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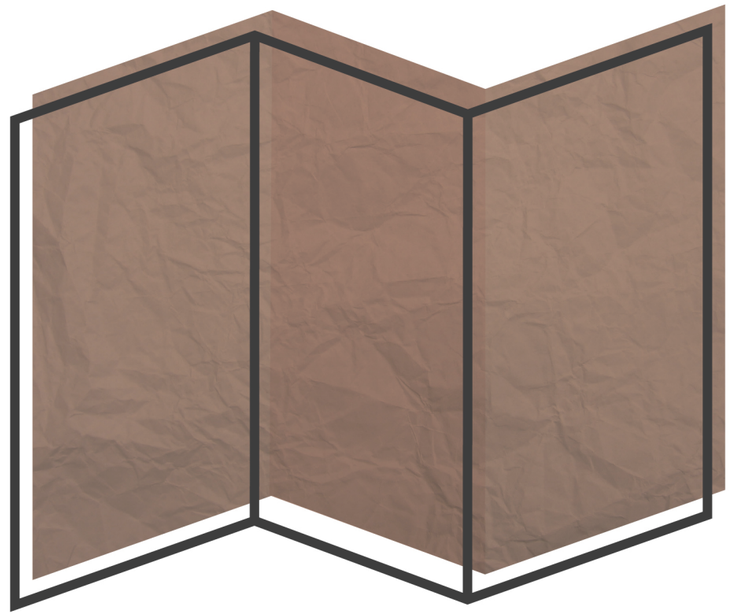
SMART URBANISM AND THE POLITICS OF DIGITAL VISIBILITY:

Mapping informality in the city of Rio de Janeiro (2008-2016)



Flávia Neves Maia

2018

Tese de Doutorado
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URBANISMO SMART E A POLÍTICA DA VISIBILIDADE DIGITAL: MAPEANDO INFORMALIDADE NA CIDADE DO RIO DE JANEIRO (2008-2016)

Flávia Neves Maia

Tese submetida ao Programa de Pós-Graduação em Urbanismo (PROURB) da Universidade Federal do Rio de Janeiro (UFRJ) como parte dos requisitos necessários para obtenção do Grau de Doutor em Urbanismo.

Rio de Janeiro
Novembro, 2018

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SMART URBANISM AND THE POLITICS OF DIGITAL VISIBILITY:

MAPPING INFORMALITY IN THE CITY OF RIO DE JANEIRO (2008-2016)

Flávia Neves Maia

PhD Dissertation submitted to the Graduate Program in Urbanism (PROURB) of the Federal University of Rio de Janeiro (UFRJ) as part of the requirements for obtaining the Doctorate Degree in Urbanism.

Mentor: Rachel Coutinho Marques da Silva

Rio de Janeiro
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Flávia Neves Maia

Urbanismo Smart e a Política da Visibilidade Digital:
Mapeando Informalidade na cidade do Rio de Janeiro (2008-2016)

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Ao meu pai Ernani Maia,
e à minha mãe Aderlane Maia
pela persistência e resistência,
otimismo e coragem.

To my father Ernani Maia,
and my mother Aderlane Maia,
for the persistence and resistance,
optimism and courage.

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A NOTE TO THE READER

This Dissertation was born from curiosity regarding the image of the city of Rio de Janeiro. The visibility of Rio in a national and global scales sends a seductive and powerful message: a marvelous, beautiful place and, at the same time, the locus of chaos and complexities. This message led me to make life-changing decisions, such as moving to Rio to my postgraduate studies. Seven years of living and breathing the city were not enough to understand it, but this mazy time and space fuelled me while writing a Specialization Monograph, a Master Thesis and a Doctoral Dissertation. Far more than looking the city from outside, looking it inside out amplified my questions about the world contradictions and inequalities, how they are perceived, and how the way they are seen influence our thought and actions. Finally convinced that academic life is not enough to solve the enigmas that I pose to myself, about urbanism and more, I can only wish that while reading this, you experience the same I did while creating: the feeling that, even facing unanswered questions, one cannot help but wonder.

UMA NOTA AO LEITOR

Esta tese nasceu de uma curiosidade em relação à imagem da cidade do Rio de Janeiro. A visibilidade do Rio em escala nacional e global envia uma mensagem sedutora e poderosa: um lugar maravilhoso e, ao mesmo tempo, o lócus do caos e das complexidades. Essa mensagem me levou a tomar decisões que transformaram a minha vida, como a mudança para o Rio para meus estudos de pós-graduação. Sete anos vivendo e respirando a cidade não foram suficientes para compreendê-la, mas essa época e espaço labirínticos me forneceram o combustível para escrever uma Monografia de Especialização, uma Dissertação de Mestrado e uma Tese de Doutorado. Muito mais do que olhar a cidade de fora para dentro, olhá-la de dentro para fora amplificou minhas dúvidas sobre as contradições e iniquidades do mundo, como elas são percebidas e como a maneira como elas são percebidas influenciam nossos pensamentos e ações. Finalmente convencida de que uma vida acadêmica inteira não seria suficiente para desvendar os enigmas que eu me imponho, sobre urbanismo e outros mais, eu só posso desejar que enquanto você estiver lendo isso, tenha a experiência que eu tive enquanto criava: o sentimento de que, mesmo diante de questões sem resposta, não é possível deixar de se perguntar.

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Earlier versions of some thoughts presented here are also found in Histórico da Representação das Favelas Cariocas em Mapas (2018) and Mapeamento das Favelas Cariocas: do vazio cartográfico ao espetáculo da integração (2016), which I co-authored with Nicoli Ferraz. Part of Chapter 4 and 5 are results of our encounters.

I also built from the work of the Comitê Popular Rio Copa e Olimpíadas. Part of the data presented here was previously collected and systematized by this group. Moreover, discussions and documents presented by them influenced the design of my research project. When data produced by the Comitê is used as a source to produce my own maps, appropriate references are made. Eventual mistakes on my own maps, however, remain my own responsibility.

I am thankful for the warmth and generosity of the team of the Chair of Environmental Technology and Design (ETD), Department of Urbanism, Delft University of Technology (TU Delft), especially Arjan Van Timmeren and Taneha Bacchin, who opened spaces for me to share this argument with researchers from different fields in a number of events in Brazil and the Netherlands. Their input strengthened my rationale.

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I am profoundly grateful to my family, especially to my grandparents Wilson and Ausair Neves, Mundico and Eunice Maia, my parents Ernani and Aderlane Maia, my sisters Cecília and Bárbara Maia, my brother in law Rémi Peyrefitte, my godparents Weldes and Gisele Neves, my cousin Carolina Neves and my lifetime friend Danielle Lima. Their contribution to this thesis and my life is immeasurable for I have always been inspired, listened by and loved by them. Thank you for those who kept other parts of my life running while all my attention was focused on this work, including Joana Meirelles, who prepared nutritious and delicious meals and took care of me while in Rio.

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Finally, I am grateful for having the chance to teach and learn in a public university for the past seven years.

Ineluctable modality of **the visible**:

at least that if no more, **thought through my eyes**.

-- Ulisses, James Joyce

Modalidade inelutável **do visível**:

pelo menos, se não mais, **pensado através dos meus olhos**.

-- Ulisses, James Joyce

ABSTRACT

SMART URBANISM AND THE POLITICS OF DIGITAL VISIBILITY:
MAPPING INFORMALITY IN THE CITY OF RIO DE JANEIRO (2008-2016)

Flávia Neves Maia

Rachel Coutinho Marques da Silva

Abstract of the PhD Thesis submitted to the Graduate Program in Urbanism (PROURB) of the Federal University of Rio de Janeiro (UFRJ) as part of the requirements for obtaining the Doctorate Degree in Urbanism.

There is a strong case today for the use of digital technologies and data to improve cities functioning and citizens lives. Smart cities are presented as a solution for a variety of urban problems, including the economic crisis, environmental sustainability, and social injustice. Offering more nuances to this assumption, this Dissertation critically engages with the notion of smart urbanism (SU), and digital visibility.

This research focuses on digital mappings of informality, a phenomenon that has been gaining importance from the early 2010s onwards, especially on the Global South, due to its supposed potential to reconfigure power dynamics at play in the making of cities. Current narratives about the inclusion of informal settlements on online maps usually link digital visibility to urban inclusion. Digital mappings of informality, we are told, are ways to empower excluded citizens and to integrate divided territories, so they can be recognized as being in the cities. Digital visibility of informality would also represent the seeds for alternative smart urbanism. In counterpoint to this narrative, this study inquiry:

Does digital visibility is, in itself, always equals urban inclusion?

To answer this question, different forms of (in)visibility of favelas on digital mappings of Rio de Janeiro, Brazil, are studied. The period of analysis is 2008 - 2016, marked by intense transformations in the regime of visibility of the city of Rio, in preparation to the Summer Olympics 2016 and other mega-events. In other words, it seeks to answer:

How does favelas' digital visibility on mappings unfold in the making of the city of Rio between 2008 and 2016?

Empirically, the study relies on existing data about urban growth, housing eviction, population displacement and other forms of favelas (in)visibility in the context of the Olympics 2016. It also

relies on produced data about favelas digital mappings. Theoretically, it aligns with Smart Urbanism (SU), a critical scholarly debate concerned with the power-knowledge equation of smart cities. It also comprises, among other fields, critical urban geography, critical theory of technology and critical cartography. The conceptual framework analytics of government is used to perceive power exercise in the regime of practices of urbanism in this well-delimited space and time. By providing a theoretical, historical and contextual knowledge of visibility and its relation to urbanism, this text indicates that:

Digital visibility is a dimension of power exercise, thus it cannot be, by itself, always equals urban inclusion.

The research question and thesis statement are oriented towards theorization. Thus, both the question and the statement are not designed to provide a yes/no answer, but to set the basis for how questions. Each of the chapters represent a layer in building the argument about how digital visibility unfolds:

(1) Digital visibility is a dimension of power exercise and, as such, play a role in the social production of (smart) cities.

(2) Digital visibility, mapping, and urbanism are social practices of governing.

(3) Favelas (in)visibility and inclusion have been ambiguous and disputed processes throughout Rio's history, and this is also the case today for digital visibility.

These three topic sentences aim to provide intellectual clarity to the notion of digital visibility, in order to help future researches in concept development and theorization within SU. The concern is not only about unveiling the narrative of urban inclusion via digital visibility as simplistic, but to open discussions about the political relevance and impact of this narrative. In other words, this work draws attention to an open problem:

If digital visibility is not by itself equals to urban inclusion, then how digital visibility produces the urban?

The findings reveal that digital visibility is not necessarily equaled to urban inclusion. Informal settlements do not receive a set of rights to be in the city once they are turned digitally visible. Digital visibility is not a switch on/off mechanism, but a journey towards a form of contemporary urban experience in which digital visibility and invisibility, as much as urban inclusions and exclusions, coexist and intertwine. This conclusion is relevant because it reinforces previous findings on the political nature of smart cities while suggesting a more profound commitment of the SU agenda with visibility as a category for the social sciences and a dimension of power exercise. There is a need for in-depth critical reasonings and argumentations about the relations between power and digital visibility in Smart Cities, in order to better grasp dynamics that need to be transformed, such as urban exclusions.

Keywords: Smart City, Smart Urbanism, Informality, Digital Visibility, Power

RESUMO

SMART URBANISM AND THE POLITICS OF DIGITAL VISIBILITY:
MAPPING INFORMALITY IN THE CITY OF RIO DE JANEIRO (2008-2016)

Flávia Neves Maia

Rachel Coutinho Marques da Silva

Resumo da Tese de Doutorado submetida ao Programa de Pós-Graduação em Urbanismo (PROURB) da Universidade Federal do Rio de Janeiro (UFRJ) como parte dos requisitos necessários para obtenção do Grau de Doutor em Urbanismo.

Há um forte argumento hoje em favor do uso de tecnologias e dados digitais para melhorar o funcionamento das cidades e a vida dos cidadãos. Cidades inteligentes são apresentadas como uma solução para uma variedade de problemas urbanos, incluindo crise econômica, sustentabilidade ambiental e injustiça social. Oferecendo mais nuances para essa suposição, esta tese engaja-se criticamente com a noção de urbanismo inteligente (SU) e visibilidade digital.

Esta pesquisa foca em mapeamentos digitais da informalidade, um fenômeno que vem ganhando importância a partir do início da década de 2010, especialmente no Sul Global, devido ao seu suposto potencial de reconfiguração das dinâmicas de poder em cidades. As narrativas atuais sobre a inclusão de assentamentos informais em mapas on-line geralmente vinculam a visibilidade digital à inclusão urbana. Os mapeamentos digitais da informalidade seriam formas de empoderar os cidadãos excluídos e de integrar territórios isolados, de forma que passem a ser reconhecidos como parte das cidades. A visibilidade digital da informalidade também representaria a semente de um urbanismo inteligente alternativo. Em contraponto a esta narrativa, este estudo questiona:

A visibilidade digital é, em si mesma, sempre igual à inclusão urbana?

Para responder a essa questão, este estudo explora diferentes formas de invisibilidade que coexistem com a visibilidade das favelas nos mapeamentos digitais do Rio de Janeiro, Brasil. O período de análise é de 2008 a 2016, marcado por intensas transformações no regime de visibilidade da cidade do Rio, em preparação para as Olimpíadas de 2016 e outros megaeventos. Em outras palavras, procura-se responder:

Como a visibilidade digital das favelas através de mapeamentos se desdobra no fazer da cidade do Rio entre 2008 e 2016?

Empiricamente, o estudo baseia-se em dados existentes sobre crescimento urbano, remoção de habitações, deslocamento populacional e outras formas de (in) visibilidade de favelas no contexto das Olimpíadas de 2016.Também se baseia em dados produzidos sobre mapeamentos digitais de favelas. Teoricamente, alinha-se com o Urbanismo Smart, um debate acadêmico crítico atento à equação entre poder e conhecimento em cidades inteligentes. Também compreende, entre outras áreas, a geografia urbana crítica, a teoria crítica da tecnologia e a cartografia crítica. O referencial conceitual analítica do governo (analytics of government) é utilizado para perceber como o poder é exercido em um regime de práticas do urbanismo, em um espaço e tempo bem delimitados. Ao prover um conhecimento teórico, histórico e contextual da visibilidade e sua relação com o urbanismo, indica-se que:

A visibilidade digital é uma dimensão do exercício de poder, assim, não pode ser, por si só, sempre igual à inclusão urbana.

A questão de pesquisa e a tese são orientadas para a teorização. Elas não foram desenhadas para simplesmente fornecer uma resposta sim / não, mas para definir as bases de perguntas do tipo como. Cada um dos capítulos representa uma "camada" na construção do argumento sobre como a visibilidade digital se desdobra:

(1) A visibilidade digital é uma dimensão do exercício do poder e, como tal, desempenha um papel na produção social de cidades (inteligentes).

(2) Visibilidade digital, mapeamento e urbanismo são práticas sociais de governar.

(3) A visibilidade e a inclusão das favelas (in) têm sido processos ambíguos e disputados em toda a história do Rio, e esse também é o caso hoje da visibilidade digital.

Estas três sentenças visam fornecer clareza teórica à noção de visibilidade digital, a fim de auxiliar futuras pesquisas no desenvolvimento de conceitos e teorização dentro do Urbanismo Smart. A preocupação não é apenas desvelar a narrativa da inclusão urbana por meio da visibilidade digital como simplista, mas abrir discussões sobre a relevância política e o impacto dessa narrativa. Em outras palavras, este trabalho chama a atenção para um problema não respondido:

Se a visibilidade digital não é, por si só, igual à inclusão urbana, então, como a visibilidade digital realmente produz o urbano?

Os resultados revelam que a visibilidade digital não é necessariamente igual à inclusão urbana. Os assentamentos informais não recebem um conjunto de direitos de existir na cidade, uma vez que se tornam digitalmente visíveis. A visibilidade digital não é um mecanismo de ligar / desligar, mas uma jornada rumo a uma forma de experiência urbana contemporânea em que a visibilidade digital e a invisibilidade, assim como as inclusões e exclusões urbanas, coexistem e se entrelaçam. Esta conclusão é relevante porque reforça as descobertas anteriores sobre a natureza política das cidades inteligentes, ao passo em que sugere um compromisso mais profundo da agenda do SU com a visibilidade como uma categoria para as ciências sociais e uma dimensão do exercício do poder. Há necessidade de uma racionalização e argumentação crítica aprofundadas sobre as relações entre poder e visibilidade digital nas Cidades Inteligentes, de modo a compreender melhor as dinâmicas que precisam ser transformadas, como as exclusões urbanas.

Palavras-Chave: Cidade Inteligente, Urbanismo Smart, Informalidade, Visibilidade Digital, Poder

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LIST OF ACRONYMS

ICT Information and Communication Technology

SU Smart Urbanism

OSM Open Street Map

SDI Slum/Shack Dwellers International

MRP Rapid Participatory Map (Mapa Rápido Participativo)

IBGE Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística)

SAGMACS Society of Graphic and Mechanographic Analysis Applied to Social Complex (Sociedade de Análises Gráficas e Mecanográficas Aplicadas aos Complexos Sociais)

PAC Growth Acceleration Program (Programa de Aceleração do Crescimento)

IPP Pereira Passos Institute (Instituto Pereira Passos)

UPP Pacifying Police Units (Unidades de Polícia Pacificadora)

PETROBRAS Brazilian Petroleum SA (Petróleo Brasileiro S.A.)

UN-Habitat United Nations Program for Human Settlements

HDI Human Development Index

COR Rio Operation Centre (Centro de Operações do Rio)

MPCRJ Participative Mapping of the City of Rio de Janeiro (Mapa Participativo da Cidade do Rio de Janeiro)

FIOCRUZ Oswaldo Cruz Foundation (Fundação Oswaldo Cruz)

SIURB Urban Information System (Sistema Municipal de Informações Urbanas)

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ONE

INTRODUCTION

Does digital visibility equal to urban inclusion?

Over the last decade, practitioners and academics alike have been advancing the idea that **being seen is essential to the contemporary urban condition**. The "right" of informal settlements to be on digital mappings would be, according to some, the same as the right to be in the city. It is certain that information and communication technologies (ICTs) have been changing how cities worldwide are imagined, experienced and seen. The data revolution is transforming urbanism as we know it. The notion that cities should benefit from the possibilities of digital technologies -- becoming smart cities -- surface as a promise for a future that is environmental, socially, and economically sustainable. However, what happens when digital visibility encounters old and ambiguous forms of spatial and social invisibility, such as those faced by people living in informality?

In contrast to the idea that digital visibility equals urban inclusion, this study proposes a nuanced understanding of the relation between digital visibility and the "social production of the urban" (Lefebvre, 1986). It digs into the relations between power, digital visibility and mappings to suggest that digital visibility is not in itself a shortcut towards urban inclusion, but a way of governing the urban.

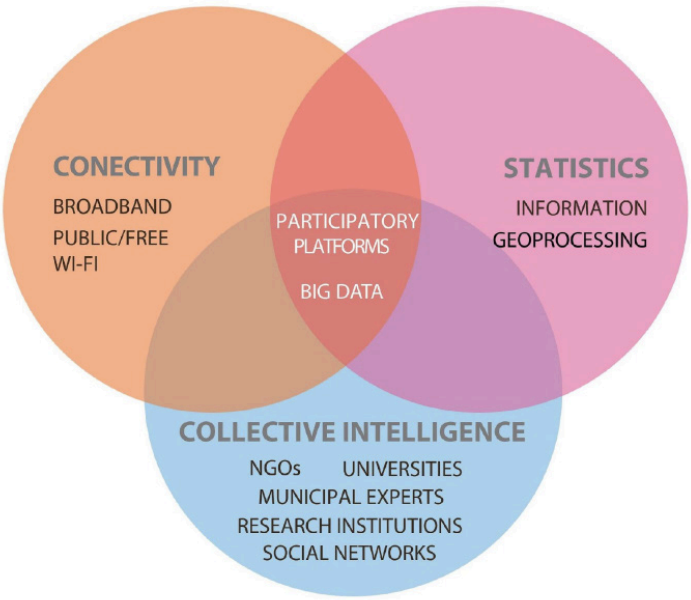
1.1. Smart Cities, Citizens, and Urbanism

Dating back from the early 2010s, the term 'smart city' has been used to refer to an increasing use of information and communication technologies (ICTs), such as the internet, the web 2.0, internet of things (IoT) and Big Data, to improve the way we plan, design, manage and live in cities. A reframe of a previous notion of 'digital city,' the "smart city" has been packed and sold as a new urban solution by tech companies such as IBM and CISCO. The concept of 'smart city' has been traveling the world over the last decade, acquiring different physiognomies across cultures. For some, smart cities are opportunities to overcome past setbacks, such as colonizing practices and inequality; for others, smart cities are a mere "corporate storytelling" (Söderström et al., 2014) that help to advance neoliberal rationales. In one way or another, it is certain that "the smart city, and the data that fuels its dreams, advances pronounced political transformations" (Luque-Ayala and Maia, 2018).

These political transformations are particularly evident across the Global South, where SU be-

came a dominant and performative discourse (Firmino and Duarte, 2015). In Rio de Janeiro, Brazil, for instance, the smart city narrative is used to justify both a top-down and a bottom-up approach of urban issues. A top-down example of SU would be the use of radars and cameras to monitor disruptions through the Center of Rio's Operation (COR), a control and command high tech room constructed by the Municipality of Rio in partnership with IBM. A bottom-up approach of SU would be the use of community data, including participatory digital mappings, to improve city functioning. In this version, smart is framed as an opportunity of empowerment, and the citizens are at the core of a smart community[1] . The following graph synthesizes the smart city approach in the city of Rio de Janeiro, according to representatives of the Municipal Institute of Urbanism (Instituto Pereira Passos or IPP).

Figure 1 The Smart City Approach In The City Of Rio De Janeiro. Poster: Participatory Map Of Rio De Janeiro. 2015. In: 27Th International Cartographic Conference. 16Th General Assembly. Re-Designed By The Author, Preserving The Content.



Source Arueira, L.R.; Medeiros, M.; Souza, L. (2017)

As practices of smart urbanism take place, scholars debate critical questions, such as the implications of SU to social justice across the Global South (for critical reflections about SU in India, South Africa and Brazil, see, respectively, Datta, 2015, 2018; Odendaal, 2006; Luque-Ayala and Maia, 2018). International networks are created to examine how people are shaping technologies, cities, and citizenship on the ground of the developing world[2] .

1 (See, for instance (188) Rio de Janeiro: Uma Comunidade Inteligente - A Smart Community).

2 (See, for instance, Whose Right to the Smart City Network – https://whosesmartcity.net/ -- and Augmented Urbanity and Smart Technologies: How "Smart" Are Our Cities Becoming? -- http://www.smart-urbanism.org/).

BOX OF CONCEPTS

//SMART CITY

"A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects." (FG-SSC and UN-ECE, 2015)

//SMART URBANISM (SU)

Emerging research field that critically unpacks the way the smart city approach transform the dynamics of power and knowledge in cities.

In Brazil, researchers draw attention, among other issues, to the new layers of inequality that surface with the smart city approach, including territorial implications of practices such as digital surveillance (Firmino and Duarte, 2015) and digital mappings (Luque-Ayala and Maia, 2018). Inequality in Brazil puts a dystopic, magnifying glass on the social issues of smart cities. The increasing pervasiveness and dependence of digital technologies to urban functioning in Brazil are said to possibly lead to a "tyranny of the educated" (Firmino, 2016).

While empirically grounded research and networks reveal new forms of spatial injustice linked to smart cities, critical debates reinforce the importance of a shift from a technology-driven to a knowledge-intensive (Söderstrom, 2015), citizen-centred or citizen-focused SU (Hemment and Townsend, 2013). "A redefined smart urbanism should be grounded in places with their specific populations, resources and problems, rather than start with technology" (Söderström, 2015, p. 64). In other words, "the real smart city needs to start with the city and its attendant social problems, rather than looking immediately to smart technologies for answers" (Hoornweg, 2011 apud Hollands, 2015, p. 63).

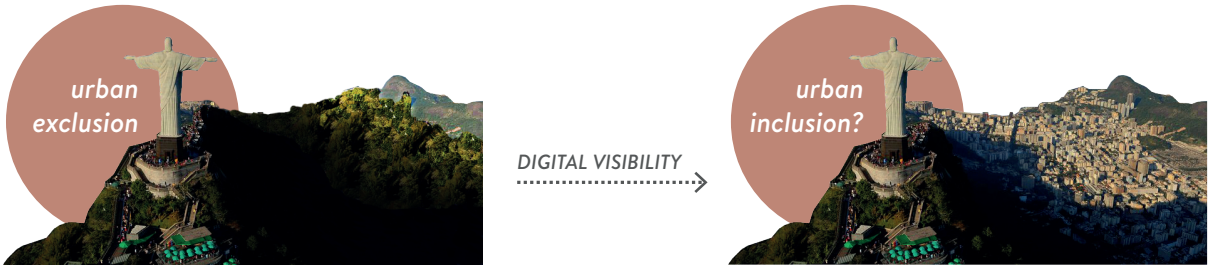
An alternative mode of a smart city -- one that has citizenship at its core -- would, therefore, consider how cities, citizenship, social justice, legal and moral geographies are framed (Kitchin, 2018). Even a so-called citizen-centered approach of SU present risks. It is acknowledged, for instance, a tendency on smart citizenship narratives of reducing citizens to sensors and citizenship to sensing capabilities (Gabrys, 2014).

In practice, the risks and opportunities associated with SU show that distinction between dominant

-- corporate/ top-down/ technology-driven -- and alternative -- bottom-up/ knowledge-driven -- modes of smart urbanism "is often subtle, as, in practice, the landscape of SU does not follow black and white logic. Rather, it is a case of "middleware" (Luque-Ayala and Marvin, 2015, p. 2113). As so, urban studies should not idealize any smart practice but critically inquiry the implications of different modes of SU (Luque-Ayala and Marvin, 2015). That is to say that dominant and alternative modes of SU may share similar rationalities, such as the understanding of digital visibility as necessary to urban inclusion -- either to improve urban functioning performance (dominant) or to advocate for the right to exist in the city (alternative).

When the smart city narrative lands in scenarios of profound social, political and economic inequalities, such as those of metropolis in developing countries, it finds a context of ambiguous and disputed processes of urban inclusion and exclusion. In these cases, **digital visibility would hardly be, in itself, a shortcut towards a form of urban inclusion for a long time denied.**

Figure 2 Mainstream Narrative regarding Digital Mapping of Informality.



Source Author (2018)

This study explores the following casual model to describe how the variables digital visibility (via digital mappings) and urban inclusion correlate. The aim is to describe how, in the particular case of informality in Rio, the dependent variable (urban inclusion) is influenced by the independent variable (digital visibility).

Figure 3 Analytical Framework



Source Author (2018)

We approach digital visibility as a social process (Brighenti, 2007, 2010) that has a role in power dynamics (Dean, 2010; Foucault, 1978), disturbing the assumption that turning an area digitally visible is the same as turning it urban. By positioning digital visibility as both part of the contem-

porary urbanism as well as a dimension of power exercise, this research highlights digital visibility as a political practice.

Besides, mappings and the digital are approached as political practices that have a role in governing the urban. In this research, a literature review on the way we govern and are governed via visibility, mappings, and the digital is put to dialogue with the Foucauldian notion of *governmentality*, a mentality of government that combines governing the other with self-government (Dean, 2010; Foucault, 1978). Together with this theoretical discussions, empirical observation of the (in)visibility of informality in online maps in a well-delimited space and time -- Rio de Janeiro 2008-2016 -- is used to better understand the politics of digital visibility at play in the smart city rationale.

1.2 Digital Mappings of Informality

This work focuses the phenomenon of participatory **digital mappings of informal settlements** across the Global South and critically interrogates its role in advancing the idea of **digital visibility** as a desire, a necessity, a right or a tool for **empowerment**. By showing how digital visibility is not necessarily equaled to urban inclusion, this study complicates statements that turning informality digitally visible on mappings is the same as acknowledging these territories as part of the urban.

Participatory mappings (or social mappings) are representations of territories by their users. Cartographic data, in this case, is based on the knowledge or experience of the mapper. As every cartographic representation, participatory mappings translate the knowledge associated with the use of urban spaces, but also, the political and social intention that guide this use (Acselrad, 2008, 2012).

According to Acselrad and Aurélio Viana (2010), participatory or social mappings have been used by vulnerable groups fighting for visibility and social justice across the Global South for at least 50 years. Along the 1980s, participatory mapping became usual among indigenous and *quilombos*[3] In Latin America. For these authors, the initiatives involved different material and symbols regarding the appropriation of traditional territories, sometimes reinforcing hegemonic practices of political and economic domination, sometimes challenging them.

Alongside the emergence of the Web on the 1990s, and especially the Web 2.0 on the 2000s,

3 Quilombo is the Brazilian word for a hinterland settlement founded by people of black people from African origin. Most of the inhabitants of quilombos (called quilombolas) were escaped slaves.

participatory mappings are transformed. Paper-based maps were complemented or replaced by digital databases (software, sites or apps), and reached new users and mappers. Nowadays, participation in mapping takes a variety of forms. It is possible to insert data on a digital platform using a smartphone with GPS, camera and internet access. We refer to these participatory, digitally enabled practices of mapping, from now on, only as **digital mappings**.

Different from the traditional participatory mappings on forest areas or rural communities, digital mappings of urban areas have a wider variety of contents and users. They may represent, for instance: infrastructure or existing buildings such as roads, waterways, points of tourist and commercial interest; reports of urban problems such as clogged culverts, holes in streets and sidewalks, accumulated litter, environmental risks, outbreaks of diseases, violence or theft; or immaterial expression as affections and fears.

Usually, digital mappings are presented as opportunities to empower citizens, assuring more participation, supporting disputes around resources, integrating territories to the city, opening a dialogue with governments, increasing awareness about environmental risks and many other socially progressive goals. Experiences with a high positive impact for citizens in crisis scenarios are consistently used as examples of a supposedly redemptory power of this practice. Some examples are the digital mapping of a political crisis in Kenya in 2007 (Ushahidi) or the digital mapping that showed water sources and refugees shelter in Haiti after an earthquake in 2010 (Open Street Map or OSM)[4].

Some are optimistic about the possibilities of digital mappings. They say that information shared horizontally is quicker because users pressure each other to publish data. The information would also be more accurate, because locals know their communities better, and because the high amount and variety of people involved in mapping allow the information to be verifiable and adjusted if needed (Kamel Boulos et al., 2011)

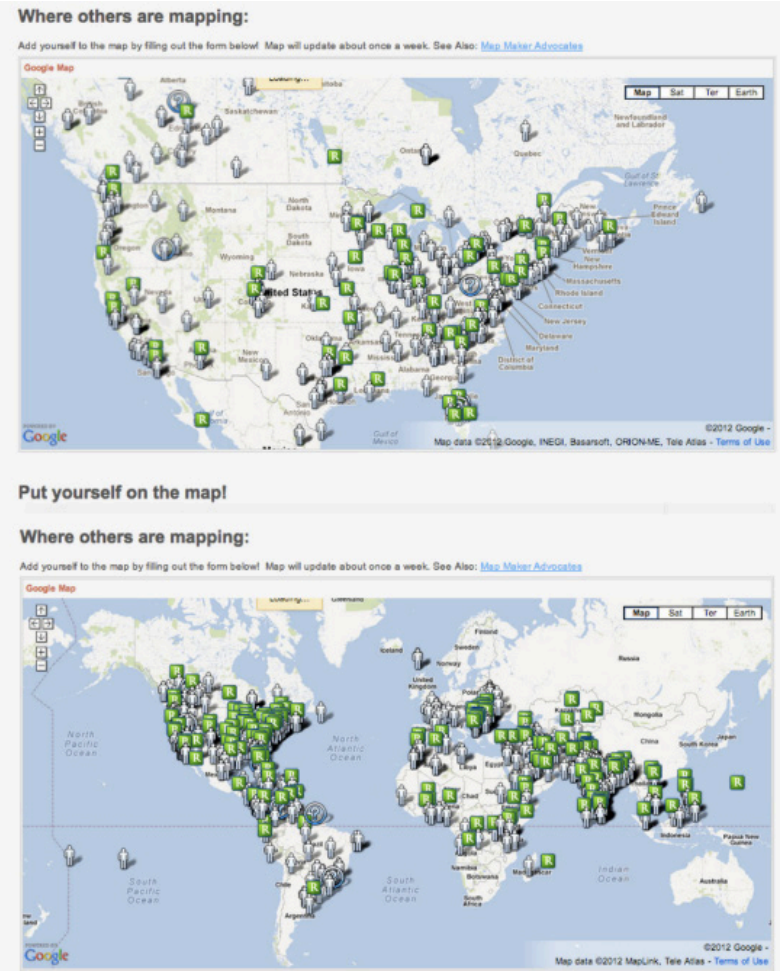
In counterpoint to the optimistic tone, others highlight the different bias in digital mappings. Digital mappings are said to (re)produce, reflect, mirror or reinforce inequalities previously existent in a given context – be it racial, gender, economic, linguistic or other.

Examples of bias are found on studies of the visual patterns of crisis mappings -- digital mappings used to assist populations after environmental disasters or political crisis, such as the Ushahidi in Kenya and OSM in Haiti, as mentioned earlier. The analysis reveals that the issues that are mapped do not necessarily reflect the extension or concentration of the damage, but the availa-

4 Vivid description of these mappings are found on (Heinzelman and Waters, 2010; Meier, 2009, 2012)

bility of digital technologies across the territories: those who have more access to technologies (not those who are the most affected) are the ones who map more. An analysis of geodata on Google-based mappings post-hurricane Katrina in New Orleans (US), when overlapped to the distribution of African-American population reveals that "race remains a key factor in the access and use of emerging digital technologies" (Crutcher and Zook, 2009, p.523). Analysis of Open Street Map and Google Map Maker show that, often, "the gender divide results in men serving as the gatekeepers of local knowledge leading to gendered user-generated representations." (Stephens, 2013 p.981)

Figure 4 Gender divisions in the production of user-generated cartographic information



Source Stephens (2013)

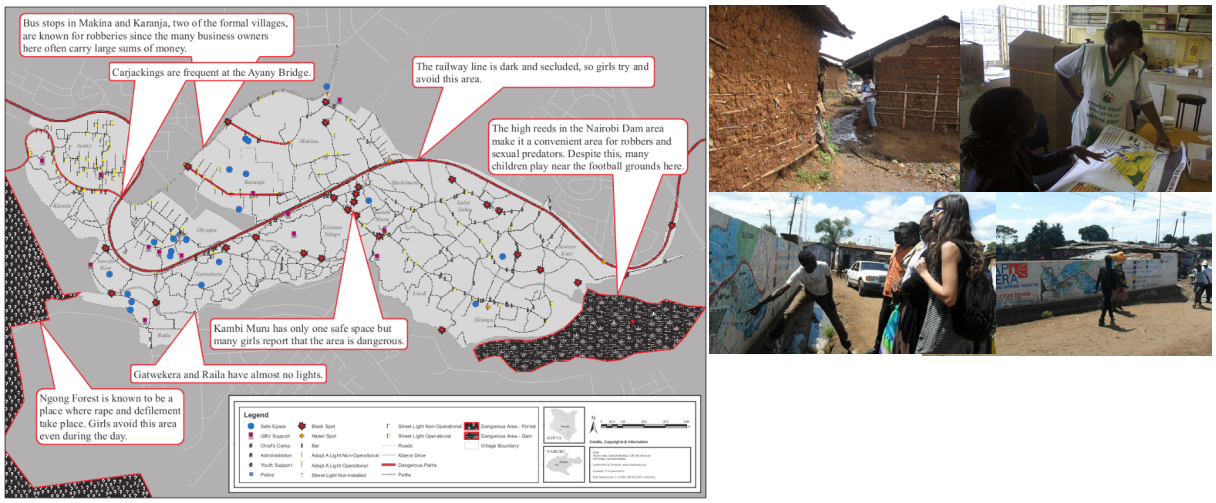
In different manners, researchers have shown that **neogeography** -- the combination of cartography and GIS accessible to many users and developers (Turner, 2006) -- configure a sort of "delusion of democratization": "there is a separation between a technological elite and a wider group of uninformed, laboring participants who are not empowered through the use of the technology" (Haklay, 2013, p.55, our emphasis).

Be it presenting digital mappings as empowering, be it presenting it as disempowering, the majority of studies recognize that digital mappings disturb power-knowledge relations in cities. It is said, for instance, that they reflect significant trends in terms of power relations between the State, citizens and the private sector (Caquard, 2013), induce shifts in the processes and power relations of spatial data creation and use, provokes reconfigurations in previously bounded disciplinary knowledge sets, and engender transformations in the subjectivities and social relations (Elwood, 2010). The reviewed literature assumes that digital mappings are not neutral or value-free. Thus, our argument is based on the idea that neogeography is a site of political formation (Elwood and Mitchell, 2013) while digital mappings function as political techniques (Luque-Ayala and Maia, 2018).

1.3 Mapping Informality across the Global South

With smart urbanism encountering the global South, digital technologies have been mobilized "to count, map, survey and document life in informal settlements" (McFarlane and Söderström, 2017 p.7). Like traditional participatory mapping of informal settlements (PGIS or PPGIS), those involved with digital mappings of informality often assume that residents' lack of access to spatial information leaves them "disempowered and unable to use the information to solve problems." (Hagen, 2011 p.70).

Figure 5 Map Kibera Images and Maps.



Source: mapkibera.org (2010)

A much-referred example of digital mapping of informality is Map Kibera[5]. It started in 2009 as an initiative to put the biggest slum in Nairobi, Kenya on an open source mapping digital platform, Open Street Map (OSM). Although many maps of Kibera have been produced throughout its history, none of them were easily available to the residents. Moreover, slums maps were they part of online digital maps of the city (Hagen, 2011). The initiative is said to aim "to alter the existing power dynamic by shifting the information dynamically." (Hagen, 2011 p.70, our emphasis). With open and georeferenced data, the purpose was to encourage residents "to use the information to influence policy and development" (Hagen, 2011 p.70). The basic entitlement by which the project was embraced was "the right to exist on a map" (Hagen, 2011 p.75):

> [...] [Map Kibera is] described as a form of 'community information empowerment'; a "resource that would harness [the community's] collective wisdom and intimate knowledge of Kibera so they could become the drivers of development" (Hagen, 2011: 76). In the nearby informal settlement of Muhimu residents and foreign volunteers expect digital mapping to bring transparency and **visibility towards political recognition** (Poggiali, 2016). (Luque-Ayala and Neves Maia, 2018 p.5, our emphasis)

Similarly, the literature about digital participatory mappings of informality describes processes that use GIS systems to gather data collected by residents on the field[6]

Patel (2012) argue that digital mappings "allow communities of the urban poor to assert their rights to the city, to secure tenure, livelihoods and adequate infrastructure" (Patel, 2012, p. 13). Moreover, such initiatives would offer "a unique opportunity to significantly improve the lives of the poor through an exploration of the best ways to link open information and deliberative development" (Donovan, 2012, p. 103). Digital mappings literature complements and reinforce participatory GIS narratives, as reviewed by Luque-Ayala and Neves Maia (2018):

5 Map Kibera is based on Open Street Map (OSM), an open data platform. The content is free to use, copy, edit and share as long as the user references its contributors and distributes the result of his/her innovation under an open license. Besides, Map Kibera promotes workshops where the residents themselves decide what the points of interest are. By so, it encourages the participants to be "researchers themselves, not merely distributors of knowledge imparted by others" (Hagen, 2011 p.76). Because of this approach, the themes to be mapped may vary according to the mappers. Girls and woman may be interested in mapping spots where rapes may occur, like on the map of vulnerability to HIV built in partnership with UNICEF. Others participants may want to highlight "the positive efforts of slum residents" in order to contest the stigma reproduced by the mass media, that make its audience to believe that "Kibera is a kind of hell on earth" (Hagen, p.70). The initiative "has created organizational structures that encourage local ownership of the project and meeting the needs of Kibera" (Donovan, 2012 p.7). Examples are the platforms created to spread geotagged local news, Voice of Kibera and Kibera News Network (KNN) (Kibera, 2017).

6 For a description of GIS mapping of informal settlements in Kisumu, Kenya, implemented by their inhabitants see Karanja, 2010; of GIS mapping of informal settlements in Cuttack, India see Livengood and Kunte, 2012; for the enumerations of informal settlements supported by GIS undertaken in Uganda, see Makau et al., 2012; and for an introduction to the practice of community-led enumerations as conducted by Shack/Slum Dwellers International (SDI), see Patel, 2001.

> Digital mappings, along with other forms of data collection referred to as 'community-led enumerations' (e.g., local censuses, data collection on living conditions and photographic records), has been seen as both a tool for political advocacy and a mechanism to achieve greater inclusion (McFarlane and Söderström, 2017; Livengood and Kunte, 2012). Often aided by other technologies, digital mapping is frequently supported by local organizations and federations of the urban poor. These ways of knowing and representing urban informality, it is argued, "can help to build a community, define a collective identity, facilitate development priority setting and provide a basis for engagement between communities and government on planning and development" (Patel et al., 2012: 13). They provide the basis for local planning and upgrading projects and contribute towards securing tenure, fostering collective discussions around urban issues, and allowing a better dialogue with governments (Livengood and Kunte, 2012; Karanja, 2010). (Luque-Ayala and Neves Maia, 2018, p. 3).

Participatory digital mapping of informality gained momentum throughout the 2010s. While informal settlements are turned visible in countries such as Kenya, India, and Brazil -- a phenomenon sometimes referred as the "digitization of slums" (McFarlane e Söderström, 2017) -- practitioners and academics alike present digital visibility as a way towards urban inclusion.

Underlying the narrative of the "digitization of slums" (McFarlane e Söderström, 2017) as a means towards socially progressive goals such as citizenship, urban integration, social inclusion, and economic growth, there is the assumption that **digital visibility delivers urban inclusion.** Digitally mapping informal settlements and thus making them visible is said to unlock the barriers that separate informal settlements from the rest of the city (see, for instance, Google, 2016).

For example, "making the invisible visible" is the motto of Map Kibera. The project is described as "one of the few remarkable examples of how technology and new media has been successfully harnessed to foster visibility of marginalized communities" (Kibera, 2017). "Making the invisible visible" is also the title of a report about slum digital data promoted in partnership with Slum/Shack Dwellers International (SDI) — a network of community-based organizations of the urban poor in 33 countries and hundreds of cities and towns across Africa, Asia, and Latin America. In this case, visibility is said to serve for advocacy and dialogue around slum upgrading and planning, and to legitimate the presence of informal dwellers in the city (Beukes, 2015).

Roy describes mappings undertaken by Slum Dwellers Federation in India and elsewhere as an affirmation that slums are not disposable in the making of the global urban future: "Against government efforts to render slums invisible they self enumerate, they map, they make themselves visible, they declare that they are here in the city" (Roy on GlobalPOV, 2013).

McFarlane and Soderstrom (2017) take a more nuanced understanding of the relationship be-

tween visibility, mapping and being in the city. They assert that data developed through digital technologies across their mapping case studies in Kenya and India has a kind of agency both in its form (it can easily circulate) and in its impact (it can have a **visual power that influences thinking and practice**). "These initiatives often seek to forge alternative social representations of informal settlements in order to challenge stigmatized narratives and images" (McFarlane e Söderström, 2017, p. 316).

Luque-Ayala and Neves Maia (2018) point out to yet another nuance on digital mapping of informality, drawing from Brazilian case studies and identifying a greater involvement of ICT corporates such as Google and Microsoft in mapping informality. They state that the corporatization of the digitization of informality "not only substantiates arguments around the corporatization of the urban via digital technologies (Söderström et al., 2014; Vanolo, 2014) but most importantly illustrates the enrolment of community-based agents and agencies in expanding the frontiers of capital accumulation through a digital reconfiguration of space." (Luque-Ayala and Neves Maia, 2018, p. 3).

Inquiries about how spaces and informality are reconfigured via mappings are not new and do not emerge with the phenomenon of digital mappings. Some postcolonial studies critically examined the way mapping favelas represents and transform power relations throughout history. Varley suggests that the scholarly interpretations about informality mappings are an expression of a misjudgment about an inexistent dichotomy related to the presence/absence of informality on maps and in the city. In reviewing the Latin American literature about this subject, he writes:

> One example of how the literature reifies the distinction between formal and informal is provided by its repeated reference to the omission of informal settlements from city maps [see, for example, Berenstein-Jacques (2002); Brillembourg and Klumpner (2005a); Gouverneur and Grauer (2008)]. Drawing attention to such omission could be interpreted in different ways. On the one hand, it may invoke colonial exclusions such as a denial of citizenship to residents. Jáuregui (2004), for example, suggests that: "these sectors of the urban fabric that often go unrecorded in official cadastral maps represent the negative image [la imagen 'noire'] of society: what no-one wishes to know about; non-places, intervals, 'dead time' in journeys across the city" (p.130). [...] On the other hand, the mapping may in itself be regarded as a colonizing practice, as witnessed by anxieties about the cadastral survey as an imposition of State order. In this context, the lack of maps of informal settlements can be understood as "resisting representation" since favelas "evade or exceed administrative or bureaucratic oversight" (Fabricius, 2008, p.6). [...] They [favelas' maps] inhabit "a grey zone between official urban data and the realm of what cannot be represented or understood" (Varley, 2013, p. 6).

This research acknowledges this critical work while takes a different approach. It takes distance

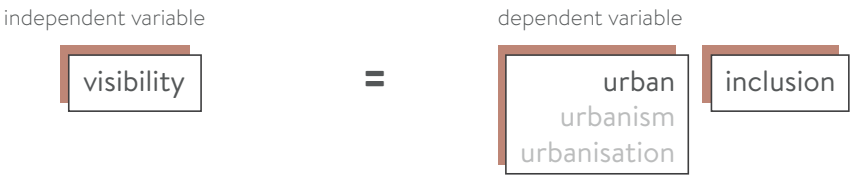
from dichotomies, such as mapping presence (visibility) / mapping absence (invisibility) as synonyms of, respectively, urban inclusion/exclusion or domination/resistance. It also refuses to approach digital visibility as empowering or disempowering by itself and considers the role of visibility and the digital in governing the urban.

This study is not concerned solely on what is turned digitally visible on informal settlements maps, but **how new forms of visibility take place.** Examples of digital (in)visibility of Rio favelas, empirically found in digital mappings produced between 2008 and 2016, as well as data about other forms of material (in)visibilities, are used to illustrate this theoretical discussion.

From this perspective, digital visibility represents a way of governing the urban. Therefore, discourses on rights to urban inclusion — e.g., urban integration, social inclusion, citizenship, rights to exist in the city — via digital visibility on its own are simplistic, for visibility is a social practice entangled with power. Digital visibility is a dimension of the social production of the urban, and an axis of a "regime of practices" (Dean, 2010) of urbanism.

Figure 6 Variables of the study: more digital visibility equals urban inclusion?.

Does digital visibility is, in itself, always equals to urban inclusion?



Source: Author (2018)

1.4 Conceptual Background and Theoretical Framework

This Dissertation benefits from ongoing discussions about power and the digital on the fields of **urban studies, political philosophy,** and **urban geography**, in particular of a contemporary subset of Foucault's thoughts on power dynamics that came to be known as **governmentality studies** (Dean, 2010; Walters, 2012).

Governmentality studies are critical scholarly debates that recognize that power is plural and diffuse. That is to say, the government does not emanate from a single source (e.g., the State) but is a relational practice of 'self-conduct' and 'conduct of others', in which freedom plays an essential role (Foucault, 1978).

BOX OF CATEGORIES

POWER // GOVERNMENTALITY (Foucault, 1977, 1978; Dean, 2010)

Power is a practice and permeates all social relations. (Foucault, 1977, 1978).

Governmentality is a technology of power. (Foucault, 1977, 1978).

Governmental tactics and strategies are the way by which a multiplicity of "institutions, procedures, analyses and reflections, calculations and tactics" (Foucault, 1979) are used to "conduct the conduct" of the populations (Foucault, 1977, 1978).

Governmentality is also a methodological tool that helps to offer a critical perspective on the analysis of power (Dean, 2010)

Before us, different critical urban studies have been unpacking dynamics of power-knowledge in 'smart cities,' and have relied on the concept of *governmentality*. For example, 'Developing a Critical Understanding of Smart Urbanism' argues that "a critical research agenda around SU demands to explore the different ways in which its rationalities, techniques, and subjectivities are being rolled-out across contrasting geographies." (Luque-Ayala and Marvin, 2015). 'Smartmentality: The Smart City as Disciplinary Strategy' offers an analysis of "the rationality and *governmentality* of urban smartness" (Vanolo, 2013). 'Michel Foucault and the Smart City: Power Dynamics Inherent in Contemporary Governing through Code' 'explores the internal logic and dynamics of software-mediated techniques used to regulate and manage urban systems' (Klauser, Paasche, and Söderström, 2014). 'Smart subjects for a Smart Nation? Governing (smart)mentalities in Singapore' shows 'what kinds of 'smart' subjects and subjectivities tend to follow from certain 'smart' socio-materialities' (Ho, 2016). This Dissertation builds on this work, but through a more explicit engagement with the theoretical notion of visibility.

On the interface between the digital and contemporary urbanism, visibility has been mainly approached in its relation with security and surveillance (Amoore, 2007; Andersen and Möller, 2013; Bruno, Kanashiro and Firmino, 2010, Krassman, 2017). Recently, Krasmann has proposed the notion of **visual citizenship** as a way to go a step further on understanding the contemporary surveillant gaze. Her line of thought close to ours, in the sense that she also builds on visibility as an essential feature of Foucault's analysis of power to theoretically explore her object of study (in her case, the digital subject):

> One of the most exciting features in Foucault's work is his analytics of power in terms of forms of visibility. It allows for a reflection on the conditions of **seeing and thinking**, thus triggering a seemingly paradoxical move: locating the limits of our perspectives entails simultaneously transgressing these limits. In a way, we decipher our blind spot. (Krasmann, 2017, p. 10, our emphasis).

Visibility is a social science concept that comprises both the visual — what is given to be seen — and the invisible — how this happens (Brighenti, 2010). Visibility is also a political practice. In Western ways of governing, vision and power are symbiotic (Otter, 2008) and the exercise of power is an exercise in activating selective (in)visibilities (Brighenti, 2007, 2010).

Following Foucault's thoughts on power dynamics, the way some elements are turned visible in space is a crucial strategy on the ways we govern and are governed. This statement assumes that urban spaces are 'spaces of constructed visibilities' (Rajchman, 1988) and that urbanism produces and is produced by specific (in)visibilities.

//VISIBILITY (Brighenti, 2007, 2010)

A Category for the Social Sciences
A relational, strategic and processual field
A socio-technical and bio-political practice

The exercise of power is an exercise in activating selective (in)visibilities (Brighenti, 2007, 2010).

Visibility is a political practice that comprises both the visual — what is given to be seen — and the invisible — how this happens. (Brighenti, 2010)

Empowerment does not rest univocally either with visibility or with invisibility (Brighenti, 2007)

Here, **urbanism** is understood as a set of ways of seeing, knowing, thinking and acting over urban spaces, that is socially constructed and temporally defined. Urbanism is understood not merely a technique (techne) or a disciplinary field (savoir-faire), but a set of rationalities, techniques, subjectivities, and methodologies that, together, harness a form of power both over spaces and populations. This notion is closely related to Foucault thoughts on "urban medicine," or "modern urbanism in statu nascendi" (Martins, 2000).

Complementary, the terms **urban** and **urbanization** are used as in Lefebvre (Lefebvre, 1972,

BOX OF CONCEPTS

Urban //Urbanization // Urban Space // Urban Inclusion // Urban Exclusion

//URBAN

Urban is not a fixed and bounded settlement type but a social process that spread throughout the planet (Lefebvre, 1974)

// URBANIZATION

Urbanization refers to the expansion of the urban fabric under capitalism. Urbanization has always been associated with transformations in the territories, such as the redefinition of practices, institutions, built environment, among other aspects (material and immaterial) useful for capital accumulation. In other words, the dynamics of urbanisation or (the regime of practices of urbanism) are constantly changing. Lefebvre referred to this process of redefining the boundaries between urban and non-urban as an implosion-explosion (Lefebvre, 1999), while Harvey referred to neoliberalism as creative destruction (Harvey, 2011).

// URBAN SPACE

Urban space is not a discrete, bounded entity, but a come together of economic global flows, a connected, fluid entity (Amin and Thrift, 2002)

Urban space is not a discrete, bounded entity, but a come together of economic global flows, a connected, fluid entity (Amin and Thrift, 2002). It is socially constructed and contested, politically and ideologically mediated. It is, simultaneously, a site, a medium (millieu) and an outcome of relations of power that are specific to a historical period and geographical space. (Brenner, 2009) Urban common spaces are traversed by contradictions, disputes and material and symbolic conflicts among different agents. (Santos Júnior, 2014, froLefebvre, 1991, 1999, 2008; and Harvey, 1973, 1996, 2005, 2006) Urban space is a “fundamental arena of capitalist spatiality” (Brenner, 2003).

Urban space is socially produced through relations among spatial practice, representations of space and representational spaces. (Lefebvre, 1991)

// URBAN INCLUSION

Inclusion of a space in capitalist urban dynamics. Transformation of a space into an urban space.

// URBAN EXCLUSION

Exclusion of a space from capitalist urban dynamics.

1986). Urban space is socially produced through relations among *spatial practice*, *representations of space and representational spaces*. These three dimensions "contribute in different ways to the production of space according to their qualities and attributes, according to the society or mode of production in question, and according to the historical period" (Alves dos Santos Junior, 2014). They act dialectically in the production of urban space. For instance, representations of space such as mappings have a substantial role in how thought may become an action in the urban space (Lefebvre, 1986).

Besides, urban is not a fixed and bounded settlement type but a social process that spread throughout the planet. In turn, urbanization is approached as the process of dissemination of urban practices on a global scale, an expression of social relations that, at the same time, act over society. Urbanization would be the coming together of social and spatial processes that allow capitalism reproduction through the creation of increasingly comprehensive, instrumental and mystified spaces (Lefebvre, 1986).

Against this background, the terms urban inclusion and urban exclusion are used here as a reference to inclusion in or exclusion of urban dynamics -- social, political, economic, cultural and others.

These concepts are framed in a critical urban studies theoretical and methodological framework synthesized as follows:

Table 1 Theoretical and Methodological Framework

Theoretical and Methodological Framework	
Paradigm	Critical
Ontology	Realities are socially constructed and under constant transformation
Epistemology	Both reality and knowledge are socially constructed and influenced by power relations in a given society (reality is space and time-specific)
Academic Fields	Fields: Urban Studies, Urban Geography, Political Philosophy. Sub-fields: Smart Urbanism, Governmentality Studies.
Theoretical Perspective	Critical Urban Theory, Critical Theory of Technology, Critical Cartography
Approach	Deductive
Research Aim	Testing and Exploration
Research Design	Desk Research, Case Study

Source Partially adapted by Author (2018) from Patel (2015), who used data from Crotty (1998)

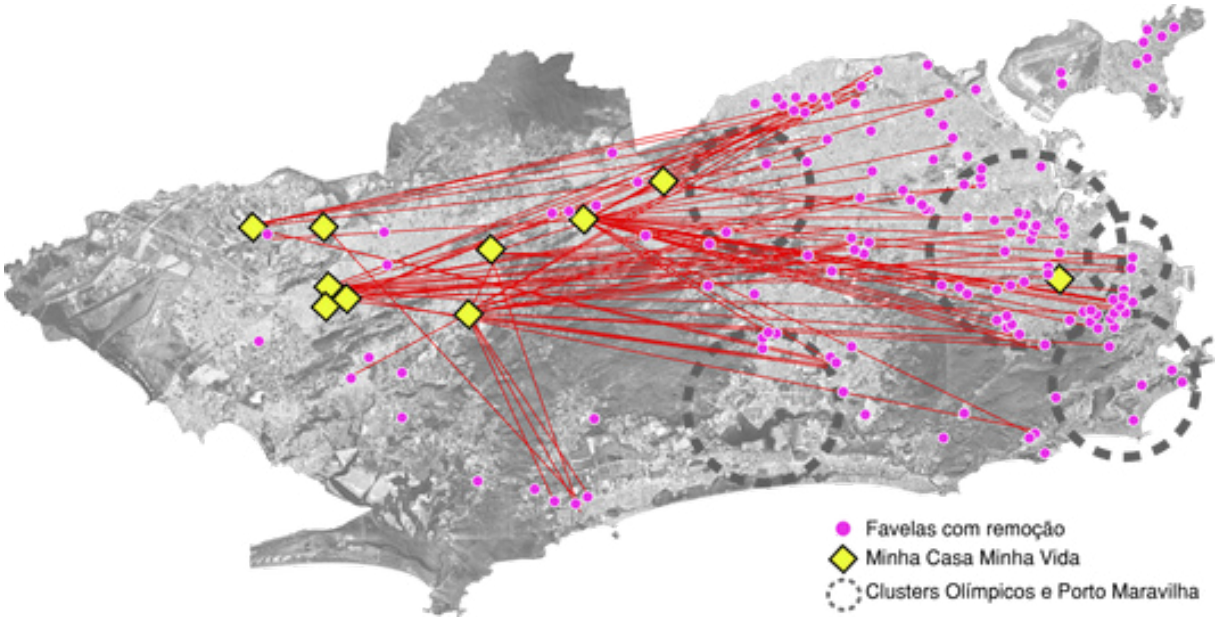
1.5 Research Design

To study space and its relations to the production of visibilities, as well as to study urbanism as a power-knowledge dynamic is a methodological choice. Within the theoretical and methodological framework mentioned above, the Dissertation sought to answer the research question using **testing** and **exploration**. Empirical data was collected in order to test if the expectations regarding digital visibility are real in the case of Rio's favelas. Also, different forms of favelas (in) visibility was studied to explore how are favelas' digital visibilities related to urban inclusions and exclusions in the city of Rio (2008-2016).

The research strategy consisted of two steps: (1) **desk research** and (2) **illustrative cases and a case study**. Desk research involved an extensive literature review as well as content analysis, which include textual analysis of narratives around mappings and cartographic data. **Narrative analysis** consisted of identifying and analyzing stories that are told about digital mapping, in particular to its relation with urban inclusion. Stories told by different participants in mapping, of primary and secondary sources, were compared. We identified a primary pattern of linking digital mapping of informality with digital visibility and urban inclusion.

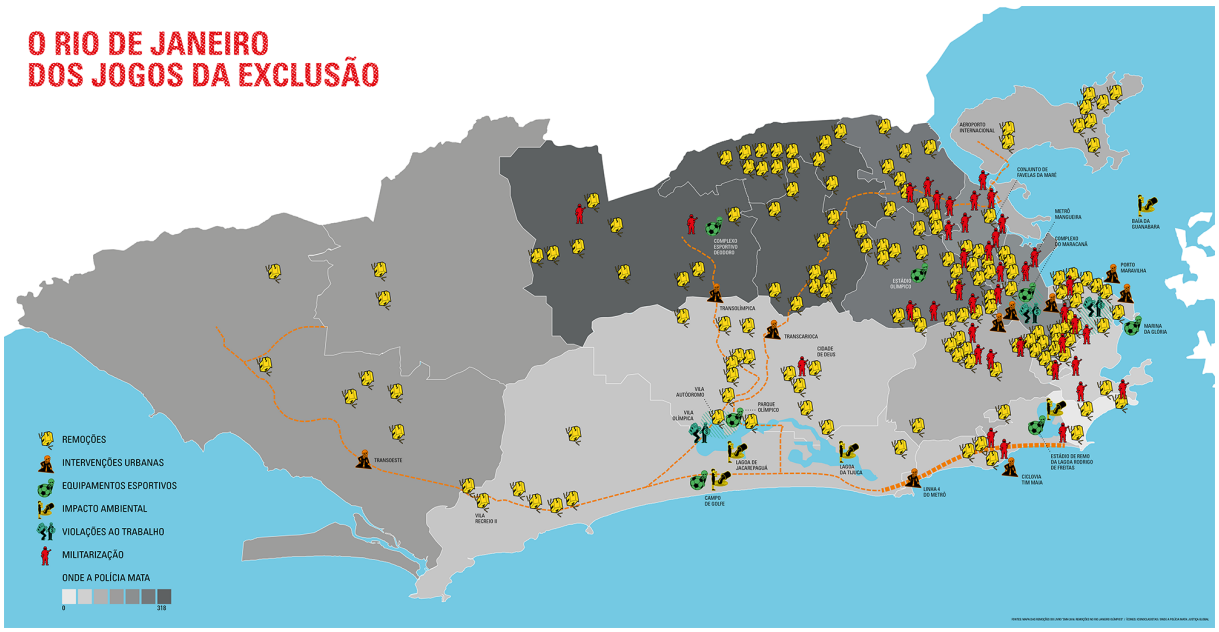
An overview of the results of previous researches (**secondary analysis**) played an important role, particularly regarding data about housing eviction and other transformations related to the Olympics 2016, systematised and shared by the Comitê Popular Rio Copa e Olimpíadas and researchers like Faulhaber and Azevedo (2016) and urban activist groups such as Jogos da Exclusão (2016).

Figure 7 Map of housing eviction, Rio 2016.



Source: Faulhaber and Azevedo (2016)

Figure 8 Map of violation of human rights, Rio 2016.



Source: "Rio 2016, Jogos da Exclusão"[7] (2016)

Seven illustrative cases were selected to provide an overview of different mapping initiatives. To provide a multiple, contrasting sample, they were organized by the leading proponents: government, civil society (NGO) and the private sector. The illustrative cases are:

(1) Government: Mapping Streets (Mapeamento de Logradouros), Rapid Participative Map (Mapa Rápido Participativo), and Participatory Map of the city of Rio de Janeiro (Mapeamento Participativo da Cidade do Rio de Janeiro).

(2) Civil Society: Wikimapa

(3) Private Sector: On the Area (Na Área) and On the Map (Tá no Mapa).

On the Map initiative at Favela Cantagalo was selected to be researched in more detail, as a Case Study. This initiative was selected among others because it is based on Google Maps, which is at this moment the digital mapping tool with the highest reach. For example, it is the basis for location awareness apps such as Waze, and transport apps such as Uber, or touristic services such as AirBnb. As such, decisions (and distortions) on Google Maps have a multiplier effect over a series of contemporary, digitally-enabled, activities. Favela Cantagalo was chosen because the mapping of favela Cantagalo by On the Map was taking place precisely during the phase we planned to do the fieldwork, so we were able to follow the process in real time. In addition, the research group we are inserted in -- *Urbanism in the Risk Society: urban planning and design in Rio de Janeiro*

7 Available: <https://issuu.com/justicaglobal/docs/mapa-jogos-da-exclusa__o> Accessed: November, 2018.

(LAURBAM/ PROURB/ UFRJ) -- has been searching favelas with Pacifying Police Units (PPUs), in particular Cantagalo, alongside this Dissertation elaboration, which facilitated group meetings and field visits. Favela Pavão-Pavãozinho, often researched in conjoint with favela Cantagalo, was left aside due to a limited possibility of access and violence occurrences.

In the case study of Google Maps in Cantagalo, the unfolding of digital visibility is framed in time and space. Three moments of favelas cartographic representation — referred as "digital eviction," "on the map" and "beyond the map" — are studied in its relation to other dynamics of favelas urban in/exclusion. Then, the mapping of Cantagalo is studied to demonstrate some (in)visibilities produced in different scales — building, street, community, and city. Observation of mapping workshops, naturally occurring talks and semi-structured interviews were used at this phase.

Our findings were organized in maps, in order to search for spatial patterns of (in)visibility in the city scale. This methodological strategy dialogues with **spatial analysis**, a way of reasoning that is spatially grounded, typical of urban design. It considers visibility from the outset and contrasts with other analyses of digital mappings that focus mainly on the digital content (e.g., geotags).

Table 2 Research Design

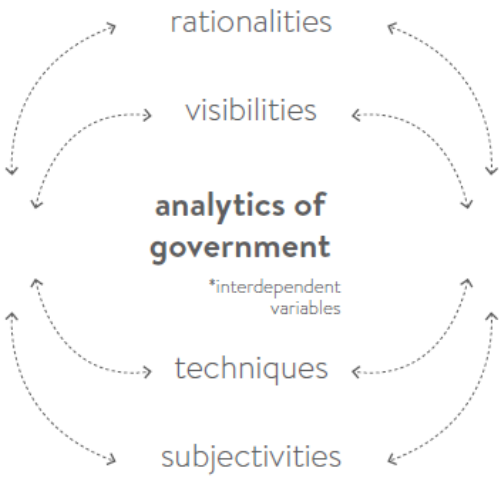
Research Design			
Research Strategy	**Approach**	**Method**	**Techniques**
Desk Research	Textual analysis: interpreting the content of documents // Analysing existing cartographic data // Overview of the results of previous researches	Content Analysis // Secondary Analysis	Analytics of government // Narrative Analysis // Spatial Analysis
Illustrative Cases* // Case Study**	Participant Observation // Naturally Occurring Talks	Observation // Interview	Naturally occurring talks // Semi-structured interview protocols and reports

Source Partially adapted by Author (2018) from van Thiel (2014) // *Multiple, contrasting illustrative cases // ** Single case study

The empirical findings of the spatial analysis, together with the narratives patterns found in content analysis, were examined through the lenses of the **analytics of government**. The analytics of government (Dean, 2010) is a tool to examine power exercise critically. It supposes that within a given **regime of practices** -- e.g., practices of medicalization, imprisonment, or, for that matter, urbanism (Foucault, 1975; Rabinow, 1991) -- it is possible to grasp dynamics of power by acknowledging simultaneous shifts in**visibilities, rationalities, techniques and subjectivities** (Dean, 2010). Thus, favelas' digital visibility, within this methodological framework, is a dimension of power dy-

namics, together with rationalities, techniques, and subjectivities.

Figure 9 Scheme Visibilities, Rationalities, Techniques, Subjectives



Source: Author (2018)

The empirical material was collected on fieldwork in Rio de Janeiro between April 2015 and June 2017. It consisted of observation, naturally occurring talks, and field visits to the Municipality, to the NGO Rede Jovem, to the NGO Afroreggae, as well as to participation in some mapping workshops. Four favelas — Cantagalo, Pavão-Pavãozinho, Santa Marta and Vidigal — were visited along the process. This material was complemented by an extensive documental analysis — interviews, maps, web-pages, grey literature reports and videos — collected from March 2014 to June 2018.

1.6 Illustrative Cases and Case Study

In Rio de Janeiro, over the last ten years, a dozen of favelas' mappings has been undertaken by different agents such as NGOs, communities, governments and tech companies. Favelas' digital data, previously scarce or disconnected, have been opened online, turning spaces and communities digitally visible on maps and other tools such as social media and search engines. This shift is often presented as a shortcut for social inclusion, urban integration, and economic growth, while digital visibility is showcased as the right to exist in the city.

For instance, Wikimapa (NGO Rede Jovem) declares that its objective is "to give visibility to the local potential and shorten the distance between city and favela — after all, one is part of the other" ("Wikimapa e a identidade do morador de favela | Brasil 247", [s.d.]). Visibility is said to value the local potential, so a violence stigma and an exclusion feeling related to the absence on

maps could be reversed. Another community-led initiative, Guia de Ruas da Maré (Maré's Streets Guide) says mapping is a "first step to exercise the right to the city [through] visibility and recognition" (Redes da Maré e Observatório das Favelas, 2012).

In this landscape of community-led initiatives, we identified a different trend, defined by greater involvement of ICT corporates such as Google and Microsoft (Luque-Ayala and Neves Maia, 2018) that tell similar stories about visibility. Microsoft presents its initiative, Na Área (On the Area) as a chance of "visibility and access to information [...] that will certainly boost communities' economy" (Microsoft Online Advertising Director, Favela 247, 2014b). Google, in turn, promises "mapping and giving visibility to favelas." Its project, Tá no Mapa (On the Map), is said to do "more than inserting communities in the digital world and the city maps," but also "promoting citizenship, local business growth and access to public services" (Afroreggae, 2013).

In this landscape, this Dissertation critically analyses discourses and images about the incorporation of some of Rio's favelas to digital maps from 2008 to 2016. This period was marked by radical urban transformations related to the preparation of the city to host mega sportive events such as the World Cup 2014 and the Summer Olympics 2016. These transformations engendered a **new regime of visibility of favelas** (Cavalcanti, 2013) and the city as a whole.

Among a dozen of illustrative cases, some mappings are further examined: (1) Wikimapa, from the NGO Rede Jovem, (2) Mapa Participativo da Cidade do Rio de Janeiro[8] (Participatory Mapping of the City of Rio de Janeiro), a partnership between the Municipality and the Community Council of the complex of favelas Manguinhos and (3) Tá no Mapa (On the Map), released by Google together with the NGO Afroreggae and the advertising agency JWT.

The last one, Tá no Mapa, is subject to a detailed **empirical analysis**, with particular attention to the favela Cantagalo. (In)visibilities at play in favelas digital mappings at various scales -- individual, building, street, community, city -- are highlighted and discussed within the theoretical and methodological framework analytics of government (Dean, 2010)

1.7 Relevance and Objectives

Drawing from critical smart urbanism (SU), this study acknowledges that discourses and practices of SU often offer a "seductive vision" (Marvin, Luque-Ayala and McFarlane, 2016) of an urban

8 To examine the Mapa Participativo da Cidade do Rio de Janeiro, two other initiatives are detailed: the Street Mapping (Mapeamento de Logradouros) and the Rapid Participatory Map (MRP).

future that has little to do with some significant contemporary urban challenges, such as the deepening of social and economic inequalities. The misleadings of this seductive vision are more evident when 'smartness' encounters the 'Global South,' a scenario of ambiguity and adversity regarding social justice and the exercise of the right to the city (Harvey, 2014; Lefebvre et al., 2009) by urban majorities. This study helps to advance a frontier in critical SU and aims to enrich and refine the notion of visibility on 'smart city' narratives. Its **relevance** is due both to the **empirical analysis** — in the sense that literature on 'Global North' smart cities is much more robust than the literature on 'Global South' smart cities — as well as to its **theoretical contribution** — considering that at this moment critical SU approaches digital visibility only tangentially.

The **general objective** of this dissertation is twofold: (1) to unsettle a common sense that digital visibility is the same as urban inclusion; (2) to advocate for a more nuanced understanding of digital visibility and its role in governing the urban, and thus socially producing the smart city.

Specific objectives include: (1) finding (in)visibilities at play in digital mappings of favelas in Rio in the years that precedes the Olympics 2016; (2) taking the critical SU agenda forwards, by suggesting that visibility, as a social process in itself (Brighenti, 2010), must be taken into consideration in urban studies.

1.8 Literature Review

Although discussions about visibility as a key to understanding the social production of smart cities is scarce, a context to be considered before our analysis is the extensive literature on **digital visualizations and visual perception.**

From geographical, cultural studies, Rose, Degen, and Melhuish (2016) discuss that digital technologies impose a new methodological transition: from a gaze on stable objects to a view of the dynamics of the production, circulation and modification of these objects.

From historical studies, Halpern (2015) discusses how did space become smart and find in '*Beautiful Data: A History of Vision and Reason since 1945*' that historical shifts in visual perception — such as Lynch's experiments about '*The Image of the City*'— are also linked to transformations in *governmentality* — ways of thinking, knowing and acting.

Urban studies acknowledge that visual perception affects the power-knowledge equation of a city, transforming urban govern (Marvin, Luque-Ayala and McFarlane, 2016). For example, McNeill (2016) analysis of IBM control rooms shows that at the core of positivistic and tech-driven assumptions about the nature of smart cities, there is a different mode of visual perception of

urban domains of governance.

Building on this corpus, here a slightly different path was taken. The focus is on visibility rather than visuality, visualization or visual perception. The political nature of visibility is foregrounded, and digital visibility is approached as a dimension of the government of smart cities.

Researches targeting specifically the idea of **governing the smart cities** have looked at the corporatization of the urban through digital technologies (Söderström, Paasche and Klauser, 2014; Vanolo, 2013) the role that code plays in governing the urban (Klauser, Paasche, and Söderström, 2014); and the potential role of digital sensors in establishing new forms of both urban *governmentality* and citizenship (Gabrys, 2017). We build on this work but engaging more explicitly with the concept of visibility.

Another important indication of related work is the **critical cartography** debate. Along the 1980s and the 1990s, there is an epistemological shift from a representational to a processual understanding of maps. One of the central figures of this scholarly debate is Harley, that, drawing on Foucault, breaks the notion of the map as a neutral, scientific mode of communication and interprets 'maps as knowledge as power.' More recent insights on the processual understanding of cartography are related to questioning the ontological security of maps. The argument is that maps 'are always mappings.' That is to say that maps are 'never fully formed and their work is never complete, [...] are transitory and fleeting, being contingent, relational and context-dependent' (Kitchin and Dodge, 2011).

Regarding digital mapping specifically, we are drawing on an understanding of it as **spatial media,** in which the production and sharing of geospatial information create value and acts as media for communicating other information (Crampton, 2001, 2009). Digital mapping as spatial media is by definition a **social activity** (Crampton, 2009; Leszczynski, 2014). It means that digital mappings are not merely a representation of reality -- e.g., geographical coordinates visualized on a digital screen -- but a practice that entails social relations. "What is at stake are not only questions of technology, but also 'sites of potential relations between individuals; persons and places; and people, technology, and space/place' (Kinsley, 2013; Wilson and Stephens, forthcoming, apud Leszczynski, 2014).

1.9 Argument

Within this theoretical and methodological framework, and based on our literature review, **'smart**

cities' rationales and practices not only transform what we see — as in a different mode of visual perception of urban domains of governance (McNeill, 2016) — **but also change the place of seeing in power-knowledge urban dynamics.** In this sense, **digital visibility would have a role in governing urban spaces.**

1.10 Outline

This Dissertation is organized into seven chapters. Each chapter is structured as a paper, with an abstract, sections and a conclusion. Although it is possible to read each one of them independently, the argument is better grasped if the text is faced as a whole.

Following this introduction, chapter **two** provides the **theoretical and methodological framework,** drawing from critical urban theory and the *critical theory of technology*. It indicates the concepts of urban, urbanism, *planetary urbanization*, and the social production of the urban, that will guide the discussion about what is in (included or existent) and what is out of (excluded or inexistent) the urban. It also proceeds a discussion about the theoretical concept of *governmentality* (Foucault, 1978) as well as of the methodological framework that derives from it, known as analytics of government (Dean, 2010). It suggests that within part of the urban studies of smart cities that are informed by Foucault's analysis of power, there is a flaw that this research may remedy, that consists in limited attention to visibility as a social process. This chapter opens up a discussion on **how digital visibility can be approached as an integral feature of Smart Urbanism**. In other words, it discusses **the role of digital visibility in the social production of a Smart City.**

Chapter **three** presents the **state of the art, definitions of terms** and a **literature review** about digital mappings and digital visibility. It conceptualizes digital mappings, acknowledging an extensive literature on participatory mappings and social cartography. It presents how critical cartography approaches the relation between mappings and urban in/exclusions. It highlights that mappings are social practices and may be approached as part of a capitalist mode of thinking the world. Regarding digital visibility, it focuses on the relation between power and vision throughout Western history and, more recently, in the smart city approach. Moreover, it offers an overview of the literature about the ways we govern and are governed through and by the digital. Finally, it suggests that the integration between three bodies of literature — governing via mappings, governing via visibility and governing via the digital — are useful in positioning **digital visibility (via mappings or else) as a form of power exercise that has a role in producing the urban.**

Chapter **four** offers a **context** of favelas visibility in Rio, which comprises a description of contem-

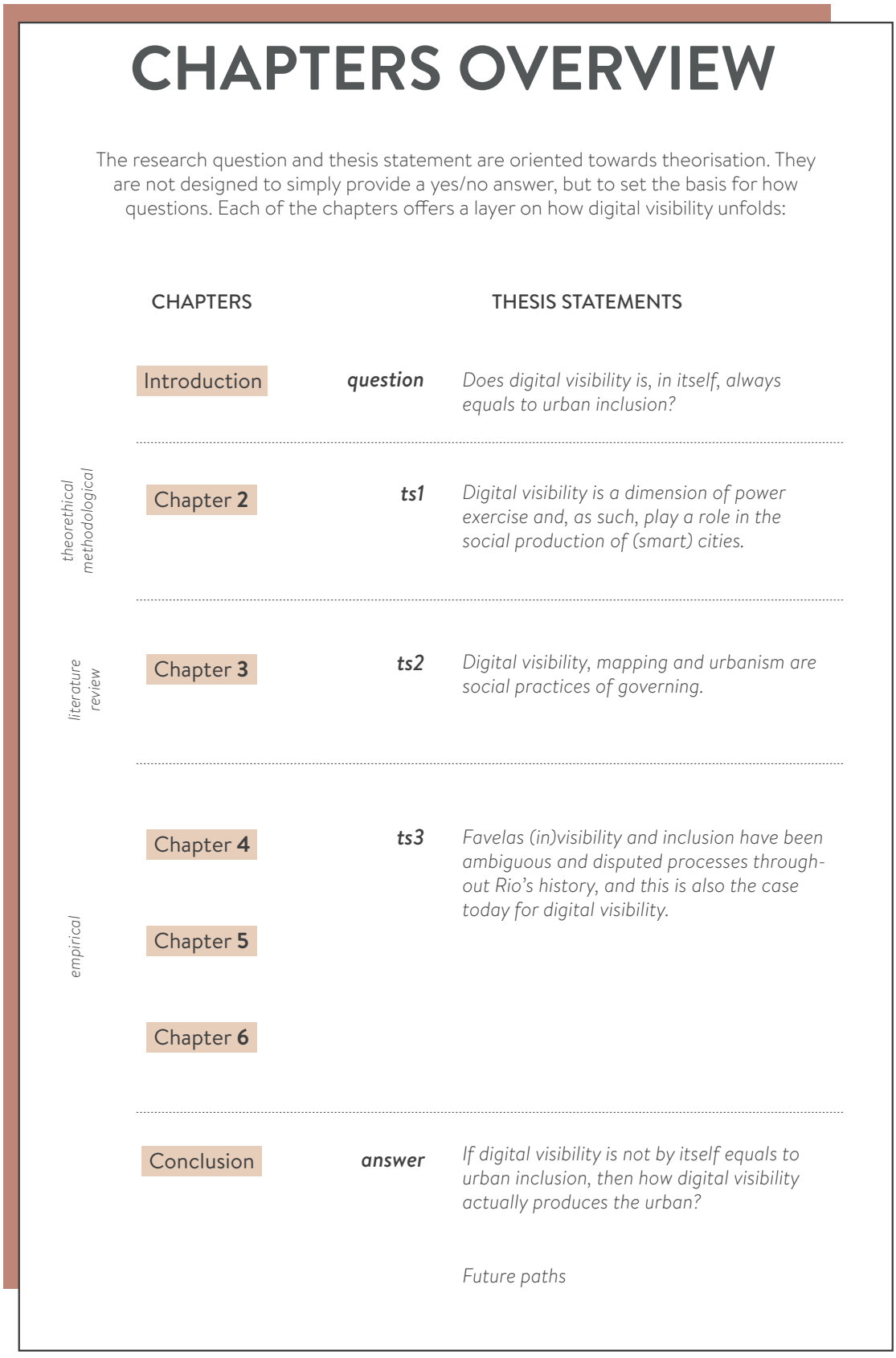
porary socio-spatial transformations in its regime of visibility. It draws attention to recent urban upgrading projects, pacification programs and the symbolic disputes around the image of the city in the context of international mega-events, in particular, the Olympics 2016. It also positions the current regime of (in)visibility of favelas in a broader history of the construction of (in)visibilities of informality in Rio. It concludes with a critical reading on how **visibility and invisibility intertwine in the making of the Olympic city**, what complicates the assumption that digital visibility would be, in itself, a shortcut to urban inclusion.

Chapter five brings an overview of some contemporary narratives and practices around favelas digital mappings, used as **illustrative cases**. It shows how the narratives tend to converge to an underlying common assumption that digital visibility equals being part of the urban inclusion. It critically unpacks the claims of digital visibility as a shortcut for urban inclusion — through urban integration, social inclusion, recognition, identity, and legitimacy -- and suggests that overlapping a "myth of marginality" (Perlman, 1979), **a "myth of invisibility" surfaces with the digitization of informality**. The surveyed mapping initiatives are compared in terms of its rationalities, methodologies, and techniques.

Chapter **six** proceeds an empirical analysis on favelas' digital (in)visibilities in Rio, with particular attention to the **case study** of Google Maps and the favela Cantagalo (Tá no Mapa project). It highlights the (in)visibilities at play in favelas digital mappings at various scales - individual, building, street, community, city. It also crosses findings with data about other urban dynamics of inclusion and exclusion in Rio along the city upgrading for the Olympics 2016. Then, the **findings are discussed** within the theoretical and methodological framework analytics of government (Dean, 2010, drawing on Foucault, 1978 and Deleuze, 1991), which helps to position **favelas visibility as part of broader dynamics of urbanism.**

The **conclusion** provides an **analytical summary** of the previous sections and **resumes the thesis achievements** in critically unpacking claims of digital visibility as the same as urban inclusion. It also makes some considerations about intellectual and practical challenges, as well as limits and possibilities of the research regarding the theoretical and methodological framework and the empirical material. Finally, it suggests future paths to the SU agenda regarding the politics of digital visibility, such as taking **digital visibility as a valuable framework of reference to unpack power dynamics in smart cities.**

Figure 10 Chapters Overview



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TWO

2. Governmentality, digital visibility, and power in the social production of (Smart) Cities

Abstract

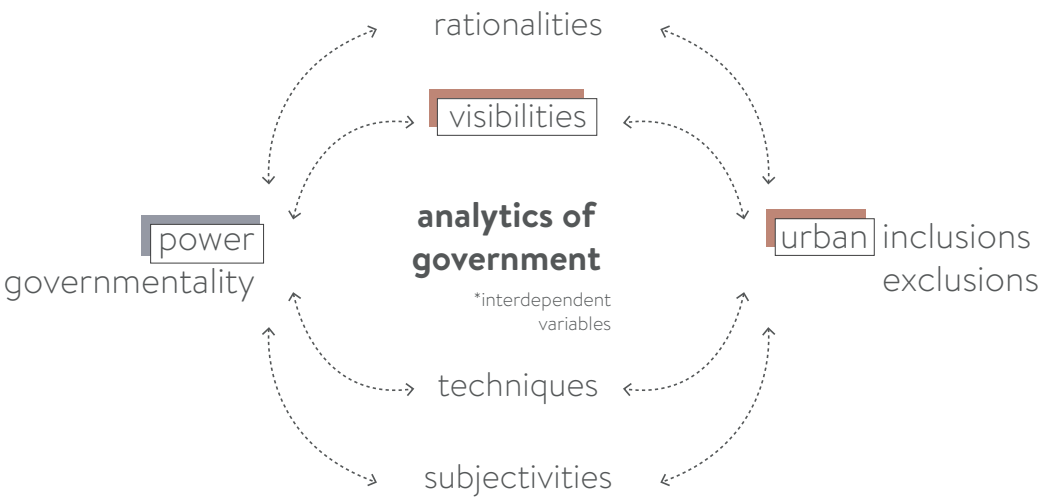
Digital mapping narratives frequently position digital visibility as the new nature of the urban condition. Being on online mappings would be a manner of being part of the urban, especially for informal settlements. In contrast, we suggest that digital visibility -- via digital mappings or else -- does not always imply in urban existence, because visibility is a dimension of power exercise. As such, digital visibility must be taken into account as an integral feature of (smart) urbanism. From this perspective, digital visibility does not generate, by itself, urban inclusion/existence or exclusion/non-existence. Digital visibility is *produced by* and *produces* urban dynamics of inclusion and exclusion. This chapter provides the theoretical and methodological framework for this argument, drawing from *critical urban theory* and the *critical theory of technology.* It indicates the concepts of *urban*, *urbanism*, *planetary urbanization*, and the *social production of the urban*, that will guide the discussion about what is in (included in) and what is out of (excluded on) the urban. It also proceeds a discussion about the theoretical concept of *governmentality* (Foucault) as well as of the methodological framework that derives from it, known as *analytics of government* (Dean, 2010). It suggests that within part of the urban studies of smart cities that are informed by Foucault's analysis of power -- smart urbanism or SU --, there is a gap that this research may help to fulfill, that is tangential attention to the notion of *visibility as a social process*. This Chapter complements the analytics of government with spatial analysis and opens up a discussion about *the role of digital visibility in the social production of (smart) cities.*

2.1 Introduction

Taking a distance from a simplistic view of digital visibility as the same as being part of the urban, we suggest that digital visibility has a role in socially producing (smart) urban spaces. In other words, digital visibility is an integral feature of (smart) urbanism. This thesis aligns with smart urbanism (SU), a critical debate that unpacks power relations at play on narratives and practices of Smart Cities. This chapter highlights some of the concepts that will be retaken later on exploring our argument -- such as urban, urbanism and urbanization -- while frame the argument within the critical urban theory (Gottdiener, 1997; Lefebvre, 1986, 1999 [1970]) and the critical theory of technology (Feenberg, 2005; Latour, 2005, 2007).

Moreover, it calls particular attention to the concept of governmentality, both in its original sense (Foucault, 1978) and in some of its contemporary interpretations (Dean, 2010). Governmentality is used as an analytical tool to discuss the different ways through which digital visibility -- in this particular case, digital visibility enabled by digital mapping of *favelas* -- is a dimension of power dynamics at play in the social production of the urban.

Figure 11: Conceptual Framework.



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2.2 Critical Urban Theory and Critical Theory of Technology

For critical urban theory, urban space is support, instrument, and result of specific continuously redefined power relations (Brenner, 2009). "Critical urban theory emphasizes the politically and ideologically mediated, socially contested and therefore malleable character of urban space." (Brenner, 2009, p.1988).

Gottdiener (1997) and Lefebvre (1991), representatives of the critical urban theory argue in *The Social Production of Space* and *Space Production*, respectively, that the spatial dimension (e.g., spatial patterns, urban morphology) and the social dimension (e.g., social practices and power relations) of urban are inseparable. Social practices transform and are transformed by spatial patterns. Spatial patterns transform and are transformed by social practices. Brenner identifies four basic propositions of this theory. (1) It addresses the premise of the need for theoretical argu-

mentation concerning the nature of capitalist urban processes; (2) recognizes historical specificity of knowledge about urban issues and their mediation through power relations; (3) rejects the instrumental, technocratic and market-oriented urban analysis that promotes the maintenance and reproduction of existing urban formations; (4) seeks alternatives - emancipatory forms of urbanization that are latent in contemporary cities (Brenner, 2009).

According to Brenner (2009), the challenges of the beginning of the 21st century demand an even more consistent commitment from urban studies with the four basic principles of critical urban theory, but this framework must be adapted to incorporate variables that were not present in its constitution after May 1968. One of the variables that deserve to be studied in this context is the incorporation of digital technologies to urban dynamics. How is urban space produced by and through digital technologies? How does the urban space that incorporates digital technologies transform actors and social dynamics? In these mediations, how can power relations be read? These questions have been explored over the last decade by the emerging academic field of Smart Urbanism (SU)[9].

SU is at its infancy, but the critical study of technology by social sciences dates back from the late 19th century. Haklay explains in *Philosophy of Technology: An Introduction* (Dusek, 2006) that by this time technology became a focus for social scientists, but most of the ideas that today inform our studies were developed during the twentieth century. Systematic research on technology has only gained prominence in the 1970s. At least four schools of thought on the relationship between technology and society are recognized, each with particular interpretations, built in tandem with social practices and technological advances of particular historical moments. The primary reference for this investigation is the *critical theory of technology*, which has been popularized since the 1990s.

To understand it, one must observe it in its relation to the other three currents that make up this field of study: *determinism*, *substantivism*, and *instrumentalism* (Feenberg, 1999; Haklay, 2013). The four currents differ fundamentally in two aspects: the view of technology as neutral or value-laden, and the understanding of its performance as autonomous or controlled by humans. Table 3 presents the principal authors, contents and historical moments of diffusion of these thoughts.

9 See, for instance: Developing a critical understanding of smart urbanism, Luque-Ayala and Marvin, 2015; and Smart Urbanism: Utopian Vision or False Dawn, Marvin et al., 2015.

Table 3 Currents of Thoughts within Critical Theory of Technology.

Currents of Thoughts on Technology		
TECHNOLOGY IS...	**AUTONOMOUS**	**HUMAN CONTROLLED**
NEUTRAL: means and ends are separated	**Determinism** // Karl Marx, Charles Darwin // "Technology is actually a force of its own with evolution that, while carried out by humans, by and large is not dependent on them.[...] Technological progress supports humanity's march to freedom and happiness. [...] Hence, technology is an extension of nature and outside the political realm" (Haklay, 2012, p.57-58) // End of the XIX century and the beginning of the XX century	**Instrumentalism** // Negroponte, Friedman // "Technology by itself does not encapsulate values, and it is the way in which it is applied that gives it its social meaning." (Haklay, 2012, p.58) // 1990s, 2000s and 2010s
VALUE-LADEN: means and ends cannot be separated	**Substantivism** // Jacques Ellul, Martin Heidegger // "Technology has political implications. [...] [It is] a force that embodies specific values, such as control over labour and resources. [...] The technologies that we use shape modem life." (Haklay, 2012, p.58) // 1940s, 1950s, 1960s and 1970s	**Critical Theory** // Herbert Marcuse, Michel Foucault, Andrew Feenberg, Bruno Latour // "Technological progress is shaped by social control. [...] Technology must be studied and understood as an integral part of society. [...] The process of creating technological artefacts is socially constructed" (Haklay, 2012, p.58) // 1970s, 1980s, 1990s, 2000s and 2010s

Source: Feenberg (1999, 2005), adapted by the author

Feenberg (1999) emphasizes that technological development is controlled by humans and therefore embodies political values and intentions. One of the most relevant points of his thought is the "ambivalent character" of the technologies. Feenberg says that while some uses of digital technologies promote and replicate a "hierarchy conservation" - that is, the continuity of power structures in capitalist societies - these technologies also incorporate "democratic rationalization" - aspects that "undermine power structures and allow new opportunities for marginalized or ignored groups to assert themselves" (Haklay, 2013, p.59 apud Feenberg, 1999).

The ambivalence between "hierarchy conservation" and "democratic rationalization" is not always obvious. Many technological codes incorporate social values - such as the value of efficiency in capitalist societies - that are reaffirmed and stabilized when these same societies appropriate

technologies. When this happens, these values become "taken for granted" and are hardly problematized. For this reason, Feenberg (1999) points out that, in the search for the democratization of technological processes, the "ambivalence" of technologies need to be analyzed. In other words, no technology, or no technological impact is merely positive or negative in itself.

The analysis of technological ambivalence highlights how technological codes are created in a "common sense" approach that hides its social, ethical, moral and environmental implications. Once the technological code is stabilized, society is expected to accept technology - as well as its impacts - as it is, without questioning it. (Haklay, 2013, p.60).

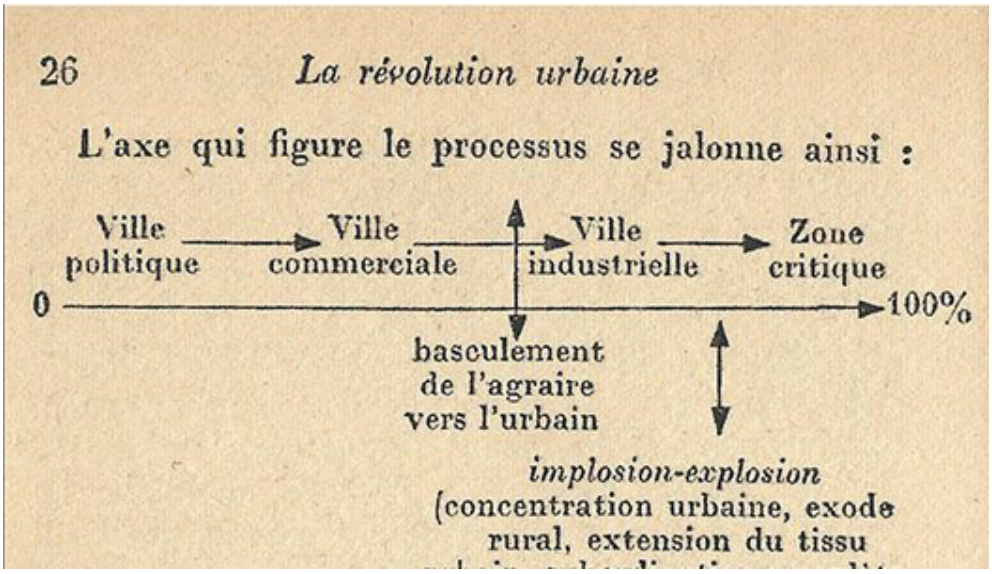
Contemporary to Feenberg, Latour (2005) also argues that it is necessary to uncover processes of production and use of technologies. Next to the notion of "ambivalence" in Feenberg is the notion of "controversy" in Latour. For him, the technological advance is marked by "controversies" between the various "actors" - human and non-human - involved in the creation and use of new devices and mechanisms. From conception to use, through production, there is no clear and unique path for a given scientific and technological advancement, but a diversity of appropriations and meanings attributed to the processes by "actants." When these appropriations and meanings are stabilized, when the negotiations that permeated all the stages of scientific and technological creation and diffusion are forgotten, when the controversies are no longer evident, the technology is no longer questioned. At this point, a *black box* is generated: specific thoughts and actions become taken-for-granted, certain appropriations reflect and reinforce a supposed common sense. To open this *black box* and expose the controversies at stake in a given situation, and - most importantly - to be able to problematize technologies, it is necessary to trace the *actants*, their actions and their speeches about these actions (Latour, 2005). Latour called *Actor-Network Theory (ANT)* this theoretical and methodological process of tracing actions and actors around scientific and technological advances, with the purpose to unpack the social and power dynamics (or controversies) involved in its creation and diffusion.

Human beings shape technologies and that they also shape them, that this process carries values and intentions. Disputes and negotiations permeate this process. Recognizing these dynamics implies understanding the political dimension of technology. It also implies in recognizing that technology "must be defined contextually and locally by the particular technology/society relationship, and that [...] it can never be removed from a context, and thus, it can never be neutral." (Feenberg, 1999 apud Melgaço and Willis, 2015).

Although technology and urban development are often perceived as complementary, and, similarly, technology and social structures are almost always seen as integrated (Melgaço and Willis,

2015), it is important not to lose track of the fact that technologies are socially produced. To understand technologies as socially produced is to acknowledge the power dynamics -- values, intentions, controversies, disputes -- around its creation, diffusion and appropriation. If digital technologies carry social values and political intentions (critical theory of technology) and so does the urban (critical urban theory), what categories help us to grasp the social implications of Smart Cities, including the digital visibility quest? To understand the social production of the smart urban environments requires muting the self-congratulatory noises of technology as an unprecedented chance of redemption for cities, and to position technology incorporation in a more extended genealogy and a broader rationale of the making of cities or *urbanization*.

Figure 12 The urban revolution.



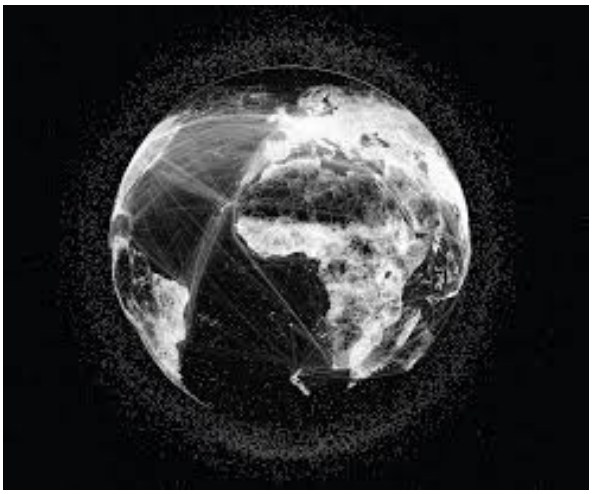
Source: Lefebvre (1970)

2.3 Digital visibility as an expression of the Planetary Urbanization

"I will start with the following hypothesis: society has been completely urbanized."

(Lefebvre, 1970)

Figure 13 Planetary Urbanization.



Source: Brenner[10] (2013).

In the 1970s, the French philosopher Henri Lefebvre (1901-1991) launched the hypothesis of the planetary urbanization, that is, that the urban phenomenon - a double advance of urbanization and capitalism - would impose itself on a global scale. This process would promote and at the same time threaten urban life. Urban use value - meetings, conversations, parties - would be progressively replaced by exchange value - the commodification of social practices. In the urbanization of industrial capitalism, the city would serve, above all, to a purpose: to consume and be consumed (Lefebvre, 1986, 1999). That procedure would be accompanied by another, a priori, contradictory. At the same time as the commodification, industrialization and financialization of cities would represent the primacy of exchange value, the use value of the urban would also withstand.

This expansion of the urban fabric, or urbanization under the capitalist system, has always been associated with transformations in territories, including a redefinition of practices, institutions, built environment, among other aspects (material and immaterial) that are useful for capital accumulation. In other words, the dynamics of urbanization or (the regime of practices of urbanism) are continually changing. Lefebvre referred to this process of redefining the boundaries between urban and non-urban as an implosion-explosion (Lefebvre, 1999 [1970]), while Harvey referred to neoliberalism as creative destruction (Harvey, 2011).

At the beginning of the 21st century, Lefebvre's hypothesis proves to be right. The urban fabric spread all over the planet, incorporating several territories. Urbanization is planetary, not only given the extent of urban materialities - infrastructure, buildings, services - however, also be-

10 Available: http://www.gsd.harvard.edu/project/urban-theory-lab/. Accessed: November, 2018

cause of the extension of social, economic, political and cultural practices typical of the urban environment (Lefebvre, 1986, 1999 [1970]). Planetary urbanization has "diluted - and even exploded - socio-spatial frontiers for long-entrenched" (Brenner, 2013a, p.19). These boundaries are transposed even where there are no cities in the traditional sense - that is, where there are no cities as "discrete, pre-established, or autonomous artifact" (Brenner, 2013b, p.95) - as "the Pacific Ocean, the Arctic, the desert of the Sahara, the Gobi Desert, the Himalayas, and even the atmosphere." (Brenner, 2015).

The advance of frontiers towards capitalist urbanization is not only about remote "intricate" areas but also occurs within urban centers where historically there are enclaves or territories "between frontiers and trenches" (Coutinho-Silva, 2006) as is the case of Rio and its favelas. Some favelas of the city of Rio de Janeiro, where the urban, or the urban conditions, are historically reduced or precarious, also has today its borders exploded by the advance of the planetary urbanization.

The producing and sharing of a significant amount of digital data about informal settlements, or the "digitisation of slums" (McFarlane and Söderström, 2017), are an expression of this explosion of frontiers, insofar as they open these territories for the circulation of "goods, information, and people" (Ascher, 2010) and capital accumulation.

Urbanism becomes more complex. At the same time, use values and exchange values of urban spaces also become more complex. Urban dynamics change, incorporating new variables such as digital visibility. In the digital age, new visibilities, rationalities, techniques, and subjectivities[11] come into play in the production of urban space. Digital mappings of favelas - and the visibilities they engender - are an expression of this extended, planetary and complex form of urbanization. As such, they express a permanent tension between use and exchange value, and they disturb relations of power at play in the production of urban space.

The renewed interest in mapping favelas and other informal settlements across the globe may be approached, metaphorically, as an expression of a "seam" of parts of the urban fabric - a transition from discontinuity to continuity of the urban fabric. From a Lefebvrian philosophical perspective, we can say that the "voids" on maps existed before because there was not a significant interest of capitalism in the urbanization of such territories.

In other words, the phenomenon of digital mappings of informal settlements are efforts to make these territories visible, more integrated into the urban fabric and thus more propitious to the advancement of capitalist practices. These mappings, indicate a turning point in the way these

11 These words are used by Dean (2010) to explain Foucault's analytics of power and will be further explained.

territories are viewed (visibility) but also represent a turning point in the way they are thought (rationalities), in the way we act on them (techniques) and in the form the subjects of mapping are constituted (subjectivities). What is observed, therefore, is not only a change in the visibility of informal settlements but in a whole system of urbanization practices.

These words are used by Dean (2010) to explain Foucault's analytics of power and will be further explained.

From the viewpoint of critical urban theory and critical technology theory, digital mapping of informality can be read as part of planetary urbanization. The global phenomenon of "digitization of slums" is, therefore, one of the facets of contemporary urbanization.

However, the "implosion-explosion" or "creative destruction" inherent in planetary urbanization is marked by iniquities and contradictions. Precisely because it is based on the advance of capitalism, the expansion of the urban fabric does not have a continuous pattern today, as Lefebvre already supposed. The more favorable or advantageous areas for the advance of capitalism tend to be more susceptible to the dilution of frontiers for urbanization.

Thus, the repositioning of informal settlements as part of the urban system does not take place in a neutral and completed way, but it is fragmented and conditioned to the specific interests of capital, which are social, temporally, politically and geographically determined.

2.4 Governmentality

Governmentality was a concept initially proposed in 1978 by Foucault in his version of the history of the emergence of the Modern State in Western Europe. As of the 2000s, the notion is revisited by the English-speaking world, and the field of *governmentality* studies emerge (Rose et al., 2010; see also: Foucault et al., 1991). More recently, postcolonial studies have been approaching *governmentality* (Turner, 2016). This section describes both notions - the original and the contemporary - and position *governmentality* as a theoretical and methodological tool.

In 1977 and 1978, Foucault offered a course in Paris entitled Security, Territory, and Population - whose title he would like to have changed to History of Governmentality (Foucault, 1977, 1978). In this course, he presents initial reflections on a technology of power that would have been part of the construction of the Modern State in the European West in the sixteenth century, reaching its peak in the eighteenth century. He called this phenomenon, fundamental in Western history, "governmentalization of the State": the incorporation into the institutional apparatus of a set of

tactics and strategies that allowed the control of people and their environment through their freedom (Foucault, 1977, 1978).

Foucault approached *governmentality* as a technology of power that was founded in and constituent of Modernity. For him, *governmentality* is based, among other aspects, on the emergence of the population as a problem of government, as well as the target and instrument of its actions. Governmentality would also be based in the government of population by directing their freedom and in the management of the population from a given reality, without pretension to deny or complement it, but to transform it through the dynamics of its variables. Moreover, governing would imply in the constitution of scientific knowledge (knowledge-powers or savoirs-faire) whose objects are these dynamics, such as urbanism, political science, and economics. Finally, Foucault approached the configuration of control mechanisms related to this knowledge, translated into devices (dispositifs) of security (Foucault, 1977, 1978).

As a way of thinking still under construction, Foucault synthesized *governmentality* as system, process, and outcome. The term would designate, at that moment: (1) "institutions, procedures, analyses and reflections, calculations and tactics" that would have allowed to exercise this very specific and complex form of power; (2) the Western tendency of predominance of this type of power - the government - over others - sovereignty and discipline - and the constitution of related knowledge; (3) "the result of the process by which the state of justice of the Middle Ages, which became the fifteenth and sixteenth administrative state, was little by little governed" (Foucault, 1979, p.429).

Throughout the twentieth century and especially in the last thirty years, the notion of *governmentality* has been intensely revisited and reinterpreted by authors in the human, social and political sciences, using different values, vocabularies, political positions, and academic references. Many of the proposed additions and displacements of the original meaning, so that *governmentality* came to be seen as an open-ended notion, with multiple meanings and possibilities of application[12]. In this way, *governmentality* has been used as a theoretical and methodological tool for the analysis of power relations in diverse historical, cultural and spatial contexts.

The primary reference in this thesis is the perspective of Mitchell Dean in Governmentality: *Power and Rule in Modern Society*, elaborated from the literature review of contemporary studies of *governmentality*, as well as from ideas of thinkers like Norbert Elias, Emile Durkheim, and Max Weber.

12 See, for example, Dean (2010); Rabinow and Rose (2006); Walters (2012).

As a theoretical notion, *governmentality* means governing oneself and others. That is, *governmentality* presupposes not only a form of government exercised by the State but also self-government. As a methodological tool, *governmentality* offers a possibility of a critique of the multiple mechanisms of power, as well as the understanding of possible resistances to these mechanisms (Dean, 2010). The analytical approach of *governmentality* aims to understand how a multiplicity of "institutions, procedures, analyses and reflections, calculations and tactics" (Foucault, 1979) are used to "conduct the conduct" of populations (Foucault, 1977).

2.4.1 Foucault on Governmentality

For Foucault, power was exercised in all social relations, from the most intimate, such as family and everyday interactions to the broadest, such as institutional and historical. His argument was that power does not emanate from any point in the social structure - for example, the State - but it is exercised in all interstices of this structure. There is, therefore, a "microphysics of power." Occasionally, power relations at the "micro" level become institutionalized and, at the same time, "great power strategies become embedded, they find their conditions of exercise in micro-relations of power." (Foucault, 1979). In one way or another - upward or downward - these relationships do not occur without resistance (Foucault, 1979).

Governmentality would be a technology of power that would have been part of the construction of the Modern State in the West in the sixteenth century, reaching its peak in the eighteenth century. The "governmentalization of the State" would have been the incorporation into the institutional apparatus of a set of tactics and strategies that allowed the control of human beings and their environment through their freedom (Foucault, 1978).

By understanding that power could not be restricted to a segment of the social structure, Foucault believed that its exercise could not be explained from inside the institutions, that is, solely from the institutional operation. He then proposed a method which sought to explain power beyond institutions, the *genealogy of power*. In this course, specifically, it seeks to apply it to the State passing "behind," "outside" of this institution, "in order to try to find, behind it and more globally than it, what we can call gross technology of power" (Foucault, 1978).

At this point, Foucault's question is, "Is it possible to restore the Modern State to a general power technology that would have enabled its mutations, its development, its operation?". He hypothesizes that *governmentality* would be this powerful technology that would have transformations in the modern state (Foucault, 1978).

Foucault believes that transformations in the general technology of power would have manifested in the early sixteenth century, in the transition from the Middle Ages to the Renaissance, with the flourishing of cities. They are expressed, for example, in documents dealing with the art of governing in a regime still dominated by the structure of sovereignty. These transformations would have reached their peak in the eighteenth century, with the urban demographic explosion, when a new political science takes place in a regime dominated by the techniques of government, as well as for the emergence of new techniques, knowledge, and disciplines, such as urbanism (Foucault, 1978).

The eighteenth century would have been the era of *governmentality* - a historical interval punctuated by the constitution of new powers and knowledge. The intense urbanization of society would have relations with these transformations. With industrialization and population growth, there is an intensification of urban problems such as marginalization, violence, and contamination by infectious diseases. In the city of London, for example, the insalubrity is such that Engels, in a famous account of visiting "disreputable quarters," says that "Londoners had to sacrifice the best part of their condition as men, all these miracles of the civilization of which the city is fruitful." (Engels, 2009 [1845]).

Urban problems gave rise, in France, to a "call to competences" (Cordonet Law of 1919) that resulted in systematization and production of knowledge about cities. In this impetus of problem control - issues of aesthetics, hygiene, and especially circulation - urbanism emerges as a novel savoir-faire. "Urbanism was, at its origin, an ambition of global knowledge about the city, an open space of intelligence, a 'science without an end,' a matter of happiness." (Claude and Saunier, 1999). This knowledge was associated with new political rationality, which, through new techniques, led to a new composition of various forms of legitimation of local power (Gaudin, 1989).

In Foucault's interpretation, this new knowledge (urban medicine or modern urbanism in statu nascendi), counted on related mechanisms of power exercise, acting on the population through action on its environment (millieu). At that time, the political technique of action on the millieu would have been one of the fundamental elements in the implantation of a new mechanism of power: the security devices, that would act mainly on the circulation. This transformation would happen precisely at the moment when there was an inversion of the city's protagonism concerning the feuds. In this transition, the territory would have ceased to be the first referent for the exercise of power, and the population would have become the focus (Foucault, 1978).

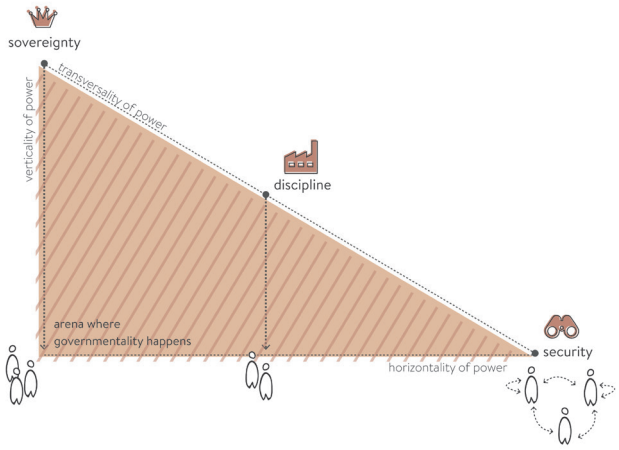
From this transformation, the perception of specific population problems - through, for example, techniques such as statistics (state science) and identification of birth rates and mortality - leads

to thinking population as a government problem. At the same time, the development of a government science helps to isolate specific population problems. The population then emerges as subject and object of sciences, such as urbanism, political science, political economy, and others.

At the same time, the population was targeted as a whole, and each person would be acknowledged as a conscious subject with aspirations. It is in this way that human interests, individual and collective, became both the target and instrument of a new government of the population (Foucault, 1978).

Foucault systematizes the transformations in technologies of power that would have led to the emergence of a new form of government over the population in three notions: sovereignty, discipline, and security. He warns that no succession is observed, but an overlap of these mechanisms throughout history. In this overlap, the population always presents itself as an essential component. Schematically, his view could be represented as follows:

Figure 14 How power is exercised in regimes of Sovereignty, Discipline, and Security.



Source: Author (2018), based in Foucault (1978)

The transition from an institutional framework of sovereignty to discipline, and from discipline to security, would consist of successive changes of questions on the part of the ruler. While sovereignty must deal with the question of how to say no, *governmentality*, through security devices, should know how to say yes. Instead of imposing a law, the government should seek to "delimit them in acceptable milestones that should not be exceeded." (Foucault, 1978, p.21). How would this be done?

In *governmentality*, population control is done through the freedom of the persons - "in what they want to do, in what they are interested in doing, in what they are told to do..." (Foucault, 1978) The

objective of governing would be not to block, but to frame this freedom. Using as examples the regulations on cereals and food shortages and the proposals of physicists and economists to solve this problem in the eighteenth century, Foucault points out that the idea of framing freedoms within the *governmentality* framework assumes that a reality is given: it is not judged as good or bad, but understood simply as what it is. To transform it what is given is neither to deny it nor to complement it. On the contrary, the variables of a given reality are allowed to act on one another until the system stabilizes in a certain way and for a certain period. The fundamental principle of this political technique is that "one should never take off from the play of reality with oneself" (Foucault, 1978, p.62).

The optimum point of this process would be the nullification of adverse effects of a given reality through the very dynamics of this reality - for example, the cancellation of food shortages by free competition between cereal suppliers, the free movement of goods and money, minimization of regulations by the State. For the philosopher, "[the devices of] security have essentially the function of responding to reality in a way that this answer nullifies this reality to which it responds - cancel, or limit, or brake, or regulate." (Foucault, 1978, p.61). One of the key performances of security devices would be not only the permission of freedom of movement but the possibility of regulating this freedom of movement within desirable parameters. "A security device can only function well [...] if it is given something that is freedom [...] the possibility of movement of both people and things" (Foucault, 1978, p.63-64).

In this context, the population comes to be seen as "a set of processes that must be managed in what they have of natural and from what they have of natural" (Foucault, 1978, p.92). This "naturalness," however, is treated as "penetrable." The intervention on it, says Foucault, would come from at least three complementary forms. First, it would occur an indirect action on the population by acting on things distant from it, such as the flow of money, for "population is always dependent on complex and modifiable variables" (Foucault, 1978, p.96-97). Second, the action focus on individual and collective desire, understanding that desire is the "driving force of action of the population as a whole" and that it is possible to "play" with it. Finally, the action on phenomena is constant, such as controlling birth rates, mortality and migration through techniques such as statistics (Foucault, 1978).[13]

13 In addition to these basic differences in governmentality over previous regimes of power (sovereignty and discipline), there is still one fundamental innovation: the launch of the notion of economy to a new level: from family to state. Slightly different from the sense that is attributed today, the economy was originally understood as the management of individuals and assets within the family. In the sixteenth century, however, the economy became a State issue. To govern also means to establish the economy at the level of the State: "to have, concerning inhabitants, wealth, individual and collective behavior, a form of vigilance, of control as attentive as those of the father of the family" (Foucault, 1978).

These were the traces of what Foucault intended to propose with *governmentality*, a technology of power founded and constituent of Modernity. For him, *governmentality* was based, among other aspects:

(1) on the emergence of the population as a problem of government, and as a target and an instrument of their actions;

(2) in the government of this population by directing their freedom;

(3) in the management of the population from a given reality, without pretension to deny or complement it, but to transform it from the dynamics of its variables;

(4) in the constitution of technical and scientific knowledge whose objects are these dynamics, such as urbanism, political science, and economics, as well as the emergence of new powers associated with new knowledge;

(5) in the configuration of control mechanisms related to this knowledge, translated into security devices (Foucault, 1978).

Foucault concludes that "the state, in its survival and limits, must be understood from the general tactics of *governmentality*." (Foucault, 1978, p.430). These tactics define "what should or should not compete with the State, what is public or private, what is or is not State," and therefore the tactics of *governmentality*, and not the State, would be "the fundamental political question and the real space of political struggle." (Foucault, 1978, p.430).

This perception makes the political question even more complicated than it was previously considered, because, unlike the legal, bureaucratic and normative framework analyzed by State theories previously, government tactics are more complex and more dynamic. The technologies of power do not stop changing under the action of numerous factors. Also, when an institution collapses, it is not necessarily because the power that supported it was put off track. It may be because it has become incompatible with some fundamental mutations of power technologies (Foucault, 1978, p.161).

2.4.2 Foucault and Urbanism[14]

In this section, the relationship between *governmentality* and urbanism is detailed. We rely on Foucault's analysis of the constitution of knowledge and powers in the seventeenth and eighteenth centuries and also on analyses of Martins (2000) and Oliveira (2010) on Foucault's thoughts.

From 1975, in the phase of his work that came to be known as the genealogy of power, Foucault explores how scientific knowledge emerged in the seventeenth and eighteenth centuries associated with specific exercises of power. Foucault explains that the emergence, permanence, and transformations of knowledge throughout history have come from the conditions of possibilities external to this knowledge. Conditions of possibilities are political, ideological, technological, cultural, economic, and social conditions of a context delimited in time and space. The author's idea at this time is that "all knowledge has its genesis in power relations" (Foucault, 1979, p.XXI). Therefore, there is no such thing as a neutral knowledge.

> [...] knowledge and power imply each other: there is no relation of power without the constitution of a new field of knowledge, but also, reciprocally, all knowledge constitutes new relations of power. Every point of power exercise is, at the same time, a place of knowledge formation (Foucault, 1979, p.XXI).

Foucault identifies that in the seventeenth and eighteenth centuries when most modern sciences were constituted, a new form of investigation on the life of individuals began to be constituted as well. This new practice was informed by new scientific knowledge, and also fed this form of knowledge. He calls this practice biopolitics.

At that moment, individuals are understood as a population as a whole - "a source of enrichment and [...] an essential component of the strength of States" (Foucault, 1978, p.474). A series of measures would be taken, systematically and rationally, to control this source of wealth and strength, to ensure its continuity and efficiency. One of them was the modification and imposition of regulations on the living conditions of the population, which included rules on housing and urbanization (Foucault, 1978, p.474).

Although Foucault does not refer directly to the constitution of urbanism as a discipline, the author deals with social medicine, public hygiene and the action of early urbanist architects on the

14 Foucault does not use the word urbanism, but the expression social medicine to refer to the first governmental practices of acting over a population by acting on the urban environment (millieu). We understand that by using this word, he was referring to Urbanism in its origin. This understanding is shared also by other authors, like Martins (2000): "When Michel Foucault [...] referred to the distinct modalities of medicine socialization in the 18th century, what is observed is, from my point of view (although he did not call it that way) is Modern Urbanism in statu nascendi. (Martins, 2000, p.45, our translation)

urban environment as political techniques. Foucault refers to the systematization of studies and experiences about cities and the configuration of a new field of knowledge, a new form of control over the population, exercised through intervention in the urban environment. If we accept this perspective, urbanism can be seen as a knowledge-power, an exercise of biopolitics, a technology of power.

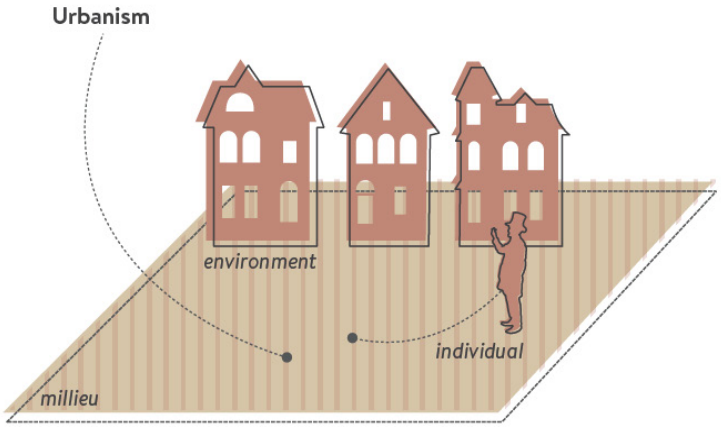
To illustrate how this technology of power works, Foucault addresses the new norms for housing and urbanization and the emergence of medical police, public hygiene and social medicine in the eighteenth century:

> In order to manage this population, a health policy is needed, among other things, to reduce infant mortality, to prevent epidemics and to lower the rate of endemic diseases, to intervene in living conditions, to change them, (whether it be food, housing or urbanization of cities) and provide sufficient medical equipment. The development from the second half of the eighteenth century onwards of the so-called Medezinische Polizei, hygiene publique, social medicine, must be inscribed in the general framework of a "biopolitics": it tends to treat "population" as a set of living beings and coexisting conditions, which have specific biological and pathological characteristics (Foucault, 1978, p.474).

Foucault also mentions the emergence, in the eighteenth century, of a political technique that, for the first time in history, would address the millieu. The millieu is understood by him both as an element in which circulation is made and as a "natural-historical environment." In his words: "the millieu is a set of natural data, rivers, marshes, hills, and a set of artificial data, agglomeration of individuals, agglomeration of houses, etc." (Foucault, 1978). He believes that the "technical scheme of the notion of millieu" is present in the way in which the first urban planners and planners of the eighteenth century sought to reflect and modify the urban space: by acting on the point where a first nature (natural) and a second nature (artificial, historical and social) meet (Foucault, 1978). Thus, he exemplifies:

> For example, the bigger are the disordered settlements, the more the miasms, the more you will become sick. The more you become sick, the more you will die, of course. The more one dies, the more there will be corpses, and therefore the more there will be miasms, etc. [...] Finally, the millieu appears as a field of intervention in which [...] one will try to reach, precisely, a population. That is a multiplicity of individuals who are and who only exist deep, essential, biologically connected to the materiality within which they exist. What is going to be achieved through this millieu is precisely the point at which a series of events that these individuals, populations, and groups produce, interferes with near-natural events occurring around them (Foucault, 1978, p.28, emphasis added).

Figure 15 The exercise of power through urbanism: acting on the population by acting on the medium (millieu)



Source: Author (2018), based in Foucault (1978)

At the core of the concern of the urban designers and planners would be the problem of circulation in abroad sense, "as displacement, as an exchange, as a contact." (Foucault, 1978). These professionals dealt basically with the question: "How do things [people, information, commodities, miasms] must circulate or not?" (Foucault, 1978, p.84-85). The horizon sought by them was the annulment of the "dangers inherent in circulation." (Foucault, 1978).

Achieving this horizon, however, was never an easy task. The "dangers inherent to circulation" are intrinsic to the city itself. In the literature on the history of cities, circulation and communication commonly appear as conditions for the emergence and growth of cities (Benevolo, 2003; Le Goff, 1992; Rolnik, 1988). Encounters and exchanges are at the very essence of the urban millieu, be it at the origin of the capitalist city as much as in contemporary cities. In the past, the expansion of the circulation beyond the walls of the fiefdoms allowed for exchanges between the erudite and the popular, the sacred and the profane, the traditions and innovations (Le Goff, 1992). This connectivity increased along history, resulting in the connected in global networks of infor-

EXAMPLE // Regime of practices of Smart Urbanism in the context of favelas mappings

For example, the narrative of Smart Cities informs the State and the population that more technologies and more data lead to faster and more adequate responses to urban problems, as well as to more citizenship and urban inclusion. In our case study, several actors, imbued with this idea, define as intervention objects some favelas in Rio de Janeiro; as appropriate techniques for dealing with them, digital participatory mapping; as objectives, the integration to the city and the empowerment of the citizens; and as actors of higher authority and power, the residents, who holds the empirical knowledge of the favelas, and corporations / governments that hold the technologies necessary to map them. In contrast, the new mapping technique generates knowledge that was previously dispersed or unavailable such as urban conditions, population size or financial assets in favelas.

mation and communication (Castells, 2007; Sassen, 2001) that we are familiar with nowadays.

Transformations in the storage and circulation of goods, information and people are the variables that characterize the three great urban revolutions along history (Ascher, 2010). In short, encounter and exchange are allowed and celebrated by circulations, and circulations are the core of urbanization.

Foucault interprets, however, that the regulation of communication and circulation - and not merely communication or circulation - arises as a condition for urbanization in the seventeenth and eighteenth centuries. The philosopher says that just by regulating how people could and should meet and communicate - circulate, talk, sell, and buy - is that cities could exist. He refers to a seventeenth-century Public Law Treaty to conclude that at first, "policing and urbanization are the same." (Foucault, 1978, p.453).

The bond between police[15]Foucault says that cities could only exist because the way people could and should first meet and, second, communicate was regulated. He uses the word communication in a broad sense, meaning "to cohabit and to exchange, to coexist and to circulate, to cohabit and to speak, to sell and to buy." The police would be a condition of the existence of urbanity. (Foucault, 1978, p.453).

Other authors have similar considerations. Oliveira (2010), in City, Biopower and Population, seeks, with a historical-theoretical approach to urbanism based on Foucault, to understand how knowledge and practices of city control emerge as a political technology in the eighteenth century. Oliveira sees urbanism in its origin as a knowledge-power over urban space and the population that dictates "new rules" for the "strategic games" of appropriation of space by people. It draws on historians such as Perrot (2006 in Silva, 2000) and Thompson (2002) to demonstrate that social medicine - intervention on cities under hygiene and sanitation imperatives - was only one aspect of Haussmann's works in Paris, which would be considered the first modern works of urbanism.

The remodeling of Haussmannian urban circulation also served the purpose of eradicating the outbreak of revolts of the working class. The urban segregation resulting from the removal of the center and the increase in the value of real estate has had a profound impact on the social life of workers and their possibilities of movement, exchange, and meeting. These factors, together

15 The term police, for Foucault does not mean the institution of police, exclusively, in the modern sense. 'Police' is the ensemble of mechanisms serving to ensure order, the properly channeled growth of wealth and the conditions of preservation of health in general' (Power/Knowledge p. 170). Available in: <http://foucauldians.blogspot.com/2004/12/police-function.html>

with stronger regulation of public space by the police, would have represented "joint operation of politics and hygiene" (Perrot, 2006 apud Oliveira, 2010, p.97).

Martins (2000), in Urbanismo: este (des)conhecido saber politico (Urbanism: this (un)known political knowledge), follows similar reasoning.

> The fact [...] is that, although it assumes a supposed technical and scientific neutrality, modern urbanism is compromised to the bone with the reproduction of the society that produced it. Considering that space has always been political and strategic, even before Haussmann and his Paris 'stripping-down' operations, the most correct would be to consider that modern urbanism has been used to operate a neutralization of urban life (Martins, 2000, p.44, our translation).

The author believes that urbanism surges "unequivocally and umbilically linked to the modern state and its rationality" (Martins, 2000, p.45). He points out that when Foucault speaks of "medicalization of cities" and "socialization of medicine" in the eighteenth century, he observed:

> [...] modern urbanism in statu nascendi, whose emergence links less to those medieval practices halfway to empiricism rationalism, developed as an attempt to caution and / or combat epidemic outbreaks that periodically collapse on cities, and more to those "political-medical" schemes, such as the sanitary cord and the quarantine, which already involved surveillance techniques and control of the city population" (Martins, 2000, p.45).

Moreover, Foucault's study of the technologies of power over the population and the urban environment in the eighteenth century would allow us to recognize "the clear political dimensions contained in a field of knowledge such as public hygiene [...] corresponding to the State's performance in social life by means of urbanization" (Martins, 2000). It would also allow us to understand that spatial segregation mechanisms were used to minimize a sanitary and political danger represented by cohabitation in the same urban fabric of the poor and rich (Foucault, 1979, p.94).

Martins (2000) concludes that the emergence of Urbanism is part of a more extensive process - the consolidation of the modern state. As such, it was (and still is) mostly a political production. Contemporary urban planners, geographers reinterpreted this idea outlined by Foucault. Also, political scientists have been explored this idea for at least 50 years within the critical urban theory.

If urbanism is a political knowledge-power (savoir-faire) then strategies, tactics, resistances, and other "mobile relations" (Foucault) of power are inherent to urbanism, both as a discipline (set of pieces of knowledge) and as a practice. Therefore, urban studies committed to the perspective of *governmentality* are not only possible but necessary and potentially productive.

In this urban study, the notion of *governmentality* is understood as a provocation to the traditional understanding of a political power that emanates solely from the State, as a possibility of criticism, and as a form of control through freedom. Urbanism is understood as an act of *governmentality*, as a knowledge-power, as an instrument that helps to control population and territory, by framing the freedom of the individuals and regulating circulations. As an action of *governmentality*, Urbanism is not something produced only by the State, but by all who live and circulate in cities.

2.4.3 Governmentality as a Critical Perspective

Beyond Foucault's original thoughts, the notion of *governmentality* was revisited and reinterpreted along the 20th century by authors in the human, social, and political sciences, who use it now as a perspective for the analysis of power. Many of these authors proposed additions and displacements of the initial proposition, so that *governmentality* came to be seen as an open notion, with multiple meanings and possibilities of application[16]. For some, *governmentality* offers a possibility of criticizing the multiple mechanisms of power in a given context, as well as of possible resistances to these mechanisms (Dean, 2010).

Its use as a theoretical-methodological tool in this study requires three considerations. First, *governmentality* cannot be understood as a theory, in the strong sense of the word (Rabinow and Rose, 2006; Walters, 2012). Second, *governmentality* studies do not offer prescriptions, but rather diagnoses and critiques (Dean, 2010). Third, *governmentality* is not the same as government or governance in the conventional sense. While notions of government and governance assume that the activity of governing is conducted exclusively or principally by the State, *governmentality* assumes that the activity of governing is present in all human relations, from the micro (as in the "microphysics of power") to the macro. The activity of governing is not conducted essentially or exclusively by the State, but by various actors, in changing and sometimes conflicting forms of association and relationship. Thus, (1) the State is not the only source or source of power; (2) Power is no single, but multiple; (3) Power is not something possessed but exercised (Foucault, 1979). Governmentality encompasses and extrapolates governance and government practices.

Several authors agree that Foucault's construct does not conform to a theory in the conventional sense (Dean, 2010; Walters, 2012). Dean believes that the philosopher's interpretations should be taken more as "revisable provocations of our thinking about social regulation and political order

16 For some possible interpretations of governmentality, see Rabinow and Rose (2006) and Dean (2010), as well a systematization by Luque-Ayala (2014) of different appropriations of the notion.

than as a fully developed alternative theoretical positioning" (Dean, 2010, p.35). Walters (2012), besides, explains that the term should be seen as an analytical toolbox that may be appropriate for the analysis of locally and historically delimited power practices.

> [...] is not a theory in the strong sense of the word. It does not offer the user a causal explanation of the social change, let alone a philosophical interpretation of such a change. [...]. Rather, it has been treated more modestly as an "analytical toolbox" (Rose et al., 2006: 18), a cluster of concepts that can be used to perfect the ability to think and critique present and past ways of governing. This toolbox equips us to do something important and quite innovative: to understand government not as a set of institutions, not in terms of certain ideologies but as an eminently practical activity that can be studied, historicized and specified (Walters, 2012, p.2, emphasis added).

This alternative understanding of government practices has no intention of prescribing solutions to the liberation of forms of domination, nor "aspirations to predict the future" (Walters, 2012, p.2), but to unravel the variables of certain forms of domination, revealing them as contingent, historical, circumstantial, provisional, unstable, and therefore questionable. The studies of *governmentality* seek, essentially, to remove the character of "taken for granted" that certain forms of domination may have (Dean, 2010).

From this perspective, "*governmentality* is a highly sensitive diagnostic tool" (Walters, 2012, p.2, emphasis added). However, *governmentality* studies, unlike many social theories, do not undertake to diagnose what the world is made of, nor the laws and principles that explain how it works (Walters, 2012). Instead, they seek to identify what is said about the world, as it is said, and what allows what is said to work (Rose, 1999 apud Walters, 2012).

Thus, the notion of *governmentality* breaks with some recurrent issues in traditional State theories and many analyses of power relations informed by these theories, such as those on participation in urbanism. Critical research on participation in urban planning often questions the legitimacy, validity or effectiveness of participation. For Foucault, however, issues of legitimacy or illegitimacy, freedom or domination, coercion or consent, inequity or equity - in short, inclusion or exclusion - in power practices are not pertinent questions. In his interpretation, legitimacy, and illegitimacy, freedom and domination, coercion and consent, inequity and equity, among other seemingly opposing and contradictory practices of inclusion and exclusion coincide and in constant dispute in all social and political relations. The very definition of *governmentality* reflects this complexity.

Governmentality is a form of control exercised through the freedom of individuals - a form of "conducting conduct" (Foucault, 1978). Thus, Foucault rejects dichotomies or generalizations in

the analysis of the exercise of power and argues that we should, first and foremost, pay attention to "mobile relations of strategies and tactics, struggles and battles, and the disposition of the forces that are employed in the exercise of political order and in the resistance it provokes" (Dean, 2010, p.35).

Likewise, this Dissertation takes distance from the dichotomy visibility vs. invisibility, domination vs. resistance, manipulation vs. participation, exclusion vs. inclusion, segregation vs. integration, among others. As dimensions of power relations, it is assumed that these processes coincide in the production of urban space. In this analysis of digital mappings of favelas, therefore, we understood that digital visibility and invisibility are entangled.

2.4.4 Governmentality as a Theoretical-Methodological Framework: the analytics of government

As mentioned earlier, the analytical approach to *governmentality* aims to understand how a multiplicity of "institutions, procedures, analyses and reflections, calculations and tactics" (Foucault, 1978, p.108) are used to "conduct the conduct" of populations (Foucault, 2004 [1979]). The first part of this definition has already been clarified. The studies of *governmentality* presuppose that power is not unique, it is multiple - it does not emanate from the State, but it is exercised by several actors, in various forms of relations and through various strategies, reconfigured continuously.

In turn, the second part of this definition, "to conduct the conduct" deserves further explanation. "Conduct the conduct" is an expression used by Foucault to refer either to the conduct of an individual over himself/herself (self-conduct or self-control) or to the conduct of individuals over one another. These two forms of conduct are targets and instruments of *governmentality*. This mode of governing seeks to lead individuals by directing their attributes to specific ends. It aims to align the objectives of the governed with that of the rulers - to lead the governed to think and act by means and for purposes defined by the rulers (Dean, 2010). This way of governing is not sought through direct control of the governed (such as summary execution in sovereignty or imprisonment in the discipline) but through the manipulation of an open series of variables that affect their desires, fears, aspirations, abilities, skills, knowledge, or other subjective attributes.

To put in another way, *governmentality* is a way of controlling humans through their freedom. Now, if *governmentality* can only be practiced through subjectivity - that is, through the framing of human capacities to think, feel, act - its exercise presupposes necessarily (albeit in some cases

only minimally) the freedom of those who are governed (Dean, 2010).

This freedom is all the more suited to the objectives of *governmentality*, the more it is informed by the "truths" (or rationalities) produced within regimes of practices of *governmentality* (Dean, 2010).

Regimes of practices are relatively organized ways of thinking and acting on things. For a scheme of practices to work, specific knowledge must inform urban agents, who define the object of practices, the appropriate techniques to deal with it, the goals to be achieved, and the fields and actors of higher authority and power. On the other hand, these techniques, when applied, generate information that is used in the construction of new knowledge (Dean, 2010).

Within the *governmentality* framework, Foucault identifies historical transformations, in regimes of practices of education, administration, hospitalization or punishment, among others (Foucault, 2001 [1976,1984], 2008 [1978]).

The regimes of practices are always contingent, circumstantial, and delimited temporally and spatially - that is, they are always constituted in circumstances, historical contexts and specific places. They are also assemblages of many variables, which relate in different ways and attack a multiplicity of problems (Dean, 2010).

The logical combination of "truths" and practices for the exercise of power allows a regime of practices to be effective. The "truths" are, on the one hand, a knowledge that informs the practices of *governmentality* and, on the other hand, a knowledge that is generated or fed by these practices.

Governmentality practices are predominantly rational, that is, they resort to clear, systematic, explicit ways of thinking about how things are and should be to elaborate and perfect techniques. At the same time, their techniques allow the emergence of new thoughts and knowledge - the construction of new "truths." These pieces of knowledge, "truths" or thoughts - the rationalities - are central to the functioning of a regime of practices. Regimes of practices always originate, transform and are transformed by rationalities (Dean, 2010, p.18).

For example, the narrative of Smart Cities informs the State and the population that more technologies and more data lead to faster and more adequate responses to urban problems, as well as to more citizenship and urban inclusion. In the case study, several actors, imbued with this idea, define as intervention objects some favelas in Rio de Janeiro and as appropriate techniques for dealing with them, digital participatory mapping. As objectives, they define the integration to the

city and the empowerment of the citizens, and as actors of higher authority and power, the residents, who hold the empirical knowledge of the favelas, as well as corporations/governments that hold the technologies necessary to map them. In contrast, the new mapping technique generates knowledge that was previously dispersed or unavailable such as urban conditions, population size or financial assets in favelas.

The interpretation of a rational control based on Foucault's "conduct of conduct" or the "government through freedom" in the 1970s represents an innovative idea for the analysis of power. In summary, from this point of view, individuals are not mere objects or targets of power, but also their subjects or instruments. In Barnett et al.'s words, a productive and non-repressive exercise of power over subjects allows them to be seen as "vehicles of power, not their points of application" (Barnett et al., 2008: 628 apud Luque-Ayala, 2014). Governmentality, therefore, requires the constitution of subjects, or subjectivities.

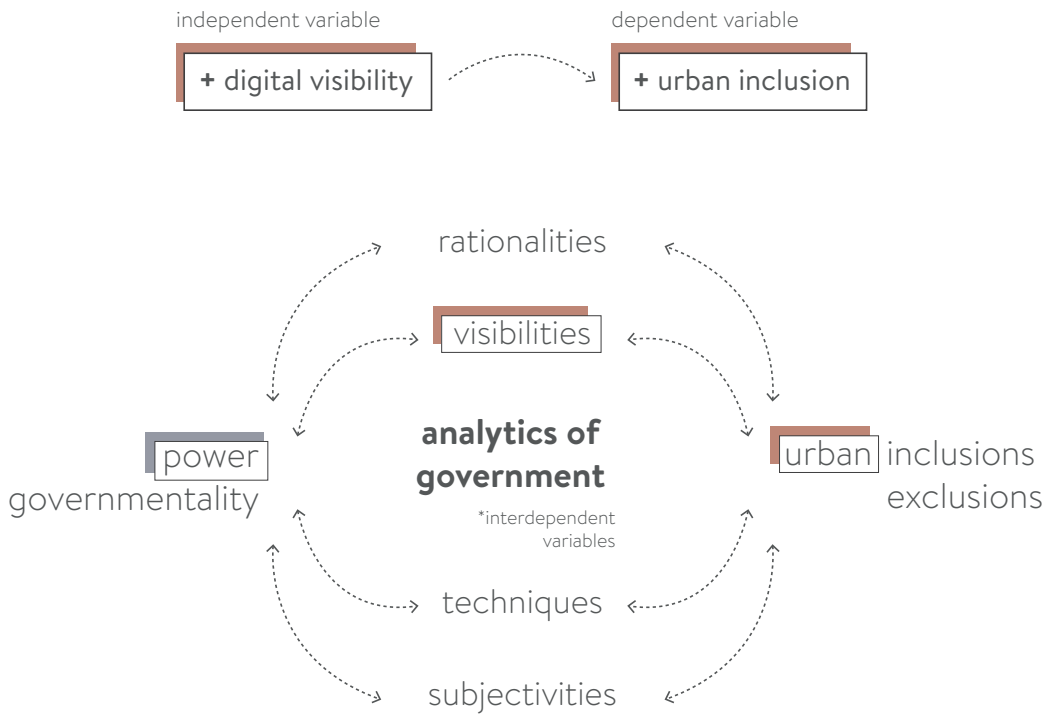
How would subjects convey this power? Power would be exercised precisely through rationalities translated into techniques (techne) capable of shaping their conduits. Thus, subjectivities, rationalities, and techniques would be privileged objects of the analytics of *governmentality*.

Dean sums up that the analytics of government ultimately "attempts to show how our 'naturalized' ways of doing things, and how we think and question these things, are not entirely self-evident or even necessary." (Dean, 2010, p.31). To this end, *governmentality* studies question how a regime of practices operates: how they emerge, exist, transform, and principally how they manage to conduct behaviors.

> Analytics of government takes as its central concern how we govern and are governed within different regimes, and the conditions under which such regimes emerge, continue to operate and are transformed. Analytics of government thus emphasizes 'how' questions. It is possible to distinguish at least four dimensions of this:
>
> Characteristic forms of **visibility**, ways of seeing and perceiving
>
> Distinctive ways of **thinking** and questioning, relying on definite vocabularies and procedures for the production of truth (e.g., those derived from the social, human and behavioral sciences)
>
> Specific ways of acting, intervening and directing, made up of particular types of practical rationality ('expertise' and 'know-how') and relying upon definite mechanisms, **techniques,** and technologies
>
> Characteristic ways of forming **subjects**, selves, persons, actors or agents.' (Dean, 2010, p.33).

These four dimensions – **visibilities, rationalities, techniques, and subjectivities** – are 'co-present within each regime of practices.' Each of them 'constitutes a line of continual transformation and variation, and each presupposes the others without being reducible to them.' (Dean, 2010) 'An analytics of government tries to recover the intelligibility of regimes of practices through each of these dimensions, to give due weight to their independence, without falling into any kind of reductionism or determinism' (Dean, 2010).

Figure 16 Governmentality and its interdependent variables.



Source: Author (2018)

If the aim of critical SU is to power relations in a given regime of practices, we argue that such an agenda cannot ignore the dynamics of visibility. Visibility is a fundamental aspect of power exercise (Foucault), along with their social-technical and political implications. Discussing how 'smart' logics configure spaces necessarily involves debating how digital visibility relates to the 'production of space' (Lefebvre). Bearing this in mind, we offer a critical analysis of digital visibility, from an urban studies perspective.

2.5 Smart Urbanism and Governmentality Studies

As a result of one of the first attempts to critically engage with Smart City discourses and practices, Luque-Ayala and Marvin (2015) report that "a critical research agenda around SU demands

to explore the different ways in which its rationalities, techniques, and subjectivities are being rolled-out across contrasting geographies." (Luque-Ayala and Marvin, 2015)

However, if we take the analytics of government as a theoretical and methodological framework, shifts in rationalities, techniques, and subjectivities, are not dissociated from shifts related to visibilities.

Before us, various critical urban studies relied on the analytics of *governmentality* as a tool to unpack the dynamics of power-knowledge in 'smart cities.' For example, 'Developing a Critical Understanding of Smart Urbanism' argue that "a critical research agenda around SU demands to explore the different ways in which its rationalities, techniques, and subjectivities are being rolled-out across contrasting geographies" (Luque-Ayala and Marvin, 2015). 'Smartnmentality: The Smart City as Disciplinary Strategy' offers an analysis of "the rationality and *governmentality* of urban smartness" (Vanolo, 2014, p.886, emphasis added). 'Michel Foucault and the Smart City: Power Dynamics Inherent in Contemporary Governing through Code' 'explores the internal logic and dynamics of software-mediated techniques used to regulate and manage urban systems' (Klauser, Paasche, and Söderström, 2014, p.869, emphasis added). 'Smart subjects for a Smart Nation? Governing (smart)mentalities in Singapore' shows 'what kinds of 'smart' subjects and subjectivities tend to follow from certain 'smart' socio-materialities' (Ho, 2016, p.3, emphasis added). Across these studies, however, visibility is approached only tangentially – if not omitted altogether.

To fulfill this gap, this Dissertation draws particular attention to the relation between digital visibility, power and social production on smart cities.

We combine the analytics of government with a simplified form of spatial analysis[17]

While the analytics of government considers the different dimensions and dynamics of power exercise, spatial analysis aims to find patterns in spatial dynamics. In this research, we choose to put these methodological tools to dialogue because our purpose is not merely to analyze the cartographic representation of favelas (e.g., the visualization of data) but also considering the different dynamics that go together with the phenomenon of favelas visibility in Rio.

17 an urban design tool that helps to find patterns in geographical data. The method consists of overlapping layers of geo-referenced data to detect patterns hidden in information about favelas inclusion and exclusion in the context of the Olympics.
"The idea of stacking layers containing different kinds of data and comparing them with each other on the basis of where things are located is the foundational concept of spatial analysis. The layers interlock in the sense that they are all geo-referenced to true geographic space. [...] Spatial analysis is a process in which you model problems geographically, derive results by computer processing, and then explore and examine those results." [Available in <https://www.esri.com/arcgis-blog/products/product/analytics/how-to-perform-spatial-analysis/>

We find how favelas visibility combines with other patterns of inclusion and exclusion — such as housing eviction and homicides — to reflect upon the production of urban space via the production of digital visibilities. Before reaching this point of our analysis, it is necessary, however, to further detail how we connect the notions of visibility, power, and urban space, as well as how governing is exercised via mappings, via visibility and the digital. The following chapter deals with the definition of terms and literature review while reinforcing our point that digital visibility is a dimension of contemporary urbanism and therefore has a role on the social production of (smart) cities.

THREE

3. Digital Mappings and Visibility

Abstract

Governmentality studies in general, and the analytics of government, in particular, recognize visibility as an axis of power exercise. Associations between visibility and power also appear on the critical cartography and, to some extent, in the smart urbanism scholarly debates. However, there are some limits on how these bodies of literature approach the relation between digital visibility, power, and urbanism. This chapter presents an in-depth definition of the terms **mapping** and **visibility**, its relations to the social production of the **urban**, and a literature review on **governing the smart city**. Approaching the interrelations between these concepts, we suggest an integration between three bodies of literature — governing via mappings, governing via visibility and governing via the digital. This integration paves the way to our approach of digital visibility within SU. Digital visibility (on maps or else) is a social practice: it is a form of power exercise and, possibly, a way of governing the urban.

Introduction

The way we govern and are governed in smart cities has been subject to attention over the last decade. Dominant and alternative modes of smart urbanism have been under intense scrutiny across critical debates (Datta, 2018; Ho, 2016; Klauser, Paasche, and Söderström, 2014; Luque-Ayala and Marvin, 2015; Marvin, Luque-Ayala and McFarlane, 2016; McFarlane and Söderström, 2017; Vanolo, 2013). A recurrent question is how empowering and disempowering smart urban practices have been. The "digitization" of informal settlements via digital mappings is one example. While digitally mapping informality is said to hold, possibly, the seeds for an alternative SU (McFarlane and Söderström, 2017) scholars indicate that these practices may both empower and disempower informal settlements residents (Hagen, 2011; Mulalu and Veenendaal, 2015) and disempower them (Chambers, 2006).

This research takes distance from a cause-effect approach, as well as from a dualistic approach of the phenomenon of digital mapping (e.g. mapping equals more power vs. mapping equals less power). We suggest a different theoretical perspective about the relationship between power and digital visibility within SU, that understands visibility both as a category for the social sciences (Brighenti, 2007, 2010) and an axis of power exercise (Dean, 2010). Digital visibility is an essential feature of the social production of the urban. Digital visibility is both made by and makes smart urbanism -- it is part of a regime of practices of a capitalist and neoliberal mode of urbanism.

3.1. Governing via mappings

The critical cartography debate approaches mappings as one way of knowing space. Along the 1980s and the 1990s, the previous notion that maps were neutral, a strictly scientific mode of communication or a transparent window to the reality was questioned. Leaping from the consolidated theory of "map as communication system" (Robinson and Petchenik, 1975, p.17), cartographers began to consider maps as politicized documents, formed within a discourse (Crampton, 2001) Harley, one of the leading figures on these debates, starts to defend, drawing from Foucault, that maps work in society as a form of power-knowledge and would represent a colonial practice of governing.

As so, to understand how maps are constructed is to understand power relations at play in a given form of governing. To "deconstruct the map" and thus to read its "hidden political messages," Harley (1988) defends that we need to listen to its "silences" -- empty cartographic spaces representing areas that are occupied. Silence on maps would express practices that deny previous existences, such as the existence of indigenous communities or informal settlements. "[Maps] exert a social influence through their omissions as much as by the features they depict and emphasize" (Harley, 1988, p. 290).

Understanding the political messages of mapping is to acknowledge that "cartography is a key political practice that both represents and produces political space" (Elden, 2013 p.12). Maps are not merely representations, but also "inscriptions" (Pickles, 2004), meaning that they do not only depict but also transform realities :

> Neither Pickles (2004) nor Wood and Fels (2008) believe there is an inherent truth beyond the map and its construction, arguing that the map does not merely represent the world (a map is not a mirror, even one with an ideological veneer), but that it produces the world. Thus the map 'creates an ideology, transforming the world into ideology' (Wood and Fels 2008, 7; original emphasis). In other words, maps are not representations but inscriptions (Pickles 2004) or a system of propositions (Wood and Fels 2008) – they capture something of the world while simultaneously doing work in the world; they precede and produce the territory they purportedly represent (Kitchin, Gleeson and Dodge, 2013).

Hence, there is an unfolding and contextual nature of mapping (Kitchin, Gleeson and Dodge, 2013). Addressing "the new nature of maps" is being able to read them as texts that both explain and transform the context in which they were produced, exerting deep influences upon the way space is conceptualized and organized (Harley and Laxton, 2002).

Echoing this narrative, recent analysis of digital mappings (e.g., volunteered geographic

information or VGI, *geoweb*, spatial media, and others) also position mappings as a way of governing that is aligned with colonial practices --- in this particular case, neoliberal rationalities. Digital mappings, in this sense, would depict “new economic zones [...] to be colonized for value extraction” (Kitchin, 2017 p.42).

Another perspective on the way mappings is put to work as governing tools comes from the non-representational theory. Along the 2000s, there is an epistemological shift within cartographic theory from a representational to a processual understanding of maps. It has been argued that maps are “always mappings” — they are “never fully formed, and their work is never complete [...] [they] are transitory and fleeting, being contingent, relational and context-dependent” (Kitchin and Dodge, 2011 p.331). It means that cartographic representations have an unfolding nature, because they are not simply a snapshot of the world, they do not freeze what they represent, but affect reality while are seen and used. The binaries between representation and reality have been consistently challenged in cartographic studies. Mappings are now approached as “representational practices” (Del Casino and Hanna, 2006). The study of maps (representations) and mappings (processes) is said to be, therefore, an “undivided terrain” (Harley and Laxton, 2002).

Approaching digital mapping as a social activity means to foreground it as a political practice embedded in power dynamics. This critical approach of digital mappings is found both on traditional studies on Participatory Geographic Information Systems (e.g. PGIS and PPGIS) (Acselrad, 2008, 2012) as well as on recent geoweb and spatial media studies (Haklay, Singleton and Parker, 2008; Kitchin, 2017a; Leszczynski, 2014; Sui, Elwood and Goodchild, 2013).

Within this framework, here we approach digital mappings as a form of *spatial media*[18], in which the production and sharing of geospatial information create value and acts as media for communicating other information (Crampton, 2009; Crampton, 2001). “Digital mapping as spatial media is by definition a *social activity*” (Kitchin, 2017a). Spatial media, is part of the *geoweb*, a term that describes the use of the Internet to deliver geographic information and maps (Haklay, Singleton and Parker, 2008) or, “the merging of digital content and location as well as the practices and presences that sustain and are sustained by this convergence” (Leszczynski,

18 Spatial media is different from Public Participation Geographical Information (PPGIS) and Participatory GIS (PGIS). The technologies, methodologies, and contents of spatial media represent "a set of techniques and tools that fall outside the realm of traditional GIS." (Turner, 2006 in Haklay et al., 2008). They are also referred to in the literature as participative digital mappings, crowdmappings or volunteered geographic information (VGI) (Goodchild, 2007; Elwood, 2008), with slightly different meanings. Beyond traditional paper or GIS mapping, the use of spatial media and the geoweb combines "pervasiveness" and "ordinariness" in the spatial practices of everyday life; in an unprecedented manner, "coming-into-contact with spatial media is generative of spatiality" (Leszczynski, 2015).

2014 p.1). It comprises "a whole range of websites and communities from the commercial Google Maps to the grassroots *Open Street Map*" that has been changing the landscape of mapping technologies since 2005 (Haklay, Singleton and Parker, 2008) dramatically. According to Kitchin (2017 p. 35-36) :

> A productive way into digital mapping is to consider it 'spatial media,' meaning that geospatial information can be produced, shared, and analyzed to create value and to act as a media for communicating other information [...] The key word here is 'shared.' Digital mapping, especially practiced online as part of the geoweb, is a vital part of such 'new spatial media' (Kitchin, 2017) (Crampton, 2010; Leszczynski, 2015)

As spatial media, digital mappings are not merely a representation (or a visualization) of reality but a practice that entails social relations. "What is at stake are not only questions of technology [understood in its traditional sense], but also 'sites of potential *relations* between individuals; persons and places; and people, technology, and space/place' (Kinsley, 2013; Wilson and Stephens, forthcoming, apud Leszczynski, 2014, our emphasis).

Digital mappings are not only a different form of spatial representation but an unprecedented change on content, features, and ways of sharing and using spatial information (Sui, Elwood and Goodchild, 2013). Two significant changes are that (1) citizens and the private sectors are now more than ever, together with the state, engaged in mapping, (2) location has taken a central role in economic activities, as well as in social and cultural practices (Sui, Elwood, and Goodchild, 2013).

This Dissertation is aligned with these debates on the critical, processual and relational understanding of mappings. Within this framework, we suggest that digital mappings and the digital visibility that entails are a social practice. Digital visibility via mappings is a form of power exercise and a dimension of smart urbanism.

3.2 Governing via visibility

> 'Where and when 'the visual' acquires the status of an essence, universality, and necessity, the philosopher's eye must look for the singular and contingent process that makes it self-evident, and so acceptable.' (Rajchman, 1988, p. 108)

Visibility is central to the way we govern and are governed in the western world (Rajchman, 1988). Vision and power are symbiotic (Otter, 2008) and the exercise of power is an exercise in activating selective (in)visibilities (Brighenti, 2007, 2010). Visibility is a political practice that

comprises both the visual — what is given to be seen — and the invisible — how this happens. (Brighenti, 2010)

The relation between power, governing, spaces and visibilities are central in critical studies, in part because of Foucault's way of thinking histories (such as the history of madness, sexuality, and others). Foucault was often concerned with how different 'ways of seeing' are gathered together in certain times and spaces to configure a subject. For him, visibility is 'not what is seen, but what can be seen' (Rajchman, 1988, p. 92), meaning that the production of visibility gives us precisely what is to be known, how, when and by whom. Each specific time and space formation – each culture – has its own regime of visibility, which 'illuminates some things and so cast others in the shade.' (Rajchman, 1988, p. 92). Each culture has a sort of 'visual thought' with thresholds. Critical studies must be able to identify and challenge the thresholds of regimes of visibilities.

Challenging the regime of visibility of a culture, Foucault's method consists of looking out to the events through which things are given to be seen. His method apprehends for example that, in the modern western culture, ways of seeing, thinking, discoursing, knowing, and acting over a subject are interrelated. For him, the 'visual thought' of this culture is 'rooted in a specific sort of material existence – the *spaces* in which it is exercised [...] and the *techniques* through which its images are reproduced and circulated' (Rajchman, 1988, p. 92). In Foucault's analysis, examples of such spaces are hospital and prisons, while examples of techniques are the medical gaze and the surveillant gaze. Spaces and techniques, thus, construct visibilities. Visibilities are not an independent aspect of a context, but part of a regime of practices. 'In short, visibility is a matter of a positive, material, anonymous body of practice [or *regime of practices*]' (Rajchman, 1988, p. 93).

An example of a body or a regime of practices is the smart city. As a corporate storytelling' (Söderström, Paasche and Klauser, 2014), the 'smart city associates more digital data with more efficient urban solutions. For instance, daily problems and crisis, according to technology companies like IBM, can be better visualized and managed from Control Rooms[19]. In turn, alternative smart cities narratives imply that digital data shared by informed 'smart citizens' may help to advance more suitable solutions to specific urban issues (Timmeren at al. 2015). In either a 'technology-driven' or a 'knowledge-driven' (McFarlane and Söderström, 2017) approach of the 'smart,' digital visibility is a core concern. Both presuppose that the world can be known better and more fully through digital visibility, the difference relying on how visibilities should unfold (by/for whom, with what purpose, etc.)

19 See, for instance: "IBM Smarter Cities - Future cities - United States." Available at: <https://www.ibm.com/smarterplanet/us/en/smarter_cities/overview/> Accessed: January 2019.

On the one hand, a 'top-down' digital visibility is often referred to in critical urban studies as a form of control or domination. Researches about surveillance, for example, usually recur to the metaphor of the Bentham *panopticon* (as seen by Foucault) to describe what happens when cities and citizens become more visible to State, corporations, or other few citizens[20]. Complementary, critiques of Control Rooms suggest that control logic is coupled with a logic of visibility. For example, the Rio's Operation Center, for Luque-Ayala and Marvin (2016) extends 'Control Room logics to the totality of the city' and operates through 'new logic of transparency and visibility, alongside the generation of new viewpoints for understanding the city' (Luque-Ayala and Marvin, 2016, p. 27).

On the other hand, a 'bottom-up' digital visibility is presented as a chance for empowerment and recognition. In this sense, digital visibility would be supposedly more effective for marginalized communities, where daily needs and experiences are often stigmatized or neglected in urban planning, projects, and policies. For example, the digital mapping of informal settlements across the Global South has been presented as a chance to empower lower-income residents.

It is therefore surprising that, despite the role that digital visibility plays in SU discourses and practices, this concept has not been exhaustively explored by urban studies until now.

Differently, digital visualization has been subject to numerous studies. In geographical, cultural studies, Rose, Degen, and Melhuish (2014) discusses that digital technologies impose a new necessity: to shift from a gaze on stable objects to a view of the dynamics of the production, circulation, and modification of these objects. McNeill (2016) identifies a sort of 'visual formation of smart cities' built and marketed in 'smart city software packages' (p.34). These packages imply that 'cities which cannot be seen in such ways are by definition not smart'; and that 'cities that cannot be viewed cannot be made to work in a smart manner' (p.35). Central to this visual formation would be digital technologies used to provide different modes of visual perception of a city's domains of governance (McNeill, 2016). What both Rose and McNeill have in common is a relevant concern about digital visualizations – respectively, 'digital visualizations of new urban developments' (Rose, Degen and Melhuish, 2014) and 'data visualization and the perception of the city' (McNeill, 2016).

Here we are concerned here more about visibilities than about visualizations. According to the Merriam-Webster, visualization means the 'formation of mental visual images' or 'the act or process of interpreting in visual terms or of putting into visible form.' In turn, visibility is 'the

20 See, for example, thoughts about a 'Foucaultian panoptical feeling' in 'Private Video Monitoring of Public Spaces' (Firmino and Duarte, 2015).

quality or state of being visible' - capable of being seen, readily noticed, discovered, perceived, exposed to view (Merriam-Webster, 2018). To dive deeper into this concept, we are aligned with, on the one hand, with Lévy and Lussault (2013), and, on the other hand, Foucault (Foucault, 1975) and Brighenti (Brighenti, 2007, 2010).

In the *Dictionary of Geography and Society Spaces*[21] (Lévy and Lussault, 2003) Michel Lussault suggests that the visible, that it, what is "presented to the eye" is a crucial process in the functioning of societies. That is particularly clear in the political domain, where the need to make visible the legitimate action over a space leads to a continuum exploration of the material space (Lévy and Lussault, 2013).

> Space, especially in its physical character, constitutes a principle of societal reality. By their spatiality, of an infinite variety, social substances become visible, their existence in the bosom of society crystallizes. To speak of space is to evoke the regime of visibility of social substances. (Lévy and Lussault, 2003)

What is essential in its definition is the idea that space is not merely where the social is inscribed, it is not a detached scenario of social experiences, but the product of these experiences - the social itself made visible. So talking about space is talking about the visibility of the social. In other words, spatial visibility and social visibility are inseparable aspects of reality: changing the spatiality of a thing is equal to changing the thing (Lévy and Lussault, 2013)

The regime of visibility is, then, how social substances are made visible in space. As space is part of the social space, the regime of visibility of space participates in the social object, and in some cases may reinforce or legitimize it. Invisibility, in turn, can weaken it or render it illegitimate.

For example, transformation in the visibility regime of favelas during the preparation of Rio for the 2016 Olympic Games implies a modification both in the spatial visibility of the territories and in the social visibility of favela populations. Narratives and images, including, but not limited to, those of digital mappings, make up a very particular scheme of a regime of practices of urbanism.

For Foucault, understanding how we govern and are governed within a particular regime of practices is to understand how our looks are oriented in certain regimes of practices.

Throughout significant part of his work, Foucault tries to reconstitute in spaces such as hospitals, asylums, and prisons: (1) the rationality – the conceptual organization – that results in what can be seen; (2) the techniques used to make things visible; (3) the subjectivities produced through this thoughts and techniques; and (4) the visibilities that result from this conceptual scheme (Dean,

21 Original: Dictionnaire de géographie et de l'espace des sociétés

2010).

Brighenti (2007) suggests that visibility must be taken as a category for social sciences. He proposes that visibility is a field with relational, strategic and processual features. Visibility is 'a social process in itself,' that lies in the intersection of the domains of aesthetics and politics. It is relational because it depends on seeing and being seen, a 'reciprocity' that is often asymmetric. These asymmetries confers visibility its nature of strategy. For instance, 'when something becomes more visible or less visible than before, we should ask ourselves [...] which specifics relations are being shaped' (p. 326). The processual nature of visibility implies that visibility is not reducible to a 'cone of visibility.' Rather, from a 'purely relational' perspective, the field of visibility has its thresholds (Brighenti, 2007). Visibility is a relational strategy that is different across space, time and cultures. At digital cultures, for instance, political struggles are involved in shaping and managing digital visibility:

> As communication technologies enlarge the field of the socially visible, visibility becomes a supply and demand market. At any enlargement of the field, the question arises of what is worth being seen at which price – along with the normative question of what should and what should not be seen. These questions are never simply a technical matter: they are inherently practical and political. (Brighenti, 2007, p. 327)

Reviewing some trends on political philosophy thoughts, Brighenti says that on the one hand, visibility is usually linked to recognition and empowerment; and, on the other hand, to domination and control. Recognition and control are usually understood as two opposing outcomes of visibility, but neither recognition nor domination lies on visibility itself. The author attributes this dichotomy to two main traditions in western sociological thought. The former – "visibility as recognition" — is an inheritance of the Hegelian concept of recognition. In Hegel's "master-servant dialectic," "a significant other (Mead, 1959) 'tests' and 'testifies' our existence by looking at us" (p. 329) Political struggles of minorities for more visibility build upon this idea. The later – "visibility as control" – is in debt to Foucault's thesis about discipline. The disciplinary thesis states that being seen is a form of being conducted, under surveillance, and subjugated. '*Le regard médicale*' (the medical gaze) at The Birth of Clinics and the vigilant viewpoint in practices of Discipline and Punish (as in the Bentham's Panoptic scheme), have in common the fact that the watcher – be it the doctor or the vigilant – is able to exercise power over the watched – the patient, the prisoner – in an asymmetric fashion. Echoing Lacan, 'visibility is a trap' (Foucault, 1977; Brighenti, 2007)

Brighenti's argument breaks this dichotomy and provides a more nuanced understanding of visibility. One of his key contributions is to present visibility as a continuum, with a minimum and a maximum threshold. In his own words:

> […] there is a minimum and a maximum of what we may call 'fair visibility' – regardless of the fairness criteria, we want to adopt. Below the lower threshold, you are socially excluded. […] [A]s you push yourself – or are pushed – over the upper threshold of fair visibility, you enter a zone of supra-visibility, or super-visibility, where everything you do becomes gigantic to the point that it paralyzes you. (Brighenti, 2007, p. 329 - 330)

Brighenti concludes that visibility may empower as well as disempower because what matters is not simply being visible or not, but how visibility is accessed and shaped. 'It is not simply true that if I am disempowered or a society's outsider, then I am invisible. Rather, what happens is that I access visibility places in ways that are largely or completely out of my control (Champagne, 1993 apud Brighenti, 2007).

In short, we admit, just like Brighenti, that power does not rest univocally with seeing or with being seen. Rather, it is the way in which we see and are seen that matters the most. "The exercise of power is always an exercise in activating selective in/visibilities" (Brighenti, 2007, p. 339).

Following Foucault's and Brighenti guidelines, we aim to understand how favelas have been given to be seen via digital mappings. However, our sight to favelas' digital visibility does not rely solely on what is given to be seen on these mappings. We do not focus, for example, on the georeferenced social media data by itself, for we are not so much concerned with visualizations as we are with visibilities. We look out of the mapping practices in an attempt to catch the 'big picture': what other urban dynamics of urban in/exclusions go together with the digital visibility leveraged by digital mapping of favelas?

3.2.1 Foucault, Visibility and Urban Spaces

Foucault was aware of how space is fundamental to any exercise of power. "In asking how entities such as 'madness,' 'illness' or 'crime' were made visible in the knowledge of different historical periods, Foucault focuses on practices of '*spatialization*'" (Rajchman, 1988). In his way of thinking, spaces are often designed to deploy 'the art of the light and the visible': to make things visible in a specific way. Therefore, spaces are always "spaces of constructed visibility" (Rajchman, 1988).

However, for Foucault, space is not merely an area to be analyzed, 'but as a central part of the approach itself' (Elden, 2002, p.2).

Foucault's analysis of madness and sexuality, among other subjects, does not offer merely an analysis of the spatial configuration of spaces such as the hospital or the panoptic. Instead, he

offers a powerful 'spatial history' of modern western culture (Elden, 2002). Foucault believes that the production of visibilities is an essential feature of the production of spaces where power and knowledge are practiced in modern western culture. For him, building certain spaces consisted of rendering things and processes visible, in order to better exercise power and knowledge.

Foucault's method of unveiling the logic of both such 'spaces of constructed visibility' and the "spatial history" in which they exist consists in looking out to the events through which things are turned visible. The following passage illustrates his method. It refers originally to painting[22]We replaced 'painting' by 'mapping favelas' (and correlated notions) in order to emphasize our own approach. (Substitutions and additions are indicated by square brackets).

> '[Mapping favelas] would be 'shot through with positivity' the self-evident character of its visuality would derive from a materially rooted way of thinking. Thought would make one particular kind of ['visibility'] seem natural or essential to [mapping favelas]. To study such 'positivity' would consist in asking how the concepts were brought together under which [favelas] could be see, where, by what means, by whom, and so forth. Through what 'system of thought' were the 'objects' of [mapping], that class of things that could be [mapped] specified? And how as this delimitation connected to the spaces in which it could be seen [...] and those in which it came to be made [...] and so the legal and economical rules that governed its ownership and its circulation? In what ways the mode of 'being a [mapper]' is conceived? How did technological innovations became part of the rationality or intelligibility of the 'techniques' open to [mapping favelas]? How did the 'materiality' of [mapping] [e.g. urban space and digital techniques such as smartphones] become more than the 'context' in which it was seen or made, part of the way it was conceived [...]? And in which ways was this construction of the conceptual space of [mapping] linked to other [...] fields in the thinking of the [digital] age? (Rajchman, 1988, p.93, modified by the author)

Bearing this in mind, Foucault refers to architecture as 'an art of rendering visible' (Rajchman, 1988) and, as so, as a '*techne*,' a part of a '*dispositif*' that entails theoretical formulations, practical applications and power relations (Söderström, Paasche and Klauser, 2014). The same could be

22 Original text: Painting would be "shot through with positivity"; the self-evident character of its "visuality" would derive from a materially-rooted way of thinking. Thought would make one particular kind of visuality seem natural or essential to painting. To study such "positivity" would consist in asking how the concepts were brought together under which paintings could be seen, where, by what means, by whom, and so forth. Through what "system of thought" were the "objects" of painting, the class of things that could be painted, specified? And how was this delimitation connected to the spaces in which it could be seen [...] and those in which it came to be made [...] and so to the legal and economic rules that governed its ownership and its circulation? In what way was the mode of "being a painter" conceived? How did technological innovations become part of the rationality or intelligibility of the "techniques" open to painting? How did the "materiality" of painting become more than the "context" in which it was seen or made, part of the way it was conceived [...]? And in which ways was this construction of the conceptual space of painting linked to other or associated fields in the thinking of the age? (Rajchman, 1988)

said about urbanism. Although urbanism, especially in its origin, is often associated with hygiene, aesthetics, and rationalization of circulations, across all these concerns there is also the concern with the production of visibilities:

> 'Changes in urban visibility are due to the most diverse reasons. Chiefly, these are not simply aesthetic reasons: both 19th-century Haussmann boulevards in Paris and 20th-century Via dei Fori Imperiali in Rome are examples of urban visibility enhancement, caused by a mix of public order functions, need for better traffic circulation and the desire to create appropriate scenographies and settings for Pompa Magna celebrations and military parades.' (Brighenti, 2007, p.332)

From this perspective, urbanism has always involved the production of urban (in)visibilities. This not occurs by chance, but it is a precise form of power exercise. In its origin as a discipline, besides hygiene, circulation, aesthetics and 'public order' concerns, there is a recurrent attempt to make the poor or the 'marginal' invisible, especially in central and wealthiest areas. Engels, in his pamphlet about 'The Housing Question' (1872) in the XIX century industrial Britain, said to be choked with the method called 'Haussmann' of pushing working classes towards the invisible, the peripheries. He writes:

> By 'Haussmann' I mean the practice which has now become general of making breaches in the working classes quarters of our big towns, and particularly in those which are centrally situated, [...] No matter how different the reasons may be, the result is everywhere the same: scandalous alleys and lanes disappear [...], but they appear again immediately somewhere else [...] (Engels, 1872 apud Harvey, 2014, p.16-17)

This form of invisibility of the poor is not exclusive of Industrial Britain, but it is inherent to capitalism modes of urbanization. Santos (1984), for instance, said the following about urban 20th-century urban renewal in the United States and Brazil:

> Americans say *urban renewal means negro removal*. Here [in Brazil] the same phrase could be used, by changing black to poor. Plans for "urban renewal" do not move only those convicted of "crime" of occupying places that are too good for them. They carry with them an enormous amount of cultural habits and economic activities, judged so despicable that they are not even taken into account. The consequence is destruction on many planes. (Santos, 1985, p.11)

This method continues to exist today all over the planet. Reflecting upon a phenomenon of slums invisibility in Indian cities, Roy suggest that "making [...] the world-class cities is about displacing, marginalizing, making invisible the poor" (GlobalPOV, 2013) — be it materially, through massive housing eviction, be it discursively, by representing their territories as blank spots in city maps.

Digital visibility, as presented today, is therefore in contrast with this tendency of making lower

classes invisible — a tendency that is at the very core of modern urbanism. In other words, the production of digital visibilities of informal settlements is in permanent tension with the very process of pushing these settlements towards the invisible, which is typical of capitalist modes of urbanization. So, putting digital visibility to work as a spatial device for the inclusion of lower classes or "marginalized" communities, is not a simple or straightforward process. Inclusion on the smart city is part of a complex interplay of political forces, in which digital visibilities are but one vector.

3.3 Governing via the digital

Technology shapes cities through the way it is imagined, used, implemented and developed in societies (Willis and Aurigi, 2018). While digital technologies continuously transform the contemporary urban condition, urban studies unpack the political nature of these socio-spatial transformations.

Research targeting specifically the idea of governing the smart cities have looked, at first, at the *corporatization* of the urban through digital technologies. Critical scholarly debates from the earlier 2010s onwards unveil smart cities as a high-tech variation of the 'entrepreneurial city' (Söderström, Paasche and Klauser, 2014; Hollands, 2008) that advance entrepreneurial economic development strategies (Wiig, 2015). "The rhetoric of intelligent, transformative digital change works much more to 'sell' a city in the global economy than to address urban inequalities." (Wiig, 2015, p.535) It privileges urbanization as a business model rather than a model of social justice (Datta, 2015)

Policy rhetoric of positive change through technology would both resemble a kickback to the failed utopias of 20th-century high modernism (Greenfield, 2013) and, at the same time, advance a new techno-utopia that fosters globalized business enterprise (Wiig, 2015).

To put it bluntly, smart cities would function as a "corporate storytelling[s]" They would entail a rationale that is reductionists in its technocratic view of urban functioning and management (Söderström et al., 2014; Vanolo, 2013) as well as in its entrepreneurial view of urban governance (Hollands, 2014). In its approach to governing, they would promote an apparently a-political or post-political view of urban development (Soderstrom et al. 2014).

Besides acknowledging smart cities as corporate storytelling that entails neoliberal rationality, researchers further inquiry *how* this rationale is put to work to govern the urban. Critical scholars

indicate various modes of capitalist domination via smart city practices. For some, smart cities, as proposed by the European Union, would function as a "disciplinary strategy" — a tool put to work to produce "docile subjects and mechanisms of political legitimation" (Vanolo, 2014, p.883)

For others, some smart cities would follow not so much a disciplinary, but a governmental logic. A specific form of *governmentality* associated with ''smart" technologies would emerge in cities like Rio de Janeiro, based on "the development of novel ways of seeing and engaging with the city" (Luque-Ayala e Marvin, 2016, p.1). Smart is interpreted as "yet another strand in the consolidation of dominant circuits of capital and neoliberal *governmentality* (Vanolo, 2014) or as a new governmental form altogether (Gabrys, 2014)" (Luque-Ayala and Marvin, 2015, p.6).

Given these changes, a series of frameworks for analyzing the role of the digital in the reshaping of urban geographies of power have been developed (see, for instance, Graham et al. 2012). Urban spaces would represent "*software sorted geographies*" -- landscapes that are formed, shaped and mediated by invisible lines of code (Graham, 2005). Plus, a digital code would influence our spatial experiences and actions through processes of *transduction*[23] (Dodge and Kitchin, 2005) while function as a set of laws to govern or influence how space is brought into being (Kitchin 2007; Kitchin et al. 2009 apud Graham et al. 2012).

3.3.1 Smart Urbanism and Governmentality

Drawing from Foucault's studies on power dynamics, scholars look at SU through the lenses of *governmentality*. *Michel Foucault and the smart city: power dynamics inherent in contemporary governing through code*, for example, affirm that "smart cities subsume a heterogeneous range of techniques and efforts aimed at *governing through code*" (Klauser, Paasche, and Söderström, 2014, p. 870).

In adopting a Foucauldian conceptual approach -- the analytics of government (Dean, 2010, from Foucault and Deleuze) -- urban studies explore the power dynamics inherent in smart cities and provide different perspectives on how smart technologies intervene in the way we govern and are governed in everyday life. '*Developing a Critical Understanding of Smart Urbanism*' argues that "a critical research agenda around SU demands to explore the different ways in which its *rationalities*, *techniques*, and *subjectivities* are being rolled-out across contrasting geographies." (Luque-Ayala

23 . In this context, transduction can be understood as "the constant making anew of a domain in reiterative and transformative practices'. Transduction of space would be, in turn, transductive practices that transform spaces, meaning practices that change the conditions under which space is (re)made. (Kitchin and Dodge, 2004)

and Marvin, 2015, p. 10, our emphasis). '*Smartnmentality: The Smart City as Disciplinary Strategy*' offers an analysis of "the *rationality* and *governmentality* of urban smartness" (Vanolo, 2014, p. 886, our emphasis). '*Michel Foucault and the Smart City: Power Dynamics Inherent in Contemporary Governing through Code*' 'explores the internal logic and dynamics of software-mediated *techniques* used to regulate and manage urban systems' (Klauser, Paasche, and Söderström, 2014, p. 869, our emphasis). '*Smart subjects for a Smart Nation? Governing (smart)mentalities in Singapore*' shows 'what kinds of 'smart' subjects and *subjectivities* tend to follow from certain 'smart' socio-materialities' (Ho, 2016, p. 3).

While there is an extensive literature on the way smart cities impact on three axes of power exercise — rationalities, techniques, and subjectivities (Dean, 2010) -- not much is said about a fourth axis -- visibility. Building upon this body of literature, and aligned with *governmentality* studies, this thesis suggests that there is a gap in how SU approaches visibility. It defends that visibility must be taken into consideration in the analysis of the power dynamics of smart cities, including governing dynamics.

3.4. Conclusion: governing the urban via digital mappings

Exploring what is known about the relationship between concepts and definitions on governing the smart city showed that the literature on governing via mappings, governing via visibility and governing via the digital complement each other. An integration between their arguments helps to better grasp the relation between power and digital visibility in smart urbanism.

The literature on governing via mapping acknowledges that this is an inherently political practice, with profound implications on power and knowledge dynamics. However, part of the literature on mapping tends to reify dichotomies, by focusing on what is visible vs. what is invisible and relating it to other forms of social inequalities, such as race (white vs. black), gender (men vs. women) or spatial justice (informality vs. formality). What is invisible is said to be excluded, subjugated, or dominated, while what is visible is said to be accepted, included, and recognized as part of a system. Alternatively, the mapping is said to function as a colonizing practice. In that case, what is invisible is what resists and contest domination, while what is visible is part of a value extraction typical of neoliberal, capitalist modes of urban functioning. Recent debates on critical cartography indicate the processual nature of mappings and signalize that power practices unfold as mappings are produced and *used*. Mappings are practices and so is power. This understanding complicates the assumption that digital mappings of informality are, by themselves, empowering

or disempowering.

Offering a more nuanced understanding of the way visibility disturbs power-knowledge dynamics, the literature on governing via visibility has shown that the way things are turned visible on spaces is essential to the way we govern and are governed. Every space is a "space of constructed visibility," what makes architecture and urbanism powerful political tools. Moreover, they have been put to work throughout modern western culture as such. Urbanism, its origin as a systematic body of knowledge and practice in the XIX century, has at its core concern with the production of visibility. In those times, as nowadays, visibilities and invisibilities are part of the making of the world-class cities: while central, formal neighborhoods shine with the light of urban upgrading and other interventions, lower income classes are pushed towards the shadows of the peripheries (Roy, 2014). Visibility is a processual, relational, and political field -- a continuum with minimum and maximum thresholds that are culturally conceived -- and so are mappings and urbanism. From this perspective, visibility (via mappings or else) does not act as an on/off light switch, but it is a much more nuanced process in which every form of visibility comes together with a form of invisibility.

Considering the political implications of digital visibility within the framework of Foucault's analysis of power, knowledge, and space -- which includes the notion of *governmentality* (Foucault, 1978) -- enriches the understanding of digital visibility as a way of governing the urban. For the analytics of government (Dean, 2010), visibility is, together with rationalities, techniques, and subjectivities, an axis of the regime of practices.

Considering urbanism is a regime of practices, smart cities both produce and are produced by specific (in)visibilities, such as the (in)visibilities leveraged by digital mappings. In other words, digital mappings do produce the smart city as much as are produced within it.

In other words, urbanism is a form of power-knowledge concerned with the production of visibilities and can be read as a way of governing. Hence, smart urbanism and the digital visibilities that it underpins are not neutral. Capitalist dynamics of urban in/exclusion, as expressions of power, are not merely coped with once digital visibility takes place. Neither digital visibilities mirror or reproduce these dynamics. Instead, urban in/exclusions are ceaselessly emerging along the production of visibilities, in the plural.

From this point of view, there are some limits on current interpretations about the relation between the act of governing and digital visibility on narratives about digitally mapping informality. Presenting digital mapping and visibility as simply empowering or disempowering oversimplify the

processual, relational and political nature of visibility, mapping and the social production of the urban. The connection between three bodies of literature -- governing via mappings, governing via visibility and governing via the digital -- help us to overcome some of these limits. From this, we derive that digital visibility (via mappings or else) is a social practice, it is a form of power exercise that has a role in producing a city, for it is part of a regime of practices of governing. Digital visibility is a dimension of urbanism, understood as a set of ways of knowing, thinking about, acting over and representing a city.

FOUR

4. Switch on/off: Disputed Visibilities of Favelas in Rio[24]

Abstract

This chapter offers a **context** of favelas visibility in Rio, which comprises both a historical overview and a description of contemporary socio-spatial transformations in its regime of visibility[25]. It briefly explains favelas growth and the ambiguous nature of their urban inclusion and exclusion. It draws attention to recent urban upgrading projects, pacification programs and the symbolic disputes around the image of the city in the context of international mega-events, in particular, the Olympics 2016. The current regime of (in)visibility of favelas is positioned in a broader context of the construction of (in)visibilities in Rio, in the light of two theses: "informality as a state of exception" (Roy, 2005) and "the myth of marginality" (Perlman, 1979). It ends with a critical reading on how visibility and invisibility intertwine in the making of the (Olympic) city and with the **statement** that visibility by itself is not equal to urban inclusion.

Introduction

Visibility of favelas in Rio has always been a disputed process. Historically, Rio's favelas have been perceived as being *in* the city, but not being *from* the town (Gonçalves, 2013). In a sense, favelas have always been, at the same time, *in* and *out* of the world. It means that, while informality is a product of the way urban spaces have been conceived, as well as an essential piece of the political, social, cultural and economic urban functioning, favelas have been often seen as excluded — a space that is out of reach, out of control and out of the urban. This way of seeing reflects the ambiguous ways of dealing with Rio's favelas, a process that historically mixes tolerance with threatens to the removal of the urban landscape (Gonçalves, 2013; Valladares, 2005). However, ambiguous ways of thinking about, acting over and representing favelas were never accidental nor at the margins of political decisions, but wittingly created at the core of it (Gonçalves, 2013).

24 Chapter 4 benefits from my debates with Nicoli Ferraz alongside the preparation of the journal article: A history of the representation of Rio de Janeiro's slums in maps (Histórico da representacão das favelas cariocas em mapas). Available: <http://revistas.unisinos.br/index.php/arquitetura/article/viewFile/arq.2018.141.06/60746278> Accessed: January, 2019.

25 Previous knowledge of the history of favelas in Rio, past regimes of visibility and transformations related to Pacifying Police Units (PPUs) may facilitate this Chapter reading. It is beyond our scope to provide a detailed description of these subjects, but an extensive and robust literature is already available. (See, for instance: Cavalcanti, 2013; Silva, 2005; Coutinho-Silva, 2010, 2014; and Telles, 2005)

An overview of favelas cartographic representation through history reveals these ambiguities and tensions around favelas inclusion and exclusion. Until nowadays, many of Rio's maps represent some favelas as empty spots, green areas or disconnected streets, while privileging the representation of some favelas over others[26]. This form of invisibility is an essential piece of the puzzle that is understanding favelas' urban condition, considering "maps are defined by what they include but, trippingly, are more revealing in what they exclude" (Turchi, 2004).

Over the last decade, it is possible to notice a renewed interest of the local government, NGOs and corporations in digitally mapping favelas. Usually, smart technologies such as smartphones are borrowed to residents, who insert points and streets on online maps, according to their empirical knowledge of their territories. These initiatives turn light into some aspects of some favelas, and draw attention to important issues such as the violation of human rights by the police (see the app *Nós por Nós*), or the excessive violence and shootings in favelas (see the website *Fogo Cruzado*). At the same time, some initiatives also cast other aspects into the shade, privileging wealthiest, touristic, pacified favelas (see Google's *Tá no Mapa* and Microsoft's *Na Área projects*).

While it is essential to understand *what* is being turned (in)visible along the favelas digital mapping phenomenon in Rio, here we are more concerned with *how* and *why* digital (in)visibility occurs. Positioning digital mappings in a broader history of the construction of the image of the city provides an enriched notion of the relation between (in)visibility and urban in/exclusions. Our purpose is to disturb the assumptions that digital visibility is a straightforward path towards urban existence.

2.1. Favelas Growth and (In)visibility

The growth of large cities in Brazil, primarily as it occurred after the 1970s, is marked by the emergence and continued growth of squatter settlements - territories that combine poor urban infrastructure/services with social problems such as violence. This tendency does not occur only

26 It was only in 2012 that the Pereira Passos Institute (IPP) - a municipal autarchy of the City of Rio de Janeiro, responsible for the collection, treatment and dissemination of statistical, cartographic and geographical information of the city - began the consolidation and organization of geographic information on favelas road maps (Mapeamento de Logradouros), which are an important basis for the planning and execvvution of public policies. This project - Mapping of Landmarks and Territorial Management in Favelas of Rio de Janeiro (Mapeamento de Logradouros e Gestão Territorial em Favelas do Rio de Janeiro) - has as scope only territories covered by Pacifying Police Units (PPUs). Previously, numerous maps of favelas had already been produced, particularly in the 1990s along the Favela-Bairro urbanization program. However, these shantytown maps were not usually included in official urban maps, such as the cadastral plans.

in Brazil, but, but has been observed in many developing countries.

In Brazil, the informal occupation of urban lands was the solution found by lower classes, often slave descendants or internal migrants, to the problem of access to housing in urban areas. In the context of inadequate housing policies for the poor, combined with a *laisser-faire* market, squatting in public lands took place. Self-built housing and infrastructure, as well as self-provided services such as electricity and mail, provided through a system of collective effort, are some standard features across many squatter settlements, including favelas.

Rio de Janeiro is the city with the greatest population living in favelas in Brazil. Between 1980 and 2010, favelas population has increased considerably: 40% from 1980 to 1991; 16% from 1991 to 2000; 19% from 2000 to 2010. For Coutinho-Silva (2015) this growth is associated, at first, with the financial and economic crisis of the so-called "lost decade" (1980) and also to the dissemination of neoliberal policies (1990), that had deepened social inequality in Brazil. These events had a significant influence on the growth of crime in Rio. There was an increase in illicit drug trafficking and many criminal groups settled in favelas, especially on those over hills, from where they could exert territorial control. "A vicious circle was formed, in which poverty and social exclusion, associated with spatial segregation, had fuelled conflict and violence" (Coutinho-Silva, 2015).

In 2010, the Brazilian Institute of Geography and Statistics (IBGE) had counted 763 favelas and 1,393,314 favelas residents in Rio — 22,03% of its population (IBGE, 2010). This number does not include *favelas* that were recognized as neighborhoods by the Municipality — such as Rocinha and the cluster of favelas Complexo da Maré — nor social housing that, in practice, are *favelised*[27], such as Cidade de Deus and Vila Kennedy. Social groups contest this official data and believe that there are more than 1,000,000 favelas in Rio.

Despite its undeniable presence in the city, the visibility of these territories and population has often been disputed. Threatens of eviction and symbolic, as well as physical removals of the city landscape has always been part of favelas history. These invisibility practices are noticeable from the very beginning of the *favelisation*[28] process in Rio.

Paradoxically, physical visibility of favelas in Rio landscape is incontestable. This form of visibility is the case especially for settlements over hills. "Favelas cling to the sides of the mountains

27 The word favelised (favelizado) is used here to denote territories that although are not labeled as favelas by official documents, are, in reality, favela-like.

28 Favelisation stands for favelização (brazilian portuguese), the phenomenon of turning urban areas in favela-like territories.

that surround the Zona Sul neighborhoods, putting the shacks of the poor on eye level with—or hovering above—upper-class apartments in modern 15-story high-rises" (Freeman, 2012). In the popular imaginary, and a large extent in Anglo-Saxon and European specialized literature, favelas are hilly. However, just a small portion of Rio favelas are over hills. In a sense, this form of material visibility has been put to work as a political tool. Paillard (2015), in an interview called 'A Politics of Visibility' compare the different forms of politics associated with informality across the Global South. He affirms that Rio has an advantage over Buenos Aires when it comes to claiming attention for political struggles: "While in Rio they [favelas] are situated over hills, or *morros*, in plain sight, in Buenos Aires they are more discreet."

Figure 17 Iconic image of favelas over hills in the city of Rio de Janeiro.



Source: Patricio Irisarri on Visual Hunt (n.d.)

Beyond the material visibility on the urban landscape, favelas have been, since its origins, at the beginning of the 20th century, highly visible not only materially, but also symbolically, discursively and ideologically, as Silva (2005) points out:

> Favelas in Rio de Janeiro grew and spread on the 1920s [...] [and] matured on the 1930s [...] In addition to the physical presence, in itself significant, it was crescent — and sometimes dramatic — their ideological visibility, as they occupied plots of land in regions of great value... For many decades, favelas have been part of the city, as part of its' growth processes. (Silva, 2005)

At the early 1930s, favelas visibility also consolidates in the media. "Favelas already had great visibility in Rio de Janeiro [...] from an ideological and political perspective, since the number of hovels would not justify, at first, the importance that was assigned to them in the media" (Silva, 2005, p.149). At the beginning of 1930, traditional favelas, such as São Carlos had already great visibility from a quantitative perspective; while favelas in the *Zona Sul* (wealthiest area),

such as Babilônia, had high visibility from an ideological and political perspective (Silva, 2005, p.150). Along the 1940s, in addition to the great ideological visibility, favelas on the wealthiest neighborhoods also increase in physical visibility (Silva, 2005, p.149-150). However, similar to what occurs nowadays, cartographic representations by then did not reflect this visibility dynamics.

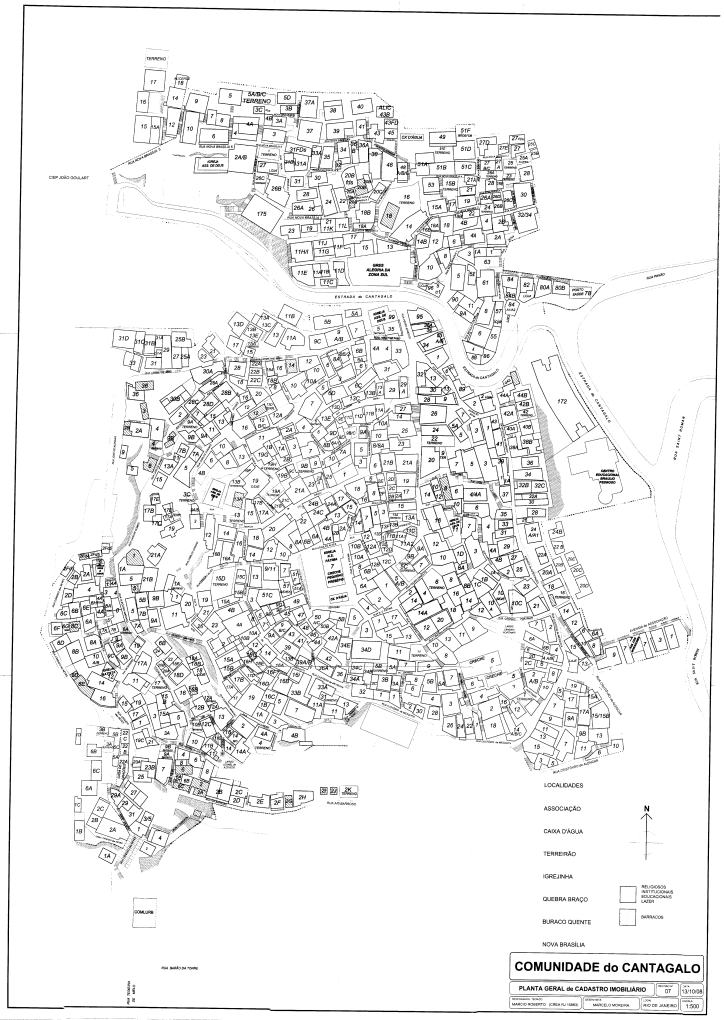
2.2 Favelas visibility on maps

Favelas are essential structures on the historical, geographical, cultural, political social and economic constitution of the city of Rio de Janeiro and have a "multifaceted insertion in the urban context" (Abreu and Vaz, 1991). However, a long time has passed until they appear on city maps

The precise date of the first appearance of Rio's favelas on maps is a controversial matter. The Maré's Streets Guide (Redes da Maré and Observatório das Favelas, 2012), registers that until the 1990s[29], favelas were not part of the city's official maps. The authors of the Guide are probably referring to the municipal upgrading project *Favela-Bairro* that has propagated a discourse on integration between favelas and the rest of the city. *Favela-Bairro* aimed then to transform some favelas into formal neighborhoods, through urban upgrading projects that included better connections between the informal and formal urban fabric. At that time, targeted favelas start to be consistently mapped. Although detailed maps of them can be found until nowadays in the Municipality, in architecture studios, and even in the Community Association of some favelas, these draws were not included in official city maps, such as cadastral or touristic maps.

29 As it will be mentioned later, favelas were part of city maps at least since the demographic census of the 1950 -- As Favelas do Distrito Federal e o censo demografico de 1950 (IBGE, 1952).

Figure 18 Map of the favela Cantagalo.



Source: Cantagalo Dwellers Association (n.d)

The historians Abreu and Vaz (1991), in turn, believe that the first favelas mappings are from 1984. They state that "despite its long permanence in the city, until 1984, the favela is not recognized *de jure*, although it exists *de facto*. As a result, it is absent in maps, reports and official documents [...] that insist in deny its existence, maybe hoping that it would disappear by magic" (Abreu and Vaz, 1991). The authors are probably referring to the Favela's Census of the Federal District of 1984 as the first favelas registers in official documents.

Differently, Perlman (2005) writes that, although in every decade since the 1950s the growth on number and extension of favelas have been exacerbating in Rio, "the very existence of favelas was long denied: only since the 1970s have they been allowed to appear on city maps" (Perlman, 2005, p.2). The period from 1970 to 1973 was marked by the dictatorship and characterized both by forced eviction (101,000 favelas residents were violently displaced) and by the building of luxury

condominiums over slopes in the wealthiest area of the city (the South zone). This movement would explain, in principle, the efforts to map favelas. To intervene in terrain it is necessary, first, to recognize and measure it.

In contrast, Valladares (2005) states that first favelas mappings date back to the 1950s. The first census on Rio's favelas, in which rudimentary maps of some favelas can be found at the Report on the Human Aspects of Carioca's Favelas (SAGMACS, 1960; Valladares, 2005) and the General Census of the Federal District (1960). The necessity to produce pertinent quantitative data about favelas marks the beginning of the official production of favelas data and a turning point in its visual representation. About this turning point and the census of 1950, Valladares writes:

> The list of favelas brings the indication of the administrative circumscription, allowing to compare geographical zones. Favelas are seen in almost every city neighbourhood, and not only where its presence is more visible and therefore more criticised, that is, on the beautiful neighbourhoods of the City Center and the South Zone (Lagoa, Copacabana e Gávea) — a fact, by the way, that was already shown by the list of favelas and by the map attached to the 1948 Census publication 30(Prefeitura do Distrito Federal, 1949:20) (Valladares, 2005)

A close read of the General Census of 1950 reveals that some surveys in favelas were undertaken before the publication of that document. The results of studies such as the one conducted by the Catholic entity Fundação Leão XIII (1947-48) were acknowledged at that time and probably contained some favelas sketches.

In the 1940s and the 1950s, when favelas exploded as an urban phenomenon, they were included for the first time in urban census — the Favelas Census of the Federal District (1948) and the General Census of 1950. The emergence of favelas as an urban issue came with the first census and the beginning of the official production of data (Valladares, 2005, p.63). These mappings follow the election of 1946, in which left-wing candidates had expressive voting in favelas, a fact that obliged the State to finally acknowledge its existence (Abreu and Vaz, 1991). As a result, rudimentary maps of São Carlos and Cantagalo, as well as detailed data from favelas such as Cantagalo, Babilônia, Pavão-Pavãozinho, and Santa Marta are found in the General Census of 1950. These are favelas that were at the vector of the urban expansion at that time, representing a frontier to the consolidation of formal, wealthier neighborhoods, such as Copacabana, Ipanema, and Leblon.

30 The 1948 Census Publication refers to the Favelas Census undertook by Rio's Municipality -- Censo das Favelas da Prefeitura -- while the Census of 1950 refers to the National General Census of Favelas (IBGE, 1952)

Figure 19 Map of Cantagalo



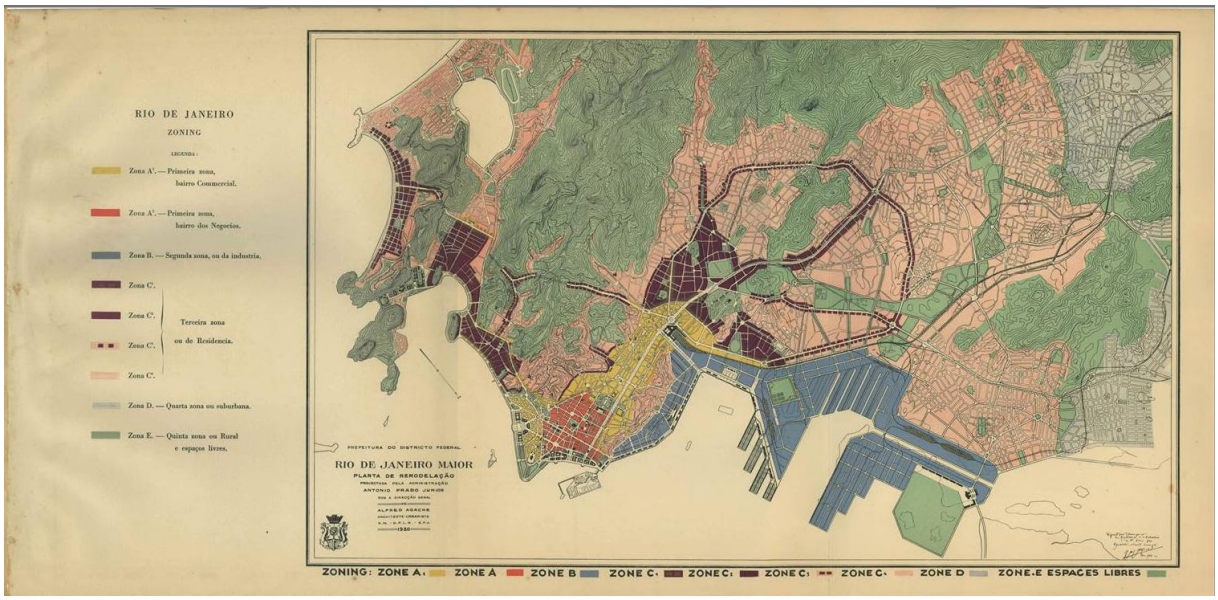
Source: 1950s Census Map (IBGE, 1953)

Before the history of favelas visibility in maps, there is a history of invisibility. In the Agache's plan of 1930 and the Building Code (*Código de Obras*) of 1937, favelas appear "in negative." Agache mentions favelas solely to justify their destruction. For him, favelas extermination would be necessary "not only from the perspective of social order and security but also from the perspective of the general hygiene of the city, not to mention aesthetics" (Agache, 1930). In his own words:

> Favelas constitute a permanent danger of fire and epidemic infections for all the neighborhoods through which they infiltrate. Its leprosy dirty is the vicinity of the beaches and the neighborhoods that are most graciously endowed with nature; it peels the slopes from its green ornaments and corrodes to the edges of the woods on the hillside (Agache, 1930, p.189-190, our translation).

Agache's text advocates for the invisibility of favelas from the wealthiest areas, and, it is not a coincidence that throughout all his maps, favelas are depicted as empty, green areas, fused to forests over hills.

Figure 20 Favelas Invisibility in Agache's Master Plan for the city of Rio de Janeiro.



Source: Agache (1930)

Similarly, the Building Code of the Federal District (1937), Section II, Chapter XV, presents a solution to the "Extinction of Anti-Hygienics Housing": to strictly prohibit the formation of favelas (Prefeitura do Distrito Federal, 1937).

On the aerial photo of the city in 1928, which was the basis for the cadastral maps in 1935, significant part of the hills is covered with blank papers. These hills were the place where sparse hovels started to configure the first informal settlements.

Figure 21 Blank spots are covering hills on Aero Photogrammetric mosaic, 1928, a basis for the Cadastral Plan, 1935.



Source: Arquivo Geral da Cidade do Rio de Janeiro (1928)

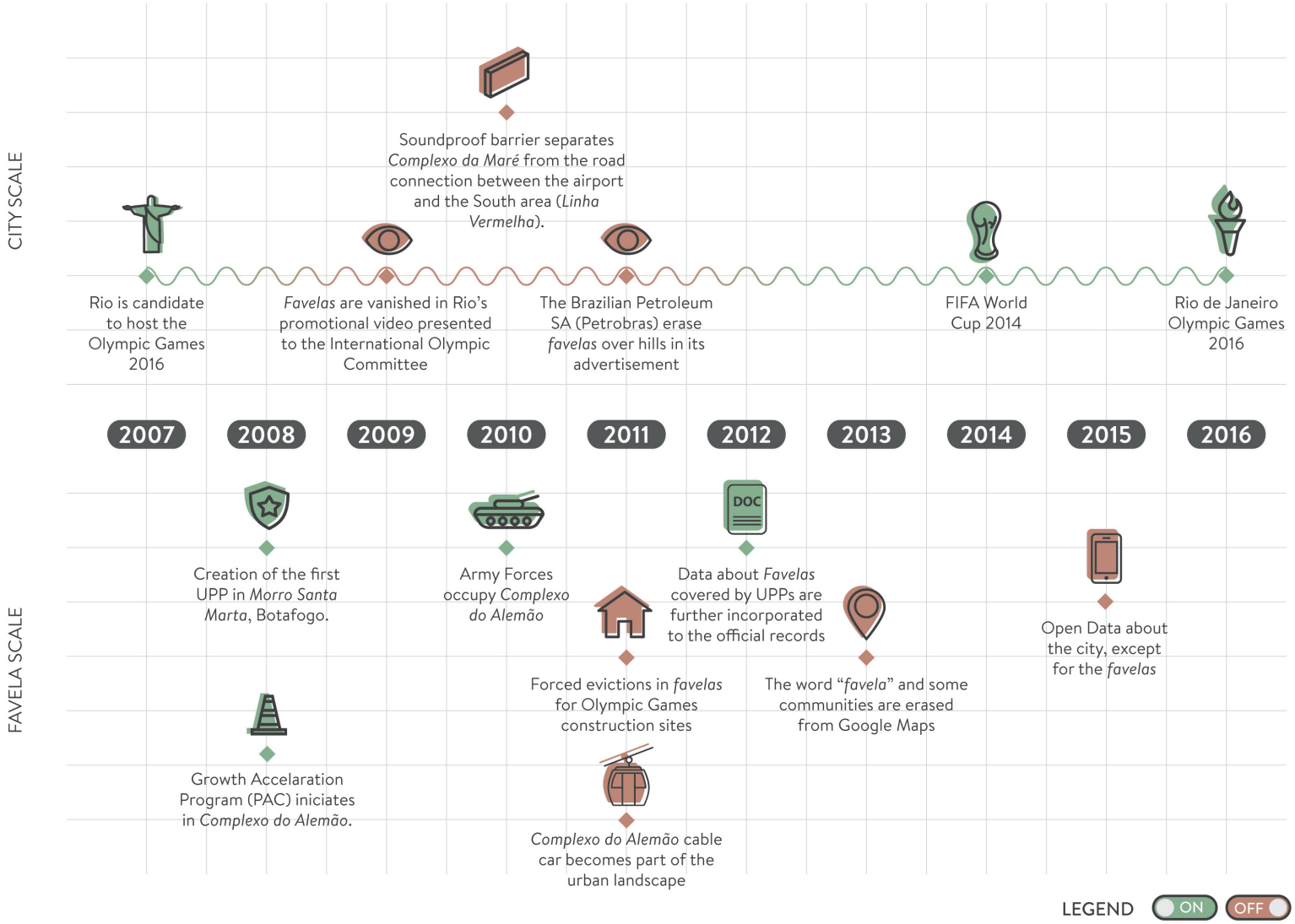
Along Rio's urban history, initiatives to deal with favelas inclusion and exclusion are fragmentary

and controversial, varying according to the government in power (right or left-wing), to the city economic and touristic situation (growth or crisis), and to cultural manifestations and temporary acceptance (carnival, soccer and samba periods). In moments when favelas are foregrounded as urban issues - be it social, political or economic -- maps often spread as a governmental tool for counting, demarcating, governing and controlling these territories.

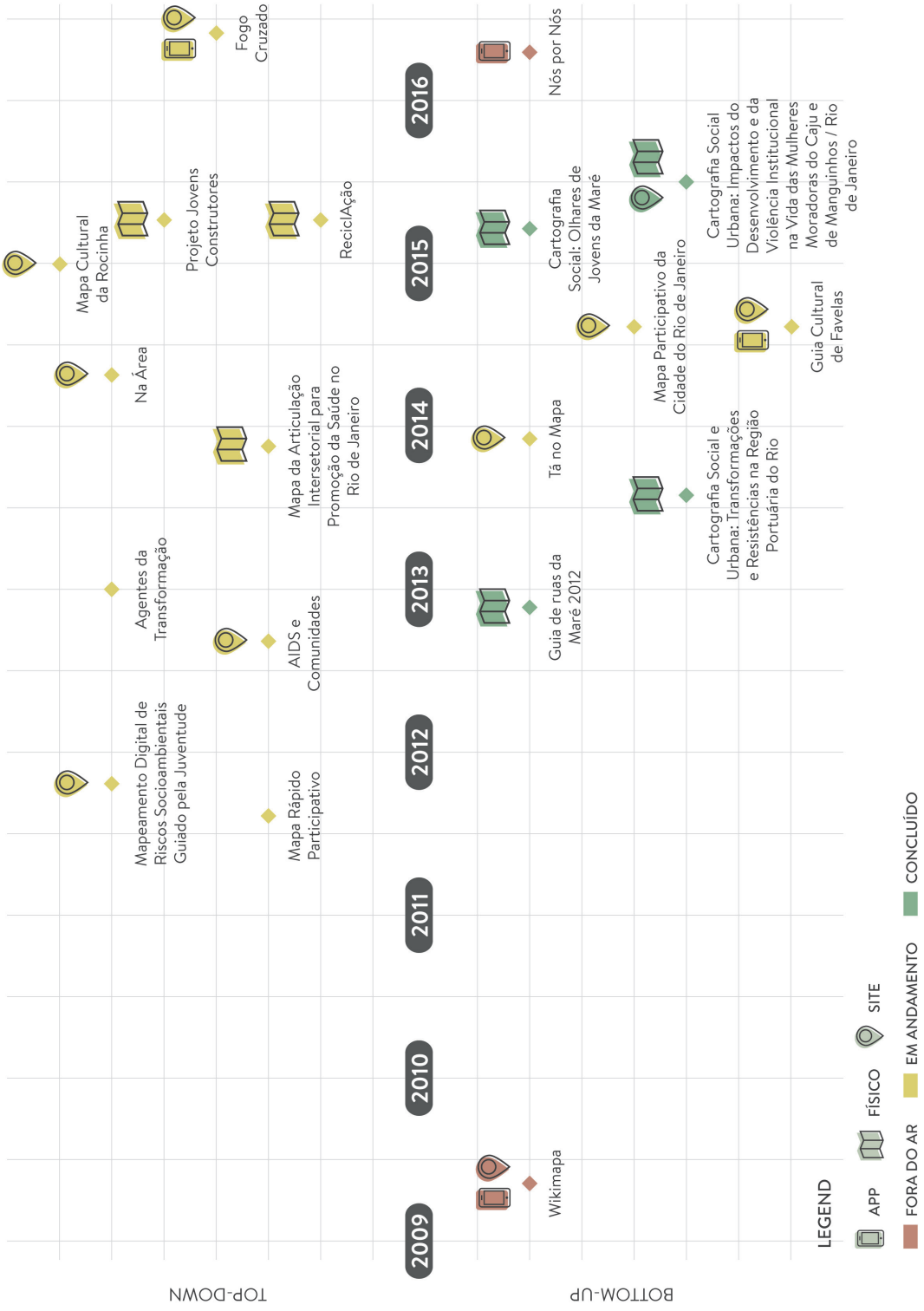
The 2010s represent a turning point on favelas visibility on maps. Previous strict to governmental action, favelas mappings start to be undertaken by different social actors such as corporations (e.g., Google and Microsoft) and NGOs (e.g., Rede Jovem and Redes da Maré). A new mode of mapping, that is digitally-enabled and participatory, undertaken by favelas residents, gain momentum. New stakeholders, together with new forms of partnership and funding, get in the dispute for favelas visibility.

As of 2016, we have registered a dozen favelas digital mappings. The following timeline (Figure 22) describes all of them, and it is punctuated by other information regarding the preparation of the city to host the Olympics 2016. A detailed spreadsheet with the raw data for the timeline, together with additional useful information, is attached. The following chapter gets into more details about some of these initiatives.

Figure 22 Timeline of the researched mapping initiatives mosaic,



Source: Author (2018)


TOP-DOWN
BOTTOM-UP
2009
2010
2011
2012
2013
2014
2015
2016
Mapeamento Digital de Riscos Socioambientais Guiado pela Juventude
Mapa Rápido Participativo
Agentes da Transformação
AIDS e Comunidades
Mapa Cultural da Rocinha
Na Área
Mapa da Articulação Intersetorial para Promoção da Saúde no Rio de Janeiro
Projeto Jovens Construtores
ReciclAção
Fogo Cruzado
Wikimapa
Guia de ruas da Maré 2012
Tá no Mapa
Cartografia Social: Olhares de Jovens da Maré
Nós por Nós
Mapa Participativo da Cidade do Rio de Janeiro
Cartografia Social e Urbana: Transformações e Resistências na Região Portuária do Rio
Cartografia Social Urbana: Impactos do Desenvolvimento e da Violência Institucional na Vida das Mulheres Moradoras do Caju e de Manguinhos / Rio de Janeiro
Guia Cultural de Favelas
LEGEND
APP
FÍSICO
SITE
FORA DO AR
EM ANDAMENTO
CONCLUÍDO

2.3 Favelas in the making of the Olympic City

Rio's last decade was marked by intense urban transformations related to the preparation of the city to host mega-events, such as the Pan American Games 2007, FIFA Confederation Cup 2013, the Apostolic Journey 2013, the World Cup 2014 and the Summer Olympics 2016. The intense concern of government and corporates with the image of the city has put a magnifying glass on the ambiguous way favelas have been treated throughout history -- a way of thinking/talking about, acting over, and *seeing/representing* favelas that combine urban inclusions and exclusions. This section focuses on favelas (in)visibilities at play along with the preparation of the city to the Olympics, focusing on the period between 2008 (when the city was chosen to host the event) and 2016 (when the event occurred).

Along the 2000s and the 2010s, the idea of favelas' integration to the rest of the city is consolidated through strategic planning to host mega-events (Cavalcanti, 2013). Integration is constructed both materially and discursively. The integrated city would be one in which *hill* and *asphalt* – local slang for *favela* and formal neighborhoods, respectively – are approached as a whole (Oswaldo Grande, 2012). In this regard, some of the most prominent integration strategies are urban upgrading and security programs. On the federal level, the Growth Acceleration Program (*Programa de Aceleração do Crescimento* or PAC, in Portuguese) stands out. The axis Urbanização de Assentamentos Precários (PAC-UAP) (2007), devoted to the urbanization of squatters settlements, encounter in Rio some of its more symbolic and visible works (Planalto, [s.d.]). On the state level, a Pacification Program (2008) comprises the occupation of favelas by the Armed Forces and the implantation of Pacifying Police Units (*Unidades de Polícia Pacificadora* or UPP, in Portuguese). PPUs have 37 of its 38 headquarters in the city of Rio. On the municipal level, *Morar Carioca* (2010) is announced as a program that would upgrade all favelas by 2016 — a goal not achieved.

PPUs are presented, by that time, as a community police model that would be able to "re-take territories" (IPP and Rio+Social, 2017) and by so, to restrain urban violence. PPUs were supposed to pave the way for social services and public equipment, such as schools, hospitals, health care, sanitation, and new job opportunities.

However, from the beginning, scholars and citizens alike have been denouncing PPUs approach, both because of excessive police violence against residents (e.g., homicides rates decreased, while missing people rates increased), as well as due to the predatory aspects of the capital that came with it (e.g. gentrification) (*Comitê Popular da Copa e das Olimpíadas do Rio de Janeiro, 2014*; Freeman, 2012). However, PPUs are also seen by many as an open door that enabled public

services (e.g., mail delivery) and economic prosperity in some favelas.

PPUs and urban upgrading strategies, together, delineate a rationale in which the urban security issue could be solved by police and social programmes as much as by urbanism (Cavalcanti, 2013). The fact that PAC Favelas was created at the same year Rio applies to host the Olympics 2016, and the fact that PPUs are announced right after Rio's candidature is no coincidence, as Cavalcanti (2013) explains:

> PAC Favelas was conceived in consonance with the demand of the strategic planning and the urban marketing that have been setting the tone of the political, discursive and imaginary construction of a city that is apt to host mega-events such as [...] the Olympics 2016 [...]. From the strategic plan point of view, the greatest obstacle for this process was the so-called 'crisis of public security,' that, over the last three decades, have been converging with the idea of the so-called 'favela issue.' (Banco Mundial, 2012; Burgos et al., no prelo apud Cavalcanti, 2013, p.196, our translation).

The making of the Olympic City advances a rationale in which urbanism (favelas urban upgrading) and the police (PPUs) are the proper answer to urban violence. They would reclaim the territorial control exercised by the drug traffic networks. "The subjacent logic [to these interventions] is that violence justifies improvements of favelas infrastructure" (Cavalcanti, 2013, p.194, our translation).

The *way of thinking* favelas as both the source of problems and solutions for the Olympic city is accompanied by a different *way of seeing* these territories and their population. The strategies to make an Olympic City involve different manners of favelas (in)visibility.

On the one hand, the media and the government draw attention to construction works, especially mobility equipment that links favelas to the rest of the city. Light is shed over large public equipment and infrastructure, such as cable cars, lifts, and bridges that connect formal to informal neighborhoods. The Rocinha walkway, designed by Oscar Niemeyer, the Cantagalo lift and the cable cars in Alemão and Providência are some examples. Besides, the headquarters of PPUs, positioned at the top of the hills, signposted and illuminated to be well-seen from below (from the "formal city" point of view), are another example (Cavalcanti, 2013).

Figure 23 Rocinha walkway, designed by Oscar Niemeyer.



Source: Rillke on Visual Hunt (n.d)

Figure 24 Cable cars in Complexo do Alemão.



Source: Clément Jacquard on Visual Hunt (n.d)

Cavalcanti (2013) refers to this process as “the spectacle of integration” and to this period as a new “*regime of visibility* of favelas." This regime "re-signifies the social contrasts and the historically constituted boundaries [between favelas and the rest of the city] with the spectacle of its incorporation to the formal city" (Cavalcanti, 2013). This new regime of visibility puts in evidence the integration, more than the favela itself:

> The juxtaposition of urban upgrading with speeches and performances of 'pacification' spreads a powerful message. PAC projects have substantial effects on the urban landscape by combining the following features: they emphasize the favela as a scenario, they are visible over great distances, and they underline the connections or passages between the favela and the so-called formal city. In this way, they produce an ambiguous regime of (in) visibility of this space, in which it is not the favela, as such, that stands out in the landscape, but the spectacle of its "integration" into the city (Cavalcanti, 2013, p.201-202, our translation).

On the other hand, at the same time that some elements are turned highly visible, other features are cast into the shade. In 2008, in the five minutes video that promoted Rio de Janeiro to the International Olympic Committee, no favelas are surrounding the competition areas, as reported by Kfouri (2009).

> "Hurray! There are no more favelas in Rio! "
>
> The capital of Rio de Janeiro was divided into four areas: Copacabana (south), Barra da Tijuca (west), Deodoro (west) and Maracanã (north). In each of them, stadiums, sports villages, places of sports games were shown. There were no favelas.
>
> [...]
>
> An example of the absence of favelas can be noticed in Maracanã, a stadium flanked by the Mangueira hill. The favela does not appear in the film. The stadium, with all the modifications planned for the year of the Olympics, is shown from an angle that keeps it hidden. Likewise, in the region of Barra da Tijuca and Jacarepaguá, where the Olympic Village and various buildings and units related to the Games will be located, the favelas of Cidade de Deus, Rio das Pedras and Jardim Azul were not shown. Also, the João Havelange stadium (the Engenhão, in the north zone) appears in an angle in which favelas around are not shown. Even the nearly circular, panoramic images of the Corcovado do not exhibit the populated hills that exist in the vicinity, such as Dona Marta and Cerro Corá.
>
> Responsible for the presentation of the future competition points, the committee's sports director, former athlete Agberto Guimarães, repeated in his talk and an interview that one of the team's goals is to draw the attention of the IOC [International Olympic Committee] evaluators to the privileged nature of the Rio de Janeiro.

> "We have to explore the beauties of Rio, the beaches," said Agberto, who showed the emissaries of the Olympic Committee a photo of Copacabana beach in which, in the distance, the Cantagalo favela is almost obscured by the sun's rays (Kfouri, 2009, our translation).

Thus, the Olympic project, while promoting the "spectacle of integration" (Cavalcanti, 2013), obscures significant aspects of urban reality, such as those related to the tensions at the interface between the favela and the formal city. Integration (inclusion) and segregation (exclusion) coexist at the same historical moment and even in the same favelas.

Strategies for making favelas invisible include (1) physical invisibility, through eviction or construction of visual barriers; (2) virtual or symbolic invisibility, through the editing of photos, videos and maps; and (3) discursive invisibility, through narratives that propagate an idea of supposed "re-foundation of the city" and operation of a "social miracle" associated with urban upgrading and "pacification".

Some registers offer an overview of these actions of (in)visibility:

2007. Rio is chosen to host the 2016 Olympic Games.

2008. The first PPU is installed - Morro Santa Marta, Botafogo. Works from the Growth Acceleration Program (PAC) take place in the Alemão favela complex, the most significant public investment ever directed to the favela complex. The program includes projects for housing, cable car, urban infrastructure, and community spaces. Of the 18,000 PAC government actions to date, the Complexo do Alemão works are considered the most symbolic and visible (Planalto, [s.d.]).

2009. Copacabana, Barra da Tijuca, Deodoro and Maracanã: beaches, stadiums, sports villages, places of sports competition. In the video that promotes Rio to the IOC, hills are sometimes hidden by the angle of the film camera, sometimes obscured by the brightness of the sun. There are no favelas in Rio (Kfouri, 2009). The city is chosen as the venue for the Olympics 2016.

2010. Maré Complex: an acoustic and visual barrier is built along the expressway connecting the Galeão International Airport to the Center, Zona Sul (south zone) and Barra da Tijuca. Complexo does Alemão: the Armed Forces, together with the civilian and military police, soldiers, helicopters, tanks and artillery of war occupy the complex, in what would be described as the most significant mobilization for entry into favelas executed by the government of the State of Rio de Janeiro. Mayor Eduardo Paes declares that the event represents almost a re-foundation of the city (Globonews, 2010).

2011. News about forced housing eviction in favelas to the accomplishment of works of the World Cup 2014 and the Olympics 2016 spread in media.

2011. The Brazilian Petroleum SA (Petrobras[31]) advertisement erases favelas from the mountains next to the beach, making it seem that forests punctuate all the touristic areas.

2012. The favelas with PPUs (38 of the 1,071 identified in the 2010 Census), which until this date were not included in the official municipal cadastral maps, are incorporated by the Pereira Passos Institute (IPP) into the corporate base of the City Hall. The other favelas remain empty cartographic.

2013. The word "favela" is excluded from most of Google Maps, and some communities appear on the virtual map of the city as parks or hills. Social groups interpret that the digital removal complements and reinforce the process of material evictions of favelas from the urban landscape (Consentino, 2013).

2014. The Urbanism Institute of the Municipality of Rio de Janeiro (IPP) launches the Rapid Participatory Map (MRP) of urban equipment and commercial establishments in favelas. The initiative is presented as another step towards integrating the favelas into the rest of the city (IPP, 2014; Vial *et al.*, 2015).

2015. The IPP starts the Mapping of the favelas reached by PPUs, which now composes the City's databases and also the Digital Map of Rio de Janeiro (pcrj.maps.arcgis.com). However, in the Open Geographic Data Portal of the city of Rio de Janeiro, the favelas continue as cartographic voids until the closing of this thesis (portalgeo-pcrj.opendata.arcgis.com/).

The game of hiding and revealing favelas associates the discourse of absences previous to the sporting event to the discourse of the presence of the State and a supposedly positive Olympic legacy. The spatial visibility imposed on some favelas does not seem to be accompanied by the adequate social visibility of the majority of its residents. In other words, the "spectacle of integration" (Cavalcanti, 2013) between formal and informal urban fabrics is not necessarily accompanied by the social integration of slum dwellers.

The complexity of the "lights and shadows" over favelas is even more evident when different favelas are compared. In the same year that the Alemão cable car was inaugurated in 2011, the cluster of favelas Maré is hidden by a wall that separates it to the highway that links the international airport to central areas. The study "The Walls of the Invisible," by *Redes da Maré*, shows that significant

31 Brazilian state-owned oil research, extraction, refining, transportation and sales company.

part of Maré's population perceives the walls like an urban makeup that is part of the production of the city for the mega-events (Redes da Maré and Observatório de Favelas, 2011).

Combined to urban upgrading and PPUs, a social program, called Rio +Social, is undertaken with the objective of articulating and promoting social actions in "pacified" territories. IPP held Rio+Social in partnership with the United Nations Program for Human Settlements (UN-Habitat). IPP is a local autarchy responsible, among other tasks, for the production and diffusion of knowledge about the city through cartographic and statistical information. The binding of the Rio +Social to the IPP reveals how the local government relates cartographic information with integration, reinforcing that digital mapping equals urban inclusion.

> It was not by chance that the City Hall bound the Rio +Social to the IPP. When you gather specialists in information, georeferencing and data management, this allows the construction of opportunities for major projects for inclusion, like the initiative of mapping the streets of the pacified communities (IPP, 2015, our translation).

The government's efforts to map, as the effort to urbanize and pacify favelas do not reach all of Rio favelas, but a small portion, situated on the wealthiest, touristic areas, covered by PPUs. The following map overlaps data about Olympic clusters and PPUs. The Municipality entirely mapped favelas covered by PPUs. (See Appendices: Figure 25)

Complementary, drawing from Faulhaber and Azevedo (2015) and the report “Rio de Janeiro of the Games of Exclusion” (*Rio de Janeiro dos Jogos da Exclusão*[32]), from the “Comitê Popular da Copa e Olimpíadas do Rio de Janeiro” (Comitê, 2016) the following maps show two different strategies of invisibility — housing displacement and homicides by the police. (See Appendices: Figure 26)

Overlap of these maps with the map of planned growth of Rio (*Plano Diretor*) and the map of the Human Development Index (HDI) reveal a pattern of pushing the lower classes towards the West zone. (See Appendices: Figure 27)

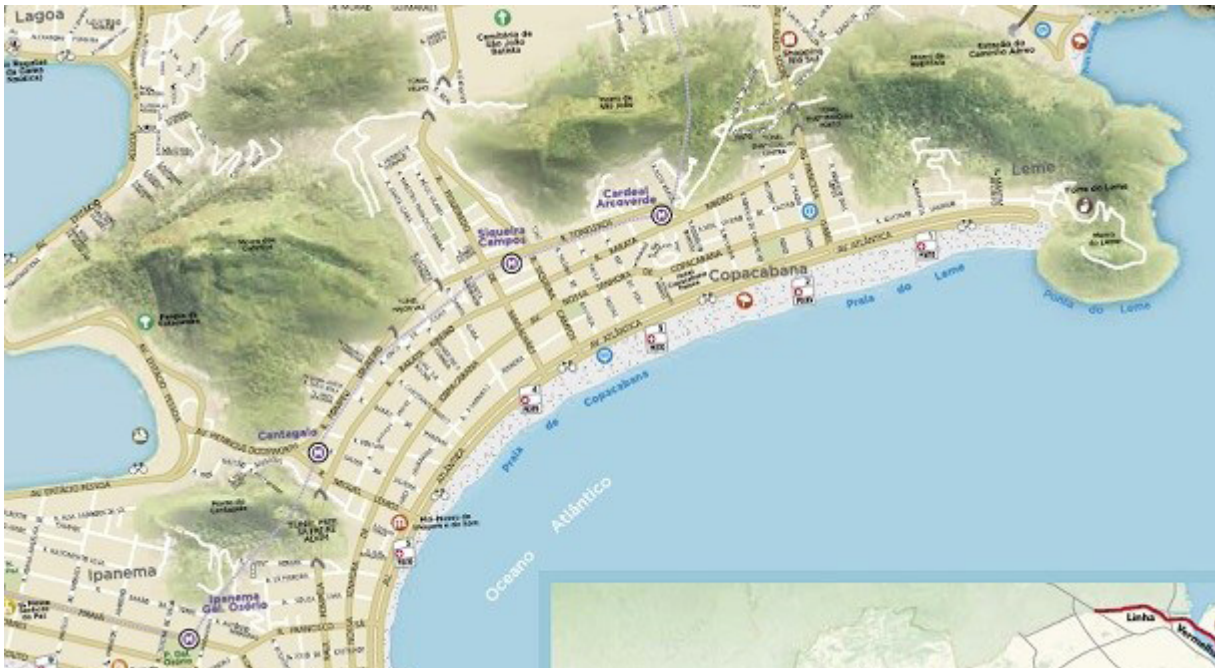
The current Urban Plan of the City of Rio de Janeiro does not induce urban growth to the West. Favelas' population is huge in this area. More than 35% of the favelas' population (274.739 of 1.443.773 inhabitants) is in the Planning Areas 4 and 5 (AP4 e AP5) (Cavallieri and Vial, 2012). These are areas in which favelas often remains invisible, not only on images, narratives, and maps about the Olympic city but on the visual thought embedded in Rio's urbanism. (See Appendices: Figure 28)

32 Available at: <https://issuu.com/justicaglobal/docs/mapa-jogos-da-exclusa__o>. Accessed: January, 2019

The majority of favelas that are visible on maps are situated on the South zone and its adjacencies (Planning Area 2 - AP2). The South zone is the wealthiest area of the city and just a small portion of favelas residents live there. It has high demographic density, concentrates upper middle and high classes' neighborhoods, and nearly 1.000.000 inhabitants, of which 174.000 are favela's residents. This amount corresponds to no more than 17% of the favelas' population in the city (Cavalieri and Vial, 2012). (See Appendices: Figure 29)

The fact that some favelas are now digitally visible does not mean that they are indelibly part of the city maps, in any case. As we write this text, in 2017, pamphlets produced by Riotur, a governmental department that foments tourism, are being distributed to citizens and tourists. The areas on the South zone, occupied by favelas such as Dona Marta (Botafogo), Babilônia (Leme) e Cantagalo (Ipanema), are represented as forests. According to a Riotur representative, "favelas are not on the map due to a technical recommendation of the cartography company that elaborated the maps." The company, in turn, justify that favelas were excluded because they are occupied irregularly. It is worth mentioning that these maps were drawn up to be distributed, at first, along the FIFA Confederations Cup (2013), the first of the series of mega-events hosted by Rio[33] (O Globo, 2017).

Figure 30 Touristic map of the city of Rio de Janeiro.



Source: Riotur (2016)

33 Available: <https://oglobo.globo.com/rio/folheto-da-riotur-distribuido-turistas-tira-favelas-da-geografia-da-cidade-21806418> Accessed: January, 2019.

The promotion of a new regime of visibility of favelas is emphasized in the context of a mega-event, the development of new urban images is not a recent or exclusive phenomenon of Rio. Mega-events such as the 2016 Olympics is one of the features of this resumption and of this attempt to reinsert the city on the global scenario of "inter-urban competition" (Harvey, 1998). It involves, once again, the activation of architectural and urbanist knowledge for the projection of future scenarios, as well as the re-creation and international projection of urban representations and the transformation of the regime of visibility of the city.

The strategic agenda for the Olympics 2016 is entangled with urban conflicts, such as urban violence, forced housing eviction and violation of human rights by the state (*Comitê Popular da Copa e das Olimpíadas do Rio de Janeiro*, 2014). In this scenario, visibility/invisibility, integration/segregation, inclusion/exclusion, participation/domination, are not a simple matter of on/off, in/out, or yes/no, but blurred processes, with no clear lines. Favelas, territories that were until recently more "opaque" to the globalization and the capital are more "urbanized" (on a broad sense). Gradually, favelas are turned into more "luminous spaces" (Santos, 2009, 2012), albeit in many occasions in detriment of interests of their residents.

However, this transition from opaque to luminous occurs on a field permeated with tensions, such as the systematic social and political exclusions of favelas and its populations along Brazil history and the encounter of these historical exclusions with the progressive attempt to consolidate favelas integrations as a public policy in Rio. They also coincide the recent transformation in its regime of visibility in the context of the preparation of the city to host the Olympics 2016 and thus attracting tourists and investments (Cavalcanti, 2013; Consentino, 2013; Maia, Mendo, and Ramos, 2015).

2.4 Conclusion: The nuances of (in)visibilities and in/exclusions

The complex relation of favelas with the urban (inclusions *and* exclusions) is simplified to the point of depicting these spaces and its residents as invisible, excluded, or at the margins of a system. However, this is not accurate. Reflecting upon urban poverty and politics in Rio's favelas along almost fifty years of empirical research, Perlman (2005) concludes that exclusion or marginality, in this case, is a "myth."

> Favelados [favelas residents] are not marginal but inexorably integrated into society, albeit in a manner detrimental to their interests. They are not separate from or on the margins of the system but are tightly bound into it in a severely asymmetrical form. They contribute their hard work, their high hopes, and their loyalties, but do not benefit from the goods and services of the system. They are not economically and politically marginal, but are exploited, manipulated, and repressed; they are not socially and culturally marginal, but stigmatized and excluded from a closed class system (Perlman, 1979, p.195). This continues to be the case today (Perlman, 2005).

Roy (2002) stretches the argument to the global scale, and says that urban informality — as a global mode of metropolitan urbanization — is produced by the State itself. For her, informality is a *state of exception* (Agamben, 2004) from the formal order of urbanization, meaning that the production of informality is not a chaotic process or a result of the disorder, but an order suspension enacted by the planning and legal apparatus of the State. By suspending or establishing order, State apparatuses (urban planning included) construct categories of legitimacy and illegitimacy, and "determine what is informal and what is not, [...] which forms of informality will thrive and which will disappear" (Roy, 2002).

> Engagement with informality is in many ways quite difficult for planners. Informal spaces seem to be the exception to planning, lying outside its realm of control. In this sense, informality resembles [...] a seemingly natural phenomenon that is external to those studying it and managing it. However, [...] informality and the state of exception that it embodies is produced by the state. This is apparent in all its various forms, from the gated, high-end informal subdivisions to squatter settlements. Planning is implicated in this enterprise. To deal with informality therefore partly means confronting how the apparatus of planning produces the unplanned and 'unplannable' (Roy, 2002, p.155-156).

Moreover, reinforcing that marginality, visibility and exclusion are terms that do not grasp the complexity of power relations inside favelas and on the interface between favelas and the rest of the city, it is worth mentioning that the State was not absent of favelas before. Lopes de Souza (2012) explains:

> A sentence like 'the States has always been absent [of favelas]' is rhetoric and politically comprehensible, but, in the last instance, not very precise: be it in political incursions, be it through clientelism, the State has always reached segregated spaces (Lopes de Souza, 2012).

Understanding favelas as functional to urban dynamics -- for example, to the Brazilian housing market (both formal and informal) -- is a far more nuanced approach of its urban condition. This approach rejects dualities such as formal and informal, inclusion and exclusion, central and

marginal and visible and invisible.

The contextualized analysis of the disputed visibility of favelas throughout Rio's historical evidence that *visibility is not by itself equals to urban inclusion* -- and it has never been. Bearing this in mind, Chapter 5 gets into details in some of the most prominent cases of digital mappings and critically addresses narratives of digital visibility as a shortcut to urban existence.

FIVE

5. (In) visibilities at play in favelas' digital mappings

Abstract

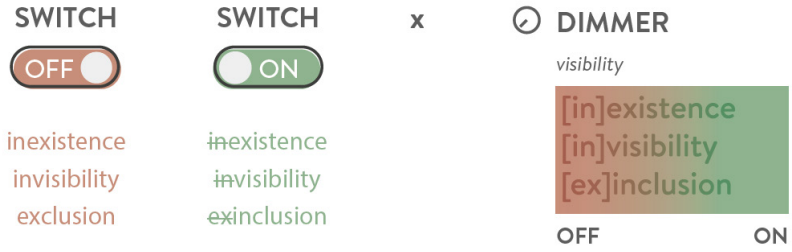
An overview of different modes of favelas (in)visibility throughout history has shown, in the previous chapter, that visibility and invisibility intertwine in the making of a city, shifting in consonance with political, social and economic configurations. However, recently, the worldwide phenomenon of digital mapping of informality obfuscates this understanding. Digitally mapping informal settlements comes with a tantalizing promise that digital visibility would represent a shortcut towards an urban existence for a long time denied. Critically unpacking this statement, this chapter offers a detailed **analysis of the narratives around favelas digital mappings in Rio**. It suggests that a "myth of (in)visibility" surfaces in this specific context. The surveyed mapping initiatives share rationalities, methodologies, and techniques while advancing at least three misconceptions about a new nature of favelas' urban inclusion. This analysis contests the affirmation that digital visibility equals to urban inclusion and indicates the necessity to investigate further the role that digital visibility plays in the making of smart cities.

5.1 Introduction: Digital Visibility is a right to exist in the city?

Critical urban scholarship suggests that in digital mappings of informality across the Global South -- a phenomenon that came to be known as the "digitization of slums" — would lay the "seeds for an alternative SU" (McFarlane and Söderström, 2017). Digital technologies, in these cases, would "have a visual power that influences thinking and practice" and could potentially lead towards a more socially just use of digital technologies to urbanism (McFarlane and Söderström, 2017). Critical studies also suggest that against government efforts to maintain entire communities invisible on maps, lower classes mapping their informal settlements all over the world would be acting to show that they are *in the city* (Roy in GlobalPOV, 2013).

Whereas digital visibility in many cases helps to advance socially progressive goals that lead towards more urban inclusion, this is not a straightforward process. Digital visibility is not a switch on/off mechanism, in which visibility is the same as urban inclusion and invisibility is the same as urban exclusion. Instead, visibility involves political choices, and these choices always produce invisibilities. Metaphorically, visibility of informality via digital mappings is a dimmer switch that throws light into some aspects, while letting others in the shade.

Figure 31 Dimmer as a metaphor for how inclusions and exclusions (shadows and light) coexist in the making of favelas digitally visible.



Source: Author (2018)

Taking as illustrative examples seven digital mappings of favelas in Rio, these chapter highlights some of the elements that are turned invisible throughout mappings process, while draws attention to three misconceptions about (in)visibility that surface in this specific spatial and temporal context (Rio 2008-2016).

5.2 The unfolding of digital visibility on mappings

From the early 2010s, various actors – social activists, local government and tech companies – have been engaged in mapping favelas in Rio using smartphones and web 2.0 platforms, as well as in opening spatial data online. Many of these initiatives are presented as a decisive shift in the way favelas are seen and experienced. Considering that favelas were not completely invisible before, we confront the narratives that go together with the promotion of favelas' mappings, with a focus on digital visibility and urban inclusion.

By the end of 2015, fourteen initiatives of digital mapping of favelas were registered. To illustrate the diversity of proponents and sources of financing — civil society, government and private sector — the following were detailed: Street Mapping, *Mapa Rápido Participativo*, and *Mapeamento Participativo da Cidade do Rio de Janeiro* (Urbanism Institute, IPP, Rio's Municipality); *Wikimapa* (NGO Rede Jovem); *On The Map* (Google, JWT and Afroreggae) and *On the Area* (IPP, Microsoft). The material was systematised in spreadsheets (Annex I).

As we go through the marketing material of all the mapping initiatives, a common discourse arises: digital visibility is directly linked to urban integration and the rightful existence of favelas in the city.

For example, a participant on *Wikimapa*, states: 'The goal is to give visibility to the local potential and to shorten the distances between the city and the favelas - after all, one is part of the other.'

(Wikimapa, 2015). Representatives of the NGO *Afroreggae*, partner of the tech company Google on the project On the Map, believe that 'today we can bring visibility and enable these people to be part of the society as a whole' (Beyond the map[34]). A public agent, presenting the *Mapa Participativo da Cidade do Rio de Janeiro* says that 'the highest intent of this project is to integrate Rio as a unified city.' (Conselho Comunitário de Manguinhos and IPP, [s.d.]).

Each one of these mapping projects represents a particular moment of the visibility of favelas in the recent urban history of Rio, marked by the preparation of the city to host the Olympics 2016 and an attempt to position Rio and its favelas in the global economic scenario. In this chapter, we present the initiatives as described by their proponents, its outputs, the mapped favelas and the criteria the initiators used to select them. We conclude with a comparison between the initiatives, and a critical perspective on their narratives around digital visibility.

5.3 Government: Mapping Streets, Rapid Participative Map, and Mapeamento Participativo da Cidade do Rio de Janeiro

According to Luque-Ayala and Marvin (2016), Rio has been often showcased as an exemplary smart city, mainly due to the operation of an IBM control room, the *Centro de Operações do Rio* (COR). Initially referred by the local government as part of a smart city strategy, different initiatives linking urban planning and management to digital technologies started to be referred to as part of a smart community strategy. In counterpoint to critiques related to the role of the citizen in the smart city, a smart community would be an environment in which citizenship and participation are keys to urban development[35].

To the Municipality, a smart city or community would be one that uses digital Information and Communication Technologies (ICTs) to gather and analyze data. This goal can be accomplished by the association of multiple performances: of devices, like cameras and rainfall sensors; of activities of technicians from the government, in fieldwork or deskwork; or of contributions of the society, through data generated voluntarily or involuntarily via *crowdsourcing* in digital social networks. In a diagram presented by the Municipal Urban Planning Department representing what Rio would be, open data and the participative platforms appear in the intersection of all

34 Available: <https://beyondthemap.withgoogle.com/pt-br/>. Accessed: October 2018

35 . The vision of Rio de Janeiro as a smart community is addressed by Franklin Dias Coelho, Secretary of Science and Technology for the City of Rio de Janeiro, in interviews about Rio de Janeiro's success in being named a Smart Intelligent Community. Available: <https://www.youtube.com/watch?v=k52P0DGteRc> and <https://www.youtube.com/watch?v=ZmbI4o6qKLc> Accessed: October 2018.

the strategies that involve the making of a *Smart City* (as shown previously in Figure 1, Arueira, Medeiros and Souza, 2015).

The systematization of geospatial information is shown as "the key to integrated and innovative answers" (IPP, 2015). The strategic plans of the City Hall for the years 2009-2012, and for the years 2013-2016, both entitled *Post-2016*, indicate, respectively, the implantation of a unique geo-referenced database and the definition of protocols for geo-referenced information as landmarks on the official schedule (Prefeitura do Rio de 2009; IPP, 2013). In 2013, a partnership with the State University of Rio de Janeiro was announced by the City Hall for the creation of the laboratory dedicated exclusively to the study of geo-technologies, the RioLabGeo (IPP, 2013). Still, in 2013, the Municipality renews its contract with the company ESRI, supplier of GIS software, through its subsidiary in Brazil, Imagem, for licensing, update and acquisition of extensions for ArcGIS (Rio Transparente: Controladoria Geral do Município, 2016). These and other actions reinforce a series of initiatives of georeferencing data previously inexistent or disperse, such as data from favelas.

By the beginning of the 2010s, the Municipality had announced the use of geo-technologies – with emphasis on citizen participation – as a turning point in the way favelas are seen and treated. The making of maps is presented as a privileged way of participation. Through favelas mappings, the City Hall invites the population to exercise what would be not only a new form of mapping but also a new way of exercising citizenship (Veiga, 2014).

Considerable confidence is deposited on digital technologies. Favelas residents are presented as the best source, the best sensor, the more trustworthy mapper, capable of circulating the territories, able to assure the flow of data from the alleys to the institutional cabinets. Favelas residents, we are told, could be seen from now on as a privileged citizen, a component of a smart community, the protagonist of the desired urban integration.

Announcing the goal to map all the favelas with UPPs by 2016, the City Hall leads three initiatives: Mapping Streets, Rapid Participative Map (MRP) and Participative Mapping of the City of Rio de Janeiro (MPCRJ). While they have different methodologies, contents, objectives, and agents, we can interpret them as part of a broader promotion strategy of the image of a city that is unified and cohesive, without conflicts or dissents.

5.3.1 Mapping Streets

A ZIP code is necessary to receive a mail, to open a bank account or to request land tenure. The most of favelas residents do not have a ZIP code, because the Municipality does not recognize many of the streets as official. The recognition of an official street is made by municipal decree and, in order to subsidize it, a sketch of the alley, and its immediate surroundings are needed. For a representative of the Municipality, mapping favelas is a democratic initiative, because it recognizes the dwellers' rights regarding their daily spaces of living and circulation and therefore their identity. "This principle could help to end the segregation between the formal city and the informal city" (Souza, 2012).

According to Souza (2012), the lack of favelas mappings also leads to difficulties in localizing, implementing and maintaining urban equipment, infrastructure, and services. Moreover, it would turn difficult identifying and signaling routes in emergencies, like storms. It would also make it harder to allow access to emergency services such as firefighters and ambulances.

Building upon these justifications, and defending that mapping would assure urban inclusion, expanding citizenship and promote rights to the city, in 2012, the social programme Rio +Social announced its intention to map streets of all the favelas with UPPs.

The mapping began as a process of consolidation of information in a single GIS basis. Different cartographic bases such as cartographic restitutions, aero photogrammetric and orthophotos from the IPP, registration of streets by the 2010 IBGE Census and the PAC, urbanization projects, land tenure registers, and even sketches made by field workers from the health system were unified (Souza, 2012).

Once this information was consolidated, fieldwork was the next step. Rio +Social program selected from one to three residents of territories with UPPs to perform paid activities for three months. These mapping agents were part of a one-month training held by civil servants about participative management and how to localize themselves on maps. Their task was to verify the disparities between what was presented in the data that was unified on the GIS before and the actual configuration of the settlement.

The residents received maps generated on GIS printed on paper. Through visual checking and interviews with other residents, they were able to reject or validate the available information. In particular, they observed if the streets were correctly traced on the map if there was circulation through *tunnels* and "*lajes*" (beneath or over the houses) and the names by which the streets were recognized. The IPP noticed that in many cases the maps were different from the reality, due to

the rapid change of streets configuration, mainly related to the construction of "*puxadinhos*" – privatization of spaces and interruption of public circulation by gates or edifications (Souza, 2012).

After this validation on the field, the scratched maps were addressed to the IPP office, where the new data was, and the street bases of the City Hall were updated.

Throughout the process, the importance of the fieldwork continually surfaces. A mapping agent reports that even with training, reading streets is confusing when the mapper is a favela resident but is not a resident from the targeted mapped favela. The following passage draws attention to the private/public dynamics, as well as to the verticality of the urban configuration.

> In Rocinha, for example, I think it is necessary to live at least five years to understand the streets. A path that seems the continuation of a street might be an abyss. An alley might be part of a house. Once, I got into an alley to map, I found myself in front of a dog and only then I realized that I was in private property. In other areas, like the "beco dos malucos" (the mad alley) the paths and houses are sometimes a labyrinth, at least for outsiders. Once, there was this street in which I was going down, and then I realized I was in a much higher place than before, without even realizing that I was going up. (Interview, 2015, our translation)

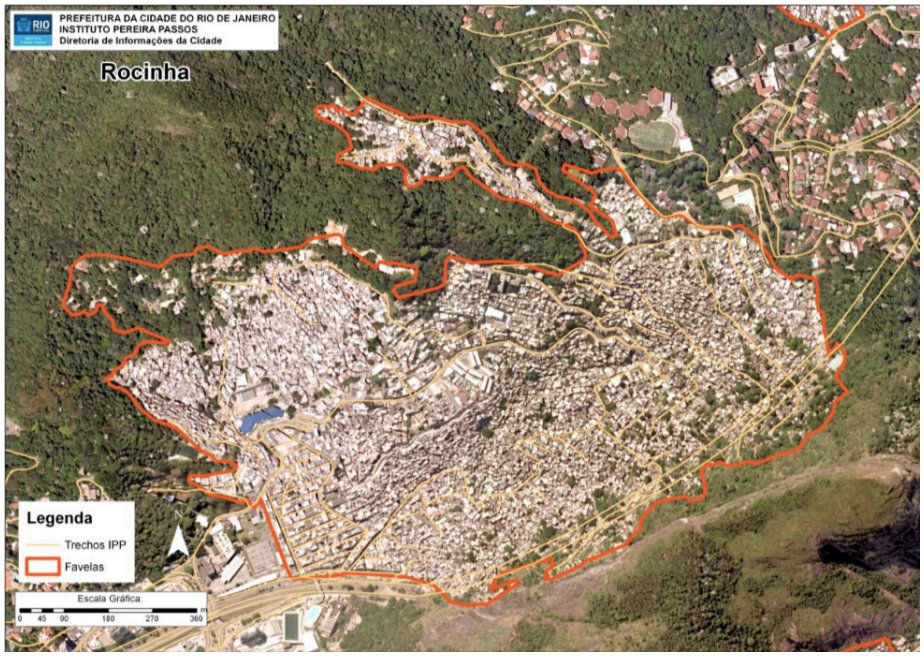
Another question that requires empirical knowledge of the territory is the identification of streets. For example, in some areas, residents recognise the same street by different names, or several streets by the same name, as is the case of numerous alleys and lanes known as *Amor Perfeito* (Perfect Love), in favela Pavão-Pavãozinho. This repetition happens due to the organic growth of the favela: a street quickly spreads into new ways as new houses are built. The junctions and smaller alleys end up keeping the original name.

Another issue about street names involves a "culture" among civil servants to not allow streets named after living people or people killed by perforation (like knives and guns). Thereby, streets recognized by the name of an old resident or a shop owner, a common practice in many favelas, have their name changed on maps. In an analysis of the mapping process for the *Guia de Ruas da Maré* (Maré's Streets Guide, our translation), writes:

> […] it was established a sort of "culture" inside the Municipality, a rule, which does not find legal support, that natural death, or "non-perforation" death (in an explicit reference to guns), would be a requirement for name a street after deceased residents, a procedure that requires the application of death certificate and a petition. […] In the favelas of the city, which are the main stage of permanent conflicts between State forces and organized crime, both of which make fatal victims, this unformalized rule prevents to pay tribute for residents who have been targets of these conflicts, regardless of whether they were an

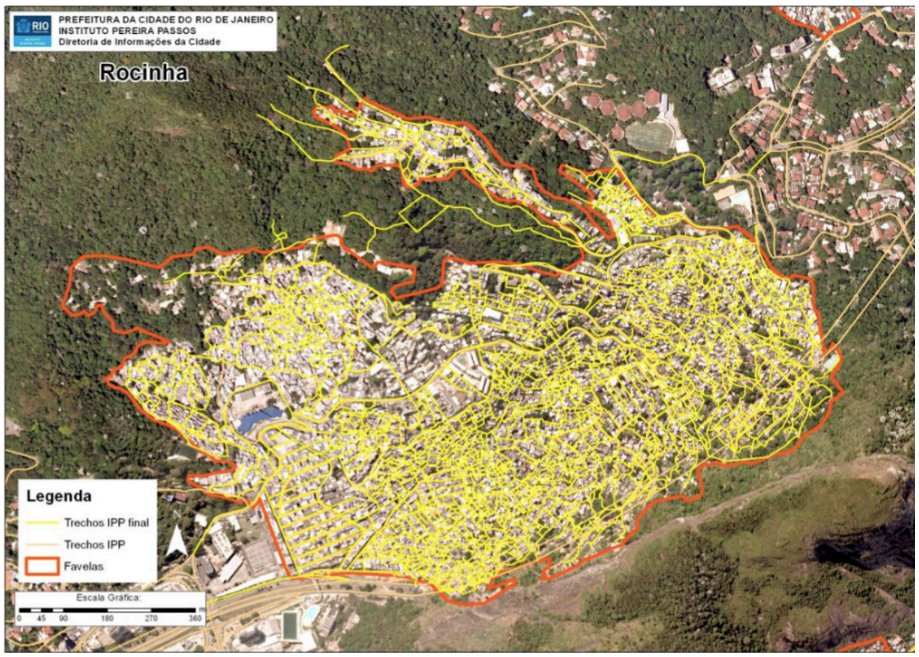
active part of them or not. If, to a certain extent, this practice contributes to maintaining a particular pattern with respect to the most frequent street names in the rest of the city, it is possible to argue also that it contributes, along with several other structural mechanisms, *to make the context of violence* that these favela populations face in the city of Rio de Janeiro invisible (Pernasetti, 2016, our emphasis, our translation).

Figure 32 Example of cartographic basis of Rocinha before the Mapping Streets project.



Source: Mapeamento de Logradouros e Gestão Territorial das Favelas do Rio de Janeiro (IPP, 2012)

Figure 33 Street mapping of Rocinha, after the Mapping Streets project.



Source: Mapeamento de Logradouros e Gestão Territorial das Favelas do Rio de Janeiro (IPP, 2012)

5.3.2 Rapid Participative Map (Mapa Rápido Participativo or MRP)

The Street Mapping set the basis for two other mapping initiatives – the MRP and the pilot project of MPCRJ in Manguinhos.

In 2012, the Rapid Participative Map (MRP) started in favelas with UPPs with the declared objective of providing a better diagnosis of favelas. This diagnosis would benefit from the perspective of the residents of the favelas, and would help to approach informality in the same ways as that of the so-called formal city (IPP, 2015).

According to the manager of Housing Studies in the Information Direction of the IPP, the project came from the need to study favelas better. It was acknowledged that favelas were not homogeneous, as seen before. It was necessary to identify difference inside of a favela and among favelas, as well as to qualify and to georeference these differences in order to monitor and identify investment priorities (Interview, 2015).

The project consists in generating maps with information about eight themes: (1) streets signaling and post services; (2) infrastructure and mobility; (3) constructive patterns of housings; (4) water supply; (5) sewage; (6) drainage and pluvial waters; (7) garbage collection and; (8) public lighting and power supply.

This georeferenced information is turned into indicators – from 0 to 6 – and graphically represented in colors – from red to green – from the worse to the best urban conditions.

As with the Street Mapping, the MRP selected from one to five residents – depending on the favela extension – to the paid function of the mapping field agent, for three months. Almost all the agents were the same involved in the previous initiative. In the same way, they were trained and supervised by IPP technicians. The empirical knowledge of the territory and the social networks already assembled facilitate the work of these residents/agents, allowing a quick and low-cost mapping.

The work was divided into two phases, each one of them composed of two other stages. The first comprised the field work for the identification of micro areas – the delimitation of areas in the interior of a favela that had common features and that could serve as a reference unit to the mapping, similar to the census sector ("*setor censitário*") of the IBGE. The limits of these micro areas were georeferenced. The second phase comprised the field work for diagnosis and, right after, the georeferencing of data.

In this second phase, the diagnosis required visual checking and interviews. For visual checking,

agents received maps in paper with the geo-referenced micro areas, a notebook of references and a formulary.

A notebook of references is an illustrated dictionary that shows questions to be asked to other residents. To each question, there are sample answers. Each answer has a photo that corresponds to a meaning. According to one of the coordinators, this enables the field agent to "have what s/he needs to observe, what s/he needs to see to be able to delimitate this area. In the case s/he is unable to gather that information based on what s/he is seeing, s/he goes back to the training, to know each of the items s/he must observe" (IPP, 2013b, our translation). The training to fill this notebook is essential, we are told, to "*homogenize* the understandings of the categories and to guarantee the maximum [homogeneity of] answers pattern" (IPP, 2013b, our emphasis)

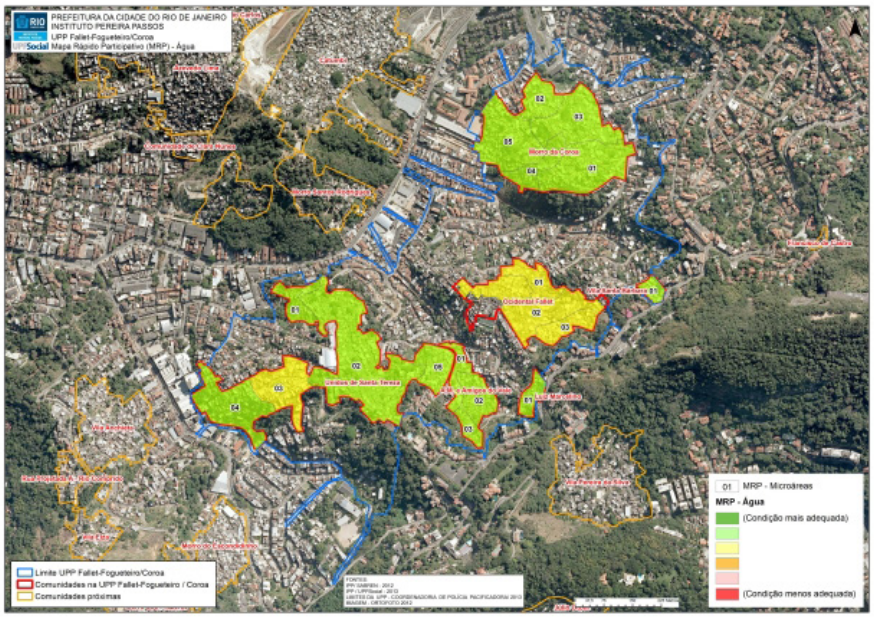
The formulary, in turn, has three fields for content: (1) standardized questions of multiple choice, yes/no, or gradations – low, reasonable, high; (2) additional descriptions and (3) photos of the local.

For the interviews, the mappers used to have critical informants as targets: ancient favelas residents, community leaders, healthcare agents, school and health post directors, for example. The interviewees should point out community demands by answering to final and objective questions.

After fieldwork, the data used to be sent to IPP, to be inserted on digital formularies. Using a programme made by statisticians, the answers were crossed to generate reports of the average score of each micro area. The micro areas maps are automatically generated. There are maps of thematic indicators – corresponding to the eight categories for each micro area – and synthetic indicators – corresponding to the geometrical average of the eight categories in each micro area.

After that, it was identified as the need to produce thematic maps that would further detail some information. On the water supply maps, for example, besides the indication of a bad or good service given by grades and color, hatching was used to indicate the frequency of water shortage. On the garbage collection maps, it was also added the type of garbage, the distance until the containers or the location of landfills, among other information.

Figure 34 MRP. Advertisement Image[36].



Source: IPP (2016).

MRP had two work phases. The first was between 2012 and 2013 and the second between 2014 and 2015. At the beginning of 2016, as its deadline approaches, some evaluations were possible based on our field notes.

The first phase (2012-2013) coincides with the consolidation of UPPs when there was a spread of drug dealers for other territories (usually for the urban peripheries and peripheric cities of the metropolitan area) and thus a reduction of its influence. At this stage, the work was comprehensive - 122 favelas were entirely visited. The second phase (2014-2015) took place at a time of increase in violence, which reduced the possibility of mapping. In the second phase, sometimes the access to some micro areas was prohibited by criminal groups. In these cases, the maps present empty spaces.

Another field agent explains that, while the access of mappers was released or not according to the area and the moment, in most of the cases it was required to the mappers not take photos. From our experience in accessing favelas, photos are allowed but not freely. Some vistas are allowed, while other prohibited, and the residents make sure to explain to the outsider what should be turned visible and what should not.

The field agent adds that, in this regard, favelas residents were crucial pieces. Besides mediating the access with criminal groups, they were, also, able to measure "the temperature of the territo-

36 Available: http://mundogeo.com/. Access: February, 2016.

ry" - they knew when it was possible to map according to the dynamics of drug trades and police entry (Interview, 2015). One of the technicians in the office stresses that without them the IPP could not enter the favelas or reach the same quantity and quality of information. In the end, they evaluate that it would be important to incorporate more residents to the mappers' teams, as well as to strengthen precautions with their safety.

MRP products were distributed to various departments of the Municipality in order to support their actions. The interviews report that some departments were suspicious about the accuracy of the data, which would justify not to use it. Differently, an agent of Rio +Social believes that the material is sometimes not used because it is seen as another workload: to provide more knowledge about an area means increasing responsibilities over it.

A challenge reported by the mappers was the distrust of other residents about the government's intentions. For one interviewer, the mistrust that people who live in favelas such as Rocinha and Vidigal are due to eviction risks. These are favelas situated in-between wealthy, formal neighborhoods (Gávea, Leblon and São Conrado). The threatens of evictions are latent, and the mere sight of an official uniform is enough to arouse resistance. In some areas, the access of outsiders is considered invasive. Previous entries of infiltrated police officers, disguised in uniforms from the Light (electricity company) or the POUSO (a post for urban orientation), reinforced suspicions. As a result, a field agent says that he would instead use just a badge, not a uniform, to access some areas. The mere sight of a government official would turn him visible in a way that would not make his work easier (Interview, 2015).

This agent also said that some residents pose many questions and the work pace was slowed down – the mappers had to spend much time explaining the project. For this reason, he confessed that sometimes the team avoided consulting the residents to fill the survey, unless when required information that the field agent could not answer by himself, as related to water supply, garbage collection or post office delivery. Because of these challenges, the interviews with residents were restricted to the occasions when residents approached the team voluntarily. Considering the usual mistrust of governmental agents, it is reasonable to think that information in these cases was turned visible in a strict and fragmented manner.

The last challenge referred to the discontinuity of the work of resident and technicians. At the time of the interviews by the end of 2015, the work was interrupted because the cooperation agreement of UN-Habitat that made the mappings possible in the first place had finished. On February 2016, the project was interrupted without completing the mapping of all of the favelas reached by UPPs.

5.3.3 Mapeamento Participativo da Cidade do Rio de Janeiro (MPCRJ): Manguinhos case

The Participative Mapping of the City of Rio de Janeiro (MPCRJ) is an online collaborative platform for registration of urban facilities, commercial establishments and city services – for both informal and formal areas. It was originated as a proposal of the Community Council of Manguinhos Complex of Favelas for the City Hall in 2014. Their idea derived from an earlier initiative of the Fundação Oswaldo Cruz (Fiocruz), to map social initiatives within the community. According to the community newspaper *Fala Manguinhos*, this initiative encouraged residents to ask for the help of the Municipality to georeference information and to formulate a cultural map to identify artists and cultural groups in the territory (Manguinhos, 2014).

At the IPP, there was a shift from the original proposal. In the current interface, which dates from 2015, there are radio stations, urban infrastructure (such as schools, day care centers and community associations) and commercial and service establishments (such as bars, restaurants, and shops).

Before this configuration, however, we found records of another interface in 2014, when the Municipality and the media came to announce the chance that residents would have to do a portrait of its territory by entering information on urban issues, such as the conservation conditions of gardens, squares and streets, water supply, sewage, drainage, street lighting, and urban sanitation, among others (IPP, 2015).

The project has been widely reported as an innovative initiative of the Municipality, especially on international events of cartography and geo-technology, such as the Geospatial World Forum, Latin America Users Conference, ESRI Users Conference, and the International Cartographic Conference. Recently, Rio +Social and the Urban Information System (SIURB) received international awards for the project (IPP, 2015).

To understand aspects of visibility on the Manguinhos mapping it is necessary, first, to go beyond the initiative itself and seek clues in the recent history of social activism in Manguinhos.

The territory of Manguinhos is recognized by a public decree of 1988 as a formal neighborhood. However, it is more commonly referred to as a *complex* of favelas – a cluster of favelas close to each other. This name came up with the recent pacification and urbanization programs, and the government and the media mostly use it than by the residents. Its 14 communities, among favelas and social housing, keep significant differences in history, urban morphology, and social dynam-

ics, among others, which makes it hard to see it as a unity.

Most of Manguinhos communities have a history of social coordination since at least the 1980s, with the re-democratization of the country. Over the past 50 years, several movements took shape in response to threats such as floods, housing removal, and urban violence.

The announcement about the allocation of PAC Favelas funds to urbanize Manguinhos in 2007, as well as the implementation of the pacification program in 2013, both represented significant changes in the dynamics of these communities. There is extensive literature in Brazil about these events. Part of it points out disputes and tensions due to the overlapping of the territorial logic, new social mobilization cycles, changes in authority structures, power relations and political mediation (Cavalcanti, 2013).

The Manguinhos Community Council arises in this scenario. The state government creates it in 2011 and coordinated by the Civil House Project Management Office (*Escritório de Gerenciamento de Projetos da Casa Civil* – PMO - Rio) through the PAC Social. Therefore, it is a top-down initiative - a result of the social work at PAC Manguinhos.

Also, in the wake of PAC, it is possible to identify a robust bottom-up movement, the Social Forum of Manguinhos, organized in response to urban upgrading proposals. Bartholl, a participant observer, reports in the paper "Urban Social Movement and PAC Manguinhos: mobilization from below, demobilization and repression from above", that in 2013 the Forum "faces a lack of dialogue with the public authorities, and, as formulates criticisms about the execution of the works, [faces] forms of repression" (Bartholl, 2013, our translation). Cavalcanti (2013), on ethnographic research about the PAC Favelas in Manguinhos, notes: "the political participation mechanisms that support projects such as PAC become a hostage of local power structures and urban informal arrangements" (Cavalcanti, 2013, our translation). Trindade (2013), studying public policies and the right to the city in Manguinhos, concludes: "The implementation of PAC in Manguinhos was more tied to the execution of a major intervention, carried out top-down than a plan fuelled by social participation." (Trindade, 2013, our translation).

So, while it is important to recognize that social mobilization in Manguinhos plays an essential role on enabling urban and social transformations, including its mapping, it is worth noticing that the forces of social mobilization in these communities cannot be seen as homogenous or consensual. From this point of view, the MPCRJ case cannot be understood merely as a bottom-up.

Manguinhos' Community Council submitted to the Municipality a proposal for data collection, which after discussions in meetings has become the primary tool of mapping. For fieldwork, it was

agreed that all stakeholders would be involved in the application of the mapping tools voluntarily, using their free time and without payment.

Only after the field survey, the data was georeferenced at IPP, similar to the previous governmental mapping initiatives.

The current methodology differs from the pilot project. Data entry is now open to any citizen with Internet access. It is possible to include information only if related to the predefined listed categories - community radio stations, urban facilities, and shops/services. It is not possible to create new categories. According to an interviewed from the executive staff, there is no mediation for entering data, but periodically the georeferencing team reviews the platform and erases posts that are considered *spams* or somehow offensive (Interview, 2015).

A field agent recalls that at the beginning of the survey there were some unexpected inserts as drug sale ("*boca de fumo*"). On the other hand, an office employee said that after the first results, it was discussed whether they should or should not maintain an open option to the insertion of urban issues (Interview, 2015).

It was noted that the categories related to problems would be withdrawn for three reasons:

(1) There was a risk that the tool would be used mainly for social activist groups in the community, such as mothers of young man killed by police in the pacifying process. This result would distort the original purposes;

(2) There was a concern about producing a map that highlighted the differences between favelas and the formal city, and therefore contributed to segregate further and intensify the stigma of these areas, which was contrary to the original proposal;

(3) There was a possibility of creating a map that stigmatized the Municipality itself, highlighting many problems far superior to its possibility of resolution. To report problems, we are told, the Municipality has a phone service: dial 1746 (Interviews, 2015).

After the initial divergences, it is possible to observe certain uniformity in the narratives of representatives of the Municipality and residents. There are at least three points in common in their narratives.

First, it is constantly emphasized that the citizen is the leading actor in generating data. Residents involvement in mapping would both increase their self-esteem and the reliability of information. On the community newspaper *Fala Manguinhos* it reads:

> We believe that this tool has an innovative approach since the registration of information in the map does not rely on the validation of official staff. It puts the citizen as central actors in the information process; it creates, thus, an assumption of legitimacy and veracity of the information generated by the Manguinhos resident (Manguinhos, 2014, our translation)

Second, they mention the importance to highlight "points of interest" of the territory, meaning features that are not exclusively associated with urban violence. A spokesman of the Community Council says in an interview for the Municipality (*Mapeamento Participativo do Rio de Janeiro em Manguinhos*): "We believe that through the map we can stimulate a resignification of the territory, it means, enhances positive characteristics of Manguinhos territory" (IPP, 2014, our translation).

Third, they believe that a community diagnosis could strengthen the participation of residents in public policy in general. The newspaper *Fala Manguinhos* also mentions the potential for the coordination and strengthening of local networks associated with the process.

Additionally, the Municipality and their partners point that mappings are strategic to the integration of favelas into the city.

> The project Participative Map of Rio de Janeiro City has like the highest intent to integrate Rio as a unified city and to improve the lives of all *Cariocas*. It is a mapping tool [...] that uses cutting-edge technology, combined with popular participation, with the interest of the Rio resident to show their city, to know their city and to effectively put their city on the map, by marking points of interest as stores, squares, cultural activities, venues, that are now seen by all and also are used by the government as a population point of view of our city (Veiga, 2014, our translation).

It is important to highlight, however, that, as every viewpoint, a population viewpoint is also biased. One of the coordinators of the Social Cooperation at Fiocruz recalls that "the production of information in favelas is strategic in the fight against oppression and authoritarianism", but we can't lose sight of the fact that information is produced "in a context where the effective freedom of expression and rights guarantees are not yet clear and assured" (Madureira, in interview for Constancio, 2014)[37].

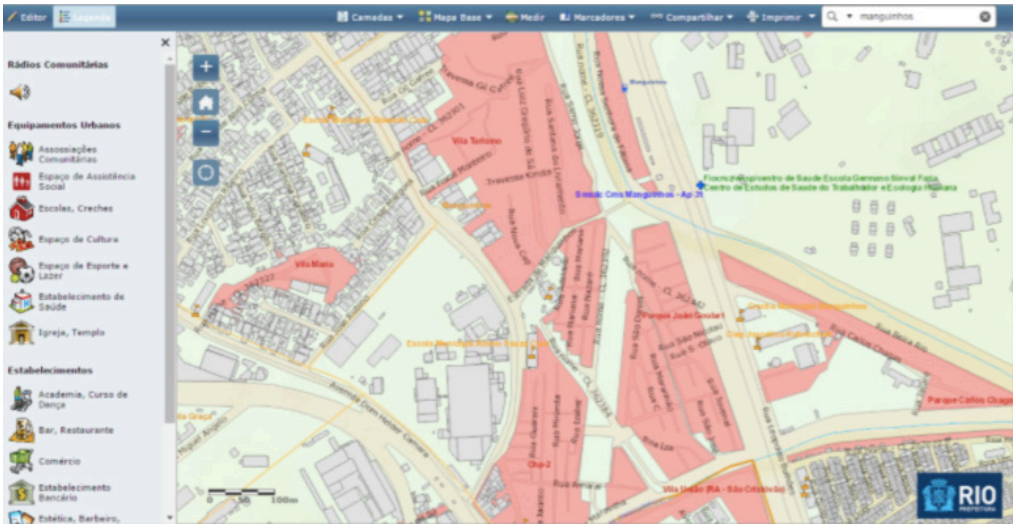
37 Available on <https://brasil.estadao.com.br/noticias/rio-de-janeiro,complexo-de-favelas-de-manguinhos-e-mapeado-por-moradores,1554377> Accessed June 2018.

Figure 35 MRP. First interface of the participatory map of the city of Rio de Janeiro. The layers are, among others: (1) Irregular water supply. (2) Sewage dump in river or lake. (3) Reflux. (4) Open sewage. (5) Flooding area. (6) Street, alley or stairs with no light. (7) Dumping ground.



Source: Mapa Participativo da Cidade do Rio de Janeiro, Prefeitura do Rio (2014)

Figure 36 Second interface of the participatory map of the city of Rio de Janeiro. The layers are, among others: (1) Radios. (2) Community Councils. (3) Social Assistance. (4) Cultural center. (5) Sports and leasure. (6) Healthcare. (7) Churchs and temples. (8) Dance academy. (9) Bar/Restaurant. (10) Shops. (11) Banks.



Source: Mapa Participativo da Cidade do Rio de Janeiro, Prefeitura do Rio (2015)

5.4 Civil Society: Wikimapa

In Brazil, Wikimapa was the first digital mapping initiative to open favelas georeferenced data online. Led by the NGO Rede Jovem, specifically by a social programme that promotes social

inclusion of youngsters from poor communities, and relying on sporadic funding from telephone companies, Wikimapa was active from 2009 to 2014. The project had as the primary objective, according to the proponents, to identify points of public interest, events, problems, local solutions and street that were not visible on digital maps. The mapping would serve to unlock potential for social, economic and environmental investments, as well as public policies (Rede Jovem, 2014).

Presented as a social technology and a collaborative mapping for the development of *marginalized* areas[38], Wikimapa represented at that point an innovative and pioneer initiative of digital visibility of informality. It was contemporary to the well-documented case of Map Kibera, a mapping project on the biggest slum in Nairobi, Kenya, released at the same year by the Open Street Map (OSM) volunteers team[39], although it did not get the same international attention.

Similar to Map Kibera, Wikimapa is said to be concerned with overcoming a stigma of violence that is historically attached to precarious settlements and inviting outsiders to know these places.

> With Wikimapa, the intention is [...] to achieve an online mapping in which the [community] potential is georeferenced, to assure *visibility* to the good things that the communities have to offer, and not only to point out to the violence and to the places [but also to positive aspects] that are *out of sight* of people who are interested in navigating and knowing [...] favelas from Rio de Janeiro and other Brazilian cities [...]" (Patricia Azevedo, 2010)

Participants of Wikimapa states that the violence stigma need to be overcome, and that duality between asphalt and city that should be broken: 'The goal is to give visibility to the local potential and to shorten the distances between the city and the favelas - after all, one is part of the other.'[40] (Stefanel, 2014). They also refer to a "lost identity" that would be recovered, and to a sense of belonging and self-esteem that would surface together with the mapping (Cavalcante, 2014). In these narratives, non-mappings are presented as a tool for urban exclusion and marginalization — e.g., empty spaces on city maps are said to represent a symbolic exclusion. In turn, mappings are presented as a tool for inclusion and urban existence — e.g., digital mappings would represent a form of integrating hills (*morros*) to the rest of the city, as well as to address identity and citizenship historical asymmetries. A series of newspaper and magazine articles at the time recurrently announced that, from now on, "youth [would] combat the symbolic exclusion of official and digital maps" and make themselves visible in the urban cartography.

38 This description can be found in many references to Wikimapa such as https://bit.ly/2EPsR7K and https://bit.ly/2JqqvLt

39 See mapkibera.org

40 Available: <https://www.brasil247.com/pt/247/favela247/144526/Ferramenta-virtual-ajuda-a-incluir-favelas-nos-mapas.htm> Accessed: October 2018

> "They [maps] were another element of segregation, which pushed the favela away from the city and created another social barrier for those who lived there. We saw that all the maps that alluded to favelas were maps of traffic, militia, crime. They always point out to these regions from a negative perspective. [With Wikimapa] the identity, the belonging, and the self-esteem change". (Director of the NGO Rede Jovem, interview for Stefanel, 2014, our translation)

> "The fact that I'm not on the map, for me, is an excluding sensation as if we are not part of the city, of the traditional route. It is something we know it is not true." (Tourist guide and favela resident, interview for Stefanel, 2014)

Wikimapa was originally thought as a way to increase the use of digital tools by the youth — especially location awareness tools, such as the search for points and routes on online maps, and smartphones. The initial scope of the project was to identify what would be interest from the youngster perspective. However, the scope shifted due to a lack of cartographic basis in which the points of interest could be inserted, in the first place. The participants noticed that they could not register a point of interest because there were no streets on the digital platform they used as a basis, Google Maps.

> The intention was to use an existing cartographic basis to stimulate young people living in low-income communities in Rio de Janeiro to use cell phones to insert locally available services and structures and to develop a web wiki system that would collaboratively allow editing information. However, the scope of the project was significantly increased when Rede Jovem faced a bigger problem than the lack of *visibility* of existing opportunities in low-income areas: the technical impossibility of marking points due to the lack of favelas and low-income areas in the official cartography. [...] [Thus,] Rede Jovem started to have a bigger mission with Wikimapa: to guarantee the creation of a new cartographic basis, overlapping the official one, inserting main and secondary streets (Azevedo and Santos, interview for MundoGEO, 2010)[41].

The methodology involved young people hired for mapping and gathering stories about favelas residents and sights. They were called "wiki-reporters" and received a scholarship to investigate more about their community history, to take photos, to map and to post about the mapped points on an online blog. Each mapped point was attached to a narrative produced by these youngsters.

On the community level, this strategy helped to reinforce cultural memories and reinforce territorialization. One example is related to street names, often a field of disputes in favelas, where the same streets may have different names, according to the memory of the person who calls it, to how long the person that informs you about the street name lives in a favela, or to different

41 Available: <https://mundogeo.com/blog/2010/05/14/wikimapa-a-voz-do-morro/>. Accessed: October, 2018.

interests or political affiliations. Referring to the practice of registering street names as a form of bringing back memories, a participant reports that:

> Street mapping brought into being memories of personalities that tell the communities history. At Cidade de Deus, there are cases as the *Tucão* Square, named after the resident that promoted parties there, and the *Zilá* Street, locally known as *Botafogo* Street, because the walls and public telephones are all painted with the [Botafogo] soccer team coat of arms, by a local supporter. Stories that defined local identity and culture have been lost amid the devaluation driven by the stereotype created on the favela and reinforced by the new generation of residents (Azevedo and Santos, interview for MundoGEO, 2010)[42].

Wikimapa has also amplified the discussion about favelas invisibility. As a result of the process, it was released a documentary that compiles different opinions around the lack of favelas on city maps, "*Todo Mapa tem um Discurso*" (Every Map Has a Discourse). It questions the reasons why favelas are hidden on most of the city maps, and the implications of this form of invisibility to social life, public investments, policies design, and economic investments. The common thread across the testimonials of practitioners and academics is synthesized as it follows: "There is a population that is invisible because favelas residents are not even part of a document that should recognize the entire city [the city map]" (Every map has a discourse, 2:21). In these narratives, favelas residents correlate cartographic invisibility to urban exclusion, and provides some practical examples of it, for example, related to not being able to receive letters, to have difficulty in accessing public services maintenance such as water supply, and to be out of the government investments plan:

> [Interviewer] — And what if I send you a letter today?
>
> [Favela resident] — Well, I will not receive it yet." (Every map has a discourse, 2:21)
>
> "So let's say a pipe bursts up there and CEDAE [water service provider] has to go to fix it. Where? 'Oh there, near the little soccer field.' 'Ok, but we have eight of them. Which one?" (Every map has a discourse, 2:21)
>
> [In the city map part of the favela Maré is confused with the formal neighborhood of Bonsucesso]. "[But] it is not the same thing to inject resources from the planning budget to the Bonsucesso area and expect that Maré will be benefited by it" (Every map has a discourse, 2:21)

Along more than five years, Wikimapa reached eleven favelas, ten of which are in Rio and one in São Paulo: Pavão-Pavãozinho/Cantagalo, Morro Santa Marta, Cidade de Deus, Complexo do Ale-

42 Available: <https://mundogeo.com/blog/2010/05/14/wikimapa-a-voz-do-morro/>. Accessed: October, 2018.

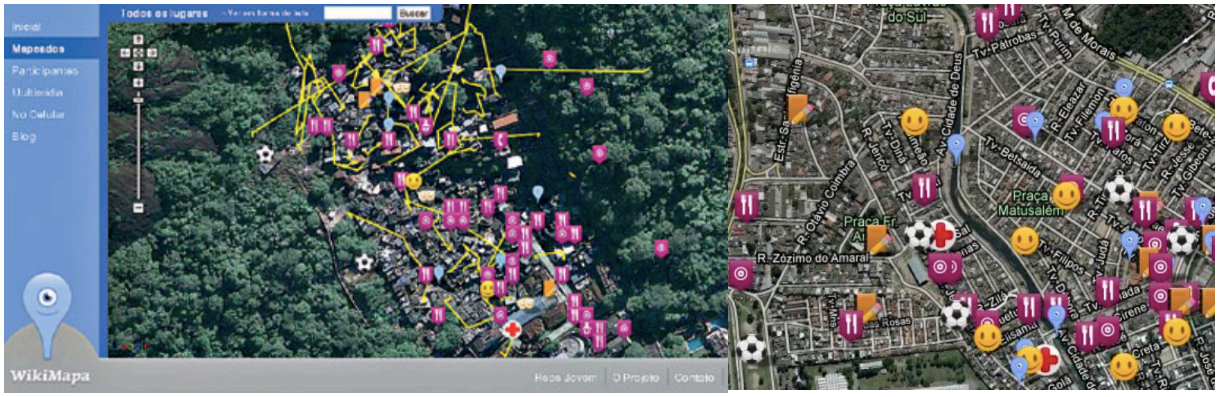
mão, Complexo da Maré, Complexo da Penha, Mangueira, Rocinha, Morro Agudo/Nova Iguaçu (RJ) e Capão Redondo (SP). According to one of the coordinators, communities were selected to cover different regions in Rio de Janeiro: North, West, and South zone.

Although Wikimapa provided a vibrant map of the targeted favelas, technological limitations were an obstacle to the legibility and usability of the resultant map. The GPS failed to draw the streets correctly, due to building density and topography. Plus, the resulting map could only be accessed on the Wikimapa platform, that is, it was not incorporated to the official cartography nor Google Maps.

The project was interrupted by a lack of funding, which made impossible, for instance, to pay for a web server to maintain the databases available online. However, the primary output of Wikimapa is not so much the digital data itself, but the discussion around visibility, cartography and the digital that it fed both on a local and a national scale. Moreover, the process involved a form of citizen empowerment, because it combined mapping with continuous training and involvement of young mappers, that used to investigate and post on a blog short stories about the mapped points.

Right after Wikimapa was interrupted, a new phase of mapping informality takes places in Rio, marked by an increasing interest of companies such as Microsoft and Google in mapping favelas. Small and medium initiatives such as Wikimapa and others are obfuscated by a narrative that position Google Maps and Bing Maps as the pioneers on involving residents and assuring favelas digital visibility.

Figure 37 Interface of the project Wikimapa



Source: Wikimapa

5.5 Private sector: On the Area and On the Map

Besides NGOs and the local government, tech companies are also involved in mapping favelas. In 2014, five years later Wikimapa was released, and at the same year it was interrupted, Microsoft

announces the project On the Area (*Na Área*). In turn, in 2013, On the Map (*Tá no Mapa*) is proposed by the advertising agency JWT as a publicity campaign to the cultural group Afroreggae. In 2015, Google joined the initiative.

5.5.1 On the Area

On the Area is a Microsoft project in partnership with the local government, via Rio's Municipal Institute of Urbanism (Instituto Municipal de Urbanismo Pereira Passos - IPP); NGOs previously involved in mapping projects such as Nós do Morro, Vidigalo and Observatório das Favelas; and private initiatives such as Foursquare and Tripadvisor.

The president of IPP describes the project as another step towards the integration of favelas to the city: "What we want is to insert these communities on the official city map, increasing the integration between these settlements and the rest of the city." (La Rocque, interview for Leonardi, 2014).

From a different yet complementary point of view, Microsoft states that their primary objective is "to identify the main points of interest inside Rio de Janeiro *communities* [meaning favelas], mainly business." (Microsoft, 2014)[43]

Besides the local impacts, another outcome is highlighted -- the possibility to show favelas to the world:

> The information [before] was due to word-of-mouth advertising. On Area project, not only [allow] them [favelas residents] but anyone in the world to be able to better know the community, its points of interest, attractions, local business and touristic sights simply using the Bing searcher". (Tinoco, interview for Teixeira, 2014).

Starting in Brazil the initiative is said to be part of a global strategy to data gathering and participative mapping of informal settlements, "that invites favelas residents, business owners, NGOs and governments to insert and consume information on Bing, a global platform that make information access easier to thousands of people all over the planet." (Microsoft, 2014)

The criteria for choosing the mapped favelas was simple: all the favelas that were reached by UPPs were to be mapped. As the main outcome of the project, an advertisement director of

43 Available: <https://news.microsoft.com/pt-br/microsoft-apresenta-o-na-area-projeto-de-mapeamento-participativo-de-comunidades/> Accessed: October 2018

Microsoft, states that: "Microsoft aims to heavily contribute towards boosting local business on these 101 [pacified] communities." (Microsoft, 2014).

5.5.2 On the Map

On the map was initially thought in 2013 as an advertising strategy for projects for social inclusion involving young residents, as part of social programmes lead by Afroreggae. As of 2014, *On the Map* involved Google and is now described as a project that delivers "more than social inclusion," it is "also to show business" (Afroreggae, 2103). The primary objective is described by the proponents as follows:

> On the Map has as its objective to map and to give *visibility* to favelas that are not on online maps. More than inserting these communities on the digital world and the official city maps, we want to promote citizenship, local business growth and public service access (Afroreggae, 2013)[44]

Tá no Mapa is promoted as a project that would turn 'data free areas' into 'data full zones' and by so, break a "digital wall" and a "wall of prejudice" that separates favelas from the city and from the rest of the world. The initiative assumes that the absence of data on favelas entails 'enormous social and economic loss' and, by consequence, generating and opening digital data could help to reverse this situation. Putting favelas on the map would boost the local economy, self-esteem, identity, a sense of belonging and citizenship (Afroreggae, 2013; JWT, 2013, 2014)

On the Map is further detailed in chapter 6 (empirical analysis). For now, this brief description is enough to highlight the similarities and differences between the mapping initiatives that we described and to critically unpack their common threads.

5.6 Common Threads: Critically unpacking digital mapping narratives

The six initiatives share at least three fundamental assumptions.First, their discourses refer to a previous absence of favelas in city maps. All of the initiatives claim to be the first effort towards favelas visibility, an innovative, citizen-oriented, trustworthy spatial referential for the provision of information about these territories. However, as we discussed previously, favelas were not completely invisible before. Visibility shifted from time to time, and according to the urban so-

44 Available: <https://www.youtube.com/watch?v=UD9DiPHaSR8&list=PLd_DrxcT5EXt4GchOIruVZiGijjR08xIKR> Accessed: October 2018

cial, economic, cultural and political context. Since its origin over a half century ago, favelas had already great visibility in the city, be it ideological, spatial, social, economic or political (Perlman, 2005; Silva, 2005). Therefore, favelas invisibility is not a fact, but an idea. In the digitization of favelas in Rio, visibility is discursively constructed so it can be overcome via a digital presence (Luque-Ayala and Neves Maia, 2018).

The narratives of invisibility on maps also ignore that, in many favelas, there are mental and paper-based maps produced by their residents, despite a weak presence of the State or low interest of markets. These maps are necessary because many services that should be provided by the Municipality are solved within the communities. The mail delivery, for example, is generally undertaken by a resident who knows the area and which receives a monthly payment to take letters from the dwellers association – where the Post Office drops them – to their recipients. These maps are, sometimes, mental, as in the case of the community postman that we interviewed in Morro da Providência, who learned the job, as a child, from his father, that in turn named most of the streets after old residents.

In other cases, these maps are codified, as in the algorithm created by the company Carteiro Amigo (*Friendly Postman*) at Rocinha, updated on an almost daily basis. In other favelas, still, the map is available at the dwellers association, or it is distributed as a touristic map, like in Vidigal (e.g., Vidigalo project)

The second underlying assumption is that digital visibility is a new urban right, a consensual desire or a contemporary necessity. Among the practitioners, there is no in-depth inquiry about why favelas were not sufficiently mapped before. Interpretations vary from a purely technical, operational, physical point of view — e.g., the absence of data is due to technical limitations such as the impossibility of identifying streets of compact favelas over hills on satellite views (Souza, 2012) — to highly ideological statements — e.g., favelas were invisible before due to an absence of the State in these territories or due to favelas residents' efforts to escape from governmental domination (Jauregui, 2004; Fabricius, 2008 apud Varley, 2013).

Both interpretations are simplistic. The reasons for the previous absence or insufficiency of digital cartographic data of favelas are due to a complex interplay of political and economic interests, that have different incarnations along history, as the previous chapter has shown.

Third, and as a corollary of all the promises, all the initiatives depart from the idea that digital visibility is a form of urban inclusion. The absence of favelas data on digital, online maps, would represent a form of urban segregation that entails other forms of exclusion, such as impossibility to receive mail or to access public investments. An absence of locational data on digital databases —

in other words, digital invisibility — is re-defined as a form of social, urban, political and economic exclusion, a lack of citizenship, belonging and self-esteem. Digital visibility, in turn, is linked to a myriad of socially progressive goals such as social inclusion, participation, and identity. Violence and a marginalization stigma are said to be overcome via a greater digital presence. This association not only reifies a false dichotomy between favela and the city (Varley, 2013; Valladares, 2005) but also position digital visibility as the new nature of the urban condition.

In short, digital visibility is said to be equal the right *to exist* in the city (Redes da Maré, 2012), echoing narratives from other parts of the globe, such as Kenya (e.g., Map Kibera). Open data and more spatial information are said to be assets towards a right for a long time denied to favelas — the right to be part of the urban as a whole. Digital mapping would represent a way to merge a "*Cidade Partida*" (divided city) (Ventura, 1994) or "to break the wall between favelas and the city" (Afroreggae, 2013)

Beyond these three basic assumptions, also techniques, methodologies, and rationalities are often very similar across the initiatives.

The language that is used to explain the projects has important intersection points. For example, the term "points of interest" is used to define the georeferenced points in all the initiatives, but the meaning of "interest" vary according to the initiative. For instance, while Wikimapa let the mapper define what is interesting, the content varying according to features such as the age or gender of the wiki-reporter; Microsoft and Google predefine local business and touristic sights as points that are more interesting than others.

Another commonality is the ways the project coordinators and participants value the empirical knowledge and the social ties that residents hold about their territories. Along the process, we came to realize that the knowledge that was essential to mapping was not only related solely to the knowledge of favelas spatial features — alleys, routes or limits between private and public spaces — but also to social codes that determine where and when a person can circulate. These codes can be gestures, sounds or even a sort of intuition on what is about to happen in the favela. Both the empirical knowledge of the territory and the possibility to infiltrate on it without being rejected by their peers are some of the features that allow residents to map their favelas easier and faster than outsiders.

Another common practice across the mapping initiatives is paid participation. Residents can volunteer to map, but most of the mapping is undertaken during specific periods — 2 to 4 months — by a small group of residents — 2 to 5 — that receive a scholarship, assistance or a salary to do so.

Future studies could address the possibilities, and limits of a paid and temporary participation, as well as of participation restricted to consultation – e.g., when residents are directly interviewed by field agents.

These groups of mappers are a tiny sample of the population of the mapped favelas. For example, Rocinha - the largest slum in the country with about 70,000 inhabitants according to the latest census of the IBGE (2010), or between 180,000 and 220,000 inhabitants according to some residents - was the territory that usually has the more numerous teams on field — 5, on the MRP and 8 on *On the Map*.

Another common thread, are the disputes that surface around the limits and expansions of territories[45]. The symbolic disputes around the name of streets — that surfaces, for instance, in Street Mapping, Wikimapa, and On the Map — are but an example on how digital visibility is not neutral, but a highly political endeavor. Digital mappings, like all forms of mapping, turn some aspects of some favelas visible and, at the same time, suppress others. This approach is not simply a technical matter but involves political choices. This political choice is particularly evident on On the Map and On the Area, because both of them explicitly state to promote economic growth, be it of local business be it of the proponents themselves (Google and Microsoft, respectively). Both cases share a narrative that visibility would impact not only the local — the favela, the informal settlement, the precarious social housing, the surrounding formal neighborhoods or the city of Rio — but also the global scenario. By turning favelas visible to the world, the mapping would make favelas spaces enter, even more, global production and consumption circuits. In this sense, digital mappings would reconfigure some favelas both as digital territory and market (Luque-Ayala and Neves Maia, 2018).

Worldwide, digital mappings involving the participation of favelas residents indeed help to advance socially progressive goals[46]. However, this is not a unidimensional cause-effect process, in which digital visibility necessarily promotes urban inclusion. This process is multifaceted. It "operates at multiple levels, [...] that needs to be read in the context of contemporary processes of capital expansion and the enrolment of digital techniques and rationalities in the creation of sites of accumulation." (Luque-Ayala and Maia, 2018, p.15).

45 For a detailed analysis about the digital making of territory via digital mapping, see Luque-Ayala and Maia (2018).

46 For Brazilian cases, see, for instance, Nós por Nós and Fogo Cruzado; for Ghana, Kenya, India, Namibia, South Africa, Tanzania, Thailand, Uganda and Zimbabwe cases, see Patel et al. (2012) and Livengood and Kunte (2012).

While the surveyed initiatives share methodologies, rationalities, techniques, and underlying assumptions, they hold differences around (1) what has to be mapped — the 'point of interest'; (2) for what purpose and (3) who maps/ who owns the map. In the case of the Municipality-led mappings, notably MRP, there is a concern with the design of a methodology that provides training for mappers, so they know *exactly* what they need to observe, the development of a close and objective questionnaire for interviews, and the standardization of the responses. In this methodology, there is little space for a propositional or creative approach to mapping by the residents. Microsoft and Google mappings do not differ regarding the re-definition of what is interesting. The difference between government efforts relies on economic bias. Wikimapa, in turn, allows residents to have freedom in deciding each one of these three questions -- what to map, what for and by/for whom.

Present in the popular imagery as an entanglement of alleys, inaccessible to outsiders, participative digital mappings of favelas can be readily accepted as an "Ariadne's thread." This thread would conduct, on one end, the population to the exit of a labyrinth of historical social-spatial segregation and, on the other end, the entrance of investments in urbanization, public policies, tourists, economic investments and social actions.

It is important to discuss, however, if this thread is somehow a myth. The reasons for the absence of digital mapping before extrapolating the questions of practical or technological order, like the difficulty of visualization of aerial photos, of access to hazardous areas or technical limitations to overlap layers of information in a georeferenced database. The empty or splintered maps of favelas are a portrait of an ambiguous relation of the public power and elites with these communities – a relation that, historically, has mixed tolerance with threatens of eviction (Gonçalves, 2013; Perlman, 2005).

Favelas have never been invisible from the urban, but visible under a condition of exceptionality[47]. Favelas' visibility has always been contingent, shifting in consonance with political, social and economic (re)configurations. Favelas have never been invisible before, as they were not inexistent, excluded, nor at the margins of the urban, but often existent and included under conditions that have been out of favelas' residents' control, like the "myth of marginality" unveils (Perlman, 1979; 2005). **Favelas visibility has been an asymmetrical process, and do not necessarily reflected the interests, wills or needs of those who were turned visible. This is also the case for favelas' digital visibility.**

47 Informality as a condition of exceptionally is an idea deeply explored by Roy (2007) drawing from Agamben (2003).

The weak presence of favelas in maps may induce to an understanding of these territories as temporary, susceptible to State reclaim or eviction. From this perspective, while digitally mapping favelas represent a turning point indeed in the way these areas are seen and experienced, this is not a straightforward process that leads necessarily to an equitable and unified city. Preferably, it is a nuanced process of in/exclusion, that varies according to who is proposing the map, who is mapping, what is being mapped and with what purposes. In a sense, these ethical questions are similar to those that were exhaustively raised along the 1990s and 2000s by those concerned with GIS participatory mappings -- “Whose map? Who is empowered and who disempowered? Who gains and who loses?” (Chambers, 2006).

We are concerned with these questions as well; however, we propose a different way of answering, that do not approach digital participatory mappings of informality as merely a win/lose the game (winning meaning visibility, inclusion, and existence / losing meaning invisibility, exclusion, and non-existence). Rather than seeing power as something that, throughout a mapping process, is given or taken (as the words empowerment and disempowerment might lead us to believe) we suggest to approach digital visibility as a process and a dimension of power exercise.

SIX

6. Off, On and Beyond the Map: Using the analytics of government to analyze favelas digital visibility[48]

Abstract:

Previous chapters had shown that the digital visibility of informality is a multifaceted process that needs to be read in the context of historical and contemporary processes of urbanism. From the angle of this Dissertation, reading digital mapping in the context of capital expansion and the creation of new sites of accumulation (Luque-Ayala and Neves Maia, 2018). From this perspective, this chapter takes the project *Tá no Mapa* (On the Map) as a **case study** and proceeds an **empirical analysis** on *favelas*' digital (in)visibilities in Rio de Janeiro, with particular attention to the favela Cantagalo. It highlights some of the (in)visibilities at play at various scales -- individual, building, street, community, and the city -- in the process of turning favela Cantagalo visible on Google Maps. Then, it crosses data about digital (in)visibility with data about other urban dynamics of inclusion and exclusion in Rio along the city prepared for the Olympics 2016. The **findings are discussed** within the theoretical and methodological framework of *analytics of government* (Dean, 2010) which helps to position favelas visibility as part of power dynamics.

6.1 Introduction

Digital visibility (via mappings or else) is a form of power exercise that has a role in producing urban spaces. In order to illustrate this statement, this section critically addresses favelas digital visibility in Rio, by focusing on narratives and images about the *inclusion in* and *exclusion of* favela Cantagalo to Google Maps.

The recent phenomenon of digitally mapping favelas in Rio, including Cantagalo, are part of both local and global transformations. Locally, digital mappings need to be read in the context of the new regime of visibility of the city of Rio and its favelas (Cavalcanti, 2013), put into motion with the preparation of the city to host mega-events such as the Summer Olympics 2016. Globally, the phenomenon of turning Brazilian favelas visible on online maps are part of the broader, global trend called the "digitization of slums" (McFarlane and Söderström, 2017).

The phenomenon of mapping informality, while advancing some forms of urban inclusion across

48 Chapter 6 benefits from my debates with Andrés Luque-Ayala alongside the preparation of the journal article: Digital territories: Google maps as a political technique in the re-making of urban informality. Available: <https://journals.sagepub.com/doi/abs/10.1177/0263775818766069> Accessed: January 2019.

the Global South (see, for instance, Map Kibera in Kenya and Slum Dwellers Federation mappings in India), also produces new forms of urban exclusion. To show some of the exclusions produced when favelas are digitally included on online maps, this chapter show trends and patterns in data about favelas (in)visibility in Rio, in particular favela Cantagalo. It focuses both on **digital visibility** -- visibility of favelas on online mappings -- and on **physical visibility** -- visibility of favelas on the urban landscape. By crossing the spatial patterns of digital and physical (in)visibility, we aim to explore the relationship between the variables in the research question -- digital visibility and urban inclusion.

To unpack the relation between digital visibility and urban inclusion, we paid close attention to the spaces in which visibilities occurs, how visibilities produce spaces, how spaces constrain or allow the production of visibilities, and how is digital visibility related to other forms of social production of the urban space.

The goal is to disturb the assumption that digital visibility equals urban inclusion.

The analysis focuses on Google and its Rio-specific projects *On the Map* and *Beyond the Map*, alongside other Google platforms such as Google Search, Street View, and My Business. The mapping of favela Cantagalo is used to demonstrate some (in)visibilities produced in the rendering of favelas digitally visible. The unfolding of the digital visibility of Rio's favelas is framed in time and space. Regarding time, three moments of favelas cartographic representation by Google are described — "off the map" (2011), "on the map" (2014) and "beyond the map" (2016). Concerning space, (in)visibility is explored in different scales -- city, community, street, building, and individual.

6.2 Off the Map

2011, April, 23

Google Maps makes Rio looks like a cluster of favelas

There are neighborhoods in Rio, even upper-middle-class neighborhoods, which are not on the map. On the other hand, the favelas, even the tiniest and most

> unknown ones, are all there, highlighted. The distorted geography, in this case, it is applied by Google Maps, the most famous search tool on the planet. Who does not know Rio and wants to try to find out a little more about the city through this mapping will have the false impression that the urban area is nothing more than a large cluster of favelas.
>
> [...] The superintendent of Rio Convention & Visitors Bureau, criticizes Google [...]: "We are sure that the Sugar Loaf, the Corcovado and the Copacabana Beach, among many other attractions, are *brands* of Brazil recognized all around the world. And so are our hills, which are also part of this *scenario*. The selection criterion adopted goes with the preference of each one. It depends on interest and focus. The site is informing wrong will fall into disuse." (Antunes, 2011a)
>
> 2011, April, 25
>
> Google will modify its maps about Rio
>
> "An encouragement to the locals that are unhappy with Rio maps provided by Google, the most significant search tool on the planet, that prioritizes *favelas* [...] The site promises, within six months to a year, change all the layout of its maps, hierarchizing information. That is, the neighborhoods will have more prominence, as well as the touristic attractions of the city, which today are not located. Favelas, in turn, will continue to be indicated, but only when the user zooms in.
>
> The Special Secretary for Tourism and President of Riotur, [...] considered an absurd the way Rio was mapped on Google. According to him, in 2009 Riotur sent an official letter to Google to include the city's sights on maps and to differentiate the favelas from the neighborhoods." (Antunes, 2011b)

In 2011, Google had been accused of giving the "false impression that Rio was no more than an immense "cluster of favelas" and of wrongly informing about the urban 'scenario' and its 'brands' (Antunes, 2011a). After being asked by the Municipality to review this form of representation, Google Maps changes its approach. The size of the font of favelas names is decreased in order to differentiate, hierarchically, 'informal' neighborhoods from the surrounding, formal neighborhoods. In some cases, the name favela is replaced by the names hill or park, which may have led users to assume that some favelas were green, unoccupied areas. These changes fed debates on evictions and symbolic disputes around the preparation of the city to host the World Cup 2014 and the Olympics 2016. Rio's Popular Committee interprets that: "the virtual removal is part of a city project that tries to turn poverty and the poor invisible, in digital spaces as much as in reality, with forced evictions" (Consentino, 2013).

Figure 38 Off the Map, from 2011 to 2013: Favela Morro da Liberdade becomes Morro da Liberdade. Favela Morro do Chacrinha is erased. Favela Sumaré becomes Sumaré and Favela Matinha becomes Matinha.



Source: Consentino (2016)

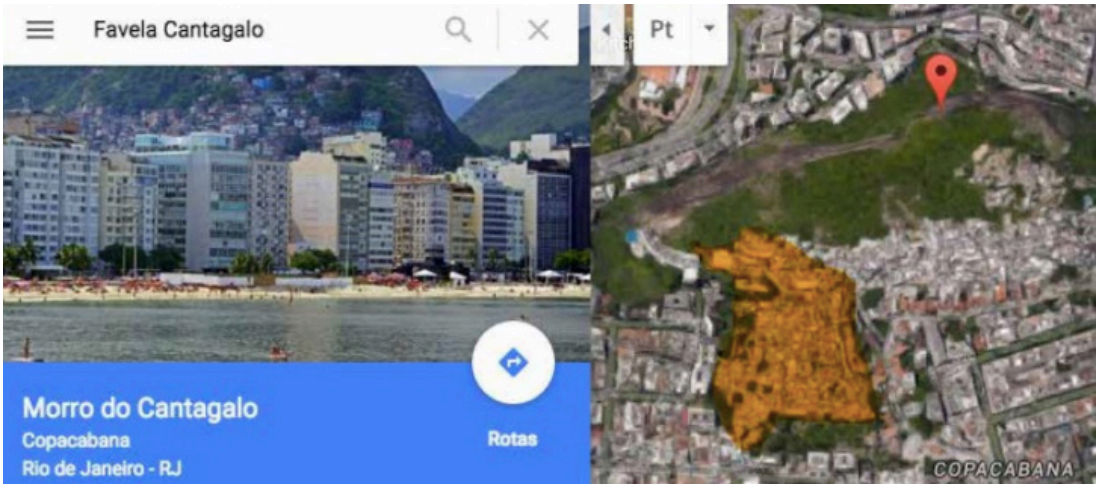
Figure 39 Off the Map in 2018. None of the previous labels appear, despite the clear evidence of informal settlements provided by the satellite view.



Source: google.br/maps. Access: February 2016

The text labels are just part of the story. Markers, streets' traces, builds and street views of Rio's favelas did not use to appear on Google Maps until 2014. By mid-2014, all favelas were grey or green spots on the search tool. In general, only the main street or the building contours — features that could be identified from satellite photos — were represented. Moreover, the search results used to present a series of errors, such as a Street View leading to Copacabana Beach and a marker pointing to Cantagalo Park.

Figure 40 Search for Favela Cantagalo on Google Maps in October 2015. Result: (1) Name: Morro do Cantagalo (Cantagalo Hill), (2) Street View: Copacabana beach waterfront; (3) Marker: Parque do Cantagalo (Cantagalo Park). The yellow polygon was inserted indicates the correct location of Favela Cantagalo.



Source: Ferraz, Betim e Maia (2016)

Differently, in 2015, the same word search indicates the correct location of the favela, some main streets, and the main marker over a new "point of interest," *Pousada Favela Cantagalo* (Favela Cantagalo Hostel). New functionality is added — the possibility of making reservations for a stay. What happened between 2011 and 2014?

6.3 On the Map

In 2014, Google launched *On the Map* as an initiative that aims to map Rio's favelas digitally. The project, initially proposed by the advertising agency JWT, is funded by Google, coordinated by Afroreggae and undertaken by favelas' residents hired for mapping streets and points of interest.

On the Map is promoted as a project that would turn "data free areas" into 'data full zones' and by so, break a "digital wall" and a "wall of prejudice" that supposedly separates favelas from the city and the world (Afroreggae, 2013). The initiative assumes that the absence of data on favelas entails 'enormous social and economic loss' and, by consequence, generating and opening digital data could help to reverse this situation. Putting favelas on the map would boost the local economy, self-esteem, identity, a sense of belonging and citizenship (Afroreggae, 2013; JWT, 2014)

Figure 41 Images of Tá no Mapa workshops and fieldwork.



Source: Afroreggae (2014a, 2014b).

Favelas' visibility on Google's narrative is tied to the visibility of business and touristic sights, drivers of communities' economy. This form of visibility, it is argued by its proponents, changes the way the big media refers to favelas. There would be a shift from violence and crime to a focus on favelas' positive aspects. Recurrently, the project is showcased as "more than mapping."

Asked about the primary outcome of the project, people involved often suggest that favelas' digital mapping equals recognition and that digital visibility is an attestation of the very existence of *favelas* in the city:

> The benefit is to exist. You are on the digital map, where everyone is. It is more than mapping, it is a recognition that you exist, that the place that you live exists, that you are not a blank spot on the map, that you are not out of the city. You are in the city. (Interview, 2016)

> "A map is more than a map. It is a certificate of existence." (Afroreggae, 2017)

> You would go on Google Maps, and that was that grey spot, like nothing, existed there. On the Map is somehow taking favelas out of the invisibility and throwing

> some light [...] We can today bring visibility and enable the people on these places to be somehow part of the society as a whole. (Google, 2016) (video 8/8)

In order to unpack how visibility unfolds in practice, we followed this process closely in favela Cantagalo. The following sections describe each of the mapping steps concisely.

6.3.1 Workshops: Preparing Mappers and Users

We found that the mapping methodology for Tá no Mapa was in part constructed along the process. Mappers team were composed by 4 to 8 mappers-agents (according to the size of the favela), one field supervisor, one office agent and one project coordinator. The field agents were hired from 2 to 4 months and should work about 6h/day, with a goal to map at least 10 'points of interest' every day. For data georeferencing, mappers use the app Map Maker Mobile Buddy, installed on smartphone borrowed from Google. The app works exclusively in the English language and comes with a set of pre-defined categories that restricts the types of features that can be mapped.

The first action is taking a picture of a "point of interest." The phone's GPS recognizes the coordinates and stores the information. At the end of the day, the agent uploads this information to the cloud. The office agent downloads the data and organizes it on Google Map Maker, using a computer. Once the map is finished, a team of regional mediators (Rio's residents, but not necessarily favela's residents) review the data, searching for errors and suggesting modifications. At the beginning of the initiative, the mediators were not residents, but Google's employees based in Ireland. Due to some difficulties of this team in recognizing favelas specificities — for example, the same street having different names or different streets having the same name — the methodology is reviewed to include regional mediators. Even these volunteers are not entirely familiarised with some features of the favelas. Due to the complexity of these territories, even a person that resides in Rio (but on a formal neighborhood) may get confused with some particularities.

Decisions about what to be visible start at the individual and building scale. In mapping training workshops, participants sometimes debated what the trainers mean by 'point of interest.' Some of their suggestions involve historical sites, Umbanda temples, recommendations for tourists on the fair price of a *moto-taxi* trip, open sewage, the sites where a homicide occurred, and others. The project coordinator explains that for Google what matters is to offer information, such as the location of *moto-taxis*, popcorn carts, and football fields. A 'point of interest' is defined as

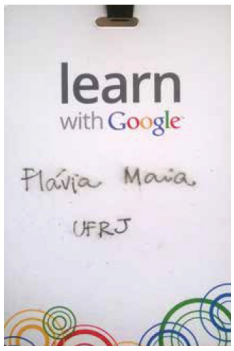
'whatever is interesting!' He does not recommend field-agents to register episodes of violence or local infrastructure problems; instead, he recommends mapping local business and touristic sights (Luque-Ayala and Neves Maia, 2018).

Drawing from the workshops observations, we conclude that commercial interest seems to be the primary concern of Tá no Mapa project. The primary interest is to map shops, service, touristic sights for a target audience of entrepreneurs. This is evident, for example, on the training workshops, as we detailed before, but also (1) on the way the projects are disclosed, (2) on the survey conducted by JWT at the end of the project in Vidigal and (3) in searches on Google Maps on mapped favelas. Luque-Ayala and Neves Maia (2018) summarize:

> Ta no Mapa's marketing material introduces favelas in decisively quantitative terms, foregrounding economic potential: "13 million people live in Brazilian Favelas. Income in those areas totals 25 billion dollars" (Google/Afroreggae, 2014). The posters and leaflets invite favela residents to get involved in the project target small enterprises, emphasizing potential business benefits: "You are now on the map! Come for breakfast and listen from experts on how to improve your business" (fieldwork material). Mapping teams are instructed to be particularly amiable and enthusiastic when engaging with local business, "developing trust and conveying the importance of gaining Internet visibility for increasing sales" (Ta no Mapa, 2015a: 3). After mapping a particular business, field-agents encourage business owners to register in Google My Business, with the objective of "increasing the number of local entrepreneurs with global visibility" (Ta no Mapa, 2015b: 3) (Luque-Ayala and Neves Maia, 2018)

On one of the workshop for targeting new users and publicizing the project, presentations were mainly directed to the support of the Microenterprise, who are invited to "learn *with* Google."

Figure 42 Mapping workshop badge in the favela Vidigal.

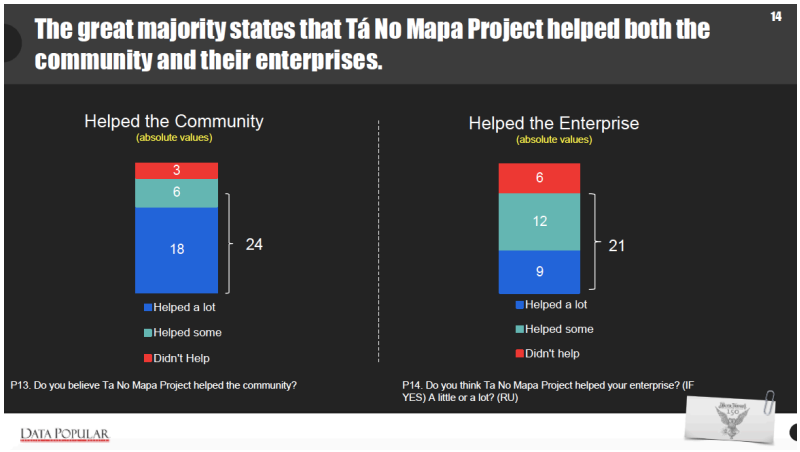


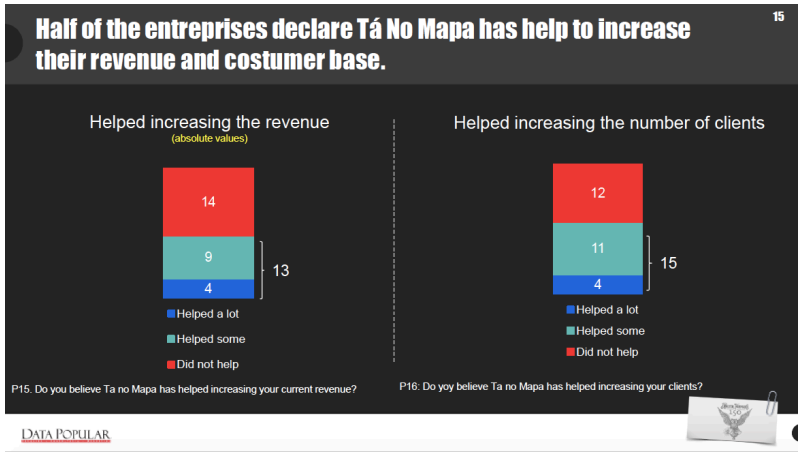
Source: Author (2018)

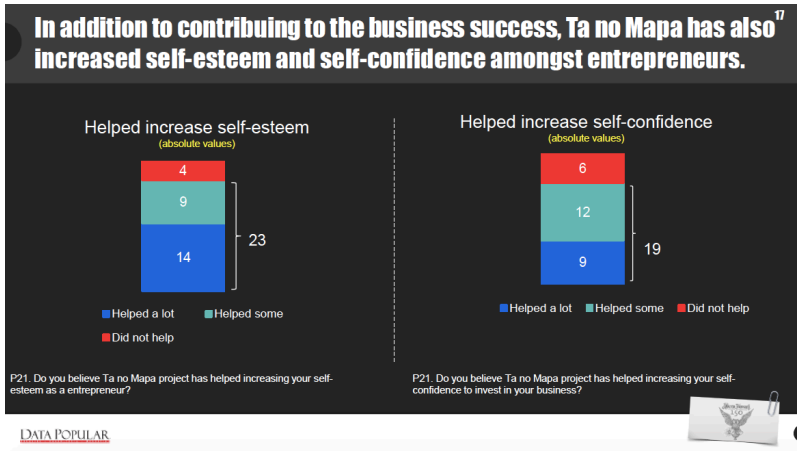
Additionally, a survey conducted by JWT six months after the end of the project in Vidigal aimed at evaluating the impact of *On the Map* on businesses. It concludes that after the favela was mapped, one in three companies increased their number of employees, and half of them said to

had sales and customer visits increased. The research asked, among other questions, if: (1) *Tá no Mapa* helped both the community and your company? (2) *Tá no Mapa* contributed to give more visibility to the business both inside and outside the community? (3) *Tá no Mapa* raised the self-esteem and confidence of entrepreneurs? The results can be read in the charts below.

Figure 43 Charts from the Presentation from JWT about the "Tá no Mapa."







Source: JWT and Data Popular (2015)

6.3.2 Fieldwork: Mapping Favelas

Once the mappers are on the field, technical challenges arise, such as the functioning of the GPS and the internet network. Sometimes, the GPS fails to identify precise coordinates of areas where the building density is high, or the slopes are sharp, sending the mapped point to the surrounding sea or forests. In this case, the field agent who took the photo has to go to the Afroreggae headquarters and point out to the office agent on a favela satellite image the exact location of the point. For this task, the agent may use as a reference, landscape marks such as trees or water tanks, as well as his or her own experience of circulating the favelas' alleys. When mobile technologies fail, mappers have to complete the digital map later, using his or her mental map.

This process emphasizes the knowledge of the residents and reinforces their role in the process. One of the primary input of the mapping process is the residents' power-knowledge over their territories. The role of these mappers, and the (in)visibilities that they produce while mapping is based on their own experience, and has a great impact on the final result. As mappers, residents translate their lived experience -- such as how, when and where to circulate -- into digital visibility. Whether the mapper is local or not, and what social networks he or she is part of, are key assets for digitally mapping favelas, for they are necessary to surpass a common mistrust of favelas residents on state representatives, for instance. "This is the greatest "pulo do gato" ('trick of the trade') of Ta no Mapa" explains a project coordinator: "we recruit people who know how to circulate in these places, who have a sense of danger, [and] a sense of how far they can go and where they cannot go" (Interview, 2015). Mappers are encouraged to use their social ties and channels of communication to facilitate their work.

Technological failures sometimes made the process slower, and the digital had to be put aside in favor of manual, analog techniques, as written on an Afroreggae report:

> On the fieldwork, in Vidigal, we identified that the points registered by GPS on the Map Maker Buddy, when uploaded to Google Map Maker, were located distant from where they were effectively recorded - the sea, the beach and the forest surrounding the favela. [...] This problem eventually affected the second stage of labor, making it slower because it was necessary to find the right spot directly on the satellite image. To solve this problem, we are also making the registry of the points manually with references from other nearby points, to make it easier the referencing when launching them on Google Map Maker. (Afroreggae, 2014a)

Another technical obstacle is related to the use of the satellite image as a basis for mapping. When barracks and buildings are too close to each other and cling over the hills, it is not possible

to identify, from above, the street paths. The satellite image shows a cluster of buildings, leading one to believe that there are no paths, or that the paths cross through some buildings.

Figure 44 Satellite view of part of the favela Rocinha[49].



Source: IPP (2012)

Plus, informal urban configurations change faster than formal ones — buildings are demolished and reappear somewhere else, floors are duplicated in a few days, landslides and deforestation may rapidly transform the landscape. Also, in this case, the field agent is critically to identify the actual urban configuration, as highlighted in some interviews:

> Google Map Maker gives you the map draw and the satellite photo of that draw. What often happens is that the photo is old, so certain buildings that existed before, does not exist anymore. So in this case, only the residents can detect. So we gradually understood this process, and we were redesigning the methodology anticipating these problems. We were learning as we were doing because there was no method to do it until then (Interview, 2015).

Once the office agent processes the data on the Google Map Maker platform, Google sends a letter containing a code to the business owners that had their businesses mapped. This letter contains a code that has to be inserted on an online platform, in order to validate the mapping. However, the official Post Office does not deliver letters in streets that are not recognized as official by the government. In general, mail delivery is an informal system in many favelas. The postman left letters in the Residents Association, and a resident — usually called the 'Community Postman' — distribute it door to door. In this process, sometimes, mail is lost before reaching its

49 Available in Mapeamento de logradouros e gestão territorial em favelas no Rio de Janeiro <https://lagf.org/2012/proceeding/Leandro%20Souza%20-%20Logradouros%20favelas%20LAGF%202012.pdf> Accessed: Novembe, 2018

destination. Because of the precariousness and informality that characterizes public services in many favelas, some business owners do not receive this letter with the code and, therefore, have issues to conclude the process of being mapped.

Only when the mapping is concluded successfully, business owners become part of a suite of tools such as Google Maps, Search and My Busines. They also become part of a series of digital services that rely on Google APIs (application programming interface) and its location-awareness, such as transit apps (e.g. Uber and Waze) or social justice apps (e.g. Nós por Nós and Fogo Cruzado).

Another limitation to mapping is related to complementary digital data. In mapping businesses, the mapper is advised to complement GPS data with hours of opening, phone number, address, and zip code. However, streets in most of Rio's favelas have no zip code, since the government does not recognize them as official. Sometimes, the residents indicate a general zip code that is not recognized by Google as corresponding to an address, which generates a minor system failure. The found strategy was to use a general zip code for the favela as a whole. Besides that, many businesses do not have phone numbers and do not open in regular hours. Opening hours are conditioned by other factors such as the dynamics of informality or the will of the business owner to open in that hour or day (Afroreggae, 2014a; b; c; d).

Besides, some informal local businesses are not accepted by the digital system. It is the case of locksmiths, a small business that exists in profusion in many favelas, and, due to its mobility and pervasive presence, is read by the system as spam or virus (Interview, 2015).

However,t invisibilities are not only due to practical limitations. There are cases in which the local entrepreneur does not want to be mapped, out of fear of taxation or other obligations that comes with its recognition as being part of the urban system (Interview, 2015). Moreover, invisibility may be strategic for some criminal groups, that avoid being identified or captured by the police constructing *barricades* and turning themselves invisibles in the labyrinth of alleys, a spatial tactic observed before in other historical moments of territorial disputes over urban spaces, such as the emblematic cases of Parisian comunas subjected to Haussmann interventions.

On the street scale, more invisibilities are produced. In many favelas, it is usual to find different streets having the same name, or the same street having different names, as mentioned before. This ambiguity opens up a possibility of disputes over a street name. In Favela Cantagalo, for instance, the main street, recognised by some residents as *Estrada Cantagalo*, *Subida Cantagalo* or *Travessa Cantagalo*, is named on Google Maps as *Criança Esperança*, a national social project for vulnerable young people funded by a television network (TV Globo), one of the sponsors of the

NGO Afroreggae. The interviewed residents say that *Criança Esperança* functions in a building located in the main street, but the street is not recognized by this name. (In)visibility of street names represents in this case, as a territory tactics.

Another layer of invisibility related to street names exists before Google Maps. There is a customary practice at the Municipality of prohibiting naming streets after people who are still alive, or that was killed by perforation such as bullet or knife, for instance (Interview, 2015). There is also an understanding that names that refer to negative aspects such as open sewage or violent episode, are not proper to be replicated on maps. Considering that many traditional favelas' streets are named after an old resident, a local famous business owner, youngsters murdered, or local features, these memories stay out of the digitization process. Names such as *Beco do Cocô* (Shit Street) in *Morro do Turano* or *Largo da Morte* (Death Square) in *Complexo do Alemão* (Gerbase, 2012) are replaced by less controversial entitlements such as birds names — Rua Canário (Canary Street) and Rua Sabiá (Sage Street), in favela Pavão Pavãozinho — or peaceful feelings — Caminho Tranquilo (Peaceful Path) and Rua Sossego (Quiet Street) in Santa Marta.

Figure 45 Graphic representation of invisibilities at the street and community scale.

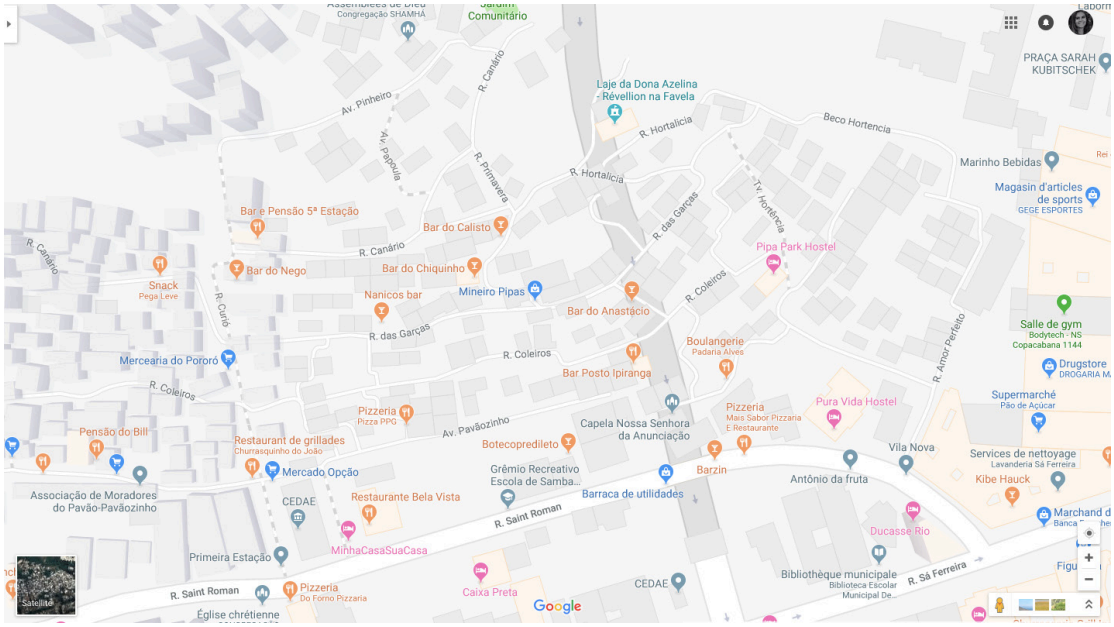


Source: Author (2018)

Other invisibilities are produced on the community scale. One of these invisibilities surfaces when the verticality of urban dynamics, which is typical of favelas over hills, is considered. Sometimes, a public path may be partially covered by the upper floors of neighbor buildings, forming a "tunnel" that turns part of the path invisible to the satellite capture. Also, when the alleys are narrows, and tall buildings are too close to each other, shadows are formed in the satellite images, making it nearly impossible to distinguish public from private spaces. Moreover, the draw of the paths may also lead to confusing reading when paths that occur at different levels are overlapped. For example,when a car tunnel that perforates the hill in which a favela is located is represented, the

different path levels are not clear.

Figure 46 Cartographic the tunnel Prefeito Sá Freire Alvim, under the hill Cantagalo, favela Pavão Pavãozinho.



Source: Google Maps (2018)

Furthermore, while actual public circulation may occur in different levels — underground, on the ground, and over rooftops — the paths suggested by Google on online maps are often simplified and limited to the most consolidated routes, ignoring shortcuts that are so natural for some residents. From our experience, when visiting the same point of the favela Cantagalo (Museu da Favela) consecutive times, the best route to reach this point changes continuously, according to the day of the week, the hour of the visit, and the resident who is guiding us.

Invisibilities are produced not only in spatial scales but also in periods of time. The mapping process does not flow without obstacles. Interruptions on the work sometimes occur, due to environmental risks (e.g. heavy rains, flood, and landslides) or episodes of urban violence (e.g,. disputes between gangs and police). These episodes are reported in different favelas: In the event of rain, the fieldwork is impaired, especially in the slums of Rocinha and Vidigal, because they are areas of higher relief and with more irregular terrain" (Afroreggae, 2014).

Besides the invisibilities produced along the process, it is also important to acknowledge (in) visibilities prior to and after the mappings. Before the process, the teams are aware that (in) visibility is an essential strategy for criminal activities. Thus,the dynamics of drug traffic and militia probably interfere on what is allowed to be digitized.

For example, drug gangs often choose to install theirs headquarters on the top of the hills, due to strategic military reasons.Theses areas are likely to remain less detailed on online maps. The area known as Vietnam in favela Pavão Pavãozinho, for instance, is referred in the public media as a violent area, a territory where not even the police can access (Soares, 2013). As a result of the obstacles to access it, its alleys are poorly represented on Google Maps.

In *favelas* where there is drug traffic, outsiders are often advised to be careful with the angle of the photos to be taken, for some vistas are prohibited, and some are not. In more than one occasion we are advised that researchers may not always see criminals, but that the drug lord of a favela always see who is coming inside. Also, some researchers report that, while on field work they can see some elements that are not seen in their field photos. For example, "while along all your way you see boys over the rooftops, some of them probably acting as informants of drug lords — a role frequently performed by underages, known as "*aviãozinhos*" (little airplanes) — when you review pictures taken on the field, these same boys managed to invisibilize themselves from the photo shoots" (Interview, 2016). This asymmetry of invisibility is useful for some who live in favela, and it may prove to be essential to the way criminals exert power.

Drug trafficking control over some areas impose limits about how far the mapping can go and, by doing this, may offer an unexpected map, a picture in negative that reveals precisely by what it conceals: the areas that are opaque to the control of the State or the reach of the private sector, international investment, and tourism. In this context, any attempt of turning spaces visible inevitably provokes tensions. Some of these tensions indirectly appear, for instance, when the mappers' team is advised to split between a woman and the men, and the woman is advised to cover only the safest areas.

6.3.3 After Mapping

Tension is also observed after the cartographic representation is concluded and the map is available for use, including by outsiders trying to access some points inside favelas. There are some social codes that one has to be aware of when accessing some areas in some favelas. For example, in some favelas, sounds, dress codes, gestures and a particular way of talking say a lot about a personal political or criminal filiation or about what is about to happen in the territory. Sounds also have meaning. The sound of fireworks may signalize that the police is coming, and it may be not safe to circulate some areas at that moment.

There are others barriers to free circulation that are invisible to outsiders. In some favelas, a

visitor is not advised to move around some areas especially if it is the first access) without some resident as a companion, preferably a person who is easily recognized by the community. This Facebook post of a foreigner trying to reach the Cantagalo Museum, on the top of the hill, as well as the Museum staff answer, is illustrative of this diffuse, invisible access barriers:

Figure 47 Social Media dialogue between a tourist and the team of the Favela Cantagalo Museum, about the need to access favelas accompanied by a resident, as well as about "takinga picture in inappropriate place.".



Source: Facebook/museudafavela (2016)

Another invisibility that is observed after mapping is that the resulting online maps often does not recognize the heterogeneity of favelas. Favelas not only hold great differences among each other but also within themselves. For instance, the map of favela Cantagalo, draw by a resident (Acme, 2012) highlight its different areas — differences in topography, architecture, culture, history, sociology, and others. These differences are not evident on Google Maps, that represents Cantagalo as an homogeneous, unified neighborhood.

Figure 48 Representation of favela Cantagalo by a resident. On the top of the draw it reads: "from a distance it looks like everything is the same, but it is not"



Source: Acme (2016)

6.4 Beyond the Map

In 2016, building on *On the Map*, Google launched *Beyond the Map*, a series of eight virtual reality (VR) videos, that allows a 360° view of favelas' alleys and public spaces and aims to bring Street View to favelas. Targeted at those who live outside favelas, and inviting them to go inside for the first time, Beyond the Map intends to show how the favelas – "an uncharted and mysterious part of the map" (Google, 2016: intro) – are now represented beyond the digital map. In viewing favelas from the street level, viewers are invited to engage with the lives of those living there (Luque-Ayala and Neves Maia, 2018). Favelas are said to be "not simply a place" but also people (Google, 2016: intro). They are portrayed through stories of residents — "People who will inspire you and make you look at the favelas in a whole different way" (Google, 2016). Favelas' residents invite outsiders to immerse on the digital experience and discover what is not usually shown in Rio's representations. Similar to *On the Map* discourses, *Beyond the Map* mobilizes a narrative around the historic 'invisibility' of favelas, and reinforces a false dichotomy between favela and city, by contrasting "the Marvelous City [...] the Rio everyone knows – Ipanema and Copacabana", with "the other, the world of the favelas" (Google, 2016). Together with Tá no Mapa discourses of mapping as the right to exist in the city, Beyond the Map reinforces the narrative of digital visibility as a means for urban inclusion.

> Beyond the Map, whilst mobilizing a narrative around the 'invisibility' of the favela, positions both business and the digital as the new nature of urban inclusion. In a video segment titled 'Change Starts with Hell,', Paloma, a favela resident, describes a bleak picture of everyday invisibility that demands a statement of presence: "The favela is a blank spot on the map. Mail does not get delivered. [...] It is as if we did not exist This is a daily fight. We are saying that we are here, that we exist, that we are part of the city" (06-Beyond the Map, Rio de Janeiro - Paloma's Story). Paloma shares with viewers the story of her life, her memories of favela violence, her fascination with computer programming, and her surprise at becoming the only computer science student from a favela at the Federal University of Rio de Janeiro. **Invisibility is discursively constructed, so that it can be overcome via a digital presence.** (Luque-Ayala and Neves Maia, 2018, our emphasis)

In this case, favelas alleys and the top of the hills are used as scenarios for dancing, singing, and other forms of cultural expression. Aerial vistas and birds-eye view, are part of all the takes. From the top of the hills, the urban landscape is surrounded by forest, and the view of the sea is breathtaking. Once again, the initiative focuses on touristic, 'pacified' favelas — such as Vidigal and Alemão — while the discourses reinforce the economical nature of the project. As said by the NGO's coordinators: "We tried to map [...] favelas [...] but with *a focus larger than only inclusion*, also to show business." (Google, 2016, 8/8, our emphasis).

As of 2017, 22 *favelised areas* had been mapped, among actual favelas, precarious neighborhoods (e.g. Rocinha) and precarious social housing (e.g. Conjunto Cesar Maia). How were these areas selected out of a thousand of other informal areas in Rio? The criterion is not evident to the participants of the workshops. One interviewed person believes that favelas with PPUs were mapped because access is easier in pacified territories. According to an Afroreggae agent, Google initially asked them to choose favelas on the South zone (touristic neighborhoods) and around the Olympic venues. Besides this requirement, Afroreggae added its criteria: the insertion of their social programs or the social ties that their team holds on certain favelas. In the end, the access of mappers depends on the success of the Afroreggae negotiations with residents. To the residents involved, this is not always clear. For a mapper of Rocinha, the primary criterion of choice is related to the threats of eviction to which residents face daily. From her point of view, the mapping process is seen as a strategy to avoid housing evictions (Interview, 2016).

On the other hand, for a mapper of Santa Marta, the project is essential to the tourists, "so they can come in and consume, because they usually go to the touristic sight, but they do not buy anything inside" (Interview, 2015). As expressed by a project coordinator at a mapping training workshop, the digital map will be a valuable resource for outsiders "who want to come and stay in the favela... If there is no information, they will not to know... we are putting [this information] on

the most accessed map on the planet" (Interview, 2015).

Zooming out from the buildings, street, and community,a focus on the city level also reveals (in) visibilities, and that is on the scale that the criteria for selecting these 22 favelas appear.Int the end, the spatial pattern of mapped favelas shows that the majority is located next to wealthiest, touristic areas, or near the Olympic venues and PPUs.

When we overlap the spatial patterns of digitally mapped favelas with a map of housing evictions, Olympic venues, PPUs and planned urban growth (City Master Plan) some interesting tendencies appears. There is a tendency to turn favelas more digitally visible on the South and the North Zones, the same areas where there are more evictions. There is also a tendency to let favelas on the West less visible. While the population growth on these favelas is higher, the City Master Plan does not aim to prioritize growth in the region. (See Appendices: Figure 28: Maps of favelas growth rate and spatial patterns of maped favelas // Figure 27: Map of urban growth and HDI)

All the mapping choices that we observed results in maps that simplify the complexity of the communities — e.g,. verticality, rapidly shifting dynamics of circulation, social codes, sounds. Streets and favelas that concentrate more shops, service, and touristic spots are prioritized over the rest. This form of urban (in)visibility is not a straightforward path towards urban inclusion in a broad sense, but focus on the economic dimension of urban inclusion. In these terms, digital visibility is close to an entrepreneurial, neoliberal approach of the urban condition, which ties urban presence, inclusion or existence to an economic role in urban dynamics. Thus, to state that digital visibility is the same as the right to exist in the city is to oversimplify what means to exist in the city, reducing urban existence to economic presence. This finding is aligned with previous discussions on the making of informality through the digital. For instance, Luque-Ayala and Neves Maia (2018) stated that digital mapping supported a Foucauldian form of governmental power and aimed at opening favelas to broader economic circulations (c.f. Foucault, 2009). This is far from providing meaningful inclusion and/or citizenship.

6.5 Findings and Results

By highlighting what is turned invisible in the digital mappings of favelas, this Chapter draws attention to the politics of visibility at play in smart urbanism in Rio. This analysis foregrounds visibility as a form of power exercise, considering that urbanism is part of a *regime of practices.* Within our theoretical and methodological framework, dynamics of power in regimes of practices may be unpacked by the *analytics of government* -- an interplay between rationalities, techniques,

subjectivities, and visibilities (Dean, 2010). By positioning digital visibility as an element of the visual thinking of a period -- the making of Rio to host the Olympics 2016 -,- our analysis reinforces that ways of *seeing* are linked to ways of thinking, talking and acting over a given subject.

In general, most of the digitally mapped favelas are located near to the most famous and tourist neighborhoods, Olympic venue, and PPUs. Digitally visible favelas are more frequent on the South and North Zone, and more scarce on the West zone, revealing a pattern of digital visibility that is similar to a pattern of physical invisibility in the context of urban upgrading and pacification programmes.

Approaching the material nature of visibility -- e.g,. digital techniques and methodologies by which is constructed, spaces in which occurs -- in a well delimited period (2008 - 2016) and spaces (individual, building, street, favela, city) provides an understanding about how power relations shape urban spaces. The results show that both physical space and digital space are central in the debate about digital visibility.

By physical invisibility, we do not mean complete removal of these spaces from the materiality of Rio's landscape. For instance, many favelas, especially hilly favelas on the South Zone and Center have an undeniable presence on the urban landscape. In this context, physical invisibility refers to the strategy to remove some aspects of the urban landscape -- housing evictions, urban upgrading projects, homicide rates, violations of human rights and pacification -- while inserting and highlighting other elements -- lifts, walkaways, cable cars, etc. These transformations are sometimes referred as a new *regime of visibility* of favelas (Cavalcanti, 2013), or as the phenomenon of the *invisibility of the poor and the poverty* in the Olympic City (Consentino, 2013). This so-called new regime of visibility focus on the positive aspects of favelas near wealthiest, touristic areas, and ignore the complexities and contradictions of the majority of favelas. The transformation is also often associated with physical and symbolic violence (see: Comitê Popular da Copa e das Olimpíadas do Rio de Janeiro, 2014).

It is interesting to notice that the majority of favelas in the West zone were not massively included in the mapping projects, with some exceptions. This area has poor infrastructure, service, and transportation if compared to the rest of the urban area. This region has also received many social housing projects to accommodate residents evicted from favelas due to recent upgrading projects. This findingoft the spatial pattern of digital visibilityand their relatioshipsn to the patterns of physical visibility reinforces previous findingsoft how transformations in the context of the Olympics 2016 contributed to transformations in the way favelas are seen and treated (Cavalcanti, 2013; Consentino, 2013, Faulhaber, 2015.,Ffavelas which arealready more included in the economic and political dynamics of theurban are turned even more visible, aadding a new layer of invisibility to favelas which already are more excluded.

Despite this significant transformation, these programs induced in the image of the city of Rio as a whole, only a minority of favelas – around 10% of the 763 existent (IBGE, 2010) are inside the limits of PPUs. This minority is composed of precisely those in the proximities of Olympic venues and touristic zones (Faulhaber and Azevedo, 2015; Lopes de Souza, 2012). Lopes de Souza (2012) points out that the primary interest of the government, as well as of private companies, is to pacify favelas in areas that are strategic from an economic and political perspective.

Considering the similarities between the spatial patterns of favelas digital visibility and the spatial patterns of the regime of visibility of the Olympic City, it is possible to consider that the phenomenon of favelas' digital mappings is not an isolated feature, but part of a specific regime of practices of urbanism. Digital visibility of favelas in Rio illustrates, together with other dynamics of invisibility, the many disputes around the image of the city in the context ofmega-events and the role economic inclusion plays in the construction of this image.

This is not to say that the spatial pattern of digital visibility of informality is a perfect mirror of major urban transformations related to the Olympics 2016 in Rio. Instead, it offers a counterpoint to the idea that digital mappings are necessarily empowering for favelas residents and, unequivocally, a form of urban inclusion. While some of the digital mappings of informality contest the perversity of the neoliberal production of the city in the context of mega-events, by denouncing violence against favelas' residents for example (e.g. Nós por Nós), others are more aligned with the mainstream urbanism rationality, that prioritises favelas on the Center, South and North zone over others.

The results indicate that urban exclusions, as expressions of power dynamics, are not merely surpassed once digital visibility takes place. Many forms of digital invisibility are produced in the process of turning favelas digitally visible. This invisibility is noticeable in may spatial scales.

For instance, on the city scale, favelas are more visible on the South than on the Wes. on the community scale, there is a sort of cartographic invisibility of the top of the hills, or spaces that are not a priority for touristic visits, such as places where violence occurs more frequently. On the street scale, the name of the streets are changed, or the dynamics of verticality are flattened. Throughout all the scales, various political decisions, made by proponents, users, mappers and other residents along the mapping processes, shape the final result.However,t our analysis also reveals that the exercise of residents political choices haves its limitations in Tá no Mapa case. The interest in the economic dimension of these territories, set out by the proponents, overpasses other interests that come into being along the mapping, such as reporting urban issues or denouncing violence.

Still, small and disperse acts of resistance has a role in the visibility process. During the mapping process power relations became clear through the networks of individuals, who could at any time block a passage or a photo shoot. This dynamic illustrates what Foucault means by the "micro-physics" of power, that is, a power that does not emanates from an authority or institution, but that permeates all social relations and constantly shifts (Foucault, 1975), highlighting the complexity of power relations at stake along processes of visibility.

Transformations in visibility enacted by 'smart' modes of urbanism are not an isolated aspect of the urban, but an integral part of how people produce it. This understanding broadens the implications of the notion of digital visibility as a social process. If visibility is a dimension of power dynamics, urban inclusion resides not merely inn being visible or not, but in deciding ho,w (why, by whom, what, when) visibilities (plural) unfold.

This reflection feeds an ongoing discussion about new forms of spatial (in)justice associated with smart urbanism. If the organization of space is central in human societies, both reflecting and influencing power relations (Lefebvre, 1986), how the organization of spaces using digital technologies disturbs power relations?

Power and vision have always been symbiotic in Western ways of governing (Otter, 2008). (In) visibility unfolding transform power-knowledge relations. Bearing this in mind, we **suggest that the exercise of the right to exist in the smart city is the exercise of the right to choose how to be digitally visible** (on online mappings or elsewhere). The ways digital visibility is accessed and shaped by people determines how urban spaces inhabited by these people are socially, politically, culturally or economic included. Bluntly put, **concerning urban inclusion, "it is the style in which seeing and being seen takes place that carries the most important consequences"** (Brighenti, 2007, p.339).

In this regard, it is valuable to acknowledge that every regime of practices — (smart) urbanism included — "illuminate some things and so cast others in the shade" (Rajchman, 1988). The creation of visibilities has always meant the active creation of invisibilities or "areas of darkness" (Otter, 2008) -- and this is not exclusive of smart cities or contemporary urbanism.

This understanding of the interplay between (in)visibility, mapping and urban inclusion is aligned with Foucault's analysis of power and his awareness that there is no determinism in any tactic or strategy of power exercise. For Foucault, there is no apparatus (*dispositif*) or mechanism that merely, by its nature, can assure control and domination, or, the opposite, empowerment and recognition, because "liberty is a practice" (Foucault and Rabinow, 1982). From this perspective, **digital visibility underpinned by digital mappings is not determinant for urban inclusion and exclusion**. Instead, **digital (in)visibilities are processes that may be put to work in practices of power, either reinforcing dominant tendencies of domination or contesting them.** As so, digital mappings can be put to work nothing promoting urban inclusions and urban exclusions of informality.

The case study also reveals that some forms of digital visibility of informality often simplifies favelas' differences (e.g,. differences within a favela, between favelas, and among favelas and the rest of the city) and reduces their complexities. Often, in narratives about mappings, favelas are associated with a negative image of crime and violence, or a neutral image of previous absences (e.g,.a blank spot on maps), to be overcome by the presence ofa business, touristic sights, and artistic performances in digital tools. In these narratives, we found a common thread, that we call a "myth of invisibility" -- the description of a situation in which a supposedly complete prior absence of favelas on online maps is one of the causes of their urban exclusion. In this "myth", a new form of urban inclusion or existence would be necessary and unavoidable: digital visibility.

In counterpoint, the empirical analysis indicates that digital mappings narratives and images may oversimplify the complexity of favelas territory, focusing on the economic dimension of inclusion. However,, more than this, this Chapter opens up a critical question about the global phenomenon of digital visibility of informality. Would digital mappings of informal settlements be an expression of more significant concern with the inclusion of informality on global circuits of financial capital (via smart urbanism)? The digitization of slums' may indicate an economic integration between informal settlements and the city indeed.,However, this is not simply an integration in a strict sense -- e.g,.material integration between formal and informal neighborhoods through walkways or lift. It is an integration inn a broader sense -- an increasing integration of some informal settlements to urban dynamics, and a strengthening of the advance of capitalist and neoliberal urbanization processes, together with its contradictions, over these spaces.

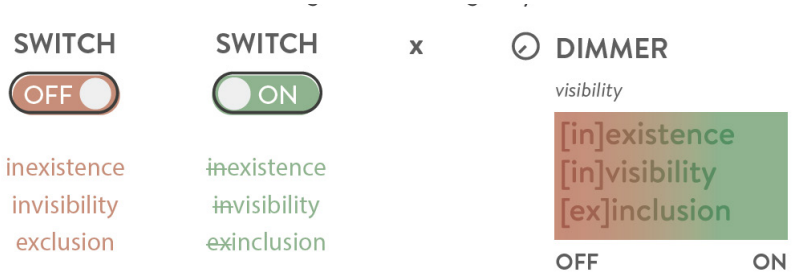
SEVEN

7. Digital visibility is a social process and plays a role in Smart Urbanism

While the Smart City approach is praised as a solution for a myriad of urban problems, the idea of digital visibility as a necessity, a desire or a right gains traction. For informality, digital visibility is said to be the same as the right to exist in a map and the city. Common sense says that digital visibility is inherently good as a form of urban inclusion. There is a case for digital visibility within dominant, technology-driven SU, as much as within alternative, knowledge-driven SU. This strong narrative resonates across the Global South, and it is particularly appealing in historically excluded spaces, such as informal settlements. Meanwhile, the social and political implications of digital visibility for the social production of smart cities, particularly regarding spatial justice, remains unclear.

This Dissertation contains pieces of evidence that digital visibility is not a value-free process, nor a straightforward path towards empowerment, recognition, integration or inclusion, but a political endeavor. Rather than accepting digital visibility as a shortcut towards urban inclusion, we demonstrate how favelas inclusions and exclusions, as expressions of relations of power, are contingent and contradictory, as much as the (in)visibilities produced along these processes. Taking a distance from a dualistic approach of visibility — e.g., visibility as a right to exist in the city *vs.* invisibility as a failure to be part of the urban — we show that digital visibility does not function as a light switch (informal settlements going from *off* to *on*), but as a *dimmer*. Digital (in)visibility of informality is a much more nuanced process of urban inclusion and exclusion, that throw light over some aspects while casting a shadow over others.

Figure 49 ON-OFF / DIMMER



Source: Author (2018)

By showing how digital visibility of informality unfolds in a delimited space and time -- the city of Rio de Janeiro, between 2008-2016 -- this work makes the case that digital visibility is not necessarily equaled to urban inclusion. From our perspective, digital visibility and invisibility, inclusion and exclusion appear not as an opposite, but as coexisting in the same geographical space and period. As so, this analysis shows that digital mapping of informal settlements does

not represent a set of acquired rights to urban existence, but a journey towards **a form of contemporary urban experience in which digital visibility and invisibility, urban inclusions and exclusions, intertwine**. This conclusion draws attention to the **political nature of digital visibility.**

Smart cities rationales and practices not only transform what we see — i.e., changes not only the visual perception of urban domains of governance (McNeill, 2016) — **but also change the place of seeing and being seen in power-knowledge urban dynamics.** Turning favelas digitally visible on online maps represents more than turning data about informality visible on screens. The narratives and images that follow the digitization of informality position **digital visibility as an essential asset for the contemporary urban condition**. Digital visibility, in these narratives, would be a tool with which citizens who live in informal settlements could exercise their power and their right to exist in the city. Drawing on the notion of **governmentality** (Foucault, 1978; Dean, 2010), we provided a counter-argument, showing that digital visibility is not, in itself, an empowerment tool, but one of the four essential dimensions of power exercise (together with rationalities, techniques, and subjectivities). From this perspective, **digital visibility would not, in itself, provides urban inclusion. Digital visibility has a role in governing the urban and, as such, may promote inclusions and exclusions.**

Our analysis, although limited in scope and time, reached the purpose of providing a more nuanced understanding of digital (in)visibility in the smart city, focusing on its relations of digital visibility of favelas in Rio with other forms of urban inclusion and exclusion. Exploring these dynamics of inclusion and exclusion between 2008 and 2016 showed to be a productive strategy, because the period was marked by intense transformations in the regime of visibility of Rio as a whole, including its favelas, in the context of mega events.

These transformations were part of a strategy to turn Rio into a "world class city" (Roy, 2011) -- a city that plays an essential role in global financial circuits. Changes in the regime of visibility of Rio involved turning positive aspects of some favelas, especially those situated on the South Zone, highly visible; and, at the same time, turning negative aspects of other favelas, especially those situated on the West Zone, considerably invisible. This pattern reinforces stereotypes of favelas as either a place of music, originality, creativity and resistance, that worth a visit or as a place of crime and violence, that need to be avoided. The geographical determinism contained in this form of (in)visibility narrative is simplistic and mismatch with the actual dynamics of the city, in which the mentioned features -- both positive and negative -- are not contained within the boundaries of territories officially recognized as favelas.

Roy (2011) notice that cities that are promoted as "world-class," like the city of Rio before the

Olympics 2016, often focus on spectacular architectures and scenarios, or praise the fact that is always being reinvented and under construction. Meanwhile, "these cities are run by the cheap labor of workers *we cannot see*" (Cox, 2013, quoting Roy, 2013, our emphasis). Because of this tendency to turn working classes invisible, Roy suggests a subversion of the very concept of the world-class city, that includes a shift on how cities are turned visible worldwide. This shift would allow the world "to see the urban poor majority as the dominant force in today's city-making" (Cox, 2013, quoting Roy, 2013). If the aim is that visibility of urban lower classes become a pillar of contemporary urban condition, digital visibility needs to be further and more in-depth examined from a critical perspective, specifically -- but not only -- in the context of Smart Urbanism.

This study takes a step in this direction. While focused on contemporary transformations related to digital visibility of favelas, this study also provides a historical background of concise information about the nature of favelas urban inclusion and exclusion. As so, it situates the discussion about digital visibility in a more extended genealogy of favelas (in)visibility, and brings to the discussion political and economic dynamics such as the rising of favelas as an urban problem and the attempts to deal with it by urban upgrading and plans -- facts that coincide with a greater attention to favelas mappings.

7.1. Analytical Summary

To set the tone of our critique, we reviewed the postcolonial literature that criticizes false dichotomies such as inclusion and exclusion or informality and formality. A valuable reference here is Perlman's vision about "the myth of marginality" of Rio's favelas, and Roy's notion of "informality as a state of exception." Complementary, the postcolonial approach of Varley (2013) was central to understand how some of the Latin American studies on informality tend to reify false dualisms between inclusion and exclusion, formal and informal, and, for that matter, visibility and invisibility.

Building on this understanding, our study shows that rather than being a simple question of inclusion, citizenship, integration, and empowerment; or, on the other hand, colonization, exploration, surveillance, and control; digital visibility via mappings may work on an ambivalent and ambiguous way. That is to say that digital visibility does not automatically promote inclusions or exclusions. Instead, digital mappings are used by different actors in different manners to promote inclusions and exclusions, at the same time. This process is permeated with conflicts and negotiations. In this sense, this work speaks directly to the double-edged nature of the digital

production of the urban, explored by SU studies.

In the theoretical and methodological chapter (2), we opened up a discussion about *the role of digital visibility in the social production of (smart) cities*, combining theoretical categories of critical scholarly debates: visibility, urban, urbanism, urbanization, power, and governmentality. This discussion established digital visibility as an integral feature of smart urbanism, a dimension of power relations that produce urban space. State of the art identifies and combine literature on the different manner by which visibility, mapping, and the digital may be put to work as ways of governing. This integration between existent studies paved the way to our approach of digital visibility within SU. We argued that digital visibility (on maps or else) is a social practice, and a form of power exercise, reinforcing that digital visibility has an intricate role in producing urban space, that goes beyond merely conceding a right to exist in a map. The context (4) provides an overview of historical and contemporary forms of favelas visibility, indicating how visibility and invisibility of informality have always intertwined in the making of the city of Rio. This contextual approach of the visibility of favelas further disturbs the assumption that digital visibility would solve urban exclusions. The illustrative cases (5) reinforce this perception with examples, that reveal how, in this specific context, a "myth of (in)visibility" surfaces with the digitization of informality. The case study (6) discusses Google Maps in the favela Cantagalo in the light of the theoretical and methodological framework *analytics of governmentality* (Dean, 2010), helping to position favelas visibility as part of broader dynamics of urbanism.

7.2 Answering the research question

Does digital visibility equal to urban inclusion? By paying close attention to the different manner favelas were made visible or invisible through Rio's history, and following the inclusion of favela Cantagalo on Google Maps, this study helped to confirm the hypothesis that **digital visibility is not by itself equals to urban inclusion.** This answer aligns with different critical scholarly debates, such as critical cartography, governmentality studies, and smart urbanism. Together, these debates provide the building blocks that help us to advance that **(smart) urbanism is a form of power-knowledge concerned with the production of visibilities**. Hence, smart urbanism and the digital visibilities that it leverages are not neutral. Capitalist dynamics of urban exclusion, as expressions of power, are not merely transformed once digital visibility takes place. Instead, urban in/exclusions are ceaselessly emerging along the production of visibilities, in the plural.

The empirical analysis has shown that in Rio, as in all urban spaces, visibility is "strategical, relational

and processual" (Brighenti, 2007). The case of Google's digital visibility — 'Off,' 'On' and 'Beyond the Map' — illustrates that strategies to make favelas visible and invisible are aligned with political, economic and social interests over favelas. At this moment, as on other occasions in the past, the thresholds of favelas digital visibility in Rio are aligned with the dominant political and economic thought embedded in its urbanism. A considerable part of urban management, planning, and design in Rio before the Olympics was concerned with the preparation of the city to host mega-events, with creating an easy-to-sell brand, and with opening up the city for international investments. As part of a regime of practices of urbanism, digital visibility underpinned by Google help to shape an image of an integrated pacified city, in which favelas would have gone from uncharted, dark, blocked, to illuminated, permeable, transparent and open to financial flows.

By investigating how this narrative unfolds in practice, we showed that this transparency has its opaque zones. Our analysis of Tá no Mapa project shows how technical and political choices create invisibilities. For example, the analysis highlighted that some invisible barriers to circulation are hardly captured by digital tools, such as social codes, or non-visual modes of perceiving the territory (e.g., hearing).

Together, theoretical and empirical analysis gradually helped to build the argument that:

(1) Digital visibility is a dimension of power exercise and, as such, play a role in the social production of (smart) cities;

(2) Digital visibility, mapping, and urbanism are social practices and have a role in governing the cities;

(3) Favelas (in)visibility and inclusion have been ambiguous and disputed processes throughout history, and this is also the case today for digital visibility.

While it is not our scope to discuss all these points in depth, they appeared throughout the text as layers that support the answer of the research question.

However, more than answering the initial inquiry, this research allows us to propose an epistemological movement within SU: the use of digital visibility as a framework of reference for analysis of power. Drawing from Foucault (1978) and Brighenti (2007, 2010), theoretical discussions on visibility, as well as from the analytics of government (Dean, 2010), we suggest that using visibility as **a social sciences concept** that involves both what is seen and the ways by which it happens (Brighenti, 2007, 2010) is much more likely to draw attention to the political nature of urban inclusion/exclusion in the smart city than a reliance solely on visualization, visual perception

or digital maps as they appear on digital screens. The integration of aspects of governing via mappings, visibility and the digital revealed that **digital visibility could be understood as part of a regime of practices of urbanism and a dimension of governmentality**.

Understanding digital visibility as social processes contributes to comprehending the profound political nature of turning informality digitally visible. It draws attention to the disturbances on power dynamics that digital visibility foregrounds, such as resistance from residents to be mapped, or the changing on street names as a form to exercise territoriality. **Digital visibility**, when compared to other forms of favelas (in)visibility in Rio such as housing eviction in the preparation of the city to host the Olympics 2016, **shows to be not an isolated aspect of a context, but an integral feature of how urban spaces are thought, seen and transformed**. As such, digital visibility does not advance political transformations by itself, but it can advance political transformations in conjoint with other strategies of (in)visibility, that is under disputed and constant negotiation among the social actors that produce urban spaces. Approaching visibility is a practice and an axis of power exercise (Dean, 2010, drawing on Foucault's analysis of governmentality, 1977, 1978), a relational field and a process (Brighenti, 2007, 2010), we can open space to investigate **how digital visibility produces and is produced by smart urbanism, and hot digital visibility can govern the urban.**

7.3 Contributions to the existing body of knowledge

By identifying *what* is said about the digital mapping of informality and *how* what is said works to advance the intended transformations, this Dissertation concludes that, in Rio, before the Olympics 2016, **digital visibility of informality (via digital mappings) is part of a regime of practices of urbanism under capitalism. As such, it full of contradictions, promoting urban inclusions and exclusions, at the same time.**

This conclusion does not invalidate the extensive literature on the many forms that digital mappings promote urban inclusions, by facilitating the dialogue between government and society, helping to promote land ownership, or avoid housing eviction, to name a few. Although we conclude that digital visibility is not by itself equals to urban inclusion, we do not advocate for digital invisibility. We agree with social activists that invisibility practices may act as a form of exclusion and stigmatization. Moreover, we recognize the role of visibility in the path of acquiring more urban rights[50].

50 . This idea is expressed, for example, by the authors of Maré Streets Guide: "It is not possible to guarantee

Also, we do not reject that digital mapping of informality may indeed hold the seeds for an alternative SU (McFarlane and Soderstrom, 2017).We aims to add more nuances to this statement, in analyzing digital visibility from the perspective of power exercise. The results illustrate, for example, some of the ways by which digital mappings may indeed dialogue with dominant modes of urbanism, as some of the overlapping of spatial patterns of digital visibility and physical visibility of favelas in Rio has shown. In some cases, digital visibility of favelas has been dialoguing with the neoliberal, capitalist rationality that guides the making of Rio as a "world class city" (Roy, 2011), or a city that deliberately turn lower classes more invisible. This spatial pattern is noticeable in particular when it comes to the tendency to push lower classes to the West zone, which has vast areas with precarious access to urban infrastructure and services.

Rather than denying the potential of digitization of informality as an alternative, citizen-driven and emancipatory mode of smart urbanism, our analysis follows the suggestion of Luque-Ayala and Marvin of not idealizing alternative modes of SU, but to inquiry how dominant and alternative SU share some rationalities and principles. Our interpretation about the way digital visibility operates complements the extensive work on the ways smart technologies, practice, and methodologies disturbs the power knowledge equation of cities worldwide.

These findings also add to the existing body of knowledge on the political implications of digital mappings (VGI, geoweb, and others), reinforcing previous interpretations that mappings are biases and may be put to work as a form of domination. Although our study takes distance from an approach of digital mapping as merely mirroring of previous inequalities, the findings are consistent with the debates on the different forms that digital divides manifest in digital visibility, as we exposed on the literature review.

This observation is consistent with other studies about the arrival of minorities in spaces from which they have been historically excluded. Puwar (2004) considerations about the arrival of women and racialized minorities in spaces of power are similar to ours about the arrival of urban spaces of informality in digital spaces. For her, as much as for us, **the arrival of minorities in spaces from which they have been historically or conceptually excluded is an illuminating and intriguing paradox: "It is illuminating because it sheds light on how spaces have been formed through what has been constructed out.Also,d it is intriguing because it is a moment of change.**

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the right to live fully in and in the city if the hegemonic the practice of making invisible and stigmatizing large portions of its territory and its population continues. The overcoming of this process must be collective action, involving civil society, the State, the Market and especially the citizens who have built, live and give a human sense to the Favela. (...) These are actions that we can achieve, which, above all, stimulate us to continue walking, knowing that the point of arrival, fullness of rights for the set of residents of the City, is far, but must be pursued already. " (Guia de Ruas da Maré, 2014 [2012], pp. 10-11)

It disturbs the status quo, while at the same time bearing the weight of the sedimented past" (Puwar, 2004, p.1).

Finally, this discussion contributes to a growing research agenda on urban “datafication” and data justice in developing countries. This agenda includes the work of Taylor (2017), who proposed that (in)visibility is one of the three pillars of international data justice (together with engagement with technology and anti discrimination). Like us, but from a different starting point, Taylor questions the growing assumption that being visible would be necessary "part of the contemporary social contract" (Taylor, 2017, p.1).

7.4 Intellectual and practical challenges

The primary intellectual challenge of this investigation is related to its multidisciplinary approach. Theoretical concepts such as visibility, power, and governmentality are multiple and may assume different meanings across the specialized literature. Human geography, urban studies, and political science have different ways of approaching each of these concepts, and we make an effort to find an intersection among them that helped us to discuss the concepts in the light of urbanism and urban inclusion.

Another challenge was the decision to approach digital mappings of informality not as the primary target of analysis, but as an entry point through which power dynamics related to the smart city approach could be examined. The research had been previously designed to focus solely on the empirical analysis of mappings, but the literature review showed a gap on how digital visibility has been discussed and hence the need to open up a theoretical debate about digital visibility and its role in SU. We decided to complement the initial strategy rather than replacing it, and the Dissertation turned to have both an empirical and a theoretical object. In this approach, insights about the relations between digital visibility and the analytics of government, as well as about the SU agenda, became an object of analysis as relevant as the mappings themselves. As so, this Dissertation has both an empirical and theoretical object. Regarding the theoretical object, we had initiated a philosophical debate about digital visibility and its role in socially producing the urban that we had not the resources to complete during the available time.

Besides, we also had unexpected limitations to access empirical material. Data collection in a context of social vulnerability and violence is a delicate matter. Along the research, a financial and political crisis in Brazil had fuel crime and episodes of violence such as shootings within the study area. The crisis culminates in a presidential decree putting the military in charge of security in Rio de Janeiro (February, 2018). Public safety was carried out by the Army by means of military

operations in gang-run favelas dominated by drug dealers, in a controversial attempt to curb rising crime (The Guardian, 2018)[51].

The plan to promote a significant urban transformation in Rio as a legacy of the Olympics 2016 fell short, and Brazil entered a recession. Because the system was disrupted, field research activities had to be interrupted, and the method was reviewed. Rather than extending the period of interviews and primary observation on the field, as we had planned at first, we opted to proceed with extensive documental analysis.

7.5 Future Paths

To increase reliability and validity of the theoretical and analytical framework, the data collection and research results, we suggest that future research develop different measurement instruments for the theoretical construct of governmentality. We also suggest to gather information from periods after and before 2008-2016. Complementary, we suggest future researchers proceed inter-research comparison and to increase the sample of interviews[52].

We raised questions that remain to be answered. One of them is the extent to which transformations in spaces and visibility enacted by digital mappings arise as part of a broader way of thinking and acting over a space. **If digital visibility is not by itself equals to urban existence, then how digital visibility produces the urban?**

Previously, We have argued that it has been possible to perceive transformations in the regime of practices of urbanism in favelas. Further research is needed to treat in reasonably great detail how this regime of practices is reconfigured, how territories and favela populations are reimagined, how data is generated, shared and incorporated into digital databases. Some steps may involve:

(1) Analysis of the ways by which the current regime of practices of favelas urbanism is problematized. The analytics of government can be useful in this regard, because it examines the moment in which questions starts to arise as problems, frequently through

51 "In 2017, there were 6,731 violent deaths in the state of Rio, or 40 per 100,000 residents — the highest level in eight years. Carjackings, robberies of cellphones and kidnappings also increased." (New York Times, 2018

52 Triangulation can bean useful strategy for future researchers. As van Thiel (2014) explains: "A tested means of enhancing reliability and validity is triangulation. Originated as a term from trigonometry, in the social science,s the word triangulation is used to indicate that more than one method is employed in a study, with the aim of double (or triple) checking on the data collection and research results. Triangulation can be applied: 1 in the operationalization phase (several measurement instruments are developed for the same theoretical construct); 2 to data sources (for example, not just gathering information from people, but also from documents and earlier studies); 3 to researchers (for example, inter-researcher comparison); 4 to research methods (for example, conducting interviews as well as analysing documents)." (Van Thiel, 2014, p. 52-53)

different manners, place, and agents.

(2) Reconstitution of the logic that is intrinsic to the mappings as part of a new regime of practices, searching for the legibility of each of the dimensions of the regime -- rationalities, techniques, subjectivities, and visibilities.

Another question to be explored is how digital visibility is part of a broader strategy of 'the production of space' – a social production where the representations of space have an essential role (Lefebvre, 1991). In other words, **in which extend the promise "digital visibility equals to urban inclusion" is fulfilled?**

This reasoning may also helps to broaden the scope of some analysis of digital visibilities enacted by digital mappings, particularly analysis concerned with social bias, divides and inequalities reproduced through the use of social media.

Future researches should amplify the reach of this form of spatial analysis that is informed by the analytics of the government. Comparative research among Global South countries, especially India and Kenya may help to understand if there is a global pattern in digital visibility via mappings.

Another research path is the investigation on the relation between digital visibility and digital territories, a discussion that we have initiated before (Luque-Ayala and Maia, 2018) and intend to pursue as part of our Postdoctoral studies immediately.

We aim that this Dissertation, alongside with the papers and discussions following from it, contribute to ongoing debates on citizenship, social justice and the right to the smart city in the developing world. The smart urbanism agenda cannot be set solely from the Global North. We have made a conscious effort to write in English in order to increase the symmetry of the dialogue North-South and South-South. By drawing from the urban experience of the global South, it is possible to strengthen the critical theory that helps us to understand and transform the many forms of the contemporary social production of urban space.

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APPENDICES

Figure 25 Map of Olympic Clusters and PPUs. Source: Author (2018), using data from Faulhaber and Azevedo (2015) and Comitê Popular Rio Copa e Olimpíadas (2016) and Prefeitura do Rio de Janeiro (2016)

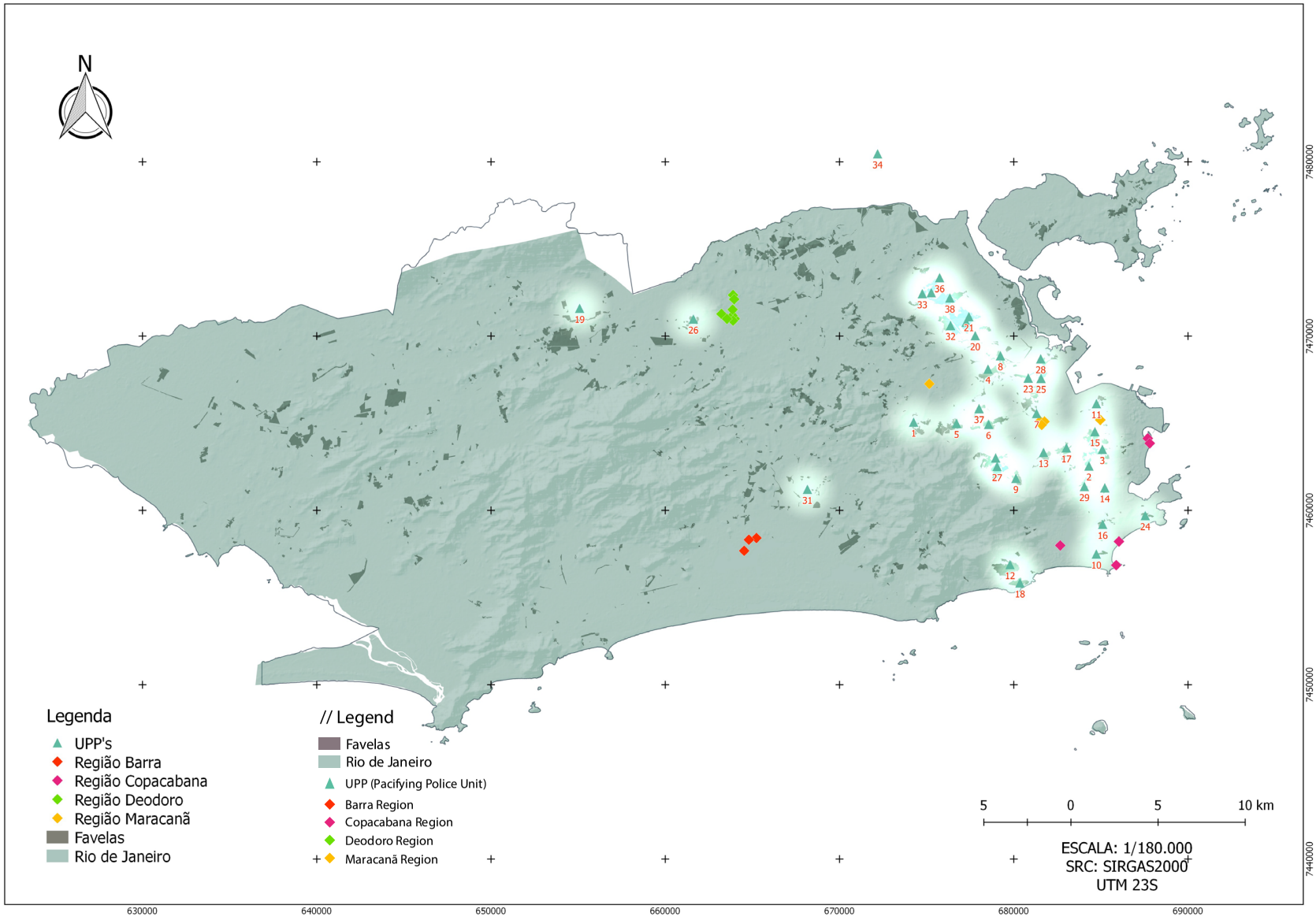

Figure 26 Map of housing eviction and displacement in the context of the Summer Olympics 2016, overlapped by the planned macrozones for the city of Rio de Janeiro. Source: Author (2018), using data from Faulhaber and Azevedo (2015), Comitê Popular Rio Copa e Olimpíadas and Master Plan for Sustainaple Urban Development (Prefeitura do Rio de Janeiro, 2011)

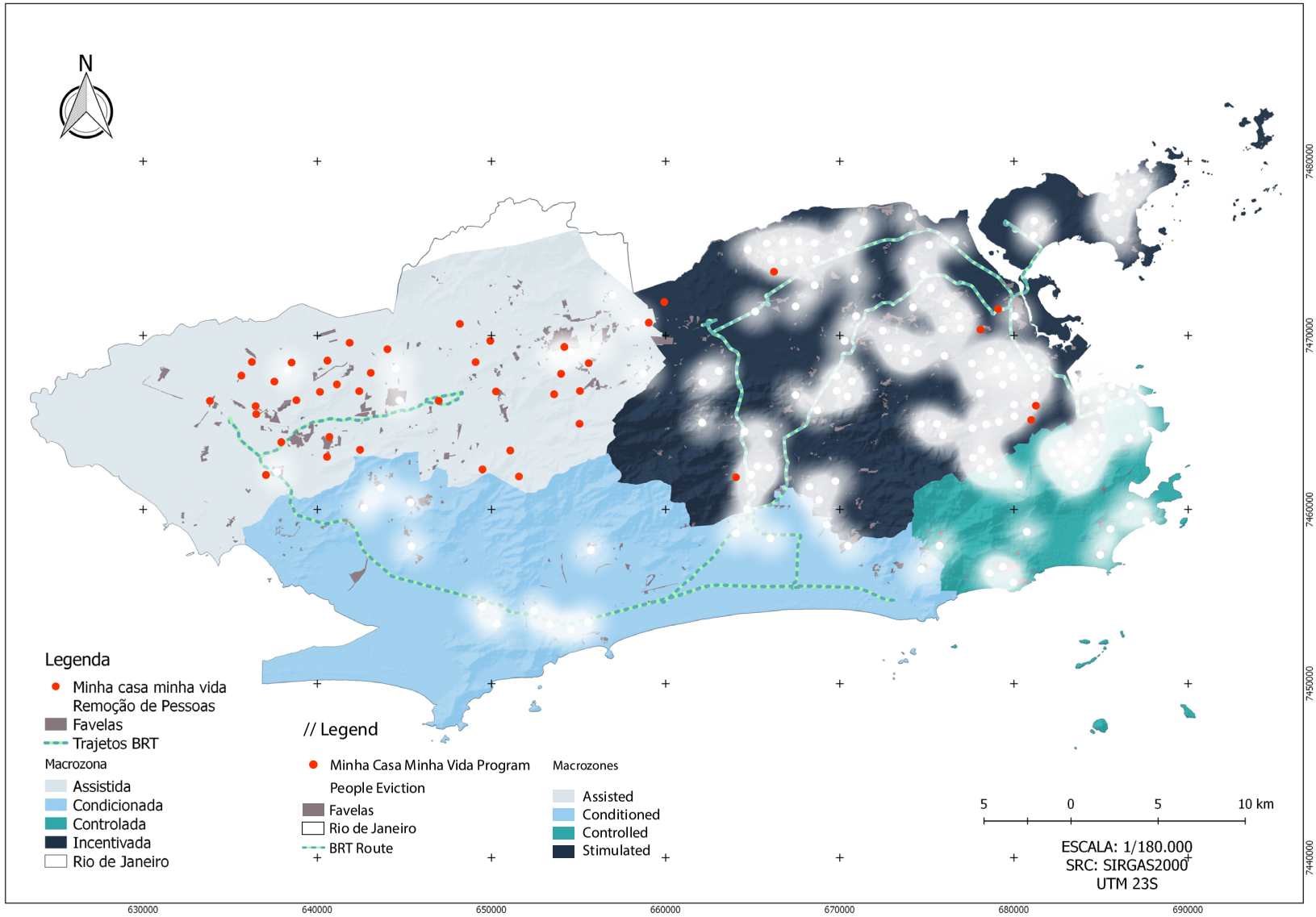

Figure 27. Map of planned urban growth and HDI. Source: Author (2018), using data from the Master Plan of the City of Rio (2011), the Urbanism Institute Pereira Passos, IPP (2012), Faulhaber and Azevedo (2015) and Comitê Popular Rio Copa e Olimpíadas (2016)

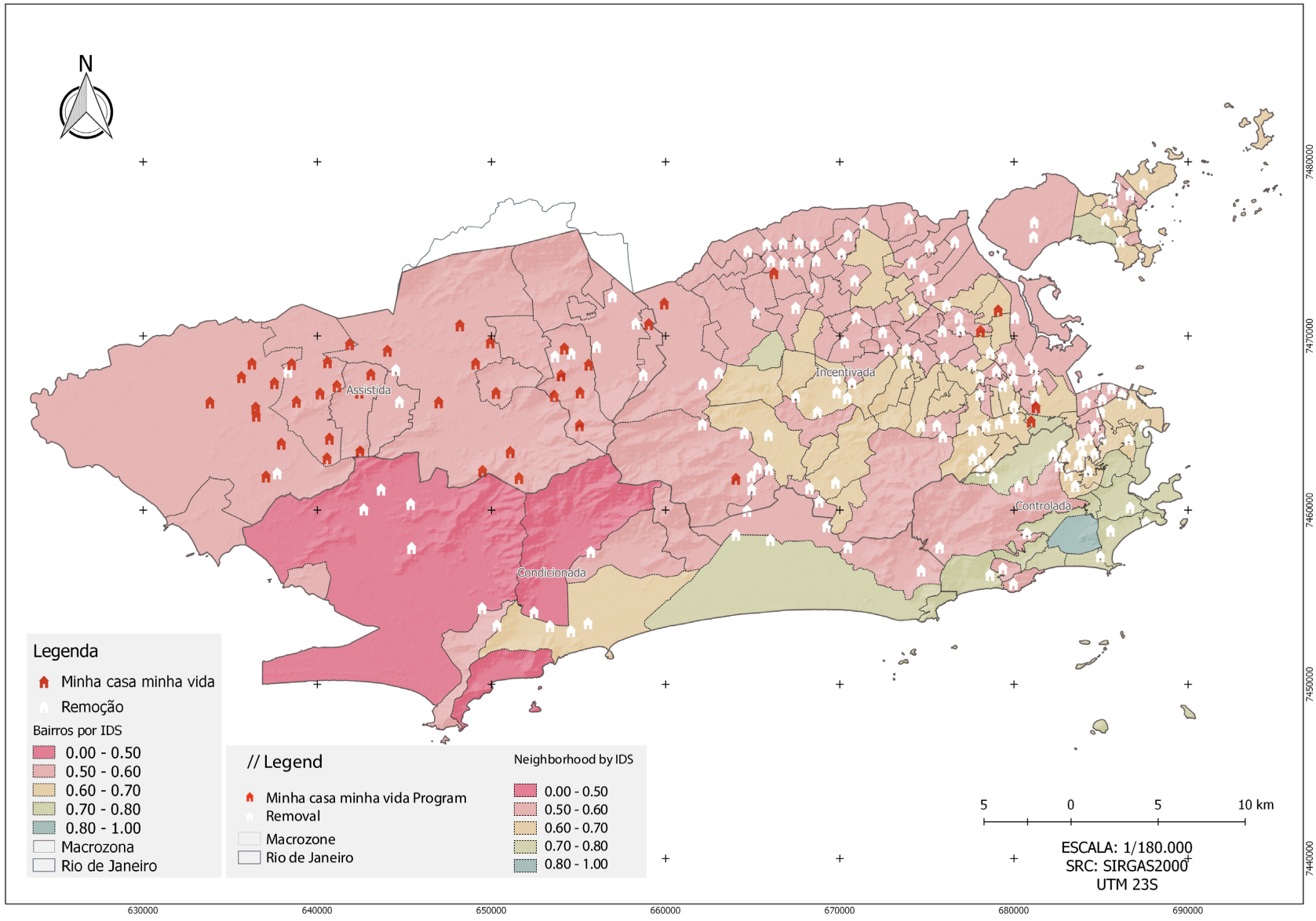

Figure 28 Map of favelas growth rates and spatial pattern of mapped favelas. Source: Author (2018), using own data, as well as data from IPP (2012)

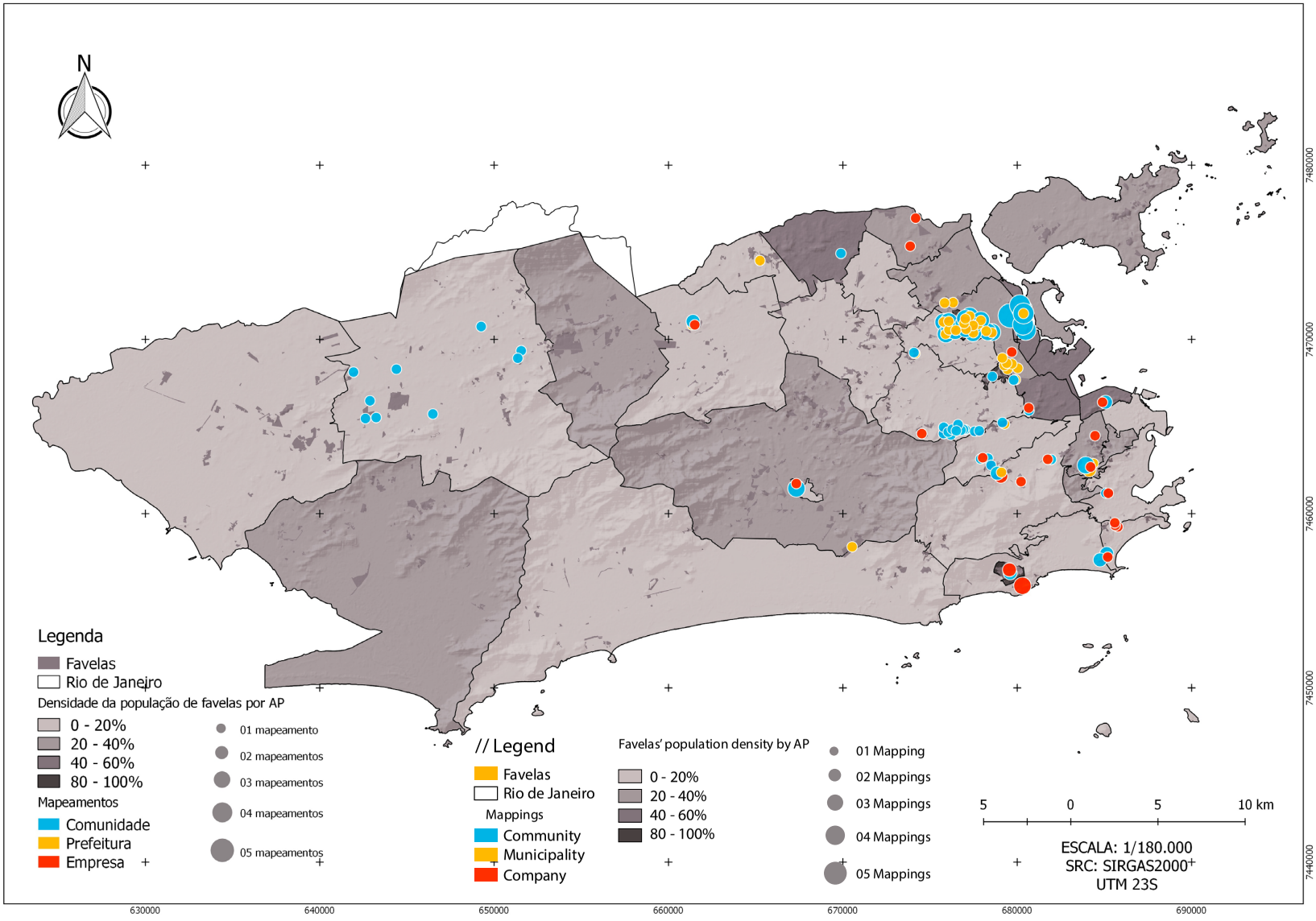

Figure 29 Maps of favelas situated on the South Zone, in contrast with favelas across the rest of the city. Source: Author (2018), using data from IPP (2012). It is possible to notice that just a minority of Rio's favelas (in yellow), the most mapped and visible, are concentrated on the wealthiest areas. The majority of favelas is dispersed across the rest of the city (in light grey).

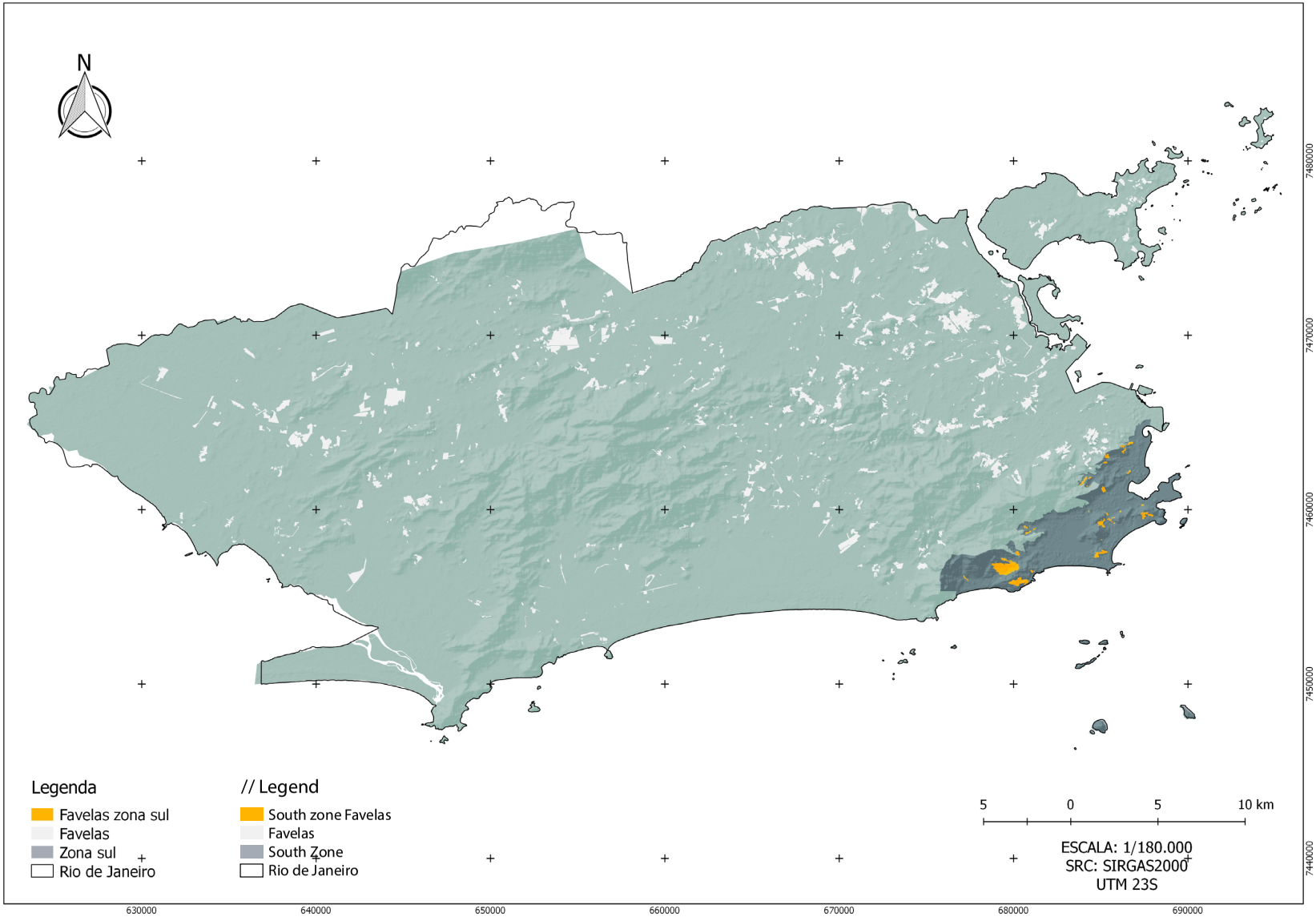

Table 4 Participatory Maps of Rio de Janeiro // Mapas participativos do Rio de Janeiro. Source: Author (2015/2018)

	Origem	Objetivo declarado	Tipo			Ferramenta					Comunidades Abrangidas			Conteúdo: camadas (Layers)	Agentes				Páginas nas redes sociais			URL	Status		
	mês/ano		Site	App	Físico	Computador		Celular			Concluídas	Em andamento	Previstas		Quem criou?	Parcerias	Quem mapeia?	Quem financia?	Twitter	Facebook			Em andamento	Fora do ar	Concluído
						Base cartográfica	Softwares	Modelo	Sistema operacional	Aplicativos									Seguidores (nº)	Cutidas (nº)	Membros (nº)				
Wikimapa	jun/09	"...tem por objetivo identificar pontos de interesse público, eventos, problemas, soluções locais e ruas ainda não identificadas nos mapas virtuais, em áreas marginalizadas das cidades. Precursor no mapeamento de favelas, o Wikimapa propõe um novo olhar sobre esses territórios, destacando potenciais de investimento social e econômico e suscitando o desenvolvimento de políticas públicas." [20]				Wikimapa	Wikimapa	Nokia N95 (primeira fase) [41]	Symbian (primeira fase), Android [41]	Wikimapa	Pavão-Pavãozinho/Cantagalo, Morro Santa Marta, Cidade de Deus, Complexo do Alemão, Complexo da Maré, Complexo da Penha, Mangueira, Rocinha, Morro Agudo/Nova Iguaçu (RJ) e Capão Redondo (SP)	-	-	Ruas, equipamentos urbanos e estabelecimentos comerciais, locais, eventos, problemas	Programa Rede Jovem	Instituto GEOeduc [39], Fundação Telefônica [40], Natio [42]	wiki-repórteres, jovens selecionados dentro da favela e capacitados para a utilização e multiplicação	Fundação Telefônica e Vivo [41]	705	2295	48	http://wikimapa.org.br/			
Mapa Rápido Participativo	ago/11 [12]	"...o mapa tem a função de registrar e analisar o caráter heterogêneo dos territórios, divididos por microáreas. Além disso, um rol de itens foi elencado para ser observado pelos técnicos-pesquisadores para aferir como estão a gestão do território [...] As observações que são feitas resultam numa escala de notas, em que a maior representa os pontos de maior desenvolvimento e as menores são dadas aos locais com condições ainda ruins. De acordo com o IPP, a sistematização destas informações coletadas tem como finalidade apoiar o direcionamento das políticas públicas para as áreas que mais necessitam." [47]					ArcGIS [45]				Complexo de Manguinhos [12] Escondidinho e Morro dos Prazeres [49]		"A expectativa é de que até 2016 o projeto esteja inserido em todas as comunidades pacificadas do Rio." [12]	Acessibilidade, moradia, infraestrutura, serviços ao cidadão, esporte e lazer [11]: Sinalização das Vias e Serviços Postais; Infraestrutura para Mobilidade; Padrão Construtivo das Moradias; Abastecimento de Água; Sistema de Esgotamento Sanitário; Sistema de Drenagem de Águas Pluviais; Coleta de Lixo e Iluminação Pública e Energia Elétrica [32]	Gerência de Estudos Habitacionais da DIC [46], Instituto Pereira Passos	ONU-HABITAT	Moradores-agentes da equipe do Campo Rio+Social	Instituto Pereira Passos						
Mapeamento Digital de Riscos Socioambientais guiado pela juventude	set/11	" é uma estratégia de educação ambiental, baseada no uso de tecnologias digitais, que busca despertar o olhar de adolescentes e jovens para a realidade socioambiental de suas comunidades. O propósito maior é fazer com que a juventude protagonize as mudanças necessárias e tornem-se disseminadoras de novas práticas e percepções sobre a questão ambiental [...] os participantes debatem e elaboram coletivamente conceitos como educação ambiental, riscos, vulnerabilidade, susceptibilidade. Com base na discussão dos desafios, os participantes constroem o roteiro de mapeamento..."[2] "A disponibilização desse material permitirá que todos acompanhem os processos de mudança e melhoria dentro das comunidades." [4]				Google Maps, OpenStreet Map	Open LOCAST [5]			UNICEF-GIS [3]	Prazeres, Macacos, Borel, Urubu e Rocinha, Andaraí, Batan, Cidade de Deus, Complexo do Alemão e Salgueiro, Cantagalo, Nova Divinéia, Parque João Paulo II (RJ)	Prazeres, Macacos, Borel, Urubu e Rocinha, Andaraí, Batan, Cidade de Deus, Complexo do Alemão e Salgueiro, Cantagalo, Nova Divinéia, Parque João Paulo II (RJ)		Acessibilidade, moradia, infraestrutura, serviços ao cidadão, esporte e lazer [11]: Sinalização das Vias e Serviços Postais; Infraestrutura para Mobilidade; Padrão Construtivo das Moradias; Abastecimento de Água; Sistema de Esgotamento Sanitário; Sistema de Drenagem de Águas Pluviais; Coleta de Lixo e Iluminação Pública e Energia Elétrica [32]	"...iniciativa do UNICEF, desenvolvido pela MIT (Massachusetts Institute of Technology)..." [3]	CEDAPS [2], PLOTS (Public Laboratory for Open Technology and Science) [3]	Jovens moradores	Prudential Foundation, Itau Social, American Air Lines e MSC [2]				http://rio.unicef-gis.org/			
AIDS e Comunidades	ago/12	"Mapeamento de Vulnerabilidades, Iniciativas e Recursos existentes para a prevenção das DST/Aids e o apoio social a pessoas vivendo com AIDS residentes em favelas e periferias: uma metodologia de pesquisa e intervenção."[56] "Através de Fóruns e Grupos de Trabalho, busca aprofundar o debate sobre as necessidades e potencialidades do movimento popular de Aids. O modelo tem se tornado fundamental como meio de esclarecimento e aproximação entre os membros da comunidade e fortalecimento das respostas ao HIV/Aids, tendo o território como base das ações e utilizando recursos locais." [57]				Google Maps	Mootiro Maps				"Morro dos Prazeres, Batan, Mato Alto, Rio das Pedras, Complexo da Maré (Favela Nova Holanda), Complexo do Alemão, Morro do Urubu, Morro dos Macacos, Vila Cruzeiro, Parque Proletário da Penha, Morro do Borel, Jardim Palmares, Campo do América, Vila Tiradentes, Morro do Chapéu, Maurimárcia (RJ)"			"Vulnerabilidades, Iniciativas e Recursos existentes para a prevenção das DST/Aids" [56]	CEDAPS	Ministério da Saúde						http://maps.mootiro.org/project/6/map			
Guia de ruas da Maré 2012	set/12	"Para dar um fim – parcial – a esse "breu" histórico [...] o guia é fundamental para o reconhecimento oficial das ruas pela prefeitura do Rio. Com o roteiro em mãos, os moradores podem reivindicar a inclusão de endereços que ainda não possuem CEP no Código de Endereçamento Postal, referência cartográfica básica. O mapa dá uma importante contribuição para que os cariocas reconheçam o Complexo da Maré como o bairro que, de fato, é." [37]									Complexo da Maré (RJ)			"todos os becos e ruelas desse extenso território" [37]	Redes de Desenvolvimento da Maré, Observatório de Favelas [50]	Instituto Pereira Passos, Fundação Ford e a Petrobras, com o apoio das 16 Associações de Moradores da região e outras organizações [37] [50]		ActionAid [37]				http://redesdamare.org.br/wp-content/uploads/2012/10/GuiaMare_Web.pdf			
Agentes da transformação	2013	"...reúne informações sobre o que jovens moradores de favelas, com idade entre 14 e 24 anos, pensam a respeito de assuntos como mercado de trabalho, educação, família e lazer, além de acesso à internet [...] A pesquisa funciona como base para orientar as políticas públicas para jovens em diversas áreas, entre elas: Trabalho e Renda; Educação; Esportes e Ciência e Tecnologia." [35]					GitHub [34]		Android [35]	Para Pesquisa [35]	Cidade de Deus, Vidigal, Pavão-Pavãozinho, Tabajaras, Providência, Morro dos Prazeres, Borel, São Carlos, Nova Divinéia, Formiga, Parque Oswaldo Cruz (Manguinhos), Batan, Unidos de Santa Teresa (Fogueteiro), Salgueiro, Santa Marta, São João e Mangueira, Bairro Ouro Preto (Lins)			"assuntos como mercado de trabalho, educação, família e lazer, além de acesso à internet." [35]	Pereira Passos e Instituto TIM	CIEE [35], La Fabrica [50]	Jovens moradores das favelas supervisionados por um coordenador de campo, do Rio+Social [35]	Instituto TIM [52]				http://institutotim.org.br/wp-content/uploads/2013/10/Apresenta%C3%A7%C3%A3o-Agentes-da-Transforma%C3%A7%C3%A3o-Imprensa.pdf			
Mapa da Articulação Intersetorial para Promoção da Saúde no Rio de Janeiro	nov/13	"Mapeamento de iniciativas, recursos, unidades de saúde e organizações com o objetivo de fortalecer a cooperação entre os diversos atores no território" com objetivo de "promover reflexão acerca da intersetorialidade e oferecer ferramentas/metodologias para potencializar as ações intersetoriais nos territórios, fortalecer a articulação intersetorial nos territórios, capacitar profissionais de saúde e parceiros estratégicos para utilização da ferramenta Mootiro Maps" [58]					Google Maps	Mootiro Maps			CAP 5.3, CAP 3.1, CAP 3.2, CAP 5.2, CAP 5.1, CAP 1.0, CAP 2.1, CAP 2.2 CAP 4.0, CAP 3.3			"iniciativas, recursos, unidades de saúde e organizações"[58]	CEDAPS							http://maps.mootiro.org/project/347/map			
Na Área	mai/14	"...identificar os principais pontos de referência, estabelecimentos públicos e comerciais dentro das comunidades [...] as informações coletadas neste tipo de trabalho serão disponibilizadas em uma plataforma de busca de alcance mundial na internet, o Bing." [16] "...aumentando a integração ao restante da cidade e valorizando seus pontos de interesse. Também é importante destacar que nesta parceria estamos usando recursos da iniciativa privada para fomentar políticas públicas..." [17]					HERE, da Nokia [54]	Foursquare, TripAdvisor, Apontador e o Telelistas, Bing Places [15]			Inicio no Morro do Vidigal"...totalizando 101, de complexos como Rocinha, Morro Dona Marta e Borel" [15]			Pontos de referência, estabelecimentos públicos e comerciais	Microsoft Brasil	Instituto Pereira Passos, Nokia HERE, Nós do Morro, Vidigalo (Vidigal), Observatório de Favelas	Moradores a comunidade, integrantes de ONGs e pesquisas realizadas pelo IPP	Microsoft, Nokia				https://www.bing.com/maps/			
Mapa Participativo da Cidade do Rio de Janeiro	ago/14	"Inicialmente o projeto-piloto foi implantado em Manguinhos. A escolha do local foi porque a ideia do projeto nasceu de uma iniciativa do Conselho Comunitário daquela região. Para participar basta que os moradores abasteçam um mapa disponível na Internet com todas as informações coletadas em sua comunidade. A ideia de um mapa colaborativo como este, surgiu da necessidade de adotar uma ferramenta de utilidade pública, na qual os moradores pudessem além de customizar mapas e cadastrar estabelecimentos da localidade, encontrar pontos de acordo com seus interesses [...] O mapa facilitará o acesso às informações, auxiliando o cidadão a conhecer melhor o lugar onde mora, integrando a comunidade ao resto da cidade" [55]					ArcGIS [55]			ArcGIS [55]		Rocinha, Morro dos Cabritos, Morro Santos Rodrigues (Catumbi), Santa Terezinha, Barreira do Vasco, Manguinhos (Vila Turismo, Parque João Goulart, Parque Oswaldo Cruz, Vila União), Parque Conquista, Nova Holanda (Maré), Parque Roquete Pinto, Morro do Alemão (Complexo do Alemão), Batan, Vila Aliança, Bairro Santo André, Bairro Nova Cidade, Saquassu	"a expectativa é de que ele se expanda para todo o resto do município" [28]	Equipamentos urbanos (escolas, creches, espaços de cultura, etc), estabelecimentos comerciais (bares, restaurantes e farmácias) e pontos de interesse relativos a lazer e eventos	Conselho Comunitário de Manguinhos	Fundação Oswaldo Cruz, Instituto Pereira Passos, ESRI/Imagem	"os próprios cidadãos possam inserir informações" [29]			715			http://pcrj.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=64b54cbc5a76401d977f14ecc863fa31			
Guia Cultural de Favelas	ago/14	"...ferramenta de busca e construção de itinerários, além de elaborar roteiros e fornecer informações sobre cada ponto de cultura e criação artística" [1]				-	-	-	-			Complexo do Alemão, Caramujo, Cidade de Deus, Manguinhos, Complexo da Maré, Complexo da Penha e Rocinha (RJ)	-	Informações sobre cada ponto de cultura e criação artística: Artesanato, carnaval, centro cultural, cultura digital, dança, fotografia, moda, museu, música, ponto de encontro, teatro	Observatório de Favelas do RJ, Solos culturais	Secretaria de Cultura do Rio de Janeiro	Jovens moradores	Secretaria de Estado de Cultura, Light, Aneel e Banco Interamericano de Desenvolvimento			59	http://guiaculturaldefavelas.org.br/			
Cartografia Social: Olhares de Jovens da Maré	abr/15	"Relatos fortes e impregnados por um sentimento de violação social, na verdade quase um desabafo, são os elementos de composição da "Cartografia Social"[...] transformando jovens em protagonistas na formatação de um mapa atualizado da região, a partir dos seus olhares, vivências e percepções. O ponto de apoio são as violações à juventude na comunidade, tendo como "agressor" o poder governamental através de políticas "exclusivas e ditas de pacificação"." [27]									Complexo da Maré (RJ)			"Segurança Pública, Infraestrutura (saneamento, esgoto e coleta de lixo), intolerância religiosa, e da não aplicação da Lei 10.639 (obrigatória na grade curricular das escolas como disciplina História Afro-brasileira), além da construção do muro que dividiu a favela da Linha Amarela, via expressa que liga os bairros da periferia ao Centro." [25]	ONG FASE		Jovens moradores da Maré							
ReciclAção	mai/2015 (data do mapa, o projeto existe desde 2013)	"propõe estimular e mobilizar a comunidade a descartar adequadamente seus materiais recicláveis, retirando-os do meio ambiente e dando origem a um ciclo fértil e produtivo que retorna em forma de recursos locais, com ênfase na educação e na cooperação" para "Contribuir com a erradicação dos riscos socioambientais no território onde atua por meio da articulação de políticas públicas pertinentes e do incremento da consciência dos atores locais sobre o descarte inadequado." [59]									Morro dos Prazeres			Pontos de acúmulo de lixo/entulho, locais de Contêiners da Comlurb, pontos de Ecobag	Projeto ReciclAÇÃO	BrasilPet e Recicoleta, CEDAPS, COMLURB, ENACTUS/CEFET-RJ, Grupo PROA, Instituto BRF e BRF, IPP, Secretaria Municipal de Meio Ambiente – SMAC, US Environmental Protection Agency – EPA	Jovens moradores do Morro dos Prazeres	Instituto BRF e BRF			1.413		http://maps.mootiro.org/project/477/map			

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