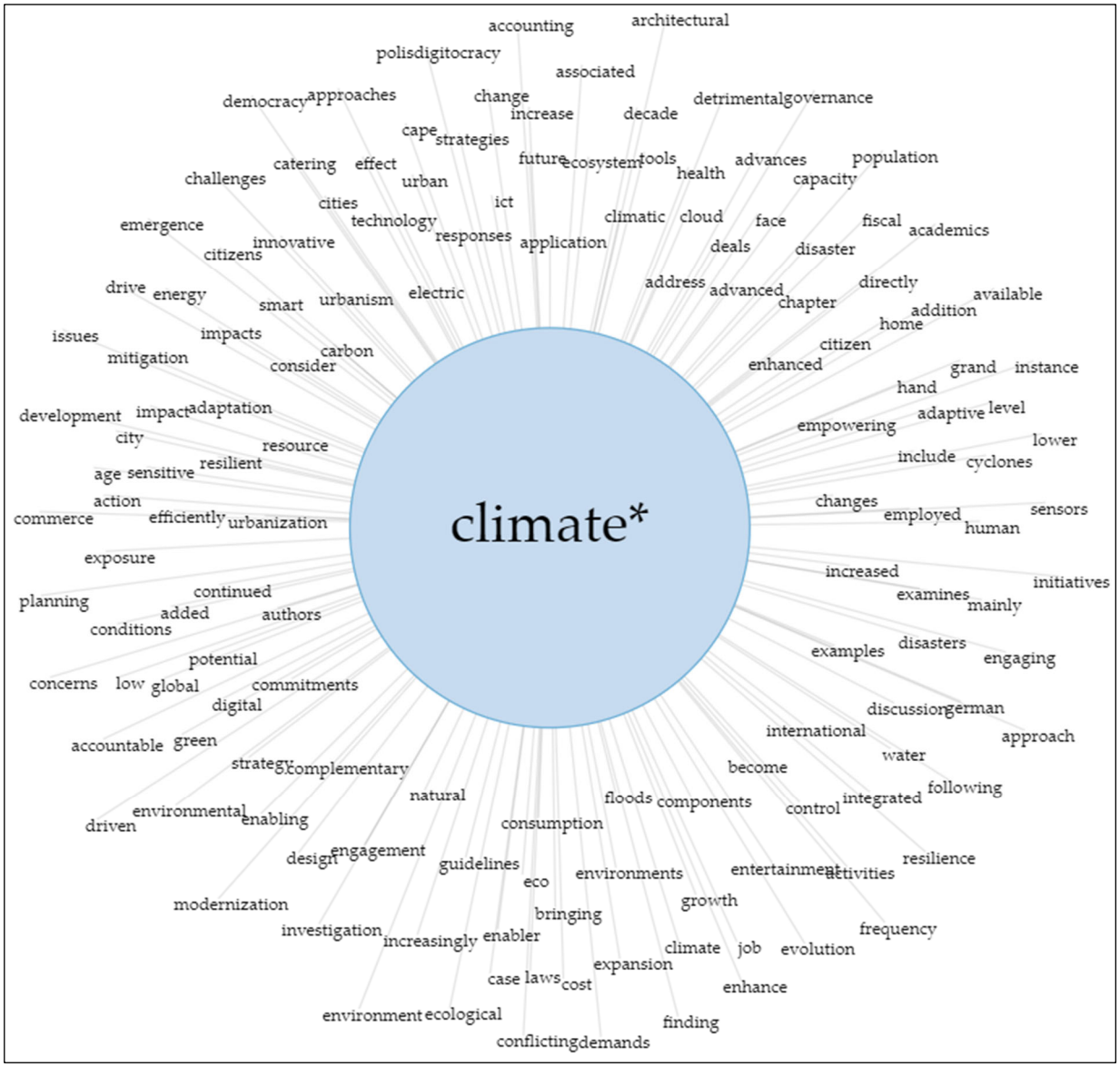


Figure 90: Main links of the term *climate* in *Academic Publications*, using *Voyant Tools*

The smart eco-city is the roadmap for the future, or so academics and mayors (and even some corporations) suggest it should be, if the concerns and consequences of climate change are to be addressed. To respond to the global challenges and local risks regarding the impact of environmental changes and the growth of urban populations, there are conflicting demands to be managed—reducing consumption of natural resources and improving urban conditions, for example—that need sustainable solutions, green technologies, and new commitments for law.

The digital reconfiguration of cities has been planned as a (partial) solution to the problem that cities have aggravated. The *smart eco-city* label incorporates the *sustainability toolkit* of low-carbon green design, urban impact assessments, resource conservation, and resilience planning to combat climate change.[1817] It represents a paradigm shift where "cities consume close to three quarters of the world's natural resources and generate three quarters of its pollution and waste."[1818] Moreover, most major cities are situated in coastal and riverside areas, ergo, the most vulnerable areas to climate change. The concerns and propositions for the sustainable city came long before anything was called a smart city, and there are gaps between the *smart* and *sustainable frameworks,* but it did not prevent the sustainability assessments from being incorporated as goals and indicators for smart cities to fight climate change.[1819]

Climate change and environmental degradation produced by the greed of hypercapitalist corporations are part of the *cyberpunk toolkit*,[1820] with a touch of nuclear waste. The *Blade Runner* look of urban decay and technological dystopia "changed the way the world looks and how we look at the world," according to William Gibson,[1821] and it makes up part of the cyberpunk canon. This decadent and polluted scenario was never restricted to a futuristic California:

> "You ever been to 'Stambul?'
> "Couple days, once."
> "Never changes," she said. "Bad old town."
> "It was like this when we headed for Chiba," Molly said, staring out the train window at blasted industrial moonscape, red beacons on the horizon warning aircraft away from a fusion plant.[1822]
> …
> It was raining in Beyoglu, and the rented Mercedes slid past the grilled and unlit

[1817] Kwi-Gon Kim, "Evolution of Climate Resilience and Low-Carbon Smart City Planning: A Process" in K Kim, ed, *Low-Carbon Smart Cities: Tools for Climate Resilience Planning* (Cham: Springer, 2018).
[1818] Parvez Hayat, "Smart Cities: A Global Perspective" (2016) 72:2 India Quarterly 177–191 at 177.
[1819] Hannele Ahvenniemi et al, "What are the differences between sustainable and smart cities?" (2017) 60 Cities 234–245.
[1820] Elana Gomel, "Recycled dystopias: cyberpunk and the end of history" (2018) 7:3 Arts 31.
[1821] Chris O'Falt, "5 Ways 'Blade Runner' Changed the Look of Sci-Fi Forever", (3 October 2017), online: *IndieWire* <https://www.indiewire.com/2017/10/blade-runner-influence-cyberpunk-sci-fi-ridley-scott-1201883053/>.
[1822] Gibson, *supra* note 1615 at 91–92.

> windows of cautious Greek and Armenian jewelers. The street was almost empty, only a few dark-coated figures on the sidewalks turning to stare the car. "This was formerly the prosperous European section of Ottoman Istanbul," purred the Mercedes.[1823]
> …
> It was a sluggish country. He watched a dull black Citroen sedan, a primitive hydrogen-cell conversion, as it disgorged five sullen-looking Turkish officers in rumpled green uniforms.
> …
> The alley was an old place, too old, the walls cut from blocks of dark stone. The pavement was uneven and smelled of a century's dripping gasoline, absorbed by ancient limestone.[1824]
> …
> He climbed back into the Honda. Condensation dribbled from the hydrogen-cell exhaust as the red fiberglass chassis swayed on chromed shocks.[1825]

Published during the long international crisis of energy and oil, "the energy imaginary of *Neuromancer"* brings scenarios where the characters walk (a lot) in Chiba, take trains in the Sprawl, and only "drive" an autonomous-speaking Mercedes in *bad old Istambul*.[1826] Energy is widely available and even a fusion plant can be seen, but streets seem empty, gasoline is a sign of century-old technologies, and even cars powered by hydrogen-cells look old and flawed. It seems that an energy transition has happened in the future of *Neuromancer*. In contrast, gasoline is still abundant in the near future of *Snow Crash*, and other energy sources as well:

> Neither Hiro nor Eliot ever mentions, or even notices, the by-now-obvious fact that Fisheye is traveling with a small, self-contained nuclear power source—almost certainly radiothermal isotopes like the ones that power the Rat Thing. As long as Fisheye refuses to notice this fact, it would be rude for them to bring it up.[1827]

Energy ressources (and guns) are all over in Snow Crash, "a satire of the social utopia for which libertarians (and many Silicon Valley gurus) long: a world with no 'Leviathan-like' state,

[1823] *Ibid* at 93.
[1824] *Ibid* at 99.
[1825] *Ibid* at 140.
[1826] Brent Ryan Bellamy, "Neuromancer: The Cultural Logic of Late Fossil Capital?" (2019) 5:1 Open Library of Humanities at 13.
[1827] Stephenson, *supra* note 1618 at 348.

in which individual initiative and enterprise can thrive and social problems can be ignored."[1828] In this hypercapitalist anti-Utopia, nuclear energy empowers vehicles, weapons, animal-bots, and people. Nevertheless, if it is rude to comment about travelling with a nuclear-powered companion and the inconvenient effects of using "nuclear fairy dust" in a fight,[1829] it may be safe to affirm that the devastating environmental consequences of nuclear wars did not teach enough lessons to change private practices driven by competition and self-regulation. In cities and SF, having more than enough resources may not be worth it if their consequences are too damaging.

Even the eco-smart promises of delivering *more for less* are going to represent a high price for cities and their inhabitants to pay. The so-called *green technologies* are presented as "a lasting opportunity for cultural, economic and social growth within a healthy, safe, stimulating and dynamic environment,"[1830] but the experiences available do not consider a systemic and integrated approach for scalable and interoperable infrastructure. For example, electric vehicles emerged as a transportation technology that is environmentally friendly,[1831] but they impose costly infrastructural conditions on electric grids, communication networks, and IoT sensors to provide energy and exchange data. Still, the *smart & green* narrative sets the data-driven approach to "assume a leading role on this path towards a more sustainable way of living"[1832] and to face the dual interlaced challenges of urbanization and climate change.

All the electronic-based smartness sold as solutions do not take long before becoming a problem with ecological and social costs. The cumulative effects of electronic waste have not led

[1828] Ronnie Lipschutz, "Eco-utopia or eco-catastrophe? Re-imagining California as an ecological utopia" (2018) 6 Elem Sci Anth at 5.
[1829] Stephenson, *supra* note 1618 at 362.
[1830] Marco Casini, "Green Technology for Smart Cities" (2017) 83 IOP Conference Series: Earth and Environmental Science.
[1831] Waleed Ejaz & Alagan Anpalagan, "Internet of Things Enabled Electric Vehicles in Smart Cities" in Waleed Ejaz & Alagan Anpalagan, eds, *Internet of Things for Smart Cities: Technologies, Big Data and Security* (Cham: Springer, 2019) 39.
[1832] Tobias Brandt et al, *Information systems and smarter cities: towards an integrative framework and a research agenda for the discipline* (2016).

to viable sociotechnical solutions in the present and there are no signs that the future will slow their production and consumption. The palliative measure taken is to keep the matter far from the public view. McDonald's *Brasyl*, takes a huge *toxic e-waste dump* closer to the reader's eyes:

> Circuit boards cook on coal griddles, release their lead solder like fat from pig-meat. Mercury baths grab gold from plated plugs and sockets. Homemade stills vaporize the liquid metal, depositing their heavy treasure. Two boys stir a stream of sand-sized processors into a plastic vat of reagent, dissolving the carbon nanotubes from their matrix. Two eight-year-olds sitting cross-legged on a sy bean sack test plastic from the heap beside them by heating it over a cigarette lighter and sniffing the fumes. Younger children rush handcarts of e-junk down from the central dump. This is the circle of the slaves, sold into debt indenture by parents crushed by 5,000 percent interest.
> …
> The population of a small town scavenges the slopes of the tech-trash mountain. By night it is extravagantly beautiful as twenty thousand torches and oil-lanterns bob and play across the ridges and valleys. Todos os Santos is big enough to have a geography: the Forest of Fake Plastic Trees, where wet ripped bags hang like Spanish moss from every spar and protrusion. The Vale of Swarf, where the metal industries dump their coils and spirals of lathe trim. The Ridge of Lost Refrigerators, where kids with disinfectant-soaked handkerchiefs over their faces siphon off CFCs into empty plastic Coke bottles slung like bandoliers around their shoulders. Above them, the peaks: Mount Microsoft and the Apple Hills; unsteady ziggurats of processor cubes and interfacers. Pickers crack them open with hammers and pry bars and deftly unscrew the components. A truck disgorges a load of terminally last-season I-shades, falling like dying bats. The catadores rush over the slippery, treacherous garbage. The fermenting trash raises the ambient air temperature three degrees. Evaporating moisture and volatiles linger in the peculiar dead spot in the wind patterns caused by the interchange: Our Lady of Trash is a true urban jungle: steamy, poisonous, diseased, wet.[1833]

Brasyl takes a problem that the *green urban smartness* of today tends to aggravate and builds a small town from it, where "whole communities live on garbage mountains trading the materials and technology extracted from the refuse of a culture of continuous consumption."[1834] Electronic-based e*cosmart technologies* are a contradiction in terms of the cities of today.[1835]

[1833] McDonald, *supra* note 1625 at 105–107.
[1834] Max Cairnduff, "Brazil is not a serious country", (14 April 2012), online: *Pechorin's Journal* <https://pechorinsjournal.wordpress.com/2012/04/14/brasyl-by-ian-mcdonald/>.
[1835] Peter Yeung, "The Toxic Effects of Electronic Waste in Accra, Ghana", (29 May 2019), online: *CityLab* <https://www.citylab.com/environment/2019/05/used-electronics-e-waste-landfill-ghana-toxic-technology/590341/>.

Some subjects should not be thought of as matters of a fictional future when reality seems too dystopian to be true, and when the Anthropocene era is already here. The existential crisis posed by imminent ecological disasters joins urban and natural spaces together to be dealt with, as "cohabitation spaces to house humans and nonhumans in a sustainable and inclusive way in the post-anthropocentric cities of tomorrow."[1836] Climate change are a matter which requires collective action and SF can be less fictional than narratives about individual actions to face it*:*

> The anthropocene is about collective action, not individuals. That's why climate change is such a clusterfuck. In default, they say that it's down to individual choice and responsibility, but reality is that you can't personally shop your way out of climate change. If your town reuses glass bottles, that does one thing. If it recycles them, it does something else. If it landfills them, that's something else, too. Nothing you do, personally, will affect that, unless it's you, personally, getting together.[1837]

Good post-Anthropocentric SF offers warnings and directions for action, and cyberpunk is not meant to fatalistically accept a "depleted world left in piles of detritus and toxic ruin."[1838] In Doctorow's *Walkaway*, "set in a near-future Canada where technology is used (slightly more so than today) to track the movements and behaviours of Canadian citizens,"[1839] there is hope for fighting climate change through collective action, not by individual *hack/punk* actions. Collective climate actions from one city might also be ineffective if they are not aligned with other cities.[1840]

When dealing with smart cities and climate change, law is a bit everywhere, anywhere, and nowhere. Since IT applications are distributed everywhere in municipalities to interact with

[1836] T Yigitcanlar, M Foth & M Kamruzzaman, "Towards Post-Anthropocentric Cities: Reconceptualizing Smart Cities to Evade Urban Ecocide" (2019) 26:2 Journal of Urban Technology 147–152 at 4.
[1837] Doctorow, *supra* note 1624 at 78.
[1838] Frenchy Lunning, *Cyberpunk Redux: Dérives in the Rich Sight of Post-Anthropocentric Visuality* (Multidisciplinary Digital Publishing Institute, 2018).
[1839] Anna McFarlane, "Could the Climate Crisis Spell the End for the 'Punk' in 'Cyberpunk'?", (28 May 2018), online: *Deletion SciFi* <https://www.deletionscifi.org/episodes/could-the-climate-crisis-spell-the-end-for-the-punk-in-cyberpunk/>.
[1840] Tan Yigitcanlar & Md Kamruzzaman, "Does smart city policy lead to sustainability of cities?" (2018) 73 Land Use Policy 49–58.

their operational problems and environmental resources (energy, water, wastel), data processing and their applications for individual and collective analysis merits special consideration. Thus, "special legal provisions need to be enacted to achieve satisfactory compromises between the conflicting interests involved by smart cities."[1841] Such a balance of individual and collective interests—such as protecting personal data and meeting general needs—is harder to achieve considering that municipal and environmental law are scattered in bits and pieces across a wide variety of legal sources, many times in ways which are contradictory to climate change.

Change is coming to climate, but also to what used to be the straightforward subjects of environmental and municipal law. For example, rainwater is moving from a legal paradigm of waste and flood control problems to become a matter of natural resource management and civil liabilities. Such change requires multiple regulatory adjustments to "diverse forms of knowledge, technology, and relations that meet political goals to build smart, resilient, and sustainable cities."[1842] Moreover, the individual interests involved with something that could seem as simple as stormwater can touch privacy concerns and other individual rights when facing collective interests, and this tends to happen in other urban policies that are being transformed to face climate change. This is also reflected in the sensible tensions involving sustainability initiatives in "existing urban areas that are already extremely vulnerable to disaster,"[1843] which frequently conflict with building codes and structural assessments to mitigate disaster risks increased by climate change. Contradictorily, this is the case in many smart eco projects taking place in the coastal and riverside areas of cities, which might increase the risks caused by climate change.

[1841] Raffaella Riva Sanseverino & Salvatore Orlando, "The Integration and Sharing of Resources for a New Quality of Living" in Eleonora Riva Sanseverino et al, eds, *Smart Rules for Smart Cities: Managing Efficient Cities in Euro-Mediterranean Countries* (Cham: Springer, 2014) 29 at 34.
[1842] Joshua J Cousins, "Remaking stormwater as a resource: Technology, law, and citizenship" (2018) 5:5 Wiley Interdisciplinary Reviews: Water e1300.
[1843] Lisa Grow Sun, "Smart Growth in Dumb Places: Sustainability, Disaster, and the Future of the American City" (2011) BYU L Rev 2157.

Considering that law is everywhere and anywhere for smart eco-cities, it is also nowhere because there is no clear legal path to approach climate change, at least considering how much more focused and popular, other subjects are, like surveillance and privacy, for example.

There are voids to be filled by legal researchers concerning smart cities and climate change. A suggestion of an initial track for them to follow can be found in *Anticipatory logics of the smart city's global imaginary* by James Merricks White. It connects key elements from the most adopted authors in this dissertation (Datta, Hollands, Kitchin, Vanolo) with contributions from the most well-known critics of the imaginary of smart cities (Greenfield and Townsend).[1844] The article explores "how the future is recruited, rearranged, and represented as a rationalization for technological intervention in the present." It also explains how the smart city is presented as the solution for the recurrent discourses of urban crisis: "massive demographic shifts and subsequent resource pressures, global climate change, and the conflicting demands of fiscal austerity."[1845] It is this global and adaptable imaginary of *smart benefits & urban risks* that allows the propagation of narratives promising *greener and healthier urban living* promoted by big tech companies,[1846] and empowers them with narratives of *tolerable compromises* to secure the *scary reality of future cities*.[1847] Considering the imaginary of smart cities and the importance of the narratives of risk for the production of law, legal scholars and practitioners should ponder the basic human rights that law may *give up or rearrange* in the name of climate emergency. Law does not have to rule a *zero-sum game* but maybe bring more post-scarcity collaboration.

[1844] Unfortunately, the article misses the monumental doctoral work of Manuel Fernández González, *La Smart City como imaginario socio-tecnológico*, which was very, very relevant for this dissertation.
[1845] James Merricks White, "Anticipatory logics of the smart city's global imaginary" (2016) 37:4 Urban Geography 572–589 at 572.
[1846] Laurence Kemball-Cook, "Smart cities will make urban living greener and healthier" *Wired UK* (23 January 2018), online: <https://www.wired.co.uk/article/carbon-free-cities-pollution-cleaner-air-autonomous-deliveries>.
[1847] Joe Svetlik, "Rise of the smart city: The awesome and scary reality of future urban living", (22 July 2015), online: *Wareable* <http://bit.ly/TheAwesomeAndScaryRealityOfFutureUrbanLiving>.

In this sense, science fiction might be of assistance for law. For Annalee Newitz, Ph.D., journalist, and fiction and non-fiction author,[1848] science fiction has inspired scientists and activists, thus, policymakers and legal scholars could also make good use of it for smart cities:

> Perhaps because cities are hotbeds of social and technological innovation, they often have starring roles in futuristic stories. But these aren't generally tales of a better tomorrow. They're ugly and dystopian, with drone-patrolled slums, pollution, overpopulated high-rises, and ubiquitous surveillance machines. But we can't dismiss these stories as pure nihilistic sensationalism. They are also twisted messages of hope. If we could just heed these fictional warnings to city planners about how our cities might fail, we might figure out how to fix them before disaster strikes.[1849]

Cities can teach about climate and social change in the past, and Newitz shows how "it's easy to tell a dystopian story about that and, in fact, it turns out it's really complicated."[1850] So can the stories about eco-smart cities told by the rich to hide the poor, as in Cooper's *Wilders*:

> "What matters the most," Julianna said, "is ideas. We haven't saved the earth yet. What was the goal of the great taking?"
> "To rewild half the earth to protect biodiversity and mitigate climate change."
> "Well." Julianna laughed out loud. "That's the textbook definition."
> "Isn't that right?"
> "In principle. As we were selling the idea, our nickname for it was 'last-chance lifeline.' The words you just used are sterile, meant to pull the fright and immediacy out of a messy and desperate situation. The fact that whole cities full of people think it's going far better than it is scares the shit out of me."
> Coryn almost jumped at the word. Julianna didn't swear.
> "We don't have the half-wild yet, we don't even have healthy cities yet. We haven't stopped the extinctions, or the migrations, or the deaths from new tropical diseases born of who-knows-what."1851

In pandemic times, the mortal combination of climate change and inequality is evident.

[1848] This is a very Jameson-about-cyberpunk-inspired footnote. I got frustrated for not finding the due time and place here to explore at least a couple of Newitz's books, but they are the ones that better serve for further research on AI and cities. If I do not make it in time, I hope other researchers pick them up: Annalee Newitz, *Scatter, adapt, and remember: how humans will survive a mass extinction*, 1st ed (New York: Doubleday, 2013); Annalee Newitz, *Autonomous*, 1st ed (New York: Tor, 2017). According to Neal Stephenson, "Autonomous is to biotech and AI what Neuromancer was to the Internet."
[1849] Newitz, *supra* note 1560.
[1850] Arthur C Clarke Center for Human Imagination, "San Diego 2049: Annalee Newitz: Your Dystopia Is Canceled", (9 April 2019), online: *YouTube* <https://youtu.be/l5opOSR8NHc?t=2508> at 41min 48s.
[1851] Cooper, *supra* note 1623 at 275–276.

3.3.2.6. The Inequality: "The Rich Get Richer and the Poor Get Poorer"

The *challenge* of *climate change* has been used as a major justification for building *surveillance* cities for managing the survival of humanity in the *future*, but the most accepted *risk* might be the increasing social *inequality*. The term *inequality* is directly related to other terms in the research (discrimination, exclusion, bias) but with more occurrences: 53 times in *Websites* and 20 times in *Academic Publications*. *Figures 91* and *92* show other related terms.

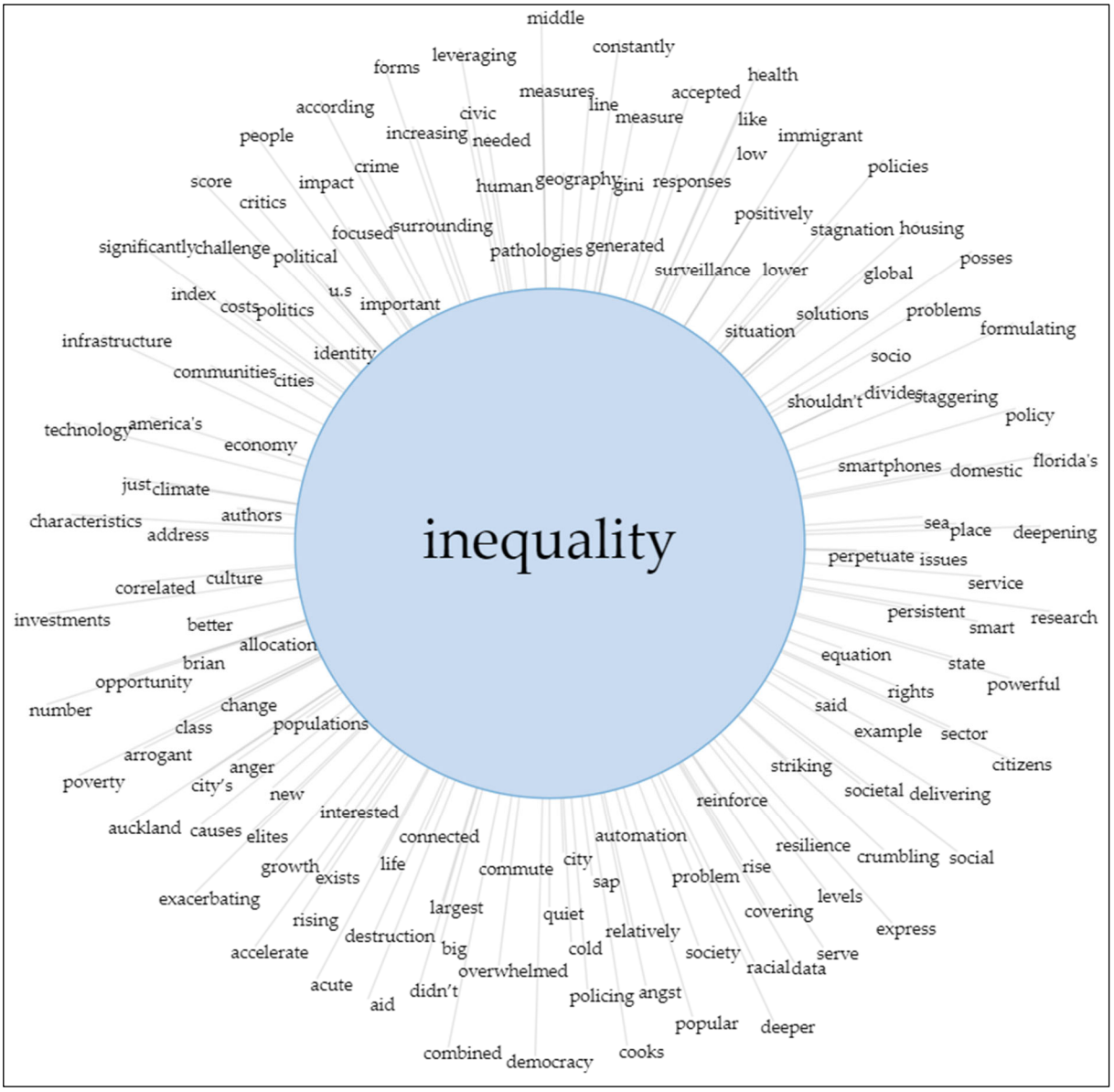


Figure 91: Main links of the term *inequality* in *Websites*, using *Voyant Tools*

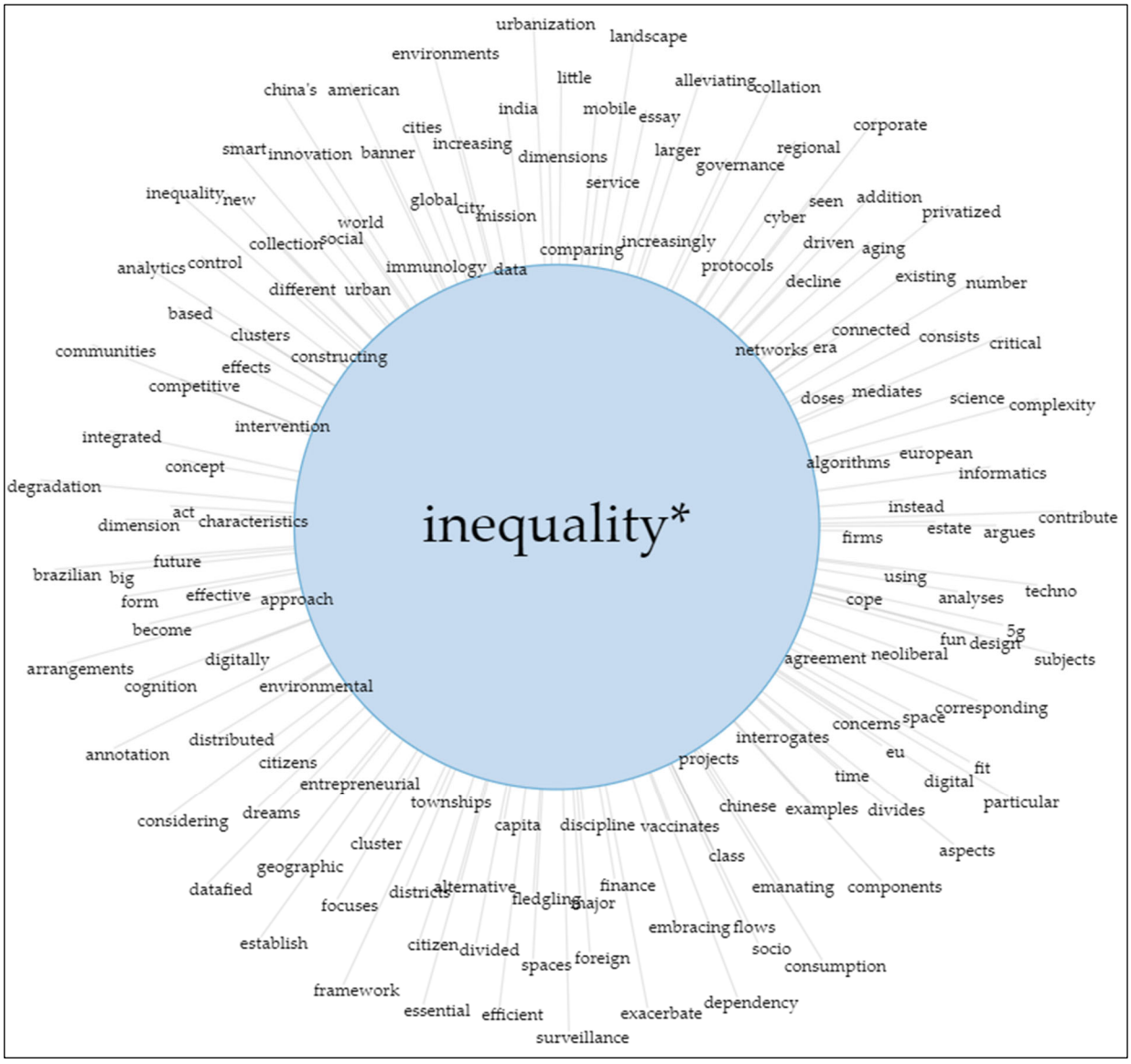


Figure 92: Main links of the term *inequality* in *Academic Publications*, using *Voyant Tools*

Environmental degradation and overwhelming urbanization correlated to climate change and increasing populations are said to be the problems to which smart city projects would become the solutions. Such interventions would combine neoliberal measures for investment (privatized infrastructure and services) with surveillance policies for governance (e.g., big data for crime and housing) to increase state efficiency and urban competitivity. Instead, they might increase inequality and deepen poverty, exacerbate racial and social class divides, perpetuate the powerful elites, and establish conditions to fit the rights of citizens as issues of consumption.

The worldwide calls for an urban agenda of resilience and smartness through *ecological modernization* and *techno-managerial solutions* might, as global initiatives may indicate, mediate "the effects of global socio-environmental inequality but does little towards alleviating it."[1852] In fact, there are experiments showing that the economic promotion of smart cities to improve economic competitiveness might end up being empty propaganda.[1853] In a contrary effect, there is much research explaining "How smart policies strengthen, weaken or replicate existing patterns of inequality and exclusion."[1854] This would not be big news for SF literature, however.

In Gibson's *Count Zero*, Marly is hired (and always monitored) by the ultra-rich Virek:

> As she walked from the Louvre, she seemed to sense some articulated structure shifting to accommodate her course through the city. The waiter would be merely a part of the thing, one limb, a delicate probe or palp. The whole would be larger, much larger. How could she have imagined that it would be possible to live, to move, in the unnatural field of Virek's wealth without suffering distortion? Virek had taken her up. in all her misery, and had rotated her through the monstrous, invisible stresses of his money, and she had been changed. Of course, she thought, of course: It moves around me constantly, watchful and invisible, the vast and subtle mechanism of Herr Virek's surveillance.
> …
> "You should look at the manuscript we're working on this month."
> Marly chewed, raised her eyebrows questioningly.
> "It's a history of the high-orbit industrial clans. A man at the University of Nice did it. Your Virek's even in it, come to think; he's cited as a counterexample, or rather as a type of parallel evolution. This fellow at Nice is interested in the paradox of individual wealth in a corporate age. in why it should still exist at all. Great wealth, I mean. He sees the high-orbit clans, people like the Tessier-Ashpools, as a very late variant on traditional patterns of aristocracy, late because the corporate mode doesn't really allow for an aristocracy."
> …
> And, for an instant, she stared directly into those soft blue eyes and knew, with an instinctive mammalian certainty, that the exceedingly rich were no longer even remotely human.[1855]

[1852] Maria Kaika, "'Don't call me resilient again!': the New Urban Agenda as immunology … or … what happens when communities refuse to be vaccinated with 'smart cities' and indicators" (2017) 29:1 Environment and Urbanization 89–102.
[1853] Alan Wiig, "The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia" (2016) 37:4 Urban Geography 535–553.
[1854] Hebe Verrest & Karin Pfeffer, "Elaborating the urbanism in smart urbanism: distilling relevant dimensions for a comprehensive analysis of Smart City approaches" (2019) 22:9 Information, Communication & Society 1328–1342 at 11.
[1855] Gibson, *supra* note 1616.

Marly is the most highly educated character in the whole *Sprawl trilogy*, and Gibson uses her internal voice for deep thoughts and narrations with philosophical and aesthetic elements. Academics and artists and can easily identify with her *persona* when analyzing Vivek, who represents the extremely small elite of ultra-rich and powerful (of there and here). For Gibson, even with the post-human condition of the wealthiest who live apart from the daily conditions of survival and sociability of almost all human beings, this elite is only a variation of a traditional aristocracy imposing the maximum exploitation of the many for the extreme benefit of a few.[1856]

Despite all the advanced technology, the highly accumulated capital, and the all-seeing-controlling powers, poverty remains as miserable or worse than today in cyberpunk works. Post-late capitalism does not spare the protagonist *Mona Lisa*, who gives the title to Gibson's novel:

> She got quietly out of bed, wincing when her bare heel brushed the floor, and fumbled for her plastic thongs. The place was dirty; you could probably get tetanus from leaning up against the wall.
> …
> She was sixteen and SINless, Mona, and this older trick had told her once that that was a song, "Sixteen and SINless." Meant she hadn't been assigned a SIN when she was born, a Single Identification Number, so she'd grown up on the outside of most official systems.
> …
> Well, it was fucking hot in Florida, like a sauna. The only beaches that weren't private were polluted, dead fish rolling belly-up in the shallows. Maybe the private stretches were the same, but you couldn't see them, just the chainlink and the guards in shorts and cop shirts standing around.
> …
> Sometimes you couldn't even smell the dead fish, because there was another smell, a chlorine smell that burned the roof of your mouth, something from the factories up the coast.
> …
> About the only thing to like about Florida was drugs, which were easy to come by and cheap and mostly industrial strength. Sometimes she imagined the bleach smell was the smell of a million dope labs cooking some unthinkable cocktail, all those molecules thrashing their kinky little tails, hot for destiny and the street.[1857]

[1856] Allen Mozek, "For The Birds: Count Zero", (8 April 2009), online: *For The Birds* <http://imforthebirds.blogspot.com/2009/04/count-zero.html>.
[1857] Gibson, *supra* note 1617.

Nobody could comment it better than a *professional cyberpunk dystopian writer*:

> "Neuromancer," says novelist and blogger Cory Doctorow, "remains a vividly imagined allegory for the world of the 1980s, when the first seeds of massive, globalised wealth-disparity were planted, and when the inchoate rumblings of technological rebellion were first felt. A generation later, we're living in a future that is both nothing like the Gibson future and instantly recognisable as its less stylish, less romantic cousin. Instead of zaibatsus [large conglomerates] run by faceless salarymen, we have doctrinaire thrusting young neocons and neoliberals who want to treat everything from schools to hospitals as businesses."[1858]

The resurgence of cyberpunk in recent years—in books, games, movies, series, animations, comics, music—shows no sign of exhaustion, no coincidence for a SF subgenre that provides narratives "reflecting reality as much as for providing an escape."[1859] A key part of these narratives is the extreme economic inequality seen in traditional cyberpunk, and a chance for the *low-life hero* to rise against the system to escape from the control of corporations.

Still, it is not easy for any city resident to escape from the corporations selling smart-tech solutions with "rationalized plans, hidden technological protocols threaten to further normalize neoliberal arrangements and exacerbate social inequalities,"[1860] fully powered by the *mystical crystal ball of Big Data*. The collection of data destined to Big Data applications for predictive policing and economic development "is seen to contribute to existing divides along racial and class lines," hiding protocols and ideologies in databases that "reproduce inequality in the urban landscape."[1861] Big Data can be used to keep each class at the same historical place.

[1858] Ed Cumming, "William Gibson: the man who saw tomorrow", *The Guardian* (28 July 2014), online: <https://www.theguardian.com/books/2014/jul/28/william-gibson-neuromancer-cyberpunk-books>.
[1859] Marshall Sandoval, "Cynicism, Recession, and the Resurgence of Cyberpunk", (21 October 2014), online: *PopMatters* <https://www.popmatters.com/187163-cynicism-recession-and-the-resurgence-of-cyberpunk-2495600424.html>.
[1860] Torin Monahan, "The image of the smart city: surveillance protocols and social inequality" in Yasushi Watanabe, ed, *Handbook of Cultural Security* (Edward Elgar Publishing, 2018) 210.
[1861] Monica M Brannon, "Datafied and Divided: Techno-Dimensions of Inequality in American Cities" (2017) 16:1 City & Community 20–24.

The tense relationship between the extremely exclusive and wealthy upper class with a few protagonist characters from the numerous and destitute lower classes was present in almost all cyberpunk works consulted during the research. This tension is clear in Ashby's *Company Town* and plays an important role in unveiling the curtain of inequality. Hwa Go is a martial arts expert with a neurological disease that makes her invisible to facial recognition systems and she is the only person in town without body enhancements; therefore, she is unhackable, and her "weaknesses" make her the personal bodyguard for the young heir of the Lynch corporation, led by Zachariah Lynch, who has just bought the entire city.[1862] They have revealing dialogues:

> Lynch looked aghast. "Do you take me for a rube? Some gullible old rube that buys into every promise of eternity? I'm not a religious man, Miss Go. Far from it. I see things as they truly are. I'm prepared for the future. Humanity is coming to an end. Some day people like you—people who remain fully organic—will be nothing more than specimens in a museum of humanity."
> "I bet you say that to all the girls," Hwa said.
> "Oh, I do not mean to offend. I think yours is a very brave choice."
> Choice had little to do with it. Money was the thing. When you had no money, you had no choice. But there was no use explaining that to someone like Zachariah Lynch.

The lack of money for urban investment is a powerful argument to justify the public-private partnerships for "sustainable development of our future cities." They can serve as an ideological cover for neoliberal urbanization that privatizes *physical spaces of inequality*, as was the case in the smart cities craze denounced in India.[1863] The rich scholarship on smart cities in the Global North, very critical to the social inequalities embedded in the projects, is still only emerging in the Global South. Therefore, in this context, it is understandable that "the production of smart citizens in the future Indian city has become synonymous to the production of a postcolonial technocratic subjectivity," extending "historic social inequalities from the urban to the digital

[1862] Annalee Newitz, "You want some weird futurism? Start reading Company Town", (16 June 2016), online: *Ars Technica* <https://arstechnica.com/gaming/2016/06/company-town-is-one-of-the-weirdest-science-fiction-novels-of-the-summer/>.
[1863] Antarin Chakrabarty, "Smart mischief: an attempt to demystify the Smart Cities craze in India" (2018) 31:1 Environment and Urbanization 193–208.

realm."[1864] The same *smart rhetoric* happening in India has been reproduced through the Global South, like in Africa: "master plans for African cities that claim to be sustainable, or to produce eco cities or smart cities, rarely seem to bother with the detail to show how they meet these qualities."[1865] Still, the narrative on PPP investments (enhancing the private even when it is mostly public) for *city intelligence* is celebrated as a victory for policies of economic inclusion and development for low-income citizens in Africa,[1866] despite the lack of evidence.

There is much literature contrasting what the academic studies and corporate reports say about the dynamics of economic inclusion and exclusion in smart cities. This is not a thesis meant o exhaust any topic, but it can put the finger on some of their underlying liberal ideologies:

> Every man of business has his saints. Edson's are those who come from nothing: the favelado become futebol legend; the Minas Gerais boy who seduces the nation with his voice; the Paulistano who turns his kibe stand into a global franchise; Alcides Teixeira.
> He was born one of the landless; that great Brasilian archetype, the drought-stricken peasant of the northeast sertão who, like so many before, embarked on the trek to the silver city. His legend began where all the others ended: at his first glimpse of the towers of Fortaleza, and the sprawling favelas around them like scabs. My face to the boot, my wife to the streets, he said, and he and his wife got straight back onto the bus. The driver didn't charge them. No one had ever done a return trip before. Alcides Teixeira had taken a development loan from the MST, the Landless League, and planted five hundred hectares of dust-poor sertão with gene-modified rape seed. Within three years he was power farming three thousand hectares. Within five years, he signed output deals with Petrobras and Ipiranga and became EMBRAÇA. Twenty-six years later Alcides Teixeira's land covered four continents with green soy and yellow rape and was stealthing down the cool cool hillsides upon the Fazenda Alvaranga.[1867]

Edson is the uplifting protagonist in *Brasyl's* 2032 timeline who explicitly shares the ideology of the *man who came from nothing*, and wants to become the businessman capable of

[1864] Ayona Datta, "The digital turn in postcolonial urbanism: Smart citizenship in the making of India's 100 smart cities" (2018) 43:3 Transactions of the Institute of British Geographers 405–419.
[1865] Vanessa Watson, "The allure of 'smart city' rhetoric: India and Africa" (2015) 5:1 Dialogues in Human Geography 36–39 at 37.
[1866] Alex Court, "What makes Nairobi Africa's 'most intelligent' city", (10 February 2015), online: *CNN* <https://www.cnn.com/2015/02/10/africa/nairobi-africa-intelligent-city/index.html>.
[1867] McDonald, *supra* note 1625 at 301. Personal note: as someone who lived among the *towers of Fortaleza* for almost three decades, I fully acknowledge and endorse this *great Brazilian archetype*.

unlimited success based only on his talent and effort. This is a popular capitalist storytelling in ascension—to which (post)cyberpunk stands in opposition—despite all the contrary evidence proving it to be implausible, especially in the Global South of ubiquitous poverty.[1868] This storytelling on the rise is reflected in the celebratory imaginary of smart cities which is dominant in the Brazilian media and academy, which subscribes to a neoliberal ideology that *sells the idea* of tech solutions and private money capable of overcoming urban problems.[1869]

This dissertation may seem tt not engage much with academic publications on smart cities from Brazilian authors, so it is advisable to note that there has been an effort to read and analyze all Brazilian publications on the subject since the beginning of the research. Considering that the smart city projects in Rio de Janeiro—a very important scenario for the academic literature and even for science fiction—are part of the analysis, perhaps a greater reference to Brazilian publications would be recommended. Outside the subchapter about Rio's projects, this did not happen for two reasons: access to the language and limited approach. The first is more obvious, as this thesis is focused on the English language for using text analytics, but it included publications in English from Brazilian researchers and a (very) few from legal authors that have alternative titles and abstracts in English. The second reason is trickier to explain.

As was well said before by its most relevant researcher in the Global South, Ayona Datta, the scholarship on smart cities has still much to develop outside the limits and frameworks of the Global North. In Brazil, it is no different. Despite the growing number of publications in Portuguese, Brazilian scholarship on smart cities is still very close to its own academic circuit, with methodologies often restricted to (very limited) literature reviews when compared to similar

[1868] Milan M Cirkovic, "A review of Ian McDonald's Brasyl" (2008) 17:1 Journal of Evolution & Technology 84–92.
[1869] Jonathan Keane, "The state of Brazil's digital cities", (9 September 2015), online: *IDG Connect* <https://www.idgconnect.com/idgconnect/analysis-review/1006721/brazils-digital-cities>.

publications in English, the *lingua franca* of the field. The major obstacle for this research was that many Brazilian publications written in Portuguese do not take into consideration the critical approaches from foreign researchers and experiences from other countries, making it difficult for one to build dialogues for knowledge, even in topics that Brazilian researchers would have a lot to contribute to, as in the case of inequality in smart cities—legal researchers also included.

It does not mean that Brazilian (legal) scholarship does not contribute to the international debates on smart cities, because it does:[1870] this does not mean that there are no highly valuable publications on smart cities in Portuguese that still do not have any correspondence in English, because they do exist;[1871] nor does it mean that the research did not identify contributions in the few texts found from legal authors from Brazil, because it did.[1872] In this last case, despite the high quality of the Brazilian journal that published the two referred articles and some interesting elements in them, the most pertinent finding was absence. Even when analyzing *self-regulation* and *sustainable development* in smart cities, the texts made no proper reference to the legal risks implied, expressing a celebratory vision on the technologies and models involved, instead. In the end, what was not found became an indicator for the research as well.

Only a small fraction of what was found is exposed here, so if there was a single recommendation to be made for further reading on the topic so that other legal researchers could make better use of this dissertation, it would be “Citizens as Consumers in the Data Economy:

[1870] IGF, “Data Governance in SMART CITIES: From Open Data to My Data”, (21 November 2018), online: *Internet Governance Forum* <https://www.intgovforum.org/multilingual/content/igf-2018-day-2-salle-vi-ws320-data-governance-in-smart-cities-from-open-data-to-my-data>.
[1871] Chiara de Teffé, Sérgio Branco & Victor Vicente, *Cidades inteligentes em perspectivas* (Rio de Janeiro: Obliq, ITS, 2019); Jhessica Reia et al, eds, *Horizonte presente: tecnologia e sociedade em debate* (Rio de Janeiro: Casa do Direito e Fundação Getúlio Vargas, 2019).
[1872] Lucas Do Monte Silva & Patrícia Borba Vilar Guimarães, “Autorregulação jurídica no urbanismo contemporâneo: smart cities e mobilidade urbana / Self regulation in the contemporary urbanism: smart cities and urban mobility” (2016) 8:4 Revista de Direito da Cidade; Mariana Ribeiro Santiago & Jordana Viana Payão, “Internet das coisas e cidades inteligentes: tecnologia, inovação e o paradigma do desenvolvimento sustentável / Internet of things and smart cities: technology, innovation and the paradigm of sustainable development” (2018) 10:2 Revista de Direito da Cidade.

The Case of Smart Cities," by Sofia Ranchordás.[1873] The professor at the University of Groningen has published several relevant legal contributions on smart cities and data-driven regulation. In the article, the legal scholar questions the problematic notion of *citizen-consumer* gaining traction in smart city projects. This is crucial because: "citizenship and consumer protection have different political and economic foundations," so the law does not treat them the same way; "it relies on the heavy collection of personal data," opening much space for discrimination; "it assumes—often incorrectly—that citizen-consumers in cities have choices," considering the weakened legal concept of consent; and "it excludes citizens" in the many ways described by the previous academic and SF authors. The conversion of citizens into consumers is part of the cyberpunk warnings about inequality and (the end of) democracy, as in Doctorow's *Walkaway*:

> The zottas are trying to secede from humanity. They don't see their destiny as tied to ours. They think that they can politically, economically, and epidemiologically isolate themselves, take to high ground above the rising seas, breed their offspring by Harrier jets.
> "I'd been walkaway for nearly a year before I understood this. That's what walkaway is—not walking out on 'society,' but acknowledging that in zottaworld, we're problems to be solved, not citizens. That's why you never hear politicians talking about 'citizens,' it's all 'taxpayers,' as though the salient fact of your relationship to the state is how much you pay. Like the state was a business and citizenship was a loyalty program that rewarded you for your custom with roads and health care. Zottas cooked the process so they get all the money and own the political process, pay as much or as little tax as they want. Sure, they pay most of the tax, because they've built a set of rules that gives them most of the money. Talking about 'taxpayers' means that the state's debt is to rich dudes, and anything it gives to kids or old people or sick people or disabled people is charity we should be grateful for, since none of those people are paying tax that justifies their rewards from Government Inc. "I live as though the zottas don't believe they're in my species, down to the inevitability of death and taxes, because they believe it.[1874]

Due to inequality, the increasing political power of the *Zotta rich* is one of the sources of the crisis of modern democracy and is an implicit topic in the final part of this chapter.

[1873] Sofia Ranchordás, "Citizens as Consumers in the Data Economy: The Case of Smart Cities" (2018) 7:4 Journal of European Consumer and Market Law 154–161.
[1874] Doctorow, *supra* note 1624.

3.3.2.7. The Democracy: "…It's the End of the World as We Know It…"

The combination of mass *surveillance* and programmed *inequality* in the cities of the near *future,* further *challenged* by the degrading conditions of *climate* emergency is far more than a mere *risk* for modern *democracy*, which is already in transition. The publications dealing with democracy in smart cities—appearing more than 70 times in *Websites* and 17 times in *Academic Publications*—pointed toward such conditions and *Figures 93* and *94* do not say otherwise.

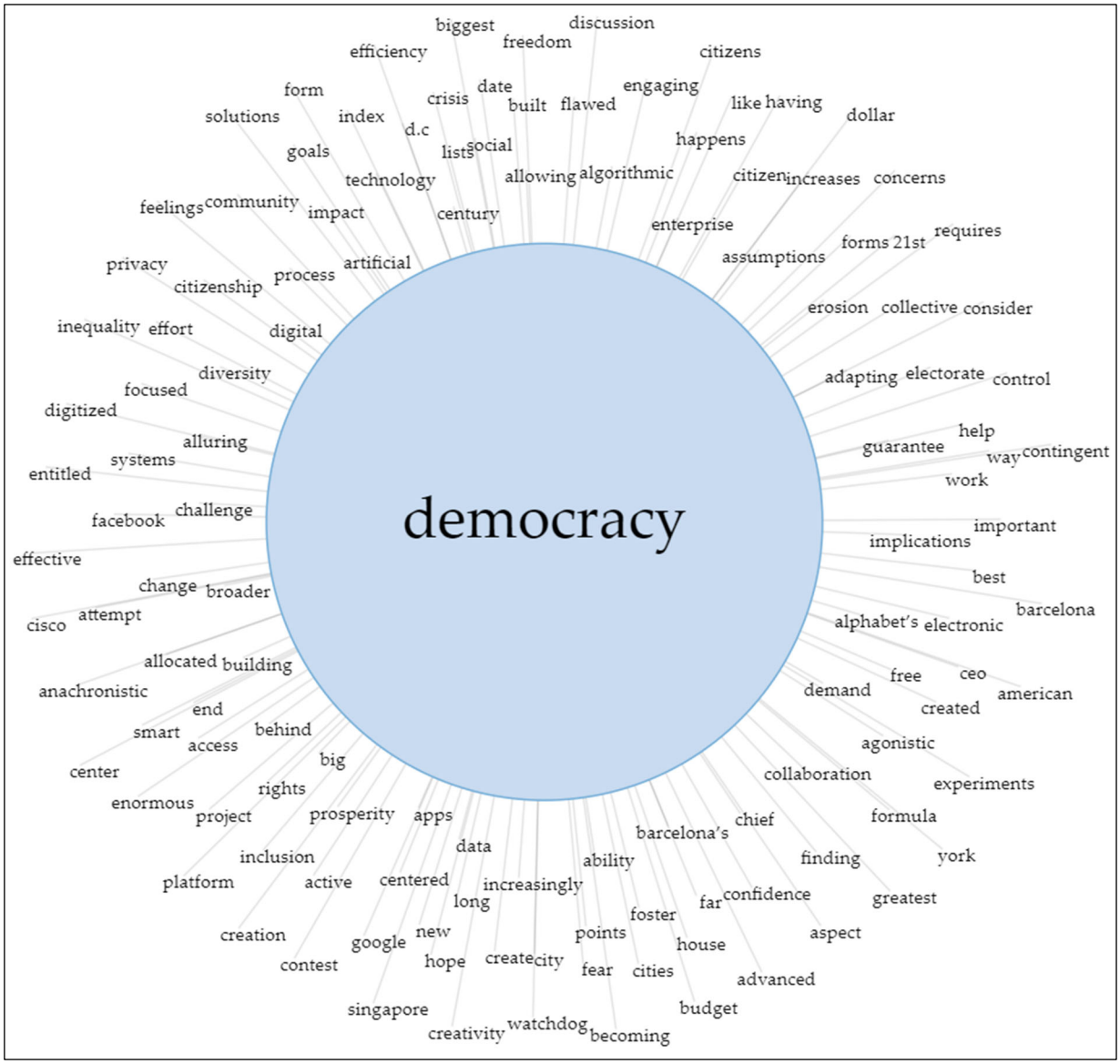


Figure 93: Main links of the term *democracy* in *Websites*, using *Voyant Tools*

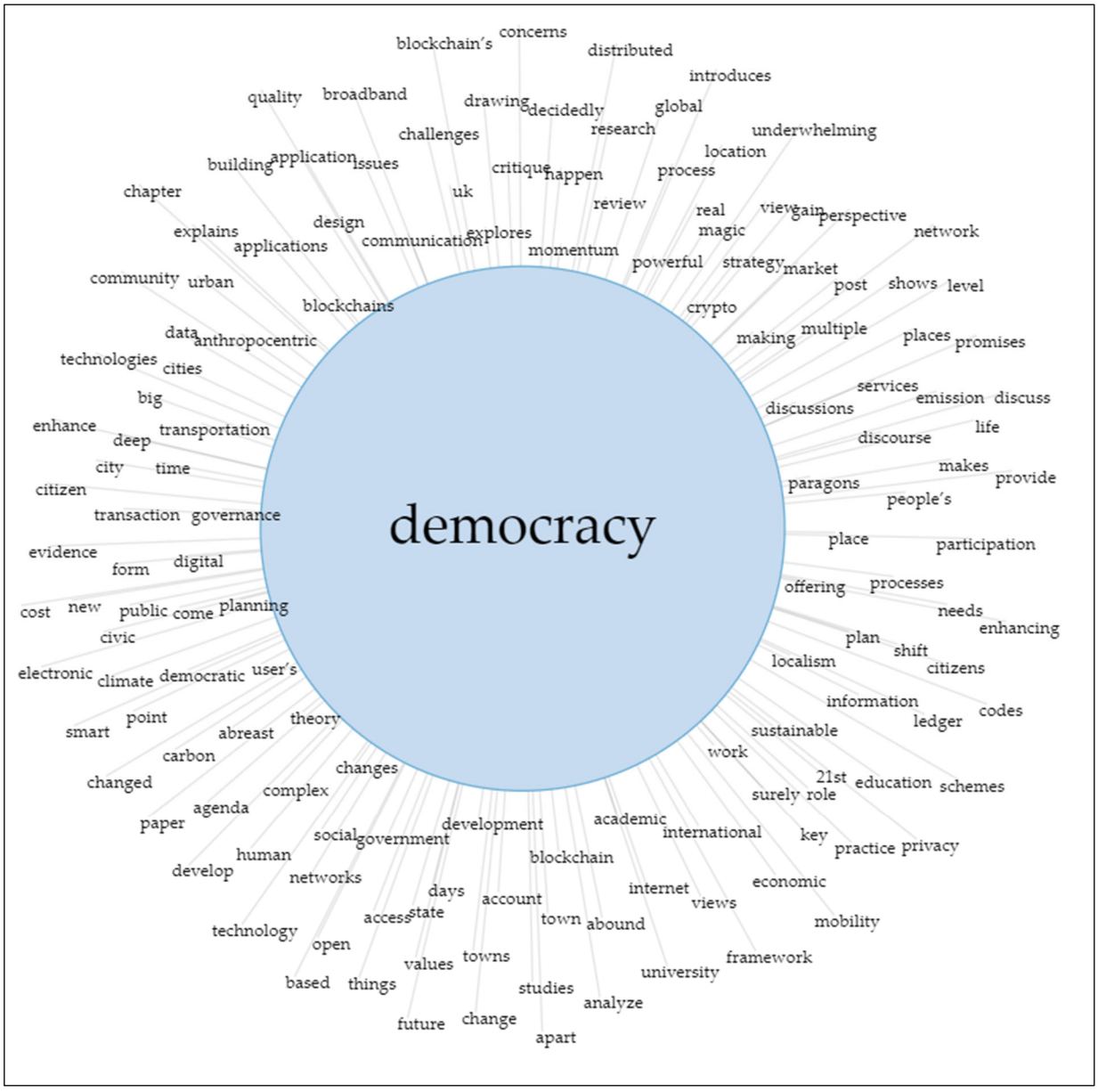


Figure 94: Main links of the term *democracy* in *Academic Publications*, using *Voyant Tools*

The greatest discussion on smart cities is about democracy. Will smart cities become the paragons of democracy or cost the end of democracy? Will they open the governments or work for the markets? Will they foster inclusion/diversity of people or focus on analysis/control of the electorates? Will they enhance digital participation or algorithmic assumptions? Will technologies such as blockchain provide more privacy and access to public services or create more concerns and flawed systems? Community building or erosion? Fears or hopes? Governance…?

It would be necessary to go back to the beginning of the second chapter and review it up to this part to gather some needed elements for partial answers to the many possible questions on democracy and smart cities. It is not a task to be realistically accomplished here in these uncertain times when modern democracy is seen to be on the edge and the postdemocratic state appears on the rise—as any transitional process, it is half invisible and half blind—or at least the authors consulted here say so. In many ways, this research could be seen as a cumulative process to get to this final point, which may result in more questions than when it started.

Around the beginning of this century, there was a surge of theories supporting the idea that the Internet, as the sum of new plural technologies, "may be used as a tool for improving democracy and popular participation, in what was conventioned to call digital democracy, cyber-democracy, tele-democracy and e-participation."[1875] The debates on smart cities have always included their possible applications for new models of representative, participative and deliberative democracy, their different inputs and outputs, their bottom-up and top-down logics, and new forms of community and citizenship in a networked society.[1876] At the same time, this techno-futurist swirl of *form-based codes and electronic governance* left much to the imagination to wonder whether this smart democracy would become *utopian, dystopian, or e-topian*.[1877]

Theories of digital democracy and their urban participatory experiences might find some advice in the collective imaginary that is present in the best works of professional cyberpunk dystopian writers. In their works that precede this debate, all politics associated with modern democracy are simply absent of power and authority, and the reminiscences of their forms are

[1875] Marciele Berger Bernardes et al, *Participatory Governance of Smart Cities: a study upon Portuguese and Brazilian government portals* (2018) at 527. Here is a good contribution from a Brazilian legal scholar.
[1876] Daniel Araya, "Smart Cities and the Network Society: Toward Commons-Driven Governance" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (London: Palgrave Macmillan UK, 2015) 11.
[1877] David Walters, "Smart cities, smart places, smart democracy: Form-based codes, electronic governance and the role of place in making smart cities" (2011) 3:3 Intell Build Int 198–218.

threatened by anarchic dissolution and corporative takeover.[1878] In Gibson's novels, there are no utopian expectations, progressive blueprints, or imagined futures more democratic than the present.[1879] There are only few mentions of governments in the *Sprawl trilogy*, like the ones still subsisting in Turkey and Brazil, and democracy is nowhere to be seen. In Neuromancer, Case has a conversation with the saved consciousness of a cyber-cowboy nicknamed "Dixie Flatline":

> He jacked in.
> "Dixie?"
> "Yeah."
> "You ever try to crack an AI?"
> "Sure. I flatlined. First time. I was larkin', jacked up real high, out by Rio heavy commerce sector. Big biz, multinationals, Government of Brazil lit up like a Christmas tree. Just larkin' around, you know?"[1880]

William Gibson evidently did not preview Rio's "mammoth 'control centre' that integrates data from 30 agencies for the city's police," running algorithms that are not "subject to the ordinary processes of democratic accountability,"[1881] but the reference is too good of a coincidence to not give it a second thought. Governments do not need to be fully privatized when they directly or indirectly attend, by action or omission, the interests of the *heavy commerce sector, big biz, and multinationals.* The example of Silicon Valley is almost self-explanatory.

When *Californian techies* see *Snow Crash* echoing everywhere, and investors think they are living Neal Stephenson's story,[1882] it is advisable to light the yellow alert on the limits of the democratic model of government and its powers of regulation over big tech companies:

> "Yeah, you know, a monopolist's work is never done. No such thing as a perfect

[1878] Ulrik Ekman, "Social Simulation in William Gibson's Neuromancer" (2002) 34:1 American Studies in Scandinavia 84–116 at 101.
[1879] Claire Sponsler, "Cyberpunk and the Dilemmas of Postmodern Narrative: The Example of William Gibson" (1992) 33:4 Contemporary Literature 625–644 at 640.
[1880] Gibson, *supra* note 1615 at 111.
[1881] David Capener, "In many ways, smart cities are really very dumb", (10 December 2018), online: *CityMetric* <https://www.citymetric.com/fabric/many-ways-smart-cities-are-really-very-dumb-4384>.
[1882] Shira Ovide, "Tech World Takes a Page From 1992 Science-Fiction Book", *Wall Street Journal* (5 June 2013), online: <https://www.wsj.com/articles/SB10001424127887324563004578523230893558920>.

> monopoly. Seems like you can never get that last one-tenth of one percent."
> "Isn't the government still strong in Korea? You must have more trouble with regulations there."
> L. Bob Rife laughs. "Y'know, watching government regulators trying to keep up with the world is my favourite sport. Remember when they busted up Ma Bell?"
> "Just barely." The reporter is a woman in her twenties.
> "You know what it was, right?"
> "Voice communications monopoly."
> "Right. They were in the same business as me. The information business. Moving phone conversations around on little tiny copper wires, one at a time. Government busted them up—at the same time when I was starting cable TV franchises in thirty states. Haw! Can you believe that? It's like if they figured out a way to regulate horses at the same time the Model T and the airplane were being introduced."[1883]

In *Snow Crash*, the most democratic space to be found is "The Street, a wide, virtual boulevard in the computer-generated universe known as the Metaverse where everyone comes to see and be seen."[1884] *The Street* is a *Baudrillardian simulacrum* of the world made as a virtual city, where "images and concepts (public transport, infrastructure, real estate development, and gentrification) overlap and the inequality evident in the real world bleeds into the new realm of the Metaverse."[1885] Any considerations about possible simulacra of democracy in cyberpunk SF should not be seen as mere coincidence—and neither should their lawless scenarios.

The optimist narratives on smart cities claiming to deliver "power to the people" have not yet found much help in law about "what we do with the information we collect and who owns it" to provide more "regulatory certainty and confidence in technology."[1886] As previously noted, when the citizen is taken to be an *empowered and participative consumer* of urban technologies, the law will not provide a treatment according to civil rights in a democracy, but to *user rights* of applications that are often not very regulated beyond weak forms of consent. Therefore, "city

[1883] Stephenson, *supra* note 1618 at 115.
[1884] Rebecca Haar & Anna McFarlane, "Simulation and Simulacra" in Anna McFarlane, Lars Schmeink & Graham Murphy, eds, *The Routledge Companion to Cyberpunk Culture*, 1st ed (New York: Routledge, 2019) 255 at 255.
[1885] *Ibid*.
[1886] Emma Wright, "Smart cities - power to the citizens?", (21 April 2015), online: *Lexology* <https://www.lexology.com/library/detail.aspx?g=4189e304-5c09-4a31-96eb-33ca32ff8b3b>.

systems become a digital marketplace where citizen-consumers' participation is increasingly involuntary, and the hegemony of global technology firms is inflated."[1887] In this case, instead of providing power to the people, the power moves to the market and marginalizes "opportunities for subversion, democratic engagement, and alternative strategies for environmental and social progress."[1888] Still, there are alternatives for democratic technologies in cities to pay attention to.

Doctorow's *Little Brother* has done much to denounce the normalization of surveillance technologies for who is most vulnerable to *online and onsite monitoring systems* developed by big tech corporations—with the support of the state and the acquiescence of the law—postulating an ideology of algorithmic authority that is now encoded into *smart schools*.[1889] At the same time, another contribution of *Little Brother* is showing that this (not so vulnerable) *money-poor-and-time-rich* generation can resist it by building communities, technical knowledge, and organizing collaborative actions with the support of similar technologies "for liberation, not oppression."[1890] Sometimes, all it takes is a teenager as Ange to say it loud and clear:

> Ange put her hand up again. "We're not going to rat on you," she said. "No way. I know pretty much everyone here and I can promise you that. I don't know how to know who to trust, but I know who not to trust: old people. Our parents. Grown-ups. When they think of someone being spied on, they think of someone else, a bad guy. When they think of someone being caught and sent to a secret prison, it's someone else—someone brown, someone young, someone foreign.
> "They forget what it's like to be our age. To be the object of suspicion all the time! How many times have you gotten on the bus and had every person on it give you a look like you'd been gargling turds and skinning puppies?
> "What's worse, they're turning into adults younger and younger out there. Back in the day, they used to say, 'Never trust anyone over 30.' I say, 'Don't trust any bastard over 25!'"
> That got a laugh, and she laughed, too. She was pretty, in a weird, horsey way, with a long face and a long jaw. "I'm not really kidding, you know? I mean, think

[1887] Jenni Viitanen & Richard Kingston, "Smart Cities and Green Growth: Outsourcing Democratic and Environmental Resilience to the Global Technology Sector" (2014) 46:4 Environ Plan A 803–819.
[1888] *Ibid*.
[1889] Alison Flood, "Cory Doctorow novel pulled from school reading for 'questioning authority'", *The Guardian* (10 June 2014), online: <https://www.theguardian.com/books/2014/jun/10/cory-doctorow-novel-pulled-school-reading-questioning-authority>.
[1890] Damien Walter, "Future tech: Big Brother, big data or creator culture?", *The Guardian* (14 March 2013), online: <https://www.theguardian.com/books/booksblog/2013/mar/14/future-tech-big-brother-big-data-creator-culture>.

> about it. Who elected these ass-clowns? Who let them invade our city? Who voted to put the cameras in our classrooms and follow us around with creepy spyware chips in our transit passes and cars? It wasn't a sixteen-year-old. We may be dumb, we may be young, but we're not scum."
> "I want that on a T-shirt," I said.
> "It would be a good one," she said. We smiled at each other.[1891]

There might be a generational gap between the experience of teenagers like Ange and Greta Thunberg fighting surveillance or climate change, respectively, and other *not-so-old techies* developing *energy-and-personal-data-hungry technologies*. In a similar way, "there might be a gap between how decision makers and citizens perceive the city."[1892] Both gaps expose divergent visions of what digital technologies for democracy in smart cities could mean, and how their different fields of application could be operated "in terms of advancement of direct and inclusive participation in planning and urban management."[1893] Younger citizens and civic movements might be eager for a more participative democracy that listens to their voices and abides by their collective propositions in policy formation, while the older decision makers and tech providers might consider that collecting "big geographic data" from residents for policy decisions is a more efficient solution of data-driven participation than the usual "messiness of democracy."[1894] By knowing where people go on the streets and what they say in the networks, the datafication process intends to provide socio-behavioural observations and an attractive "passive civic participation" to cities,[1895] at the expense of contradictions to democracy, one of them being privacy. Some would say, "this is very *Black Mirror*!"[1896]

[1891] Doctorow, *supra* note 1624 at 157–158.
[1892] Lasse Steenbock Vestergaard, João Fernandes & Mirko Alexander Presser, "Towards smart city democracy" (2015) 14:25 Geoforum Perspektiv at 43.
[1893] Paolo De Pascali, "Technology for democracy in smart city planning" (2014) 4:1 Italian Journal of Planning Practice 3–28 at 23.
[1894] Matthew Tenney & Renee Sieber, "Data-driven participation: algorithms, cities, citizens, and corporate control." (2016) 1:2 Urban Planning 101 at 102.
[1895] *Ibid* at 103.
[1896] Charles Bramesco, "What does the future hold for the futures of Black Mirror?", (9 October 2017), online: *The Verge* <https://www.theverge.com/2017/10/9/16446260/black-mirror-uss-callister-season-4-netflix-preview>.

A disclaimer is needed: Doctorow's *Little Brother* (2008) has a sequel, *Homeland* (2013), and this novel could have been included here and it would add much to the topics of privacy and surveillance,[1897] considering that "Doctorow is bang up-to-date (as Orwell never was) on the uses of rapidly changing technology."[1898] The same goes for other works from the author who has much to say about the use of sensors, drones, and smartphones in smart cities, and *the messiness of democracy*.[1899] These works were all left for future research. *End of the disclaimer*.

Democracy and technologies have controversial relations, some more than others. Technologies are hitting the streets and networks of cities, Big Data powered by IoT represents what urban smartness means nowadays, artificial intelligence is the next promise of prowess to be set in motion, and blockchain is the one around the corner with much to be proven in smart city applications. The blockchain narrative makes some big, bold claims about improving democracy in municipal governments, and being capable of delivering all kinds of services, such as: "appropriate distribution of resource among its citizens, both individual and corporate… the distribution of monetary resource and… social intangibles such as security, the conditions for the maintenance of the rule of law."[1900] There is no lack of blockchain advocates and start-ups promising that the decentralized ledger can change democracy and governance in cities to cope with their risky challenges in the present and near future. The boldness of such techno-social assumption (some would call it arrogance) is not a problem *per se*, after all, "balancing the desire for control with the need for healthy chaos and experimentation are the essence of empowering

[1897] *See*: Alexandra Alter, "Edward Snowden and Cory Doctorow Talk Sci-Fi and Reality", *The New York Times* (5 May 2017), online: <https://www.nytimes.com/2017/05/05/books/edward-snowden-and-cory-doctorow-talk-sci-fi-and-reality.html>.
[1898] Tom Shippey, "Unfriending Big Brother", *Wall Street Journal* (19 February 2013), online: <https://www.wsj.com/articles/SB10001424127887324162304578304093248501044>.
[1899] Cory Doctorow, "The case for ... cities that aren't dystopian surveillance states", *The Guardian* (17 January 2020), online: <https://www.theguardian.com/cities/2020/jan/17/the-case-for-cities-where-youre-the-sensor-not-the-thing-being-sensed>.
[1900] Renming Qi et al, "Blockchain-Powered Internet of Things, E-Governance and E-Democracy" in TM Vinod Kumar, ed, *E-Democracy for Smart Cities* (Singapore: Springer, 2017) 509 at 516.

a progressively generative city environment";[1901] yet, what their promises seem to miss is that "technology is only part of the solution; policy matters just as much."[1902] And when democracy is taken for a ride with any kind of upgrade, public policy might matter a lot more than technology.

In Cooper's *Wilders*, the cities of Seattle and Vancouver, both "vibrant technology hubs," have merged into the megacity of *Seacouver* "with a grassroots campaign and a surprise vote that barely passed both cities."[1903] Born from a democratic defiance to the governments of the United States and Canada, democracy is encoded into Seacouver's self-governing algorithms which take inputs from all kinds of sensors, the opinions of residents, and voting systems.

> News packed the city, a glorious cacophony of conversation and facts. The people who owned property or businesses voted on ideas in their neighborhoods, and made change upon change, sometimes to fix problems and sometimes just for fun. This same social experiment filtered through everyone for votes on city leaders and laws.[1904]

To deliver sustainable and efficient services to its inhabitants in a world of ecological collapse, the urban AI tracks and analyzes massive amounts of data to detect risks, including to itself, and takes action to prevent them. In a given moment of the plot,[1905] the protagonist Coryn and the former mayor Julianna have to hide from the sensors of the city, because freedom of expression and democratic change can be included as systemic risks for Seacouver:

> "Did you build the tunnels?"
> "Yes."
> "Why?"
> "So we could be safe from the city if we needed to be. We didn't know what we were creating back then. A self-healing city run by linked smart systems? Billions—billions of billions—of real-time feeds online? Millions of people interacting with a computer every day and not really knowing it, so they'd still be people? No one had ever tried anything like it. So we built physical back doors into the city upgrade plans. We had that power, early on. They're all over

[1901] Ayesha Khanna & Parag Khanna, "Generative Cities: Innovative, Sustainable, Inclusive" in Daniel Araya, ed, *Smart Cities as Democratic Ecologies* (London: Palgrave Macmillan UK, 2015) 35 at 41.
[1902] *Ibid* at 35.
[1903] Cooper, *supra* note 1623 at 32.
[1904] *Ibid* at 7.
[1905] Please, forgive me for all the spoilers in this dissertation. I tried to avoid them, I swear.

> Seacouver and here, at least."
> Julianna stopped, looking around as if seeing her gardens with fresh eyes. "Not that we need the tunnels in the way we thought we might. We were afraid the city systems might fail. Or attack us. But it works. The city works. Mostly. Everyone has enough to eat and enough power. Almost everyone has a job to do. We still have elites and creatives and entrepreneurs. . ."
> Julianna looked proud as she glanced over at Coryn. "I suppose that only makes some sense to you. There are issues. You've seen those. The problems—the deep ones—they're with human psychology, not the infrastructure. We're trying to understand that now. But even though it works, it's smart to have a safe place. The tunnels and our other shielding makes it impossible for the city to watch our every move. **It's not stupid, the city**."[1906]

Cooper's *Wilders* offers much to reflect on regarding surveillance and privacy in the *not-stupid cities* of the post-climate-change era, ultimately as a dilemma for democracy itself. Democracy and the rule of law are not frequently found in the near future SF that deals with hyper-capitalist self-preserving systems which intend to preserve "elites and creatives and entrepreneurs" (and the necessary number of poor people to work cheap for them). Among other works that might also offer it for (legal) research,[1907] *Wilders* "demonstrates the potential for post-cyberpunk fiction to respond in the utopian mode to its situation in the Anthropocene, refusing the 'metastasis of the present' that paralyzes the dystopian future."[1908] In this sense, post-cyberpunk works have much to offer for the legal imaginary of democratic cities in the near future.

The most challenging task for legal scholars when considering smart cities is not finding the adequate legislation and interpretation for the present legal dilemmas, but projecting how the rule of law itself might coexist with the automated normativities of the near future. Therefore, assuming that the rule (and role) of law is necessarily connected to the projections of democracy in smart cities, all public policies concerning *smart democracy* are matters for law as well.

[1906] Cooper, *supra* note 1623 at 271–272. Emphasis added.
[1907] For example, *Peripheral* by William Gibson and *Autonomous* by Annalee Newitz ("See you later!").
[1908] Veronica Hollinger, "Ecology in the Anthropocene" in Anna McFarlane, Lars Schmeink & Graham Murphy, eds, *The Routledge Companion to Cyberpunk Culture*, 1st ed (New York: Routledge, 2019) 326 at 332.

There are straightforward propositions to include democratic practices for the future of cities by adapting legislation to the ISO 37120:2015-03 standard—which includes indicators of transparency, participation and accountability—in the hope that legal standards would "provide technical guidance in determining the indicators characterizing an intelligent city."[1909] Other legal scholars have been saying that the existing legal previsions (GRDP, Directive 2003/35/EC, Aarhus Convention) are already suited to the task of accommodating future city solutions to basic and human rights (personal data, participation, environmental protections) and bring legal action when certain social standards are on the line.[1910] Finally, a more adaptable (and not restricted to the EU) legal approach for smart cities is to focus on local governance "aligned with human rights due diligence in order to establish that smart and safe technologies only exist within cities because they meet the standards of legality, necessity, and proportionality, and are therefore acceptable in a democratic society."[1911] The best global solution might be the most local one.

Finally, the last (and best) recommendation for legal researchers on smart cities is about how *localism* might provide legal guidance to policies for transparency, privacy, and democracy. The article *Privacy Localism,* [1912] by Ira S. Rubinstein, "provides the first comprehensive analysis of privacy regulation at the local level," and it shows that shaping "emerging privacy norms for an increasingly urban future, inspire more robust regulation at the federal and state levels, and inject more democratic control into city deployments of privacy-invasive technologies."[1913] In the 89 pages of the detailed article, democratic governance is an essential key for such a task.

[1909] Anna Orzeł, "The Legal Aspects of Intelligent Cities" in Anna Brdulak & Halina Brdulak, eds, *Happy City - How to Plan and Create the Best Livable Area for the People* (Cham: Springer International Publishing, 2017) 255 at 272.
[1910] Justyna Bazylińska-Nagler, "Smart City Landscape Protection—EU Law Perspective" in Anna Brdulak & Halina Brdulak, eds, *Happy City - How to Plan and Create the Best Livable Area for the People* (Cham: Springer, 2017) 241.
[1911] Nora Ni Loideain, "Cape Town as a smart and safe city: implications for governance and data privacy" (2017) 7:4 International Data Privacy Law 314–334 at 334.
[1912] It received the *9th Annual Privacy Papers for Policymakers Award* from the *Future of Privacy Forum*.
[1913] Ira S Rubinstein, "Privacy Localism" (2018) 93 Wash L Rev 1961.

With the closing of the last page of the experimental chapter of the research, almost six years after several doctoral back-and-forths, and having gone through all the texts here and the remaining ones in biological memory, everything points to a simple and possible conclusion for those looking for legal guidance on smart cities: local and democratic governance. This conclusion may be better seen after reading Older's *Centenal Cycle* or, at least, *Infomocracy*:

> "I hate your stupid pseudodemocratic infomocracy, true," Domaine agrees. "But I would hate a corporate dictatorship manipulated by the military-industrial complex even more."
> …democracy is of limited usefulness when there are no good choices, or when the good choices become bad as soon as you've chosen them, or when all the Information access in the world can't make people use it.[1914]

Thanks to Older and her generation of writers, cyberpunk is neither dead nor "merely one more marketable product,"[1915] allowing the readers (and law & literature researchers) to move between and beyond the utopian/dystopian frontiers where smart cities are (archeo)typically set. *Infomocracy* and all post-cyberpunk works approached here amplified the components for a legal imaginary of smart cities, providing ways of exploring the possibilities of democratic governance that are not limited to simple polarities, as distributed sensemaking or direct democracy.[1916]

Such governance is not the hypermarketized and hyperscientific model of governance; otherwise, it would not be local or democratic,[1917] but based on the networks of communities and expressions of urban life.[1918] Law must engage with it to avoid urban democracy ending up being described in the future just like cyberspace once was: "a consensual hallucination."

[1914] Older, *supra* note 1626.
[1915] Christopher D Kilgore, "Post-Cyberpunk" in Anna McFarlane, Lars Schmeink & Graham Murphy, eds, *The Routledge Companion to Cyberpunk Culture*, 1st ed (New York: Routledge, 2019) 48 at 48.
[1916] Claude Rochet & Amine Belemlih, *Direct Democracy as the Keystone of a Smart City Governance as a Complex System.* (2016).
[1917] Kris Hartley & Glen Kuecker, "Will smart cities become the next populist scapegoat?", (16 April 2018), online: *Policy Forum* <https://www.policyforum.net/will-smart-cities-become-next-populist-scapegoat/>.
[1918] Thomas McMullan, "How art is making the data-driven city more liveable", *The Guardian* (11 June 2015), online: <https://www.theguardian.com/technology/2015/jun/10/art-data-digital-city>.

4. To be Concluded

As it has once been said by the Oracle: “Everything that has a beginning, has an end.”[1919] This text represents the end of a doctoral research, hoping to bring a new beginning. However, first it has to do a fast check-up on the body of the research, a brief discussion to ponder about some of its senses and meanings, and a concise conclusion to answer the introduction.

Two simple text analysis were produced over the 116,408 words in the *corpus* of the dissertation, from the introduction to the end of the third chapter, excluding all footnotes. They produced a wordlist (*Table 18*) using *Sketch Engine* and a word cloud (*Figure 95*) using *Voyant Tools.* The word counting and the cloud visualization allow a quick scan of all the content.

Nouns											
Term		Freq	Term		Freq	Term		Freq	Term		Freq
1.	city	1860	26.	service	137	51.	word	102	76.	area	84
2.	law	544	27.	work	135	52.	regulation	100	77.	infrastructure	82
3.	datum	463	28.	world	134	53.	knowledge	99	78.	tech	82
4.	research	426	29.	de	134	54.	process	99	79.	tool	82
5.	science	358	30.	fiction	133	55.	issue	98	80.	company	81
6.	technology	328	31.	state	132	56.	condition	98	81.	paradigm	80
7.	project	301	32.	result	132	57.	subchapter	96	82.	academic	79
8.	term	277	33.	part	126	58.	montréal	93	83.	practice	78
9.	data	257	34.	model	125	59.	society	93	84.	chapter	78
10.	policy	220	35.	database	124	60.	narrative	92	85.	review	77
11.	literature	215	36.	subject	124	61.	transparency	92	86.	life	76
12.	future	189	37.	approach	124	62.	scholar	91	87.	theory	76
13.	publication	181	38.	way	122	63.	rio	91	88.	fact	75
14.	time	178	39.	analysis	118	64.	case	89	89.	accountability	75
15.	citizen	173	40.	community	117	65.	network	88	90.	goal	74
16.	information	169	41.	challenge	117	66.	surveillance	88	91.	example	74
17.	risk	169	42.	form	116	67.	medium	88	92.	websites	73
18.	privacy	161	43.	development	116	68.	idea	87	93.	sense	72
19.	dissertation	161	44.	big	114	69.	problem	87	94.	researcher	71
20.	governance	150	45.	security	110	70.	concern	87	95.	management	69
21.	text	149	46.	cyberpunk	109	71.	innovation	87	96.	order	68
22.	system	147	47.	solution	108	72.	reference	86	97.	context	68
23.	government	145	48.	change	108	73.	topic	86	98.	application	67
24.	element	144	49.	people	108	74.	participation	85	99.	democracy	67
25.	figure	137	50.	author	102	75.	perspective	84	100.	debate	66

Table 18: Wordlist of nouns in the *dissertation corpus*, using *Sketch Engine*

[1919] In the third movie of the *Matrix trilogy* (The Wachowskis), *Matrix Revolutions*, this phrase appears twice, with different meanings in each context: warning and hope. *See also*: Therrien, *supra* note 20.

Figure 95: Word Cloud of 500 words from the *dissertation corpus,* using *Voyant Tools*

After so many tables and visualizations used here, there is hope that the reader can build an interpretation on her/his own before jumping into the one from the research. Representations of text such as those provided earlier allow flexible interpretations for each analysis/analyst. Several paragraphs of this dissertation were written using only the nouns, verbs and adjectives provided by such visualizations. This was one of the (hidden) experiments of the research.

The provided terms (8th) in the previous figure (25th) are able to present the common ideas (68th) on the topics (73th) of this doctoral dissertation (19th). Any researcher (94th) in the area (76th) could possibly identify specific narratives (60th) and paradigms (81st). This is a doctoral research (4th) about smart cities (1st), describing digital solutions (47th) and social issues (55th) related to their innovative technologies (6th), adopted models (34th), and major projects (7th) around the world (28th). The many perspectives (75th) mentioned in it were identified by online tools (79th) used for textual analysis (39th) of two databases (35th) that were built from relevant publications (13th) on the main subject (36th) by authors (50th) coming from media (67th) and academia (82nd). Expected legal elements (24th) emerged from the applied process (54th), such as privacy (18th), security (45th), transparency (61st), participation (74th), accountability (89th), and governance (20th). A general review (85th) was produced on the available information (16th) about the public policies (10th) of Big Data (44th/9th) in the two municipal cases (64th) of Rio (63rd) and Montréal (58th), and their regulation (52nd) in the Brazilian and Canadian contexts (97th). The combined approaches (37th) from science (5th) and literature (11th) were explored to reflect on the normative concerns (70th) represented by the global challenges (41st) and local risks (17th) brought by urban surveillance (66th), climate change (48th), and other neoliberal conditions (56th). Cyberpunk (46th) SF reveals itself useful for engaging with the shared problems (69th) that need to be faced in the present time (14th), all involving democracy (99th). The achieved results (32nd) show that this work (27th) was, in fact (88th), about the complex network (65th) of practices (83rd) and senses (93rd) between (post)modern law (2nd) and the imaginary of the future (12th).

The data visualization and interpretation allowed an overview on the dissertation,[1920] and any reader who is interested in the conclusion should go directly to the subchapter 4.2. The next subchapter is a last legal discussion that could only be done after going through all the research.

4.1. What Is the Purpose of a (Data-Driven and Cyberpunk) Legal Thesis?

Returning to the very beginning of the doctoral endeavour, even before defining an initial subject for the research, there were questions that made it hard to start: why would someone go through all the trouble of writing a legal thesis in times like today? What purpose would (more) law in such context serve (and for whom)? These questions were not new. Legal scholars like Pierre Noreau had long been looking for answers: "*Le droit, à quoi ça sert? Quelle question...*"[1921]

Time (and the lack of it) finds a way of postponing doubts, or arranging provisional and convenient answers for the time being. The pragmatic answer that justified the *investment of life* in a legal thesis was a prospect described by Jacques Commaille: "*l'aptitude des acteurs du droit à s'insérer dans des « communautés épistemiques » et… alors devenir des éléments d'une « policy community », à travers notamment une activité doctrinale*."[1922] But assuming that the legal research would serve the researcher, would it serve the law? If so, what would the law serve?

It was only in a more advanced research stage that the questions—"*Avons-nous toujours eu besoin du droit ? Avons-nous encore besoin du droit ?*"[1923]—would reemerge as mandatory and no longer postponable. The dominant smart city model is predicated on the "*concurrence des normativités*," as described by François Ost, which implies that "*normes « matérielles », au*

[1920] Besides the nouns in the table 18, wordlists of verbs and adjectives and their first hundred results were also used to write the previous paragraph.
[1921] Pierre Noreau, "Et le droit, à quoi sert-il? Étude des usages étatiques et des fonctions du droit contemporain" in Pierre Noreau, ed, *Le droit à tout faire: explorations des fonctions contemporaines du droit* (Montréal: Thémis, 2008) 205 at 207.
[1922] Jacques Commaille, *A quoi nous sert le droit?* (Paris: Gallimard, 2015) at 16–17.
[1923] Ost, *supra* note 253 at 3.

sens propre du terme, inscrites dans les dispositifs techniques eux-mêmes."[1924] Normativity is diluted everywhere in the technological and managerial standards of smart cities, reducing the rule of (state) law to so-called "best practices." If technoscience would reduce law to a secondary role in the cities of the future, then what purpose would one more legal thesis serve? As a fading endnote in a risk management manual for a corporation assuming privatized city services?

Far from being a dilemma limited to cities, this crisis of modern law comes at a time when an "unprecedented dimension of risk has undermined the credibility of the trust provided by the state," according to Boaventura de Sousa Santos.[1925] As law was reduced to state law, the undermined state also undermines law, and the same goes for liberal democracy. In times of *unprecedented risks*, state and democracy are under a process of rupturing by a neoliberal rationality that contradicts its own narratives of smart, sustainable, and democratic megacities.

This rupture was recently described by Manuel Castells, the former urban researcher who once inspired much hope for building a more democratic society in the flows of information. All those elements are present in his book, which might seem familiar to readers of cyberpunk:

> The rupture in the institutional relationship between the governing and the governed creates a chaotic situation, which is particularly problematic in the context of the broader evolution of our existence as a species on this blue planet – not least as its very habitability for human life is cast into doubt through our own actions and inability to apply the corrective measures that we know are needed. It is problematic, too, as our extraordinary technological development comes into conflict with our political and ethical underdevelopment, putting our lives into the hands of machines. Then there are the environmental conditions in the megacities that host a growing proportion of the global population, which could cause and are already causing all manner of diseases, while feeding violence. Our planet continues to face the present threat of nuclear holocaust thanks to the madness of leaders with god complexes and no real psychiatric restraint. The technological dimension of new forms of war, including cyberwarfare, could potentially make for conflicts more terrible than their twentieth-century precursors. Meanwhile, international institutions are powerless to put in place survival strategies for the common good, dependent as they are on states (and therefore the short-sighted, corrupt and unscrupulous

[1924] *Ibid*.
[1925] Santos, *supra* note 77 at 78.

nature of many of the people who govern them).[1926]

While preparing the literature review for this dissertation, it became clear that there are irreconcilable contradictions between the corporate narrative of *eco-smart-human-centric cities* with the scientific diagnostics and literary prognostics of digital surveillance, climate change, growing inequality, and the degradation of democracy in the cities of the near future. The imaginary of the smart city tries to incorporate elements from both perspectives under a neoliberal aegis which, in turn, also affects its legal imaginary toward a post democratic state.

Rio de Janeiro represents these contradictions that impoverish the imaginary of the cities of the near future. Just a few years ago, Rio was declared the "smartest city of the world" with a Sci-Fi control centre powered by Big Data, a mayor championing an innovative "polisdigitocracy," and investments in infrastructure for the FIFA World Cup and Olympic games were under way. Now, the "marvellous city" is becoming the antithesis of the former narrative and closer to the (cyberpunk-ish) rupture described by Castells. As Brazil serves as a world-class laboratory for neoliberal and postdemocratic experiments, its most iconic city illustrates the fast degradation of smart city policies and their imaginaries—with legal elements included in the *downgrade patch*.

The concept of imaginary, the transition toward the postdemocratic state, and their relationships with law and the Judiciary are subjects in the works of the legal scholar Rubens R. R. Casara, who is also a judge at the Court of Justice of the State of Rio de Janeiro. The imaginary can be understandood as a set of unconscious representations that appear from the images and other phenomena perceived by the individual.[1927] It is the imaginary that makes people understand and accept what happens with them, their social identity, and their city, as

[1926] Manuel Castells, *Rupture: The crisis of liberal democracy* (John Wiley & Sons, 2018) at 145.
[1927] Rubens R R Casara, *Estado pós-democrático: neo-obscurantismo e gestão dos indesejáveis*, 4th ed (Rio de Janeiro: Civilização Brasileira, 2018) at 78.

well. When the imaginary incorporates neoliberal ideology, it becomes impoverished in terms of what is used to give sense and direction to life in society. This has severe consequences for law, which is supposed to ensure the collective well-being and the democratic governance of cities.

Casara also points to the relations between the imaginary and the symbolic, the plane of language and culture which allows displacements of meaning and conflicting interpretations.[1928] In this sense, the research embraced the symbolic function performed by law, as promoted by the works of Casara[1929] and Noreau[1930] for dealing with the necessary displacements and unavoidable conflicts required by the subject of smart cities. The symbolic force of law is based on diverse parameters and goes beyond the will of the state or the legislator: "*La force du droit ne réside pas ici dans l'atteinte d'une visée éthique ou idéologique particulière, mais dans la conséquence du droit sur les représentations personnelles et collectives des sujets de droit*."[1931] Law is a source of social representations that "ordinary citizens" understand, evoke, avoid, and resist—law makes part of their imaginary. If a legal thesis can add to the expansion of the legal components in the imaginary of smart cities, it can answer the initial questions of this subchapter.

A legal thesis will serve the law. And the law? "*En définitive, le droit sert aux fins que nous imaginons pour lui,*"[1932] is the both simple and complex answer from Ost. The Belgian scholar then refers to a book by Santos, in which a particular text passage may help the legal imagination (not to be confused with the imaginary) to seek new paths for knowledge and action:

> In a period of paradigmatic transition, old knowledge is a poor guide. We need a new knowledge instead. We need a legal science of turbulence, sensitive to the new intellectual and political demands for more realistic and efficacious

[1928] *Ibid*.
[1929] *See also*: Rubens R R Casara, *Sociedade sem lei: pós-democracia, personalidade autoritária, idiotização e barbárie*, 1st ed (Rio de Janeiro: Civilização Brasileira, 2018).
[1930] Making part of a research centre as the CRDP has the advantage of experiencing unexpected conversations with professors who provide incidental insights and recommendations of bibliography.
[1931] Pierre Noreau, "De la force symbolique du droit" in *La force normative Naissance d'un concept* (Paris: LGDJ/Bruylant, 2009) 137 at 148.
[1932] Ost, *supra* note 253 at 13.

> Utopias than those we have lived by in the recent past. The new constellation of meaning does not begin from scratch. It has much to gain from excavating into the past in search of suppressed or marginal intellectual and political traditions… Above all, the new knowledge is premised upon the unthinking of the old and still hegemonic legal knowledge, the knowledge that will not admit the existence of the paradigmatic crisis before all progressive or hopeful solutions have been discarded or made impossible. Unthinking is epistemologically complex… Moreover, because undertaken in the wake of modern science and modern law, the destructive side of the unthinking must be disciplinary – that is, it must be carried out within law as a scientific discipline… while its constructive side must be non-disciplinary: unthinking amounts to a new cultural synthesis.[1933]

In order to move toward a *legal science of turbulence* capable of excavating the past, facing the present, and expanding the imaginary of the future—the smart city acting here as a representation of the near future—the research included the still *marginal intellectual tradition* of *law & literature* as a method. The *text analytics* approach was already in motion and served well as a *disciplinary* method to *be carried out within law as a scientific discipline*. The data-driven and cyberpunk approaches achieved to the convergence of the several legal vectors into the goal of *cultural synthesis* proposed by Santos and (hopefully) carried by this dissertation.

A final confession is due. It was the paradigmatic author of the doctoral period, François Ost, who shared the final password for bringing science fiction into the core of the research and for approaching the legal imaginary of the subject. In "*Raconter la loi : aux sources de l'imaginaire juridique*," Ost focuses on classic authors but includes references to Orwell and Huxley.[1934] Literature is in the *cœur* (and all over) of "*À quoi sert le droit* ?," a book from which this thesis has taken a lot. A final push came from "*Le droit, objet des passions*," when Ost concludes that: "*C'est l'enjeu essentiel du courant « droit et littérature » de rappeler cette vérité un peu oubliée que les émotions et l'imagination… sont des éléments essentiels du débat public.*"[1935] So, in lieu of Greek tragedies in city states, the emotion went for *high tech and low life* in cyberpunk cities.

[1933] Santos, *supra* note 77 at 83.
[1934] Ost, *supra* note 313 at 330.
[1935] François Ost, *Le droit, objet de passions ?* (Brussels: Académie royale de Belgique, 2018) at 143.

4.2. Leaving the Future Perfect, Back to the Present Continuous

The conclusion of this *strange, open, legal thesis* is a (triple) return to the beginning. Three non-legal questions that endured through all the period of this research still remain. They will be simply presented as matters of (artistic) perspective, but none are simplistic. Not to be confused with *perception* or *point of view*, they could be a matter of *literary perspective* where *purpose* would play a big part, but there is too much text here and it could end up being confusing. Instead, they are a matter of *visual perspective,* as used for photography, drawing, and cinema. The three long-lasting questions will be set in different *positions*—foreground, middleground, and background—which are suitable for a research about imaginaries, representations, and images.

The first question is set in the *foreground* plane, the closest image to the viewer, usually in the front of a photo. *Were all the objectives, questions, hypotheses, and approaches satisfied by the research?* The foreground focuses on the most relevant and detailed image in a photo. The photographer, who was there during the whole process to register a fraction of it, could offer the best description, but this question calls for the elements in the introduction to be answered.

The main objective of the research was to *explore the legal imaginary involved in what have been called smart cities, by combining approaches from science, law, and literature*. The main objective is directly related to the general research question: *what might the components of the legal imaginary of smart cities be?* The twinned elements were thoroughly satisfied.

The imaginary is understood here as the set of representations that arise from images that give sense and meaning to an individual. Such representations are mostly unconscious. The research gradually brougth up the components of the smart city to the conscious surface over the course of the text. The elements of the imaginary that compose the so-called *smart city* come from many sources. In order to explore such images, publications from media, academia, and

science fiction were analysed and presented. Documents from governments, corporations, and NGOs were mostly left out, but they were indirectly referred to in the analysed publications. Special attention was directed to the publications from legal scholars under any form. Legal components could be found in all sorts of publications, because they are not exclusive to the *legal public* and are matters of concern to the *general public*. Law makes part of the imaginary of smart cities, as was supposed by the hypotheses. The concept of an imaginary is spread in bits and pieces to be found over the course of the text, and is openly discussed in the conclusion, after going throught the process of exploring the legal elements in the imaginary of smart cities.

The specific objectives and questions, derived from the main objective and question, were also satisfied. As they are related to one another, they need to be presented together.

The dissertation started by exposing the theoretical framework needed to contextualize and guide the research process, including the paradigms and (meta)narratives on science, law, and literature. The dissertation moved to identify the knowledge and experience available on smart cities, present their concepts and definitions, and describe their techno-social components with approaches from media and scientific publications. The legal components of the imaginary of smart cities were analyzed in the literature review, examined in smart city policies related to projects in Rio de Janeiro and Montréal, and summarised in the applicable legislation related to the projects of both municipal cases. Literature can contribute with the legal imaginary of the cities of the near future by synthesizing their potential scenarios, possible vectors, and sociolegal concerns that already exist in the present. Finally, the dissertation delivered here is the expected tool to present the research results to the academic, governmental, and legal communities.

The objectives and questions provided the principal and the auxiliary hypotheses—which are not necessarily ment to be proven right or wrong—as well as working hypotheses. They were put under (stress) tests, showed promising results, and should contribute to further research.

The principal hypothesis is expressed in the introduction and in the title of the dissertation: *examining the legal imaginary of smart cities is a way of speculating about the relations between the law and the future*. Smart cities present the prime conditions for such a task: they are the projected cities of the near future, to be designed by science and technology; there are diverse sets of smart technologies, with many experiences to investigate; and the proximity between municipal governments and the local effects of their smart projects makes the research more feasible. All sorts of dilemmas related to innovation can find prospects in smart cities, the urban scenarios where the future is framed as digital technologies and the law as public policies.

The auxiliary hypothesis is a presupposition expressed in the introduction and throughout the text: *the rationality of law is expressed through public policies for dealing with the future*. It is not by chance that so many lawyers elaborate part of the public policies for smart city projects but by design. One day, the legislative choices and court decisions that serve as primary sources of law might be part of the imaginary of smart cities, but they are not there yet. The contributions to the legal imaginary of smart cities come mostly from the secondary sources of law. In sum, the law as a network extends its connections to the future by encoding itself into public policies.

The working hypotheses are clearly stated in the introduction and worked through in all chapters. They were used here to develop the main hypotheses, organize the available knowledge on the topics, and guide the application of the tools for the research. The working hypotheses in the introduction were further developed and expanded into these:

- *The composition of the legal imaginary of smart cities depends on its sources*. It is able to absorb diverse elements from narratives in the media, technoscientific contributions, representations from literature and cinema, and new approaches for sociolegal concerns;
- *The dominant model of smart cities promises a lawless future of algorithmic normativity.* In spite of this, law resists by making part of the imaginary of smart cities and providing guidance for public policies to potentialize their benefits and to minimize their risks;

- *Law adapts to deal with the benefits and risks of smart cities according to local conditions.* The planning and management of smart projects can vary substantially in each case, shifting with techno-social contexts, legal dispositions, and political orientations;
- *Law must design a network-based balance of benefits and risks for each smart city.* Instead of simple measures based on general assumptions, law must customize policies with *ex ante* and *ex post* protocols for dynamic responses according to each context;
- *Privacy, security, transparency, participation, accountability, and governance form the legal imaginary of smart cities*. They form a network of principles and practices divisible into the axes of opacity, intelligibility, and compliancy for the legal analysis of policies;
- *Law needs to expand the imaginary of smart cities into new laws and public policies.* Law has to develop new frameworks to face the challenges and risks in the *present future* of cities—such as surveillance, climate change, and inequality—that threaten democracy.

The demonstration of the main hypotheses and the working hypotheses were based on the three approaches adopted to explore the legal imaginary of smart cities. In order to justify and conciliate them, a multi-theoretical approach examined the metanarratives of modernity and the postmodern conditions of knowledge. The factors and relations between their (cognitive, practical, and expressive) rationalities and respective (market, state, and community) logics were explored, and they framed the adopted methodology. A set of non-hegemonic and network-oriented approaches, focused on (counter)storytelling, was assembled for the task of combining science, law, and literature. The methodology was followed, and the results were satisfactory:

- *A text analytics approach outlined the topics of smart cities in media, sciences, and law*. Text mining tools were deployed to analyze and illustrate two databases of publications from media and academia (natural/social sciences, law, urbanism, humanities);
- *A legal approach explored the legal terms and concerns of the imaginary of smart cities*. After identifying the main normative elements and sociolegal issues related to the subject, they were examined in the public policies of the projects of Rio de Janeiro and Montréal;
- *A Science & Law & Literature approach contributed to the legal imaginary of smart cities.* It interlaced all the previous efforts, by pinpointing topics from text analytics, expanding issues not fully developed by law, and contrasting them with cyberpunk science fiction.

The second question is set in the *middleground* plane, with secondary images behind the foreground, sustaining the story in a drawing. *Were the narratives, styles, and angles used able to show the points and tie the laces of the research?* The whole point of this work depends on them. The public, who will interpret the outcomes of the discovery and engagement process of a drawing, may offer the best opinion, but this question requires a brief caveat.

The many (kinds of) lines of this dissertation were drawn as (en)acts of translation and transformation, always in progress and revision. The text was written in English by a non-native speaker and, despite the best advice,[1936] it kept a strong Latin accent in long phrases that might bother native speakers (and so will the works from Santos, Castells and Ost). There are fuzzy narratives in the texts and images, and it is hard to (know when or how to) switch between them. The writing and visualization styles were planned to adapt to each goal as part of the experience, not always successfully. Finally, the unusual angles used for a legal thesis might make it seem out of focus. It explains why many apologies can be found in a text that remains quite arrogant.

The last question is set in the *background* plane, the least detailed image in the frame, the furthest from the viewer of a movie. *Was it a good thesis?* The *mise-en-scène* displays the boldness and contribution of the work, sets the scale for all planes, and helps filling the blanks of a story. Time and critics will offer the answer, but the question also calls for a last thought.

A last threefold criterion might give some clues.[1937] A good thesis is supposed to advance the knowledge of a field, demonstrate valid conclusions, and be coherent with the proposal. As the criteria and visual perspectives overlap, they give hope that the thesis was good enough.

[1936] Nanette Neuwahl, “Écrire une thèse dans une langue autre que la sienne” in Emmanuelle Bernheim & Pierre Noreau, eds, *La thèse: Un guide pour y entrer. et s’en sortir* (Les Presses de l’UdeM, 2016) 209.
[1937] Pierre Noreau, “Une bonne thèse... c’est quoi ?” in Emmanuelle Bernheim & Pierre Noreau, eds, *La thèse: Un guide pour y entrer. et s’en sortir* (Les Presses de l’UdeM, 2016) 115.

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Appendix 1: Documents in the *Websites* Database

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Mark Eggleton	Smart cities and IoT: Technology's potential huge but security concerns remain	Financial Review	2018
Mark Sawyer	Technology is making cities smart, but it's also costing the environment	Phys.org	2018
Mark Thomas	The business of smart city disruption	The Spinoff	2018
Mark Wilson	The Surveillance City That’s Always Watching You	Fast Company	2016
Martine Courgnaud, Del Ry	Smart city : « L'hyper-technicisation laisse peu de place au citoyen »	La Gazette des Communes	2017
Martine Courgnaud, Del Ry	Villes de France publie une étude encourageante sur le développement des smart cities dans les villes moyennes	Actualité fonction publique territoriale	2018
Mateja Kovacic	If you want to see the future of your city, take a look at these 3 places	World Economic Forum	2018
Mathieu Lefevre	Moving Beyond the ‘Smart City’ Paradigm	NewCities	2014
Matt Hamblen	Singapore’s ‘city brain’ project is groundbreaking -- but what about privacy?	Computerworld	2016
Matthew Braga	Welcome to the neighbourhood. Have you read the terms of service?	CBC News	2018
Matthew Finnegan	‘IoT, drones and smart city tech will ease pressure on public sector budgets’, says Amey CIO	Techworld	2015
Matthew Reitman	'Smart Cities' of the Future Will Require More than Big Data	RealClearLife	2017
Max Armanet	"Comme Smart City, Paris n'a rien à envier à Londres!" (Anne Hidalgo)	La Tribune	2014
Maya Sinha	The PPP route to smart urban living	The Hindu Business Line	2015

Megan Rose Dickey	Uber and Lyft are responsible for about half of SF's rise in traffic since 2010	TechCrunch	2018
Melissa Low	Many Smart Cities, One Smart Nation – Singapore's Smart Nation Vision	SCL	2015
Melissa Petrucci	Villes intelligentes: de la science-fiction à la réalité	Natura Sciences	2016
Michael Berkowitz, Robert Muggah	Opinion: The smartest cities are resilient ones	Devex	2017
Michael Kanellos	Making the megacity sustainable through IoT	Readwrite	2016
Michael Scott	Smart Cities and the Technology of Walking	Government Technology	2014
Michael Totty	The Rise of the Smart City	Wall Street Journal	2017
Miguel Helft	Google's Newest 'Moonshot': Improve Life In Cities	Forbes	2015
Miimu Airaksinen	Smart cities, can the performance be measured?	VTT Research	2016
Mike Barlow, Cornelia Lévy-Bencheton	Smart cities are futuristic but they must also learn from the past	Smart Cities World	2018
Mike Cooray, Rikke Duus	Technology is not enough to create connected cities – here's why	The Conversation	2017
Mike Gurstein	Smart Cities vs. Smart Communities: Empowering Citizens not Market Economics	Gurstein's Community Informatics	2014
Mike Hower	The problem with translating smart cities to the global South	GreenBiz	2015
Mike Montgomery	Smart Cities Are Smart Places for Entrepreneurs	Forbes	2018
Mike Steep	Smart Cities Will Need Smart Leaders and Even Smarter Citizens	Forbes	2014
Molly Sauter	Google's Guinea-Pig City	The Atlantic	2018
Myriam Quéméner	Enjeux juridiques et perspectives de la smart & safe city	SD Magazine	2017
Nancy Torres	How Data and Cities Can Shape the Future of Mobility	Data-Smart City Solutions	2017
Natalie Gagliordi	Smart cities will house 9.7 billion IoT devices by 2020: Gartner	ZDNet	2015
Naveen Rajdev	Smart cities are great. Human-centric cities are (again) the future	Quartz	2017
Nick Carney	Data-Smart Cities and the Sharing Economy	Data-Smart City Solutions	2013
Nick Carney	The Parking Revolution Will Be Digitized	Future Structure	2013
Nick Carney	Big Data Without the Fear of Big Brother	Data-Smart City Solutions	2014
Nick Dunn	Have our visions of future cities become more positive?	CityMetric	2014
Nick Ismail	The smart nation: Singapore's citizen-centric drive	Information Age	2016
Nick Ismail	The future of smart power in the smart city	Information Age	2016
Nick Ismail	IoT and smart cities: meeting sustainable development goals	Information Age	2017
Nick Ismail	What problems will artificial intelligence solve in the public sector?	Information Age	2018
Nick Pinto	Google Is Transforming NYC's Payphones Into a 'Personalized Propaganda Engine'	The Village Voice	2016

Nick Rojas	Chicago And Big Data	TechCrunch	2014
Nicolas Martin	Ville de demain : une ville intelligente ?	France Culture	2017
Nisa Malli	Public policy for our automated urban future	Brookfield Institute for Innovation + Entrepreneurship	2018
Noah Toly	Why Cities Need More than Big Data	The HedgeHog Review	2014
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Òscar Canalís Hernández	La ciudad como escritura: de la piedra al sistema Big Data	El País	2016
Pablo Sanchez Chillon	Manual para fieles de la innovación urbana: 20 tips para quienes perdieron la fe (y el norte) en las smart cities	Urban 360º	2015
Pamela Robinson	New Toronto Smart City Project Has To Be Open Too	Huffington Post	2017
Patricia McMarney	City Data Matters: Lessons For India, Canada And The World	HuffPost Canada	2017
Patrick Russell	The Smart City—Technocratic or Democratic?	City Smarts	2015
Patrick Sisson	An idiot’s guide to futuristic smart cities under development	Curbed	2017
Paul Marks	Who will really benefit from the coming smart-city revolution?	New Scientist	2017
Paul Mason	We can’t allow the tech giants to rule smart cities	The Guardian	2015
Paul Mozur	Inside China’s Dystopian Dreams: A.I., Shame and Lots of Cameras	The New York Times	2018
Paula Clemente	Las 'start ups' que construyen la ciudad inteligente	EL MUNDO	2017
Paz Peña, Patricio Velasco	Smart Cities: In Defense of Stupid Cities*	Paz Peña Blog	2017
Peter Hirst	Is London Becoming the World’s Greatest City for Innovation?	Wired	2014
Peter Williams	Smart Cities and Artificial Intelligence: Balancing Opportunity and Risk	Meeting of the Minds	2017
Philippe Guillemette	How can we accelerate the development of smart cities? - IoT Agenda	TechTarget	2017
Phoebe Magdirila	IBM Helps the Biggest City in the Philippines Transform to a Smart City	Tech in Asia	2013
Pierre Trudel	Les villes intelligentes	Le Devoir	2017
Pierre-André Normandin	Montréal veut éviter l'effet Big Brother	La Presse	2018
Pranav Srikanth	Mireille Hildebrandt speaks on the ethics of smart cities	The Varsity	2018
Qian Li	The brain center of the smart city	Shanghai Daily	2017

Rachel Cheung	Smart cities: are we sleepwalking into a Big Brother future of constant surveillance in the name of improved efficiency and safety?	South China Morning Post	2018
Rachel Keeton	When Smart Cities are Stupid	INTI	2015
Radim Cmar	Less traffic, better infrastructure: How urban mobility will advance	Smart Cities World	2018
Rahul Bhatia	'We don't need IT here': the inside story of India's smart city gold rush	The Guardian	2016
Raina Singh	Smart cities need smart urban governance	Cities Today	2016
Rama Lakshmi	Indian officials want 100 'smart cities.' Residents just want water and power	Washington Post	2015
Ramnani Vandana	Just a small percentage of population to benefit from Smart Cities Mission	Hindustan Times	2016
Randy Billings	Smart Cities Come with Inherent Privacy Risks, ACLU Says	Future Structure	2018
Randy Ksar	Podcast: It's Not Smart Cities, It's Connected Citizens	DZone IoT	2017
Raymond Yeung, Harminder Singh	Why Singapore is a much smarter city than Hong Kong? City left trailing rival in global technology index	South China Morning Post	2017
Reinier de Graaf	The smart city is the ultimate free-for-all	Dezeen	2015
Rene Millman	Industry, government, academia to create global smart city roadmap	Internet of Business	2018
Rich Haridy	Science Fiction Cities: How our future visions influence the cities we build	New Atlas	2018
Richard Florida	When Artificial Intelligence Rules the City	CityLab	2017
Richard Forster	How Barcelona's smart city strategy is giving 'power to the people'	ITU News	2018
Richard Henderson	Is Your City Smart Enough to Tackle GDPR?	Infosecurity Magazine	2018
Rick Robinson	The sharing economy and the future of movement in smart, human-scale cities	The Urban Technologist	2013
Rick Robinson	What's the risk of investing in a Smarter City?	The Urban Technologist	2014
Rick Robinson	Why Smart Cities still aren't working for us after 20 years. And how we can fix them	The Urban Technologist	2016
Rob Kitchin	Continuous Geosurveillance in the "Smart City"	DIS Magazine	2015
Rob Pegoraro	Why 5G Internet Is a Policy Minefield for Cities	CityLab	2018
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Robert Bevan	What makes a city a city - and does it really matter anyway?	The Guardian	2014
Robyn Dowling	Smart cities: does this mean more transport disruptions?	The Conversation	2016
Rodger Lea	Making Sense of the Smart City Standardization Landscape	IEEE Standards University	2016
Roger Dooley	Is The City A Platform Worth Billions?	Forbes	2017
Roger K. Lewis	'Smart cities' are closer to reality than we realize	Washington Post	2016
Rohaidi Rohaidi	How Barcelona's citizens will control the use of their data	GovInsider	2017
Rohit Talwar, Steve Wells, Alexandra Whittington	Will the city of the future be sustainable?	Green Building	2017

Rohit Talwar; Steve Wells, Alexandra Whittington	The future of cities – balancing surveillance and data capture	International Business Times UK	2017
Romain Mazon	La ville intelligente, une smart city post marketing	La Gazette des Communes	2018
Romi LeLevine	U of T, Toronto experts offer insight into the ‘promise and peril’ of building smart cities	University of Toronto	2018
Ronaldo Lemos	A cidade tecnológica	Folha de S.Paulo	2014
Ronaldo Lemos	'Inteligência' de 'smart cities' precisa se distribuir entre seus cidadãos	Folha de São Paulo	2017
Rory Stott	Without Architects, Smart Cities Just Aren't Smart	ArchDaily	2013
Ross Tieman	Barcelona: smart city revolution in progress	Financial Times	2017
Rowan Conway	The digital city: the next wave of open democracy?	RSA	2017
Rudy Takala	Blockchain will be key to security for 'smart cities' of the future	The Hill	2018
Rutrell Yasin	Microsoft gets into the smarter city game	GCN	2013
Ryan McCauley	Cool Cities Rely on Technology; Smart Cities Rely on Data and Partnerships	Future Structure	2016
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Ryan Patrick	How should a Smart City be created? Why India is setting a template for others to follow	IT World Canada	2016
Ryan Patrick Jones	Toronto at the centre of 'smart city' R&D with launch of new technology hub	CBC News	2018
Saber Fallah	Driverless cars are forcing cities to become smart	The Conversation	2018
Sabine Blanc	Les intelligences de la smart city	La Gazette des Communes	2014
Sabine Blanc	Les promesses à double tranchant de la ville intelligente	La Gazette des Communes	2014
Sabine Blanc	La ville intelligente, une big mother en puissance ?	La Gazette des Communes	2014
Sabine Blanc	Retour sur investissement : la smart city est-elle une bonne affaire ?	La Gazette des Communes	2014
Sabine Blanc	La Smart city à la recherche de modèles économiques	La Gazette des Communes	2016
Sally Davies	Glasgow aims to be first ‘smart city’	Financial Times	2014
Salomon Salinas, Kira Gidron	The Smart Way to Build a Smart City (Industry Perspective)	Future Structure	2016
Sam Liccardo	Innovation Is a Risk Worth Taking	Huffington Post	2016
Samantha North	Do city rankings really matter?	CityMetric	2015
Sandeep	Smart Cities: Governance first	The Indian Express	2015
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Sara Degli-Esposti, Siraj Ahmed Shaikh	With smart cities, your every step will be recorded	The Conversation	2018
Sara M. Watson	What the UK can learn from Singapore's smart city	Wired UK	2017
Sarah Daoust-Braun	Montréal : une nouvelle politique sur les logiciels libres	Le Journal de Montréal	2018

Sarah Murray	Smart cities: Urban areas set to be test beds	Financial Times	2013
Sarah Wray	Data needs accountability: Here's how it could happen	TM Forum Inform	2017
Sarah Wray	Smart cities can't exist while there's a digital divide	Smart Cities World	2018
Sari Ladin-Sienee	Location is Driving the Value of L.A.'s Open Data	Data-Smart City Solutions	2016
Sarwant Singh	Smart Cities – A $1.5 Trillion Market Opportunity	Forbes	2014
Scott Ikeda	Smart Cities – Not So Smart Privacy	CPO Magazine	2018
Sean Barton	University experts help create first mobile-connected smart city ranking	Phys.org	2014
Sean Kinney	The key role of cloud computing in a smart city	RCR Wireless News	2016
Sean Thornton	The Next Phase of Transparency	Data-Smart City Solutions	2013
Sean Thornton	Funding Civic Technology: A Look at the Smart Chicago Collaborative Model	Data-Smart City Solutions	2014
Sean Thornton	OpenGrid for Smart Cities	Data-Smart City Solutions	2016
Sean Thornton	How a Smart City Tackles Rainfall	Data-Smart City Solutions	2017
Shahana Chattaraj	India: smart cities need smart governance	CityMetric	2014
Shalene Gupta	Cities dream of a 'smart' sci-fi future	Fortune	2015
Shawn DuBravac	"Smart" Cities and the Urban Digital Revolution	Recode	2014
Shawn McCarthy	Government IT in 2014: More connections, more exposure, more risk	GCN	2013
Shruti Ravindran	Is India's 100 smart cities project a recipe for social apartheid?	The Guardian	2015
Sim Shuzhen	The smart city – no risk, no reward	Singapore Management University	2018
Simon Long	The Singapore exception	The Economist	2015
Siraj Datoo	Smart cities: are you willing to trade privacy for efficiency?	The Guardian	2014
Skip Descant	Partnership Hopes to Streamline Smart City Data Sharing Between Cities, Industry	Government Technology	2018
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Smriti Kak Ramachandran	Modi wants parameters identified for Smart Cities	The Hindu	2014
Sofia Ranchordás	Law and Autonomous Systems Series: Cities as Corporations? The Privatization of Cities and the Automation of Local Law	Oxford Law Faculty	2018
Sommer Mathis	The Rise and Fall and Eventual Rise Again of the 'Smart City'	CityLab	2014
Soumik Roy	Why citizen-centric innovation helps build better smart cities	Tech Wire Asia	2018
Souvik Das	Here's how IBM is using Watson to promote smart cities in India	Digit	2016
Stephan Barthel, Johan Colding	The Smart (Cyborg) City Needs Smarter Ecological Resilience Thinking	The Nature of Cities	2017
Stéphane Schmoll	Géolocalisation: smart city=big brother ?	La Tribune	2014

Stephen Goldsmith	Why Data Sharing Should Be Government's Default	Governing	2016
Stephen Goldsmith	How Civic Tech Can Address Urban Inequality	Governing	2017
Stephen Goldsmith	Smart Procurement for Smart Cities	Governing	2017
Stephen Goldsmith, Neil Kleiman	Cities Should Act More Like Amazon to Better Serve Their Citizens	Next City	2018
Stephen Goldsmith, Susan Crawford	Good data make better cities	Boston Globe	2014
Stephen Pritchard	Securing the Smart City	Infosecurity Magazine	2016
Steve Durbin	Building Smart City Security	TechCrunch	2015
Steve Loffreda	City life under a microscope	China Daily	2013
Steve Lohr	Sidewalk Labs, a Start-Up Created by Google, Has Bold Aims to Improve City Living	The New York Times	2015
Steve McCaskill	Smart Stadiums, Streets & Airports: How Tokyo Is Preparing For 2020 Olympics	Silicon	2017
Steven Poole	The truth about smart cities: ‘In the end, they will destroy democracy'	The Guardian	2014
Sue Lebeck	The 'smart city' movement: From experimentation to standardization	GreenBiz	2014
Sue Lebeck	How do you build a smart city? Start with energy, tech, water	GreenBiz	2014
Sue Lebeck	Building smart cities: secrets for climate, community, resilience	GreenBiz	2014
Sue Lebeck	How strategic public-private partnerships are shaping up in cities	GreenBiz	2018
Sue Lebeck	From Cape Town to Charlotte, there's a partner for every purpose	GreenBiz	2018
Surabhi Agarwal, Aditi Divekar	Smart cities or wiretap ones?	Business Standard India	2014
Susan Crawford	Concrete steps towards an urban Internet of Things	Knight Foundation	2017
Susan Fourtané	Connected Vehicles in Smart Cities: The Future of Transportation	Interesting Engineering	2018
Suzanne Goldenberg	Masdar's zero-carbon dream could become world’s first green ghost town	The Guardian	2016
Sylvain Kahn	la ville intelligente est-elle une utopie ?	France Culture	2014
Sylvie Albert	Smart cities present risks, opportunities	The Conversation	2017
T. R Goldman	Why Smart Cities Are Turning Themselves into Sponges	Politico Magazine	2017
Talia Smith	Opinion: How to build a 'smart city' in a fragile and conflict-affected context	Devex	2017
Tamil Nadu	Students, academic heads offer suggestions on ‘Smart City’	The Hindu	2015
Tanvi Misra	Can London Become a People-Centric Smart City?	CityLab	2018
Ted Smith	The problem with most 'Smart City' projects is they're vitamins instead of painkillers	TechRepublic	2018
Teena Maddox	The world's smartest cities: What IoT and smart governments will mean for you	TechRepublic	2015

Teena Maddox	Smart cities: 6 essential technologies	TechRepublic	2016
Teena Maddox	How not to do a smart city: Let a thousand flowers bloom instead of having a plan	ZDNet	2016
Teena Maddox	66% of US cities are investing in smart city technology	TechRepublic	2017
Teena Maddox	Smart city technology market set to reach $775 billion by 2021	TechRepublic	2017
Teresa Scassa	Emerging Legal Issues in the Smart Cities Context	Centre for Law, Technology and Society - uOttawa	2015
Teresa Scassa	Smart Cities: Data Ownership and Privacy Issues	Teresa Scassa Blog	2017
Teresa Scassa	Who owns all the data collected by ‘smart cities’	The Star	2017
Teresa Scassa	Considerations for Canada’s National Data Strategy	Centre for International Governance Innovation	2018
Teresa Scassa	Smart planning for smart cities	The Hill Times	2018
Teresa Scassa	Smart cities data - governance challenges	Teresa Scassa Blog	2018
Teresa Scassa	Some thoughts on Smart Cities and Data Governance	Teresa Scassa Blog	2018
The Economist	The multiplexed metropolis - Clever cities	The Economist	2013
Theo Bass	Data by the people, for the people: why it’s time for councils to reclaim the smart city	CityMetric	2018
Theo Douglas	'4 Cs' — Commitment, Collaboration, Consistency, Community — Crucial for Smart Cities	Future Structure	2017
Théo Roux	Why should Smart Cities look up to Favelas for inspiration?	L'Atelier BNP Paribas	2017
Thom Patterson	Hey Internet, where's my talking city?	CNN	2014
Thomas Arbuckle II	Link.nyc and future of the smart cities [NYC leading the way]	NYC Blockchain & Tech News	2016
Thomas Graham	Barcelona is leading the fightback against smart city surveillance	Wired UK	2018
Thomas McMullan	How art is making the data-driven city more liveable	The Guardian	2015
Tim Smedley	Are smart cities the answer to rising populations?	The Guardian	2013
Tim Smedley	Smart cities: adapting the concept for the global south	The Guardian	2013
Tim Smedley	The new smart city – from hi-tech sensors to social innovation	The Guardian	2013
Tim Smedley	Stupid mayors are putting the wrong things at the heart of smart cities	The Guardian	2013
Timothy Revell	A smart city in China tracks every citizen and yours could too	New Scientist	2017
Tod Newcombe	The Rise of the Sensor-Based Smart City	Government Technology	2014
Tod Newcombe	Security, Privacy, Governance Concerns About Smart City Technologies Grow	Government Technology	2016
Todd Jaquith	Here's a Look at the Smart Cities of the Future	Futurism	2017
Todd Thibodeaux	Smart Cities Are Going to Be a Security Nightmare	Harvard Business Review	2017

Tom Blewitt	Interoperability: The key to the emerging smart city	ReadWrite	2017
Tom Dallessio	Smart City Expert Says “Sustainable” Shouldn’t Be the Goal	Next City	2018
Tom Saunders	Power to the people: how cities can use digital technology to engage and empower citizens	Nesta	2016
Tom Vander Ark	How Cities Are Getting Smart Using Artificial Intelligence	Forbes	2018
Tracey Lindeman	Startup City: Smarten up Montreal	Montreal Gazette	2014
Troy K. Schneider	Securing the smart city	GCN	2015
Tyler Edell	Are smart cities just a utopian fantasy?	TechCrunch	2016
Tyler Hamilton	With connected communities on the rise, we must be smart about managing data	The Globe and Mail	2018
Um KyungSoon	Big data, cloud and Smarter Cities	IBM	2012
Usman Haque	Messiness will inevitably arise in spite of smart cities	Wired UK	2013
Valentín Muro	Entre ciudades inteligentes y tonterías tecnológicas	La Nación	2018
Vanessa Watson, Babatunde Agbola	Who will plan Africa's cities?	Africa Research Institute	2013
Víctor Pérez	Las razones por las que Barcelona es una de las 3 ciudades más inteligentes del mundo	Business Insider	2018
Victoria Turk	City sensors: the internet of things is taking over our cities	Wired UK	2013
Vincent Lucchese	« La smart city n'aime pas les pauvres ! »	Usbek & Rica	2017
Vivienne Walt	Barcelona: The most wired city in the world	Fortune	2015
Wenyu Sun	China's 'smart cities' to number 500 before end of 2017	People's Daily Online	2017
Winnie Tang	Why building a 'city brain' is key to becoming a world-class Smart City: OPINION	ITU News	2018
Xi Sun	China to Be Ready for Smart City Construction Boom	All China Women's Federation	2013
Yasheng Huang	China’s use of big data might actually make it less Big Brother-ish	MIT Technology Review	2018
Yevgeniy Sverdlik	Chicago CIO: Big Data for big-city problems	Datacenter Dynamics	2012
Yury Shupilov	How Will Cities Look In The Future?	Shupilov Real Estate	2018
Zach Noble	No smart city is an island	FCW	2015
Zachary Karabell	Saudi Prince Plans a 'City of the Future.' Don't Bet on It	Wired	2017
Zack Quaintance	‘Imagine Boston 2030’ Dashboard Seeks to Bolster City Government Accountability	Government Technology	2017
Zack Quaintance	Public Opinion Often Sets Privacy Standards for Smart City Tech	Government Technology	2017
Zvika Ashani	The Future Is Here: Artificial Intelligence To Become Standard For Smart Cities	Security Informed	2017

Appendix 2: Documents in the *Academic Publications* Database

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Author	Title	Year
A. Abid, A. Kachouri, A. Mahfoudhi	Data analysis and outlier detection in smart city	2017
A. Bartoli, J. Hernandez-Serrano, M. Soriano, M. Dohler, A. Kountouris, D. Barthel	On the Ineffectiveness of Today's Privacy Regulations for Secure Smart City Networks	2012
A. Corradi, G. Curatola, L. Foschini, R. Ianniello, C. R. De Rolt	Smartphones as smart cities sensors: MCS scheduling in the ParticipAct project	2015
A. Crooks, K. Schechtner, A. K. Dey, A. Hudson-Smith	Creating Smart Buildings and Cities	2017
A. Enayet, M. A. Razzaque, M. M. Hassan, A. Alamri, G. Fortino	A Mobility-Aware Optimal Resource Allocation Architecture for Big Data Task Execution on Mobile Cloud in Smart Cities	2018
A. Ismail	Utilizing big data analytics as a solution for smart cities	2016
A. J. Jara, D. Genoud, Y. Bocchi	Big Data in Smart Cities: From Poisson to Human Dynamics	2014
A. Martinez-Balleste, P. A. Perez-martinez, A. Solanas	The pursuit of citizens' privacy: a privacy-aware smart city is possible	2013
A. Sharif, J. Li, M. Khalil, R. Kumar, M. I. Sharif, A. Sharif	Internet of things smart traffic management system for smart cities using big data analytics	2017
A. Wolff, G. Kortuem, J. Cavero	Urban Data Games: Creating Smart Citizens for Smart Cities	2015
A. Yassine, S. Singh, A. Alamri	Mining Human Activity Patterns From Smart Home Big Data for Health Care Applications	2017
A. Yavari, P. P. Jayaraman, D. Georgakopoulos	Contextualised service delivery in the Internet of Things: Parking recommender for smart cities	2016
Adel S. Elmaghraby, Michael M. Losavio	Cyber security challenges in Smart Cities: Safety, security and privacy	2014
Adriana Galderisi	The Smart City Metaphor to Foster Collaborative and Adaptive Decision-Making Processes in the Face of Climate Issues	2018
Adriana Galderisi, Angela Colucci	Smart, Resilient, and Transition Cities: Commonalities, Peculiarities and Hints for Future Approaches	2018
Agnieszka Leszczynski	Speculative futures: Cities, data, and governance beyond smart urbanism	2016
Agusti Solanas, Constantinos Patsakis, Mauro Conti, Ioannis S. Vlachos, Victoria Ramos, Francisco Falcone, Octavian Postolache, Pablo A. Pérez-Martínez, Roberto Di Pietro, Despina N. Perrea, Antoni Martínez-Ballesté	Smart health: A context-aware health paradigm within smart cities	2014
Ahmed Shahat, Ahmed Elragal, Birgitta Bergvall-Kåreborn	Big Data Analytics and Smart Cities: A Loose or Tight Couple?	2017
Aija Staffans, Liisa Horelli	Expanded Urban Planning as a Vehicle for Understanding and Shaping Smart, Liveable Cities	2014

Akemi Takeoka Chatfield, Christopher G. Reddick	Smart City Implementation Through Shared Vision of Social Innovation for Environmental Sustainability: A Case Study of Kitakyushu, Japan	2016
Aksel Ersoy	Smart cities as a mechanism towards a broader understanding of infrastructure interdependencies	2017
Alan Wiig	The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia	2015
Alan-Miguel Valdez, Matthew Cook, Stephen Potter	Roadmaps to utopia: Tales of the smart city	2018
Albert J. Meijer, J. Ramon Gil-Garcia, Manuel Pedro Rodríguez Bolívar	Smart City Research: Contextual Conditions, Governance Models, and Public Value Assessment	2015
Albert Meijer	Smart City Governance: A Local Emergent Perspective	2016
Albert Meijer, Manuel Pedro Rodríguez Bolívar	Governing the smart city: a review of the literature on smart urban governance	2016
Albert Meijer, Marcel Thaens	Urban Technological Innovation: Developing and Testing a Sociotechnical Framework for Studying Smart City Projects	2016
Alberto Abella, Marta Ortiz-de-Urbina-Criado, Carmen De-Pablos-Heredero	A model for the analysis of data-driven innovation and value generation in smart cities' ecosystems	2017
Alberto Vanolo	Is there anybody out there? The place and role of citizens in tomorrow’s smart cities	2016
Alberto Vanolo	Smartmentality: The Smart City as Disciplinary Strategy	2013
Alberto Vanolo	The Fordist city and the creative city: Evolution and resilience in Turin, Italy	2015
Alberto Vaquero-García, José Álvarez-García, Marta Peris-Ortiz	Urban Models of Sustainable Development from the Economic Perspective: Smart Cities	2016
Aleksandar Karadimce, Ninoslav Marina	Smart Mobile City Services in the 5G Era	2018
Alessio Bechini, Francesco Marcelloni, Armando Segatori	Low-Effort Support to Efficient Urban Parking in a Smart City Perspective	2014
Alexander D. Cartier, David H. Lee, Burak Kantarci, Luca Foschini	IoT-Big Data Software Ecosystems for Smart Cities Sensing: Challenges, Open Issues, and Emerging Solutions	2016
Alexander Regander, David Månsson	To Be Smart or To Be Alone? Exploring return on investment and problems in smart city	2016
Alexandra Georgiana Ioan, Anton Anton, Alexandra Georgiana Ioan	Sewer system calibration for smart cities	2017
Ali Komeily, Ravi Srinivasan	Sustainability in Smart Cities: Balancing Social, Economic, Environmental, and Institutional Aspects of Urban Life	2017
Alkiviadis Giannakoulias	Cloud computing security: protecting cloud-based smart city applications	2016
Allan Cook, Michael Robinson, Mohamed Amine Ferrag, Leandros A. Maglaras, Ying He, Kevin Jones, Helge Janicke	Internet of Cloud: Security and Privacy Issues	2018
Alvaro Palomo-Navarro, Julio Navío-Marco	Smart city networks' governance: The Spanish smart city network case study	2017
Alyson Nicholds, John Gibney, Chris Mabey, Dan Hart	Making sense of variety in place leadership: the case of England’s smart cities	2016
Amador Durán-Sánchez, María de la Cruz del Río-Rama, Almudena Sereno-Ramírez, Kristina Bredis	Sustainability and Quality of Life in Smart Cities: Analysis of Scientific Production	2016

Amal Ben Rjab, Sehl Mellouli	Smart cities in the era of artificial intelligence and internet of things: literature review from 1990 to 2017	2018
Amir Ganjavie	Role of Utopia for Design of Future Cities: Utopia in Urban Planning Literature	2012
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