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Thinking Urban Transformation through Elsewhere: A Conversation between Real-World Labs in São Paulo and Hamburg on Governance and Practical Action

Martin Kohler [1,*], Anita Engels [2], Ana Paula Koury [3] and Cathrin Zengerling [4]

[1] Department of Computer Science, University of Applied Sciences Hamburg, 20099 Hamburg, Germany
[2] Faculty of Business, Economics and Social Sciences, University of Hamburg, 20146 Hamburg, Germany; anita.engels@uni-hamburg.de
[3] Graduate Program in Architecture and Urban Planning, Universidade São Judas Tadeu, São Paulo 03166-000, Brazil; apkoury@gmail.com
[4] Faculty for Environment and Natural Resources, Albert-Ludwigs University Freiburg, 79106 Freiburg, Germany; cathrin.zengerling@enrlaw.uni-freiburg.de
* Correspondence: martin.kohler@haw-hamburg.de

Abstract: Urban real-world laboratories (RWLs) are increasingly used internationally and studied as an instrument of urban transformation. New cases in diverse political, economic, social and ecological situations offer a rich set of learning experiences, but the distinctive urban contexts make it impossible to draw comparisons in the traditional sense. In this article—an experiment in itself—we aim to gain a deeper understanding of how RWLs contribute to urban transformation in very different contexts. We apply Jennifer Robinson's theoretical framework "thinking through elsewhere" on two ongoing urban RWLs: the Itaim Paulista Lab, located in the urban periphery of São Paulo, Brazil and the Lokstedt Urban Transformation Lab in Hamburg, Germany. We operationalize Robinson's framework in two steps. First, we present the genetics—context, roots, concepts and activities—of both labs. Second, we engage the RWLs in a generative conversation on their role in transforming governance and practical action, with a special focus on the questions of if and how the labs contribute to long-term transformative change. We also find that both labs show potential to contribute to long-term transformative change through governance and practical action.

Keywords: urban transformation; urban governance; climate governance; practical action; real-world labs; urban comparison

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1. Introduction

Current trends in transformation processes for sustainable urban systems popularize the concept of transformative science and give rise to one of its main instruments, the real-world laboratory (RWL). There is no fixed definition yet, and there are many close links to similar concepts and approaches. For an overview of different definitions and concepts, see Table 1. For our own empirical work, five main characteristics have been important in guiding our thinking about RWL:

RWLs often share five main characteristics; they:

(1) Contribute to transformation,
(2) Use experiments as a key research method,
(3) Have a long-term orientation,
(4) Produce scalable and transferable results, and
(5) Offer a focus on learning and reflexivity [1,2].

There are several other models and concepts available for integrated, applied research and the transformation of urban structures with both shared and unique characteristics, such as transformation labs, living labs and transition labs [2]. These various formats are

typically justified by the expectation that they find new ways of governing climate change, shared open spaces, and mobility and housing issues. Their actual outcomes do not always correspond to these expectations, but they often contribute to the creation of networks between hitherto unconnected actors, manage to break up traditional routines, facilitate compromise and thereby effectively enable change, even though this change may not be immediately deeply transformative. RWLs, and other similar forms of labs, are usually set up as transdisciplinary research projects, bringing academics from different disciplines together with practitioners and citizens.

This relatively new concept has gained traction throughout the world as it offers new approaches and new tools to manage the transformation of cities towards, for example, more climate-resilient and climate-adaptive structures [3,4]. With the expansion of the RWLs as a process for change towards new spatial contexts, the concept of RWLs creates marked contrasts in cases throughout urban worlds. With this expansion, it is not always clear how the RWLs work, or how they connect to and influence the specific local constellations, and political and social forces shaping the urban worlds. It is one goal of this article to gain clarity on these questions by looking at two cases that are located in completely different contexts and settings.

Our research interest is at the intersection of three strands of research on RWLs, each of which has specific challenges and research gaps. Within the first strand of work—RWLs as a research infrastructure for sustainability transformation—the growing body of literature on RWLs ranges from specific case studies, e.g., Ref. [5], to conceptual [6,7] and structural [8] papers. The research is dominated by case studies from Germany and Europe, with related insights [7]. It highlights long-term orientation, scalability and transferability as particularly challenging [2]. Non-European-based case studies are still rare. The second strand of research looks at RWLs as one experimental mode of urban (climate) governance. Our work relates to these studies, which identify and analyze experimentation as a new and promising form of urban (climate) governance [3,9–15]. The new modes encompass a broad array of experimental settings [13,16], and RWLs are only one of them. Among the challenges identified in this field of work is a deeper understanding of the role and outcomes of experiments in processes of socio-technical transformation [13,17]. We hope to use our case studies to address this challenge. The third research strand looks at RWLs from an international perspective. Studies show a large concentration of RWLs and other forms of urban experimentation in the European Union, especially in Germany [7], but also stress a growing global expansion of urban laboratories [3,4] and other concepts of experimentation [18]. The German Advisory Council on Global Change suggests, in its report on the transformative power of cities, the global upscaling of RWL experiments and highlights the importance of knowledge exchange [19]. Marvin et al. [20] also discuss international examples and highlight the overall lack of systematic learning and international comparison of the impacts and the effectiveness across urban and national contexts. We hope to further this learning by adopting a methodological framework that allows for a deeper understanding of how RWLs contribute to urban transformation in highly different contexts.

Table 1. Structural perspective on RWLs in general "schools of transdisciplinary transformative research" [19].

General Approach	Position of RWL	Structure of RWL
Transdisciplinarity [1–3]	One element in the process of transdisciplinary research [4]	Process element
Transition management [5–7]	Structures that nurture niche development, experimental spaces for innovation and learning [8–10]	Element of niche development embedded in structuration processes
Transformative science [11,12]	Reflexive learning spaces that combine practice and scientific perspectives [13–16]	Physical research infrastructure

We apply Jennifer Robinson's theoretical framework "thinking through elsewhere" to two ongoing urban RWLs: the Itaim Paulista Lab, located in the urban periphery of São

Paulo, Brazil, and the Lokstedt Urban Transformation Lab in Hamburg, Germany. Both laboratories were set up in 2016 and are part of transdisciplinary climate research projects involving collaboration between local universities and local administrations. Their creation was the outcome of historical processes. They are both embedded in wider social and political processes of urban governance and planning with different traditions and forms of local citizen engagement, and they operate in diverse planning systems. Special focus is given to the questions of if and how the labs contribute to long-term transformative change.

The remainder of this article is structured into three parts. In Section 2, we explain how we operationalize Robinson's framework into a genetic and generic analysis of two cases of RWL. Section 3 contains the genetic account of the two RWL in São Paulo and Hamburg, looking for the very case-specific sequences of events through which they were formed. In Section 4, the generic perspective starts from the two different cases and brings them into a promising conversation on the themes of modes of governance and modes of action. The discussion (Section 5) contains the most important outcomes from the conversation, while the conclusion (Section 6) briefly discusses the implications of using Robinson's framework in this way, and future research perspectives.

2. Comparative Approach: Thinking through Elsewhere

"Comparing" a German and a Brazilian case study of RWLs, a relatively new research infrastructure, mainly tested and evaluated within Northern Europe, is experimental and requires a suitable theoretical concept of urban transformation processes. Urban constellations in South America have extreme social, ecological and economic conditions, rapid and radical open conflicts and inequalities, and a very different history of public-civil partnerships and planning procedures compared to many parts of Europe. This context shifts the focus from learning and knowledge production of RWLs to the RWL as a tool within a larger contextual framework of urban innovation as a social evolution [21].

For our research, we focus on the urban way of life, as constituting places where people live rather than as material setting. Abdou Maliq Simone has claimed that it is important to "rediscover the possibilities of ways of being in the city, learn from the usually difficult conditions through which urban residents attempt to become persons, and place these efforts front and center in our collective consideration of urban life" [22]. Embracing urban life in a multicultural world of cities as part of our research is a necessity as "the urban is a collective project in which the potentials generated through urbanization are appropriated and contested" [23], where the city and the urban are no longer the same. Although this further complicates the possibility of comparisons, we consider this holistic perspective important in the context of RWLs and transformative change. This extends the comparison and transforms the very endeavor into a research and analytical conversation between researchers and everyday life, without much theory a priori.

In her critique of urban comparisons, Jennifer Robinson pointed out that any urban site is unique and thus impossible to compare, or at least only within a set of rather similar cases [24]. In this sense, the two cases in Hamburg and São Paulo are certainly not comparable, therefore a conventional multiple case study is not appropriate [25]. However, there is a lot to learn from different cases in a diverse world of cities, where the global processes might be universal, but they yield different outcomes when confronted and shaped by specific local constellations. To identify and connect urban outcomes and their constellations, one can trace the results of "repeated instances" [26] while generating theory and the level of comparisons from the cases analyzed. Carefully composed cases can draw insights from a wide array of contexts acknowledging the situatedness of all theoretical endeavors. Robinson termed this the "thinking cities through elsewhere" [25] framework, aiming at revisable theory generation as enabling conversations beyond the single case [27,28]. "Rather than starting with territorialized cases, imagined as composed of wider processes hitting the ground differently, comparative practices could engage with urban outcomes through tracing their genesis by means of specific connections, influences,

actions, compositions, alliances, experiences, across the full array of possible elements of urban life: material-social-lived-imaginative-institutional." [25].

In this sense, we apply genetic, as well as generative, comparative tactics as developed in Robinson's theoretical framework. Genetic comparative tactics trace how a specific urban outcome emerges amidst other interrelated phenomena at a specific place (genesis) [25]. Generative comparative tactics, on the other hand, bring different cases into the conversation on issues deemed insightful by the researcher (ibid.). By means of this conversation, we "seek to develop a new vocabulary and methodological grounding for doing urban comparison" as Robinson suggested [25].

In order to gain a deeper understanding of how the two RWLs contribute to urban transformation, we operationalize Robinson's framework in two steps. First, we present the RWLs' contexts, roots, concepts and activities—and thus their genetics—in Section 3. This approach delivers insights into how the RWLs came into being and how they 'work' in highly different local constellations. Second, in Section 4, we complement this presentation of genetics with a generative conversation between the RWLs on two themes: their roles in transforming governance and practical action. Both themes grapple with the overall questions of if and how RWLs contribute to long-term transformative change. The first theme on governance responds to the research gaps identified above. The second theme on practical action emerged during our discussions as an important element to address in the context of the RWL experiences around transformative change. Figure 1 visualizes how we apply these comparative tactics.

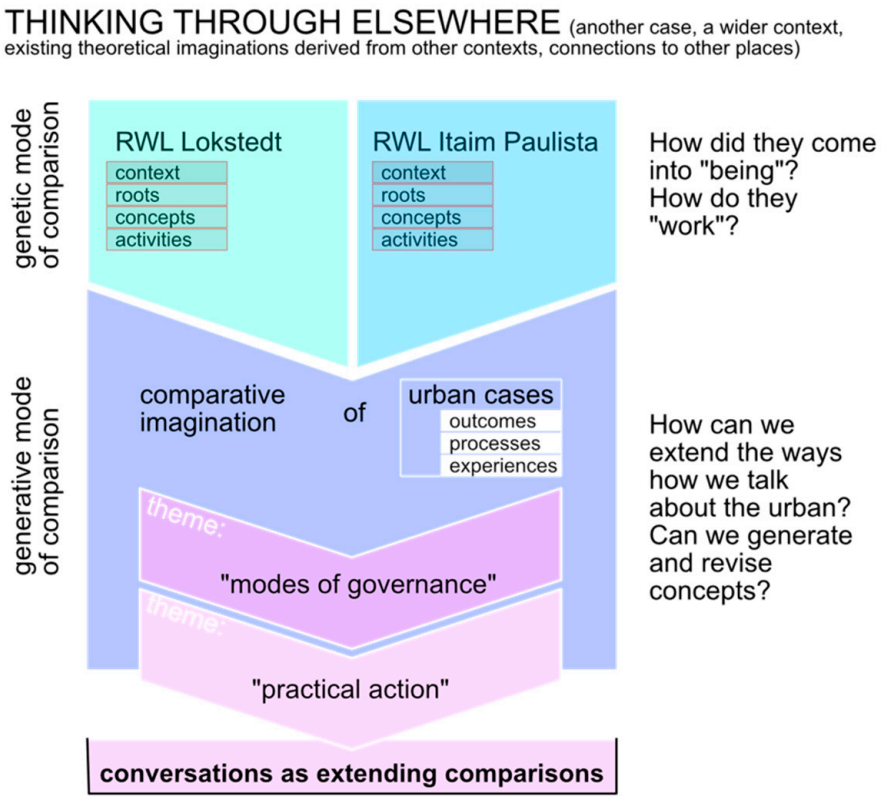

Figure 1. Scheme of comparison model used in this paper; illustration by Kohler.

The first conversation theme is concerned with RWLs as an experimental mode of urban (climate) governance and its relation to other, more continuous, modes of urban (climate) governance [3]: self-governance (governing of each cities' own activities), regulation (local law-making and planning, exerting local authority), provision (of resources, infrastructure and services), partnership (cooperation with other stakeholders) and enabling (of activities with or of private businesses, NGOs, citizens and local communities). It asks if,

and to what extent, there was a spillover effect from the experimental mode into one of the more continuous modes of governance and builds on the idea that such a spillover is an indicator of the RWL's contribution to long-term change. "Spillover" here means that the RWL triggered, initiated or influenced any instrument or activity within another mode of governance (e.g., a planning process, a new partnership or an enabling activity). The spillover is then critically scrutinized as to whether it is likely to enhance long-term transformative change or instead cement 'business as usual' [11,29], thus responding to one of the research gaps shown in Section 2 above.

The second conversation theme complements the modes of governance perspective with another type of dynamic, framed here as practical action. In scrutinizing activities and effects in and around the labs, we found various forms of practical action that do not fall under intentional steering, and thus governance, but could still be very relevant for long-term transformative change. This is of significance, as most research presumes some kind of co-benefit for stakeholders that brings them to coordinate their activities in some ways [30]. In the lab descriptions instead, we discuss which practical actions they triggered, even if they are outside of the actual lab, and seemingly address different topics. In this perspective, the RWLs will appear as objects that can themselves be (mis)used, appropriated and pushed to new directions. As an idea generated by the conversation between the two labs, we will consider whether these practical actions may be—somewhat similar to the modes of governance—categorized into "modes of action" across the varying urban realities. We also ask to what extent they may contribute to long-term transformative change.

The paper draws on empirical data from the two case studies in Hamburg and São Paulo and combines the work of two research groups. As a team of authors, we are connected via the Brazilian–German cooperation project Klimapolis, which aims to contribute to the development of environmentally resilient cities and improved governance structures in Brazil via the means of transdisciplinary research. Over the course of several workshops and visits in São Paulo and Hamburg, we started to exchange experiences with the research infrastructure of RWLs in both cities. This article is an attempt to deepen and structure this mutual understanding under two themes relevant for the Klimapolis Laboratory research agenda. Prior publications on earlier stages of the two RWLs have focused on designing strategies to address multi-perspectivity in the case of the Hamburg Lokstedt Lab in Hamburg, Germany [31], and studies on conflicts between urban planning interventions and natural resource protection in the case of the Itaim Paulista Lab in São Paulo, Brazil [32,33]. The empirical data used in this paper is derived from the datasets and experiences of the two heads of these labs and the co-authors of this article, Ana Paula Koury (Itaim Paulista Lab) and Anita Engels (Lokstedt Lab), as well as documents, press releases and plans issued in relation to the RWLs. We also draw from reports and presentations in social media channels that have been produced by both labs, and from several reflective group discussions among all staff members and an extended circle of supporters and critics.

3. Genesis: Real World Laboratories in the Wild

In the following, we aim to explore the highly different *genetics* (see Figure 1) of the two RWLs via their specific *contexts*, *roots*, *concepts* and *activities*. This approach helps us understand how the RWLs emerged; how they 'work' within their respective local constellations [25]; and how each lab related, during different phases of the process, to the challenges of climate governance. Both labs seek to produce transformative science and to create reflexive learning spaces (Table 1), yet in very different ways.

3.1. Lokstedt

3.1.1. Context of the Lab

Hamburg is a city of almost 2 million inhabitants and is the core of a metropolitan agglomeration in Northern Germany. While the surrounding area is predominantly characterized by agriculture, tourism and some scattered industry, Hamburg's main economic activities stem from a large seaport, logistics, a huge copper plant, and refineries, as well

as the media and service industries. The governance context is distinct as Hamburg is a city-state; it is concurrently a municipality and one of the 16 states in the federal system of Germany. Hamburg's population had been shrinking between the mid-1960s and 1987 but has since grown again and is now above the peak level of 1963. Creating affordable accommodation has been a major urban planning topic in the last decades, together with keeping the harbor economically alive and at the core of the city.

In terms of climate change, Hamburg was first concerned with assessing climate impacts for the city and finding ways to adapt through long-term urban planning and structural change. Rising and more frequent storm tides, extreme rainfall events and urban heat islands are prominent issues in urban adaptation debates. Attention has also focused on the possibilities of mitigating climate change. The city of Hamburg became a member of the transnational city networks ICLEI and the Covenant of Mayors in 2008. In 2011, it participated in a European competition for green European Capital, which it won. The international context was a source of inspiration and additional resources. Local climate governance, however, is not easy to implement. The city-state is embedded in a multi-level system with many of the fields of governance relevant for climate protection subject to national legislation [34,35]. Climate governance in Hamburg has also long been characterized by a sectoral approach. Officially, the responsibility for climate adaptation and mitigation was transferred to the Ministry for Environment and Energy when Hamburg joined the Aalborg Charta in 1996. However, the often competing ministerial programs for transport, economic growth, environment, planning and construction were not easily reconciled [36]. Since 2007, the Coordination Center for Climate Issues of the city government (Leitstelle Klima, LSK) acquired a formal role in harmonizing approaches and developing central planning documents to guide climate-related activities at the city level. It started with the Hamburg Climate Protection Plan that was replaced by a Masterplan Climate Protection in 2013, and the Climate Plan in 2015, which was renewed in 2019 with sectoral reduction goals for the first time. The Climate Plan itself does not have the status of a law; however, the overall CO_2 emission reduction goals have been transferred to the 2020 Hamburg climate protection law, which refers to the 2019 renewed Climate Plan and thus, for the first time, makes all CO_2 emission reduction goals legally binding [35].

An integral element of the German multi-level governance system is a plethora of forms of public participation in planning processes and political decision-making. The city of Hamburg provides regular information on urban planning goals and activities. In land-use planning processes, the planning authority must fulfill certain formalized public consultation steps. Beyond this, there is also a trend towards broader participatory planning. The number of citizens participating in these processes is typically low, except for some controversial projects in which active participation has led to non-trivial changes in the plans and the implementation process. Hamburg has also seen examples of effective single-issue social movements leading to a binding referendum (Bürgerentscheid). One recent example forced the city to buy back the local electricity, gas and heat grids from a large international private energy corporation.

There is also a long tradition of expert involvement in urban development and planning. Apart from local universities (HafenCity University and the University of Applied Sciences Hamburg) specializing in urban and regional planning and applied sciences, many types of expertise have been facilitated by the International Building Exhibition (2006–2013). In the field of climate science, a diversified landscape of both university and non-university research institutions has existed since the 1970s, but it is rather fragmented and has not found institutionalized ways of creating science policy for many years.

3.1.2. Roots of the Lab

The Lokstedt Lab must not only be understood in this wider and dynamic frame but also in the fragmented institutional context. It is located in Lokstedt, a city district (Stadtteil) of Hamburg with a population of less than 30,000 inhabitants, which is part of the district of Eimsbüttel (Bezirk) and close to the densely populated central area of Hamburg. The lab

was initiated by the chair of the Coordination Center for Climate Issues of the city government (LSK). Together with university partners, they submitted a joint research proposal to a call for a federal funding program on urban sustainable transformation in which RWLs were a much-preferred mode of research. Such a collaboration between academic and public partners would have been very unlikely in the fragmented institutional landscape described above. However, some strategic networking had begun in 2007, initiated by the University of Hamburg in the context of a huge research cluster on climate change, and funded by the German Research Council DFG (EXC 177 CLISAP). One goal of that cluster was to establish a collaboration network on climate change research with other partners throughout the metropolitan area of Hamburg. This was initiated in 2008, and developed further in the following years as KlimaCampus Hamburg. This network now contains 12 partners, including four universities, two ministries and six non-university research partners. This was the meeting place for members of the administration to get to know researchers, establish trusting relationships and start working on joint projects—an ideal new breeding ground for the RWL. The funding call was thus a window of opportunity that was eagerly exploited by this new partnership. The consortium consisted of two universities, the LSK, the district office of Eimsbüttel, and several partners active in the field, such as Hamburg's municipal sanitation company and a large housing association. The University of Hamburg brought social science expertise on climate governance to the project, and the HafenCity University brought extensive experience with urban planning, climate adaptation and participatory research.

The main goal of the RWL was to bring together the varying perspectives of urban development and climate change mitigation. As an expression of the different institutional backgrounds of members of the consortium, various sub-goals emerged. The project was funded from July 2016 to November 2019 and received about 850,000 Euros. During the project, three topical urban transformation labs were conducted (see next section) and many new alliances were formed.

3.1.3. Concept of the Lab

The concept of the lab was developed as a compromise between the various interests of the project partners [31]. The University of Hamburg was primarily interested in collecting data through household interviews and applying a systematic methodology with a specific focus on the everyday practices of ordinary citizens, regardless of their inclination to protect the climate or to participate in urban planning processes [37]. The HafenCity University had a much stronger focus on transitional processes, and on pioneers and change agents who specialized in climate protection [38,39]. The LSK was very much interested in promoting climate goals and appealing to citizens' voluntary engagement in climate friendly behavior. Whereas the District Administration (BAE) was eager to broaden its portfolio of participatory planning and types of interactions with citizens, always keeping an eye on the early identification and, if possible, prevention of conflicts around large urban planning initiatives. The parties agreed on one variant of the RWL as the main project concept. Although the majority of these labs focus on change agents, empowering radical alternatives to the status quo and analyzing implementation efforts [2], the goal of this particular RWL was to balance and reconcile transformative impulses with the specific framework conditions of public authorities, as well as the everyday perspectives of citizens. It was thus clear from the beginning that the outcomes of the RWL would most likely not be very radical. The goal was to develop socially robust transformation agendas. At the suggestion of the city partners, it was agreed to focus on three fields where practices could be studied and which were among the most promising from the point of view of the LSK and the BAE: (1) energy consumption in private households, (2) urban mobility and (3) waste management. The concept was developed around these three fields, and each contained a series of several steps that are described in detail in the next section.

3.1.4. Activities of the Lab

The RWL was designed to follow a specific order of steps with nine months for each of the three fields in question (see Figure 2). Step 1 was a workshop with the official project partners to analyze the specific situation of Lokstedt in regards to the field in question, and to derive a number of challenges and open questions. Step 2 was organized as an open public event to inform citizens about the ideas behind the project and to collect their feedback, which would be included in the next steps. Between 30 and 90 participants attended these events; some citizens came regularly and became close followers of the project. Step 3 was the analysis part with three strategies. One strategy followed the core interest of the University of Hamburg and consisted of interviews with a random sample of around 30 Lokstedt households. These interviews focused on the everyday motivations, understandings and resulting practices of ordinary people regarding their energy consumption, mobility patterns and treatment of household waste. In parallel, the second strategy led to interviews with so-called climate change pioneers in Hamburg, identifying their motivations but also the structural supports and the barriers they experienced in their attempts to start and maintain low-emission initiatives and businesses. The third strategy applied several online tools to generate ideas for change. In step 4, all inputs and ideas from the previous steps were brought together in a package of transition proposals that were then discussed and amended in an expert forum. This resulted in a set of measures that had already undergone several filters and rounds of discussion. In step 5, these measures were then presented to the citizens of Lokstedt through public meetings where passers-by were invited to briefly assess one or several measures of the transition agenda. Step 6 consisted of activities in local schools where two topics of the RWL (mobility and waste) were translated into interactive teaching units. Finally, step 7 completed the circle with another open public event where the results were presented to citizens, interviewees, experts and partners in the field. After a final round of feedback from this event, a socially robust transformation agenda was generated.

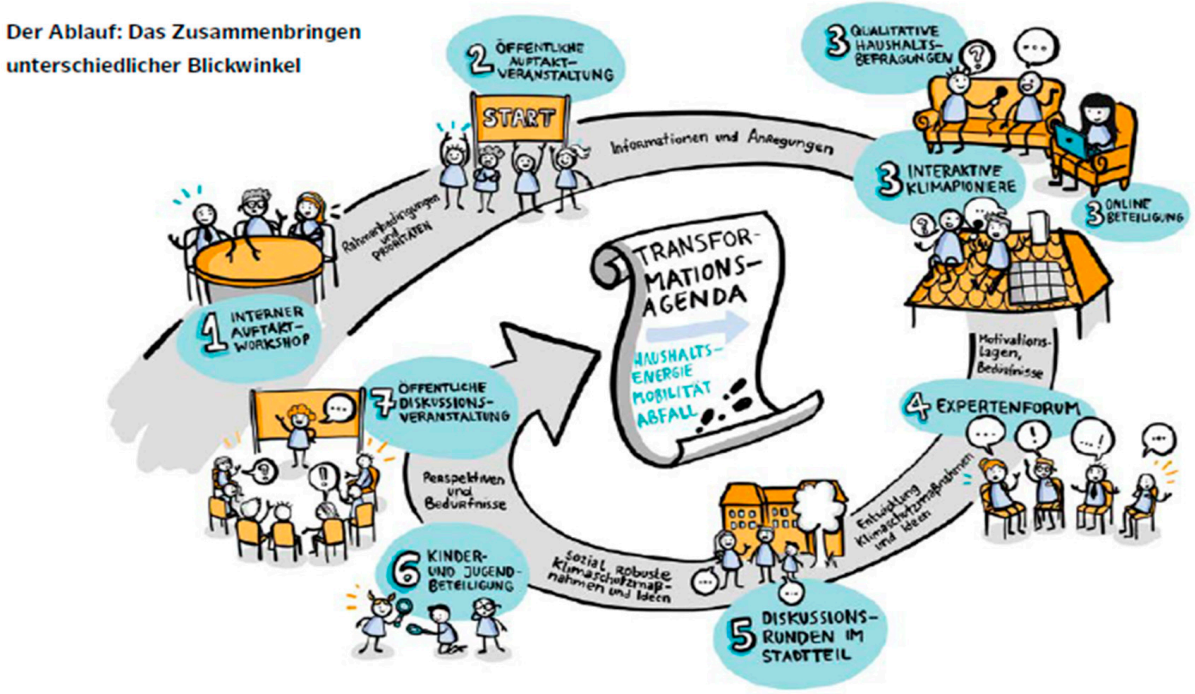

Figure 2. Schematic design of the Lokstedt RWL in space and time in German [40]; illustration by Riesenspatz.

Many extra activities and new alliances emerged from this project, or were facilitated by events organized as part of the RWL. A new citizens' initiative was formed to change the status of a central street in Lokstedt (Grelckstraße) from a through road to a traffic-free

public space, an exchange between active citizens of Lokstedt and visiting scientists from the Klimapolis project in São Paulo was organized around the idea of citizen science, and a collaboration between the University of Hamburg and a photographer resulted in an art project with the production of a photo book and the staging of a photo exhibition [41]. When the possibility of a follow-up research proposal emerged towards the end of the first funding period, the University of Hamburg, the District Administration of Eimsbüttel and a Lokstedt citizens' initiative (Bürgerhaus Lokstedt/Zukunftswerkstatt) submitted a successful proposal that provides funding for a formal continuation of the RWL from September 2020 to August 2022.

3.2. Itaim Paulista

3.2.1. Context of the Lab

São Paulo is the largest city in Brazil, with an estimated population of 12 million inhabitants in 2020. The city is in the center of the largest metropolitan region in the country. The demographic concentration was the result of its industrial economy that intensively attracted migrants from the northeast region between 1940 and 1980 [42,43]. Nowadays, the city is an important hub for services. The metropolitanization process has also increased social vulnerability in the city, mainly since the 1980s due to an economic crisis triggered by the external indebtedness of the country. This period was responsible for a drastic rise in social vulnerability [44].

The urban concentration in the country occurred between the 1960s and the 1980s. During these 30 years, Brazil went through two political transitions: the military coup in 1964 and redemocratization in 1985. Urban policy and planning have played a strategic role in Brazilian democracy. The Democratic Constitution was a great achievement for the Brazilians and triggered movements towards popular participation and democratic governance of the cities.

Providing access to public services such as sewage disposal, decent accommodation and public transport has been a great challenge for the city of São Paulo. According to the settlement census 2010 in Brazil, almost 5% of Brazilians are living in substandard housing conditions. A total of 18.9% of Brazilian substandard housing is located in the metropolitan region of São Paulo, equivalent to 596,479 units, 25% of which occupy creeks, rivers or lake banks [45]. These settlements are most affected by heavy rains causing flooding and landslides in the region. The climate crisis intensifies the severity of rainfall, making these homes even more vulnerable.

Since 2009, the city of São Paulo has had a municipal climate change policy established by Law 14.933 and led by a climate change committee located in the Secretariat for Green and the Environment. The municipal policy established mandatory inventories of greenhouse gas (GHG) emissions to be prepared every five years, and an ambitious GHG emissions reduction goal of 30% by 2012, as compared to 2003. Although the last inventory presented in September 2019 shows a reduction in emissions, the target set by law has not been achieved. In 2019, the city of São Paulo instituted an Intersecretary Working Group (GTI) to produce a climate action plan to be developed within the international city network C40. The São Paulo Climate Action Plan is being drawn up and includes not only the control of GHG emissions but also considers the actions necessary to adapt the city to the impacts of climate change affecting the most vulnerable population.

To respond to an international transparency agreement, the city of São Paulo is developing the Subprefecture Action Plan. The city of São Paulo is divided into 32 Subprefectures, each with a local mayor appointed by the city mayor, a local headquarters, technical staff and independent resources. The Subprefecture Action Plan aims to strengthen the conditions for deploying the subprefecture plans [46] and to develop neighborhood plans as part of the municipal legislation [47]. These two levels of planning—at subprefecture and neighborhood levels—are supposed to represent the local interests of the citizens in different parts of the city. However, these two levels of planning are rarely implemented.

The participatory Master Plans included in the "City Statute" [48] were a device to overcome the tendency of low responsiveness of the plans. The methodology adopted was further developed and institutionalized by the Ministry of the Cities (2003–2019).

The participatory Master Plans and the Ministry of the Cities were huge achievements for a left-wing generation in Brazil [49]. The academic community members and social movements have supported the democratic implementation of the Master Plans, and the technical assistance by architects and engineers to improve housing conditions in informal settlements was included in the Federal Social Housing System in 2008 by law [50]. This has contributed to improving living conditions in vulnerable settlements and to fostering some experimental initiatives led by social movements in partnership with academic communities and the public sector.

A broader overview of the technical assistance for social housing initiatives in Brazil was supported by the Council of Architects and Engineers. The Council launched two contests to build capacity in this field. A national platform was created in 2016 by an NGO group and improved by the partnership between several institutions linked to academic community members, such as the Gaspar Garcia Center of Human Rights (CGGDH), a collective of students of architecture in the metropolitan region of São Paulo, the Institute of Architects of Brazil—Department of São Paulo (IABsp) and Mackenzie College (https://www.athis.org.br/) (access on 1 August 2020). The platform is an interesting kaleidoscope of ATHIS (Assistência Técnica para Habitação de Interesse Social) initiatives nationwide.

3.2.2. Roots of the Lab

Itaim Paulista is one of the densest and most populated districts of the city, with 17,195 inhabitants/km^2, and is close to the ecological conservation area of Tietê River. The area has 358 thousand inhabitants and is traversed by a water network comprising 6 streams. It has among the lowest amount of vegetation coverage per capita, increasing the effects of air pollution and forming heat islands in the eastern part of the city [51].

Itaim Paulista was previously characterized by self-construction and informality, but over the last decade it has seen expansion in the real estate market, especially in relation to the housing market. The arrival of these new enterprises is increasing the cost of housing in the neighborhood and threatening the environmental and social vulnerability of the Itaim Paulista even more.

The Itaim Paulista Lab aimed to understand the underlying causes and interrelations that triggered conflict over the establishment of a bus corridor on Avenida Dom João Nery with a local lens. The avenue is an important road that cuts through the area and divides the neighborhood. It was built on one of the water streams. The bus corridor, included in the 2014 Master Plan, implied evictions, threatened the neighborhood's centrality and was therefore opposed by local merchants and residents.

In 2013, when the São Paulo Master Plan was submitted to the city council for approval, they organized a protest against the bus corridor that, according to the participants, would destroy the local commerce and threaten the employment of many residents. In 2014, several activities involving partners from Germany and the United States were developed as a response. The German Center for Science and Innovation in São Paulo (DWIH-SP), in partnership with the Municipal Secretariat for Urban Development (SMDU), the University of São Paulo (IAU/EESC/USP) and HafenCity University Hamburg, organized a workshop to study the environmental impacts of the implementation of urban mobility systems and to propose solutions for this bus lane [52]. The workshop was led by Renato Anelli (IAU USP), Michael Koch (HCU) and Martin Kohler (HCU) [53]. A workshop was organized to investigate the conflicts between technical intervention in the territory and participatory processes. It was hosted by Universidade São Judas (USJT), as the first so-called São Paulo Meeting and funded by São Paulo Research Foundation (FAPESP) and the University of Texas (UT-Austin) [32].

The socio-environmental problems resulting from the Lageado Basin (Itaim Paulista) urbanization process was formulated within the scope of the Urban Studies SP: New

Mobility Lines Workshop [54]. Full integration of the workshop teams and the research project took place in 2015, as the second São Paulo Meeting ("Planning by Conflicts"). The academic meeting mixed the workshop strategy of urban studies and academic seminars with public authorities and local stakeholders. The Itaim Paulista Lab originates from this case study and continued those initial activities.

3.2.3. Concept of the Lab

The Pathway Model for the Itaim Paulista Lab was developed in these meetings in response to the conflicts around the bus corridor. Figure 3 shows the concept of the lab in nine steps. The definition of the scientific problem gave rise to the lab and its case study. At this stage, the research sought to clarify the roles of the State, the University and the technical planning sector in a new urban environmental agenda. The investigation was initiated in 2013 and elected the Subprefecture of Itaim Paulista as a case study in 2015 (Steps 1 and 2).

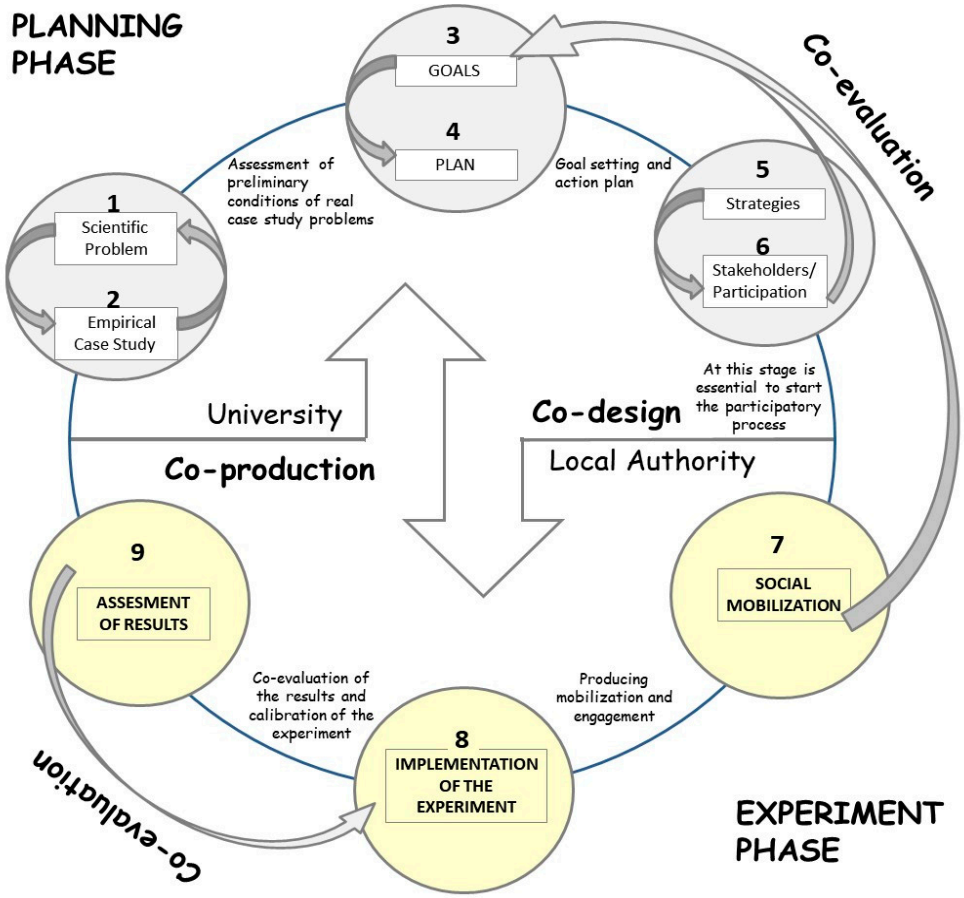

Figure 3. Pathway Model for the Itaim Paulista Lab experiment. The Pathway Model aimed to integrate the university and the local authority to achieve better responsiveness in the planning system. It is divided into a planning phase and an experiment phase.

The Itaim Paulista Laboratory is established through a formal agreement between the Universidade São Judas and the São Paulo City Hall–Municipal Secretariat for Urban Development (SMDU), published in the Official Gazette of the City of São Paulo 24 December 2016. This agreement focused on the Subprefecture of Itaim Paulista and had three goals: (1) to develop an environmental pedagogical strategy, (2) to follow up on the implementation of the Subprefecture Action Plan, and (3) to offer a training course for local managers. The goals were discussed with the Municipal Secretariat for Urban Development (Steps 3 and 4). The work started at the beginning of 2017 and allowed the group of students and

professors to officially connect with the Itaim Paulista Subprefecture. The established goals allowed the university partners to deepen contact with local challenges and stakeholders (Steps 5 and 6).

On meeting the local stakeholders, the university partners realized that the Subprefecture Action Plan did not have the same importance for the Subprefecture and the Municipal Secretariat for Urban Development. It was then that, from step 6, we "went back" to step 3, including the problems of waste and vulnerable populations located in the streams into the Itaim Paulista Lab studies. It was at this point in 2018 that the lab joined the Klimapolis Laboratory. The Klimapolis project gave new perspectives to the concept, introducing similar practices in the workshops. This partnership expanded the lab's interdisciplinarity, allowing it to diversify its performance.

In 2019, the Itaim Paulista Lab was invited to occupy a room in the local authority headquarters and developed two programs in a local school. To improve all these ongoing activities providing identity to the lab, four communication channels were created. The "Papo do Lab" channel broadcasts the lectures given by professors and students there, the "Lab Explica" offers content through courses and publications, the "Lab Participa" identifies the lab's involvement in local activities, and the "Lab Memória" studies the urban history of the locality in order to preserve the symbolic elements of spatial connection between residents and the area (Step 7). The local activities carried out in step 7 built more effective local partnerships, concurrently improving engagement with different levels of authority within the city.

3.2.4. Activities and Interests of the Lab and Its Students

The activities of the Itaim Paulista Lab aimed to mobilize partners and to promote a better understanding of the problems through different approaches. Since 2015, one main activities of the lab is the organization of the São Paulo Meeting that has brought together partners from the academic community and public authorities to discuss the challenges identified in the case study. The role played by the São Paulo Meeting is particularly important in strengthening the Itaim Paulista Lab partnerships and building understanding in order to respond to local challenges.

In March 2019, the sixth edition of the São Paulo Meeting "Itaim Paulista Possibilities of Transformation" included contributions from Anita Engels (UHH), Martin Kohler (HAW) and Nico Caltabiano (Klimapolis/MPI). The seminar brought together municipal authorities from various levels, promoting integration between the Universidade São Judas, the Klimapolis Laboratory, the São Paulo Urban Development Company and the Subprefecture. It paved the way for the new agreement with the Municipal Secretariat for Urban Development and the Klimapolis Laboratory and increased the support of the local authority and of the Universidade São Judas for the lab's activities.

At the local level, the Itaim Paulista Lab supported the movement to clean the Black Mother Square in 2019 led by the students from the school Dama entre Rios Verdes. Another activity carried out in this school was a workshop to assemble a low-cost PM10 particle sensor. It was organized by Instituto de Astronomia, Geofísica e Ciências Atmosféricas in partnership with Escola de Artes, Ciências e Humanidades and Universidade São Judas Tadeu, in the context of the Klimapolis Laboratory and attended by a focus group of 18 students. With the Klimapolis partnership, the Itaim Paulista Lab broadened its activities to issues of air pollution and strengthened its performance.

The genetic comparative approach showed the specificity of each lab and its evolution. We have shown that the two urban contexts are shaped by different struggles and conflicts; they have developed different approaches to planning and participation; and that each lab started with different goals, ambitions, resources and formats. We will now switch to more generative comparative tactics to bring the different cases or singularities into the conversation on issues we deemed insightful.

4. A Conversation between the RWLs on Long-Term Transformative Change

The following *generative conversation* [55] aims to deepen our understanding of if and how the RWLs in Itaim Paulista and Lokstedt contribute to urban transformation, and specifically of long-term transformative change. As Evans et al. [56] pointed out:

> "(...) the complexity of achieving broader change is often hidden behind a lexicon of verbs such as upscaling, replicating, transforming, seeding, rolling out and breaking through. These words imply quite different understandings of how change unfolds over space and time, black boxing the social and political agency through which it takes place."

Bringing cases into the conversation [57] produces an opportunity for inventive and positive experimentation. With the intention of decoding the "black boxes" of change and returning to the research interests set out in Section 1, we structure the conversation along the lines of the *two themes* introduced in Section 2 (see Figure 1): first, RWLs and modes of urban (climate) governance, and second, RWLs and practical action. Both themes recognize that RWLs may open new spaces and trigger change in terms of governance but also in terms of (non-instrumental) practical action in the city. With respect to both themes, we will critically scrutinize whether the RWLs reinforce dominant institutional settings and actor constellations ("fit-and-conform") or "stretch-and-transform" them [11,29,58].

4.1. RWLs and Modes of Urban Climate Governance

With regard to the first conversation theme—"RWLs and modes of urban climate governance"—we ask if, and to what extent, there was a spillover effect from the experimental mode into one of the more continuous modes of urban climate governance. We build on the work of Bulkeley, Kern and Castán Broto, who identified six modes of urban climate governance in their extensive research into city-level activities on climate change: self-governance (governing of cities' own activities), provision (of resources, infrastructure and services), regulation (local law-making and planning, exerting local authority), enabling (of activities with or of private businesses, NGOs, citizens and local communities), partnership (cooperation with other stakeholders) and experimentation [16,59,60]. "Spillover" here means that the RWL triggered, initiated or influenced any instrument, process or activity within another mode of governance (e.g., a law-making or planning process, the implementation of a law or a plan, or a new partnership or an enabling activity). We assume that such spillover is an indicator of the RWL's contribution to long-term change. Whether such a long-term change is transformative or not depends on whether it "fits-and-conforms" or "stretches-and-transforms" dominant institutional settings and actor constellations [29].

The concept of "modes of urban climate governance" was mostly developed in a global north context but is still generic enough to capture measures of government-led urban climate governance in cities of the global south. We start by providing, very briefly, examples of each of these modes of climate governance in Hamburg and São Paulo before focusing on the relationship between the experimental modes provided by each of the labs and other modes of governance.

All *six modes of governance* can be found when looking at Hamburg and São Paulo climate governance. *Self-governing* in Hamburg is, for example, translated into increasing the share of renewable energy in power contracts with the city and the city-governed public institutions. In São Paulo, self-governance measures include climate-friendly purchasing of goods, investments and education, as well as the ecofleet program in which the municipal bus company, SP Trans, tested the adoption of alternative fuels [61]. *Direct regulation* takes place in both cities through climate action plans setting emission reduction goals and through land-use planning, which has the most direct influence on the activities that will materialize on urban land [35]. *Provision* is also crucial, as both cities (though on different scales) are struggling to replace inner-city individual car traffic with increasing public transport and cycling. In Hamburg, *the enabling mode of governance* is mainly adopted via a cluster approach in which the city promotes cooperation by academic, business, indus-

try and administration actors. Hamburg also supports practical demonstration projects through the International Building Exhibition (IBA, e.g., the transformation of a garbage landfill into a site for renewable energy production [62]). In São Paulo, it encompasses training programs on climate within the administration but also, for example, in schools (see [58]). Several *partnerships* have been created and are maintained through programs (in Hamburg especially) with local companies and industries (Umweltpartnerschaft) and the energy cooperation, aimed at economic actors operating on land belonging to the harbor company [63]. A prominent international partnership initiated by the city of São Paulo is the C40 city network. Both cities are members of the networks ICLEI Local Governments and Sustainability and the Covenant of Mayors for Climate and Energy. In recent years, the number of *experiments* has also increased in both cities (for São Paulo, see [64]). For example, the climate commission of the city of São Paulo cooperates with the Klimapolis Laboratory. In Hamburg, experiments happened mainly in the field of urban mobility, allowing for temporary alternative uses and initiating the Lokstedt RWL proposal of a federal funding program.

In our further *conversation*, we focus on the relationship between and (potential) effects of the RWLs on two of the above mentioned five modes of governance beyond the experimental mode: *regulation* and *partnership*. We focus on these two categories because our empirical material indicates that most of the potential "spillover" happened in these two modes of urban climate governance. On the one hand, we aim to explore if and how the experimental mode might have helped to *expand the sphere of regulation*. Regulation captures the exercise of local authority (i.e., local law-making and planning), including the institutional aspects of processes and decision-making, as well as implementation. On the other hand, we ask how the *experimental mode* might have helped to build up and maintain new long-term *partnerships*. Partnerships encompass, for example, cooperation between and within local governments, as well as other stakeholders.

When we ask how the labs became part of urban climate governance in the first place, we discover very different dynamics in which various forms of *partnerships* played crucial roles. The lab activities in São Paulo did not start in a climate governance context but were triggered by an urban planning conflict arising from the potential implementation of a bus corridor, as regulated in the São Paulo Master Plan. It was only via the "roundabout route" of international collaboration, and the availability of funding for innovative German-Brazilian partnerships in research, that the lab in Itaim Paulista expanded its activities into the field of climate change. It established new connections to the Intersecretary Working Group (GTI) and got involved in the process of developing a climate action plan. If we look at the origins of the Lokstedt Lab, we see that the dynamic was almost the inverse. The initial motivation was that climate governance at the city level was perceived to have some implementation and participation gaps, so the *experimental mode* of a RWL seemed to promise improvements and a better response to climate goals.

In terms of an expansion of the sphere of *regulation*, both labs play an interesting role in bridging the different administrative levels of city and (sub-)prefecture/district planning, as well as in connecting administration, citizens and university partners, all of them crucial actors in (science-informed) urban and climate action planning and its implementation. In São Paulo, the lab could contribute to bringing the city-level Department of Urban Planning in the Secretariat of Urban Development closer to the urban planning department in the Subprefecture Itaim Paulista. Considering that the city of São Paulo has 32 subprefectures, with a high turnover of local mayors, it is challenging for the city level administration to follow what happens at the local level. The laboratory was also useful for the new local mayor to get to know the territory and contact locals, with a university partner able to neutralize frequent animosities between the public authority and the vulnerable population. The lab also mediated the local school's demands through the Black Mother Square program. We believe that integrating the city's administrative bodies is part of democratic social learning in Brazil's public authorities. The 1988 Federal Constitution opened a large space for the country's participatory process at various levels. However,

the power system's autocratic culture is still a bottleneck for the country in ensuring greater responsiveness in public policies in general. The democratic advance in the public management culture is a fundamental step, which also promises greater effectiveness of climate action policies in the city of São Paulo. In Hamburg, the lab was initiated by the city-level climate commission and located at the (sub-)district level with the intention of improving the implementation of city-level climate planning. The work of the lab included representatives of the district administration, and all thematic workshops brought together representatives of the city-level climate commission, the sectorial departments, the local district level and the citizens.

A (potential) expansion of the sphere of *regulation* can also be identified in the development, as well as the implementation, of climate plans and climate-relevant urban planning. Looking at São Paulo, the lab experienced large structural and "cultural" differences in connecting the themes of urban planning and climate governance. The São Paulo city government is committed to strong climate governance. However, the Commission of Climate Change is arguably not yet well integrated into the urban development debate and has only selected ties with the universities. The Itaim Paulista Lab was created under the umbrella of the Advisory of Applied Research and Promotion. The Advisory was created to integrate universities into the Secretariat of Urban Development. It lasted only during the Fernando Haddad term (2013–2016) but opened a wider and creative channel of communication with different groups and universities [65]. Through building further ties with the climate governance system, the lab can contribute to bridging structural gaps between the administrative systems of climate governance and urban planning. In addition to these structural differences, there is also a difference in "planning culture". While the established system of urban planning has a long tradition of working in *experimental* modes, supported by collaborations between the Department for Cooperation and universities, climate policies have so far been steered more centrally towards *regulatory* and top-down-approaches, without much *experimentation*. One outcome of the lab in São Paulo is that now several new connections and potential future *partnerships* have been generated, and the *experimental mode,* as practiced in the urban planning sector as a response to all kinds of local problems, has been brought "upwards" to the sphere of city-government led climate governance.

Quite to the contrary, the connection to the official system of urban planning remained rather loose in the case of the Lokstedt Lab. Over the course of the project we realized that the Coordination Center for Climate Issues (LSK), which initiated the project, chose to retreat gradually from the lab's activities and made rather symbolic use of the project. The fact that the City of Hamburg was part of this RWL, and that this was funded as a project from federal public sources, was seen as external recognition of the city's efforts in climate governance. The Hamburg Minister for the Environment came to official project events to show his symbolic support and to use the project for marketing purposes. However, the closer the project came to its finalization and the more concrete the planning for a second phase became, the more distant the LSK appeared. In the final decision about the follow-up project proposal, the LSK decided to change its status in the project from a formal project partner to a background supporter. Regarding the initial intention of the LSK to set up a RWL in order to enhance participatory climate action planning and its implementation, it can be stated that lab workshops and other activities did open up new spaces for participation and supported the overall implementation process of Hamburg's Climate Plan.

The main goal of the second Lokstedt proposal was to turn the research mode of the RWL from simply discussing transformative agendas to putting real experimentation into practice. The LSK's reasoning for reducing its participation was that a commitment for one of the districts (but not for the others) would be inappropriate preferential treatment. The LSK's role as a coordinating body was to enable new ideas and concepts but not to be directly engaged in concrete experiments that might lead to practical changes. While this sounds strange if we look at this through the São Paulo lens, it makes sense in the

Hamburg context. The higher ministerial level, at which the LSK is situated, is much more constrained by party politics, compared to the lower levels of the district administration, the local initiatives and the politically neutral university partners. It remains to be seen if the next project phase can help to *expand the sphere of regulation* under this new and looser form of partnership. Since the new membership configuration encompasses representatives of the district administration, who are also responsible for drafting the first district level climate action plan, there is a new chance for fruitful interactions between the *experimental* and the *regulatory* mode of climate governance.

If we scrutinize the *partnerships* around the Itaim Paulista Lab more deeply, we learn that it was quite challenging to maintain good ties with both the local government and the Secretariat of Urban Development after the end of the term of Mayor Fernando Haddad. The maintenance of the lab's activities and partnerships was only possible because it ended up becoming an opportunity for both the city government and the local authorities. The lab worked against the background of clashes within the city of São Paulo's management system. As it is a politically neutral partner (in theory) and recognized for its academic status, the lab assumed a legitimate place in the partnerships.

Thus, it may be said that different instances of government in the city of São Paulo appropriated the Itaim Paulista Lab as an *experimental mode of governance* in the context of several challenges in local urban development. Through new connections and *partnerships*, as well as urban planning and development interventions responsive to the local needs and interests, the lab could successfully contribute to the balancing of power within the São Paulo city government.

While one of the activities of the Lokstedt Lab was to identify local climate protection pioneers (through research activities by the HafenCity University), the LSK did not make use of this opportunity to expand its local network of climate partnerships. "*Partnerships*" as a mode of governance is very formalized in Hamburg, so it seemed that the climate protection pioneers—often young entrepreneurs with very transformative but difficult to evaluate business ideas—would not fit in that format where large companies dominated.

To summarize this *generic conversation* along the theme of *modes of climate governance*: in both RWLs, we find some spillover from the experimental into the regulatory and partnership modes of governance, which indicates that both labs contribute to long-term change. Both RWLs are still ongoing, and it is too early to draw a conclusion on their actual effects on urban climate governance. Our analysis up until now shows that the Itaim Paulista Lab, on several occasions, contributed to "stretching and transforming" dominant institutional settings and actor constellations. In the Lokstedt Lab, the LSK seemed to not be supportive of activities that would question dominant institutional settings and actor constellations. However, it must be noted that the very goal of the Lokstedt Lab was to enhance participation in, and implementation of, urban climate action planning. So here, successful implementation of ambitious Hamburg climate targets must be recognized as transformative in itself. The second phase of the Lokstedt Lab is designed differently and shows potential to contain several "stretch and transform" elements.

4.2. RWLs and Practical Action

While governance processes and strategies (as framed here) involve state actors and strategic goal-finding procedures, we do acknowledge that transformative processes can be brought forward by *tactical action* and *actors outside the institutional context*. As outlined in Section 2, insurgent or conflicting actors, and actors that challenge dominant power-structures or the very structure under which most planning, participation or change is organized, can also have an important impact as they irritate the system causing a variation that might result in testing and accepting structural changes (stretch-and-transform). As we will see in the Itaim Paulista case, such provocations can even be used by institutional actors against the dominant planning system of the higher administrative body. The unexpected emergence of an academic workshop on urban mobility (Estudos Urbanos 2013), further work by student seminars, and additional activities created a continuous

movement that, although irritating at first, received growing attention and support from the local city mayor. Using the accepted activities of the academic institutions with local and international universities, the local politician endorsed the results and became an agent of the lab's activities. This greatly enhanced his position in communicating and dealing with the higher-level institutions in a way that went beyond what was designated by the planning system.

In addition to actions that clearly challenge existing power-structures and potentially transform the system, we also wanted to look for the *unconnected actions of city-makers, activists and residents* appearing in the same spatial context. These actions are not necessarily part of the RWL process but contribute to the same transformations without being triggered or steered by the RWL and its actors. Where governance does imply a goal-oriented strategy, there are also actions that must be considered tactical without a clear aim at first. Resulting from pure necessity, curiosity, political reasoning or even as a collateral effect of activities not meant to produce urban transformations, such unconnected actions can very well be transformational (for the city) without being aware of such capacity. For a richer picture on the elements of change in the context of the RWLs, we include these "practical actions" in a second strand of our conversation to learn about urban practice in urban transformations, and as a potential contribution to enhance and build theory for the urban:

> "while clearly theoretical frameworks often inform my work as an activist, there are at least as many times when activists have shaken my theoretical assumptions." [66]

Which practical actions have emerged in the context of the labs, how may they be categorized across the varying urban realities, and to what extent might they contribute to long-term systemic change? Looking at the two labs with these questions in mind, we can see many actions that were started outside of the lab, or parallel to it, that became part of the experiment over time. Other actions stay outside permanently but still shape the process. We also see many successful efforts to appropriate the RWL and bend it towards new and additional goals. This can be very creative and enriching. Eventually, some actions resulted in structural changes to how planning procedures are carried out and to how power hierarchies play out.

In the Lokstedt example, several *practical actions* emerged that *were not officially part of the project plan*. From the start, the climate topic opened the door to all kinds of urban topics, and various citizen groups made use of the lab to increase the visibility of their specific concern. For example, the citizen initiative Future Lab/Bürgerhaus Lokstedt often used the public events organized around the three topics of household energy, mobility and waste management to also promote their own priority topics, to establish new connections and to build a deeper relationship with the university partners. As a result of these networking tactics, university partners were often invited to events by the Future Lab/Bürgerhaus Lokstedt to either provide social science input gained by the interviews conducted in the project in Lokstedt households or to moderate public debates on critical topics as 'neutral' conveners. The Future Lab/Bürgerhaus Lokstedt even became a formal project partner in the second project phase, and one member of the initiative was hired by the university to work full-time for two years on the project. So here, *practical action* was a first step towards integrating a new local partner into the RWL, thus potentially strengthening the experimental and partnership modes of urban climate governance.

A second Lokstedt citizen group also tried to make use of the project for its political struggle to defend urban allotments against plans to build housing on these sites. The district administration is severely under pressure to identify and develop new sites for affordable housing, for which it has the formal planning responsibility. This particular citizen group attended most of the public project events and expressed a highly critical view of all project activities. In their public statements, they used climate adaptation arguments to defend the allotments, emphasizing that the trees and plants on these plots also absorb CO_2 and counterbalance the effects of rising temperatures in the city. While the first initiative used a collaborative approach to lay open and discuss conflicts with the

aim of finding compromises, the second initiative remained firmly in a destructive mode and rather isolated. Over time, the project staff (university, LSK and district administration) managed to neutralize this influence on the project dynamics. One irritation led to innovation, while the other irritation was excluded from the process.

Another outcome was the *new alliance* around the transformation of Grelckstraße to increase the quality of the urban public space and to create new opportunities for community activities. This initiative was neither included nor directly generated by the RWL itself, but interested strangers met during public lab events and were inspired to join forces and become activists. The Grelckstraße Initiative gained a lot of momentum even after the end of the first project phase (November 2019). For complex administrative reasons, and also due to the Covid 19 pandemic, the second phase of the project could only start about a year later (September 2020), but activities in Lokstedt continued between the two project phases, and local actors have been pressing the university team to kick start the transformation process. These initiatives and the district administration developed a mutual understanding of citizens' priorities on the one side, and of the formal planning necessities and the legal restriction on the administrative side. In the meantime, the initiative around Grelckstraße led to several resolutions of the district assembly, which institutionally and financially supports the transformation of Grelckstraße, most specifically in an ongoing traffic experiment that tests two alternative options of redesign (car-free and one-way with limited access on weekends). So here again, we observe how a *practical action* can trigger change in *modes of urban climate governance*, in the *regulatory* and *enabling* mode.

The Itaim Paulista Lab held several meetings bringing together different levels of government at the university. The different perspectives aired in these meetings have contributed to the construction of the lab's activity agenda and structured the research programs of Universidade São Judas. The absence of representatives for the residents and the local participatory council in the Itaim Paulista Lab's activities has prevented confrontations during these meetings. The Itaim Paulista Lab has been very cautious in including residents in its *mode of action*, always placing public institutions at the local level as intermediaries in contact with the population. It reinforces the state's capacity and perception in locations where institutional weakness allows for the rise of power linked to primary groups (religious or criminal).

The new links between the state institutions and the universities were not only partly institutionalized via formal *partnerships*, they also enabled new *forms of practical action*. For example, Ana Paula Koury and F. Lara offer courses to simulate the hydrological behavior of the Lageado Basin in Itaim Paulista with three different scenarios: before urbanization; with the current occupation situation in the basin; and after the implementation of sustainable drainage devices within the scope of the block, the lot and the road system. Lageado Basin is where the expansion of the metropolitan mobility network is planned with the bus corridor on Avenida Dom João Nery—the starting point for Itaim Paulista Lab. The objective is to present the results to government and university partners, sensitizing decision-makers to the importance of expanding the environmental assessment of the hydrological issues in the city's development. This incorporates the original conflict and contributes to better integrated urban planning and climate adaptation agendas.

Looking back at the development of the conversation, one can see the different trajectories and achievements of the two RWLs. While the Lokstedt Lab improved the cooperation between existing actors in transformation processes, brought new actors into the arena for new cooperation and created action items to be pursued, this consideration highlights the achievement of the Itaim Paulista Lab. Where the lab in Lokstedt could base its actions and communications on stable partnerships and a long-term grant, the lab in Itaim Paulista had to build the arena first. In this precarious position of starting with nothing, the project manager showed exceptional skills in weaving smaller activities and projects together. These concrete activities resulted in new coalitions and potentialities that had to be enacted by other players (the appropriation of the lab by the local mayor is one of the prime examples here). In this, the activities of the lab can be considered as proto-planning processes that

created and empowered the participatory and democratic capacity of planning—a legal requirement but not an enacted reality in many cases. Here, cooperation and co-design fulfill completely different functions in a collaborative and often conflicting process of change.

5. Discussion

This article is an experiment in itself. When we started presenting and discussing our RWL experiences with reference to Robinson's theoretical framework, we did not know if and how it would work. To make sense of two lab experiences in very diverse political, economic, social and ecological situations, we could not follow a classic comparative approach but decided to work with the theoretical framework "thinking through elsewhere" from Jennifer Robinson [25]. We operationalized Robinson's framework in two steps (see Figure 1). First, we presented the RWLs contexts, roots, concepts and activities, and thus their "genetics", in terms of Robinson's framework. This approach delivered insights into how the RWLs came into being and 'work' in their highly different local constellations. Second, we complemented this presentation of genetics with a "generative conversation" between the RWLs on their role in transforming governance and practical action.

There are certainly many other options to operationalize the theoretical framework. Retrospectively, we find that Robinson's framework, and our pragmatic two-step operationalization of it, was a valuable tool to gain a deeper understanding of the two RWLs' structure and evaluate their work and contribute to urban transformation in highly different contexts. Applying Robinson's framework ensured detailed presentation and discussion of genetic and generative elements, always embedded in the specific context but still open for meta-level analysis. The researchers' flexibility in defining suitable themes for the generative conversation allows for the targeted use of the framework tailored to the broader research interests. Considering RWLs and their effects are typically local in nature, the application of the framework seems promising for urban studies in international contexts, especially in research on RWLs in international cooperation projects.

In order to gain a deeper understanding of if and how both RWLs contributed to long-term transformative change, we used two themes. In our *first conversation* on RWLs and *modes of urban climate governance,* we found that in both cases there was a spillover from the *experimental* mode of urban governance to the *regulatory* and the *partnership* mode, two arguably more continuous and long-lasting *modes of urban climate governance*. In our second conversation on RWLs and *practical action,* we saw that unintended and non-instrumental practical action emerging in the context of the RWLs also has significant potential to contribute to long-term transformative change. Tracing the effects of the RWLs under these two themes is only one of many possible ways to decode the "black box" of change [see 53]. It made sense for us, since we wanted to learn about the role and the effects of RWLs as one possible form of the experimental mode of urban climate governance but also wanted to highlight our observation that many unintended practical actions happened in and around the labs. Other research interests and perspectives of course allow for very different decoding of transformative change. For now, we cautiously framed a spillover from the *experimental* into more *continuous modes of urban climate governance* as an indicator of long-term transformative change. We can state that both RWLs show potential to contribute to long-term transformative change. We will continue to trace their effects as they continue to evolve in order to test our hypothesis with more empirical material.

Our findings have some implications for the transformative potential of climate governance in complex urban contexts. We have advanced the understanding of RWL as one form of the experimental mode of urban climate governance, and we have demonstrated a spillover from the experimental to more continuous modes of urban climate governance. We see this spillover as an indicator for the lab's contribution to long-term transformative change. If this holds true, it could be advisable for the design and operationalization of RWLs in the context of urban climate governance to be aware of the status quo, strengths and challenges of strategic climate action planning in the city in question, and to observe it

in the context of other modes of climate governance. This would enable the RWL to explicitly work towards spillovers to ensure contributions to long-term transformative change.

6. Conclusions and Future Perspectives

We found that Robinson's framework is a valuable tool for making sense of RWLs and their effects in international contexts. Especially in projects involving international cooperation, the framework could be applied more frequently to understand RWLs and trace change in this context. With regard to our overarching research question, we found that both RWLs show potential to contribute to long-term transformative change via governance and practical action.

Our generative conversations led us to suggest a conceptual innovation. We propose to cluster practical action into several "modes of action"—somewhat complementary to the "modes of governance"—in order to capture the transformative forces RWLs may engender beyond intended governance effects. RWLs emerge as one of the main instruments for transformative science. The concept of transformative science does not only involve new ways of doing science, it also redefines the role of science explicitly as a catalyst for social change towards sustainability in an urbanized world [67]. RWLs appear in urban settings to support, initiate and learn from larger urban transformations and spatial practices. These are not empty spaces but contested fields of urban development strategies and experimentation with interventions. Different modes of "doing urban" interventions have been analyzed [68,69]. While governance processes are typically well described, these complementary "modes of action" and interventions rarely receive as much attention. The RWLs and the modes of governance can connect to state-led development strategies and development alliances, but this conceptual focus has difficulty bringing the more resilient or tactical modes of urban interventions into view.

Tactic and strategy are two types of practices, as distinguished by de Certeau [70]. Where strategies can be used by subjects of will and power, the powerless must use tactics to regain some forms of autonomy. In this sense, it seems necessary to include also actions that contest or appear disconnected to the experimentation of the formal actors in our inspection of processes of change around and within RWLs. Looking at strategies of resistance [71], oppositional [72] or simply tactical interventions [73] and grassroots activities that decide to remain outside the urban regime [74] could reveal different modes of action on the limits of, or beyond, the consensual experiments in multi-actor partnerships with the state. Our empirical material from the two labs is not yet sufficient to develop a fine-grained clustering of modes of action. More research is needed to delve deeper into the questions of if and how "modes of action" can and should be distilled to better trace unintentional and evolutionary transformative change.

Last but not least, our careful genetic and generic reconstructions of the two labs also highlighted various types of engagements of the involved researchers. These observations raise an ethical aspect of the RWLs. Our conversation has shown that in each case, the researchers turn—often involuntarily—into change agents themselves. They provide the ground for some groups or actors to advance their cause and prevent others from appropriating the lab. They also provide academic input in the form of seminars or presentations and sometimes contribute to changing the perspective of the actors involved in urban issues. By this, they also contribute to urban innovation and become unavoidably political actors themselves. This ethical dimension of the RWL is often overlooked [75,76] and deserves greater attention in future research.

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