Cities for Citizens: Identification of Public Values and their Conflicts in Urban Space

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Cities for Citizens:

Identification of Public Values and their Conflicts in Urban Space

by

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Preface

City science is a truly multidisciplinary research field. Fittingly, this thesis also makes use of various concepts from many fields, including geography, philosophy, computer science, public administration research and sociology. In my point of view, it is exactly such an interdisciplinary approach that is needed when trying to conceptualize the complex system of cities.

In such a preface, this piece of text before the brackets, setting the scene for the whole document, it should be denoted that the research conducted largely refers to urban planning theories developed by European and North American researchers during the 20th and 21st century. This thesis is thus shaped by a Western background and builds upon Western theories. In the wake of the present case study of Hamburg, Germany and my personal background, this seemed like an appropriate approach to me. However, it shall also be remarked that out there on this surprisingly small planet travelling through space a magnificent richness of thoughts exists, and with it a great diversity on how to perceive, understand and make sense of the world. More specifically and related to the topic of this thesis, urban spaces and public values might greatly vary from society to society, and their perception will hopefully be subject to future research on a broader scale. This thesis thus only provides a first attempt to study public values related to urban space and their conflicts, focusing on a case study of the city of Hamburg, Germany. In doing so, I tried to describe my research in ways that can be accessed, followed and understood by people from all kinds of different backgrounds.

Additionally, I would like to make use of this preface to thank the people without whom this thesis in its present form would not have been possible. I deeply believe that who we are and how we decide is largely influenced by the people around us, and that the impact all these people have on our lives can never be underestimated. Thus, first and foremost, my deepest gratitude goes to my family for their continuous support since my early childhood. Without my parents, my brother, my grandparents and the rest of my family, I would have not come to finishing a Master's degree. Also, I am very thankful for all the people I came to meet throughout my life, many of whom I am glad to call my friends. To all friends back home, to the EPA community and, of course, to Melli: Thank you.

Furthermore, I would like to thank Trivik and Juliana for their exceptional guidance in both finding the topic of this thesis and navigating the research process through their daily supervision process. For multiple inspiring starting points, references and discussions about urban space and the role of values, I would like to specifically thank Reinout. I am grateful for the critical and challenging advice of Frances, which helped me carve out the main sections of this research and overcome some of its limitations. To Geertje, I would like to express my thankfulness for counseling me in qualitative research and sharing her knowledge and experience. Last but not least, I would like to express my earnest appreciation for Holger's weekly input, his constant flow of ideas and his motivational striving for new approaches. Integrating the viewpoints of a total of six supervisors has been a challenging, but very enriching process.

With that being said, it is up to me to express that I hope this thesis provides the reader with interesting starting points for thoughts about the nature of value-laden urban space and its inherent conflicts. Integrating the needs, desires and values of the citizenry into urban planning in my point of view serves the constant endeavour of a more pluralistic society based on democratic principles. After all, the future of our species might very well depend on the decisions that are taken within and throughout urban spaces.

R. H. Herzog
Delft, August 2021

Contents

Executive Summary

In the wake of more inclusive and sustainable cities, as targeted in the UN's Sustainable Development Goal (SDG) 11, public administrators and urban planners aspire to incorporate the pluralism of public values into decision making. Although a theory of public values already exists since the 1990s, they are yet to be empirically identified and applied in a context of relational urban space. First attempts to outline values and their conflicts in urban planning brought forward a sustainability / livability prism with six main value conflict archetypes as edges. Going beyond the theoretical discussion, a general lack of empirical identification methods for public values has been pointed out by the literature. More specifically, there are calls to leverage data stemming from the citizenry itself to identify public values. In the context of urban space, researchers call attention to the lack of accounting for the pluralism of values in urban space.

Using a case study-mixed methods design, the present thesis attempts to overcome these knowledge gaps by identifying public values and their spatial conflicts in Hamburg, Germany. The main research question to be answered is "Which public values and inherent spatial conflicts can be identified by leveraging participatory data in urban planning?". Managing ongoing urban growth, having a city-wide transparency law and equipping urban planners with a digital participation system (DIPAS), Germany's second largest city provides provides ideal prerequisites to study public values and their spatial conflicts. To do so, an explanatory sequential mixed methods approach provides the framework to quantitatively identify public values and their conflicts and subsequently evaluate and interpret the findings qualitatively. In the quantitative strand, structural topic modelling (STM) uncovers latent topics and underlying public values from large-scale qualitative geo-located participatory data of a total of 25 participatory projects. Leveraging manual value assignment and spatial analysis, public value conflicts are identified under the lens of the sustainability/livability prism. These results are then assessed and discussed in workshops with expert planners, which provide qualitative input of their experience with participatory data. As a last step, the findings of both strands are integrated and discussed.

Findings of the quantitative strand indicate that additionally to the public values of social equity, economic opportunity, ecologic quality and livability as the vertices of the sustainability / livability prism, the public values of health and safety play a significant role in citizen's contributions. Although multiple of the topics identified by the unsupervised STM algorithm do not reflect a single, but rather multiple public values, clusters of coherent public value topics show the existence of all value conflicts under the sustainability/livability prism within the case study of Hamburg. Participatory processes aimed at mobility oftentimes give rise to the property conflict between the public values of social equity and economic opportunity, or the private versus collective nature of urban space. They manifest in the wish to assign public space to either (private) parking spots or to (collective) usages such as bike/pedestrian lanes or green areas. For new residential development projects, multiple overlapping public value conflicts manifest. For instance, the green cities conflict, the resource conflict and the gentrification conflict play a role in Hamburg's "Jump across the Elbe river", a series of new residential development projects in former industrial port areas. Workshops with expert planners in the qualitative strand largely confirm these public values and their spatial conflicts. They bring forward the additional public value of conservatism and public value conflicts between ecology and safety (dangers of nature conflict), between the values of aesthetics and quietness within the umbrella of livability values (drawbacks of beauty conflict) and a conflict between economy and health (externality conflict). Still, some discrepancies between both research strands exist and are generally related to methodological limitations of the quantitative part. The integration of both strands results in a new conceptual model for public values and their spatial conflicts in urban planning. This conceptual model of public value spheres leaves behind the enclosed volume of the sustainability / livability prism and allows for a flexible and extendable display of public values and their conflicts.

The societal relevance of the present work is threefold. One, various knowledge gaps in urban planning and public values are addressed and yield new insights for further academic research. Two, the quantitative methods deployed and the proposed conceptualization of public value spheres provides urban planners and practitioners with new tools to account for value-laden relational urban space in future participatory processes, thus contributing to the United Nation's Sustainable Development Goal 11 of more inclusive and sustainable cities. Three, the citizenry itself profits from a better discourse due to aggregation of voices in participatory tools and a transparent mapping of public values that creates a sense of the pluralism of public values within a city.

1 Introduction

By 2050, around 10 billion people will inhabit the earth (United Nations, n.d.) and 68% of the worlds's population are projected to live in urban areas by then (United Nations, 2018). While connecting people unlike any other form of settlement, urban areas account for more than 70% of global CO_2 emissions (Johansson et al., 2012; Ribeiro et al., 2019), can have severe health effects on their inhabitants (Zhou et al., 2015) and expose them to stressors like lacking social support, loneliness and overcrowding (Srivastava, 2009). It is thus crucial to diligently plan and manage urban growth.

In the wake of more inclusive and sustainable cities, as targeted in the UN's Sustainable Development Goal (SDG) 11, public administrators and urban planners aspire to incorporate the pluralism of public values into decision making, more specifically urban land-use planning (Beierle & Konisky, 2000; Godschalk, 2004; Karimi & Adams, 2019; Nabatchi, 2012). The concept of public values was first introduced by M. H. Moore (1995) and has gained significant scientific interest since the late 2000s (Fukumoto & Bozeman, 2019). Although much theoretical work has been laid out (Beierle & Konisky, 2000; Jørgensen & Bozeman, 2007) it is the identification of public values that is still considered the "most fundamental" problem (Fukumoto & Bozeman, 2019). Identifying public values is however seen as a first necessary step for public officials to further "understand, and select among competing public values" (Nabatchi, 2012).

In urban planning, prominent paradigms such as *New Urbanism* or *Smart Growth* consider the values of sustainability and livability fundamental to future urban development (Godschalk, 2004). These values however come along with inherent conflicts, which Gough (2015) describe as a "messy terrain of tensions". To understand and cluster these tensions, Godschalk (2004) developed a much-recognized sustainability/livability prism outlined by the four edges livability, equity, economy and ecology. So far, limited attempts to empirically study value conflicts in urban and spatial planning have been undertaken (Brown & Raymond, 2014; Karimi & Adams, 2019; Karimi et al., 2015) and there are calls to make further use of public participation data to identify public values (Brown & Raymond, 2014; Nabatchi, 2012).

In this thesis, I apply a newly developed set of methods comprised of natural language processing (NLP) and explanatory spatial analysis techniques to identify value conflicts in their spatial dimension through the lens of Godschalk's sustainability/livability prism. By leveraging geo-located citizen comments data from several participatory mapping processes in Hamburg, Germany (Lieven, 2017; Thoneick, 2021), I expect to gain insights into the nature and distribution of public values and their conflicts in Hamburg's urban planning processes and add to the growing amount of analysis techniques to process participatory data. Thus, this research aims to assist public administrators and urban planners to better identify and understand the citizenry's values to improve their decision-making (Nabatchi, 2012) and to facilitate an democratic and inclusive debate (Thoneick, 2021).

The explanatory sequential mixed-methods approach of this thesis combines a quantitative NLP analysis of participatory data with qualitative expert workshops to identify public value conflicts in urban spaces. Both strands are embedded in an overarching case study of Hamburg, Germany. In the

quantitative strand, I expect to extract public values and their conflicts and locate them spatially. The qualitative part is aimed to interpret and evaluate the findings of the quantitative strand with expert knowledge. Thinking of future use cases, the method I propose could also serve as a real-time “aggregation of voices” (Thoneick, 2021) in participatory planning processes. This might eventually lead to more officials feeling obliged to go beyond mere tokenism in public participation, thus also contributing to the UN’s SDG 11 of more inclusive cities.

This thesis is structured as follows: Chapter 2 embeds the present thesis in a larger body of academic literature on urban space, public values and public participation in urban planning. This allows to carve out the main research questions. Chapter 3 outlines the case study-mixed methods approach that is chosen to answer the research questions. Chapter 4 sets the scene for the overarching case study of the city of Hamburg by describing the reasons for selecting the case study and outlining both the historical and current developments within the city of Hamburg. Chapter 5 elaborates on the quantitative stand of the thesis by laying down details of the data, methodology, operationalization and results of the NLP pipeline leveraging participatory data from the DIPAS platform in Hamburg. Chapter 6 explains the qualitative strand by describing the methodology and the results of the expert workshops conducted with urban planners from Hamburg. Chapter 7 integrates the findings of both the quantitative and the qualitative stand to come to one comprehensive understanding of public values and their conflicts in urban space. Chapter 8 provides a discussion on the results of the mixed-methods study in the light of the theoretical background, addressing both limitations and strengths that were encountered during the research. Lastly, Chapter 9 completes this thesis by listing conclusions that can be drawn from the present research and providing an outlook to a possible future research agenda.

This thesis also concludes my two year studies in the “Engineering and Policy Analysis” Master programme at TU Delft. Reflecting the main objectives of the programme, the present thesis is of analytical character and applies both a natural language processing model, as well as spatial data science methods to quantitatively identify public values conflicts in urban space. Following the social science strand of the programme, expert workshops with different actors in the field of urban planning were conducted and systematically analyzed based on the results of the quantitative strand. Its relevance to the public domain is given by its aim to support the grand challenge of sustainable and inclusive cities (UN SDG 11) by starting a first attempt to integrate public values into urban planning.

2

Theoretical Background

This chapter outlines the theoretical background of the present thesis. It aims to draw a line from what lies at the very basis of public value conflicts in urban spaces - the conceptualization of space itself - to the theoretical work on individual and public values, their conflicts and eventually to public participation as a means to identify such conflicts in space. This section thus intends to situate the present work in a larger body of scientific research and to carve out the main research questions.

2.1. Urban Space

To identify public value conflicts in urban space, it is necessary to first form a solid theoretical basis by elaborating upon urban space and its role in planning. This section is intended to serve that purpose.

2.1.1. Historical Synopsis of the Conceptualization of Space

Similar to multiple key terms in the present research, the conceptualization of space in general, and urban space in particular, is dependent on the context of its usage. Historically, space is both subject and object of analysis in many research fields, including physics, engineering disciplines and interdisciplinary fields such as city science. A brief historical synopsis is set to remedy some of the ambiguity.

Around 300 years before Christ, the Greek mathematician Euclid of Alexandria laid down a set of axioms in his 13-book-long treatise “Elements”, which would later become one of the most fundamental contributions to science itself and the basis of euclidean geometry (Euclid. & Heath, 1956). Building on this semantic work, Sir Isaac Newton in the 17th and 18th century developed his laws of motion and gravitation with an euclidean conceptualization of space, assuming and proclaiming an infinite expansion of space in three dimensions, independent of time and all matter within (Newton, 1687). It was more than 200 years later when Einstein (1916) revised this conceptualization and introduced the idea of general relativity. Space in its current physical conceptualization is now proved to be inseparable of time and relative to matter.

Similar to the paradigm shift in physics, the conceptualization of urban space in the planning disciplines over time changed from absolute to relational. Before the 1960s, Taylor (1998, p. 14) describes a long-prevalent perception of Western urban planning as a production of granular, high-precision master plans based on the ideas of the Enlightenment. Planning ideals of that time, such as the Athens Charter and Le Corbusier’s Radiant City, advocate for a rigorous segregation of different land-usages in different city zones (Corbusier., 1935). Typical authors of that period also strictly limit urban planning to physical planning of space. Social, economic and political aspects are explicitly excluded from the profession, thus conceptualizing urban space as something that can be planned in a technical and apolitical manner by designated experts (Taylor, 1998, p. 14-16). In this view, urban space is something comprehensible and absolute; a “grid of Euclidean coordinates” , something that is “intelligable and whatever there is in space can be known” (Lehtovuori, 2016, p. 14-15).

Starting from the 1960s, relativity slowly found its way into the conceptualization of urban space, which was then increasingly described from a systems perspective. Following that view, cities consist of many interwoven subsystems that are interdependent and - similar to living organisms - in constant change (Taylor, 1998, p. 66). Nonetheless, also the system's conceptualization of urban space came along with a dominantly modernist and scientific attitude; a notion that trained planners could comprehend the system's inner workings and thus objectively maximize the public good (Taylor, 1998, p. 83).

A truly "relative space-conception" (Lehtovuori, 2016, p.18) was later obtained by the introduction of social space. One of the first scholars to explicitly emphasize this dimension in planning practice was Jane Jacobs (1961). By criticizing urban planning as a "pseudoscience" in her famous book "The Life and Death of Great American Cities", she then caused an uproar in established planning institutions when advocating for less quixotic desk work and more direct observation to understand the plurality of patterns and dependencies of urban life and space. Lefebvre (1991) later in his seminal work "The Production of Space" theorized the inherent social dimension of urban space and its production through complex social interactions and valuations. Coming from a Marxist world view, his main idea is that space is produced through the interaction of three different modes of production. Firstly, what he calls the perceived space is the actual physical matter in everyone's environment. Secondly, conceived space is the space as conceived by professionals such as architects and urban planners and typically dictates how the perceived space is shaped. Thirdly, lived space is space in its everyday experience of citizens (Lefebvre, 1991). Soja (2000) later builds upon the work of Lefebvre (1991) and proposes the terms "firstspace", "secondspace" and "thirdspace", which he processes in a trialectic approach. In the meantime, more and more citizens in Western cities made use of their democratic right of assembly and protested against large-scale projects imposed by planners, such as extensive inner city highways (Taylor, 1998, p. 84), thus enforcing and embracing the idea of the social production of space.

In the middle of the 2000s, 89 years after Einstein published the theory of general relativity, Massey (2005, p. 18) suggests that "time and space must be thought together". She argues that time is molded by space, and space is shaped by time. Thus, when thinking of one, the presence of the other is implied and should not be neglected.

2.1.2. Current Gap Between Theoretical and Practical Conceptualizations

When it comes to contemporary conceptualizations of urban space, its relational and relative nature is widely acknowledged in academic theory (Forester, 1999; Lehtovuori, 2016; Massey, 2005; Sandercock, 2004). However, multiple scholars identify a clear divide between academia and practice.

Forester (1999) in his book "The deliberative practitioner" laid out how the daily practical reality of planners might significantly differ from their former theoretical teachings. In his view, planning practice is constantly moulded by value judgements (Forester, 1999, p. 31). Forester describes urban planners as "practical ethicists" (Forester, 1999, p. 31) stressing their continuous implicit or explicit decision-making about which issue to prioritize, which voices to hear and which value to consider more important in the face of conflict. In that sense, every fact that is brought forward in deliberation about a planning project cannot be considered merely "factful", i.e. free of values. He argues that "value-free facts would be, by definition, without value, really worthless" (Forester, 1999, p.133) and that hence the mere upbringing of a fact can already be considered as a value statement. Following this line of thought, the debate about values and their conflicts should be integral to urban planning practice.

According to Lehtovuori (2016, p. 21), the work of many urban planners today is however tied to what he labels the "Concept City" and the "Visible City". In his view, many planning professionals conduct the fallacy to mingle representation and reality; to not take into account the shortcomings that every (mental) model inherently has. Lehtovuori argues that - much in line with the concept of absolute urban space and the Enlightenment's proposed existence of a universal truth - planners conceive a city as a concept; as something that allows them to "bypass the complex, unpredictable city of countless actors and instead to understand and create space through finite, isolated properties that are linked to each other in a controlled manner" (Lehtovuori, 2016, p. 22). In his perception, this comes along with a mainstream attitude of scientific expertise among planners; a job understanding of knowing optimal solutions for a city; of being able to speak on behalf of a city, thus claiming to have the last word

(Lehtovuori, 2016, p. 33).

What Lehtovuori calls the “Visible City” can be described as a primacy of the visual sense in planning disciplines. Maps, renderings, drawings, graphs and other visualizations are the single most prominent conceptualization tools of space in planning disciplines. In his view, it is primarily this mode of space representation “that is taken seriously in the planning and realisation procedures” (Lehtovuori, 2016, p. 25). Especially aerial photographs and the bird’s eye viewpoint of cities are much-used representations of urban space since the European Renaissance. However, to put it in the words of Massey (2005, p. 106), “[...] a map of a geography is no more that geography - or that space - than a painting of a pipe is a pipe”.

According to Lehtovuori, this gap between theoretical conceptualizations and practical reality is due to difficulties in the operationalization of the concept of relational space in planning practice. Instead of coping with the challenges of urban complexity, many practitioners choose to “go the easy way” and oppose the theoretical relational conceptualization of space. Hence, although much of the daily work of planners is filled with consultation, mediation and discussions, planning is still dominantly conceived as the production of plans (Lehtovuori, 2016, p. 20).

The Australian urban planner Leonie Sandercock also highlights the gap between the daily work of planners and theory of space and aims to reposition the role of planners in society. Coming from the realization that planning practice for decades “allows the myths of objectivity, value neutrality, and technical reason to persist” (Sandercock, 2004), she highlights that “all knowledge is embodied; it is historically situated; it is shaped by language; and it is embedded in power relations. Clearly we can no longer hold on to the idea of the expert planner knowing the public interest through rational deliberation” (Sandercock, 1998, p. 76). She thus urges other practitioners to not only embrace, but to go beyond the political aspects of planning; to “redefine political debate, producing new sources of power and legitimacy, changing the force field in which we operate” (Sandercock, 2004).

Lastly, it is at this point to mention that recently more and more planners are rethinking their conceptualization of urban space. In the line of Jacobs (1961), Gehl and Svarre (2013) lie down practical principles for how to study the interaction between public life and space. Porter (2011) in her editorial to the “Planning and practice” journal argues that planning professionals should place “the political [...] front and centre stage for planning” and favor conflict over consensus. Potts (2020) too recognizes an currently ongoing epistemological shift of planners to fully embrace the capacity of modern technology for communicative planning, reflecting an increasing recognition of the complexity of urban space. Largely building on the work of Lefebvre (1991), the present work conceives urban space as a relational and socially produced construct. Precisely because urban space is value-laden and relative to its observer and time, the need to analyze different spatial perceptions and values arises. Such an analysis however needs a solid theoretical basis of what is generally meant by the term “values”, how they can be defined and how they can be identified.

2.2. Individual and Public Values

Since values are present in every research field that deals with human behavior and society, there exists a sheer unmanageable body of philosophical, economical, sociological and political science literature on the topic of values (for an overview, see e.g. Graeber, 2001). It is beyond the scope of this thesis to give a full review of different streams of philosophy and economics and their respective ethical and value theories. Instead, the aim of this section is to connect the planning of urban space with a sufficient account of individual and public value theory. Strikingly, an initial review of literature reveals a fundamental lack of value identification and analysis in urban planning. This is accounted for by transferring applicable concepts from public value theory in public administration research to a planning context. This section thus starts off by defining individual and public values and then connects these concepts with the existent literature on values and in urban planning.

2.2.1. Defining Values

Generally, the term “value” can be described as a measure of “relative worth, utility, or importance” (Merriam-Webster Dictionary, n.d.), but is also characterized by epistemological ambiguity (Graeber, 2001, p. 1). To capture such vagueness, it is useful to lay down multiple conceptual distinctions of

values.

Bozeman (2007) distinguishes values in a broader and a narrower sense. The broader usage of the term values entails the norms and principles one basis their morality upon (Bozeman, 2007, p. 114). A more narrow usage of the term is linked to the assignment of something perceived as valuable to an entity. The second, more narrow notion can be illustrated building on an example outlined by Bozeman (2007, p. 115), that shows the variety of answers that could be obtained when one is asked about the value of something. For instance, when asking about the value of an old tree in a specific neighborhood, one might receive a monetary value as an answer (*"If I were to buy a similar tree, it'd cost me at least €20.000"*), another one might receive a story of personal attachment (*"This tree reminds me of my youth, that's the one under which I had my first kiss"*), yet another one an aesthetic appreciation (*"Its branches have this elegance and beauty to it"*) and a fourth person might give a description of its biological function (*"This tree provides oxygen to the atmosphere by conducting photosynthesis"*). All of these instances share the allocation of something perceived as valuable (a price, reminiscence of youth, elegance, provision of oxygen) to an object (the tree). It also becomes apparent that in this narrower notion, multiple individual valuations are possible: One could value e.g. both the elegance and the provision of oxygen when looking at a the tree in the example. Building on this narrower conceptualization, Bozeman (2007, p. 120), based on the seminal work of Rokeach (1973) and mainly referring to Lemos (2005), further lays down a distinction between intrinsic and instrumental values. Their main difference is that intrinsic values do not serve any specific purpose; they are "ends in themselves" (Bozeman, 2007, p. 119). In contrary, instrumental values are purpose-bound to an intrinsic value. For instance, one could see (instrumental) value in reforestation as a means for the (intrinsic) value of nature preservation. Yet, another one might see nature preservation as an instrumental value for the intrinsic value of long-term self-preservation of the human species. Bozeman (2007) thus points out that both intrinsic and instrumental values are by their very nature dependent on the person expressing them, and thus incommensurable between people.

Hillier (1999) in an attempt to delineate values in environmental planning also differentiates between intrinsic and instrumental values, and further identifies the categories of economic, cultural, aesthetic and symbolic values. In his view, economic value is mostly constituted by the (usually monetary) exchange value of objects seen as commodities, but also by the use value of objects. Use value is described as a typically more subjective and local assessment and can involve intangible values. Hillier (1999) then coins the umbrella term of cultural values which subsume aesthetic and symbolic values. He characterizes them tied to emotions (aesthetic) and spiritual (symbolic).

Another much discussed demarcation in value theory is the relationship between facts and values. From what has long been perceived as a dichotomy (Putnam, 2004), contemporary scholars argue for a inseparability of the two concepts. Forester (1999, p. 133) points out that in a planning context, "value-free facts would be, by definition, without value, really worthless". Bozeman (2007, p. 115) recognizes "both a cognitive and an emotional aspect to values". McAuliffe and Rogers (2019) recently echo these claims and argue that "values are often the product of reasoning".

Summing up, this thesis follows a definition of values as described by Bozeman (2007, p. 117): "A value is a complex and broad-based assessment of an object or set of objects (where the objects may be concrete, psychological, socially constructed, or a combination of all three) characterized by both cognitive and emotive elements, arrived at after some deliberation, and, because a value is part of the individual's definition of self, it is not easily changed and it has the potential to elicit action". By using this definition, the interlinkages between the concept of value and the concept of relational urban space become apparent: People attach individual values - both of cognitive and emotional quality - to urban space and its development, and especially the nonconformity of public official with these values might lead to opposition and trigger resistance to certain projects. The question that is then imposed on urban planners is how to transcend the incommensurability of such values. Dealing with this plurality has recently become the focus of some research in urban planning, but can be considered to still be in its infancy (McAuliffe & Rogers, 2019). Thus, the present thesis borrows from public value theory originating from public administration research that aims to provide additional insights by systematically analyzing individual values in the public sphere.

2.2.2. From Values to Public Values

What all different distinctions of values outlined in section 2.2.1 have in common is their subjective assessment and their incommensurability. Simultaneously, in democratic systems, elected representatives and public officials (including urban planners) ought to serve the “public’s interest” and reflect their values in their decision-making. Thus, some sort of decision-making based on aggregated individual values is inherent to every public administration. While this thesis is not concerned with the manifold and complex mechanisms behind such decision-making, it is of concern how values transcend the individual sphere and become common, societal values that shall be acted upon. In that sense, public value theory provides one way of describing how individual values can be linked with decision-making in a larger societal context.

The concept of public value was originally introduced by M. H. Moore (1995) as a counterpart to a company’s creation of private value. He notes that while the value created by the private sector can easily be measured in monetary terms, the value creation of the public sector is much more ambiguous and needs a dedicated theory of public value (M. H. Moore, 1995, p. 28). Initially, M. H. Moore (1995) was interested in researching into the values of public employees for a better creation on public value from a public management side (Fukumoto & Bozeman, 2019). While this line of research of public value (singular) still exists, a second strand of literature has developed that is concerned with “the social standards, principles, and ideals to be pursued and upheld by government agents and organizations” (Nabatchi, 2018). This research on public values (plural) is heavily influenced by the work of Barry Bozeman, who defines public values as “those providing normative consensus about (a) the rights, benefits, and prerogatives to which citizens should (and should not) be entitled; (b) the obligations of citizens to society, the state, and one another; and (c) the principles on which governments and policies should be based.” (Bozeman, 2007, p. 13). It is this definition of public values that is widely acknowledged (Fukumoto & Bozeman, 2019; Nabatchi, 2018) and thus also followed in the present thesis. To clearly demarcate public values from individual values, Bozeman (2007, p. 132) points out that “Citizens can hold a public value that is not the same as their own self-interested private value”. In this context, he gives the example of the wealthy paying for social security funds because “they expect public value of such policies” (Bozeman, 2007, p. 132)

However, it is recognized that in reality, the utopia of normative consensus on values seldom materializes (Nabatchi, 2012) and public values pluralism exists (Spicer, 2009). Public value pluralism is “the notion that several values and value orientations can simultaneously exist in society, all of which may be equally valid, correct and fundamental” (Nabatchi, 2012). This incommensurability between public values is not only the source of conflict (see section 2.3 for further details), but also poses challenges to public employees in their decision-making (Spicer, 2009). While it is out of scope of the present thesis to focus on the selection among various incommensurable public values, it is the “most fundamental” (Fukumoto & Bozeman, 2019) problem of identifying public values that is addressed.

So far, multiple approaches for the identification of public values have been proposed, including the analysis of governmental documents (Fukumoto & Bozeman, 2019), intuition, elections, surveys and academic literature (Bozeman, 2007, p. 133-141). Nabatchi (2012) in her article “Putting the ’Public’ Back in Public Values Research: Designing Participation to Identify and Respond to Values” suggests to leverage public participation as a means to identify public values. She argues that any approach for public values identification other than including the public “tend to favor privileged values, and thus may neither be inclusive nor recognize all of the relevant values in play” (Nabatchi, 2012).

Results of identification attempts have, amongst others, brought forward an inventory of 72 public values (Jørgensen & Bozeman, 2007), but also the realization that much more specific public values can be obtained from other disciplines as compared to public administration research (Van der Wal et al., 2015). A systematic attempt to study the appearance of the concept of public values in other disciplines revealed interest in public values in environment planning, but no representation in urban planning (Van der Wal et al., 2015). More recently, Huijbregts et al. (2021) published a review on public value assessment and find that for different fields, different approaches and methods are needed to identify public values.

2.2.3. Public Values in Urban Planning

Building on this more thorough understanding of values in public administration, this section combines the concept of public values with values in urban planning. Although the role of values in urban planning gained significant traction since the recognition of relational urban space (e.g. planners as "practical ethicists" by Forester (1999, p. 31), rejection of value-neutral planning by Sandercock (2004)), there is only limited theoretical account for identifying public values in urban planning (e.g. Hillier, 1999), and a coherent theory is yet to be developed (McAuliffe & Rogers, 2019). Complementary to values in general public administration, which e.g. Jørgensen and Bozeman (2007) inventory, I argue that public values specific to urban planning not only exist, but can and should be identified. What e.g. honesty, humaneness, transparency and responsibility are to public administration in general (see Van Der Wal et al., 2006, for an extensive discussion), there should be specific public values on which the planning of urban space is based upon. However, a thorough research into the principles behind urban planning revealed a clear lack of their identification. This gap is not related to theory where plenty of scholars propose new paradigms on how to develop urban space, but - much in line with Nabatchi (2012) - it is the identification based on contributions of the public itself. It is somewhat striking that even though scholars advocate for "The Just City" (Fainstein, 2010) and increased deliberation and participation in urban planning, no attempt has yet been undertaken to identify public values and their conflicts in urban planning stemming from the citizenry itself. This impression is only fortified by a review about public values in other disciplines than public administration (Van der Wal et al., 2015), in which environmental planning, but not urban planning appears. Surprisingly, literature on recreational and environmental planning recognizes the value-laden nature of space and possible conflicts since the 1990s (Saremba & Gill, 1991; Vaske et al., 1995) and multiple studies of such value-laden conflicts have been undertaken.

Eventually, the call of Hillier (1999) that planners "need to rethink the values they incorporate into planning decisions by exploring, rather than rejecting, the plurality of values in play" has remained largely unheard. Godschalk (2004), building on the work of Campbell (1996), partially addressed this issue by discussing values inherent to the planning paradigms of "Smart Growth" and "New Urbanism" and their conflicts. He identified four main values, namely economy, ecology, equity and livability, which he illustrated as vertices of a prism. The edges of this prism represent value conflicts between the two adjacent vertex values. In his view, the "future of land use planning may well depend on how it resolves these conflicts and creates settlement patterns that are both livable and sustainable" (Godschalk, 2004). Although his conceptualization of urban planning somewhat reflects the "concept city" (Lehtovuori, 2016), the values he identified provide a good basis to investigate public values in urban planning. In the same line, Campbell (1996) describes the values of sustainability and their conflicts as the "historic core of planning". Applying the concept of public values to Godschalk (2004), I argue that economic opportunity, ecologic quality, social equity and livability represent "ideas that should be pursued and upheld by government agents" (Nabatchi, 2018), specifically urban planners. Gough (2015) in the same line argue that livability and sustainability are "values, [...] to which many people and institutions subscribe". That is not to say that it is solely these values that can be considered public values in urban planning. Rather, in line with (Nabatchi, 2012), I propose that a true plurality of values can only be identified with the involvement of the public. Because of the scarce literature on (conflicting) values in urban planning and due to the concordance of the values outlined by Godschalk (2004) with public values theory, the remainder of this thesis will largely build upon the values and their conflicts as outlined by Godschalk (2004). To eventually identify these values in citizen's contributions, it is crucial to further describe them.

Economic Opportunity

Campbell (1996) describes the value of economic development in urban planning as one where urban space is seen as a "location where production, consumption, distribution, and innovation take place. The city is in competition with other cities for markets and for new industries. Space is the economic space of highways, market areas, and commuter zones".

Ecologic Quality

The value of ecologic development, as outlined by Campbell (1996) conceives a city "in competition with nature for scarce resources and land, and always poses a threat to nature. Space is the ecological space of greenways, river basins, and ecological niches".

Social Equity
Campbell (1996) describes equity in a spatial context as related to “the social space of communities, neighborhood organizations, labor unions: the space of access and segregation”. Godschalk (2004) further points out the inter-generational aspect of equity, as famously proposed by Brundtland (1987).

Livability
Godschalk (2004) describes livability as something “operat[ing] at the level of the everyday physical environment and focus[ing] on place making”. These “design aspects, ranging down to the micro scale [...], as well as up to the macro scale” in that sense reflect the value of a pleasant urban space, that is appealing to an individual’s and a community’s needs. Gough (2015) recognized the inherent intangibleness of the sustainability concept, and describes livability as a more concrete concept that captures the elements of everyday life. She continues to put both livability and sustainability in a direct relationship, arguing that “livability interventions represent the incremental steps that collectively increase the potential for longer-term strides toward sustainability” (Gough, 2015).

2.3. Conflicting Public Values

Although much debate revolves around the conceptualization of (public) values, the existence of value conflicts is uncontested. Nabatchi (2018) emphasizes that values “regularly spawn conflict”, Hillier (1999) states that “many are in direct contradiction with others”, de Graaf et al. (2016) coins the term “value incompatability”. This section aims to provide theoretical background and outline related work to conflicting public values. This is accomplished by both drawing from literature situated in the field of environmental planning and discussing conflicts in urban planning.

2.3.1. Value Conflicts in Environmental Planning

Conflicts in environmental planning have been linked with values since the 1960s (Lucas, 1963; Saremba & Gill, 1991). Vaske et al. (1995) categorized such conflicts in two main classes: (1) interpersonal conflict and (2) social value conflict. The former is characterized by the clash of divergent goals of at least two physically present parties or individuals. For instance, interpersonal conflict might occur when bikers and pedestrians share the same lane, when playing children meet relaxing seniors in a park or when silence-seeking canoeists encounter motorboaters on a lake. Considering these examples, another attribute of interpersonal conflict becomes apparent: The probability of asymmetry in conflict perception. Children might not mind the presence of elderly, and motorboaters might even enjoy seeing canoeists paddling nearby. Seniors and canoeists on the other hand might feel disturbed by the noise produced.

Social value conflict on the other hand does not require the physical encounter or social interaction of two groups. It rather relates to disagreement regarding underlying values in a sense that is discussed in section 2.2. Vaske et al. (1995) point out that social value conflict is typically harder to resolve as the mere physical separation of the conflicting parties will not resolve the issue at hand. For instance, in an environmental planning context, the conflict between hunters and anti-hunters remains even though the two groups do not encounter. Both groups have inherently different public values (Vaske et al., 1995). The present thesis thus mainly focuses on what Vaske et al. (1995) describes as social value conflicts.

2.3.2. Value Conflicts in Urban Planning

Tying public values theory to the conception of urban space, it becomes apparent that from a relational viewpoint, value conflicts are not only unavoidable, but inherent to the planning process itself (Gualini & Bianchi, 2015). In this context, such value statements are usually directly attached to space, and conflicts in urban space are far beyond scarce. Multiple scholars in the urban planning domain describe this causal relationship between conflict and space: Deutsche (1996, p. 278) points out, “urban space is the product of conflict”; Lehtovuori (2016, p.10) argues in that “conflict between different lived place-experiences” gives rise to emergent urban spaces and Hamelink (2008) highlights “that conflict is inherent to urban life”.

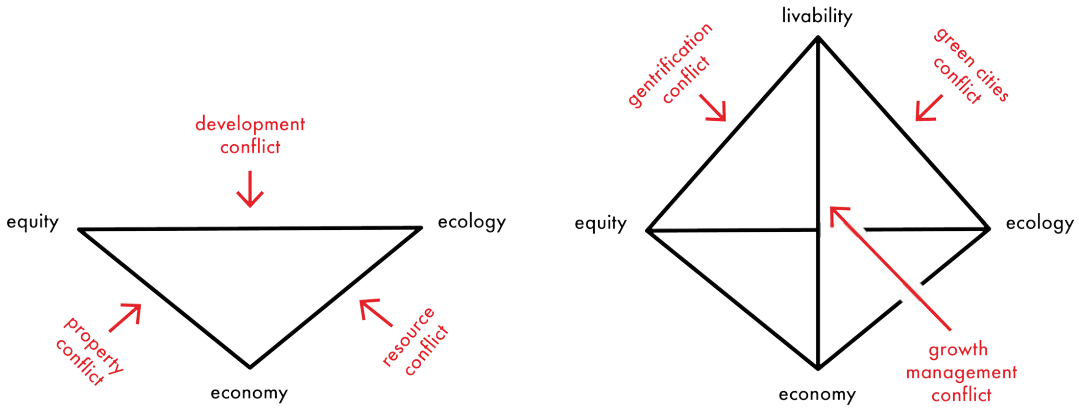

Figure 2.1: Conflicts inherent to sustainability/livability values, adapted from Godschalk (2004) and Campbell (1996)

As outlined in section 2.2.3, little academic attention has been payed to conceptualizing and identifying public values inherent to urban planning. Consequently, also specific value conflicts received little interest. Essential work in this field was laid down by Campbell (1996) and Godschalk (2004) by pointing out the value conflicts inherent to the sustainable and livable development of cities. Sustainability in itself aims to balance its three defining dimensions, namely economy, environment and equity (Berke, 2002) and naturally, tensions arise. Campbell (1996) identified a "triangle of conflicting goals" between environmental protection, economic growth and social equity goals: There is a property conflict between economy and equity, a development conflict between equity and the environment and a resource conflict between economy and ecology. Godschalk (2004) expanded on these conflicts by adding a forth dimension, namely "livability" as an additional public value in urban planning. He identified a gentrification conflict between equity and livability, a green cities conflict between livability and ecology and a growth management conflict between economic and livability values. He incorporated all these conflicts in a sustainability/livability prism as shown in Figure 2.1.

Since such development goals are still valid for urban planning in many cities, including Hamburg (The Free and Hanseatic City of Hamburg, 2014), the six conflicts identified and recognized by Campbell (1996) and Godschalk (2004) shall be described in more detail in the following paragraphs. I argue that by describing these conflicts and adding relevant literature, the public values behind these conflicts too become more tangible and thus easier to identify.

The Property Conflict
Situated between the vertices of economic development and equity, the property conflict describes the tense relationship between "management and labor, landlords and tenants, or gentrifying professionals and long-term residents" (Campbell, 1996). Foglesong (2015, p. 104), who Campbell (1996) bases his description of the property conflict on, outlines an inherently "social character of land", which is in constant conflict with "its private ownership and control".

The Resource Conflict
The resource conflict as an umbrella term for the tensions between economic and ecologic values is related to the exploitation of natural resources (including space itself) for economic development as opposed to their ecological preservation. In this sense, ecological preservation can be understood both as an instrumental value (Godschalk, 2004) or as an intrinsic one. Campbell (1996) goes as far as describing the resource conflict as an "Ur-Konflikt, rooted in the fundamental struggle between human civilization and the threatening wilderness around us", but leaves it up to other disciplines to describe the origins of this conflict in more detail.

The Development Conflict
Originally described as the "most elusive" (Campbell, 1996) conflict, the core of the development conflict lies in lacking solutions of how to both preserve the environment and make sure that "the bottom

of society find greater economic opportunity". He further explains that there are inherent distribution conflicts between environmental protection and social equity values, illustrating that proponents of the former are usually considered to be elitists by the proponents of the latter. Campbell (1996) provides the example of the decision between an (polluting) expansion of the local bus service for low income neighborhoods and the financing of a new electrical tram line, that would reduce car traffic from the suburban middle class.

The Gentrification Conflict
The gentrification conflict arises in between those who advocate for upgrading certain districts of a city in terms of livability and those who promote the preservation of such districts to avoid the living population to be gentrified (Godschalk, 2004). Contrary to the property conflict (Campbell, 1996), the gentrification conflict does not arise from economic interest, but from the (possibly intrinsic) wish to develop an area in terms of livability. Gentrification could however be an outcome of both conflicts.

The Green Cities Conflict
The green cities conflict stems from "competing beliefs in the primacy of the natural versus the built environment" (Godschalk, 2004) on the edge between ecological and livabile values. Godschalk (2004) here opposes proponents of the "New Urbanism" paradigm with proponents of "Green Urbanism". The former proclaims that urban space "should be framed by architecture and landscape design that celebrate local history, climate, ecology, and building practice" (Godschalk, 2004), whereas the latter puts the ecological much more upfront. Beatley (2000, p. 127) calls for "cities like forests, like prairies, like wetlands" and proposes Hundertwasser-alike building design. This conflict also illustrates the differentiation between ecological and livability values in the eye of Godschalk (2004) and, too, its conceptual weaknesses.

The Growth Management Conflict
Godschalk (2004) describes the growth management conflict, situated between economic opportunity and livability, as the competing ideas how a livable city should be developed. The academic discussion he basis his idea of the Growth Management conflict upon is mainly the one in between Ewing (1997) and Gordon and Richardson (1997) discussing the desirability of urban sprawl as opposed to compact development in the United States. While Gordon and Richardson (1997) argue that sprawl is an economically efficient development reflecting consumer preferences and the market at work, Ewing (1997) takes the stance that compact development should be followed due to imperfect markets at play and the arising needs for intervention. In this view, in order to ensure a livable environment, planners shall ensure a compact development to ensure accessibility and prevent environmental deprivation. Eventually, the growth management conflict boils down to the debate on how to develop a rapidly growing city, to "what kind of growth is allowed or encouraged" (Ewing, 1997).

These inherent conflicts require planners to up until today "navigate the messy terrain of tensions" (Gough, 2015) to find the "elusive, perhaps utopian, perfectly realized sustainable urban area" (Godschalk, 2004) at the prism's central point. However, it shall also be noted that both the values and their conflicts as described by Campbell (1996) and Godschalk (2004) are difficult to distinguish and might lack mutual exclusiveness in their varying conceptualizations. This - I hypothesize - might be due to the commingling of instrumental and intrinsic values: For one, an ecologic development of urban space is an end to itself; for another, green development is only a means to create a livable, aesthetic space.

2.3.3. Conflict Identification

While Godschalk (2004) outlines the main conflicts inherent to his sustainability/livability prism theoretically, he did not attempt to identify such value conflicts in space. Quite the contrary, he used his prism to investigate in how the "ecology of plans" (Godschalk, 2004) in Denver, Colorado addressed and resolved each of the conflicts; hence assuming that all of these conflicts are already present in the city under study. While this might be true for Denver, Colorado in the beginning of the 2000s, the (spatial) extend to which such public value conflicts occur in other cities is worth a thorough investigation that is yet to be undertaken.

Echoing Nabatchi (2012), this thesis aims to both address the "most fundamental" (Fukumoto & Bozeman, 2019) issue of public value identification, as well as their conflicts in space by leveraging

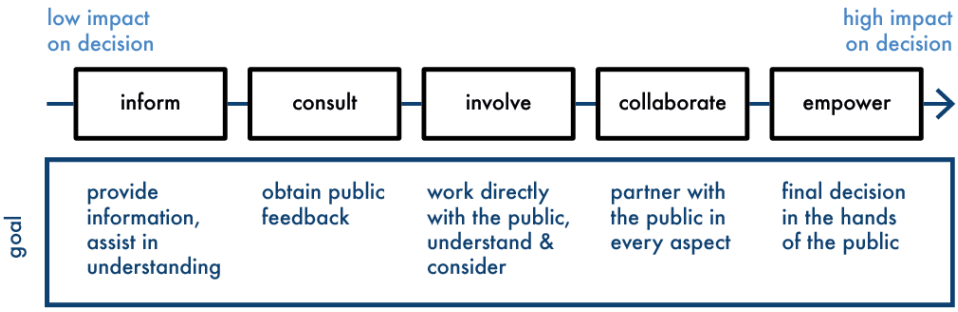

Figure 2.2: Spectrum of Public Participation, adopted from IAP2 (2018)

data stemming from the citizenry itself. This however needs a solid theoretical understanding of public participation practices in urban planning.

2.4. Public Participation

Given the theory outlined in section 2.1 and 2.2, public participation suddenly becomes a means to identify, analyze and reconcile different values tied to urban space (Nabatchi, 2012). This section thus provides a background on public participation in urban planning and, more specifically, on public participation geographic information systems (PPGIS).

2.4.1. Classifying Public Participation

"Public participation" can be considered an umbrella term which describes some sort of "public" participating in some kind of deliberative process. As much theoretical debate revolves around the question what "public" and what "participation" actually mean (Barnes et al., 2003; Brown et al., 2014; Irvin & Stansbury, 2004; Percy, 1984; Schlossberg & Shuford, 2005), an all-encompassing definition of public participation is yet to be found. However, since the exact instance of public and the specific arrangement of participation varies on broad scales across different public participation processes, it is useful to specifically look into several classification attempts of public participation.

Generally, the involvement of the public by planners (Forester, 1999) can be derived from multiple different argumentations, one of them being the conceptualization of relational space: Because space is not perceived as a mere collection of matter, but rather continuously co-produced by society, this society should be included in the creation and planning of such space. It is - amongst others - this reasoning and the principles inherent to democracy itself, which has led to calls for more public participation in urban planning since the 1960s; one of the most prominent ones issued in Jacobs (1961) "The Death and Life of Great American Cities". Since then, multiple classification attempts of public participation investigate in the different forms how public participation materializes.

One of the most famous classifications of citizen participation has been proposed by Arnstein (1969) characterizing citizen participation on her famous "ladder" into either "nonparticipation", different "degrees of tokenism" or different "degrees of citizen power". Although Arnstein's "ladder of citizen participation" is up until today used to classify public participation efforts in urban planning, there are also more recent attempts to delineate various practices of involving the public into planning. For instance, the International Association for Public Participation (IAP2) developed a quasi-standard "spectrum of public participation" (IAP2, 2018). This spectrum sets out to assist both planners and the public to situate any public participation exercise in a range of various participation goals with their respective promises to the public. As Figure 2.2 shows, any public participation exercise according to IAP2 (2018) can be classified in an ordinal scale along the axis of public impact on decision making.

Contrary to Arnstein (1969) and IAP2 (2018), Fung (2006) classifies public participation along three different axis, namely "Participants", "Communication and Decision Mode" and "Authority and Power" (Fung, 2006). His "democracy cube" thus situates public participation in a three-dimensional space, which Fung (2006) uses to situate typical participation processes inside the cube.

2.4.2. New Means of Public Participation

With the rise of the internet, mobile technologies and digital open-source solutions, digital participatory mapping tools emerged as one way to capture citizen's perceptions, values and preferences. Their development largely builds upon the notion that technology-aided public participation "present[s] a unique opportunity for enhanced citizen involvement in public policy and planning issues" (Schlossberg & Shuford, 2005, p. 16). Brown and Kyttä (2014) identified three main approaches, namely public participation GIS (PPGIS), participatory GIS (PGIS) and volunteered geographic information (VGI). PPGIS "focuses on ways the public uses various forms of geospatial technologies to participate in public processes, such as mapping and decision making" (Tulloch, 2014). According to Brown and Kyttä (2014), PPGIS is typically deployed by government authorities in the Global North. PGIS is mostly used by NGOs in the Global South as a means of "countermapping" (Peluso, 1995), i.e. leveraging PGIS technology to "oppose dominant power structures through the promotion of progressive social goals" (Brown & Kyttä, 2014). Both PPGIS and PGIS aim to include marginalized and socially excluded groups in the decision making process by lowering the burdens of participation. VGI, in comparison, is much more connected to the fields of citizen science and crowd sourcing of geographic information (Sui et al., 2013).

It is especially PPGIS and PGIS tools that receive increasing attention and are more frequently used in formal and informal public participation processes by public authorities, researchers and NGOs (e.g. Carvalho et al., 2019; Jankowski et al., 2021; Lieven, 2017). It can be argued that such technology is currently driving a change in planning paradigms, shifting "towards a more interactive, intelligent, self-organising, and interconnected planning" (Potts, 2020). Howbeit, it is also the case that such new means of public participation come along with a need to analyze the big data produced, which imposes different challenges to planning officials (Thoneick, 2021). Among these methods deployed for handling large-scale data, natural language processing (NLP) can assist in the analysis of large-scale unstructured textual data (Thoneick, 2021). NLP itself is a rather old computer science research field with origins in the 1950s which has recently underwent a renaissance. Given the advancements in machine learning and artificial intelligence, NLP now bundles different methods like word tokenization, spelling correction and named entity recognition (Nadkarni et al., 2011), but also higher-level tasks such as text generation, topic clustering and text summarization.

2.4.3. PPGIS and Public Value Identification

Shortly after the start of the new millenial, Beierle and Konisky (2000) describe the inclusion of public values as one "of the most important aspiration for public participation programs". Following the calls of Nabatchi (2012) to leverage public participation data for the identification of public value conflicts, it becomes apparent that there are only limited attempts to empirically identify public value conflicts with the help of large-scale public participatory data. Moreover, the present attempts are all linked to the environmental planning domain and not to urban planning.

For instance, Brody et al. (2004) used GIS methods to calculate spatial conflict scores based on stakeholder values they assumed. They both point out the usefulness of mapping such conflicts for planners and the need to validate their assumptions with input data from real stakeholders (Brody et al., 2004). Brown and Raymond (2014) firstly developed a preference and value score for a regional planning project in Australia based on data from a participatory mapping process. They compared three different approaches to evaluate land-use conflicts, conflicting public values being one of them. Karimi et al. (2015) make use of PPGIS data to identify socio-ecological hotspots and call for additional case studies to further include social values in spatial decision support tools. In both studies that used participatory data, participants were asked to map their values given a limited list of possible values. In an urban context, for instance Tyrväinen et al. (2007) and Tyrväinen et al. (2003) investigate in the values related to urban forests both using data from public hearings and from PPGIS. All of these studies share the methodological aspect of presupposing a list of values[1] that are handed to the participants. In another approach, Kahila-Tani et al. (2016) made use of participatory mapping of green areas deserving protection and potential sites of building development. Using a spatial compatibility analysis, they identify potential areas of value conflict, more specifically of the resource conflict as specified by

[1] More specifically, it is 11 distinct values for Brown and Raymond (2014), 13 values for Karimi et al. (2015)

Godschalk (2004).

There is however until today no attempt in literature to extract public values from large-scale qualitative textual data (i.e. geo-located citizen comments in participatory mapping) to identify public value conflicts in urban spaces. Contrary to predefined lists of values (Brown & Raymond, 2014; Karimi et al., 2015), an extraction of public values from sentiments and topics of citizen's comments might reveal more nuanced public values and their conflicts.

Dyer et al. (2017) in their bibliometric analysis of the connections of citizen involvement and urban planning conclude that "research made little progress since the 1960s when Jane Jacobs [...] published her seminal work" and thus call for an "evidence-based urbanism" that makes use of data directly stemming from the citizenry. K. R. Moore and Elliott (2016) in the same line argue that public participation events should be increasingly seen as "data collection events" to improve democratic decision making.

2.5. Research Questions

Following a relational, value-laden and social production of urban space (Lefebvre, 1991; Lehtovuori, 2016; Sandercock, 2004), current research gaps in accounting for the pluralism of values in urban planning (Hillier, 1999; McAuliffe & Rogers, 2019) and the general lack of identification methods for public values (Fukumoto & Bozeman, 2019; Nabatchi, 2012) become apparent. As perceptions of "public" and "participation" still continue to differ significantly (Brown et al., 2014; Schlossberg & Shuford, 2005), urban planners up until today oftentimes solely rely on socioeconomic and infrastructure data or their aesthetic perception when designing future cities (Dyer et al., 2017). Systematic qualitative and quantitative analyses of citizen participation processes are rarely conducted and the data gathered is not effectively used to improve urban planning processes (Horelli, 2002; Ianniello et al., 2019; Rowe et al., 2008).

This thesis sets out to bridge some of the gaps described in this chapter by investigating the identification of public values and their spatial conflicts in urban planning. Building on public participation as a means to identify public values (Dyer et al., 2017; Nabatchi, 2012), the present work aims to answer the following main research question:

Main Research Question: *Which public values and inherent spatial conflicts can be identified by leveraging participatory data in urban planning?*

More specifically, four sub research questions (SQ) were crafted to further guide the research process.

SQ1: *Which public values can be identified through the application of NLP methods to large-scale qualitative participatory data?*

SQ2: *Building on spatial value clusters obtained from geo-located participatory data, which spatial conflicts in public values can be identified under the sustainability/livability prism?*

SQ3: *Which public values and inherent conflicts do planning experts identify based on participatory data?*

SQ4: *How can the findings of the quantitative and qualitative strand be integrated for a better understanding of public values and their conflicts in urban planning?*

Answering these research questions serves an additional purpose: It adds to the lack of transparent analysis techniques for participatory data (Fagerholm et al., 2021). In the future, the set of methods applied might nurture a real-time "aggregation of voices" (Thoneick, 2021) in open-source participatory mapping platforms.

3

Research Approach

To answer the research questions outlined, it becomes apparent that leveraging large-scale qualitative geo-located participatory data inevitably leads to an investigation of one or multiple cases. Qualitative, textual and participatory data with a geodetic location is almost always tied to its geographical (and historical) context, entered with a specific purpose and thus difficult to generalize, if only sampled from one specific geographical area. A case study research approach, which aims to “conduct an analysis and develop an in-depth understanding of a phenomenon [...] within a real-world context” (Guetterman & Fetters, 2018) is therefore ideal to account for this particular kind of data.

However, it also becomes apparent that the identification of public values and their conflicts in urban planning is both a rather unexplored field of research and - due to the incommensurabiltiy of values - rather subjective in nature. This creates the need for a careful research approach integrating multiple viewpoints to cope with the challenges mentioned. More specifically, leveraging large-scale participatory data from the citizenry alone to identify public value conflicts might lack crucial information about the context in which this data was entered. In this regard, mixing quantitative and qualitative methods promise a more in-depth and broad understanding of the area under study. Furthermore, mixed methods approaches also proved to be useful in post-positivist settings, emphasizing the involvement and entanglement of an observer with the object under study (Creswell & Clark, 2010; Maggetti, 2018)

Following this reasoning, it can be concluded that both a case study and a mixed methods approach contain important aspects that suit and help answering the main research questions of the present thesis. As the two approaches significantly overlap, researchers have already successfully combined them in multiple different research fields (Guetterman & Fetters, 2018). Such combinations typically follow one of two main design choices (Guetterman & Fetters, 2018):

1. Mixed Methods-Case Study Design (MM-CS): The case study approach is deployed as the qualitative section of the overarching mixed-methods approach
2. Case Study-Mixed Methods Design (CS-MM): The mixed methods approach is embedded in an overarching case study

For the present research I decided to follow the latter CS-MM approach that nests a mixed methods design in a surrounding case study. Hereby, it is crucial that the mixed methods design is rigorously deployed and drafted for “meaningful integration” (Guetterman & Fetters, 2018) of the quantitative and qualitative strands within the context of a case study.

Generally, mixing methods as a researcher needs a solid reasoning on why and how different methods are combined to answer the main research questions (see e.g. Creswell & Clark, 2010). Mixed methods approaches are chosen “for the broad purposes of breadth and depth of understanding and corroboration” (Johnson et al., 2007) and involve at least one quantitative and one qualitative research strand. One of these strands is usually selected as the core component of the research, while the other one serves a supplemental purpose (Schoonenboom & Johnson, 2017). Aside from the focus

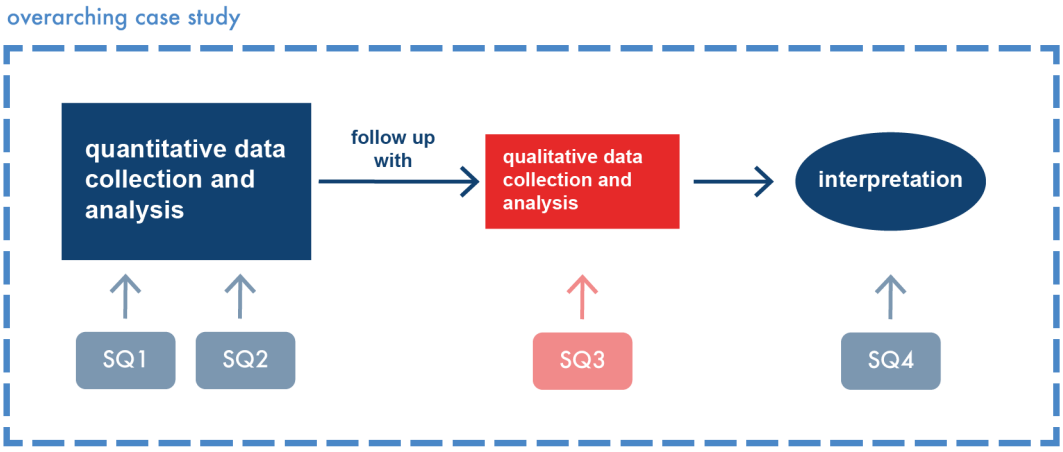

Figure 3.1: Explanatory Sequential Mixed Methods Prototype as described by Creswell and Clark (2010) embedded in a Case Study-Mixed Methods Design (Guetterman & Fetters, 2018)

strand, mixed methods approaches can be distinguished in fixed vs. emergent, independent vs. interactive level of interaction, concurrent vs. sequential timing and into several integration types of the quantitative and the qualitative strand (Creswell & Clark, 2010). While it is out of scope for this thesis to discuss different prototypical mixed methods blueprints (for such an overview, see e.g. Creswell & Clark, 2010), the chosen approach based on an explanatory sequential design[1] shall be described in more detail. This type of mixed methods design, as shown in Figure 3.1, consists of an emphasized quantitative strand, which is build upon by a consecutive qualitative strand. Eventually, the results from both strands are integrated - or "mixed" - and interpreted.

Since the qualitative strand succeeds the results of the quantitative strand, this type of mixed methods design is partially emergent and both strands interact at distinct points of interference. The main purpose of studies using an explanatory sequential design is that a "smaller qualitative study helps evaluate and interpret results from a principally quantitative study" (Morgan, 1998, p. 368). In the present research, this approach was selected since the quantitative analysis of participatory textual data in terms of public values and their conflicts is usually dependent on the researcher conducting such a study (Chang et al., 2009). Therefore, the results of the quantitative strand are followed up with a qualitative strand that makes use of expert knowledge for the purpose of interpretation and evaluation. Additionally, approaching a largely unexplored research field with mixed methods promises to both increase the depth of the exploration and the confidence in the findings of the study. Lastly and fittingly, mixing methods fully embraces the interdisciplinary character of city science in general and the present work in particular.

[1] Also referred to as "qualitative follow-up approach" (Morgan, 1998)

4

Setting the Scene: The Case Study of Hamburg, Germany

This chapter presents the overarching case study of Hamburg, Germany, which was selected to gain insights into the identification of public value conflicts in urban space. Following the reasons for selecting this specific case study, a historical synopsis of Hamburg's city development it is given and its current strategic development plans are described.

4.1. Selection of the Case Study

Hamburg is both one of the 16 states of the Federal Republic of Germany, as well as its second largest city in terms of population (City of Hamburg, n.d.-b). As detailed in section 4.2, its strategic location at the Elbe river enabled a long-lasting position as a key actor in international trade. Up until today, the port of Hamburg is Germany's largest sea port, the third-largest port in Europe and the 18th largest port in the world in terms of container turnover ("Port of Hamburg", n.d.). Population predictions forecast a dynamically growing city population, possibly reaching two million inhabitants before the year 2040. As compared to population levels of 2017, this is a relative increase in population size of around 12% (Statistisches Amt für Hamburg und Schleswig-Holstein, 2019). Thus, Hamburg can be considered an exemplary city of the ongoing urbanization process, at least in a Central European context. Because of its growing population, Hamburg is currently undertaking a "Jump across the Elbe River", which refers to the city development of Hamburg's formerly industrial areas on the Elbe island (Will, 2019). Additionally, the HafenCity as Europe's largest inner-city development project (HafenCity Hamburg GmbH, n.d.) was planned to expand Hamburg's inner city area by around 40% with an area of more than 120 hectares and a private and public investment volume of around €13 billion (HafenCity Hamburg GmbH, 2021). The HafenCity district is scheduled to be finished between 2025 and 2030 to then provide housing for around 15,000 people and jobs for around 45,000 people (HafenCity Hamburg GmbH, 2021).

In 2012, concurrently to all of these large-scale city development plans taking shape, Hamburg's senate founded the "Stadtwerkstatt" (engl. "Urban Workshop") which aim is to stimulate a new planning culture in Hamburg by proactively involving the citizenry (Bürgerschaft der Freien und Hansestadt Hamburg, 2012). Its focus was especially laid on informal participation processes which go beyond the legally required formal participation. However, it is explicitly stated that the results of such informal participation processes can, but are are not required to be implemented in any urban planning decision making (Bürgerschaft der Freien und Hansestadt Hamburg, 2012). In the framework of the IAP2 (2018), such participation processes could hence be classified up to "collaborate", depending on the exact design of each participation process. From 2012 until 2016, a total of 97 informal participation processes were carried out by the Stadtwerkstatt (Lieven, 2017). In 2016, the Stadtwerkstatt in collaboration with the HafenCity University Hamburg and other actors deployed a digital participation system (DIPAS), which was used in 55 additional participation processes collecting comments, ideas and critique of the citizenry (DIPAS, n.d.).

Another distinctive feature of the City of Hamburg is its transparency law, which was passed in 2012 as the first of its kind in any German state (Murjahn & Tegtmeyer, 2016). The law prescribes the publication of information processed within the city's administration in a central online repository, which shall be accessible in an anonymous way without any costs (Murjahn & Tegtmeyer, 2016). With the exemption of privacy-related data or data violating business and trade secrets, today more than 130,000 data sets of 14 categories can be found in Hamburg's transparency portal[1] (City of Hamburg, 2021).

Combining ambitious city development projects, the provision of planners with the infrastructure needed for large-scale public participation processes and a pioneering transparency portal, the City of Hamburg was selected as a case study for the present research. With its large reservoir of accessible participatory data and a general and institutionalized openness towards (informal) public participation, the case of Hamburg provides ideal prerequisites to investigate in public value conflicts in urban spaces by leveraging data from the citizenry itself. To further contextualize the case, the Stadtwerkstatt as a centralized institution for public participation is an ideal point of contact. The transparency portal too provides plenty of additional information to conduct the present case study.

4.2. Historical Synopsis of Hamburg's City Development

Put on record for the first time in the 9th century under the name of "Hammaburg", the city of Hamburg today is Germany's second largest city in terms of population (City of Hamburg, n.d.-b; Schafer, n.d.-b). This section aims to provide some historical context to the case study by roughly highlighting important social and economical aspects of the city development.

4.2.1. From Hammaburg to the Hanseatic League

What started off as "Hammaburg", a small settlement at the Elbe river with a strategic location in the 9th century AD, soon became involved in clashing claims of power between the Francs, the Slavs and the Danish. In the year 1189, Friedrich Barbossa, Holy Roman Emperor of the German Nation, certified city and trade rights for the settlement. In 1266, this document was officially notarized, which marked the beginning of Hamburg's impressive economic development based on its seaport.[2] Subsequently, Hamburg entered the Hanseatic League (Hansa), which evolved from a loose network of merchants to a city network dominating sea trade from the Baltic to the Mediterranean for centuries (Norddeutscher Rundfunk, 2016). Leveraging the free port, the trade income and the Hansa, Hamburg grew increasingly wealthy, attracting both more inhabitants as well as buccaneers (Schafer, n.d.-b). Until today, Klaus Störtebeker, a pirate of that time, is one of Hamburg's most prominent characters and protagonist of multiple urban myths (Schafer, n.d.-c).[3]

4.2.2. The 19th and 20th century

After what is now called the "Große Brand" (engl. the "Great Fire") in 1842, almost a quarter of the city was reduced to ashes. With 20.000 people losing their homes and more than 90 million marks of damage (as opposed to 5.5 million marks of yearly city tax income), the city managed to get up on its feet with the help of foreign donors (Schafer, n.d.-a). Utilizing the tragedy as an opportunity of city modernization, the city senate decided to rebuild iconic parts of the city, such as the City Hall and the Alster Arcades according to Venetian ideals (Schafer, n.d.-a). In 1871, Hamburg entered the German Kaiserreich and subsequently negotiated free trade zones for large areas of its port, which lasted until 2013 and then still made up 25% of the port area (Schafer, n.d.-b). In 1892, more than 8.600 people died in a devastating cholera epidemic. In 1937, under national socialist rule, many formerly independent cities surrounding Hamburg, such as Altona, were integrated in "Greater Hamburg". This reorganization led to an increase of city area from 415 to 745 km^2 and city population from around 1.2 million to around 1.7 million inhabitants (Schafer, n.d.-b). In 1943, under the military operation name

[1] Hamburg' transparency portal can be accessed under http://transparenz.hamburg.de/

[2] Strikingly, the document of Fredrich Barbossa more then 1000 years later turned out to be a forgery (City of Hamburg, n.d.-a)

[3] One of the more noteworthy myths involves Störtebeker, defeated and after his capture, negotiating with the mayor of Hamburg to pardon as many pirates as he would be able to pass by with his head chopped of. He seemingly managed to pass eleven, after which the hangman scented lost income and tripped the headless Störtebeker up. The mayor eventually decided to decapitate all pirates and the hangman (Schafer, n.d.-c). This legend does not intend to glorify former violent justice, but to give a sense of Hamburg's local spirit coined by trade, the port and pirates.

“Gomorrah”, British and American bombers destroyed nearly 80% of the port and rendered more than 900.000 people homeless by destroying large parts of the city. With around 45,000 civil victims, 70,000 fallen soldiers, more than 7,800 deported jews and many more refugees, Hamburgs population has fallen back to 1.1 million inhabitants after World War II, (Krieger, 2012, p. 105). In February 1962, after the city has been rebuilt to a large extend, a storm flood caused by a dike failure encircled around 150.000 inhabitants. The flood led to immense power outages and caused 317 deaths (Schafer, n.d.-b). Even more devastating effects could be averted by the fast and unbureaucratic actions of Helmut Schmidt, who would later become the fifth chancellor of the Federal Republic of Germany (Schafer, n.d.-b). In the late 1960s and the beginning of the 1970s, large-scale infrastructure projects such as the TV tower, the Congress Center and the new Elbtunnel were realized (Krieger, 2012, p. 112-113). Towards the end of the 20th century, in 1997, a 120 hectare large area in direct proximity to the city center was dedicated to future city development. This utterly new district called “HafenCity” is still under development, but is already listed as a flagship project (Krüger, 2009).

4.3. Current Strategic Development Plans

On their website, the Stadtwerkstatt lists current concepts and strategies for the city of Hamburg, such as the urban development concept, the inner city development concept, a regional development plan, a spatial vision, and sectoral city development guidelines (City of Hamburg, n.d.-c). Out of all of these documents, the urban development concept provides “perspectives on urban development in Hamburg” (The Free and Hanseatic City of Hamburg, 2014) and outlines the main focus points of Hamburg’s city development until 2030. Under the vision “Green, inclusive growing city by the water”, the development concept specifies four areas of action, namely “more city in the city”, “the inclusive city”, “green and environment-friendly city” and “urban development in the business metropolis” (The Free and Hanseatic City of Hamburg, 2014). As these different development visions already foreshadow, the dimensions of sustainability are deeply embedded within Hamburg’s vision for 2030. The value of economy is reflected in the goal “urban development in business metropolis”, the value of ecology in the “green and environment-friendly city” and the value of equity in “the inclusive city”. Much of how Godschalk (2004) describes the value of livability is reflected in the goal of “more city in the city”, which describes optimal building heights, guidelines for open space and how to achieve more “urbanity” in the whole city (The Free and Hanseatic City of Hamburg, 2014). Additionally, the urban development concept explicitly states that “Hamburg is committed to sustainable urban development” (The Free and Hanseatic City of Hamburg, 2014, p. 14) and that “a consensus among all involved” shall be achieved. Taking consensus as an explicit objective, the urban development concept already points out certain conflicts between public values that shall eventually be remedied. For instance, energetic retrofitting for ecological preservation might conflict with the social equity goal of affordable housing.

5

The Quantitative Strand: Content Analysis, Value Assignment and Spatial Analysis

The quantitative strand primarily makes use of participatory data collected via the Digital Participation System (DIPAS) in Hamburg, Germany. Using structural topic modelling (Roberts et al., 2019), manual value assignment and spatial clustering (Chen et al., 2019), latent topics behind the citizen's contributions are identified, values are assigned to the topics and their spatial relationships are analyzed. This chapter aims to describe the data, the methodology, model operationalization and, lastly, the results of the quantitative strand.

5.1. The Data

This section provides an overview of DIPAS' architecture and workings, the resulting data structure and the participation processes which are used in the present study.

5.1.1. DIPAS Platform Architecture

DIPAS is a digital platform that enables both online and offline collection of geo-located citizen contributions (Lieven, 2017; Thoneick, 2021). It was developed and tested since 2016 in Hamburg (Lieven, 2017) and is now openly accessible and usable under an Open Source license (DIPAS, n.d.).

DIPAS was designed both to be accessed on an internet browser and on a touch desk used in participatory workshops. The landing page, as displayed in Figure 5.1, is mainly occupied by a large map that displays the citizen contributions collected. A user navigates through the contribution map by zooming and panning. Depending on the zoom level, contributions will be automatically clustered and the number of contributions in a cluster is shown. A click on any existent contribution will open up a window that displays the category, the contribution title and an abstract of the contribution text. The call-to-action button "Beitrag erstellen" (engl. "Add contribution") prompts the user to add their own contribution and will guide them through a series of steps, until the contribution eventually appears on the main map.

Several tabs provide additional functionality to the platform. Under "Beitragsliste" (engl. "contribution list"), contributions can be filtered and accessed in a grid-styled layout. Additionally, up- and downvotes of contributions, as well as their category and type are displayed. The category property usually refers to the content of a contribution (such as cycling, parking, pedestrians) and the type property refers to the intention of the contributor (e.g. idea, critique, proposal). By clicking on a specific contribution, the user is taken to a single dedicated page for the respective contribution. On that page, any user can up- or downvote contributions and add comments or reply to other comments. The tab "Über das Verfahren" (engl. "About the process") displays information regarding the participation process itself, such as background information, goal of the participation process and further proceedings. The tab "Auswertungen" (engl. "Analysis") provides dashboard functionalities, such as basic statistics

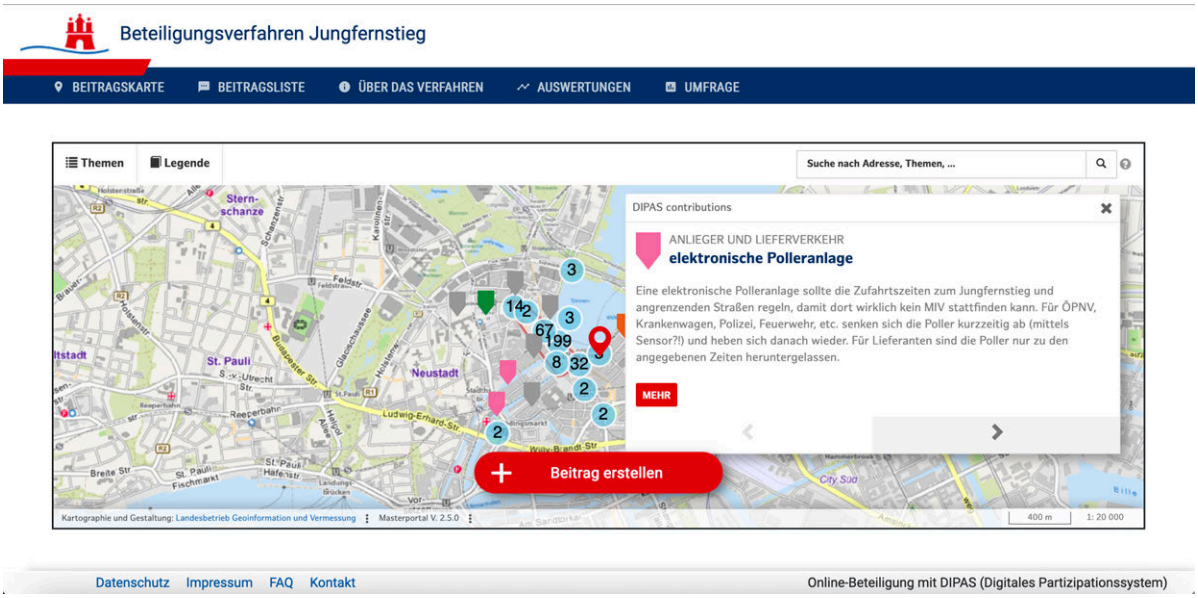

Figure 5.1: DIPAS Platform Landing Page Example

(total number of contributions and comments, distribution of contribution types and categories) and lists of the Top 10 contributions sorted by the number of comments and the rating. Depending on the participation process, another tab “Umfrage” (engl. “Survey”) is added to the platform which leads a user to a survey to answer specific questions posed by the project owner.

5.1.2. Data Structure and Conflict Types

Following from the platform’s architecture, the data used for the present research has the following structure: As displayed in Figure 5.2, multiple geo-located citizen contributions are linked to one participation process. Each of these contribution have zero or more comments and zero or more replies that are linked to other comments or replies. Additionally, each contribution has a certain number of up- and downvotes, a category and a contribution type as specified by the contributor’s input.

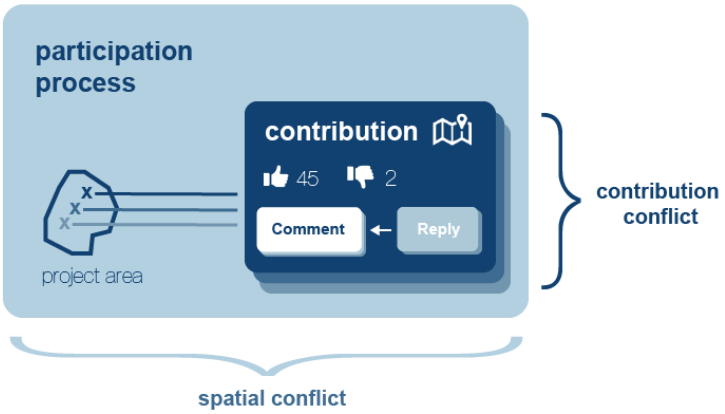

Figure 5.2: DIPAS Data Strucuture and Conflict Types

Based on these attributes, there are two main types of conflicts that can be distinguished on the DIPAS platform: conflicts inherent to contributions (contribution conflicts) and spatial conflicts in between proximal contributions (spatial conflicts). Contribution conflicts are characterized by a disagreement of citizens on the content of a single contribution or contribution comment. Due to the data structure itself,

all of these conflicts are already linked by one original contribution. Spatial conflicts however are not necessarily related to each other. It is spatial proximity of two or more contributions reflecting opposing values that indicate spatial conflicts. For instance, if one user asks for extended bike lanes on a given street segment while another user wishes for extended space for cars in the same segment, these two contributions do not necessarily refer to each other. Nonetheless, they indicate a spatial value conflict.

5.1.3. Data Collection

DIPAS has been extensively tested in multiple participation processes within Hamburg before releasing the Open Source version in the beginning of 2021 (Lieven, 2019). For the present study, DIPAS data of a total of 25 participation processes has been retrieved. Out of these 25 processes, nine processes were conducted with an initial version of DIPAS based on the content management system DRUPAL 7. The data of this (old) system was shared by the Stadtwerkstatt in .xlsx files. With a newer back end of DIPAS (DRUPAL 8), an application programming interface (API) was integrated in the platform (DIPAS, n.d.) so that contributions, comments, replies and project areas can be retrieved automatically. Therefore, the data of the remaining 18 participation processes was collected via the DIPAS API. A comprehensive list of the various participation processes, their goals, their conduction time and the individual number of contributions, comments and replies, as well as a short description can be found in Appendix A.2.

Overall, the data collected consists of 4,528 contributions (of which 3,584 are geo-located), 4,289 comments and 1,387 replies. Additionally, 16,379 votes on contributions were registered, comprised of 11,622 upvotes and 4,757 downvotes.

5.2. Methodology

As shown in Figure 5.3, the methodology of the quantitative strand consists of four main steps, namely preprocessing, content analysis, value assignment and spatial analysis. Each of these sections is detailed below. The main method chosen to uncover public values and thus answer sub research question 1 is structural topic modelling (STM) in combination with manual public value assignment, which will be elaborated upon in subsections 5.2.2 and 5.2.3. Subsequently, the contributions resembling a certain public value are spatially clustered, transformed into polygons and visually inspected. By conducting the steps outlined in subsection 5.2.4, sub research question 2 is addressed.

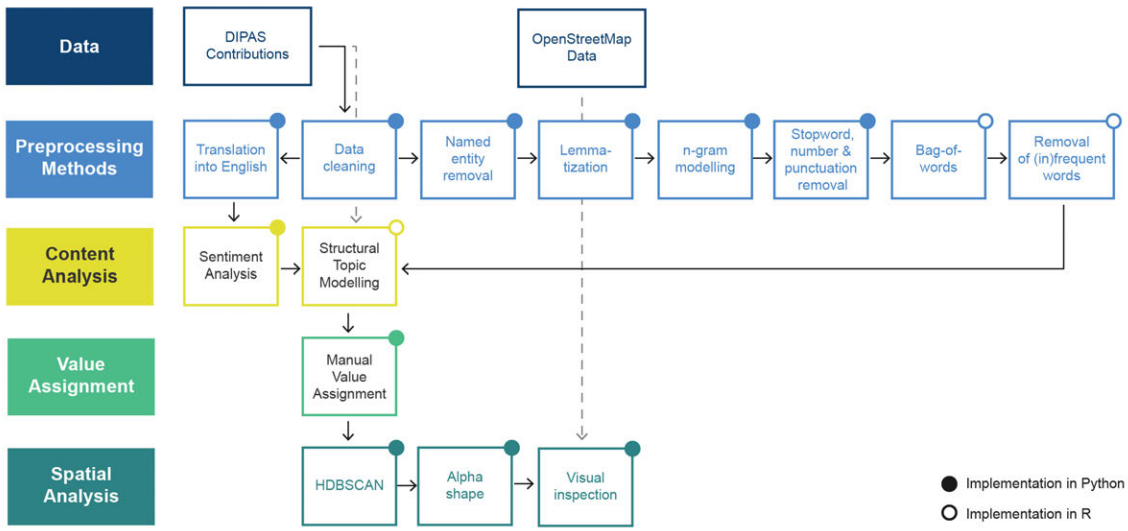

Figure 5.3: Methodology Overview Quantitative Strand

5.2.1. Preprocessing

In this section, the various preprocessing steps and methods for the further analysis are outlined. In order to provide both a concise and meaningful overview, the descriptions focus on the main aspects and the relevance of each step to the present research. When deemed necessary, references to more detailed descriptions are given. Except "data cleaning" and "translation to English", all preprocessing steps are taken to prepare the DIPAS data for STM. At this point, it should be mentioned that the results of unsupervised topic modelling algorithms such as STM are found to be "extremely sensitive to the preprocessing choices the researcher makes" (Denny & Spirling, 2018), both with regards to the preprocessing steps selected and their order of execution. Aiming to explore the impact of such choices, various preprocessing steps were taken in various orders. The type of preprocessing steps taken are largely based on best practices in topic modelling as outlined by Grimmer and Stewart (2013). As this operationalization process is however further described in section 5.3, at this point the only remark to add is that the order depicted in Figure 5.3 is the one eventually selected for further analysis. To illustrate some of the different preprocessing steps in a more tangible manner, the following imaginary example contribution shall accompany the descriptions:

"Trees clean up the air, which is why I'm up for planting 500% more trees in the North-West-Street."

Data Cleaning

As a first preprocessing step, basic data cleaning is conducted. Duplicate contributions, comments and replies are removed and geolocations outside of Hamburg's city area are identified. Furthermore, the metadata of contribution categories and rubrics are consolidated by aggregating several entries into overarching terms. For instance, the partially synonym categories of "mobility and infrastructure", "automobile traffic", "mobility", "cars", "mobility and traffic", "traffic and mobility" etc. are consolidated under one parent category, namely "mobility". In total, eight of such overarching categories and five overarching rubrics are chosen. For a detailed description of which initial categories and rubrics are consolidated under which overarching categories and rubrics, I refer to the accompanying code.

Translation to English

The vast majority of contributions entered in DIPAS is written in German. However, as it was decided to integrate sentiments of DIPAS contributions into the quantitative analysis with the help of the Python-based sentiment analysis library VADER (Hutto & Gilbert, 2014), the contributions needed to be translated into English as a prerequisite. For this, the Google Translation API integrated in the Python library deep-translator was used.

Named Entity Removal

Since most DIPAS participation processes are conducted within a given project area, contribution authors oftentimes refer to specific place names within their textual input. In initial STM attempts, this led to the realization that the topics identified by the method largely revolve around location names rather than actual "topics", i.e. the underlying wishes and values of the citizenry. It is because of this reason that it was decided to strip the DIPAS data from such location names as one preprocessing step. In natural language processing (NLP), the identification of location names falls under the broad task of "Named Entity Recognition" (NER) and can be performed with various approaches (Jiang et al., 2016). For this specific preprocessing step, the Python-based library spaCy is used, which it both fairly easy to implement and achieves good results in NER tasks (Jiang et al., 2016). Additionally, the locations identified by spaCy are subset by a list of custom words to limit the removal of false positive locations. For an over- and review of several other NER approaches, it is referred to Goyal et al. (2018). After named entity removal, the example contribution results in the following:

"Trees clean up the air, which is why I'm up for planting 500% more trees in the ."

Lemmatization

As outlined by Grimmer and Stewart (2013), one of the main preprocessing steps for topic modelling is either stemming or lemmatization. While stemming only removes common endings of words (such as "-ing", "-ed","-ant", etc.), lemmatization transforms inflected words into their dictionary form. The purpose of this step is to account for different conjugations and declension forms that all refer to the same word. Eventually, this process improves the overall topic identification across documents. In the present

research, the lemmatization functionality of the spaCy library in Python was used since lemmatization was found to yield slightly better results as compared to stemming (Balakrishnan & Lloyd-Yemoh, 2014). After lemmatization, the example contribution results in:

"Tree clean up the air, which be why I be up for plant 500% more tree in the ."

n-gram Modelling

As STM requires the different documents to be input in a so-called bag-of-words format, the information embedded in the word order and overall grammar will eventually be discarded (see preprocessing step "bag-of-words"). To mitigate such effects, one can decide to not only integrate unigrams (text fragments separated by white spaces), but also n-grams (text fragments that frequently appear in the same order) (Grimmer & Stewart, 2013). In the present research, bigrams and trigrams are found with the bigram/trigram model of the Python library gensim (Rehurek & Sojka, 2010). Transferred to the example contribution and depending on the frequent occurring of the same phrase in other contributions, a possible bigram could be *"clean up"* and a possible trigram could be *"be up for"*. In practice, such bigrams are usually connected with underscores so that the algorithm will recognize them as a single coherent element. After n-gram modelling, the example contributions could result in:

"Tree clean_up the air, which be why I be_up_for plant 500% more tree in the ."

Stopword, Number and Punctuation Removal

As described by Grimmer and Stewart (2013), words are subsequently transformed to lower case and punctuation, numbers as well as very common words (so-called stopwords, such as "and", "the", "a", etc.) are removed from the bag of words. For the present research, the stopword list of the Python library nltk is used. Obviously, the underscores indicating an n-gram were kept. The example contribution would then be further reduced to:

"tree clean_up air be_up_for plant more tree"

Bag-of-Words

To construct the vocabulary of the whole corpus (i.e. the collection of all contributions, comments and replies), the order of words is discarded. Unique elements of the corpus are extracted and a counted on a document (i.e. contribution, comment and reply) level. This so-called "bag of words"-approach is a prerequisite for the STM approach and allows for a document-term matrix as a representation for each document. The example document would be separated by white spaces so that the following bag of words including their word count results:

{"tree" : 2, "clean_up" : 1, "air,": 1, "be_up_for": 1, "plant": 1, "more": 1}

Removal of (in)frequent words

Lastly, terms are excluded based on their frequency across the corpus. For this, the stm package in R enables a user to set both a lower and an upper threshold. One can specify that a word has to occur at least in n documents in order to be taken into account. Similarly, if words appear in too many documents, their added meaning is limited and they can also be discarded with a specific upper threshold. For a lower threshold, several researchers consider between 0.5% and 1% to be a rule of thumb (Denny & Spirling, 2018; Grimmer & Stewart, 2013).

5.2.2. Content Analysis

In the content analysis part of the methodology, the content of the DIPAS data is quantitatively analyzed. Firstly, sentiment analysis is performed to both gain insights in the various sentiments of DIPAS contributors and to generate additional metadata for STM. Secondly and mainly, STM is applied to uncover latent topics underneath the DIPAS data, which can than be leveraged to identify public values and in a second step, their potential conflicts.

Sentiment Analysis

The translated text contributions are used as an input to the rule-based sentiment analysis library VADER (Hutto & Gilbert, 2014). This library takes text as an input and returns a positive, negative and compound score for each contribution. It is also coded to reflect the use of negations, smileys and other slang in the sentiment scores (Hutto & Gilbert, 2014). It shall however be noted that contrary to machine learning approaches to sentiment analysis, VADER is founded on a rule-based approach, i.e. human sentiment labels for each word in a limited dictionary. The sentiment scores for text pieces are thus calculated based on hard-coded negation rules and aggregation of individual sentiments of words.

Structural Topic Modelling

Structural Topic Modelling (STM), as described by Roberts et al. (2019), is an unsupervised clustering algorithm for large text corpora to infer latent topics behind documents in the text corpus. Contrary to a supervised algorithm, it does not require any labelled training data to predict clusters for text documents. The clustering is solely performed on the information embedded in the data itself.

STM builds heavily on Latent Dirichlet Allocation (LDA) (Blei et al., 2003), another unsupervised algorithm for natural language processing, which has found enormous usage in all kinds of research fields, including urban science (Kowalski et al., 2020; Lansley & Longley, 2016; Lock & Pettit, 2020). STM however greatly improves the performance of LDA by enabling a user to integrate metadata into the clustering process (Roberts et al., 2019). Hence, STM is considered ideal to infer latent topics and public values from the DIPAS corpus, which comes along with several types of metadata in itself.

The main ideas behind STM can be described as the following (Roberts et al., 2016; Roberts et al., 2019): Consider a collection of text documents, also referred to as a corpus. This corpus contains a finite number of unique elements (words, numbers, punctuation, etc.). Assume that each text document in that corpus is comprised of a number of latent topics. Topics in turn are characterized by different distributions of the corpus' elements (words, numbers, punctuations, etc.). With a finite number of topics and a finite number of corpus elements, one can estimate the probabilities of elements being represented in a given topic and the probabilities of topics being represented in a given document.

For instance, consider a corpus containing multiple citizen contributions (documents). These contributions raise a number of issues (latent topics), such as unsafe roads, too little green space or too little parking spots. It is important to note that one contribution can address multiple issues to different extends, i.e. discuss unsafe roads in great length and shortly add a notice that more green space would also be desirable. This is then represented the topic prevalence distribution (in the contribution example, this distribution would assign a high probability to the issue unsafe roads, a medium probability to the issue of green space and low probabilities to the remaining issues). Each of these issues is characterized by a unique distribution of all words in the corpus that assigns a high probability to words that usually co-occur when discussing an issue. For unsafe roads, this distribution would assign high probabilities to the words "dangerous", "road", "fast", "car", "accident", "unsafe" and low probabilities for the words "picnic", "shopping", "restaurant" or "subway". For the issue of too little green space, the probability distribution constituting the topic would look rather differently.

Topic modelling algorithms, such as STM or LDA, estimate the topic prevalence distributions per document and the term prevalence distributions per topic. Albeit it is referred to Roberts et al. (2016), Roberts et al. (2019) and Blei et al. (2003) for an in-depth explanation of LDA in general and STM in particular, the main ideas of LDA and STM shall nonetheless be outlined. In LDA as introduced by Blei et al. (2003), documents are initially assigned a Dirichlet distribution[1] θ indicating their (random) topic proportions. For each topic, a vector β contains a distribution of the unique words in the vocabulary. In STM, the prior distributions of θ and β are influenced by the topical prevalence covariate metadata and the topical content metadata respectively, which are transferred into a general linear model. To estimate these two main parameters, Roberts et al. (2016) implemented a Laplace approximation embedded in a partially collapsed expectation-maximization algorithm, which is further described in their publication.

[1] Dirichlet distributions are multivariate continuous distributions oftentimes used as conjugate prior distributions to categorical and multinomial distributions

Figure 5.4: Interactive Notebook for Model Diagnosis and Value Assignment

Regarding reproducibility, STM comes along with “spectral initialization”, which renders the same results no matter the random seed specified (Roberts et al., 2019).

STM was chosen as one central component of the methodology and the present research because of its unsupervised nature. While previous studies have examined (environmental) values and their conflicts in space through a predefined list of values (e.g. Brown & Raymond, 2014; Karimi et al., 2015; Tyrväinen et al., 2007), I argue that using unsupervised text clustering as the pipeline’s main component enables a less biased approach to value identification. As supervised clustering algorithms require labelled data sets, one would have to again presuppose a finite number of values which again reflects a personal choice. Or to put it in the words of Denny and Spirling (2018): Unsupervised approaches, “where the goal is to reveal interesting latent structures” are considered a better fit for public value identification than supervised approaches, “where effective classification is the goal”.

5.2.3. Value Assignment

Based on the topics identified using STM, one can now manually inspect and analyze the different topics. The value assignment takes place in an interactive tool which was developed for this specific purpose. As shown in Figure 5.4, a user can navigate through the different topics that have been identified and can choose how many example contributions should be shown for a given topic. A histogram is displayed that shows the topic prevalence distribution of the elements in the topic selected. In an utopian model, each contribution that only regards one specific topic would be assigned with a probability of close to one. In reality however, this is not the case. Thus, the histograms gives a first impression of how well a certain topic is represented in the contributions. Furthermore, the 15 most probable words per topic are displayed, as well as the 15 highest-ranking words on the FREX and LIFT index. The FREX index combines word FRequency with word EXclusivity, weights both indicators and calculates the harmonic mean. The LIFT index additionally takes into account the frequency of a word in the other topics, thus highlighting the words which occur less frequently in the remaining topics (Roberts et al., 2019).

Based on this information, a user is able to add public values to a value list and assign one to a topic. Additionally, one can assign a specific topic caption to each topic to later not only analyze public values, but also spatial distributions of general topics. Whenever one finishes assigning the values, they can be further analyzed by spatial clustering.

5.2.4. Spatial Analysis

In order to identify spatial clusters of contributions that reflect a certain value, all contributions are grouped by the values that have been assigned to their prevalent topic (i.e. topic with the highest

probability). Iterating across all value groups, the HDBSCAN algorithm and the alpha shape boundary detection algorithm are applied consecutively. Thus, the spatial analysis section of the present research largely follows the methodology of Chen et al. (2019), who explore "the dynamics of urban areas of interest through volunteered geographic information" by a combination of the HDBSCAN and the alpha shape algorithm. Subsequently, visual inspection then served as a means to identify spatial value conflicts.

HDBSCAN
The hierarchical density-based spatial clustering of applications with noise (HDBSCAN) algorithm is applied to identify spatial clusters of contributions that belong to the same public values. While it is referred to Campello et al. (2015) for an in-depth explanation of the specific workings of HDBSCAN, various advantages of its usage shall be mentioned at this point. For one, as opposed to parametric clustering approaches such as k-means, the nonparametric HDBSCAN algorithms is able to detect clusters of any shape, including non-concave ones (Campello et al., 2015). Secondly, due to its hierarchical nature, HDBSCAN itself estimates an optimal number of clusters based on different DBSCAN density estimates, so that the analyst receives solid results with little or no need to input prior parameters (Campello et al., 2015). The single parameter that is needed to run the HDBSCAN algorithm is the minimum number of points in each cluster, which can be chosen rather intuitively. Lastly, HDBSCAN performs comparatively fast in its current implementations in Python (Mcinnes et al., 2017).

Alpha Shape
Generally, there are many different methods of how to create polygons from spatial clusters. One main trade-off in this task is the one between the emptiness and the complexity of such clusters (Akdag et al., 2014). In that sense, computing the convex hull of clusters oftentimes render large empty areas when the cluster points are projected on top of their convex hull polygons (Akdag et al., 2014). One way of reducing such empty areas while also not exaggerating the polygon complexity is by applying the alpha shape algorithm as originally proposed by Edelsbrunner et al. (1983). As outlined by Chen et al. (2019), the parameter alpha directly influences the level of polygon complexity in an urban setting and needs to be chosen based on the respective point clusters.

Visual Inspection
As a last step of the quantitative strand's methodology, visual inspection provides a means to identify spatial public value conflicts and their manifestations in the case study of Hamburg. For that, both the original contributions and the spatial polygons were plotted on an interactive map based on the Python library Folium. As depicted in Figure 5.5, users can select the public values and their respective contributions that shall be displayed. They can navigate by panning and zooming. Clicking on individual contribution points will open a pop-up containing the contribution title, the contribution text, the assigned public value and the assignment probability.

5.3. Model Operationalization

In the present thesis, model operationalization is understood as the process of transforming the methodological steps into a concrete, functional model. Since the set of methods described in Section 5.2 require multiple choices to be made in terms of data preprocessing, hyperparameter setting and value assignment, an experimental framework was set up to strategically investigate in how different choices affect the outcome. The framework allows a researcher to set up experiments, name them and describe their purpose in an exploratory fashion. All (intermediate) outcome data related to one experiment will then be saved accordingly and can be loaded into all of the interactive notebooks (value assignment and analysis). For a comprehensive overview of all experiments conducted, it is referred to Appendix A.3.

5.3.1. Operationalizing STM

As the aim of unsupervised methods such as STM is the uncovering of latent structures of interest, their results are commonly not evaluated in "hard" statistical benchmarks (Denny & Spirling, 2018). Quite the contrary, some scholars find that statistical measures of topical coherence are not related to how humans interpret the semantic meaningfulness of topics (Chang et al., 2009). It is thus up to

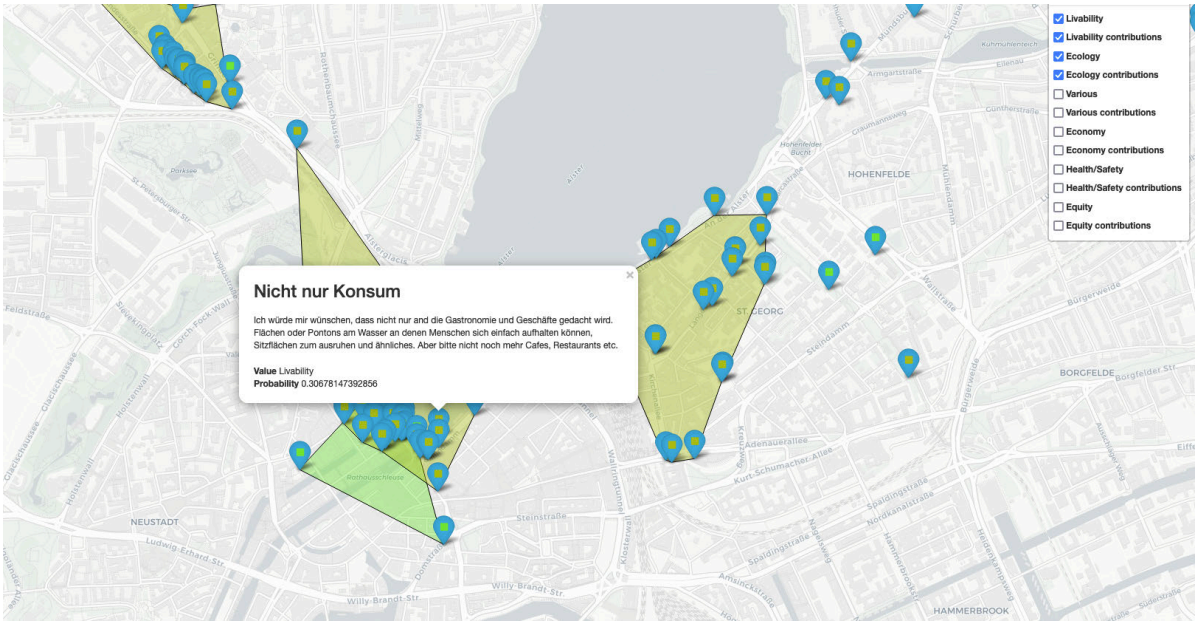

Figure 5.5: Interactive Map for Visual Inspection

the researcher to operationalize a topic model from which meaningful topics for a specific research question can be inferred.

The choices for such an operationalization of STM are manifold. As Denny and Spirling (2018) point out, alone the choice whether to conduct seven different preprocessing steps or not would leave one with 128 different resulting topic models. That is not taking into account the multiple parameters that are involved in each of these preprocessing steps and the hyperparameters to specify for the STM algorithm itself. Thus, careful reasoning of researchers is needed when deciding upon the number and order of preprocessing steps and the setting of parameters. To avoid the issue of "following previous work, without much theoretical basis to form an independent justification for the case at hand" (Denny & Spirling, 2018), multiple of such important choices and their reasoning shall be mentioned in this chapter. All of the preliminary conclusions outlined in this section are based on the iterative conduction of experiments within the experimental framework, which are detailed in Appendix A.3.

Preprocessing choices

It has been pointed out that the topics found are especially sensitive to preprocessing choices (Denny & Spirling, 2018). Hence, the combination of preprocessing methods should render the key aspects of each contribution while stripping all other words that do not contribute to identifying public values. As specific place names are not considered relevant to this task, an additional first step of named entity removal was added. In total, around 1,500 location names were dropped across the total of 10,184 contributions, comments and replies and their omission led to a significant shift towards more semantically coherent topics. Subsequently, lemmatization in combination with n-gram modelling was found to be highly useful in maintaining some important information embedded in word order. For instance, the German bigram "zu_schmal" clearly indicates a valuation of a specific place as being "too narrow". Without lemmatization and n-gram modelling however, this specific word order would've not been captured: The proposition "zu" would have been dropped in the subsequent step of stopword removal and the mere description of a place as "narrow" makes it harder to infer the contributor's valuation. After multiple experiments with n-gram modelling, it became apparent that solid results can be obtained by keeping the initial gensim library parameters and setting the minimum occurence of identic bigrams and trigrams across all 10,184 contributions, comments and replies to 5. For the step of stopword removal, additional custom stopwords were added to the nltk German stopwords in the process of experimentation. Whenever a word was found to appear in the most probable words of a topic but not add any semantic meaning to it, it was added to the custom stopword list to be excluded for the subsequent experiments. After that, when creating bag-of-words, it was eventually decided that only geo-located contributions are incorporated into STM. This decision was based on multiple experiments

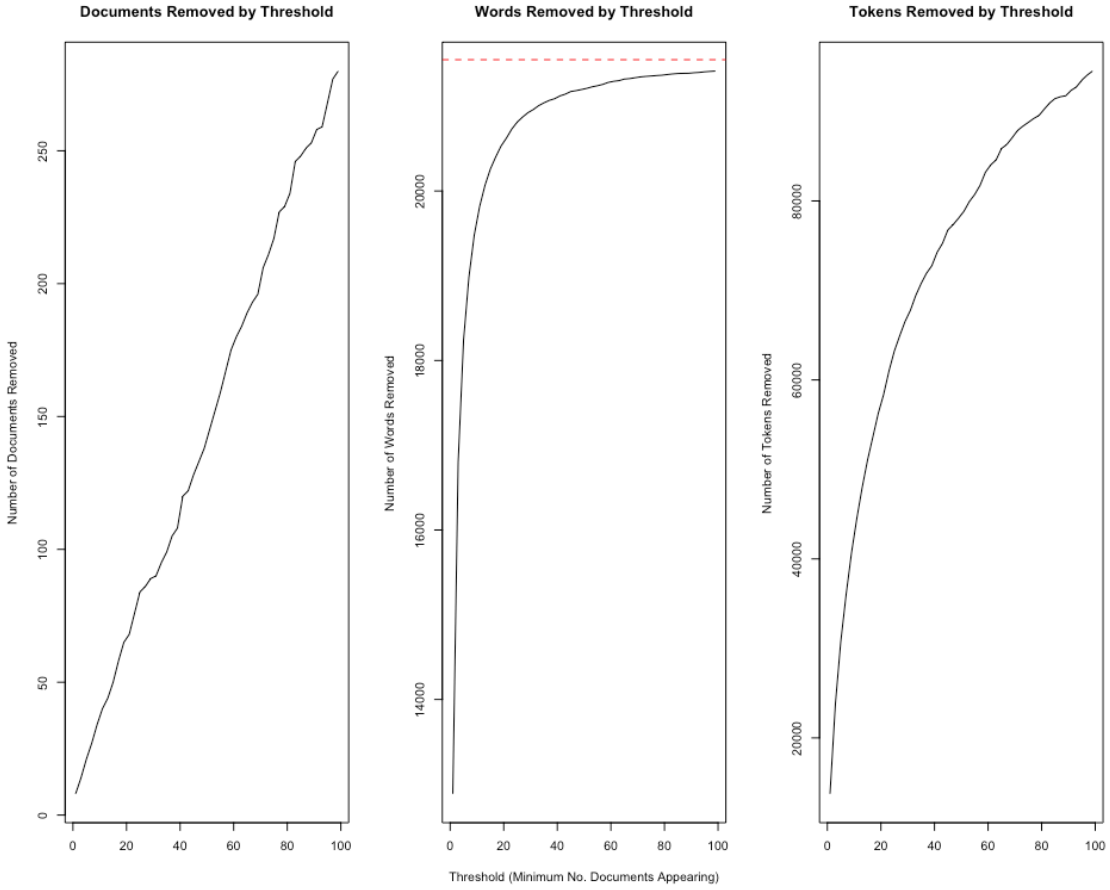

Figure 5.6: Removal of infrequent words based on lower threshold

with all contribution, comment and reply data, which all yielded multiple topics that were semantically not coherent. This was due to the fact that comments and replies are typically only understood in the context of the original contribution. Lastly, it was found that the topics' quality is highly sensitive to the percentage of (in)frequent words of the vocabulary that are dropped. Previous research (Denny & Spirling, 2018; Grimmer & Stewart, 2013) outlines that terms which appear in less than 0.5% to 1% of the documents shall be dropped. With a total of 4,528 contribution inputs to STM, this would result in a lower threshold of 23 to 45 documents, i.e. any term which appears in less than 23 or respectively 45 documents is removed from the vocabulary. As Figure 5.6 shows, this range is within a region in which the number of removed words is sensitive to the threshold level. With a lower threshold of 23 documents (0.5 % of all contributions), 20730 of 21549 terms are removed due to (in)frequency, dropping a total of 76 now-empty documents. 819 unique terms are left in the vocabulary. With a lower threshold of 45 documents (1 % of all contributions), 21173 of 21549 unique terms are removed and with that, 128 documents that do no longer contain any words. 376 terms remain in the vocabulary. Experiments with a fixed lower threshold of 5 - 10 documents (not relative to the total number of documents) however showed that having a larger vocabulary does not lead to more semantically coherent topics, since singular, very specific terms inhibit a coherent clustering. Eventually, it was decided to select a lower threshold of 0.75% (34 documents), which results in a removal of 21021 terms and 98 documents with no words. After all preprocessing steps, the final vocabulary for STM thus contains 4428 documents and 528 unique terms.

STM Parameter Setting

With the preprocessed corpus and documents, the single most important parameter to specify in STM is the number of topics that are to be identified. The underlying trade-off between too much generality when choosing too little topics and too much specificity when choosing too many topics can be resolved by multiple approaches. Firstly, one can make use the algorithm proposed by Lee and Mimno (2014) that finds convex hulls around specific anchor words. These words can been projected from the high-dimensional co-occurrence matrix to a visually observable 2D or 3D space via principal component analysis or the t-SNE algorithm. Roberts et al. (2019) argue that using the t-SNE algorithm gives a good indication of how many topics one should choose, but nonetheless point out the need for thorough manual validation. Its downside however is its non-reproducible behavior. t-SNE, depending on various runs, results in around 40-50 topics for the input data (see experiments 12 and 13 in Appendix A.3).

A second way of selecting the number of topics to identify is running STM multiple times with different topic number hyperparameterizations and evaluating certain metrics across the different runs. Such metrics include held-out log-likelihood (Wallach et al., 2009), residual analysis (Taddy, 2012), semantic coherence (Mimno et al., 2011) and lower bounds (Roberts et al., 2019). As held-out log-likelihood is found to be a rather bad indicator in comparison to human judgement of semantic coherence in topics (Chang et al., 2009), it was not used to select the number of topics, but is shown in Figure 5.7 for the sake of completeness. Residual analysis as proposed by Taddy (2012) is another indicator of the model fit, whereby a residual score closer to one indicates a better approximation to the statistically "true" number of topics. An increasing semantic coherence score indicates a higher possibility of the most probable words in a topic co-occuring (Mimno et al., 2011). Lastly, the lower bound indicator reflects an adopted lower bound of the marginal likelihood in the Bayesian estimation process whereby a higher lower bound indicates a better parameter estimation (Roberts et al., 2019). Since these metrics suggest a lower number of topics than the t-SNE algorithm (around 20 - 40 topics, as shown in Figure 5.7), several experiments were performed with different number of topics. Manual observation of the semantic coherence in between topics showed that a topic number of 30 is a good parameter to choose, thus reflecting a choice based on the residual and semantic coherence criterion. Following t-SNA in this specific case led to an overfit of the model.

Another hyperparameter that needs specification in STMs is how the accompanying metadata influences the assignment of a given document to a topic (topic prevalence covariates). In various experiments, different variations of metadata inclusions were investigated. Eventually, it was found that the inclusion of sentiment metadata produced by the Python library VADER (Hutto & Gilbert, 2014), as well as the consolidated rubrics and categories yield good outcomes. Additionally, contribution rating as a -1 to +1 scale calculated by the ratio of up- and downvotes, as well as the number of replies per contribution were added as topical prevalence covariates.

5.3.2. Operationalizing Spatial Analysis

As STM results in an unique distribution of topics per document, all topics are assigned to a single contribution, but with varying proportions. For spatial analysis, it was chosen that only the most prevalent topic for each document is selected and analyzed further. For instance, if one contribution lists multiple issues, only the most prevalent topic is assigned. In the subsequent spatial analysis, the contribution will only be subsumed under that specific topic.

The two main parameters to specify in the spatial analysis section of the quantitative strand is the minimum cluster size for the HDBSCAN algorithm and the alpha value for the alpha shape algorithm. As the HDBSCAN algorithm finds clusters based on the local density and due to the fact that at least three points are needed to construct a polygon with a surface area greater than zero, a minimum cluster size of three points was chosen. For the alpha value, a trade-off between polygon complexity and too much empty space within the polygon exists. An alpha value of 150 was found to render good results.

5.4. Model Diagnosis, Verification and Validation

Multiple segments of the quantitative research strand as outlined in section 5.2 and operationalized in section 5.3 need to be carefully diagnosed, verified and validated. The difference between the latter two is that verification is intended to check whether one is building the model right, validation answers

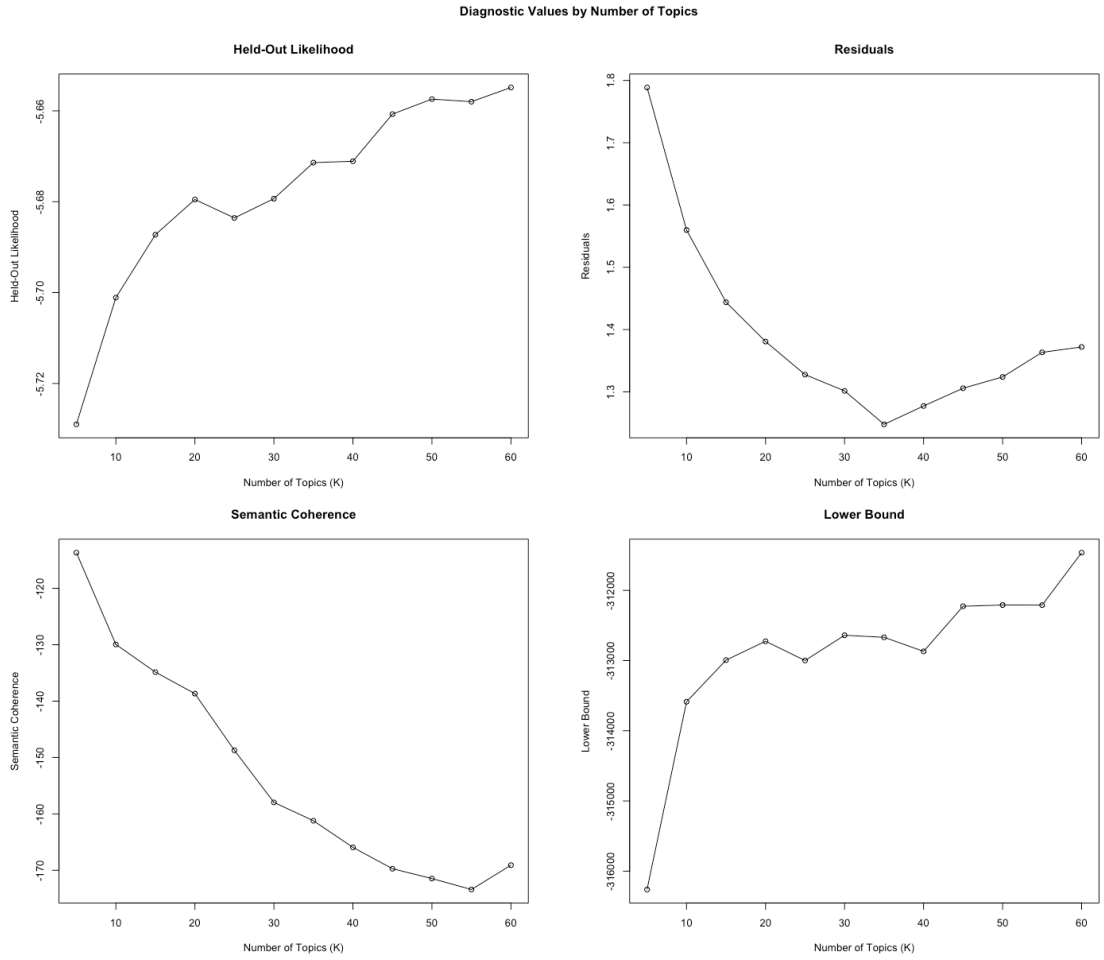

Figure 5.7: Diagnostic Values for Different Topic Numbers

the question whether one is building the right model (Cook, 2005). As the peer-reviewed STM implementation in the programming language R as described by Roberts et al. (2019) is used, this model is already considered verified. This leaves the question whether the right model was built, or whether the model can be validated.

Firstly, after its convergence, a structural topic model needs thorough assessment (Roberts et al., 2019). Tools such as the R library “stminsights” offer a local web service to investigate in the topic composition and prevalence across documents. Additionally to this library, an interactive Jupyter notebook was developed that allows to both inspect the different topic clusters and to assign public values to the respective topic. As the inherent aim to unsupervised topic modelling approaches is uncovering latent structures of interest, such a model can be “validated” (i.e. diagnosed as useful) when it fulfills this goal. The STM model was thus examined by investigating in each of the 30 topics for semantic coherence of the top 15 words based on probability, the FREX and the LIFT index. Additionally, for each topic, the 10 contributions with the highest probability of assignment were read and checked for consistency. After this investigation, a topic name was assigned to each topic representing the overarching concept that lies behind the topic. In two instances, no such overarching caption could be found (see Appendix A.4 for the topic words and captions). Thus, 28 out of 30 topics, or around 93% of all topics are evaluated as semantically coherent. However, it is at this point to mention that finding an overarching concept for a list of words is an inherently subjective task and varies across different people. Thus, validation concepts such as word intrusion or topic intrusion (Chang et al., 2009) can be used to validate topic models with the help of study participants. Due to limited time, such resource-intensive validation methods were not applied.

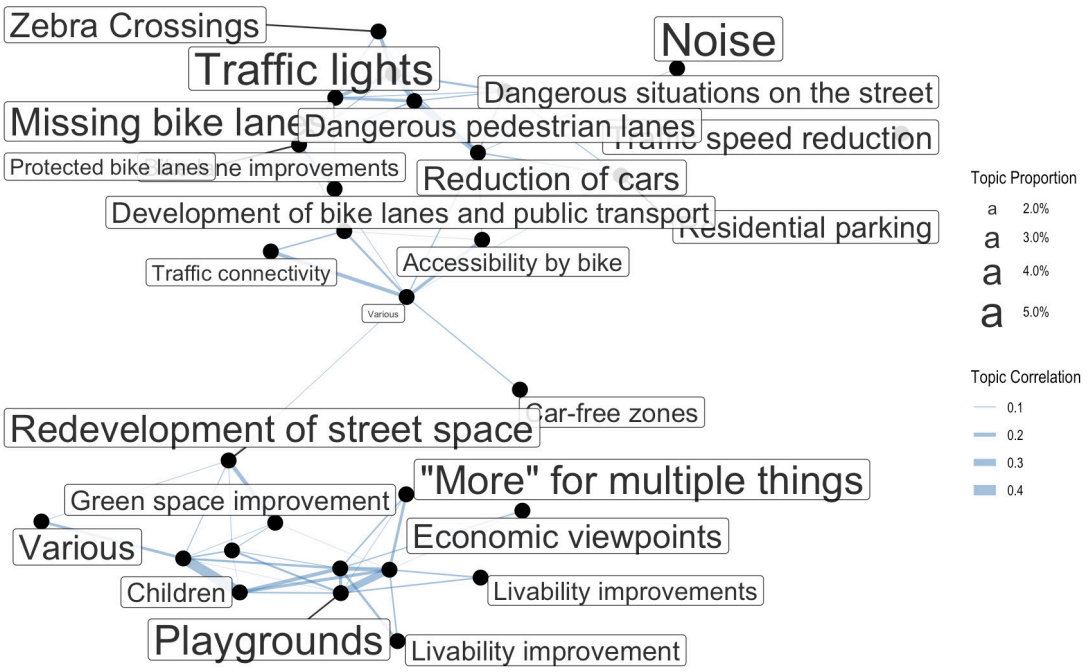

Figure 5.8: Topic Correlation Graph

Validating public values that are assigned to different topics is a more challenging task, as values can be considered incommensurable and difficult to infer when only provided with limited information. As this task is also crucial to the subsequent value conflict identification, the qualitative strand of the present research is partially designed to validate the value assignment and the conflict identification. Thus, at this point, it shall be referred to chapter 6 for an evaluation of value assignments and a qualitative description of public values in a planner's perception.

5.5. Results

Following the two sub research questions, the results of the quantitative strand are described in two main sections. Firstly, results for SQ1 "Which public values can be identified through the application of NLP methods to participatory data?" are described in section 5.5.1. Results for SQ2, "Which spatial conflicts in public values can be identified under the sustainability/livability prism?" are described in section 5.5.2.

5.5.1. Public Values Identified

Out of 30 topics, 28 were assigned with a topic caption that represents the overarching concepts discussed in each topic. For a complete overview of all topics words and captions, see Appendix A.4. Figure 5.8 shows the correlation graph of these topics. A larger font size indicates a larger prevalence of the topic in the whole corpus and a lager link weight indicates a higher correlation between the connected topics. Correlation in that sense means that on a corpus level, the two topics are likely to co-occur in a contribution. The topic correlation graph shows two main clusters of topics, where the upper one refers to mobility (traffic lights, missing bike lanes, residential parking, traffic connectivity etc.) and the lower one to urban space in general. Interestingly, both clusters of topics are connected via the topic of "Redevelopment of street space". The "urban space" cluster consists of much more general topics, such as green space and livability improvements, the wish for "more" in multiple things, children-related topics and economic viewpoints.

After assigning topic captions, each topic was checked for underlying public values. In case one topic could be subsumed under one public value, the respective value was assigned to the topic. In

Table 5.1: Public Values and Topic Captions

Public Value	**Topic Captions**
Economic Opportunity	Residential parking, Economic viewpoints
Ecologic Quality	Green area protection, Green space improvement
Social Equity	Missing bike lanes, Traffic light green phases, Living for marginalized groups, Development of bike lanes and public transport, Reduction of cars, More attractions for everyone, Accessibility by bike
Livability	Livability improvements (x2), Playgrounds, Redevelopment of street space
Safety / Health	Dangerous situations on the street, Traffic speed reduction, Zebra Crossings, Dangerous pedestrian lanes
Various	Building development, Car-free zones, Traffic connectivity, Children, Noise, ”More” for multiple things, Usage of space, Protected bike lanes, Bike lane improvements

Table 5.2: Number of Assigned Topics and Contributions of Public Values

	Number of Assigned Topics		**Number of Assigned Contributions**	
Public Value	Absolute	Relative	Absolute	Relative
Ecology	2	6.7%	250	6.0%
Economy	2	6.7%	251	6.0%
Equity	7	23.3%	1292	30.8%
Health/Safety	4	13.3%	607	14.5%
Livability	4	13.3%	500	11.9%
Various	11	36.7%	1294	30.9%
Total	30	100%	4194	100%

case the topic words or the example contributions for one topic did not show a single overarching public value, the respective topic was marked as containing various values. Overall, five broad public values are identified. Table 5.1 displays these values of economy, ecology, equity, livability and safety/health and the respective topics that are subsumed under each public value. Additionally, the topics which reflected multiple public values were assigned to a category titled “Various”.

As shown in Table 5.2, 11 out of 30 topics containing 1,294 contributions were assigned to the category “Various”. The remaining majority of 2,900 contributions are included in a topic that was assigned to one specific public value. Out of these, the majority of contributions was assigned to the public value of social equity, followed by the public value of livability and health / safety. With 250 and 251 contributions, the values of ecology and economy are least represented in the body of contributions.

Figure 5.9 displays five violin plots that show the distribution of assignment probabilities for each public value. Assignment probabilities for a public value were computed by summing up the assignment probabilities of the topics that are clustered under each public value. The median assignment probabilities vary in between 20% and 30%. All distributions are skewed to the right, i.e. the mean assignment probability is higher than then median. Overall, the values of equity and livability are assigned with the highest probabilities. The public value of economy is assigned with the lowest mean probability, indicating that the contributions that are attributed to an economic public value are less likely to actually reflect that value. For the value of ecology, the assignment probability range is much higher: There are much more contributions which are assigned with a higher probability as compared to the economic value.

Linking the topics with public values needs thorough substantiation. Thus, each value is elaborated

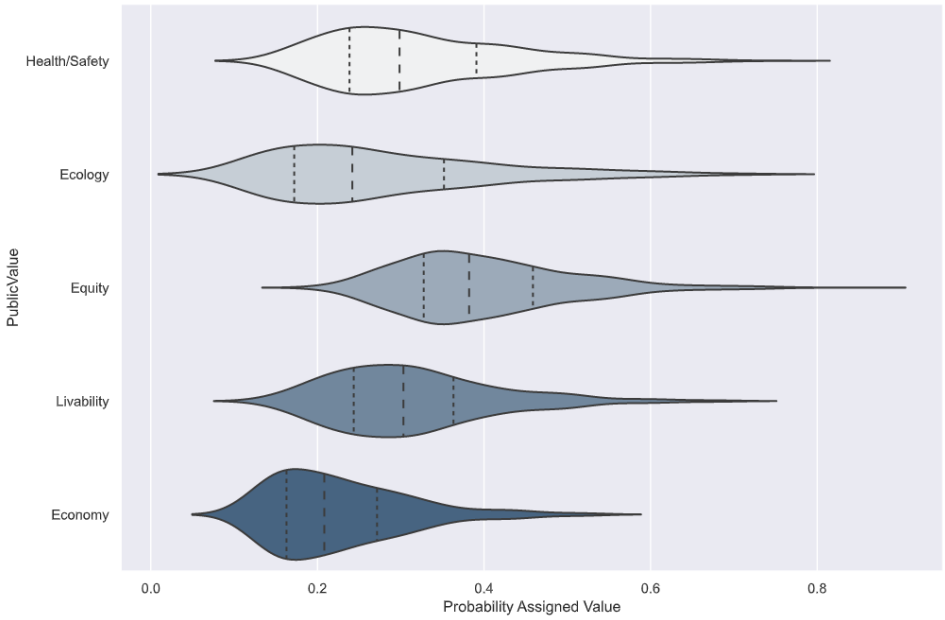

Figure 5.9: Assignment Probability of Contributions by Public Values

upon in more detail and examples on how the respective value is reflected in participatory data are provided. Word clouds were chosen as one means to visualize the most probable words for a public value. As several topics are assigned to a single public value, the most probable words for each public value were calculated by summing up the probabilities of word occurrences across all constituting topics. For the purposes of interpretability, all words were then translated to English via the Google Translate API. Unfitting translations were partially changed by the researcher to reflect the original German meaning. The German words and their respective probabilities can be found in Appendix A.5. Descriptions of public values are largely based on the investigation into several underlying topics, their example contributions and their most probable words in combination with the most probable words of the value.

Ecologic Quality

As shown in Figure 5.10, the public value of ecologic quality revolves around the two main ideas of protection and creation of green spaces. Various words related to green areas can be found in the word cloud, for instance tree, nature, naturally, green reserve. Words like protect, stay, remain reflect the public value of preservation and words like create, invest, idea, possible indicate a public value of additional ecologic development. The word “not” too stands out in the wordcloud and appears to be counter-intuitive. A possible explanation can be found when qualitatively looking at the most likely examples for the ecological value. Multiple of them oppose a certain development (thus the negation “not”) and then advocate for either ecological preservation or development. This is also shown by the following examples taken from the top-ten list of contributions with the highest assignment probability for ecologic quality:

Figure 5.10: Ecologic Quality Wordcloud

- ***Example 1:****“Replace trees. Do not cut down all trees! Chopped down trees must be replaced”*

(Assignment probability: 71.1 %)

- ***Example 2:**: "Trees, environmental quality. It is particularly important for me that the green character of the Elbchaussee is protected, i.e. that trees are involved sensibly and not chopped down, when they are in the way."* (Assignment probability: 68.8 %)
- ***Example 3:** "Preservation of green and open areas. Green areas must be preserved. Terraced houses shall not be built at the cost of small gardens."* (Assignment probability: 62.7 %)

Social Equity

Figure 5.11: Social Equity Wordcloud

The public value of social equity, which reflects "the space of access and segregation" and "the social space of communities, neighborhood organizations and labor unions" (Campbell, 1996) is both the most prominent value across all contributions and the value with the highest average assignment probability. Its most probable words as displayed in Figure 5.11 are "car", "bicycle", "provide", "good" and "wide". They reflect the idea that the city should be more accessible to cyclists by the improvement of bike lanes, e.g. their widening. The number of cars shall be reduced. This is also shown in the following examples taken from the top-ten list of most probable contributions that are assigned to the value of social equity:

- ***Example 1:**"Pedestrian and cyclist traffic light is red for a long lime and green only very briefly. The traffic light there is green for pedestrians and cyclists only for a very short time. The longest time it is green for cars going into the parking garage"* (Assignment probability: 83.0 %)
- ***Example 2:**"Diversion onto the lane is missing. When one is coming from the connection way Bötelkamp, there is no opportunity to go onto the lane on the Julius Vosseler Street (right turn)"* (Assignment probability: 76.2 %)
- ***Example 3:**"Long waiting times for pedestrians. It takes very, very long for the traffic light to turn green for pedestrians."* (Assignment probability: 72.8 %)

Due to the sheer amount of contributions discussing pedestrian and cycling infrastructure, some important aspects for social equity found in non-bicycle related topics are omitted in the wordcloud. Examples of such other values can be found in topic 11, captioned with "Living for marginalized groups". This topic clusters contributions that lament exploding apartment rents, wish for subsidized and accessible living space for disabled people, suggest increased investment in neighborhood activities due to increasing loneliness of the elderly/the youth or actively look out for partners to provide living space for the homeless. To add these perspectives to the value of social equity, additional examples are provided:

- ***Example 4:**"Apartment rents explode! If you want Eimsbüttel to remain a district where people of different cultures and different social backgrounds live, you should take care of a cap on cold rents in the district quickly and actively => implementation of the already passed law. Otherwise, only isolated people with high incomes will soon be living in Eimsbüttel."* (Assignment probability: 71.2 %)
- ***Example 5:**"Housing for people with disabilities. Supported/accessible housing for people with disabilities and/or mental illness."* (Assignment probability: 67.9 %)

Economic Opportunity

Figure 5.12: Economic opportunity Wordcloud

Following the theoretical definition of an economic public value in an urban context outlined in section 2.2.3, the two topics of residential parking and economic viewpoints were assigned to the public value of economic opportunity. As Campbell (1996) from an economic standpoint describes urban space as the "space of highways, market areas and commuter zones", the issue of providing parking spots for residents in public spaces was selected to reflect the public value of economic opportunity. Since a large amount of contributions are attributed to this specific topic, the most probable words are "local residents", "far away", "zone", "always" and "establish". However, it shall also be noted that as economic opportunity is the value with the lowest mean assignment probability, comparatively many contributions that part of the top ten list are misplaced under economic opportunity. Even the wish for residential parking does not necessarily reflect the value of economic opportunity. Citizens that wish for residential parking could also be in favor for reducing cars, increasing space for pedestrians and cyclists and thus reflect public values of ecology and/or livability. The following examples from the top-ten list of most probable contributions for economic opportunity reflect this:

- ***Example 1:****"Residential parking. In the Lindenallee only residents with parking permits should be allowed to park."* (Assignment probability: 46.7 %)
- ***Example 2:****"Redesign of the Lindenallee. The following aspects for the redesign of Lindenallee are important to me as a resident: clearly less motor vehicles, clearly marked parking spaces on one side, widening of the street for bicycles and pedestrians, traffic reduction, one-way street, significantly more bicycle parking spaces, parking spaces for residents, Aesthetic design, e.g., uniform streetlights not placed directly in front of residential windows."* (Assignment probability: 43.2 %)
- ***Example 3:****"Residential parking. I would welcome a redesign of the Lindenallee - but it must not be one-sided. Traffic/cars: a decision to establish residential parking in the Lindenallee and the entire neighborhood is overdue. That would go a long way toward easing the situation. Possibly a one-way street regulation. I myself am professionally dependent on the car and often have to transport heavy equipment. A cancellation of all parking in Lindenallee would be very serious for me. However, in recent years many caravans are permanently parked and often do not move for weeks. This is probably legal, but very annoying and anti-social. Are there solutions for this? For children, there are several children's playgrounds in the immediate vicinity of the Lindenallee, as well as the Lindenpark."* (Assignment probability: 43.1 %)

Nonetheless, especially in the topic of "Economic viewpoints", there are contributions which reflect the public value of economic opportunity to a greater extend: People wish for more security in long-term business planning, object missed opportunities for developers and mention that their business needs space for deliveries. Additionally, there are contributions that heavily emphasize that no parking space shall be taken away from public space. To illustrate these points, additional examples are provided:

- ***Example 4:*** *"Revision and planning of the area Brauhausstieg - Wandsbeker Königstraße - Wandsbeker Marktstraße - Brauhausstraße. The former Strauss Innovation areal has been vacant for several years and has changed owners several times. Not interesting for developers, as building law dates back to the 60s. No future-oriented development possible. Sufferers are the business people 'next door' and the neighborhood as well."* (Assignment probability: 38.8 %)
- ***Example 5:*** *"Location security for neighboring companies and jobs. The logistics and commercial companies that provide jobs for a large number of citizens in the neighborhood of the new district*

need a long-term location perspective. The planning framework must therefore be designed in such a way that neighboring businesses are not endangered in their existence, restricted in their operations or impaired in their development." (Assignment probability: 34.9 %)

Livability

Figure 5.13: Livability Wordcloud

The public value of livability in its operationalization of Godschalk (2004) is hard to demarcate and thus requires a closer investigation and description of the results. Representing the more tangible everyday environment and its design, many (partially contradicting) desires are subsumed under livability. Dominant words as displayed in Figure 5.13 are "should", "find", "instead of" and "design", indicating a wish for a different shaping of urban space. Looking for terms that concretize these desires, words like "gastronomy", "subway", "business", "market", "bank" and "playground" can be found. In the top 10 contributions with the highest assignment probability, the following examples provide a good indication on how livability shall be improved:

- ***Example 1:****"Playground on the site. I would wish for a swing for small children or a swing with a net as on the playground Niendorfer Gehege. Or trampolines - that's fun for children and parents."* (Assignment probability: 67.1 %)
- ***Example 2:****"Island principle: Playground, Sport and Recreation at the Pond. In order to unite as many interests as possible, I propose an island principle for the green space, which includes 3 areas: Playground for young families (very important in this area), sports equipment, and area for recreation and relaxation at a small pond, because looking at water is known to be very relaxing (thereby the pond in the rather shady area next to the sports equipment, seating and a barefoot path in the sun). The areas can be separated from each other by trees and shrubs.I look forward to the redesign!"* (Assignment probability: 63.1 %)
- ***Example 3:****"Benches everywhere. Benches for old people! Benches for connections and socializing! Benches for rest! Benches for communication and mutual listening, understanding, appreciation ...."* (Assignment probability: 58.7 %)

Additionally to these examples, people wish for several sport activities, such as Boule or calisthetics, express their (dis)like for certain aesthetic park designs or discuss building heights.

Health / Safety

Additionally to the four public values outlined by Godschalk (2004), the public values of health and safety were identified. Both values are merged, as they appear to be in close relationship in the context of their occurrence in the participatory data analyzed. The vast majority of health/safety-related topics appear in the cluster of mobility, which backs their merging: Absence of safety in traffic typically leads to physical harm of some participants, impairing their health substantially. The most

Figure 5.14: Health/Safety Wordcloud

probable words as shown in Figure 5.14 of the health/safety public value cluster too reflect this impression: traffic, protection, tempo, high, sidewalks and dangerous situations. The most likely example contributions assigned to the respective topics indicate a clear demand for more safety in the street space. Qualitatively speaking, recurrent themes are dangerous crossings, spaces of high collision probabilities between cyclists, cars and pedestrians, as well as speeding cars. Additionally, in close relation with the topic of traffic speed reduction, contributors complain about noise pollution. In some instances, poor air quality caused by too much traffic is discussed.

- ***Example 1:****"Install a mirror opposite to the parking garage. Fortunately, I have a parking space under the Grundstraße, but when exiting I regularly have the problem that the view to the right and left is very limited by parked vehicles, so that it has already come to dangerous situations several times when a cyclist is driving very fast on the road. Therefore, I propose to install a mirror opposite the parking garage exit with a viewing angle to the right and left, so that one can safely exit the parking garage. "* (Assignment probability: 75.3 %)
- ***Example 2:****"Zebra crossing Baumacker in front of Max-Träger School. Until spring 2020, there was a crosswalk in front of the Max Träger School so that the many elementary school children could cross Baumacker safely. This is now missing, wantonly endangering children's lives in the confusing traffic conditions especially just before 8am. The crosswalk (or a pedestrian traffic light) in front of the school should be urgently reintroduced!"* (Assignment probability: 67.5 %)
- ***Example 3:****"Speed limit 30 in the Lange Reihe. It would be desirable to increase safety with a 30 speed limit in the Lange Reihe. "* (Assignment probability: 66.0 %)

Various
A total of eleven topics were labelled as containing various values. Subtracting the two topics which showed no overarching concept, nine topics that reflect a certain coherent topic were not assigned to one single value. These topics revolved around a certain theme, but the contributions either reflected contradictory viewpoints or did not allow for the inference of any value. In the following, three example topics are discussed:

- **Topic 5 (Building development):** Contributions assigned to this topic mainly discuss dwelling densities. The majority of contributors discuss an aesthetic transition from low-rise to medium-rise dwellings and a cap on dwelling density, thus indicating a value of livability and/or aesthetics. Opposing voices want to see a high density with good accessibility, mainly referring to economic viewpoints.
- **Topic 10 (Car-free zones):** This topic mainly contains contributions regarding the car-free zones that were established in the inner city areas. A clear conflict between those who favour the banning of cars and reflect ecologic, social and livability values (e.g. "climate strike for a car-free inner city", "[...] thus, the inner city becomes appealing for pedestrians", "the redesign is an amazing development for the cityscape") and those who express economic values ("destroying the economy through ideology", "a coffin nail for the inner city, especially to annoy wealthy customers") becomes apparent. However, there are also instances of contributions where people complain about lacking accessibility for disabled persons.
- **Topic 22 (Protected bike lanes):** Being a very semantically coherent topic, the most probable contributions all advocate rather shortly for protected bike lanes. Thus, a single public value cannot be inferred since it cannot be discovered whether protected bike lanes are demanded for the purpose of increased safety, better accessibility or due to livability-related aspects such as better street coverings.

5.5.2. Spatial Public Value Conflicts

As displayed in Figure 5.15, several larger value clusters of equity, livability and health/safety were identified. Additionally, three larger clusters of economic values can be observed. Multiple smaller clusters of each value are distributed seemingly randomly across the city.

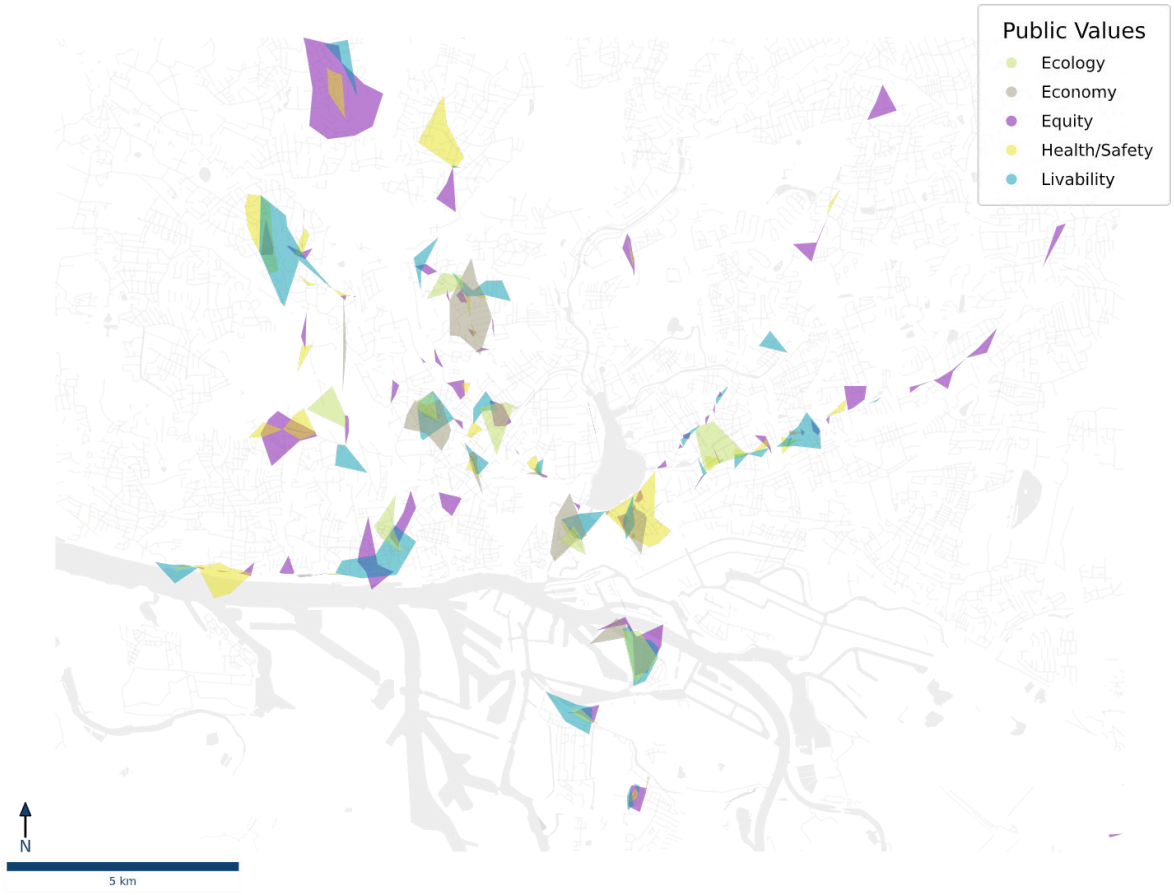

Figure 5.15: Public Value Map

Based on the main value conflicts as outlined by Godschalk (2004) in his sustainability/livability prism, potential conflict areas are calculated as the intersection of the public value clusters ecology, economy, equity and livability. The resulting urban spaces displayed in Figure 5.16 are discussed subsequently to gain insights into the spatial manifestations of these value conflicts. Firstly, each archetypical conflict is described one by one. Subsequently, three portraits are selected to investigate into areas which are characterized by multiple overlaying value conflicts at the same time. These spaces are indicated by the letters (a), (b) and (c) on the map and were chosen to represent the two larger topic clusters of mobility and urban space in general (see subsection 5.5.1). In doing so, the sustainability/livability prism was color-coded and displays the public value conflicts that appear in a larger area with an increasing width of the respective edge of the prism.

Development Conflict

In multiple areas a development conflict manifests. Its most common form is the dedication of street space for increased access to pedestrians and cyclists as opposed to green area protection. In this manifestation, a development conflict appears along the Hindenburgstraße and the Mansteinstraße. At the Jungfernstieg (a), there are advocates of an unsealing of currently sealed areas for more green areas and habitat space for animals. At the same time, a better accessibility for bikes and pedestrians is aspired.

In the Grasbrook (b) and Spreehafenviertel (c) Neighborhood, which are both areas that are currently undergoing a development process, there are strong proponents of protecting the current green areas. At the same time, people wish for affordable social housing and accessible space for the eldery, thus creating a development conflict between ecological and equity public values.

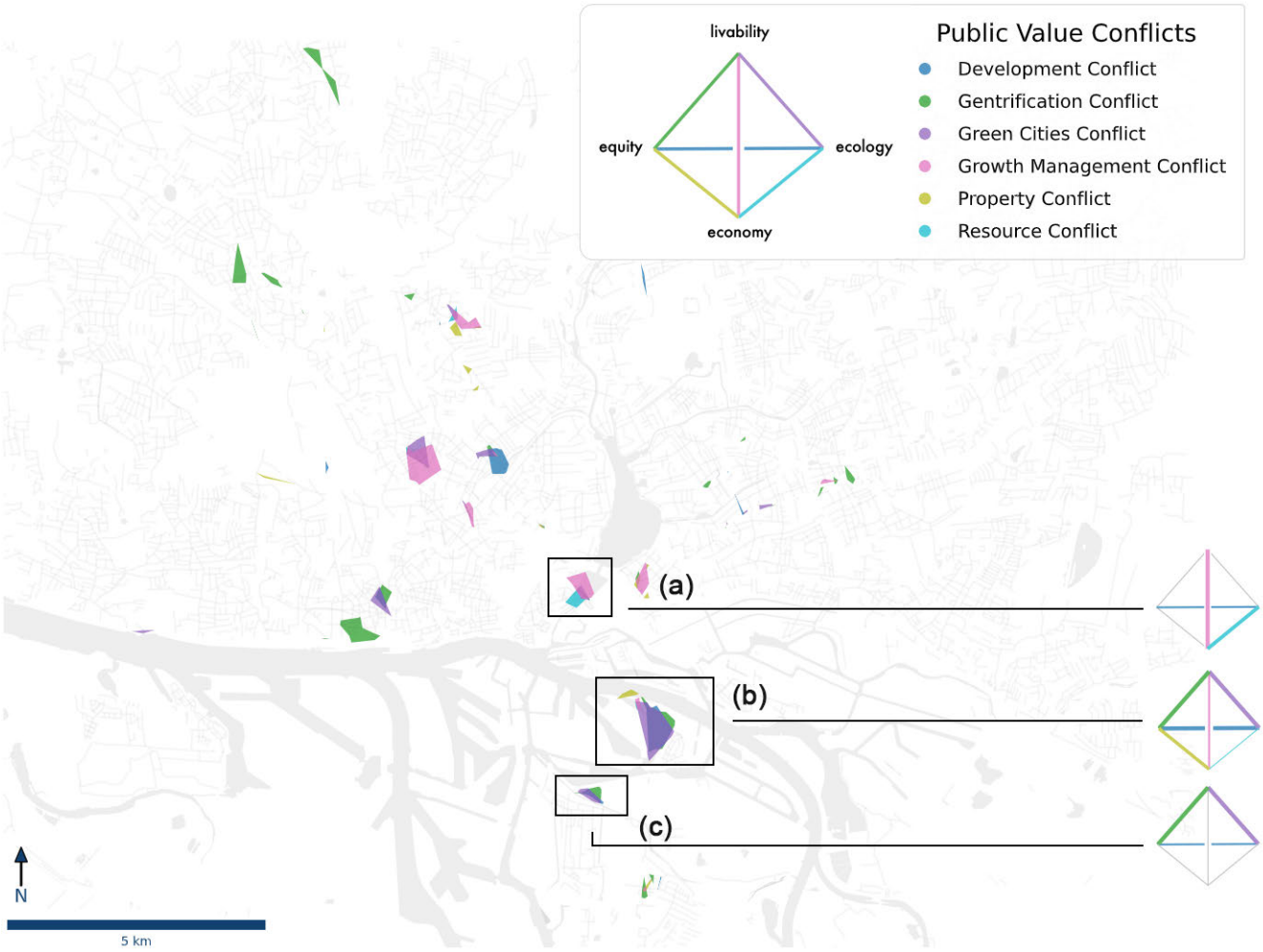

Figure 5.16: Public Value Conflict Map

Gentrification Conflict

The gentrification conflict as outlined by Godschalk (2004) becomes apparent in multiple parts of the city; the most prominent being the newly developed district of Grasbrook (b). At this place multiple contributions reflect the value of livability by wishing for a more organic and vanguard architecture, as well as for vibrant outdoor spaces for music and culture. Simultaneously, contributors frequently wish for affordable living for students, the elderly and meeting spaces for everybody. Others want to cap private investments and the number of jobs created. Although the district is still in its early planning phases, a clash between highly livable environments and affordability becomes apparent. A similar situation is present at the area of the Spreehafenviertel (c): As this neighborhood is about to be developed for residential living, multiple people wish for affordable government housing [2] and multiple people wish for exciting architecture and an appealing places. For a subjective viewpoint, the possibility of gentrifying the closeby low-income district of Wilhelmsburg is clearly given.

However, the results also show that at multiple places, such as St. Georg, Schnelsen, Altona, Wandsbeck and Eidelstedt, a gentrification conflict between equity and livability does not necessarily manifest. There, contributors wish for a more livable environment such as upgrading of certain places, and for a more equitable accessibility for pedestrian and bike traffic. These two manifestations of public values do not conflict. Nonetheless, improvements in the livability of a certain district could - in the long term - possibly always lead to gentrification effects, even if there are no voices in that area advocating for equity values.

Green Cities Conflict

The green cities conflict between the “primacy of the natural versus the built environment” (Godschalk, 2004) is partially reflected in the case study of Hamburg. The areas which are identified as potentially conflicting between the values of livability and ecologic quality show that in the perception of most contributors, both go hand in hand. This becomes especially apparent around the Jungfernstieg (a): Frequently, livability values reflect a desire for more green instead of the built environment. However, there are also sporadic contribution who wish for open-air cinemas, more art and more kiosks, which could be in a green cities conflict with contributors wishing for the restoration of nature at the Jungfernstieg (a).

In other areas, such the Altona train station area, people in a playground participation project both wish for more public utensils in the form of playground accessories and protection of green areas. Thus, a possible green cities conflict between built and natural environment is given. The green cities conflict finds an exemplary instance in the Spreehafenviertel (c), an areal on the Elbe island which is currently undergoing development. One contribution condenses the green city conflict’s essence in its title: “Whoever advertises for the ’Green Island’, must also protect the green”. Others in the same future neighborhood advocate for an open architecture of the buildings close to the channels, thus creating a debate around whether green areas should be protected or additional built environment should be created.

Growth Management Conflict

The growth management conflict as outlined by Godschalk (2004) revolves around the appearance of urban sprawl versus compact development. On this scale, no growth management conflicts can be found based on the participatory projects in central Hamburg. However, certain public value conflicts between livability and economic viewpoints manifest. Around the Jungfernstieg (a) area, which was chosen to be car-free as a pilot project, multiple people lament the decay of the inner city due to lacking accessibility of well-funded customers by car. Simultaneously, many see a more livable environment created through the exclusion of private cars. The topic of car parking as opposed to the creation of a more livable environment in terms of public utensils such as fitness circuits is also present in the Lindenallee area. Other areas that are outlined as containing potential growth management conflicts suffer from the overall low assignment probability of economic values. The clusters of economic values that are present at these places can mostly not be attributed to economic values.

[2] One speaks of an “Arrival district” for refugees and low-income workers, which should have a chance to stay

Property Conflict
Multiple smaller sections in Hamburg exhibit the property conflict between equity and economic values. The “social character of land” which is in conflict with “its private ownership and control” (Campbell, 1996) is frequently reflected in the wish of redeveloping street/parking space for cyclists and pedestrian. In that way, pedestrian and bike lanes reflect a much more social sharing of space. Private cars are considered to take up public space that could be used otherwise for a broader society’s benefit. For instance, such property conflicts manifest at the Bundesstraße, the Lindenallee, the Mansteinstraße and the Sillemstraße.

Resource Conflict
Lastly, the resource conflict between economic and ecologic values manifests only in very sparse sections of the city. It is identified in similar spaces as the property conflict, since oftentimes, the wish for more parking spots contradicts the wish for the preservation or creation of green areas. However, some of the identified resource conflict areas do not show one, since multiple contributions seem to be misplaced under the public value of economy.

Portrait (a): Jungfernstieg
The area south of Hamburg’s inner-city lake Binnenalster, the Jungfernstieg, is one of the the city’s main tourist attractions. For locals, it is typically used as a boulevard for sauntering. The participatory process in this area revolved around feedback for the city senate’s decision to temporarily prohibit the passage of private cars. As a pilot project of the currently governing green party, street space was also temporarily redesigned to improve walkability. After extensively collecting feedback and input from the citizenry, the final design based on the contributinos is scheduled to be implemented in 2022 (“Beteiligungsverfahren Jungfernstieg”, n.d.). The two main conflicts identified in this area are the resource conflict between ecology and economy and the growth management conflict between economy and livability. As the former conflict can be identified through contributions, the latter conflict manifests in a different way than originally proposed by Godschalk (2004). Some contributions reflect the concern of the inner city’s decay due to lacking accessibility by car while other contributions complement the decision of a car-free Jungfernstieg since it enhances livability. When visually inspecting the contributions in the interactive map, another conflict becomes apparent: Since cars are banned, proponents of the public value of social equity complain about lacking accessibility for disabled persons. Not reflected in these spatial conflict areas is the original STM topic of car-free zones (Topic 10), which was assigned to the category of “Various” values.

Portrait (b): Grasbrook
The Grasbrook district, similar to the HafenCity, but south of the Elbe river’s northers branch, is a former industrial port area with loads of vacant storehouses. It is now part of the “Jump across the Elbe river” expansion and currently undergoing residential development (“Öffentlicher Dialog – Der Beteiligungsprozess – Grasbrook Hamburg”, n.d.). In this specific area, all public value conflicts under the sustainability/livability prism can be observed; the most prominent and large-scale being the green cities conflict, the development conflict and the gentrification conflict. The gentrification conflict in this specific instance is of particular interest, since no citizens live in the neighborhood yet. Nonetheless, multiple citizens explicitly state that affordability of new homes shall be given. Furthermore, especially the wish for affordable social housing conflicts with the protection and creation of green areas and an aesthetic built environment.

Portrait (c): Spreehafenviertel
The Spreehafenviertel is another part of the “Jump across the Elbe river” and is situated close to the neighboring district of Wilhelmsburg. Similar to the Grasbrook district, it is currently undergoing residential development and citizens were asked for general input about the future neighborhood (“Häufig gestellte Fragen | Beteiligung Spreehafenviertel”, n.d.). In this area, largely identical value conflicts as compared to the Grasbrook district manifest. However, its main difference is the proximity to the closeby low-income district of Wilhelmsburg, which could likely be affected by the gentrifying effects of high-income housing in the Spreehafenviertel. Also, larger areas of currently untouched forests would need to be cut down for residential development, thus giving rise to the green cities conflict. Since the results do not show many proponents that support economic development, the resource conflict is not identified in the map.

6

The Qualitative Strand: Expert Workshops

For the qualitative strand of the present explanatory sequential mixed-methods design, expert workshops were chosen to interpret and evaluate the findings of the quantitative strand. As the conduction of expert workshops involves human subjects, it shall be referred to the ethics application and approval in Appendix A.1, which was conducted to eliminate possible ethical concerns and risks.

6.1. Methodology

Workshops as a research methodology are intended to both serve the personal interests of workshop participants and to "produce reliable and valid data about the domain in question" (Ørngreen & Levinsen, 2017) for workshop conductors. In academic settings, "workshops provide a platform that can aid researchers in identifying and exploring relevant factors in a given domain by providing means for understanding complex work and knowledge processes that are supported by technology" (Ørngreen & Levinsen, 2017). Contrary to other types of qualitative research such as interviews or observations, workshops are designed to specifically engage participants and become actively involved in a certain topic (Ahmed & Asraf, 2018). The role between a facilitating researcher and a workshop participant thus becomes an interesting relationship: A researcher needs to position himself/herself the spectrum of purely objectifying a workshop participant for research purposes (i.e., ethnographic research) on the one side and actively becoming involved and engaged with a participant on the other side (Ørngreen & Levinsen, 2017). While the former seeks to maintain academic distance, the latter generates trust between facilitators and participants so that "backstage" knowledge is more likely to be shared (Ørngreen & Levinsen, 2017).

In the present case study of Hamburg, expert workshops are selected as a method to evaluate and interpret the findings of the quantitative strand. Additionally to this research goal, workshops are chosen as a method to provide planning experts with input in form of NLP and discuss the possible extension of DIPAS functionalities for their daily work. Thus, a mutual benefit for workshop participants and the workshop conductor is created. Due to restrictions regarding the spread of the Coronavirus and time constraints, workshops were conducted individually in an online Zoom environment. The Stadtwerkstatt Hamburg acted as an intermediary to establish contacts to planning experts. To ensure a mutual benefit of workshop conduction, only planning experts with background knowledge in the DIPAS tool and participation processes were selected as workshop participants.

As shown in Figure 6.1, the expert workshops are structured in three main parts, each designed for a specific purpose. Section one, "Introduction" aims to set the scene, introduce participants to the concept of public values and to generally "break the ice". Section two, a semi-structured interview, seeks to gain insights into the perception of public values and their conflicts by expert planners by asking specific questions. Four main questions target general public values (Q1), their identification (Q2), conflicting public values (Q3) and conflict manifestation (Q4). In a semi-structured manner, follow-up questions are asked dependent on the answers of the interviewee. Lastly, the third section of interactive

Table 6.1: Topics Discussed in Expert Workshops

Topic Number	Topic Caption	Assigned Value	Subjective Confidence of Assignment
11	Living for Marginalized Groups	Equity	high
7	Green Area Protection	Ecology	high
1	Dangerous Situations on the Street	Health/Saftey	medium
17	Playgrounds	Livability	medium
21	More attractions for everybody	Equity	low

discussion brings the workshop character into play: Together, the STM results are investigated and via remote controlled screen sharing, an interactive map of contributions and areas of possible public value conflicts is explored. More specifically, five resulting topics of STM were selected and presented to workshop participants in form of a word cloud of the most probable words, a list of the most exclusive words and three example contributions with the highest assignment probability. The topics selected are shown in Table 6.1. Since time constraints restrict expert value assignment to all 30 topics, five topics were selected according to subjective confidence of assignment. The aim of this selection is to qualitatively establish a relationship whether the subjective public value assignment of a non-expert concurs with the value assignment of a planning expert that is experienced in working with participatory data. Thus, two topics with a high confidence of assignment, two topics with a medium confidence of assignment and one topic with a low confidence of assignment were selected. Although one could utilize the metric of interrater reliability (McHugh, 2012) to quantitatively determine the intersubjective confidence of assignments and their statistical significance, this was not applied to this research. That is largely due to the low sample size of value assignments and the lack of an unbiased selection of topics.

The interactive discussion section of the workshop is included to evaluate, interpret and verify the concrete findings from the qualitative strand and the semi-structured interview is aimed to expose general knowledge about public value conflicts in daily planning practice. The full workshop outline is present in Appendix A.6. After workshop conduction, the recordings are transcribed and encoded with the help of the software Atlas.ti. In the encoding process, codes specifically referring to public values and their conflicts are assigned.

6.2. Results

In total, four one-by-one expert workshops were conducted with representatives of four different sectoral planning domains. These are: Green area and playground planning (Workshop 1), traffic and transport planning (Workshop 2), residential planning (Workshop 3) and noise protection planning (Workshop 4). In an attempt to answer SQ 3 “Which public values and inherent conflicts do planning experts identify based on participatory data?”, first public values in a planner’s perception and their identification process are described in section 6.2.1. Subsequently, public value conflicts and their manifestation are outlined in section 6.2.2. In both sections, the main display of results is the expert’s planner’s statements, which are considered to speak for themselves in most instances. Lastly, in section 6.2.3 and in order to evaluate the findings of the quantitative strand, the value assignment of expert planners is presented and contrasted with own value assignments.

6.2.1. Public Values in a Planner’s Perception

Not surprisingly, when asked for public values, the answers of expert planners depend on their area of expertise. It became clear that typically, the DIPAS online participation only serves a supplementary function for public value identification. Although all planners mention that they read the entire individual contributions, some of them focus on public hearings and actual conversations. As one planner puts it, *“We don’t just use the online tool. This online participation is always supplemental. We always focus on personal encounters, personal information and personal exchange. Because such conflicts can be*

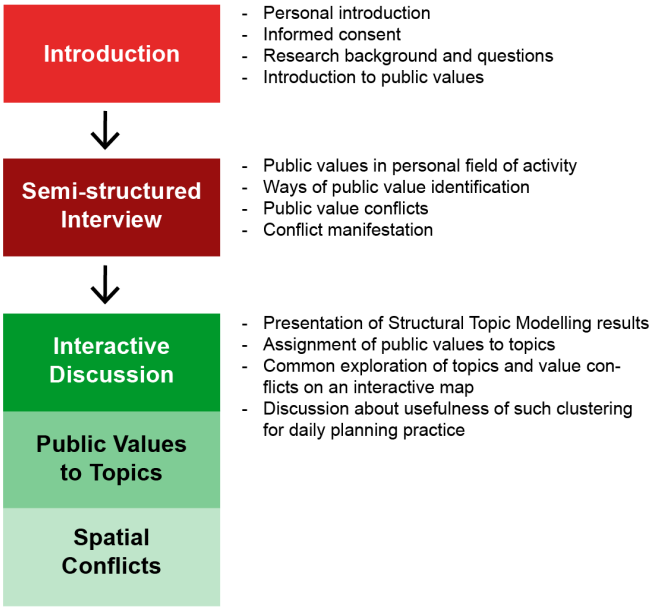

Figure 6.1: Expert Workshop Structure

discussed and weighed up in a completely different way. " (Participant Workshop 3).[1]. Additionally, in a formal and institutionalized participation processes, other authorities, clubs and organizations are consulted for any participation process: *"Otherwise, it actually runs via the official consultation. In the first mailing, you involve various public interest groups. Of course, you always get different feedback. These are institutions such as the police commissioner's office, the traffic authority, the fire department, the Hochbahn and all kinds of other institutions. But also associations like Fuß e.V., which is dedicated to promoting pedestrian traffic, or the ADFC[2] or Barrierefreies Hamburg[3]"* (Participant Workshop 2). This broader input of participatory data widens the space for public value identification. Thus, the following is an attempt to subsume different public values as identified by planners based on all actors involved in participation processes under the values of sustainability and livability. Additionally, other public values that were mentioned by planners are explored.

Ecologic Quality

The value of ecologic quality is identified by all of the workshop participants. Manifestations of the public value of ecology are that urban green spaces shall be created or protected. In terms of protections, public spaces should not be sealed and present green areas shall be preserved. This wish is typically directly expressed by citizens: *"There's something that would be widely perceived as a forest, and citizens who were consulted want to preserve this as far as possible."* (Participant Workshop 3).

In a sense of green area creation, this value is reflected in multiple different ways. For instance, (fruit) trees should be planted, bees and insects need to be given space, and green space is preferred over sealed (parking) space. One expert puts some of these wishes in a direct planning context: *"What's also always interesting is that they're all yelling for fruit trees at the moment. That's also such a trend, it has something to do with the bees, that they think only if we plant fruit trees in public spaces now - which is really difficult - then we are super ecological."* (Participant Workshop 1)

Social Equity

The value of social equity revolved around certain key concepts which were raised during the workshops. For one, inclusivity and the creation of spaces for everyone is reflected in citizen's wishes for

[1]The transcriptions of all four expert workshops can be found in the 4TU research repository under https://figshare.com/s/20bde9faa7a5e0829a8e or the Digital Object Identifier (DOI) 10.4121/15141933
[2]German Bicycle Club (Allgemeiner Deutscher Fahrrad-Club e.V.)
[3]Association of Barrier-free Hamburg

inclusive playgrounds and the reduction of parking spaces in favor of a more "public" usage: *"First and foremost inclusive places, playgrounds, that's a large topic"* (Participant Workshop 1), *"And there are many people, especially in inner-city areas, who consciously decide not to own a car and then say they would rather use the space for something else. But that can be very diverse, it can be bicycle parking, it can be sidewalks, it can be green."* (Participant Workshop 2).

Secondly, accessibility is brought up as an important concept for equity; both as a means to enable a better access of citizens with disabilities and as a goal to increase the accessibility of other modes of transportation than the car: *"Accessibility has become an important topic in transportation planning. So I would also see that as a bit of a value concept, that you have to plan barrier-free in these days."* (Participant Workshop 2).

When discussing the value of equity, planners also reflect their individual role in the planning process as enablers and promoters of social equity. Deliberation and creating offers for different user groups was an aspect raised by two experts: *"But they are simply afraid that there are drunkards, groups and homeless people. They don't want that, but then one must also say that these people are part of our society. They too have a right of accessing and using public space."* (Participant Workshop 1), *"One really has to take into account the different concerns in the planning."* (Participant Workshop 2). In a playground planning context, the promotion of diversity was also mentioned: *"Then we have to make sure that we have a diversity of playground opportunities, so that we can simply say that we need different motor skills for the children."* (Participant Workshop 1)

Economic Opportunity

The public value of economic viewpoints was most apparent in an noise protection context: *"There is still little that can be done about aircraft noise because the economic component is so strong. We can't do anything about it, we can't do anything at all."* (Participant Workshop 4). In other instances, residential development was mentioned: *"People say 'Yes, we want this progress. We want housing and we want something to develop and happen here'"* (Participant Workshop 3).

From another perspective, municipal budgeting and financing issues were mentioned in the specific case of reducing the speed limit: *"Nevertheless, afterwards it is the financing, the funds have to be ready, it all costs money. So a 30 speed limit at night is not just a sign put up. Even that sign costs money, apart from that. But there was so much inspection for that and all the workup and you might have to change the traffic signals to have a different steady at night and that costs money."* (Participant Workshop 4). In a way, that statement reflects a public value of frugality, which might also be found under the designation of economic opportunity.

Livability

The results show that the public value of livability contains many different facets. Much more than the three public values of sustainability, livability seems to be an umbrella term that bundles a myriad of individual perceptions of livability. Although some common denominator seem to exist and the focus of Godschalk (2004) on the "everyday physical environment" narrows down the spectrum, multiple conceptualizations of a livable environment were mentioned by the experts. Firstly, the public value of sports can be subsumed under livability. In the perception of one planner, this is a fad; a temporary fashion that was already there in the last century and is now returning: *"I remember this from my childhood. In the 70s, 80s there were trim trails in every forest with workout stations. Then that was all deconstructed in the nineties. That's a trend that's just coming back, so sports in public spaces, accessible to everyone. [...] Sports clubs with fixed times are on the decline and people want to do individual sports. They want more and more sports in public spaces."* (Participant Workshop 1). Some citizens value (historical) aesthetic aspects in their everyday built environment: *"I would say there is a nostalgia factor. You live in street X, a cobblestone street, and you think that's nice. Of course, that also fits in with the old buildings that are there. Needless to say, it's worth preserving in certain areas, and it also somehow gives the street its flair and charm."*(Participant Workshop 2). Possibly related to aesthetics, people value cleanliness in their surroundings: *"Quite often when we have downtown playgrounds, people say 'Build a public restroom!'"* (Participant Workshop 1). Quietness is another value that appears regularly in the context of the everyday lived environment: *"So we also notice that with certain age groups it's quite normal, if they just meet in the group and talk, then it gets louder. They don't even shout, but they are always perceived as a point of disturbance"* (Participant Workshop 1), *"Because this topic actually also came up: '[...] we are close to the Sternschanze here and we*

don't want a 2nd piazza here. So no people sitting around outside the houses, consuming alcohol and partying there and being loud.'" (Participant Workshop 2), *"I would say noise protection can be considered a public value"* (Participant Workshop 4). Lastly, one planner pigeonholes social interaction also under the value for livability: *"I believe that pedestrian traffic is very much one of the things that actually contributes to livability, because it is actually also the public space or the traffic space where you can stop sometimes and get into conversation or so"* (Participant Workshop 2).

Safety
The public value of safety is primarily related to traffic. In this specific domain, *"Safety is always the top priority and I have to subordinate everything to it."* (Participant Workshop 2). More specifically, *"it's [...] about individual safety and also about the perception of safety. So it's not always about objective safety. Rather, what plays a role is subjective safety."* (Participant Workshop 2). The participant in workshop 4 narrows down the public value of safety for specific social groups: *"We would like to have more traffic safety for our cyclists, for our children"*. In that conceptualization of safety as the absence of fear, it is to be distinguished from the public value of health.

Health
Although analyzed together in the quantitative strand, discussions with planners reveal that health in the public perception might be decoupled from safety. As one planner puts it, *"[...] otherwise, things like fine dust pollution or something like that would certainly play a role."* (Participant Workshop 2), also linking the topic of health with the topic of ecologic quality. Additionally, health too is related to the public value of quietness: When talking about a noise level map of Hamburg, one planner admits: *"If you look at the map as an overview of Hamburg, everything is red or everything is purple. There is a lot that is already a health hazard."* (Participant Workshop 4). Additionally to livability, an instrumental public value of sports can also be assigned to an intrinsic value of health. More workout possibilities in public space could both contribute to an intrinsic value of better livability and to an intrinsic value of health.

Conservatism
Multiple planners referred to people opposing action or change. One planner mentioned *"that everything was better in the past comes up quite often."* (Participant Workshop 1). Another expert, when asked for which public values citizens would like to be realized, answered: *"I would say there are not so many things that they wanted to see realized as things that they did not want to see realized."* (Participant Workshop 3).

This value might well be titled conservatism in a sense of conserving the status quo, or "the quality of not usually liking or trusting change, especially sudden change" (Cambridge Dictionary, n.d.). In that sense, the public value of conservatism seems - counterintuitively to its political connotation - related to the public value of ecological preservation. Interestingly, this behavior is also expressed by small children when it comes to changes on places they are familiar with: *"They are often afraid or are in the age group where they are not necessarily in favor of change. That is also typical of this age group. They want the familiar, they want security, but that has something to do with their phase of life."* (Participant Workshop 1).

Interrelation of Public Values
As the various public values already foreshadow, in a complex urban landscape with a diverse citizenry, public values are heavily interconnected by concrete changes to urban space. For instance, citizens expressing a desire for bike traffic improvement could have the underlying public values of social equity (fair accessibility for every mode of transport), livability (less noise), safety (currently going by bike is dangerous), health (biking as a health-improving exercise) or ecologic quality (less emission of greenhouse gases).

In the interactive discussion on spatial value clusters, this interrelation of public values was brought up multiple times by planners. When navigating through the interactive map and selecting different value clusters, multiple planners looked at example contributions and issued that this very specific contribution could also be sorted under another public value. For the present example of bike traffic improvement, one planner explicitly pointed out the ecological aspects of riding bikes: *"One could debate whether the promotion of pedestrian and bike traffic also reflects an ecologic value."* (Participant Workshop 2)

These conceptual interrelations boil down to the subjective differentiation between instrumental and intrinsic values and to very role that public values currently play in urban planning. Because people are asked *what* they want in their city and typically not *why* they want it, public values are hard to identify and thus, assign to a specific category.

6.2.2. Public Value Conflicts in a Planner's Perception

Expert workshops brought forward a wide range of public value conflicts. Most of the conflicts outlined by Godschalk (2004) somehow manifest in the case study of Hamburg. However, as already teased in section 6.2.1, the multitude of actors involved in participatory processes of the expert planners opens up completely new spaces for conflict, for instance public value conflicts between institutions and other actors in play.

Conflicts under the Sustainability/Livability prism

In between the public values of social equity, economic opportunity, ecologic quality and livability, various conflicts are described by expert planners:

The development conflict between equity and ecology manifests in playground planning: *"People understand by inclusive playgrounds usually that wheelchair users can use the playground equipment. Of course they can't drive through sandy areas, that means actually they need a complete surface sealing with certain fall protection surfaces, That actually contradicts itself."* (Participant Workshop 1). In another instance, planning of bicycle routes was mentioned to be at the expense of ecologic quality: *"At the moment, attempts are being made to maintain the roads in their wide dimensions, and to build additional bicycle routes, which of course then comes at the expense of the roadside greenery."* (Participant Workshop 1). The dynamics behind urban gardening in Hamburg too lead to some kind of development conflict. Talking of such community garden projects, the participant in workshop one reckons: *"That gets destroyed. People garden and then that gets torn up or harvested or destroyed, whatever. There's a lot of vandalism and then there's the cry for fencing off public space for an individual group. And I personally see that very, very, very critically, because actually people want more and more that with such demands public space is privatized for individual user groups. That actually contradicts public space."*.

The resource conflict seems to appear in most residential development projects: *"In all participation formats, there is always the conflict, so to speak, that people say 'Yes, we want this progress. We want housing construction and we want something to develop here and something to happen' and at the same time this preservation of undeveloped green spaces. That's what we almost always have as a conflict."* (Participant Workshop 3).

The property conflict between social equity and economic values manifests in multiple instances. In the description of Foglesong (2015), who outlines the private versus social character of land, parking of private automobiles on public space falls under the property conflict: *"It's always this issue: this is public space and is it allowed to use public space to park your private car there? As a car owner, you say, 'Well, okay, where else am I going to put it?' And there are many people, especially in the inner-city areas, who consciously do without their own car and then say that they would rather use the space for something else."* (Participant Workshop 2). The participant in workshop 3 outlines a similar conflict: *"That was actually also a conflict that we noticed. Not necessarily in online participation, there was certainly that too, but also fundamentally in the participation formats. Some people said, 'That's not enough for me. Why not completely car-free? Why don't they block it off and you're only allowed to drive around here by bike?'. The others said, 'That's all an illusion, and it won't work. How do they want to regulate that, so to speak, that people no longer have a car? That can't be determined and then they park somewhere else and all that doesn't work. And we don't want that either.' So that was actually also a conflict of values."*

One planner of residential development describes the gentrification conflict between the values of livability and equity as an underlying fear of almost every project: *"That's always a fear that has been hovering over everything for years. [...] So that's something we already know before we make this participation."* (Participant Workshop 3).

The green cities conflict between ecologic and livability values was described by two planners. On the one hand, people value unsealed surfaces, on the other hand, there is a specific preference for the built environment. In one case, this shall not be high-rise: *"A recurring theme in District ABC is the issue of land sealing. We've always had these conflicts between 'It shouldn't be built so high so it doesn't create a ghetto.' But we also don't want so much land sealed."* (Participant Workshop 3). In another case, the green cities conflict materializes within playground planning: *"On the one hand, they want it to be green, but on the other hand, they want masses of playground equipment, and such playground equipment always has a safety area and a drop zone. That contradicts each other."* (Participant Workshop 1).

The growth management conflict as described by Godschalk (2004) originates from political preferences for economic development paired with public values of a livable built environment: *"There is the objective that so and so many apartments should be built. Then you have the option of either building in the area or building in the height. To put it very bluntly. We try to go through these options with the citizens and say, 'Okay, if we shouldn't build high, then we'll inevitably have to build more on the surface.'"* (Participant Workshop 3).

Additional Public Value Conflicts

The public value of safety, although not very present, might also conflict with other values. One planner mentioned that such viewpoints however are typically not expressed due to social norms, indicating a high rank of safety in Hamburg's citizenry in general. When asked for conflicts with the value of safety, the answer was that *"there are certainly, but I think hardly anyone dares to express it so concretely. So I can well imagine that there are people who say 'Yes, cyclists just have to watch out' or 'Car drivers have to watch out when parking'. But these things are said less often."* (Participant Workshop 2). In one instance, something I call the "Dangers of Nature Conflict", a planner describes how the value of safety opposes ecological values: *"So when I think about ecology and fruit trees and bees, they all yell for it. But if I plant fruit trees in a playground and in the summer the bees come, the parents don't like it either."* (Participant Workshop 1).

Another conflict I entitle the "externality conflict" appears in between economic development viewpoints and the public value of health. In the instance of noise protection, which is both related to health and livability, one planner mentioned: *"Conflicts are the economic interests and also the regulatory interests among themselves. The economic interests is related to aircraft noise. When every second person says 'I only want aircraft noise from 8 a.m. - 10 p.m.', but now you can take off and land in Hamburg until 11 p.m.. These are pure economic conflicts. And, of course, also regulatory ones, because the transport authority naturally tends to see the economic side. We as the environmental authority say 'Nah, you have to come up with something.'"*

Lastly, within the umbrella term of livability, the values of tranquility and aesthetics might conflict in ways that aesthetic spaces typically attract people, which will then lead to noise. This can be called the "drawback of beauty" conflict.

6.2.3. Evaluation of the Quantitative Strand

One goal of the expert workshops is to evaluate the findings of the quantitative strand. From multiple possible evaluation aspects, the focus was on two main points, namely the topic to value assignment process and the discussion of the quantitative results on an interactive map.

Firstly, given its subjective nature, closer attention was paid to providing insights into the topic assignment process. Due to time restraints, no exhaustive discussion of all 30 topics and their underlying public values could be performed. Thus, a selection of five topics as shown in Table 6.1 was made to investigate whether the subjective confidence of assignment corresponds with the assessment of expert planners. The slides as shown to the planners are shown in Appendix A.7. As the results in Table 6.2 show, the topics with a high confidence of own assessment show a large similarity with expert assessments. Due to time restraints, topic 1 was only presented to two experts, which both subsume under traffic safety, corresponding to the subjective assessment of health/safety.

[4] No assessment possible due to time restraints

Table 6.2: Topics Discussed in Expert Workshops

Topic Number	Assessment Workshop 1	Assessment Workshop 2	Assessment Workshop 3	Assessment Workshop 4	Own Assessment
11	Gentrification worries, participation	Gentrification, inclusivity, accessibilty, social equity	Living in the city for everyone	Living space	Social equity (high confidence)
7	Livable city	(Urban) Ecology	Protection and creation of Green areas, specifically tree preservation	Protection of green areas	Ecologic quality (high confidence)
1	-[4]	Traffic safety, Traffic optimization	-[4]	Traffic safety	Health/Safety (medium confidence)
17	Individual sports, opposite of participation value	Open space	no coherent meaning identified	Better playgrounds	Livability (medium confidence)
21	Participation, Social equity	Open space, Choice for everyone	no coherent meaning identified	no coherent meaning identified	Social equity (low confidence)

However, for topics 17 and 21, one and two, respectively, planners did not identify any coherent meaning. The others picked out certain aspects from the example contributions provided, such as “individual sports” or “better playgrounds” for topic 17. This goes along with a medium (topic 17) and low (topic 21) own confidence of assignment.

Secondly, the resulting value clusters and possible areas of value conflict were interactively investigated with the planners, who were asked to “think out loud” while navigating through the interactive map and viewing the individual contributions. Findings from this second evaluation of the quantitative strand vary depending on the sample selections planners made on the map. For instance, in one case, a planner confirmed the apparent gentrification conflict between a livability public value cluster and the equity public value cluster, but when asked about it neglects inference from the quantitative methodology: *“Sure, that [gentrification, ed.] is always a fear that’s been hovering over everything for years. But I wouldn’t read that from this tool here. So that’s something that we already know before we do this participation.”* (Participant Workshop 3). The same planner in another instance noted *“So the only conflict that I see now is, so to speak, no housing construction and preserving trees. But I was already aware of that beforehand in this case”*. In another section of the map, the planner noted: *“So here I find that would offer no added value for me now. Because I find the posts are not clearly assigned to the topic that I have clicked now.”* (Participant Workshop 3). The participant of workshop 2 largely confirmed the assigned public values to the contributions that were selected, but also highlighted the difficulties in inferring public values from contributions: *“I don’t really know whether you assign it more to the topic of - what did you call it - livability, or to the topic of security, it’s kinda both”*. The participant of workshop 1 also largely confirmed the value assignments of individual contributions, but also highlighted an over-representation of the topic of mobility *“Yes, these are mobility-related topics. No matter what I click on, it’s always traffic, isn’t it? Comes again and again”*. Based on these exemplary instances and the overall interactive discussion sections with the planners, it can be observed that

clustering contributions with public values yield many correct assignments. However, also a significant amount of wrong assignments is recognized, which was mentioned to reduce the estimated usability of such a clustering tool in planning practice. Regarding value conflicts, all planners recognize conflicting public values and their conflict manifestations in large concordance with the conflicts shown by the spatial cluster overlaps. One planner specifically noted to be in possession of such conflict knowledge beforehand, so that the clustering would not bring any added value.

7

Integration

This chapter brings together the results of the quantitative and the qualitative strand for a meaningful integration. Its main purpose is answering SQ4, namely “How can the findings of the quantitative and qualitative strand be integrated for a better understanding of public values and their conflicts in urban planning?”. As both the results from the quantitative and the qualitative strand brought forward a variety of public values that have so far not been discussed in an urban context, the integration chapter serves as an attempt to formulate a more comprehensive model of public values and their spatial conflicts in urban planning. As a first step, the overall concordances of both research strands are summarized and subsequently, their discrepancies are explicitly stated. This process then forms the basis of a more comprehensive model of public values and their conflicts in urban planning.

7.1. Concordances of Quantitative and Qualitative Results

The results of both strands of the present thesis show a high concordance of public values and conflicts that were identified. Structural Topic Modelling led to the identification of 30 underlying topics, that were assigned to five main public values. Leveraging HDBSCAN and alpha shape polygon detection, spatial areas of frequently appearing public values were identified. Utilizing the sustainability/livability prism as a conceptual tool, all of the six conflicts outlined by Godschalk (2004) were spatially located across Hamburg. Especially areas which are about to undergo a residential development show an overlap of multiple value conflicts.

In the qualitative strand, largely similar results are obtained; thus increasing the credibility of the results of the quantitative strand. Recurring spaces of potential conflict in the quantitative strand and their main conflict points were mentioned by planners before interactively discussing the results of the algorithm. During the interactive discussion, the fact that one planner deemed the overlapping clusters to be impractical because the conflicts were already known beforehand can be interpreted as a sign of very high concordance in between the qualitative and the quantitative strand: The quantitative methodology gave exactly the results that expert planners identify given their extensive background knowledge.

Using these STM and spatial value cluster results as an input to the workshops, additional valuable and contextual information were collected. One main reason for this is that planners could draw from their experience in DIPAS online participation and other means of public participation, such as public hearings and formal participation. Thus, coding of the workshop transcripts brought forward a wider range of public values and potential conflicts. For instance, the public value of conservatism and several public values inside the rather subjective umbrella term of livability were identified. Three additional conflicts were identified, namely the externality conflict, the dangers of nature conflict and the drawback of beauty conflict. All of these public values and their conflicts are also concordant in between both research strands in a way that there are no apparent contradictions in between them. Moreover, the qualitative results add valuable context to the quantitative findings by supplementing and broadening them. It is hence of dialectic interest to look specifically into points of discrepancy in between both strands.

7.2. Discrepancies between Quantitative and Qualitative Results

Integrating the findings of both strands, some quantitative results do not align with the findings of the qualitative strand. The resource conflicts in this regard provides an exemplary instance of such a discrepancy. Although planners describe the conflict between nature preservation and economic development as an archetypical conflict in every new development project, the quantitative results merely reflect that. This is not due to lacking citizen contributions which can be frequently found on both sides, but rather due to wrong assignments and thus missing spatial clusters. Especially since the public value of economic opportunity suffers from a comparatively low assignment probability, all spatial conflicts involving economic public values are underrepresented. Also, multiple valuable contributions remain in the collection of topics that were assigned to “Various values” and are thus neglected in spatial conflict areas. This kind of discrepancy thus results from methodological limitations, which are extensively discussed in section 8.2. Additionally, value conflicts that open up between official municipal decisions and citizens are not identifiable in the quantitative strand. From a theoretical perspective, such municipal public values are legitimized by electing government officials and should thus also fall under public values to consider. Similarly, public values of institutionalized actors and special interest groups are not reflected in the quantitative strand either. In that way, the qualitative results diverge from the quantitative due to the expert planner’s access to different kinds of participatory data.

Overall, integrating the quantitative and the qualitative strand leads to the main insight that public values and their conflicts in urban planning are not limited to the ones outlined by Godschalk (2004). The sustainability/livability prism can be found to serve as a solid conceptual tool for identifying public value conflicts inherent to sustainability and livability goals. However, these public values and conflicts only cover a certain part of the total spectrum of public values of urban planning; hence creating a need to expand the prism towards a more comprehensive and encompassing conception of public values.

7.3. From the Sustainability/Livability Prism to Public Value Spheres

Similar to Jørgensen and Bozeman (2007) and Van der Wal et al. (2015) who made use of the metaphor of universes and galaxies when delineating public values, I propose to expand the sustainability/livability prism of Godschalk (2004) to public value spheres in urban planning. Leaving behind the enclosed volume of a prism, conceptualizing public values in spheres provides a tool to better understand the nature of value-laden urban spaces and their inherent conflicts. At the same time, the conceptual work of Campbell (1996) and Godschalk (2004) is both preserved and embedded in a larger context. Contrary to geometrical shapes that grow in complexity when adding vertices, a spherical representation of a public value allows for a simple expansion and display of the pluralism of public values and their conflicts. Depending on the purpose of usage, such spheres can be displayed differently.

In a first display of public value spheres as shown in Figure 7.1, the focus is on both showing the broad public value categories and their main points of conflict. While the values of sustainability and livability are still present and central to public values in urban planning, they are now embedded in additional public values of health, safety and conservatism. The latter is rather isolated and plays a special role in public value spheres: Since the intrinsic value lies in opposing change itself and preserving the status quo, it could possibly conflict with any other public value. The umbrella term of livability was found to contain multiple public values: Quietness, Aesthetics, Sports, Cleanliness and Social Interaction. Social Equity values seem to revolve around inclusivity, accessibility, affordability and diversity. Ecologic quality covers the two main aspects of green space creation and green space preservation.

A second display of public value spheres in Figure 7.2 shows the interplay of instrumental and possible intrinsic public values via overlapping public value spheres. For instance, if citizens value green space protection/creation instrumentally, the related intrinsic public value could either be in the sphere of ecologic quality, livability or health, in two spheres respectively or in all of them. Similarly, if people value social interaction, that might be an intrinsic value in itself or might serve the overarching value of social equity or livability. The public values of sports and recreation might be subsumed under either the public value of health or the public value of livability.

To iterate, these overlaps follow from an integration of the results of both research strands and are

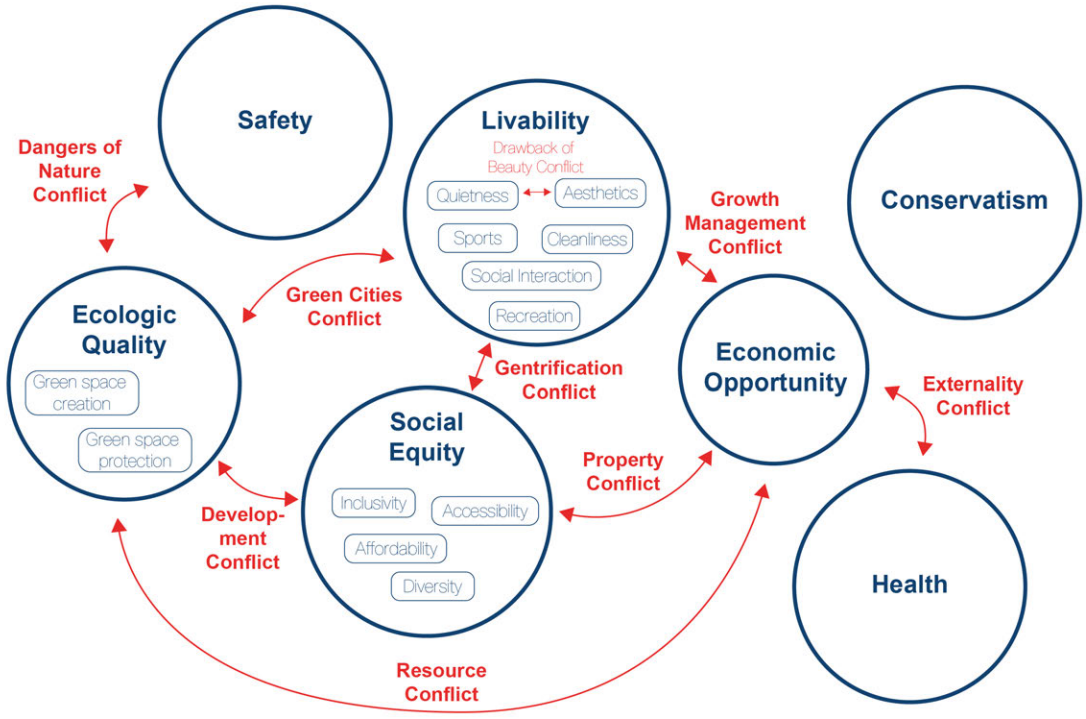

Figure 7.1: Public Value Spheres with Conflicts

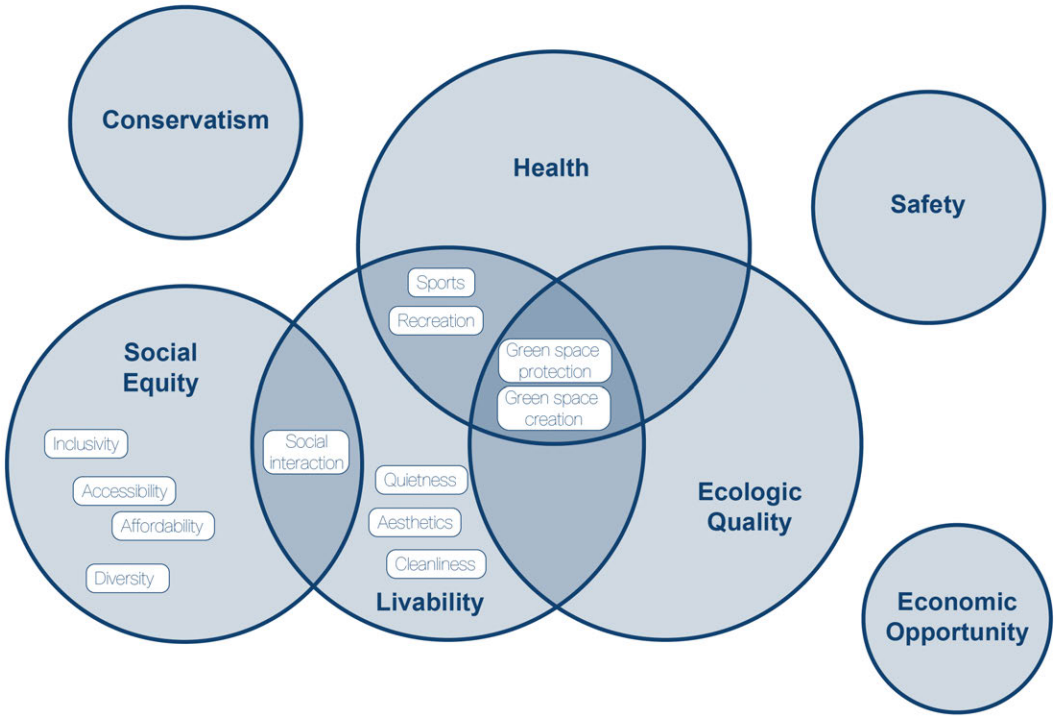

Figure 7.2: Overlapping Public Value Spheres

by no means meant to be exhaustive. In contrary, they provide a first display on how the conceptual model of public value spheres can also be utilized to distinguish in between instrumental and intrinsic public values. It might also be applied to analyze where specific planning interventions or development choices are situated and which specific public values they could serve. Such possible applications of public value spheres are however discussed in more detail in chapter 8.

8

Discussion

This chapter aims to embed the results in a larger context. Additionally, the present work is discussed in the light of its limitations.

8.1. Embedding of Results

This section dedicated to embedding the results of the present thesis in a larger context aims to broaden the scope after the in-depth analysis of the case study. The integration of both research strands is discussed, possible applications of the results are listed and by reflecting on digital participatory processes, concrete suggestions for DIPAS improvements are made.

8.1.1. Mixed methods in Spatial Sciences

Since this thesis brings together quantitative and qualitative research in a novel way by combining the geospatial analysis of natural-language-processed participatory data with expert workshops, firstly the learnings from mixing methods shall be discussed. On a general notion, the mixed methodology shows the utter importance of contextualizing data and gaining access to latent and tactic knowledge. Although the quantitative results enabled a detailed investigation of public values and their possible areas of conflict, the qualitative follow-up succeeded in adding nuance and context. Especially in conflict identification, expert knowledge of experienced planners is needed to identify points of clashing public values. For instance, the manifestations of the development conflict between the values of equity and ecology in a playground setting seems difficult to identify given only the clustering of (correctly assigned) citizen contributions. In that way, the quantitative results might indicate a latent development conflict, but not explain its possible manifestation at a specific instance of urban space. Additionally, and although NLP has made profound progress with the advent of new statistical methods such as STM, applying quantitative methods to largely unstructured textual data in many cases can still not outperform human judgement. This is even more the case when inferring public values from citizen contributions, a task that is very much dependent on background information and knowledge of the human nature. In that regard, the qualitative follow-up mitigates the shortcomings of the quantitative methodology and supplements its advantages in analyzing big participatory data.

8.1.2. Applying Public Value Spheres

As it became apparent in the qualitative strand, multiple people might oppose a certain development in their direct surroundings, but generally favor the very same development. For instance, in one planner's perception, citizens do value green space, playgrounds and children, but not in front of their own home. In another instance, a planner describes how the very same people that heavily lobby against aircraft noise are the ones going for long-distance flights every holiday. This observation is oftentimes framed as a "Not in my backyard" (NIMBY) phenomenon. While such behaviour in an urban context is explained as a consequence of post-political and post-democratic currents in the citizenry (Nagel & Satoh, 2019), seeing it through the lens of public value spheres might provide an additional way of understanding. This is, in my point of view, that NIMBY behavior is a direct consequence of the interplay in between individual and public values. While in general, playing opportunities for children are favored

as a public value, the individual value of quietness might outdo the public value in a specific instance. It is precisely the idea that values comprise both cognitive and emotional aspects that explains why in many instances, conflicting (public) values appear and (counter)action is elicited. As public values are incommensurable in their plurality, instances of seemingly irrational behavior of citizens can be explained through the lens of values in urban planning.

Although this might appear like a straight forward line of thought, its implications are possibly far-reaching for public participation in urban planning. Studying urban conflicts through public values spheres provides a suitable conceptual tool for planners to understand and map the plurality of public values and their conflicts in urban space. For doing this, one has to rethink and possibly adapt current participatory practices. That is, first and foremost, to truly involve citizens in a way that brings to light not only *what* they want, but *why* they want it. Once these public values are discovered, public value spheres can help understanding the plurality of values in play, their interrelations and their archetypical conflicts. On the side of citizens themselves, public value spheres provide a means to exchange viewpoints and understand other perspectives than the ones found in personal social bubbles. They might also serve as a visual means to understand that in a deliberative planning process, there will inevitably be conflicts between public values. For academia, public value spheres provide a means to study and reveal the interconnections of several public values and possibly map them to socioeconomic groups for future sociological and data-driven research. Eventually, by taking into account the value-laden nature of urban space and identifying underlying public values, the aim of developing more sustainable and inclusive cities as pursued in the UN's SDG 11 is supported.

8.1.3. Reflection on Digital Participation

Since the main section of the present research makes use of participatory data originating from Hamburg's PPGIS platform and was then evaluated qualitatively by expert planners, some reflections on digital participation shall be brought up in this section of the discussion. Building on that, suggestions for future DIPAS improvements are made.

Digital technologies significantly lower the thresholds of participation. Since expressing ones opinions is not limited to physical presence at one specific place in time, citizens are enabled to input their views, statements and concerns according to their preferences and daily schedules. As a consequence, planners have access to more diverse inputs. As the participant of workshop 1 puts it, *"I always had this wild idea: online participation - people read that and go to the site in the evening and participate. No, they sit on the playground at 10 in the morning and write their comments on their smartphones. Which is good, too, and of course that means we have a higher level of participation. And we also get another view. The higher the participation, the greater the likelihood that we'll get another input."* Moreover, "offline" participatory processes might suppress certain voices due to social norms and other psychological and sociological factors. For instance, as it is described by one expert planner who conducted multiple public hearings, citizens *"[...] come up to us afterwards and say 'Yes, I don't want any trouble with the neighbor, but I'd rather have it this way and that way'"* (Participant Workshop 1). This is, according to the planner, more likely to happen when few very opinionated individuals take over physical meetings by voicing their opinions in a very assertive, non-inclusive way. As one planner puts it very bluntly, *"there is usually one person who yells very loudly and the others then do not dare to say anything anymore"*. (Participant Workshop 1). In that regard, digital participation as designed in the DIPAS platform ensures a much more equal playing field, since anonymity provides all individuals the space necessary to express their true believes without any immediate feedback of social control. Another benefit of digital participation specifically to planners is the documentability of participatory artifacts, which can typically not be performed during on-site events in an adequate depth (see also the related discussion of Dyer et al., 2017; K. R. Moore & Elliott, 2016).

On the contrary, there are also scholars who view the physical presence in a deliberative space as a prerequisite for democratic debate. As Assheuer (2021) rephrases the thoughts of famous philosopher Hannah Arendt (1960), "Any public space must be a physical space; even in the fiercest conflict, citizens should relate to a real, tangible world, a world that both separates and connects them - even if it is only a table". In Arendt's view, physical urban space that can be directly experienced is the fabric of any public urban debate. It provides a common reference frame for discussion. In the digital space

however, where algorithms tailor content to individuals, such a common reference frame gets lost and debates become fragmented up until a point where consensus is beyond reach and (value) conflicts prevail (Assheuer, 2021).

In the specific case of Hamburg's digital participation system, DIPAS was developed to be deployed both in online and offline settings. It is released as open source software which can now be implemented in participatory projects around the world for no proprietary costs. In that regard, some suggestions shall be mentioned for designing future participatory processes. They originate both from the expert workshops and from personal observations.

In order to both identify public values and motives of the citizenry, specifically asking contributors for the intrinsic reasons of their specific idea/feedback/critique eases inclusive urban planning. Although participatory projects might be very specific in their nature, asking for underlying (public) values assists a comprehensive understanding of the inherently social urban space, both for planners and for citizens. Asking for the "why" subsequently to asking for the "what" might also lead to personal reflections of citizens on the origins of their contribution, thus enhancing the democratic process itself. As citizens however might not always be capable of articulating their underlying values, research on generative design techniques and contextmapping (Visser et al., 2005) might provide additional starting points on how to support the extraction of tactic knowledge and latent needs. Both kinds of information are characterized by the fact that people are typically unaware of them and they can hardly be articulated without the trigger of a previous self-reflective process (Visser et al., 2005). Thus, one possible starting point could be the inclusion of sensitization design elements, where generally "participants are triggered, encouraged and motivated to think, reflect, wonder and explore aspects of their personal context" (Visser et al., 2005). In an online PPGIS context, this could for instance be the usage of a tutorial-like interactive introduction which both explains how the platform functions and provokes reflection of the participant.

With the use of quantitative NLP tools such as STM, a pre-clustering of contributions into certain themes can serve as a real-time "aggregation of voices" (Thoneick, 2021) and "aggregation of values". Implementing such a functionality into the platform would both provide planners with better analysis tools and citizens with a better overview of already existent discussion points. In that way, both the discourse itself as well as the impact of contributions on planning can be improved. Another point brought up in the expert workshops was the adoption of the DIPAS platform to the needs of specific groups. For instance, the participant of workshop 1 stated that teenagers are typically underrepresented in participatory processes. Thus, adopting the interface of the tool in an appealing way for certain groups might lead to a better representation of them. This could be in terms of user interface, display of results or even playful elements for younger generations.

8.2. Limitations

In the present explanatory sequential mixed-methods approach, one quantitative strand and one qualitative strand were conducted to identify public values and their inherent conflicts in urban planning within the case study of Hamburg. This research approach comes along with some limitations that need to be highlighted.

8.2.1. Biases in Input Data

Participatory data in itself is subject to bias. Related research in a Western context (US, Canada, Autralia, New Zealand) shows that voluntary participation in PPGIS platforms yields significantly different outcomes compared to random sampling (Brown et al., 2014). On average, voluntary participants were found to have a higher education and were less satisfied with the participation process as compared to participants selected from random sampling (Brown et al., 2014).[1] Thus, the present input data on which structural topic modelling was performed, is almost certain to be biased. As DIPAS was developed with data privacy concerns in mind, neither planners nor the platform providers know who contributes to the various processes. This voluntary participation character in combination with a

[1] Random sampling does not lead to a truly representative outcome of participants either. Return rates from elderly males with a higher formal education were found to be higher in a US context. Certain minority groups are underrepresented (Brown, 2012)

low-threshold design makes DIPAS prone to biased contributions originating in mobilization of certain interest groups and from individuals. In an initial data analysis phase, multiple occurrences of the same contribution with only slight changes in wording were found, supposedly to circumvent a duplicate detection algorithm built into DIPAS. As this thesis is concerned with the identification of public values and their conflicts and not the implications for decision-making, such biased input data however only affects the research to a certain extend. Public value incommensurability and pluralism are highlighted at multiple occasions and no normative statements are inferred from public value identification. Steps where biased input data influences the quantitative outcomes are topic composition, parameters to select the number of topics and spatial clusters. Aside from the bias in contributors, a bias of the input data in terms of topic (and related values) is likely. As multiple participation projects were started with a specific question posed to the citizenry, the topics and public values also reflect these initial conditions.

8.2.2. Methodological Limitations

Starting from the main research approach of a case study-mixed methods approach, it shall be highlighted at this point that the results outlined are all embedded in the overarching case study of Hamburg. The geographical and historical context of the city must thus be acknowledged when analyzing certain specific public values and their conflicts. On a general notion, Hamburg's central European location and its institutional organization of a representative democracy likely brings forward different public values and different conflicts as compared to other historical and cultural contexts and regimes. Nonetheless, since the proposed conceptual tool of public value spheres is explicitly designed to be open to expansion and/or rearrangement, the findings are believed to be generalizable. This is to the extend that future case studies in differing contexts might help with drawing a more holistic picture of public values and public value conflicts in urban planning. It is at this point to also mention that given Hamburg's ongoing urban development processes and its pioneering role in public participation and transparency, it can be considered an exemplary case study for Central Europe.

Some limitations come along specifically with the quantitative methods involved. As brought up by one planner in the expert workshops, clustering contributions with unsupervised algorithms and their preceding preprocessing might lead to certain voices being suppressed. Dropping the most infrequent 0.75% of terms as done in the present research leads to the exclusion of highly specific contributions, which might reflect important aspects and public values to consider. As STM is based on expectation maximization for the likelihood of certain word occurrences, infrequent words are usually not reflected in the most probable topic words. While the latter is partially mitigated by including the FREX metric into topic investigation, the former is a limitation inherent to the quantitative method itself. Thus, it should be highlighted that any quantitative analysis of textual participatory data cannot replace a thorough manual inspection. As this process however takes up many resources from planners, the proposed methodology could also be combined with other, more in-depth participatory processes. As this present research shows, it can be utilized to identify potential areas of value conflicts. Additionally, clusters of certain topics can be identified with the same set of methods except manual value assignment. Both quantitative analysis steps can then serve as a pre-aggregation of contributions for both planners and citizens. Mapping spatial public value conflicts is also impaired by topics which show no coherent public value, but rather reflect a debate around certain topics. For instance, the debate around the car-free character of the inner city area Jungfernstieg could not be reflected in spatial value clusters, since the topic itself was assigned to "Various values". Although these effects were tried to be mitigated by including sentiment data into topic assignments, they could not be fully eliminated. After all, around one third of the contributions were not allocated to a single public value, thus significantly lowering the amount of possible value conflict spaces identified. One means to mitigate this limitation would be by looking at specific "topic maps", which display where discussions revolve around certain topics and - possibly - how the discussion points reflect community values in terms of up- and downvotes.

8.2.3. Comments and Replies

As multiple experiments regarding the inclusion of comments and replies into STM did not show semantically coherent topics, all of the public values embedded in such contribution conflicts are underanalyzed in the present thesis. The main reason for this is that contextual information of the "parent" contribution or comment is needed to understand many comments of replies. STM as a methodology - although allowing for the inclusion of metadata - cannot process such complex relationships embedded

in textual nuance. To also make use of these contribution conflicts found in the DIPAS data, a possible starting point could be the related work of Liebeck et al. (2017). They used the concept of word embeddings in a multidimensional vector-space in combination with a conceptual model of arguments in online participation to extract pro and contra points. This "argument mining" (Liebeck et al., 2017) could also be applied to identify underlying public values that are found in comments and replies of DIPAS.

8.2.4. Inferring Public Values

Inferring public values from participatory data leads to one main limitation of the current research: Citizens typically contribute *what* they want, not *why* they want it. Thus, both in the process of manual value assignment, as well as in the results of expert workshops, the participatory data largely served as a proxy to identify public values. Multiple implicit and explicit assumptions are made when inferring the *why* from the *what*. Results of the qualitative evaluation reflect this inference problem. Out of the topics with a low subjective assignment confidence, multiple planners came to the conclusion that no coherent public value can be pointed out, thus weakening this specific step in the quantitative methodology. Nonetheless, as a transparent value assignment and documentation of the methodology is performed, it is up others to check whether these assumptions and value assignments hold true, both for the case of Hamburg and on a broader scale. This also ties in to the fact that the present work does not aspire to provide an exhaustive collection of public value spheres. Quite the contrary, I believe that conducting additional case studies on different scales bring forward more underlying public values, as well as more conflict archetypes. This thesis thus serves as a starting point for integrating the concept of public values into urban planning theory.

8.3. Outlook: Conflict Mitigation and Resolution

Identifying public values and their points of conflict is only a first step towards finding specific solutions for how to develop the scarce resource of public space. In a very general notion, the expert planner of workshop 1 stated that *"We cannot solve everything. We cannot solve societal problems in public space."*. Personally, I agree with that statement, because it reflects the limited capabilities of any individual when it comes to larger societal problems. One cannot expect a planner to solve every spatial conflict, especially not when underlying public values conflict. Reiterating the definition of a value, Bozeman (2007, p. 117) states that "because a value is part of the individual's definition of self, it is not easily changed and it has the potential to elicit action". Instead, broad societal changes towards more inclusive and sustainable cities requite effort of all individuals constituting the society. In that process, truly acknowledging the relational character of urban space also means tolerating different and conflicting values.

Nonetheless, many spatial public value conflicts can certainly be mitigated or resolved by solutions that find agreement of representatives from conflicting groups. For instance, a drawback of beauty conflict between the values of quietness and aesthetics/appeal in a playground setting can be mediated by installing certain noise-reducing fence elements that dampen the sound of footballs. Identifying these conflicts however provides a necessary first step to research into mitigation or conflict resolution strategies.

9 Conclusion

Coming back to the main research question of the present thesis, “Which public values and inherent spatial conflicts can be identified by leveraging participatory data in urban planning”, and the respective sub research questions, multiple concluding answers could be found. At the same time, new questions open up possible pathways for future research. This chapter thus aims to state conclusive remarks, as well as to outline possible future research questions.

Understanding public values and especially their inherent conflicts in the dimensions of sustainability and livability is crucial to achieve the UN’s Sustainable Development Goal 11 of more inclusive and sustainable cities. Only once such conflicts are identified, they can be effectively addressed, mitigated and potentially resolved. By viewing such conflicts through the lens of public values, the case study of Hamburg showed that Godschalk’s sustainability / livability prism provides a good starting point for investigating public values and their conflicts in urban spaces. Answering sub research question 1, “Which public values can be identified through the application of NLP methods to large-scale qualitative participatory data?”, the public values of social equity, economic opportunity, ecologic quality, livability and safety/health were identified, thus largely confirming the existing literature. A closer look into the public value clusters, their respective wordclouds and most probable contributions revealed that the public value of ecologic quality revolves around two main points, namely the creation and protection of green spaces. Social equity was found to be an umbrella term to the values of accessibility, affordability and inclusivity. The public value of livability subsumes the values of aesthetics, sports and recreation.

Revisiting sub research question 2, “Building on spatial value clusters obtained from geolocated participatory data, which spatial conflicts in public values can be identified under the sustainability/livability prism?”, all conflicts were reflected in different areas of the case study of Hamburg. Participatory processes aimed at mobility oftentimes gave rise to the property conflict between the public values of social equity and economic opportunity, or the private versus collective nature of urban space. They manifest in the wish to assign public space to either (private) parking spots or to (collective) usages such as bike/pedestrian lanes or green areas. In the same context, also the development conflict manifests in between the values of social equity and ecologic quality. This is discussed by proponents of protecting existent green areas and trees and proponents of increasing accessibility by constructing additional cycling lanes. For new residential development projects, multiple overlapping public value conflicts manifest. For instance, the green cities conflict, the resource conflict and the gentrification conflict play a role in Hamburg’s “Jump across the Elbe river” in the new districts of Grasbrook and the Spreehafenviertel. For the latter project, a latent gentrification conflict is identified that might also impact the neighboring low-income district of Wilhelmsburg.

Building on the quantitative research strand and to answer sub research question 4 “Which public values and inherent conflicts do planning experts identify based on participatory data?”, workshops with expert planners largely confirm the public values and their conflicts identified in the quantitative strand. As they draw from different sources of participatory data, such as institutionalized participation

processes, public hearings and conversations with citizens, additional public values and conflicts were identified. An argument was made for separating the values of health and safety into two different dimensions. Oftentimes, according to expert planners, the subjective, perceived safety rather than the objective safety related to physical health can be found in participatory data. The public value of conservatism is identified. Its core lies in the objection of change and the preservation of the status quo. The public values of quietness, cleanliness and social interaction are added to the overarching value of livability. Furthermore, the public value of diversity is subsumed unter the value of social equity. Expert planners also point out additional spatial public value conflicts between the public values that were identified. These newly discovered conflicts are named the “Externality Conflict” between the values of economy and health, “Dangers of Nature Conflict” between the values of ecology and safety and the “Drawback of Beauty Conflict” between the values of quietness and aesthetics.

To answer sub research question 4, “How can the findings of the quantitative and qualitative strand be integrated for a better understanding of public values and their conflicts in urban planning?”, leveraging participatory data from the citizenry and expert workshops provides clear evidence for expanding the concept of public values in an urban context beyond the sustainability/livability prism. Thus, a need for a new conceptual tool to understand public values and their conflicts in urban planning arises. Based on these conclusions, the conceptualization of public values as spheres is proposed. Leaving behind the enclosed volume of a prism, public value spheres can be expanded, rearranged and used for multiple displays of public values and their conflicts. They too can serve as an aggregation of voices for the citizenry, as a conceptual tool for planners to better identify and mitigate public value conflicts and as a means to study the complex social interactions in urban spaces for academia.

Overall, the present thesis contributes in two main ways to the advancement of urban science. For one, from a methodological point of view, the chosen case study-mixed methods approach provides a means to combine quantitative and qualitative work in an urban context and in an innovative and scientifically viable way. Up to my best knowledge, this is also the first attempt to study large-scale qualitative textual participatory data originating from PPGIS platforms quantitatively using natural language processing. It thus adds to the list of spatial analysis techniques, specifically the ones of participatory big data. Secondly, from a theoretical point of view, the present thesis brings together public value theory originating in public administration research with urban planning and public participation research. Utilizing the concept of relational space as a common theme, the newly proposed conceptual tool of public value spheres provides a novel theoretical perspective on how citizens value urban space and how these valuations might lead to conflicts in urban development.

Multiple alleys for future research open up. Building on the discussion in chapter 8, five main starting points are provided. Firstly, additional case studies in other social and cultural contexts, especially ones in the Global South, would add additional perspectives on public value spheres. Enlarging this public value network with additional public values and archetypical conflicts will ultimately lead to a more comprehensive understanding of the complex interactions of public values and urban space. Secondly, investigating in the differentiation between individual and public values and the sources of conflict in between those would certainly help explaining multiple urban social phenomena and could provide starting points for more effective public participation processes. Additional multidisciplinary research is needed in developing a comprehensive theory of public values in urban planning and its relationships to social norms and interpersonal conflicts. Thirdly, research into participatory processes and generative design techniques could aid in improving current PPGIS platforms to not only investigate in what citizens want, but also their underlying public values. Fourthly, investigating in whether certain sociodemographic groups can be related to certain public value spheres could lead to insights concerning the representative involvement of the citizenry. For instance, if certain sociodemographic factors would correlate with similar public value sets, inferences about the representation of such groups in participatory processes can be drawn. Fifthly, a closer investigation in specific public value conflicts could possibly bring forward strategies on how to deal with, mitigate and possibly resolve these conflicts.

Lastly, it is at this point to mention that cities for citizens in their most inclusive manifestation are not beyond reach. Attempts to truly understand the citizenry should start at identifying their norms and values; the principles on which the development of their city should be based. Emerging technology

and multidisciplinarity approaches now enable an integration of pluralistic values obtained from a large-scale sample of citizens for inclusive and sustainable planning of urban space.

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A

Appendix

A.1. Ethics Application and Approval

Since the present work involves direct research with human subjects in its qualitative strand and leverages participatory data in its quantitative strand, it was examined by the TU Delft Human Research Ethics Committee (HREC). Both the application to conduct the present research and the approval are attached in this chapter.

A.1.1. Checklist HREC

Delft University of Technology
ETHICS REVIEW CHECKLIST FOR HUMAN RESEARCH
(Version 18.06.2020)

This checklist should be completed for every research study that involves human participants and should be submitted before potential participants are approached to take part in your research study. This also applies for students doing their Master-thesis.

In this checklist we will ask for additional information if need be. Please attach this as an Annex to the application.

The data steward of your faculty can help you with any issues related to the protection of personal data. Please note that research related to medical questions/health may require special attention. See also the website of the CCMO.

Please upload the documents (go to this page for instructions).

Thank you and please check our website for guidelines, forms, best practices, meeting dates of the HREC, etc.

I. Basic Data

Project title:	**Cities for Citizens: Identification of public value conflicts in urban areas**
Name(s) of researcher(s):	**Rico Herzog**
Research period (planning)	**22.03. – 27.08.2021**
E-mail contact person	**r.h.herzog@student.tudelft.nl**
Faculty/Dept.	**TPM Facults, Department of Multi-Actor Systems**
Position researcher(s):[1]	**Student**
Name of supervisor (if applicable):	**Trivik Verma**
Role of supervisor (if applicable):	**Supervisor Master Thesis**

II. A) Summary Research

The research proposes to investigate in public value conflicts in urban planning. Anonymized geo-located citizen's comments are leveraged to identify spatial value conflicts using natural language processing and explanatory spatial analysis techniques. To compare and contrast the algorithmic findings,expert workshops with urban planners are conducted.

B) Risk assessment & risk management
No risks are expected.

[1] For example: student, PhD, post-doc

III. Checklist

Question	Yes	No
1. Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children, people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups).		x
2. Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator (such as own children or own students)?[2]		x
3. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people in non-public places).		x
4. Will the study involve actively deceiving the participants? (For example, will participants be deliberately falsely informed, will information be withheld from them or will they be misled in such a way that they are likely to object or show unease when debriefed about the study).		x
5. Sensitive personal data • Will the study involve discussion or collection of personal sensitive data (e.g., financial data, location data, data relating to children or other vulnerable groups)? Definitions of sensitive personal data, and special cases thereof are provided here.		X
6. Will drugs, placebos, or other substances (e.g., drinks, foods, food or drink constituents, dietary supplements) be administered to the study participants?		x
7. Will blood or tissue samples be obtained from participants?		x
8. Is pain or more than mild discomfort likely to result from the study?		x
9. Does the study risk causing psychological stress or anxiety or other harm or negative consequences beyond that normally encountered by the participants in their life outside research?		x
10. Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants?		x
Important: if you answered 'yes' to any of the questions mentioned above, please submit a full application to HREC (see: website for forms or examples).		
11. Will the experiment collect and store videos, pictures, or other identifiable data of human subjects? [3] .	x	

[2] **Important note concerning questions 1 and 2.** Some intended studies involve research subjects who are particularly vulnerable or unable to give informed consent .Research involving participants who are in a dependent or unequal relationship with the researcher or research supervisor (e.g., the researcher's or research supervisor's students or staff) may also be regarded as a vulnerable group . If your study involves such participants, it is essential that you safeguard against possible adverse consequences of this situation (e.g., allowing a student's failure to complete their participation to your satisfaction to affect your evaluation of their coursework). This can be achieved by ensuring that participants remain anonymous to the individuals concerned (e.g., you do not seek names of students taking part in your study). If such safeguards are in place, or the research does not involve other potentially vulnerable groups or individuals unable to give informed consent, it is appropriate to check the NO box for questions 1 and 2. Please describe corresponding safeguards in the summary field.

[3] Note: you have to ensure that collected data is safeguarded physically and will not be accessible to anyone outside the study. Furthermore, the data has to be de-identified if possible and has to be destroyed after a scientifically appropriate period of time. Also ask explicitly for consent if anonymised data will be published as open data.

Question	Yes	No
12. Will the experiment involve the use of devices that are not 'CE' certified? *Only, if 'yes': continue with the following questions:*		x
➢ Was the device built in-house?		
➢ Was it inspected by a safety expert at TU Delft? (*Please provide device report, see: HREC website*)		
➢ If it was not built in house and not CE-certified, was it inspected by some other, qualified authority in safety and approved? *(Please provide records of the inspection).*		
13. Has or will this research be submitted to a research ethics committee other than this one? (*if so, please provide details and a copy of the approval or submission).*		x

IV. Enclosures

Please, tick the checkboxes for submitted enclosures.

Required enclosures

- ○ A data management plan reviewed by a data-steward.

Conditionally required enclosures

if you replied 'yes' to any of the questions 1 until 10:
- ○ A full research application

If you replied 'yes' to questions 11:
- ○ An Informed consent form

If you replied 'yes' to questions 12:
- ○ A device report

If you replied 'yes' to questions 13:
- ○ Submission details to the external HREC, and a copy of their approval if available.

Additional enclosures

- ○ Any other information which you feel to be relevant for decisionmaking by the HREC.

V. Signature(s

Signature(s) of researcher(s)
Date: 09.04.2021

Signature (or upload consent by mail) research supervisor (if applicable)
Date: 09.04.2021

A.1.2. Data Management Plan

Cities for Citizens: Identification of public value conflicts in urban areas

A Data Management Plan created using dmproadmap

Creators: Rico Herzog, First Name Surname

Affiliation: Delft University of Technology

Template: TU Delft Data Management Plan template (2021)

Project abstract:

The research proposes to investigate in public value conflicts in urban planning. Anonymized geo-located citizen's comments are leveraged to identify spatial value conflicts using natural language processing and explanatory spatial analysis techniques. To compare and contrast the algorithmic findings, expert workshops with urban planners are conducted.

Last modified: 08-04-2021

Cities for Citizens: Identification of public value conflicts in urban areas

0. Administrative questions

1. Name of data management support staff consulted during the preparation of this plan.

My faculty data steward, Nicolas Dintzner, has reviewed this DMP on 08.04.2021.

2. Date of consultation with support staff.

2021-04-08

I. Data description and collection or re-use of existing data

3. Provide a general description of the type of data you will be working with, including any re-used data:

Type of data	File format(s)	How will data be collected (for re-used data: source and terms of use)?	Purpose of processing	Storage location	Who will have access to the data
Anonymized, geo-located citizen comments	.csv, .geojson	API access to DIPAS platform, per mail from DIPAS project manager	Identification of public value conflicts	Local Computer, private GitHub repository	Principal Investigator
Workshop recordings	.mp4, .mp3	Smartphone / Computer recordings	Comparison and contrasting of algorithmic findings to expert knowledge	Local computer, OneDrive	Graduation committee
Workshop results	.jpg, .pdf, .doc	Scanning, Screenshots, Text documents	Comparison and contrasting of algorithmic findings to expert knowledge	Local computer, OneDrive	Graduation committee
Code	.py, .ipynb, .r	Will be created	Creating aggregated results from the anonymized input data	Local Computer, private GitHub repository	Graduation committee
Spatial public value clusters	.geojson	Will be created	Results created from the code and the input data	Local Computer, private GitHub repository	Graduation committee

4. How much data storage will you require during the project lifetime?

- < 250 GB

II. Documentation and data quality

5. What documentation will accompany data?

- README file or other documentation explaining how data is organised
- Methodology of data collection

Geo-located citizen's comments, as asked for by the data owners, will be deleted after aggregated results were obtained.

Otherwise, anonymized transcripts of the findings of expert workshops will be published within the Master Thesis as an appendix.
A ReadMe file will be created to give an overview of the code and the results produced.

III. Storage and backup during research process

6. Where will the data (and code, if applicable) be stored and backed-up during the project lifetime?

- Another storage system - please explain below, including provided security measures
- OneDrive

Private GitHub repository with no access rights to any other person except the principal investigator.

IV. Legal and ethical requirements, codes of conduct

7. Does your research involve human subjects?

- Yes

8A. Will you work with personal data? (information about an identified or identifiable natural person)

If you are not sure which option to select, ask your Faculty Data Steward for advice. You can also check with the privacy website or contact the privacy team: privacy-tud@tudelft.nl

- Yes

8B. Will you work with any types of confidential or classified data or code as listed below? (tick all that apply)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

- Yes, confidential data received from commercial, or other external partners

Anonymized contributions and comments from users made on different instances of the DIPAS platform are received.

9. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your Faculty Contract Manager when answering this question. If this is not the case, you can use the example below.

The ownership of the citizen comment's is partially openly accessible, but also partially confidential (for this part, access was granted by the data owner).
The aggregated data, as well as the results of the expert workshops will be published within the TU Delft Repository (Master Thesis), as well as the 4TU repository (code and resulting dataset) as being part of the final results of the Master Thesis.

10. Which personal data will you process? Tick all that apply

- Other types of personal data - please explain below
- Signed consent forms
- Data collected in Informed Consent form (names and email addresses)
- Email addresses and/or other addresses for digital communication
- Names and addresses

Audio/Video recordings, if consent is given.

11. Please list the categories of data subjects

Experts in the urban planning domain, preferably urban planners involved in planning processes in Hamburg.

12. Will you be sharing personal data with individuals/organisations outside of the EEA (European Economic Area)?

- No

15. What is the legal ground for personal data processing?

- Informed consent

16. Please describe the informed consent procedure you will follow:

Experts will be handed an informed consent form in which they consent their participation in the workshop, as well as the data processing required to compare and contrast their assessment of public value conflicts to the algorithmic findings.

17. Where will you store the signed consent forms?

- Same storage solutions as explained in question 6

18. Does the processing of the personal data result in a high risk to the data subjects?

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data during your research (check all that apply).
If two or more of the options listed below apply, you will have to complete the DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to receive support with DPIA.
If only one of the options listed below applies, your project might need a DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to get advice as to whether DPIA is necessary.
If you have any additional comments, please add them in the box below.

- None of the above applies

22. What will happen with personal research data after the end of the research project?

- Anonymised or aggregated data will be shared with others

Anonymized statements and assessments from the workshops will be part of the resulting Master Thesis.

25. Will your study participants be asked for their consent for data sharing?

- Yes, in consent form - please explain below what will do with data from participants who did not consent to data sharing

Their data will, if consent is given, be shared in an anonymized way, such as unidentifiable quotes or statement.

V. Data sharing and long-term preservation

27. Apart from personal data mentioned in question 22, will any other data be publicly shared?

- Not all non-personal data can be publicly shared - please explain below which data and why cannot be publicly shared

29. How will you share research data (and code), including the one mentioned in question 22?

- My data will be shared in a different way - please explain below
- I will upload the data to another data repository (please provide details below)

The Master Thesis including the anonymized quotes and results of the workshops will be shared in the TU Delft Education Repository.
The code, as well as the resulting data will be shared in the 4TU repository.

30. How much of your data will be shared in a research data repository?

- < 100 GB

31. When will the data (or code) be shared?

- At the end of the research project

32. Under what licence will be the data/code released?

- GPL

VI. Data management responsibilities and resources

33. Is TU Delft the lead institution for this project?

- Yes, the only institution involved

34. If you leave TU Delft (or are unavailable), who is going to be responsible for the data resulting from this project?

Trivik Verma, t.verma@tudelft.nl

35. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

4TU.ResearchData is able to archive 1TB of data per researcher per year free of charge for all TU Delft researchers. We do not expect to exceed this and therefore there are no additional costs of long term preservation.

A.1.3. Informed Consent Form

Consent Form for Expert Workshops to Identify Public Value Conflicts in Urban Spaces

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the study		
I have read and understood the study information sheet or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	□	□
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	□	□
I understand that taking part in the study involves audio recordings, which will later be (partially) transcribed in text, and possibly textual and visual information co-produced by the expert and the workshop conductor. The audio recordings will later be destroyed.	□	□
Use of the information in the study		
I understand that information I provide will be used for comparing and contrasting algorithmic findings with expert knowledge within a Master Thesis. Subsequently, given academic interest, aggregated results might be published in an academic paper and will be made publicly available.	□	□
I understand that personal information collected about me that can identify me, such as E-Mail, Name, job occupation and audio recordings, will not be shared beyond the study team.	□	□
I agree that my information can be quoted in research outputs without mentioning my name, but my broad job description. Any personal information that can identify me will be anonymized.	□	□
Future use and reuse of the information by others		
I give permission for the textual or visual inputs that I provide, as well as audio transcripts to be archived in a repository so it can be used for future research and learning. The data deposited will in any case be anonymized so that no backtracking can happen.	□	□

Signatures

_____	_____	_____
Name of participant	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Researcher name [printed]	Signature	Date

Übersetzung: Einwilligungsformular zur Identifikation von öffentlichen Wertkonflikten in urbanen Räumen

Bitte die entsprechenden Kästchen ankreuzen	Ja	Nein
Teilnahme an den Workshops		
Ich habe das beiliegende Informationsblatt gelesen und verstanden oder es wurde mir vorgelesen. Es wurde mir ermöglicht, Fragen hinsichtlich der Forschung zu stellen und meine Fragen wurden zu meiner Zufriedenheit beantwortet.	□	□
Ich stimme der Teilnahme an den Expertenworkshops freiwillig zu und ich bin mir bewusst, dass ich zu jeder Zeit Antworten auf Fragen verweigern kann und die Workshops verlassen kann, ohne hierfür Gründe angeben zu müssen.	□	□
Ich bin mir bewusst, dass die Teilnahme an den Workshops Audioaufnahmen involviert, welche später (teilweise) transkribiert werden. Zudem können im Laufe des Workshops textliche oder visuelle Informationen gemeinsam mit dem Workshopleiter produziert werden. Die Audioaufnahmen werden letztendlich vernichtet werden.	□	□
Verwendung der generierten Informationen		
Ich bin mir bewusst, dass die Informationen, die ich zur Verfügung stelle, genutzt werden, um die Ergebnisse des entwickelten Tools mit Expertenwissen zu vergleichen und zu kontrastieren. Im Nachgang können aggregierte Resultate ggf. in einer wissenschafltichen Veröffentlichung verwendet werden, sollte akademisches Interesse bestehen.	□	□
Ich bin mir bewusst, dass personenbezogene Informationen, die über mich gesammelt wurden und mich identifizieren können (bspw. E-Mail, Name, Jobbeschreibung und Audioaufnahmen), ausschließlich innerhalb des Forschungsteams geteilt werden.	□	□
Ich stimme zu, dass die Informationen, die ich zur Verfügung stelle, im Rahmen der Forschungsresultate ohne Namensnennung, aber mit der generellen Jobbezeichnung zitiert und veröffentlicht werden können. Jegliche Informationen, die zu meiner Identifikation führen können, werden anonymisiert.	□	□
Zukünftige Nutzung der Informationen von anderen		
Ich stimme zu, dass die texlichen oder visuellen Ergebnisse des Workshops, sowie die Transkripte in einem Repository archiviert werden, sodas sie für zukünftige Forschung zur Verfügung stehen. In jedem Fall werden die dort abgelegten Daten anonymisiert, sodass keine Rückschlüsse auf meine Person möglich sind.	□	□

Unterschrift

_____	_____	_____
Name des/der Teilnehmenden	Unterschrift	Datum

Ich habe die Informationen auf diesem Blatt dem/der Teilnehmenden gewissenhaft präsentiert und mit bestem Wissen und Gewissen sichergestellt, dass der/die Teilnehmende aus freien Stücken einwilligt.

_____	_____	_____
Name des Wissenschaftlers	Unterschrift	Datum

A.1.4. Letter of approval

Date 28-04-2021
Contact person Ir. J.B.J. Groot Kormelink, secretary HREC
Telephone +31 152783260
E-mail j.b.j.grootkormelink@tudelft.nl

Human Research Ethics Committee
TU Delft
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The Netherlands

Ethics Approval Application: Cities for Citizens: Identification of public value conflicts in urban areas
Applicant: Herzog, Rico

Dear Rico Herzog,

It is a pleasure to inform you that your application mentioned above has been approved.

Good luck with your research!

Sincerely,

Dr. Ir. U. Pesch
Chair HREC
Faculty of Technology, Policy and Management

A.2. Participation Processes

Name	Description	Time window	Number contributions	Number comments and replies
Eimsbüttel 2040	Under the slogan “Continued growth: But how?” a large participatory process was started in the district of Eimsbüttel. Since the district is projected to grow even more densely, the question posed to the citizenry was which aspects to consider when planning for that growth (“Bezirksamt Eimsbüttel – Wohnen, Bauen & Verkehr – Eimsbüttel 2040 - hamburg.de”, n.d.).	Summer 2016	613	228
Elbchaussee	The Elbchaussee is one of Hamburg’s main streets following large parts of the river Elbe. In a large participation process, citizens were asked to input their thoughts on a new traffic concept for the street (**Elbchaussee-Dialog:Master**)	Mar - Apr 2018	742	605
Grasbrook	For the development of the new district Grasbrook, multiple participation processes were conducted, online participation being one of them. How its development goal of being an “innovation district with city-wide reach” (“Öffentlicher Dialog – Der Beteiligungsprozess – Grasbrook Hamburg”, n.d.) could be best fulfilled, was subject to an online participation process.	Jun 2018 - Feb 2019	157	51
Holstenkamp	Concurrently to tunneling/capping the A7 highway, city planners included the public in the development of a new residential area “Am Volkspark” vie the Holstenkamp road (“Holstenkamp Beteiligung Hamburg - MetaVer”, n.d.)	2017	106	37
Klimafreundliches Lokstedt	Over the course of three years, possibilities on how to become a climate-friendly district were gathered and discussed in multiple participation formats (“Klimafreundliches Lokstedt - hamburg.de”, n.d.).	2017 - 2019	125	0
Oberbillwerder	“Wishes and ideas, concerns and critique” (“Mitwirken - Oberbillwerder”, n.d.) were collected for the development of the new district of Oberbillwerder. This kick-off was the first participation for the development of the district, which is planned to take up 10 - 15 years (“Mitwirken - Oberbillwerder”, n.d.).	Oct 2016 - Feb 2017	234	114
Spreehafenviertel	Citizens were asked to name their most important aspects in the development of the new Spreehafenviertel (“Häufig gestellte Fragen | Beteiligung Spreehafenviertel”, n.d.)	Jun 2017	74	48

Stadtklima Altona	The main purpose of the participation process “Stadtklima Altona” was to obtain ideas for best practice climate protection examples (“Ihre Ideen für das integrierte Klimaschutzkonzept für Altona | Beteiligungsverfahren Stadtklima Altona”, n.d.)	Feb 2018	239	28
GreenSam	The participation process of “GreenSam” (Green Silver Age Mobility), as conducted in summer 2020 in the district of Eimsbüttel, intends to involve participants aged 60 and above to lay down their need in public transportation infrastructure. More specifically, citizens were asked to contribute public mobility spots that need action, and comment on solution proposals (“Beteiligungsverfahren GreenSAM”, n.d.). In total, 6 geo-located citizen contributions were added on DIPAS.	Summer 2020	6	0
Hindenburgstraße	The intent behind the participation project “Hindenbergstraße” was to get the citizenry’s input on the design of new pavements, bicycle lanes and faster bus connection between the Alster bridge and the Jahnring. 131 contributions were made, which again received 141 comments before the participatory process ended in July 2020 (“Beteiligungsverfahren Hindenburgstraße”, n.d.).	until Jul 2020	131	141
Schnackenburgallee	The Schnackenburgallee, situated between the districts of Eimsbüttel and Altona, is currently home to commerce and industry. In the wake of a sustainable development concept for this industrial area, the participation process aims to collect the citizen’s wishes, feedback, suggestions and collaboration potentials. 66 contributions were registered until November 2020, which received 8 comments (“Beteiligungsverfahren Nachhaltiges Entwicklungskonzept Gewerbe- und Industriestandort Schnackenburgallee”, n.d.).	until Nov 2020	66	8
Magistralen in Wandsbek	The two main traffic arteries in Hamburg’s eastern district of Wandsbek (called “Magistralen”) are, according to the district’s chief officer, up for redesign (“Beteiligungsverfahren Die Magistralen in Wandsbek”, n.d.). Aiming to enhance livability, develop new housing projects and possibly reduce space for streets, 417 contributions with a total of 661 comments were collected until the end of August 2020 (“Beteiligungsverfahren Die Magistralen in Wandsbek”, n.d.).	until Aug 2020	417	661

Wilhelmsburg-East	The participation process of Wilhelmsburg-East was conducted in two steps: Firstly, suggestions for the central district of Hamburg were collected via participatory mapping to serve as an input for development drafts and secondly, the public could comment on the drafts produced by several architecture and urban planning bureaus. 88 geolocated contributions were collected in the first phase (“Beteiligungsverfahren Wilhelmsburg-Ost”, n.d.).	-	88	0
Playground at the Osterkirche	This participatory process was aimed at children in particular, who could raise their wishes for a new playground around the Osterkirche in the borough of Bramfeld. After 31 contributions were collected from August to September 2020, a draft was designed and can be commented again in the beginning of the second quarter in 2021 (“Beteiligungsverfahren Spielplatz Bei der Osterkirche”, n.d.).	Aug - Sep 2020	31	0
Pedestrian traffic concept St. Georg	Following the question whether the built environment in the central district of St. Georg serves the needs of the citizenry, the public was asked to provide input on how to improve the pedestrian network within the district. 217 contributions with 153 comments were added in the period from November 2020 until January 2021 (“Fußverkehrskonzept St. Georg”, n.d.).	Nov 2020 - Jan 2021	217	153
Jungfernstieg	In an ongoing pilot project, car traffic is reduced at the Jungfernstieg, one of Hamburg’s most-visited promenades. This participation process serves to collect the citizen’s impressions of the reshaped Jungfernstieg until May 2021 to include them into the final design, which is planned to be implemented in 2022. So far, 317 contributions with 937 comments have been collected (“Beteiligungsverfahren Jungfernstieg”, n.d.).	until May 2021	317	937
Pedestrian traffic concept Eidelstedt	With the specific aim to improve the safety and the attractiveness of every day paths and ways to schools, the city district of Eimsbüttel asked the citizenry for their input from October until December 2020. 184 contributions and 333 comments were received (“Beteiligungsverfahren Fußwegekonzept Eidelstedt”, n.d.).	Oct - Dec 2020	184	333

Wellingsbütteler Road	After a variant development for an improved traffic flow, better pavements as well as improved bicycle lanes at the Wellingsbütteler Road, the citizenry was asked to comment on the variant to further improve the conception. One overview plan and four plan sections were provided, and 877 non-geotagged comments were collected from October until November 2020 (“Beteiligungsverfahren Wellingsbütteler Landstraße”, n.d.).	Oct - Nov 2020	0	877
Bicycle traffic in Eimsbüttel	Aside from its main aspect of bicycle path improvements, citizens could contribute to four street areas in Eimsbüttel to voice ideas, suggestions and critique for pavements, general livability, parking spots, urban green areas, as well as other mobility modes. 438 contributions with 973 comments were collected from November until December 2020 (“Beteiligungsverfahren Förderung des Radverkehrs in Eimsbüttel”, n.d.)	Nov - Dec 2020	438	973
Integrated district development in Billstedt Horn	In the wake of updating the integrated district development plans of Billstedt Horn, giving home to more than 100.000 inhabitants, the public was asked to share feedback regarding specific areas they like or dislike. 24 contributions and six comments were collected from December 2020 until January 2021 (“Integrierte Stadtteilentwicklung in Billstedt Horn - Weiter geht’s bis 2025!”, n.d.)	Dec 2020 - Jan 2021	24	6
Sport and exercise in Oberbillwerder	Oberbillwerder, a newly planned borough in the district of Bergedorf, is projected to have 7000 dwelling units and give home to up to 5000 new jobs. The new district is also a model district for sports and exercise, for which exact design the future citizenry was asked to provide input. 87 contributions and 40 comments were collected (“Sport und Bewegung in Oberbillwerder”, n.d.).	-	87	40
Playground Walddörferstraße	Potentials users of a re-developed playground at Walddörferstraße were asked to submit their ideas for a future, improved playground. 21 non-geolocated contributions were collected from January until February 2021 (“Beteiligungsverfahren ”Spielplatz für Alle” Walddörferstraße”, n.d.).	Jan - Feb 2021	21	0
Lindenallee	This participation process concerns the redesign of the Lindenallee into an urban park with particular emphasis on urban livability and green spaces. The public was included in this process to express wishes and concerns regarding this development. 240 contributions and 1257 comments were collected during March 2021 (“Beteiligungsverfahren Umgestaltung Lindenallee”, n.d.).	Mar 2021	240	1257

Green space at König-Heinrich-Weg	The local authorities at the district of Eimsbüttel look for the public's input to the redevelopment of a green space near the König-Heinrich-Weg that serves the need of all age groups. 36 contributions and 84 comments were retrieved ("Beteiligungsverfahren Grünanlage König-Heinrich-Weg", n.d.).	-	36	84

A.3. Experiments

General		Preprocessing			STM		Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	Inf-requently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
English Contributions	Contributions only, complete preprocessing done by the stm package	First attempt, needs further refinement. No further investigation in value assignment.	stm package	no	?	42.0	t-SNE	Category + Rubric + Participation Process Name + Upvotes + Downvotes	0.0	0.0
Lindenallee German	Investigation in only one participation project, namely the Lindenallee.	Topics are not coherent due to too little data to cluster.	stm package	no	??	15.0	Manual	Category & Rubric	0.0	0.0

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General	Preprocessing			STM			Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
German Python Preprocessing	Preprocessing in python, inclusion of a bigram and trigram model	Topics are better, but not. Quite high assignment probablility, especially as compared to other experiments.	Python nltk library	gensim bigram and trigram model on all contributions	??	60.0	t-SNE	Category + Rubric + compound	0.0	0.0
Location Removal German	Preprocessing in python with Named entity recognition in spacy. Idea is that topics will reflect the values in a better way since all the shared words in terms of locations are removed.	The location removal removes a lot of false positives, which makes the topics worse. Adjustment in location removal needed	Python nltk stopwords	gensim bigrams and trigrams	??	60.0	t-SNE	Category + Rubric + compound	0.0	0.0

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General	Preprocessing			STM			Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
All Data + Location Removal German	Improvements to the named entity location removal, and input of all data (incl. comments and replies)	All data as an input might be too much. It is good for building the ngram model, but distorts the topic assignments.	nltk + own stopwords for location removal	bigrams and trigrams	??	45.0	t-SNE	compound + Category + Rubric	0.0	0.0

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General	Preprocessing			STM			Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
Nouns + Adjectives	Nouns, adjectives (+ adverbs) are filtered out from all contributions, comments and replies and input.	Topic assignment does not seem to work too well. A lot of context is missing and added through the verbs, also the comments and replies often refer to the main contribution or the comment before, so that including them seems to worsen the results	no removal, all nouns and adjectives included	no, only nouns and adjectives	??	36.0	t-SNE	compound	0.0	0.0

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General	Preprocessing		STM			Spatial Clustering				
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
Contributions Nouns + Adjectives	Only nouns and adjectives from the contributions are taken into account, based on the results of the prior experiments.	Leads to consistent topics, but they often represent both sides of the spectrum and both values. Thus, it sort of hijacks the method.	no	no	0.5%	35.0	t-SNE	compund + Category + Rubric	0.0	0.0
Drupal 7 Integration	Integration of the old comments in Drupal 7, similar preprocessing as compared to German Python Preprocessing.	Topics are coherent. Very little economic values apparent.	nltk Standard Stopwords	gensim bigrams and trigrams (min_count = 5, threshold = standard setting of 10)	0.5% threshold (min 23 contributions), 90% upper contributions (4075 contributions)	40.0	t-SNE	compound + category + rubric + compound + Type	0.0	0.0

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General	Preprocessing			STM			Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
Drupal 7 Contributions	Only take into account the contributions, but including the Drupal 7 ones.	Larger corpus seems to lead to better topics, intuitively makes sense	nltk standard stopwords	gensim bigrams & trigrams, min occurence = 5, threshold = 10 (standard setting)	0.5 % lower, 90% upper	48.0	t-SNA	compound + category + rubric	0.0	0.0

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General	Preprocessing			STM		Spatial Clustering				
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
Drupal 7 Contributions Advanced Stopword Removal	Remove custom stopwords that seem to appear frequently based on the results of the previous experiment. Also, exclude more words based on frequency so that topics could become more coherent.	Topics are not coherent due to too little data to cluster.	stm package; Stopwords = [”antwort an nr.”, ”beitrag phase”, ”aus dem masterplan”, ”beitrag vom auftakt-workshop”, ”sehr geehrte damen und herren”, ”grüße”]	gensim model after custom stopwords removal; min occurence 5, threshold 10	1%	NaN	NaN	NaN	0.0	0.0
Drupal 7 Named Entity Removal	Remove Named entities, especially streets from a larger dataset	Good attempt, but too many false positives in NER -> need to lower the number of false positives	NaN	NaN	NaN	40.0	t-SNE	Category + Rubric + compound	0.0	0.0

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General	Preprocessing			STM			Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
Category and Rubric Consolidation	The category and the rubrics are consolidated, so that better metadata could lead to a better assignment of the topics. Location names are removed.	Good and coherent topics!	nltk standard stopwords + Custom Stopwords	gensim bigram and trigrams model, min = 5, threshold = 10, ngram model trained on all contributions	0,75 % removal min, 90% max	47.0	t-SNE	compound + category + rubric + rating	0.0	0.0
Contributions, Comments, Replies Consolidation	The category and the rubrics are consolidated so that better metadata could lead to a better assignment of the topics. Location names are removed.	Comments and replies seem to have too much textual references to the original contribution, so they impair more meaningful topics	nltk standard stopwords + Custom Stopwords	gensim bigram and trigrams model min = 5, threshold = 10, ngram model trained on all contributions	0.5 % min \n90% max	NaN	NaN	Category + compound + Rubric + Rating + Number.replies	0.0	0.0

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General	Preprocessing			STM			Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	In-frequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
Large Vocab Integration	Instead of choosing a relative minimum threshold a lower bound of minimum 10 occurences in all >10.000 contributions is chosen	Some quite good topics, some are also less coherent . Seems like overfitting. Maybe more exclusion of infrequent words and less topics would make a difference.	nltk and custom stopwords	bigrams and trigrams gensim	min = 10 , max 90%	58.0	t-SNE	Category + compound + Rubric + Rating + Number.replies	0.0	0.0

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General	Preprocessing			STM			Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
Contributions + Comments	Similar preprocessing as in Experiment 15, but only take into account contributions & comments. Replies are typically much more referring to other comments and need more context.	Not too much difference; comments seem to also refer to the original contribution a lot	NaN	NaN	NaN	40.0	based on combination of held-out likelihood and residuals	Category + compound + Rubric + Rating + Number.replies	0.0	0.0

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General	Preprocessing			STM			Spatial Clustering			
Name	Description	Result	Stopword removal	n-grams	Infrequently used words	Number of Topics	Topic selection	Topic Prevalence Covariates	Minimum cluster size	alpha
Contributions Advanced Stopword Removal	More stopwords from the previous experiments added. Locations are removed.	Good and coherent topics, representing most of the public values identified in literature.	nltk Stopwords + Custom Stopwords: [”antwort an nr.”, ”beitrag phase”, ”aus dem masterplan”, ”beitrag vom auftakt-workshop”, ”sehr geehrte damen und herren”, ”grüße”, ”-Dieser Beitrag wurde bei dem Beteiligungsstand”,”Hier könnte Ihr Beitrag stehen”, ”samen”, ”holstenkamp”, ”amp”, ”elbchausse”, ”eidelstedt”, ”steindamm”, ”lindenallee”, ”wilhelmsburg”, ”bargteheider”, ”veddel”, ”hafencity”, ”jungfernstieg”, ”hohenzollernring”, ”eimsbüttel”, ”billwerder”, ”beitrag”, ”allermöhe”, ”beitrag_auftaktveranstaltung”]	gensim bigram and trigram model trained on all contributions, comments and replies	0.75% min (amounts to lower threshold of 34) - 90% maximum (upper threshold of 4075)	40.0	Trade-off between held out log likelihood, residuals and semantic coherence	Category + compound + Rubric + Rating + Number.replies	3	150

A.4. STM Topic Words, Captions and Values

Topic	Most Probable Words	Words with Highest FREX Index	Words with Highest LIFT Index	Topic Caption	Public Value
1	verkehr fahren regelmäßig reihe situation fahrzeug immer_wieder gefährden fahrradstreifen kommen links rechts verbieten fussgänger geschwindigkeit	verkehr regelmäßig gefährden immer_wieder reihe verbieten fahrradstreifen fahrzeug rechts links situation fussgänger geschwindigkeit konsequent abbiegen	verbieten verkehr regelmäßig gefährden rechts immer_wieder fahrradstreifen links fahrzeug reihe fussgänger geschwindigkeit konsequent aufstellen situation	Dangerous situations on the street	Health/Safety
2	anwohner zone einrichten parkplätze einbahn spiel anwohnerparken frei können_man deutlich erlauben nur_noch einfahren dafür sinnvoll	einrichten einbahn parkplätze zone anwohner anwohnerparken spiel frei erlauben nur_noch können_man einfahren deutlich zugeparkt flächen	anwohnerparken einbahn einrichten parkplätze spiel zone anwohner erlauben frei nur_noch zugeparkt flächen einfahren am_gut können_man	Residential parking and one-way streets	Economy
3	fahren richtung fußweg fahrbahn fahrradweg fehlen fahrradfahrer kommen schmal stadtauswärts bushaltestelle str stadteinwärts verkehrsführung einspurig	fahrradweg fahrradfahrer fahrbahn fußweg schmal bushaltestelle richtung fahren stadtauswärts fehlen stadteinwärts str verkehrsführung einspurig beim	fahrradweg fahrradfahrer bushaltestelle stadteinwärts schmal str stadtauswärts fahrbahn fußweg verkehrsführung einspurig fehlen richtung ständig fahren	Missing bike lanes	Equity
4	radfahrer fußgänger kreuzung für_fußgänger langen kommen grün warten müssen elschaltung rot kurz an_der_kreuzung wenn_man überqueren	kreuzung fußgänger für_fußgänger radfahrer langen elschaltung warten rot an_der_kreuzung kurz muss_man grün kommen abbiegen überqueren	elschaltung kreuzung für_fußgänger fußgänger rot langen warten radfahrer an_der_kreuzung kurz muss_man obwohl abbiegen zeigen ändern	Traffic light green phases	Equity
5	neu wichtig vorhanden neue bebauung bereits bauen verbinden wohngebiet kategorie gebiet planen vorsehen nicht notwendig	wichtig neu vorhanden verbinden neue kategorie bebauung gebiet bauen bereits wohngebiet bau notwendig vorsehen dicht	kategorie verbinden wichtig neu vorhanden gebiet neue bau bebauung notwendig südlich dicht vorsehen bauen wohngebiet	Bulding development	Various

Continued on next page

Topic	Most Probable Words	Words with Highest FREX Index	Words with Highest LIFT Index	Topic Caption	Public Value
6	gestalten bieten für_all aufenthaltsqualität geschäft gastronomie markt deshalb strecken davon schließen chance ende einfach vorbild	bieten aufenthaltsqualität gastronomie chance strecken für_all markt geschäft gestalten ende davon deshalb vorbild sehr_gut schließen	chance gastronomie bieten aufenthaltsqualität strecken ende vorbild markt sehr_gut für_all davon geschäft deshalb blick schließen	Livability improvements	Livability
7	baum grün grünfläche nicht grüne erhalten_bleiben natürlich all erhalten natur bäume hören fallen charakter erhalt	baum grünfläche erhalten_bleiben grüne bäume grün fallen erhalt natur natürlich hören charakter erhalten liegen stattdessen	bäume baum erhalt erhalten_bleiben fallen grünfläche grüne charakter natur hören natürlich grün stattdessen flächen liegen	Green area protection	Ecology
8	tempo hoch erhöhen sicherheit zentrum konzept lärm verkehrsberuhigung verhindern kmh müsste wünschenswert verkehrsfluss sorgen mindestens	tempo erhöhen zentrum verkehrsberuhigung sicherheit hoch verhindern konzept verkehrsfluss kmh lärm sorgen wünschenswert müsste reduzierung	verkehrsberuhigung tempo verkehrsfluss zentrum erhöhen verhindern sicherheit sorgen konzept kmh reduzierung wünschenswert hoch lärm müsste	Traffic speed reduction	Health/Safety
9	weit immer daher planung nicht umgestaltung schon jahr seit bürger folgen planen direkt halten umgebung	weit immer umgestaltung planung daher bürger umgebung seit folgen jahr schon wesentlich halten direkt einschränken	umgebung umgestaltung weit immer bürger wesentlich planung seit daher funktionieren folgen einschränken jahr halten direkt	Economic viewpoints	Economy
10	innenstadt stellen autofrei kfz durchgangsverkehr nicht umbau sperren maßnahme richtig durchfahren behindern ring all sperrung	innenstadt durchgangsverkehr autofrei sperren umbau maßnahme stellen sperrung kfz richtig ring behindern durchfahren einzig handeln	sperrung innenstadt sperren maßnahme umbau durchgangsverkehr ring autofrei behindern durchfahren richtig stellen kfz handeln einzig	Car-free zones	Various
11	stadt mensch wohnung leben wohnen nicht mögen all projekt fläche wohnraum immer_mehr familie sozial wenn_man	mensch stadt leben wohnung wohnraum wohnen immer_mehr projekt mögen familie sozial tun denken grund lage	wohnraum mensch leben sozial stadt immer_mehr familie wohnung projekt lage wohnen grund tun mögen denken	Living for marginalized groups	Equity

Continued on next page

Topic	Most Probable Words	Words with Highest FREX Index	Words with Highest LIFT Index	Topic Caption	Public Value
12	schnell spur verbindung fahren sbahn alternative durchgehen bis_zum busse bekommen kfzverkehr blankenese verlängerung elbe stau	verbindung spur schnell durchgehen alternative blankenese busse elbe verlängerung sbahn bis_zum kfzverkehr bekommen stau linie	elbe blankenese verlängerung verbindung durchgehen busse spur alternative schnell kfzverkehr bis_zum sbahn stau linie attraktive	Traffic connectivity	Various
13	etc statt klein finden jed fördern ubahn bank entwickeln grüner privat usw lebensqualität extrem vorschlag	etc statt grüner bank fördern ubahn entwickeln klein finden privat jed usw lebensqualität extrem begrünen	grüner statt etc bank ubahn entwickeln fördern privat usw lebensqualität klein finden extrem jed begrünen	Livability improvement	Livability
14	sichern zebrastreifen eln kinder querung insbesondere an_dies_stelle im_bereich überqueren autos überquerung ecke übergang schule gefährlich	zebrastreifen sichern querung eln überquerung an_dies_stelle kinder übergang überqueren im_bereich insbesondere zu_gelingen ecke queren fußgängerel	überquerung zebrastreifen querung übergang sichern an_dies_stelle eln zu_gelingen im_bereich kita kinder fußgängerel queren unübersichtlich rasen	Zebra Crossings	Health/Safety
15	kind stadtteil bewohner quartier schule _auftaktveranstaltung ausreichen bestehen fläche spielplätze zukünftig dienen müssen berücksichtigen insbesondere	quartier bewohner _auftaktveranstaltung stadtteil kind ausreichen spielplätze dienen schule zukünftig bestehen berücksichtigen art fläche anzahl	_auftaktveranstaltung quartier dienen bewohner spielplätze zukünftig stadtteil ausreichen berücksichtigen art schule kind bestehen anzahl attraktive	Children issues	Various
16	auto parken autofahrer fußwege stehen nicht nehmen überholen recht fahren benutzen möglich_mein kommen lösung stattdessen	auto fußwege parken autofahrer überholen möglich_mein recht nehmen stehen benutzen stattdessen lösung falsch fast weder	möglich_mein fußwege auto überholen recht parken autofahrer benutzen nehmen stattdessen falsch weder stehen paar lösung	Reduction of cars	Equity
17	schön ganz alt stehen vielleicht schon kleine ort spielplatz finden welch können_man sehen beispiel bereich	schön kleine vielleicht ort alt ganz spielplatz hier_können beispiel schön_wenn stehen welch wirken schon wünschen	hier_können schön_wenn schön kleine ort beispiel spielplatz vielleicht wirken alt wünschen ganz schöne tollen welch	Playgrounds	Livability

Continued on next page

Topic	Most Probable Words	Words with Highest FREX Index	Words with Highest LIFT Index	Topic Caption	Public Value
18	breit autoverkehr fahrradwege verbessern ausbauen öpnv reduzieren radfahren klar weiterhin gut verbesserung verringern genug radfahrern	fahrradwege ausbauen verbessern autoverkehr breit reduzieren weiterhin klar radfahren öpnv verringern verbesserung genug radfahrern gut	fahrradwege ausbauen weiterhin verbessern reduzieren autoverkehr klar breit radfahren verringern verbesserung öpnv genug radfahrern infrastruktur	Development of bikelanes and public transport	Equity
19	radwege radverkehr schlecht gut schützen polizei meter zustand nicht beidseitig fahren passieren möglich gestaltung rund_um_der	radwege radverkehr schlecht polizei zustand schützen meter beidseitig passieren gestaltung rund_um_der entweder gut benötigen strecke	radwege zustand radverkehr polizei schlecht meter schützen passieren beidseitig rund_um_der strecke gestaltung entweder fußverkehr benötigen	Bike lane improvements	Various
20	schaffen erhalten idee bleiben anlegen möglich mitte evtl grünstreifen ggf gleichzeitig möglichkeiten bereich einfahren dafür	schaffen idee evtl anlegen erhalten grünstreifen mitte bleiben möglichkeiten möglich ggf gleichzeitig einfahren bereich im_bereich	evtl grünstreifen schaffen idee anlegen mitte möglichkeiten erhalten ggf bleiben gleichzeitig einfahren möglich früh im_bereich	Green space improvement	Ecology
21	geben gut groß raum haus gerne öffentlich möglichkeit nutzung toll angebot ermöglichen luft mehrer müssten	öffentlich groß gerne raum angebot geben toll haus nutzung gut luft ermöglichen möglichkeit müssten zu_erreichen	angebot öffentlich toll luft gerne nutzung groß haus raum ermöglichen geben gut zu_erreichen müssten möglichkeit	More attractions for eveyone	Equity
22	radweg trennen fuß brücke verlaufen super radfahrer lösung fühlen baulich nichts sowohl gerade eigen zu_schmal	radweg brücke trennen super verlaufen fuß fühlen lösung baulich nichts sowohl radfahrer eigen zu_schmal falsch	super radweg brücke verlaufen trennen fuß fühlen nichts baulich falsch lösung sowohl eigen zu_schmal vernünftig	Protected bike lanes	Various
23	gehweg rad oft eng gefährlich kind stelle bürgersteig dringen kommen ausweichen häufig oster nötig gefahr	gehweg oft eng stelle rad bürgersteig ausweichen gefährlich nötig oster gefahr dringen unterwegs kind häufig	gehweg oft eng stelle ausweichen nötig bürgersteig gefahr oster rad fußverkehr unterwegs helfen gefährlich dringen	Dangerous pedestrian lanes	Health/Safety

Continued on next page

Topic	Most Probable Words	Words with Highest FREX Index	Words with Highest LIFT Index	Topic Caption	Public Value
24	fahrrad entlang pkw veloroute ausbau bund sillem anschließen anbindung somit nachhaltig abstellen insbesondere sodass bzw	veloroute ausbau fahrrad pkw entlang bund sillem anschließen anbindung nachhaltig somit abstellen sodass insbesondere extrem	ausbau veloroute sillem bund fahrrad pkw entlang anschließen anbindung nachhaltig somit abstellen sodass extrem strecke	Accessibility by bike	Equity
25	nicht bus leider mal warum dürfen fahren lassen besonders endlich überall wirklich laut wer zeit	bus warum leider mal lassen überall laut dürfen nachts endlich besonders nicht wer zeit wirklich	laut nachts überall warum lassen bus leider mal endlich dürfen ruhig besonders wer generell zeit	Noise, but also many other topics	Various
26	mehr wenig bitte brauchen leute insgesamt nehmen noch_mehr so_viel geben nicht bekommen park öpnv problem	mehr wenig insgesamt brauchen bitte leute noch_mehr nehmen so_viel park bekommen problem öpnv zeit geben	insgesamt mehr wenig brauchen bitte leute noch_mehr so_viel nehmen park problem bekommen öpnv bringen nichts	”More” for multiple things	Various
27	sollen strasse entstehen komplett entfernen umbauen fahrspur bauen_werden umgestalten aufwerten begrünen gestaltung errichten neben bereich	sollen entfernen strasse umbauen komplett umgestalten entstehen fahrspur bauen_werden aufwerten begrünen errichten gestaltung neben völlig	umbauen entfernen sollen umgestalten strasse komplett fahrspur bauen_werden aufwerten entstehen begrünen errichten gestaltung völlig sodass	Redevelopment of street space	Livability
28	zwei seite höhe sowie zusätzlich beid mit_einer gebäude bzw stark bisher angrenzen teil kaum bahnhof	seite zwei gebäude beid zusätzlich zusätzliche höhe östlich angrenzen haltestelle neues bisher westlich jeweils sowie	neues haltestelle zusätzliche östlich jeweils westlich installieren offen angrenzen seite gebäude bisher beid zusätzlich bahnhof	Various	Various
29	nutzen gehen platz autos nicht dadurch menschen meist müssen derzeit voll gern wasser vorbei drei	platz dadurch gehen menschen nutzen voll autos gewinnen meist gern wasser vorbei derzeit drei stören	gewinnen dadurch platz menschen voll gehen wasser vorbei gern stören meist drei nutzen derzeit autos	Usage of space	Various

Continued on next page

Topic	Most Probable Words	Words with Highest FREX Index	Words with Highest LIFT Index	Topic Caption	Public Value
30	all nicht gerade müssen entlasten kommen fahren außerdem nutzen können_man geben dafür gut bereich schon	all gerade entlasten müssen nicht außerdem kommen können_man dafür nutzen fahren bereich geben direkt sehr_viel	entlasten gerade all müssen außerdem nicht können_man dafür bereich kommen allerdings sehr_viel nutzen direkt fahren	Various	Various

A.5. Most Probable Words in Public Value Clusters

Public Value	Most Probable Words
Health/Safety	verkehr (19.2 %), sichern (16.9 %), tempo (13.0 %), gehweg (12.0 %), rad (9.2 %), oft (8.8 %), hoch (8.2 %), kommen (6.9 %), gefährlich (6.9 %), fahren (6.7 %), zebrastreifen (6.4 %), situation (5.4 %), erhöhen (5.3 %), eln (5.1 %), kinder (5.1 %), eng (4.9 %), regelmäßig (4.8 %), kind (4.7 %), nicht (4.7 %), sicherheit (4.5 %), zentrum (4.3 %), reihe (4.2 %), insbesondere (4.1 %), dringen (4.0 %), stelle (4.0 %), fahrzeug (4.0 %), immer_wieder (3.9 %), gefährden (3.9 %), konzept (3.9 %), querung (3.9 %), geschwindigkeit (3.7 %), fahrradstreifen (3.7 %), lärm (3.6 %), häufig (3.6 %), verkehrsberuhigung (3.5 %), bürgersteig (3.3 %), verhindern (3.2 %), kmh (3.2 %), ecke (3.1 %), an_dies_stelle (3.1 %), ausweichen (3.0 %), im_bereich (3.0 %), oster (2.9 %), müsste (2.9 %), überqueren (2.9 %), links (2.9 %), rechts (2.8 %), wünschenswert (2.7 %), unterwegs (2.7 %), verkehrsfluss (2.6 %)
Economy	weit (17.7 %), anwohner (17.7 %), immer (9.2 %), zone (8.2 %), einrichten (7.4 %), daher (6.3 %), planung (6.0 %), nicht (5.4 %), parkplätze (5.1 %), einbahn (4.9 %), schon (4.9 %), umgestaltung (4.6 %), spiel (4.5 %), jahr (3.8 %), anwohnerparken (3.7 %), frei (3.6 %), können_man (3.6 %), seit (3.4 %), deutlich (3.3 %), erlauben (3.3 %), bürger (3.3 %), nur_noch (3.0 %), folgen (2.6 %), planen (2.5 %), direkt (2.2 %), halten (2.2 %), umgebung (2.2 %), einfahren (2.1 %), dafür (2.1 %), sinnvoll (1.9 %), situation (1.7 %), wesentlich (1.7 %), zugeparkt (1.6 %), flächen (1.6 %), parken (1.6 %), kfz (1.5 %), einschränken (1.5 %), funktionieren (1.5 %), einfach (1.4 %), all (1.4 %), sehr_viel (1.3 %), aktuell (1.3 %), viertel (1.3 %), zumindest (0.9 %), erheblich (0.9 %), nutzen (0.9 %), unbedingt (0.8 %), am_gut (0.8 %), jedoch (0.8 %), aufgrund (0.7 %)
Equity	auto (31.2 %), fahrrad (30.1 %), geben (21.9 %), gut (20.6 %), radfahrer (19.0 %), fahren (16.1 %), fußgänger (14.9 %), breit (14.7 %), groß (14.2 %), stadt (13.6 %), entlang (12.0 %), parken (11.6 %), autoverkehr (11.2 %), kommen (10.8 %), autofahrer (10.7 %), richtung (10.6 %), pkw (10.6 %), nicht (9.1 %), fußweg (9.1 %), fahrbahn (8.9 %), mensch (8.8 %), fehlen (8.7 %), fahrradweg (8.6 %), fahrradwege (8.6 %), verbessern (8.4 %), ausbauen (7.9 %), öpnv (6.9 %), veloroute (6.7 %), reduzieren (6.6 %), kreuzung (6.3 %), für_fußgänger (5.8 %), langen (5.7 %), ausbau (5.6 %), fahrradfahrer (5.6 %), bund (5.5 %), stehen (5.5 %), wohnung (5.4 %), sillem (5.3 %), leben (5.0 %), wohnen (4.9 %), raum (4.8 %), fußwege (4.7 %), müssen (4.7 %), radfahren (4.5 %), haus (4.5 %), wenn_man (4.4 %), möglichkeit (4.4 %), mögen (4.3 %), klar (4.0 %), gerne (3.6 %)
Livability	sollen (63.2 %), etc (11.2 %), finden (11.0 %), klein (10.4 %), statt (9.0 %), gestalten (8.3 %), schön (8.1 %), jed (7.1 %), ganz (7.0 %), bieten (6.9 %), für_all (6.3 %), entstehen (6.1 %), fördern (5.6 %), strasse (5.3 %), aufenthaltsqualität (5.1 %), ubahn (5.0 %), alt (4.6 %), geschäft (4.6 %), stehen (4.5 %), vielleicht (4.3 %), gastronomie (4.3 %), markt (4.3 %), schon (4.2 %), deshalb (4.0 %), strecken (3.7 %), komplett (3.6 %), kleine (3.6 %), bank (3.6 %), entwickeln (3.5 %), davon (3.5 %), schließen (3.4 %), ort (3.3 %), begrünen (3.3 %), chance (3.3 %), ende (3.3 %), einfach (3.3 %), vorschlag (3.1 %), grüner (3.1 %), welch (3.0 %), entfernen (3.0 %), privat (2.9 %), spielplatz (2.8 %), vorbild (2.8 %), deutlich (2.7 %), sehr_gut (2.7 %), bereich (2.7 %), können_man (2.7 %), usw (2.7 %), bedarf (2.6 %), umbauen (2.6 %)
Ecology	schaffen (25.8 %), erhalten (17.6 %), baum (13.0 %), grün (11.0 %), grünfläche (8.8 %), bleiben (7.1 %), nicht (6.9 %), idee (6.9 %), anlegen (5.8 %), möglich (5.2 %), grüne (5.1 %), mitte (4.6 %), erhalten_bleiben (4.5 %), all (4.5 %), natürlich (4.5 %), natur (3.9 %), evtl (3.7 %), grünstreifen (3.7 %), bäume (3.3 %), ggf (3.3 %), hören (3.1 %), fallen (2.9 %), charakter (2.9 %), erhalt (2.9 %), gleichzeitig (2.8 %), möglichkeiten (2.7 %), müssen (2.4 %), liegen (2.2 %), bereich (1.9 %), einfahren (1.9 %), unbedingt (1.6 %), dafür (1.4 %), im_bereich (1.3 %), attraktiv (1.1 %), flächen (1.1 %), stattdessen (1.1 %), jed (1.0 %), möglichkeit (1.0 %), mit_einer (0.9 %), gerade (0.8 %), bzw (0.8 %), entsprechen (0.7 %), ganze (0.7 %), denken (0.6 %), eigentlich (0.6 %), früh (0.6 %), sondern_auch (0.5 %), bauen_werden (0.4 %), tag (0.4 %), lage (0.3 %)

A.6. Workshop Outline

Cities for Citizens: Identification of Public Value Conflicts in Urban Spaces

Expert Workshop Outline

Duration: 45-60 min
Participants: One urban planner, workshop conductor

Main RQ Which spatial public value conflicts inherent to sustainability and livability goals in urban planning can be identified by leveraging large-scale qualitative geo-located participatory data?

Qual. RQ1 How do planning experts identify public values and their conflicts based on participatory data?

Qual. RQ2 How does the conflict identification of planning experts compare to the findings of the case study?

A Interview

Semi-Structured Interview for RQ 3

A.1 Public Values in urban planning

- Which kind of public values do you see in your area of expertise?
- How do you identify them?

A.2 Public Value Conflicts

- In between which public values do you see the potential of conflict?
- How does this conflict manifest in your area of expertise?

B Interactive Discussion

Based on results of the algorithmic findings

B.1 Value Assignment

This part of the workshops deals with the assignment of public values to different topics that have been identified by the STM algorithm.

Topics are selected and presented to the planning experts. Planning experts are then asked to identify a public value that they think lays behind the topic. To guide them, firstly the public values identified from the literature will be shortly presented (economic opportunity, ecologic quality, social equity and livability). However, experts are encouraged to also name other public values, if they think the public values behind a certain topic do not fit in the four values that are presented.

For example, the following is presented to the experts:

Topic 11

Words in topic with the highest probability:
place, existent, use, naturally, become, however, livability, possibly, present, nice

Words in topic with the highest exclusivity:
place, naturally, existent, become, at_beautiful, livability, nice, bus stops, however, possibly

Example contributions:

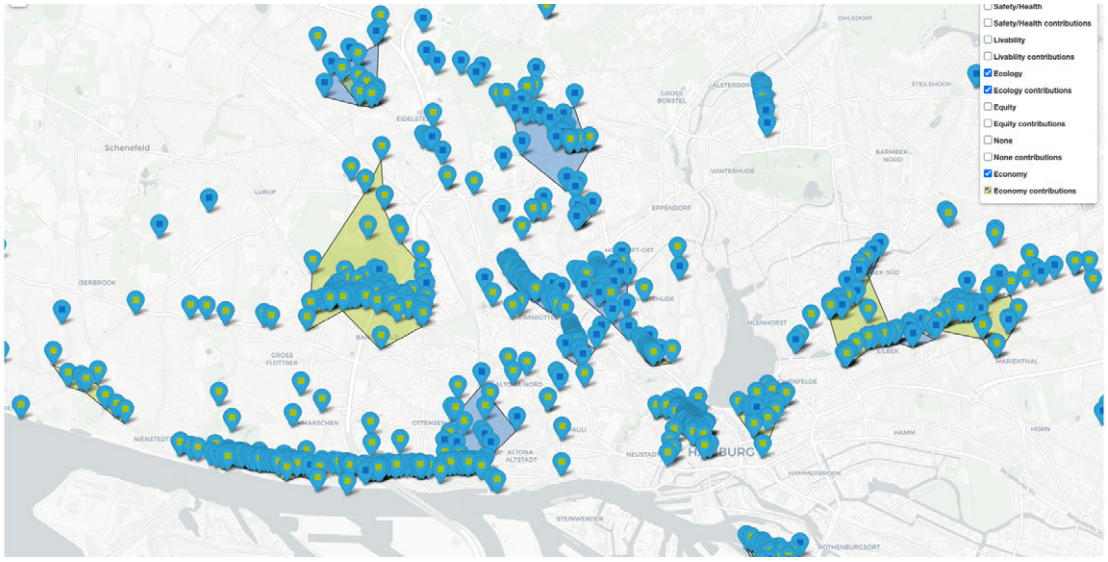
Example 1: Completely convert one car lane in each direction for bicycle traffic.

Example 2: Creating space. It is a shame that this beautiful place has no quality of stay. Unfortunately, this great place is degenerating into a parking lot. With a view of the church, gastronomy and a small parking space, that would greatly enhance the area.

Example 3: Bus stops and bike racks at the exits to the Elbe Bus stops and bike racks at the exits to the Elbe if space is available

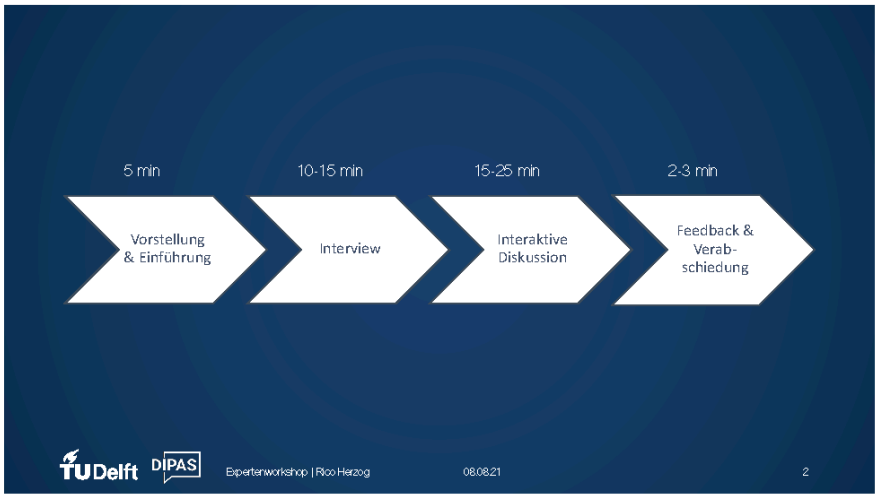
B.2 Conflict Identification on the Map

Depending on the field of expertise of a planner, the conflicts identified by the algorithm and my personal value assignment, different parts of different city sections are investigated in an interactive fashion.



A.7. Workshop Presentation

1



2


Vorstellung & Einführung
Persönliche Vorstellung & Einführung in die Forschungsfrage
08.08.21
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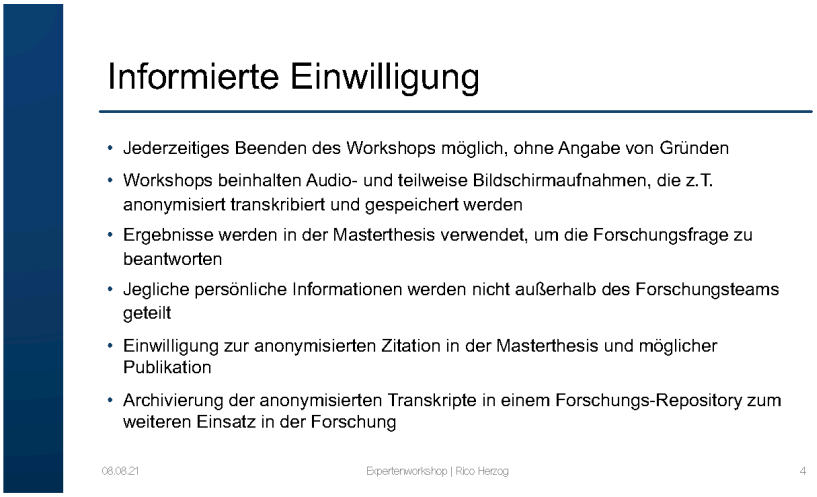
3

3


Informierte Einwilligung
• Jederzeitiges Beenden des Workshops möglich, ohne Angabe von Gründen
• Workshops beinhalten Audio- und teilweise Bildschirmaufnahmen, die z.T. anonymisiert transkribiert und gespeichert werden
• Ergebnisse werden in der Masterthesis verwendet, um die Forschungsfrage zu beantworten
• Jegliche persönliche Informationen werden nicht außerhalb des Forschungsteams geteilt
• Einwilligung zur anonymisierten Zitation in der Masterthesis und möglicher Publikation
• Archivierung der anonymisierten Transkripte in einem Forschungs-Repository zum weiteren Einsatz in der Forschung
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4

Forschungsfrage

Welche öffentlichen Wertkonflikte (insb. zwischen den Dimensionen der Nachhaltigkeit und Lebenswertigkeit) können durch die Verwendung von geo-lokalisierten Partizipationsdaten identifiziert werden?

→ Wie identifizieren Expert*innen der Stadtplanung öffentliche Werte/Gemeinwohlvorstellungen und deren Konflikte, insbesondere basierend auf Partizipationsdaten?

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Öffentliche Werte

„Stoppt die Flächenversiegelung! Wir sollten aufhören, immer mehr Flächen zu versiegeln und stattdessen die Parks und Grünflächen ausweiten. Die Umwelt wird es uns danken."

„Ich finde die Bäume sollten einer zweispurigen Fahrbahn, Bürgersteigen und Parkplätzen weichen. In dieser Gegend werden dringend neue Abstellmöglichkeiten gebraucht"

„Grünflächen schön und gut, aber ich fühle mich hier nachts nicht mehr sicher, weil ständig angetrunkene Jugendliche herumbrüllen und abhängen."

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Interview

Öffentliche Werte und deren Konflikte

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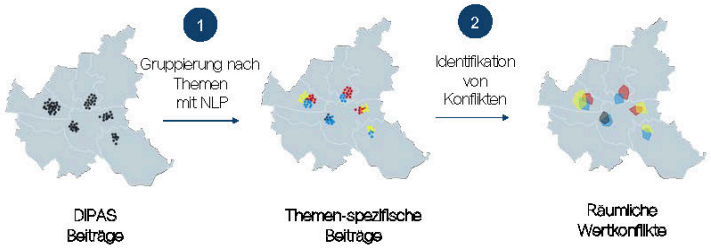
7

Tool-Überblick



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Identifikation öffentlicher Werte

Identifizierte Themen und deren zugrundeliegende öffentliche Werte

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Thema 11

Exklusive Wörter des Themas:

mensch, stadt, leben, wohnung, wohnraum, wohnen, immer_mehr, projekt, mögen, familie, sozial, tun, denken, grund, lage

- **Beispielbeitrag 1: Mietpreis explodiert**
  Wer möchte, das Eimsbüttel ein Bezirk bleibt, in dem Menschen verschiedener Kulturen und verschiedener sozialer Herkunft leben, sollte sich um eine Deckelung der Kaltmieten im Viertel zügig und aktiv kümmern => Umsetzung des bereits verabschiedeten Gesetzes. Andernfalls leben bald nur noch "isoliert" Menschen mit hohem Einkommen in Eimsbüttel.
- **Beispielbeitrag 2: Wohnraum für Menschen mit Beeinträchtigungen**
  Geförderter/barrierefreier Wohnraum für Menschen mit Behinderungen und/oder psychischen Erkrankungen
- **Beispielbeitrag 3: Nachbarschaftsprojekte fördern**
  Immer mehr Menschen wohnen alleine. Die Älteren haben dabei nur noch wenig Außenkontakte und auch bei jüngeren konzentriert sich vieles auf die Arbeitskollegen, die jedoch i.d.R. nicht in der Nachbarschaft wohnen.

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Thema 7

Exklusive Wörter des Themas:

baum, grünfläche, erhalten_bleiben, grüne, bäume, grün, fallen, erhalt, natur, natürlich, hören, charakter, erhalten, liegen, stattdessen

- **Beispielbeitrag 1: Bäume ersetzen**
  Nicht alle Bäume abholzen! Gefällte Bäume müsse ersetzt werden!
- **Beispielbeitrag 2: Bäume, Umweltqualiät**
  Mir ist besonders wichtig, dass der grüne Charakter der Elbchaussee erhalten bleibt, d.h. die Bäume sensibel einbezogen werden und nicht gefällt werden, wenn sie im Wege sind. Dabei müssen auch die Wurzelbereiche der Bäume geschützt werden.
- **Beispielbeitrag 3: Erhalt von Grün- und Freiflächen**
  Grünflächen müssen erhalten werden. Es dürfen nicht nur Reihenhäuser gebaut werden, auf Kosten von Kleingärten etc. -Dieser Beitrag wurde bei dem Beteiligungsstand in Niendorf abgegeben.

Thema 1

Exklusive Wörter des Themas:

verkehr, regelmäßig, gefährden, immer_wieder, reihe, verbieten, fahrradstreifen, fahrzeug, rechts, links, situation, fussgänger, geschwindigkeit, konsequent, abbiegen

- **Beispielbeitrag 1: Spiegel aufstellen gegenüber TG-Ausfahrt**
  Ich habe glücklicherweise einen TG-Stellplatz unter der Grundstraße habe jedoch beim Ausfahren regelmäßig das Problem, dass die Sicht nach rechts und links duch parkende Fahrzeuge sehr eingeschränkt ist, so dass es bereits mehrfach zu gefährlichen Situationen gekommen ist, wenn ein Fahrradfahrer sehr zügig auf der Straße fährt. Daher schlage ich vor, gegenüber der TG-Ausfahrt einen Spiegel aufzustellen mit Blickwinkel nach rechts und links, damit man gefahrlos aus der TG ausfahren kann.
- **Beispielbeitrag 2: Wendemanöver**
  Hier wenden immer wieder Fahrzeuge, um die Hindenburgstr zurück zu fahren. Sie gefährden damit nachfolgende Fahrzeuge, stoppen den Abbiegevorgang.
- **Beispielbeitrag 3: Fahrradstreifen breiter machen**
  Aufgrund der Parksituation und den Personen die ungeachtet, ohne nacht links oder recht zu gucken, andauernd über den Fahrradstreifen laufen.

Thema 17

Exklusive Wörter des Themas:
schön, kleine, vielleicht, ort, alt, ganz, spielplatz, hier_können, beispiel, schön_wenn, stehen, welch, wirken, schon, wünschen

- **Beispielbeitrag 1: Wir wünschen uns eine Spiel- und Bewegungsfläche als Treffpunkt für jung und alt**
  VWir sind 2019 hierher gezogen und Leni (7) findet es traurig, dass sie in der direkten Nachbarschaft noch immer keine Kinder kennengelernt hat. Das liegt wohl daran, dass es hier keinen vernünftigen Spielplatz gibt. Gleichzeitig sehen wir auch, dass hier auch sehr viele ältere Menschen leben, vielleicht haben auch diese Lust auf Begegnung ? Wir wünschen uns einen tollen Abenteuerspielplatz mit Ritterburg/Kletterturm zum hangeln und Rutschen, eine Skater-Ecke, Trampoline, Reckstangen, Geräte für die Kleinen, Sportgeräte wie z.B. in der Hafencity oder an der Alster für die Älteren (Stepper, Muskeltrainer etc.), vielleicht ein schönes großes Schachfeld oder Boulefeld als Begegnungsort und eine kleine Bürgerbühne auf der nach Genehmigung im Sommer kleine Konzerte oder Theateraufführungen stattfinden können. Dazu noch die Obstbäume und vielleicht gemeinsam gepflegte Hochbeete? Ich hätte Lust eine AG mit Nachbarn zu gründen und z.B. auch ein jährliches Straßenfest gemeinsam zu gestalten!
- **Beispielbeitrag 2: Spielplatz auf dem Gelände**
  Ich würde mir eine Kleinkindschaukel oder eine Schaukel rund mit Netz wie auf dem Spielplatz im Niendorfer Gehege wünschen. Oder Bodentrampoline - das ist Spaß für Kinder und Eltern.
- **Beispielbeitrag 3: Inselprinzip: Spielplatz, Sport und Erholung am Teich**
  Um möglichst viele Interessen unter einen Hut zu bringen, schlage ich für die Grünfläche ein Inselprinzip vor, das 3 Bereiche umfasst: - Spielplatz für junge Familien (ganz wichtig in dieser Gegend), - Sportgeräte, und - Bereich zur Erholung und Entspannung an einem kleinen Teich, denn auf Wasser zu schauen entspannt bekanntlich ganz besonders (dabei den Teich im eher schattigen Bereich neben den Sportgeräten, Sitzgelegenheiten und ein Barfussprfad in der Sonne). Die Bereiche können durch Bäume und Sträucher voneinander abgegrenzt werden. Ich freue mich auf die Neugestaltung!

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Thema 9

Exklusive Wörter des Themas:
weit, immer, umgestaltung, planung, daher, bürger, umgebung, seit, folgen, jahr, schon, wesentlich, halten, direkt, einschränken

- **Beispielbeitrag 1: Bauplanung Anegarweg/Rimbertweg**
  Durch Zufall erfuhren wir von Verdichtungsplanungen in unserer direkten Umgebung Ansgarweg/ Rimbertweg. Diese Ecke ist wie auch schon Eimsbüttel generell übermäßig dicht bebaut. Eine weitere Verdichtung ist Bürgern dieser Wohngegend aus vielen Gründen nicht zumutbar, da es einfach auch hier zu eng wird und der sympathische Charakter dieser Gegend den Interessen einer gut in der SPD vernetzten KAIFU geopfert wird. Gemäß Gerüchten, konkrete Informationen werden gehein gehalten bzw. nur verdeckt gehandelt, sollen der geplanten Verdichtung-bebauung sogar sehr alte und daher mächtige Bäume gefällt werden. Eine Beleidigung des normalen Bürgers, der derartige Schritte ohne Bestrafung nicht vornehmen dürfte. Ein sehr wesentlicher Faktor sind die fehlenden Parkmöglichkeiten, da aufgrund des hohen Grundwasserspiegels nicht in die Tiefe gebaut werden kann! Was es scheint, sind verständliche Bürgerinteressen wieder nicht von Interesse! Ein wesentlicher Aspekt sei zum Schluss beleuchtet: Wieso werden die massenhaften Schrebergärten in der Umgebung in nicht nachvollziehbarem Maße geschont. Diese Klientelpolitik ist geradezu abscheulich in Abwegung der Interessen der betroffenen normalen Bürger (Verdichtungsgebiet) im Vergleich zu diesen privilegierten Grundbesitzern! Ganz abgesehen von der absurden verkehrspolitischen Konsequenz, dass die arbeitende Bevölkerung ins Auto getrieben wird damit die relativ wenigen Freizeitgärtner im Stadtgebiet ruhig gehalten werden. Ein weiteres Gerücht macht in der Umgebung die Runde, dass privates Eigentum enteignet werden soll, um der KAIFU weiteres Baugebiet zuschanzen zu können. Für unser Demokratieverständnis einfach ein Unding und abartig!
- **Beispielbeitrag 2: Bewohnerparken**
  Eine Umgestaltung der Lindenallee würde ich begrüßen - aber es darf nicht nur einseitig sein. Verkehr/Autos: ein Entscheidung die Lindenallee und das gesamte Viertel als Bewohnerparken auszuweisen ist überfällig. Das würde die Situation wesentlich entspannen. Eventuell eine Einbahnstraßenregelung. Ich selbst bin beruflich auf das Auto angewiesen und muß öfters auch schwere Geräte transportieren. Eine Streichung von allen Parkmöglichkeiten in der Lindenallee wäre für mich sehr schwerwiegend. Allerdings werden in den letzten Jahren viele Wohnmobile oft dauergeparkt und bewegen sich oft Wochen lang nicht. Das ist rechtlich wohl legal, aber sehr nervend und unsozial. Gibt es dafür Lösungen? Für Kinder gibt in unmittelbarer Umgebung zur Lindenallee etliche Kinderspielplätze, dazu auch noch den Lindenpark.
- **Beispielbeitrag 3: Überarbeitung und -planung**
  des Gebietes Brauhausstieg- Wandsbeker Königstraße - Wandsbeker Marktstraße - Brauhausstraße Seit etlichen Jahren Leerstand des ehemaligen Strauss Innovation und mehrfacher Eigentümerwechsel. Für Entwickler nicht interessant, da Baurecht aus den 60er Jahren. Keine zukunftsgerichtete Entwicklung möglich. Leidtragende sind die Geschäftsleute "nebenan" und das Quartier ebenso.

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Thema 21

Exklusive Wörter des Themas:
öffentlich, groß, gerne, raum, angebot, geben, toll, haus, nutzung, gut, luft, ermöglichen, möglichkeit, müssten, zu_erreichen

- **Beispielbeitrag 1: Angebote für Jugendliche**
  Es benötigt mehr Angebote und Infrastruktur für Jugendliche, bspw. Räume zum Aufhalten. [Dieser Beitrag wurde auf dem Wochenmarkt in Lokstedt geschrieben]
- **Beispielbeitrag 2: Babyschaukel**
  Was in anderen Ländern längst Gang und gebe ist, fehlt in Deutschland (bzw. Hamburg) sehr oft. Eine Babyschaukel wäre wirklich toll. Für die größeren gerne Seil-Kletter-Gerüste und eine tolle Rutsche.
- **Beispielbeitrag 3: Inselprinzip: Spielplatz, Sport und Erholung am Teich**
  Es gibt genügend Cafes mit Alkohol und Spielautomaten, aber keine Angebote und Treffpunkte für Jugendliche und Frauen.

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Interaktive Diskussion

Öffentliche Werte und deren Konflikte

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