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Imagining Cycling Futures – A Comparative Analysis of Future Visions in Urban Mobility Plans

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Tim Martin Widdig

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Abstract

This thesis explores how European cities with different cycling regimes compare in their future imaginaries on cycling, addressing gaps in the literature on urban transportation and cycling. The multi-level perspective from transitions literature and the concept of socio-technical imaginaries serve as a robust theoretical basis, conceptualizing cycling as a socio-technical regime. This study conducts a comparative content analysis of 13 official planning documents from Copenhagen, Amsterdam, Cologne, Vienna, and Brussels, using an inductively developed coding scheme. The findings reveal significant differences between the cases: Both when it comes to the pursued measures as well as their rhetorical styles. Especially Copenhagen's documents stand out, focusing extensively on future imagining. Across all cases, four distinct future imaginaries are identified: Smart Cycling, focused on technological innovation, Integrated Cycling, emphasizing multimodality, Cycling in the Livable City, linking cycling to attractive streetscapes, and Inclusive Mobility, addressing transport inequalities. These imaginaries align predominantly with sustainable mobility discourses but vary in emphasis on technological against social innovation. A supplementary case study on Cologne, identified as an outlier for its limited use of future imaginaries, revealed contextual explanations for the deviating planning style. The case study revealed that this approach is expected to change towards a more imaginative planning approach, facilitated by the adoption of the EU-mandated Sustainable Urban Mobility Plan (SUMP). The findings of this thesis underscore the importance of future imaginaries in shaping cycling policies and the influence of EU policymaking on urban transport planning.

Diese Abschlussarbeit untersucht, wie sich europäische Städte mit unterschiedlichen Fahrradregimen in ihren Zukunftsvisionen über Fahrradfahren unterscheiden. Dabei werden Forschungslücken in der Literatur zu urbaner Mobilität und Fahrradverkehr adressiert. Die Mehrebenenperspektive aus der Transitions-Literatur und das Konzept sozio-technischer Zukunftsvisionen dienen als theoretische Grundlage, die Radfahren als sozio-technisches Regime konzeptualisiert. Diese Studie führt eine vergleichende Inhaltsanalyse von 13 offiziellen Planungsdokumenten aus Kopenhagen, Amsterdam, Köln, Wien und Brüssel durch, wobei ein induktiv entwickeltes Codierschema verwendet wird. Die Ergebnisse weisen erhebliche Unterschiede zwischen den Fällen auf: Sowohl in Bezug auf die angestrebten Maßnahmen als auch auf den rhetorischen Stil. Vor allem die Kopenhagener Dokumente stechen durch einen starken Fokus auf Zukunftsvisionen heraus. Über die fünf Fälle hinweg lassen sich vier verschiedene Zukunftsvisionen identifizieren: ‚Smart Cycling', das sich auf technologische Innovationen konzentriert, ‚Integrated Cycling', das Multimodalität betont, ‚Cycling in the Livable City', welches das Radfahren mit attraktivem Stadtbild verknüpft, und ‚Inclusive Mobility', die sich mit Ungleichheiten in urbaner Mobilität befasst. Diese Visionen stimmen überwiegend mit Diskursen über nachhaltige Mobilität überein, unterscheiden sich aber in der Betonung der technologischen gegenüber der sozialen Innovation. Eine ergänzende Fallstudie über Köln, das wegen seiner begrenzten Verwendung von Zukunftsvisionen als Ausreißer identifiziert wurde, demonstriert kontextbezogene Erklärungen für den abweichenden Planungsstil. Die Fallstudie zeigte, dass sich dieser Ansatz voraussichtlich in Richtung eines visionäreren Planungsansatzes verschieben wird, was durch die Verabschiedung des von der EU vorgeschriebenen Sustainable Urban Mobility Plans (SUMP) begünstigt wird. Die Ergebnisse dieser Arbeit unterstreichen die Bedeutung von Zukunftsvisionen für die Gestaltung der Radverkehrspolitik und den Einfluss der EU-Politik auf die städtische Verkehrsplanung.

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Contents

List of Abbreviations

CBA – Cost-benefit analysis

EU – European Union

EC – European Commission

MaaS – Mobility as a Service

MLP – Multi-Level-Perspective

PT – Public Transport

SDG – Sustainable Development Goals

SUMP – Sustainable Urban Mobility Plan

UN – United Nations

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1 Introduction

Cities are confronted with numerous challenges in the realm of transportation, notably the pressing need to reduce carbon emissions (UNDP 2024). One highly promising yet underutilized mode of transport that can address these challenges is cycling, which is identified as a cheap, space-efficient effective and sustainable mode of transport (Pucher and Buehler 2017). With the rise of sustainable transport discourses and the adoption of sustainable urban mobility plans many Western European cities are increasingly promoting cycling, resulting in higher cycling levels (Oldenziel et al. 2016; Pucher, Dill, and Handy 2010). However, the prevalence of cycling varies widely: While being practically non-existent in some places, cycling constitutes a dominant mode of transport in others. Such differences across national borders are underexplored in the literature on cycling and cannot be solely attributed to factors like geographical conditions (Pucher and Buehler 2008; Nello-Deakin 2020).

The process of cycling planning is structured through the publication of official cycling strategies and future transport visions. Such mobility plans are underexplored in the academic literature as well. This thesis contributes to closing these gaps, by analyzing official cycling plans in five EU cities, which differ drastically in their cycling levels: Copenhagen, Amsterdam, Cologne, Vienna and Brussels. Drawing on the concept of socio-technical future imaginaries (Jasanoff and Kim 2009) and the multi-level perspective from transitions literature (Geels 2012), this thesis seeks to answer the following research question: How do European cities across different cycling regimes compare in their future imaginaries on cycling?

This question is answered through an exploratory content analysis of 13 official municipal transport- and cycling strategies using an inductively developed coding scheme. The findings reveal significant differences among the selected cities, both in the types of cycling policies and in the use of future envisioning and imagination. Through an analysis of code co-occurrences and qualitative observations, four distinct future imaginaries were identified across the five European cities: *Smart Cycling*, *Integrated Cycling*, *Cycling in the Livable City* and *Inclusive Mobility*. Drawing from the literature, it is possible to situate these imaginaries within academic discourses on transport. While sustainable mobility discourses dominates, elements of neoclassical and critical approaches are also reflected. Some imaginaries focus more on technological innovation, while others emphasize social innovation.

In a follow-up analysis, this thesis further seeks to explain some of the findings, by conducting a case study of the most divergent city, Cologne. Here, the impact of the EU mandated sustainable urban mobility plans was identified, leading to an increase of the usage of future envisioning.

This thesis is organized as follows: Chapter two introduces the relevant literature on urban transport and cycling, offering an overview of recent trends in planning practices. Chapter three presents the theoretical framework of this thesis, consisting of the multi-level-perspective from transition research and the concept of socio-technical imaginaries. Chapter four summarizes the theoretical section and elaborates on research gaps and the research question. In chapter five, the research design is discussed, focusing on case and data selection as well as the analytical strategy. Chapter six presents the results of the coding analysis and introduces the different imaginaries. In chapter seven, an additional case study following up on the case of Cologne is conducted, using semi-structured expert interviews. Chapter eight discusses the main findings and limitations, followed by a conclusion in Chapter nine.

2 Literature Review

2.1 Research on Urban Transportation Planning: Three Approaches

In the second half of the 20th century, research on urban transportation was focused on cars and making cities efficient for car travel. The dominant idea was to provide necessary infrastructure for an inevitable increase in car usage and ownership (Jones 2014, 8). This was guided 'rational' approaches to transport planning. Planners saw transport as something technical, which could be handled in a top-down manner through rational modelling and technical expertise (Koglin and Rye 2014, 217). Such neoclassical approaches embrace predictive transport modeling, cost-benefit analysis (CBA) and see transport as an important contributor to economic growth (Kębłowski and Bassens 2018). The dominant scholarly disciplines are thus engineering and economics. This car-centered planning of the post-war era has fundamentally redefined the street. In Europe, this was sped up after world war II: Destroyed cities provided planners with the opportunity to drastically reshape cities to accommodate space for cars (Schipper, Emanuel, and Oldenziel 2020, 308).

After decades of car-dominated urban planning in Western Europe under the ideal of modernism, some scholars started raising concerns about the impact of car-centered planning on urban life. Early scholars like Jane Jacobs or Jan Gehl identified the detrimental effects of car-oriented planning and voiced concerns, critiquing the decline of social interaction due to long car travel caused by functionalist separation, environmental degradation and health issues (Jacobs 1961; Gehl 2001). These critiques remain relevant today.

Starting with the oil crises of the 70s, concepts like sustainable development emerged and became relevant in the field of transportation research as well, with a growing recognition of transport emissions and their contribution to climate change. Since the early 2000s, transport research has increasingly focused on issues of sustainability, leading to a rapid growth of publications following the notion of 'sustainable transport'. Within the literature on sustainable urban transportation, a

key contribution, which remains relevant to this date is the 'sustainable mobility paradigm' introduced by Banister (2008). He argues for a paradigm shift in urban transportation motivated by the need to decarbonize urban transport. It promotes mixed-used city design, departing from mono-functional urban planning, which minimizes the need for trips. Furthermore, the paradigm advocates for a modal shift towards public transport and soft modes of transportation instead of car mobility, such as walking and cycling, reducing the reliance on car trips. While climate change is clearly the motivation behind that sustainable mobility paradigm, it also aims to achieve improvements not directly related to transport: Attention is also dedication to individual transport behavior, participation, accessibility and social inclusion, breaking with top-down transport planning traditions. Here the approach has a similar focus as other urban planning approaches with the goal of building 'attractive' and 'livable' cities (Banister 2008; 2011). These changes go beyond purely technical transport planning and are multidimensional, and can thus be characterized as a socio-technological transitions (Schwanen, Banister, and Anable 2011; Geels 2012). Overall, urban transport planning and research is slowly moving away from neoclassical approaches in favor of sustainable planning. Sustainable mobility discourses have become one of the dominant approaches to urban transport planning (Jones 2014, 8; Kębłowski, Dobruszkes, and Boussauw 2022).

However, the sustainable mobility paradigm has also sparked criticism. While it introduced transportation research to topics like social justice and accessibility, it fails to address the structural causes of inequality in transportation. The paradigm instead employs a rather depoliticized view of transportation, following a neoliberal rationality. Furthermore, there is a moralizing element, distinguishing between 'good' cyclists and pedestrians and 'bad' car drivers. (Reigner and Brenac 2019; Kębłowski, Van Criekingen, and Bassens 2019; Cunha and Silva 2022). In addition to such direct criticism of the sustainable mobility paradigm, there is the criticism that scholarly contributions within sustainable mobility discourses often resemble those of neoclassical transport. Critics argue that instead of a radical departure from neoclassical planning, sustainable discourses do not operate in fundamentally distinct logics, but rely on similar tools with only slight modifications. A good example is the usage of CBA, which has only been adapted into "multi-criteria analysis", or "social CBA" instead of dropping this approach altogether (Kębłowski and Bassens 2018; Tudela, Akiki, and Cisternas 2006; Saitua 2007). In addition to that, sustainable approaches can often be characterized by technological determinism and rely heavily on technological innovations, such as electric vehicles and thus fail to instead pay attention to more radical future envisioning relying on social innovations (Timms, Tight, and Watling 2014; Gössling and Cohen 2014).

Following such critiques, a branch of more 'critical' perspectives on urban transport, informed by a political economy lens is emerging. These works follow Brenner's notion of 'critical urban

theory' and emphasize political power struggles that shape urban mobility (Brenner 2009). Such analyses prominently address issues like class, gender, race and inequality and call for uncovering influences of capitalism on urban transport (Reigner and Brenac 2019; Hanson 2010). The focus lies on understanding and challenging dominant structures that explain unsustainable transport (Kębłowski and Bassens 2018). Such analysis reveals the existence of certain 'transport taboos', like not addressing disparities between income classes or an ignorance of key measures to reduce transport emissions (Gössling and Cohen 2014).

To summarize, there are three different academic discourses on urban transportation: Neoclassical approaches, sustainable approaches and a growing field of critical political economy approaches. Despite neoclassical approaches being most prominent in the post-war era, it is important to note that they are not a thing of the past: Such contributions are still relevant and powerful today, often in connection with digital or intelligent technology and smart city narratives, like 'smart traffic modeling' and the collection of big data (Kębłowski and Bassens 2018). Given the current dominance of neoclassical and sustainable approaches to transport, there is still a dominance of engineering, economics and to a lesser extent behavioral psychology when it comes to academic disciplines researching urban transport (Schwanen, Banister, and Anable 2011).

2.2 Cycling Mobility Research

This section outlines the major branches of academic literature on cycling that inform this research project.

As an active and non-polluting mode of urban transportation, cycling is increasingly regarded as a promising solution amongst urban policymakers to address climate change and environmental challenges. As outlined above, as a 'soft' mode, promoting cycling is a key suggestion within the sustainable mobility paradigm (Banister 2008). But the potential benefits of cycling go far beyond ecological sustainability improvements: For example, cycling infrastructure is cheap to implement, very space-efficient and cycling also offers significant health benefits (Handy, van Wee, and Kroesen 2014, 12). This section offers an overview over relevant academic contributions on cycling. I furthermore situate cycling within the current mobility system of western European cities and provide an overview of the relevant literature.

Cycling has, for a long time, been a neglected mode of transportation, both by planners and academia (Koglin and Rye 2014, 214). Recently however, there is a dramatic increase of cycling-related papers (Pucher and Buehler 2017, 689). An important set of studies on cycling focuses on assessing the impacts of cycling. These are found to be largely positive: Cycling is space-efficient and cheap to implement and it provides health benefits, both individually as well as for public health. In times of the climate crisis, cycling is also strongly recognized for its potential to mitigate transport emissions (Koglin and Rye 2014; Nikolaeva and Nello-Deakin 2020; Handy, van Wee, and

Kroesen 2014). Furthermore, cycling is increasingly associated with topics of productivity and economic growth (Spinney 2018). The economic impacts of cycling are contested, but there is some evidence that cycling is beneficial to economic growth. Furthermore, the health benefits often end up being economic benefits for the society as a whole (Handy, van Wee, and Kroesen 2014).

Despite a recent expansion of scholarship on cycling and sustainable transport, there are still many unanswered questions and challenges. Some argue that the field suffers from "theory-free pragmatism", with research failing to locate themselves within the field, which makes it hard to challenge underlying assumptions that were might in the research process (Koglin and Rye 2014, 214). According to critics, power relations are largely unexplored. Cupples and Ridley (2008) critique what they call "cycling fundamentalism", referring to an overly positive framing despite cycling being a "marginal activity", in terms of mode share. Cycling infrastructure has also been found to be a contributor to processes of gentrification and marginalization, thus not addressing power structures is even more problematic (Cunha and Silva 2022). These critiques of the cycling literature bear many similarities to critiques raised against neoliberal and sustainable approaches to transport research often raised by scholars of the increasingly prominent critical transport studies described earlier.

It is not possible to discuss cycling without addressing the role of automobility. Given the history of car-centric planning, the car is still *the* single most important mode of transportation and has shaped cities massively. In an influential contribution Urry (2004) coined the term 'system of automobility', referring to cars as the dominant transport regime. The system of automobility (Geels 2012; Böhm et al. 2006) can be understood as a complex system spanning all parts of society from industry, planning to cultural representations of the car. To Urry, the automobile is the "quintessential manufactured object" of Western capitalism (Urry 2004, 25). He sees the system of automobility as a self-expanding system, which is still deeply rooted in all parts of modern societies, not least due to path dependencies (Urry 2004, 36). An example of such rootedness of automobility is that some politicians specifically avoid talking about cars because of it's cultural significance to voters (Sheller 2018, 2). Scholars in transition studies often make similar observations, referring to the 'automobility regime' instead of 'system' and emphasizing the ideological ideals of freedom, individuality, and progress associated with cars (Geels 2012; Böhm et al. 2006). This deep embeddedness within contemporary societies leads to lock-in effects like sunk costs, knowledge and cultural practices stabilizing the dominance of the automobility regime (Geels 2012). The dominance of cars against other modes of transport is also acknowledged and stressed in the cycling literature. Cox stresses that vélomobility "always operates in the shadow of the automobility" (Cox 2019, 29).

Another influential branch of the literature deals with the question of what predicts and increases cycling. These papers employ predominantly regression-based analyses using infrastructural, geographical and socio-demographic variables to explain individual cycling behavior (Willis, Manaugh, and El-Geneidy 2015). The largest debate in this field surrounds the question of whether soft policy measures increase cycling levels. Soft measures refers to measures which are unrelated to physical infrastructure, like communication, educational measures or campaigns which aim at influencing the local cycling culture (Harms, Bertolini, and Brömmelstroet 2016; Aldred and Jungnickel 2014, 78). Results of studies are mixed, with some finding evidence that infrastructural measures increase cycling levels, while others document the role of communicative and soft measures (Yang et al. 2010; Ogilvie et al. 2004; Pucher and Buehler 2017; Willis, Manaugh, and El-Geneidy 2015). In line with these results, there is also scholarship focusing specifically on those 'soft' policy measures in order to increase cycling. Such soft approaches are also increasingly implemented by municipal governments, for example in Copenhagen (Spinney 2018, 454; Gössling 2013). The significance of determining what drives cycling is undisputed. However, Nello-Deakin (2020) argues that this branch of research, especially contributions focusing on geographical and environmental determinants of cycling have reached a point of saturation. He claims that the most important points about cycling promotion are re-iterated over and over again, without novel findings. He thus calls for a departure from this research agenda.

A set of factors that is typically underrepresented in large-n-studies which aim at explaining the causal factors behind cycling, are local circumstances like the agency of municipal governments or the role of local activism. Such variables are harder to quantify than population density, geographical factors or accessibility of public transport. Despite often similar geographical conditions, cycling levels vary drastically between different European cities. While in some cities like Utrecht or Copenhagen, cycling is becoming the most popular mode of transportation (Willis, Manaugh, and El-Geneidy 2015, 4), in many cities it still qualifies as a niche phenomenon. Some studies point to the importance of 'mobility cultures' or 'cycling cultures' in explaining regional differences shaping cycling behavior (Klinger, Kenworthy, and Lanzendorf 2013; Aldred and Jungnickel 2014; Kuipers 2013; Gössling 2013). Examples are the long tradition of Dutch cycling culture which contributes to a national identity, but also smaller-scale activism contributing to a cycling subculture (Aldred and Jungnickel 2014, 85; Kuipers 2013).

Given the significant influence of individual city governance on cycling levels, it is surprising how little comparative research exists on different cities' approaches to cycling. Much of the literature neglects city governance, focusing on individual-level variables or nation states as structuring entities (Pucher and Buehler 2008). When papers address the role of individual cities, this usually happens in the form of single case studies analyzing the particular situation in one particular place (Gössling 2013; Canitez 2019; Wieser 2021; Martens 2013). Given an increasing harmonization

of transportation planning governance (more on that in the next chapter), this lack of cross-national comparative research is surprising. A notable exception is a publication by Oldenziel et al., which reviews the historical development of cycling across multiple European cities and aims at including further cities in the future. Such historical research uncovers factors like actor-coalitions and drivers contributing to cycling growth and often reveals surprising similarities across different national contexts between cities while pointing to the crucial role of local governance (Oldenziel et al. 2016, 187). In another study, the same authors thus call for a future research agenda, which puts "diverse urban contexts in a broad comparative framework without losing sight of the transnational circulation that influences how urban mobility comes about" (Schipper, Emanuel, and Oldenziel 2020, 313f.). This thesis aims at contributing to narrowing this research gap, by comparing the different city publications about cycling in five European cities. This way, it is possible to analyze how differences in planning practices shape the status of cycling as a mode of transportation in various places.

2.3 Recent Trends in Urban Transport Planning Practice

To analyze transport planning documents, it is important to understand how the planning practices have evolved in recent years. Due to globalization and easier knowledge exchange, planning has become an increasingly international practice. Given the shared urgency of climate action, urban governance all over the world faces the challenges of quick decarbonization, especially in the transport sector. Cities are increasingly recognized as important actors when it comes to climate action. The United Nations' Sustainable Development Goals (SDGs) have been widely adopted by urban governments, with SDG 11 - focused on carbon reduction and sustainable transport - being particularly relevant (United Nations 2023). These goals are increasingly reflected in official city strategies.

Another important trend are international city networks. These are organizations made up of different municipalities with voluntary membership, often dedicated to reducing carbon emissions. Many influential ones, like the C40 or Resilient Cities Network strongly emphasize the topic sustainable transport. The literature on city networks broadly distinguishes between two types: Exclusive elite networks like C40 and non-exclusive mass networks like the Covenant of Mayors or ICLEI (Haupt and Coppola 2019). Such networks facilitate knowledge exchange and push the implementation of 'best practices' from elsewhere, following a logic of Darwinian experimentation (Davidson, Coenen, and Gleeson 2019). This is particularly true in the mobility sector, where practices like Bus Rapid Transit or pop-up cycling lanes are extremely mobile and are often transferred to other cities (Sheller 2018). While not empirically contested, these trends are criticized by some scholars, arguing that best practices cannot easily be translated into new and different urban contexts. These scholars critique the standardization of policy agendas as

leading to a depoliticized policy agenda, which can be seen as problematic as this can lead to de-emphasis of democratic contestation and inclusion of diverse perspectives (González 2011; Peck and Theodore 2010; Kębłowski and Bassens 2018; Castañeda 2020).

Within the European Union, the above-mentioned trends are accelerated. While the EU has a long history of interfering in urban and regional planning through bodies like INTERREG and its cohesion policy (Hall and Tewdwr-Jones 2020, 215ff.), the European commission (EC) only recently got involved in transport planning. Historically, the EC emphasized subsidiarity, avoiding involvement in policies that could be managed at the regional or local level. However, the realization that urban transport makes up for a substantial amount of the EU greenhouse gas emissions has led to a drastic change and the issue was identified as too important to be left to local governments (May 2015, 3). In response, the commission issued reports on urban transportation. These efforts resulted in a 2009 Action Plan on Urban Mobility, followed by a 2011 White Paper (European Commission DG Move 2011; European Commission DG Energy and Transport 2009). These documents encourage the adoption of 'Sustainable Urban Mobility Plans' (SUMP) for European cities. SUMP have now become a mandatory requirement for larger cities in the EU (May 2015, 3). SUMP guidelines advocate an integrated planning approach, which covers all types of mobility and does not view them in isolation. The SUMP guidelines further demand drastic changes in urban transportation, requiring cities to reduce transport related greenhouse gas emissions by 90% by 2050 (Jordová and Brůhová-Foltýnová 2021, 1). Advancing cycling as part of an integrated approach to transport planning is a clear recommendation in SUMP guidelines, moving away from car-based mobility (Jordová and Brůhová-Foltýnová 2021, 1). The EC also encourages campaigns aimed at behavioral change, with a focus on increasing walking and cycling. Importantly, the SUMP guidelines also call for the development of a long-term future vision, demanding cities to develop "a common vision of a new mobility culture", recognizing the importance of future imaginaries, which is a clear departure from traditional predict-and-provide transport planning (European Commission DG Mobility and Transport 2013, 12; Rupprecht Consult 2019).

Supporting these policies, the EU fosters knowledge exchange through various initiatives, including exclusive city networks like EUROCITIES (Maltese, Gatta, and Marcucci 2021, 2; ELTIS 2023). The EU identified urban governments as key political agents and actively seeks to empower them, to a degree bypassing the national level altogether (Marsden et al. 2011, 501; Peters and Pierre 2012; Kumar 2019). This also applies to dedicated cycling policies, like the "CIVITAS Handshake Cycling" project, where cities like Copenhagen and Amsterdam mentor other European cities on advancing cycling (Marsden et al. 2011, 508; CIVITAS 2023; Maltese, Gatta, and Marcucci 2021). This puts European cities in an increasingly comparable governance framework and devalues the role of nation state. Such efforts accelerate knowledge exchange and further enhance

the mobile nature of many transport policies, as planning professionals are in constant exchange with colleagues from elsewhere (Sheller 2018, 12; Schipper, Emanuel, and Oldenziel 2020).

In conclusion, the growing influence of international governance bodies, the dominance of mobile policies in transportation debates, and the widespread adoption of the SDGs mean that cities are operating within an increasingly shared governance framework, particularly within the European Union. For this research project this implies that a comparison between European cities is increasingly appropriate. Additionally, it partially addresses one limitation of this thesis - namely, the selection of only one case per country, which limits the systematic analysis of country-level impacts.

3 Theoretical Framework

3.1 Sustainability Transitions

To understand how transitions in urban mobility come about, a robust theoretical framework is required. A socio-technical transition perspective offers a valuable lens that transcends the conventional focus on economics, engineering, and behavioral studies in transport research, challenging the dominance of positivist epistemological frameworks. (Schwanen, Banister, and Anable 2011). This section briefly introduces the literature on urban sustainability transitions.

As the name suggests, this literature goes back to the introduction of the concept of sustainable development. This concept emerged in the 1980s with the Brundtland Commissions report "Our Common Future", which was published by the UN-initiated World Commission on Environment and Development (WCED 1987), following the pivotal "Limits to Growth" report issued by the Club of Rome in 1972 (Meadows et al. 1972). Sustainable development quickly became the dominant discourse surrounding international environmental policy (Dryzek 2013). While there is no single agreed-upon definition on sustainability as a concept, it commonly refers to achieving social, environmental, and economic prosperity both in the present and for future generations (Loorbach and Shiroyama 2016). In 2015, the United Nations World Summit of Sustainable Development formulated the Sustainable Development Goals (SDG), further underscoring the significance of the concept (United Nations 2023; 2016).

Sustainability is increasingly regarded as an urban issue. Urban areas account for approximately 70% of energy-related greenhouse gas emissions, highlighting their significant role in driving climate change. At the same time, cities are also regarded as promising places of innovation and societal progress, offering unique opportunities to pioneer sustainable solutions (Loorbach and Shiroyama 2016). Over the last decade, sustainable urban governance has developed into an increasingly popular narrative. Especially given the popularity of the United Nations Sustainable development goals (SDG) among urban policymakers and the emergence of climate city networks,

cities are increasingly seen as the ideal places for climate action. Despite this potential, contemporary urban governance structures often still prioritize short-term economic growth and conventional technological solutions over ecological and social sustainability. This prioritization has persisted for over three decades, indicating a challenge in fundamentally integrating sustainability into urban governance (Loorbach and Shiroyama, 2016, p. 6). Nevertheless, there is reason for optimism, given an "uncoordinated yet globally emerging movement in cities where innovative new sustainable solutions are being experimented with, shared, scaled and translated in emerging speed" (Loorbach and Shiroyama 2016, 4). The ease of knowledge transfer and the creation of 'translocal' city networks foster intellectual exchange and drive the transition toward sustainability (Loorbach and Shiroyama 2016).

Within the field of urban transition studies, transitions are understood as "structural change in a societal system […] that is the result of co-evolution of economic, cultural, technological, ecological, and institutional developments at different scale levels" (Loorbach and Shiroyama 2016, 6). Importantly, this definition encompasses wider societal and cultural issues and is not limited to technological innovation. An important aspect of transition studies is the emphasis on niches. Here, the role of experimentation and multisectoral co-evolution is stressed, as niches can be characterized as protected spaces were innovations that would not be able to persist on the free market yet, can develop further towards being an alternative to dominant practices (Loorbach and Shiroyama 2016). One very influential contribution in the field of transition studies is the multi-level perspective (MLP), put forward by Geels (2002). The following section gives an overview of this contribution and applies it to urban mobility and cycling.

3.1.1 Multi-Level Perspective

The multi-level perspective (MLP) has proven to be a useful theoretical lens when it comes to analyzing sustainable transitions and urban change. It has been applied to many different transitions, such as urban resilience (Rogov and Rozenblat 2018), nature-based solutions (Mitić-Radulović and Lalović 2021), energy transitions (Kanger 2021) or automobiles (Martin 2021). The framework has also been applied to urban mobility and more recently, cycling (Geels 2012; Canitez 2019; Geels 2018). In the following, I present the general framework of the multi-level perspective in the context of mobility transitions and apply it to the concept to cycling.

Geels understands transitions as "transformations in the way societal functions such as transportation […] are fulfilled" (Geels 2002, 1257). While the focus lies on technological innovation and his primary example is one of a mostly technological transition, he emphasizes that the theory is not limited to technological changes (Geels 2002, 1257). According to Geel's framework, transition are non-linear changes that come about through the interaction of three different analytical levels: Niches, socio-technical regimes and the socio-technical landscape

(Geels 2002; 2012). Niches are protected spaces in which innovation occurs. Here, learning processes happen and visions and networks are created. The socio-technical regime is a well-developed and established system, like the system of automobility. Here, innovation happens only incrementally, because of sunk costs of continuing to use established technologies and approaches, low costs due to economies of scale or shared beliefs (Geels 2012, 473). The socio-technical landscape constitutes the wider surroundings, such as spatial structures, political ideology and societal values, the media landscape or macro-economic trends (Geels 2012, 473).

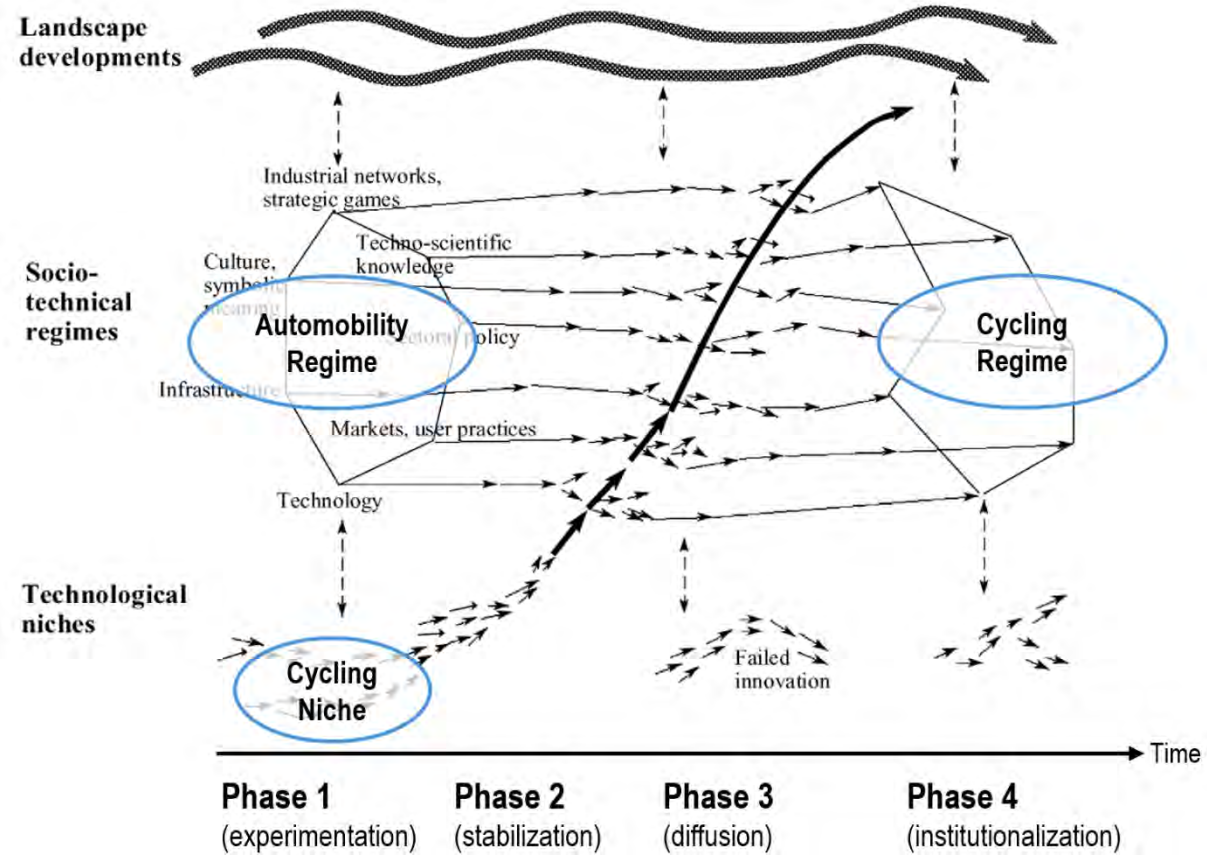

Figure 1: Schematic visualization of transition processes for cycling according to the multi-level perspective, adapted by author (Geels 2002, 1263; 2019)

According to this theory, transitions happen through the interplay of the different levels: Niches can create radical innovations, which gain momentum and create pressure on the regime level from below in a bottom-up process. In addition to that, developments on the landscape put further pressure on the regime, like the acknowledgment climate change as a major problem. These different pressures from below and above create a 'window of opportunity' which can lead to socio-technical transition. Figure 1 presents a schematic visualization of Geel's framework applied to a transition from an automobility regime towards a cycling regime (Geels 2012, 474; 2002).

Contrary to other approaches to sustainable transitions, the MLP is more holistic, drawing from innovation studies, economics, sociology and neo-institutional theory (Geels 2012, 472). Many alternative approaches to sustainable development focus on only a single issue of unsustainability

of established solutions and potential (technical) alternative solutions, while the multi-level perspective offers a more holistic view on societal systems, by explicitly addressing the interplay of different levels (niche, regime, landscape). As explained earlier, research on sustainable transport is still dominated by studies relying on neo-classical engineering, economics and psychology, which typically focus on single issues of unsustainability (Schwanen, Banister, and Anable 2011). For example, neoclassical economics regard environmental problems only as negative externalities resulting from market failures, and thus leave initiative mostly to market actors (Stern 2006; Geels 2012). Similarly, psychological studies focus primarily on shifting individual's behavior instead of system level interventions, while engineers tend to over-emphasize the impact of technological innovation over social innovation (Geels 2018, 471). The MLP thus encompasses a wider array of factors than narrower approaches like transport engineering, which are typically applied in the transportation sector (Geels 2012, 472; Schwanen, Banister, and Anable 2011). Following the multi-level perspective, transitions do not happen because of single causal drivers but are always caused by an interplay of many different factors. The multi-level perspective thus represents an interpretative epistemological style which is well-suited to study messy transition processes, like changes in urban governance and planning (Geels 2012, 474).

While the MLP gets frequently applied to the field of transportation, with a major focus on car transitions – in fact Geels' first example was one of transport innovation (Geels 2002) – there are limited applications to cycling (Bruno 2022, 3). This may in part be explained by a forward-looking bias of transition studies towards radically new innovation. Cycling however, used to be much more prominent in the 1920s to 1940s than it is now and thus largely constitutes old technology (Shove 2012). Addressing this issue, Shove calls for heightened attention to processes of disappearance and reappearance, stressing that the stages of the innovation journey (niche – stabilization – diffusion – institutionalization) are the same for re-emerging sociotechnical configurations as for new ones (Shove 2012).

Applying the socio-technical approach to transport in the context of low carbon transitions, transport systems are understood as configurations of technology, policy, markets, consumer practices, infrastructure, cultural practices and scientific knowledge (Geels 2012, 471). There are different socio-technical transport regimes. The dominant regime is that of automobility, but other modes of transport, like cycling and public transit, exist as their own regimes as well. This regime is held in place through lock-in effects. This way, cycling is understood as its own full socio-technical regime (Geels 2012, 473). Given the long history of cycling and other transport regimes like trains, these can hardly be classified as niche developments in a sense of radical novelty. But, these still occupy niches, given their relative position against the dominant regime of automobility. Measured by their mode share cycling can often be regarded as a niche mode of transportation,

much like public transit. In this view, these modes occupy transport niches. Geels thus calls such niche regimes '*subaltern*', referring to these modes as having a low status compared against the automobility regime (Geels 2012, 473). According to this view, the general theory of how transitions happen through niche innovation still applies.

Figure 2: Cycling as a Socio-technical regime with constitutive subsystems (Canitez 2019, 176)

However, regarding cycling as a niche or subaltern mode of transport can be problematic. While most of the few publications working with the multi-level perspective on cycling simply adopt Geels classification as a subaltern regime (Bruno 2022, 3), this can be problematic for two reasons: First, while cycling certainly qualifies as a niche mode of transport if measured globally, this status is simply not accurate in all places. In some cities, like Amsterdam or Copenhagen, cycling trips surpass the number of car trips, potentially giving the cycling regime a dominant status (Bruno 2022; Oldenziel et al. 2016). In these places, the classification as a subaltern mode is thus empirically invalid as of today. Secondly, viewing different modes of transport in isolation fails to capture integrated modes of transport and the increasingly important concept of multimodality, highlighting symbiotic relationships between some modes of transport, like the combination of taking the train with using a bike (Schwanen 2016). Through integration, different modes with small individual mode share can still represent an important part of the overall transport volume when combined (Bruno 2022, 3). This is important part of the sustainable mobility paradigm (Banister 2008). Thus, the usage of the term 'subaltern' should only be used when speaking of modes of transport which have a substantially lower status then the automobility regime and thus needs to be applied depending on the situation in a given case. I therefore refrain from using this

term in general to conceptualize cycling, departing slightly from Geels' proposition. Despite this criticism, the term subaltern still accurately reflects the situation of cycling in many places. Here, innovations towards more cycling likely happen as radical niche innovation.

Conceptualizing cycling as a socio-technical regime reflects the complexities of cycling and the multi-actor network attached to it. Using a socio-technical lens, Canitez (2019) proposes a configuration of cycling systems with seven dimensions (see figure 2): User practices, infrastructure, socio-cultural meanings, regulations, knowledge, technology and industry, which illustrates the holistic, integrated perspective of the MLP. Additionally, it pays attention to the built- and natural environment, reflecting the landscape regime of Geels framework (Canitez 2019, 176). He successfully applies this framework to niche cycling developments in Istanbul, illustrating its that all socio-technical dimensions of the cycling system play a role in the transition focus, demonstrating the need for a holistic framework (Canitez 2019).

Applying a socio-technical lens to cycling is especially helpful when situating cycling against the dominant socio-technical regime of automobility. Such a conceptualization is in line with multiple branches of academic research on cycling and transportation, such as Urry's 'system of automobility' or the literature on 'velomobility', which highlights power structures between cycling and automobility (Cox 2015; 2019). This way, the MLP serves as a useful framework for explaining the continued dominance of the automobility regime, which is commonly observed within the transport scholarship.

Bruno (2022) proposes an analytical framework using a multi-level perspective and the sustainable mobility paradigm to assess sustainability of cycling measures which pays special attention to the state of the cycling regime. First, he differentiates between spaces with niche cycling regimes and mature socio-technical cycling systems, improving upon the blind labelling of cycling as 'subaltern'. Against this backdrop, he assesses if cycling policies actually advance sustainable mobility or represent conventional car-dominated planning approaches (Bruno 2022, 6). Applying this differentiation demonstrates that some cycling measures are first and foremost improvements for car traffic instead of cycling improvements and thus don't qualify as sustainable mobility. This is for example the case for infrastructure that improves cycling against the status quo, but at the same time also improves car traffic flow, thus not contributing to a shift from cars to cycling, such as Eindhoven's prestigious cycling roundabout (Bruno 2022, 7). On the other hand, in regimes where cycling is still a niche phenomenon, seemingly small and mundane changes represent radical innovation which have been made possible through protected niches and advance cycling at the cost of car traffic and thus qualify as sustainable policies (Bruno 2022, 7). This is in line with other studies on cycling, which also stress that decreasing the attractiveness of car traffic is a key component of cycling promotion (Harms, Bertolini, and Brömmelstroet 2016).

Bruno's work stresses the importance of differentiating between places with niche cycling against places where cycling is already more dominant. Additionally, it demonstrates the value of a multi-level perspective in assessing if given measures do actually advance sustainable transitions or not, stressing that sustainability improvements in the field of cycling need to reduce car traffic and not simply improve cycling conditions. This re-iterates the importance of always analyzing cycling against the backdrop of automobility.

Transition theory and niche management research has found that in order to foster niche innovation, the process of envisioning plays a key role in advancing transition pathways. 'Transition visions', understood as deliberate and creative tools play an important role in creating consensus in the long-term (Loorbach 2007). As innovation is happening within niches, agents of change make use of transition visions, which help provide guidance within niches and attract attention from external actors (Sengers 2017; Schot and Geels 2008; Geels 2012). The crucial role of imagined futures is also reflected in research on the concept of imaginaries.

3.2 Urban Imaginaries

The idea that future visions or imaginaries are important is stressed by numerous urban scholars across different academic strands. In a recent publication, Lindner and Meissner (2019) retrace the academic usage of the concept of urban imaginaries and connect it to pivotal contributions in the field of urban studies dating as far back as the Chicago School and early urban scholars like Georg Simmel and Walter Benjamin. The first explicit articulation of imagination was put forward by urban planner Kevin Lynch in the 60s, where he introduces the concept of 'imageability' and demonstrates its importance in shaping cities (Lynch 1964). Later, prominent scholars like Lefebvre (1991) argued that imaginaries need to be examined in relationship to social power structures. Similarly, according to Marxist geographer David Harvey "utopian imagining" plays a crucial role in changing the current state of uneven urban development (Harvey 2000). A concrete definition of the concept of urban imaginaries was put forward by Edward Soja, who defines urban imaginaries as "interpretative grids through which we think about, experience, evaluate, and decide to act in the places, spaces and communities in which we live" (Soja 2000, 324), stressing that urban imaginaries are in constant transition (Lindner and Meissner 2019). In parallel to the solely urban scholarship, an entire interdisciplinary research field of 'future studies' emerged, with a focus on studying envisioned futures (Beckert and Suckert 2021; Bazzani 2023).

The most fleshed-out theoretical conceptualization of future imaginaries to date, with a focus on empirical applications, was published by Jasanoff and Kim (2009; 2015). In an empirical study analyzing national pathways with regards to nuclear power, the authors introduce the concept of 'sociotechnical imaginaries'. They define sociotechnical imaginaries as "collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific

scientific and/ or technological projects" (Jasanoff and Kim 2009, 119). Jasanoff and Kim stress that sociotechnical imaginaries produce visions which strongly shape public expenditure. Their work highlights the impact of cultural visions to shaping the social order. According to them, imaginaries are an important cultural resource that shapes the future by projecting positive goals and ways to attain them. This attainability is crucial, as sociotechnical imaginaries may be utopian, but are actually reachable, not relying on fictional unachievable technology or developments (Jasanoff and Kim 2009, 120ff.). Crucially, despite not addressing the transitions literature, the terminology bears striking resemblance to the concept of socio-technical regimes from the multi-level perspective. Much like the multi-level perspective, Jasanoff and Kim stress both sides of the term 'socio-technical', highlighting that innovation is not only driven by science and technology, but just as much through socio-cultural societal processes. The interplay of technological and societal developments is not seen as an either or question, but the importance of the interplay between both is stressed (Jasanoff and Kim 2009, 122). This way of thinking is very similar to the idea of socio-technical systems put forward by Geels (2012), which are also made up of both technological as well as socio-cultural configurations (Geels 2012, 471). I thus argue that these two conceptualizations, despite not addressing similar issues bear high compatibility in the way the interplay between technological and social innovation is conceptualized.

The study by Jasanoff and Kim focuses on national policy, but the authors stress that they see no reason to limit the application of their concept to this context. Following their publication, many authors built on their contribution and adapted it to urban contexts (for example Sengers 2017; Tozer and Klenk 2018; Miller 2020; Gross, Buchanan, and Sané 2019; Olesen 2020). Tozer and Klenk (2018) build upon Jasanoff and Kims work and stress that imaginaries "do political work" (Tozer and Klenk 2018, 174) and thus strongly shape policy outcomes. To them, they function as a shorthand for political actors, by simultaneously explaining why measures are important in a broader context and relaying a positive outlook which is psychologically important to motivate action. Sengers (2017) stresses the value of imaginaries as a concept for the transition management school, connecting the two bodies of literature. He states that sustainability transitions are kickstarted by "urban imaginaries", which he defines as "shared understandings of what constitutes a desirable future city". Imaginaries can be seen as similar to the vision developing process which constitutes the first step of the transition management cycle (Sengers 2017, 13). He also re-emphasizes that imaginaries have a dual function: On the one hand, they present a desirable outcome. On the other hand, they are a crucial tool when it comes to achieving the outcome, as they shape policy (Sengers 2017; Kuchler 2014). He also highlights the role of urban imaginaries in connection to the sustainability transitions literature: Such transitions are paved by imagination, which is enabled by creative cognitive work of individuals or social movements. This way, imaginaries are important when it comes to reshaping 'cognitive territory'

(Sengers 2017; Eyerman and Jamison 1991). This way, imaginaries emerge in intellectual niches and from there contribute to reshaping societal discourses and with that consequently at some point public expenditure.

Adapted or similar versions of Jasanoff and Kim's concept have since been successfully applied to different objects of study covering urban cycling futures (Nikolaeva and Nello-Deakin 2020; Sengers 2017), carbon neutrality visions (Tozer and Klenk 2018), walking visions (Tight et al. 2011), urban air quality plans (Gross, Buchanan, and Sané 2019), autonomous vehicles (Martin 2021), smart city plans (Miller 2020) and light rail projects (Olesen 2020), demonstrating flexibility and value of the concept. Although most contributions quote Jasanoff and Kim's work, many drop the "socio-technical" prefix of their definition and instead work with adapted concepts like "urban imaginaries" (Sengers 2017), "velotopian imaginaries" (Nikolaeva and Nello-Deakin 2020) or "infrastructure imaginaries" (Olesen 2020), which are often not clearly defined. This could be due to the fact that these authors are not talking about technological innovation and thus want to distance their work from studies exclusively focusing on technological innovation, such as smart city narratives. For example, In a study on smart city plans, Miller (2020) even depicts sociotechnical imaginaries as the opposite of what he calls "imaginaries of sustainability" (Miller 2020, 3). This way, he conceives sociotechnical imaginaries as being only about technological solutions, a bias he also ascribes to the transitions management literature as a whole (Miller 2020, 3f.). While this may be true, and could explain the lack of engagement of this literature with cycling, I argue that the term 'socio-technical' is still a useful conceptualization. Refraining from the socio-technical lens fails to acknowledge the explicit holistic approach of the underlying socio-technical perspective, and reduces it to one of its parts. Both contributions - both by Geels and Jasanoff and Kim - use the term 'socio-technical' precisely to illustrate that they are not only talking about purely technological solutions, but solutions that encompass socio-cultural practices as well, as outlined above in chapter 3.1.1.

Applying the concept of "velotopian urban imaginaries" (Nikolaeva and Nello-Deakin 2020, 309) analyze how elements of different cycling visions by 20th century thinkers Constand and Le Corbusier still shape current debates and cycling policies in the Netherlands. The authors establish that cycling has taken on an increasingly prominent role in envisioned urban futures going beyond traditional cycling advocacy (Nikolaeva and Nello-Deakin 2020, 309). Cycling is more and more being envisioned as the future of transport by proponents of 'smart mobility' narratives (Nikolaeva and Nello-Deakin 2020, 310), which is in line with Miller's argument about 'smart city' discourses dominating over truly sustainable discourses (Miller 2020). Investigating different cycling imaginaries, the authors conclude that the seeming consensus around cycling as a future mode of urban transport can follow very different ideals, from ecological transportation

to neoliberal urban governance focusing on individual responsibility and efficiency (Nikolaeva and Nello-Deakin 2020; Sengers 2017).

The concept of imaginaries is by nature a future-oriented. The same tendency applies to research of transitions theory (Shove 2012, 264). This could partly explain the lack of engagement of this literature with cycling, as contemporary cycling does not constitute a radically new innovation. Shove (2012) argues that processes of disappearance and reappearance deserve more attention from the transitions literature (Shove 2012, 364). Historical studies of socio-technical transition usually regard the gradual displacement of old technologies as a byproduct of innovation (Geels 2002). In this view, the decline in cycling rates is an expected consequence of the system of automobility, which replaced the dominance of cycling found in the early 20th century with that of the car, through a process of mostly technological innovation (Shove 2012, 369). At first sight, the contemporary reappearance of cycling in many places is thus puzzling, from a multi-level perspective viewpoint. Shove argues that theories of socio-technical transition can still be useful in explaining the re-appearance of cycling due to the evolutionary character of the model, arguing that the stages of the innovation journey from niche to breakthrough are the same for reintroduced socio-technical configurations as they are for novel ones (Shove 2012, 370).

In similar vein, Schipper et al. (2020) understand the re-emergence of cycling as a "remarkable U-turn" and builds on the ideal of 'the usable past'. While not addressing imaginaries or the multi-level perspective directly, the authors state that "past visions of future mobilities […] have turned out to be quite powerful mechanisms and have been particularly effective when dominant institutions and social actors supported them" (Schipper, Emanuel, and Oldenziel 2020, 10). They stress that the prevalence of automobility did not result from the car's superiority, but lobbying effects. To them, the combination of cycling as an old low-carbon mobility with 21st century technological advances like bike sharing or electric bikes can be promising for cycling. It must also be noted that some of the cycling re-emergence we observe today is related to novel innovation instead of reemergence of technology from the past, such as app-based bike sharing schemes or battery technology making electric bikes a feasible option. Thus, cycling cannot only be conceptualized as a re-emerging socio-technical regime. Contemporary cycling has some novelties enabled by technological innovation to it.

4 Research Gap and Research Question

The previous sections presented a brief overview of the relevant literature for my research. To summarize, I mainly conceptualize cycling using a multi-level perspective lens on socio-technical transitions. This study builds upon existing scholarship on urban transport planning and particularly on cycling. Insights drawn from these bodies of literature guide an analysis of future imaginaries, consistent with the theoretical frameworks on imaginaries and transition visions.

This research addresses two significant gaps in the existing literature: First, there is a clear lack of comparative studies on cycling, especially across different countries. I thus contribute to a research agenda studying cycling across different national contexts without losing sight of contextual factors, facilitated by a medium-n comparative study design. Second, there is a striking lack of studies examining municipal transport plans or strategies. While the emergence of the SUMP spurred some comparative research (for example Jordová and Brůhová-Foltýnová 2021; Arsenio, Martens, and Di Ciommo 2016; Mozos-Blanco et al. 2018; Maltese, Gatta, and Marcucci 2021; Michelini, Dametto, and Michel 2023), academic engagement with transport plans remains scarce. As of right now, we know very little about how distinct or similar municipal transport plans are, both conceptually as well as in terms of addressed measures. Consequently, the impact of these planning documents is not well understood. This study aims to bridge this gap as a preliminary exploratory effort.

In addition to addressing these critical research gaps, this thesis contributes to the broader literature on MLP, imaginaries and future studies, as well as cycling and transport research. Specifically, it extends the MLP literature by engaging with studies on re-emergent technologies (Shove 2012) and the few studies connecting this literature to cycling (Bruno 2022; Canitez 2019).

The main research question of this thesis reads: How do European cities across different cycling regimes compare in their future imaginaries on cycling?

5 Research Design: Comparative Case Study

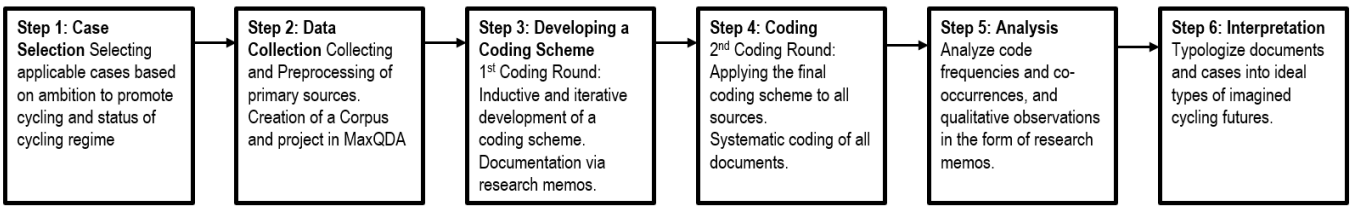

Figure 3: Schematic Visualization of the Analytical Strategy

This chapter illustrates the analytical strategy of this research project. A simplified and idealized illustration of the main steps is portrayed in figure 3, adapted from Wenzler-Cremer (2007). To summarize, I conduct a comparative case study of five different western European cities. In these cities, strategic planning documents related to cycling are identified and then analyzed qualitatively. This is done through qualitative content analysis using coding. The key results of this analysis constitute an explorative comparison of different themes across these cities as well as an identification of ideal-typical future imaginaries present in the five cities.

At the heart of this thesis lies a comparative case study. This method has a long tradition in urban studies and contributions using comparative case studies underwent a renaissance in urban studies (Nijman 2007, 1; Krehl and Weck 2020; Ward 2008). The main goal of comparative case

studies in urban studies lies in the search of similarity and variance across different regions or cities (Mills, Van De Bunt, and De Bruijn 2006, 621). The method is particularly well-suited for answering how-questions like in this thesis and allows for a nuanced understanding of different city contexts. Drawing comparisons between different cities enables the researcher to understand how local governance structures shape urban outcomes. Compared to single-case studies, comparative methods typically allow for wider generalizations (Yin 2018; Gerring 2006).

However, this method has been critiqued by scholars who question its usefulness (Mills, Van De Bunt, and De Bruijn 2006). Comparative case studies traditionally used to apply a deductive, a-priori research logic, with a variable-centered research approach. This kind of research is strongly influenced by political sciences and usually aims to draw wider generalizations from its findings (Krehl and Weck 2020, 1861ff.). In response to this rather positivistic type of comparative research, more recent contributions emerged within the field of urban geography, which argue for a departure from the quasi-scientific 'controlling for difference'-approach in favor of comparing more different cases across the global north-south divide (Robinson 2016).

In addition to this debate, a major critique towards comparative research is that it is often conducted without sound justification of the case selection and the aim of the research. Often, comparative case studies are conducted in a very pragmatic manner without much attention to theoretical and methodological standards around comparative research (Mills, Van De Bunt, and De Bruijn 2006, 621; Krehl and Weck 2020, 1860). Krehl and Wreck (2020) thus argue that comparative research should more explicitly tackle questions of epistemology, the studies' ambition to generalize and especially the reasoning behind case selection and its corresponding trade-offs (Krehl and Weck 2020, 1867ff.).

Thus, in this thesis more careful attention is paid to a representative case selection on the variables that are being measured, in order to be able to compare and investigate differences properly. Within the debate between more traditional, variable-centered comparative research and the more recent 'generative' approach (Robinson 2016), I situate my work somewhere in the middle between the two poles. On the one hand, this is a mostly exploratory research project, contributing to the expansion of comparative works when it comes to cycling. Thus, I don't follow a deductive and purely theory-driven hypothesis-testing approach. On the other hand, this thesis only compares European cases and ensures relatively high similarities between the cities on variables other than the cycling situation, which aligns it more with traditional case selection methods (Krehl and Weck 2020).

As established in the literature review (section 2.3), especially European cities facilitate their transport planning under an increasingly harmonized institutional framework. International frameworks like the UN Sustainable Development Goals are increasingly recognized and

addressed by city governments. The rising significance of city networks lead to an increase of knowledge exchange and 'best practices', as well as learning from other cities' implementation of novel policies, positive or negative. The transportation sector is especially characterized by such 'mobile policies' and best practices from other cities (Davidson, Coenen, and Gleeson 2019; Haupt and Coppola 2019). While local contexts remain unique, transport planning is "profoundly shaped by experts who exchanged ideas in transnational circles on how best to shape urban mobility" (Schipper, Emanuel, and Oldenziel 2020). The European Union accelerates such trends, particularly through it's SUMP planning approach (May 2015). Given these trends, I argue that it is possible to compare European cities when it comes to their transport planning, at least for an explorative study of this kind.

The comparative case study design with five cases allows for a detailed analysis which can focus on nuanced concepts like imagined futures, something that is impossible in large-n quantitative studies. At the same time, this study provides a comparative perspective to contextualize, which is absent from single-case studies. Following the main analysis, a mixed-method investigation further enables an exploration of driving factors going beyond descriptive research (chapter 7).

5.1 Case Selection

My research focus are imagined transportation futures with an emphasis on cycling. My case selection is based on two main conditions which cities need to meet: First, political ambition to promote cycling is a minimum condition. The selected cities need to have ambitions to make cycling an important mode of transportation. This is an important minimum criterion, as cities who do not display any motivation to support cycling are unlikely to publish meaningful information about the role of cycling in their imagined transportation future. The second criterion is that my cases feature different levels of cycling regimes. My analysis seeks to cover cases ranging from mature cycling regimes all the way to cities where cycling can be considered a niche phenomenon. As this is a project with limited resources, it is impossible to include all potentially interesting cases (e.g. all bigger cities in EU). A practical solution is excluding cases where neither the outcome (high share of cycling) nor a pre-condition for the condition of interest (imagined future of cycling) is present, as these qualify as analytically irrelevant cases for this project according to established case selection methods (Beach and Pedersen 2018).

Regarding the first criterion, ambition is assessed qualitatively, by manually reviewing different cities' goals. Given that the unit of observation are official city strategies, the final operationalization of this minimum condition is the existence of official municipal publications on cycling. In order for cases to be selected into my analysis, a city needs to have recently published planning documents which a focus on cycling. Furthermore, and especially for cities with lower cycling levels, there should be positive trends. The modal share of cycling needs to have risen

within the last decade. While this cannot serve as conclusive evidence, it is possible to assume a credible commitment of cities towards cycling if cycling levels are rising.

Turning to the second criterion, the theoretical framework established that cycling can be regarded as a transportation regime which exists alongside other transport regimes (Urry 2004; Bruno 2022; Geels 2012). Given the historical dominance of car transport planning in the 20th century, cycling can be regarded as a niche regime in most places, but may eventually ascend from this status into a dominant regime. In order to explore and compare the potential differences and similarities in between municipal cycling imaginaries, it is helpful to include cities which are at different levels of their cycling transition. Some European cities are already far along in the transition of cycling towards a dominant mobility regime, while for others cycling is still a niche phenomenon. The second variable structuring the case selection thus reflects the current state of the cycling regime, ranging from niche to dominant status. This distinction is also identified as important in the cycling literature, which also commonly classifies cities based on the status of cycling, like "starter cycling cities" (Cunha and Silva 2022, 2) or the dominance of the car regime (Bruno 2022; Cox 2019).

Given the previously identified gap in the literature when it comes to comparing municipal strategies, this research project is characterized by its explorative nature. Thus, the aim is to compare cities which cover a wide variation when it comes to the cycling regime status. I operationalize this in a twofold manner: First, the mode share of cycling serves as a good first indication of the cycling status. While being a key indicator, it still comes with a set of drawbacks: Most cities don't measure the modal split continuously, making large gaps in the data commonplace. For Amsterdam for example, the most recent data is from 2015. Besides that, cities count mode share differently: Some calculate the mode share of cycling based on all trips in the city, including trips from outside into the city and vice versa. Other cities calculate it only using intra-urban trips, not including commuters who come from outside the city. This leads to the situation that in Copenhagen, 26% are made by bicycle and in Cologne, 25%. However, few people would argue that these cities are similar when it comes to the status of cycling. To overcome these drawbacks of associated with the mode share, I further assess the state of the cycling regime by qualitatively reading through academic and grey literature. In addition to selecting cases on different stages of their cycling regime, I also aim for selecting cases from different countries. This is closer to the more recent "generative approach" to comparative studies, although this analysis is still restricted to Western European cases (Robinson 2016). Choosing different cases adds to the relatively small but increasing number of studies analyzing cycling from a cross-country perspective (for example Schipper, Emanuel, and Oldenziel 2020).

In order to identify suitable cases, I conducted a literature review searching for cases in order to identify cities which have recently invested into making cycling more attractive. This search included both academic references as well as grey literature, because cycling-related case studies on cities that are not well-known for their cycling infrastructure and planning are scarce. Non-academic sources, like the 'Copenhagenize index' and other cycling-related indices, rankings and awards (see for example Copenhagenize Design EU 2019; Deloitte Netherlands 2020) have proven helpful in identifying potential cases with ambition towards cycling.

Taking the above-mentioned factors into account, 13 cities across Europe were considered. The final selection consists of five cases: Copenhagen, Amsterdam, Cologne, Vienna and Brussels. These cases constitute a wide variety of cycling regimes, ranging from Copenhagen and Amsterdam, which are often listed among the best cycling cities in the world to Brussels with a mode share below 5%. When it comes to the available planning documents on cycling, the image is diverse, too. Copenhagen has published a multitude of cycling-related planning documents, with the other cities offering far less documents. Nevertheless, each city has at least two important publications when it comes to their cycling strategy, thus matching the minimum condition of ambition to change the cycling situation. In addition to that, cycling levels are increasing in Brussels, Vienna and Cologne.

Some practical considerations also influenced the case selection: Importantly, the cities in my sample are relatively comparable in their density and population size, with Vienna being the largest and Copenhagen the smallest city. Here, my research reflects the more traditional approach to comparative studies. Lastly, personal familiarity with the individual cases and language skills are influencing factors which ensures that I can comprehend nuanced details, thus enhancing the validity my research findings.

5.1.1 City Profiles of Selected Cases

The following section provides a literature-based overview of the cycling history and current situation in the selected cities. As my analysis focuses on imagined futures, this section further portrays each city's broader future vision or strategy, if such plans exist. This allows me to situate my analysis within broader long-term trends and developments in each city.

As this analysis only contains western European cases, broad temporal trends are often similar across cases. In all included cities, cycling was a major transport mode at the turn of the century (Gössling 2013, 198). This era is typically followed by a continuous decline of cycling in almost all industrialized countries since the 50s, while car use increased, following ideals of functional separation and modernism. To which degree this decline happened varies though. In the last two decades, cycling shares are growing again in many Western European cities, leading many

observers to speak of a cycling 'renaissance' (Pucher, Dill, and Handy 2010; Gössling 2013). The following sections positions each city within these trends.

5.1.1.1 Copenhagen

The Danish capital is a rapidly growing city and currently has around 650.000 inhabitants. In Copenhagen, cycling was an enormously popular mode of transportation in the 1930s (Emanuel 2016). The typical cycling decline after world war II happened as in many places, but it was smaller than in most European cities (Koglin, te Brömmelstroet, and van Wee 2021). Nonetheless, the city witnessed a rapid growth of car traffic, especially during the 60s (Gössling 2013). However, cycling always remained an important mode of transport in the city (Emanuel 2016). The 1970s marked the beginning of a cycling renaissance in the Danish capital. This was in large parts driven by increasing environmental concerns after the oil crisis (Gade Jeppesen 2012; Gössling 2013). This resurgence was accompanied and accelerated by a strong presence of interest groups. As in Amsterdam or Cologne, protests formed around car-centric reconstruction of the city, including those which foresaw the demolition of cycle paths (Cycling Embassy of Denmark 2024; Koglin, te Brömmelstroet, and van Wee 2021; Emanuel 2016).

The city's planning tradition was also influenced by progressive city planners like Jahn Gehl and Steen Eiler Rasmussen, emphasizing a human-centered planning approach. An example of such thought is the Fingerplan from the late 1940s, which can be interpreted as an early version of transit-oriented planning and emphasis on access to green space. The plan envisioned relatively dense urban development along five major commuter rail axes with ample accessible green spaces in between these 'fingers' and shapes Copenhagen's urban fabric until today (Danish Architecture Center 2024b; Knowles 2012).

In terms of cycling policies, Copenhagen pioneered data collection and monitoring with the introduction of the bi-annual 'bicycle account' to monitor cycling conditions and public attitudes towards cycling (Koglin, te Brömmelstroet, and van Wee 2021). The city published its first comprehensive cycling strategy in 2002, which kickstarted further official publications dedicated to improving the cycling experience in the city. Out of my sample, Copenhagen has published by far the most strategic documents. In 2007, Copenhagen formulated the ambition to become the world's best cycling city, which the city re-emphasized with the 2011 follow-up, that is subject to my analysis (Gössling 2013; City of Copenhagen 2007).

During the last 10 years, cycling constituted between 25% and 30% of the city's modal split (City of Copenhagen 2021). These numbers however represent all trips including those to and from Copenhagen. For commuting trips within Copenhagen, the cycling share is much higher at 35% and used to be above 40% between 2016 and the pandemic (City of Copenhagen 2022). Besides constructing new cycling infrastructure, the city placed large importance on soft policies, notably

the creation of positive future visions (Gössling 2013, 204). Today, the city is widely regarded as a frontrunner in terms of cycling, both in academia (e.g. Zhao et al. 2018; Koglin, te Brömmelstroet, and van Wee 2021; Elesawy 2021) as well as in planning practice, where many initiatives center around how cities can become like Copenhagen (M. Glaser and Krizek 2020; Copenhagenize Design EU 2019; CIVITAS 2023). These views are accompanied by an active branding strategy as 'the city of cyclists' by the city administration (Emanuel 2016). By its residents, cycling in Copenhagen is largely regarded as positive (Haustein, Kroesen, and Mulalic 2020).

Recently however, the city is facing some challenges: Despite the city's targets, cycling levels have not risen substantially since 2014, partly due to the city's massive expansion of its metro system (City of Copenhagen 2021; Koglin, te Brömmelstroet, and van Wee 2021). Another challenge is rising car ownership, which can be attributed to overall increasing income levels and national tax cuts. This has led to increased conflicts between cars and cycling in the city (Henderson and Gulsrud 2019). Thus, Koglin, te Brömmelstroet, and van Wee expect cycling levels to drop in the coming years, contrary to the city's targets.

Copenhagen's broader urban vision centers around ambitious climate goals and sustainable growth. The city has ambitious plans to reach carbon neutrality in 2025 and has generated promising results thus far, although it currently doesn't look like the city is going to fully meet its targets (Damsø, Kjær, and Christensen 2017, 19; City of Copenhagen 2020; Szumski 2022). Overall, Copenhagen leans heavily on a green growth rhetoric accompanied by technological optimism in all of its official plans, like mobility plans or the circular economy plan (Calisto Friant et al. 2023). Good examples in line with such future visions are the city's modern waste incineration plant 'Copenhill' and its new districts which are heavily branded as sustainable, like the Nordhavn redevelopment project (Danish Architecture Center 2024a; 2024c).

5.1.1.2 Amsterdam

The Dutch capital currently has around 800.000 inhabitants. The city has a long history of cycling. Cycling levels were already very high before World War II with a mode share of about one third in the 1930s (Gemeente Amsterdam 2019; Koglin, te Brömmelstroet, and van Wee 2021). After the war, the city's historic structure remained largely intact, facilitating the preservation of Amsterdam's cycling tradition.

The typical post-war decline in cycling observed in many European cities was comparatively small in Amsterdam. This can partially be attributed to the egalitarian nature of cycling in the Netherlands, where all income groups used bicycles, similar to Copenhagen (Koglin, te Brömmelstroet, and van Wee 2021, 354). This led to cycling being continuously present throughout the 20th century. However, the suburbs were developed with a car-friendly approach, emphasizing functional separation (Koglin, te Brömmelstroet, and van Wee 2021). Pressures by

car centric planning peaked in the 60s, when cycling was no longer part of the official city vision (Gemeente Amsterdam 2019). The push for modernization during this period provoked substantial public backlash in the 1970s, epitomized by the "Stop de Kindermoord" (stop the child murder) movement. Although cycling was not the primary focus of these protests, it emerged as a powerful symbol of resistance (Koglin, te Brömmelstroet, and van Wee 2021).

In response to the waves of protests, the city government reacted with measures to restrict car access to the historic city, such as reducing through-traffic and introducing speed limits. However, the evolution of cycling in Amsterdam was characterized by slow and steady increases rather than abrupt policy shifts with strong planning visions. Koglin, te Brömmelstroet, and van Wee (2021) describe this process as "the Hardly Visible, Slow Hand". The city only implemented measures promoting cycling in a reactive and reluctant way, forced by protests and continuously high cycling levels (Oldenziel and de la Bruhèze 2016). By 2016, cycling and walking became the dominant modes in the city.

Today, Amsterdam is renowned for being a cycling city and the administration embraces this reputation. Despite that, Amsterdam is not ranked among the top Dutch cities for cycling. Factors such as the city's size, car-oriented suburbs, and a robust public transport system make cycling in Amsterdam less attractive than in other Dutch cities. The modal split varies strongly by neighborhood, despite an overall high quality network spanning the city (Koglin, te Brömmelstroet, and van Wee 2021). Overall, the modal share of cycling was at 35% in 2015 (Gemeente Amsterdam 2017). An outstanding feature compared to cities in other countries is the integration of public transport and cycling through the ‘OV fiets’ system of shared bikes at train stations, creating competitive multimodal travel times (Oldenziel and de la Bruhèze 2016). Given its competitive edge over public transport, cycling is likely to increase in the coming years (Koglin, te Brömmelstroet, and van Wee 2021).

When it comes to broader future visions for the city, Amsterdam has chosen to align its policies with the model of doughnut economics by Kate Raworth (Raworth 2017; Doughnut Economics Action Lab 2020). This includes a high focus on social well-being in a ‘thriving city’, while not exceeding planetary boundaries. The overarching goal is to become a circular city by 2050 (City of Amsterdam 2020). The city’s stance on economic growth is somewhat contradictory, with the doughnut model not emphasizing growth as a means to itself, while the circular city strategy advocates for a decoupling of economic growth (Calisto Friant et al. 2023, 12f.). Calisto Friant et al. (2023) describe Amsterdam's approach as a "Reformist Circular Society," characterized by technological optimism and a moderate concern for social justice. Compared to Copenhagen, the focus here thus lies less on climate targets but on a vision of circularity. Social aspects play a bigger role.

5.1.1.3 Cologne

Cologne is Germany's fourth largest city with one million inhabitants. It is centrally located in Europe's traditionally economically strong region 'blue banana'. Unlike the nearby Rhine-Ruhr region, Cologne is not struggling under a structural economic crisis (Kessler 2012). Cologne was heavily destroyed during WWII, which led to a very rapid process of car-friendly rebuilding under the idea of "car-governed cities", which was popular among post-war German city planners (Martinetz and Paal 2010, 55; Unternehmer für die Region Köln e.V. 2008; Bruhèze and Emanuel 2016).

Cycling constitutes 25 per cent of Cologne's modal share and has significantly risen over the past decades (Stadt Köln 2024b). Despite many changes to cycling infrastructure, Cologne was ranked the worst large German city for cycling in the 2020 Cycling survey led by Germany's largest cycling advocacy group (ADFC 2020). Recently, an important cycling project was 'RingFrei', which aimed to convert a car lane into a bike lane on the city's central ring-street. Although adopted as a formal vision in 2009, it took an activist initiative to push for its implementation. By 2024, the project is nearly complete (Stadt Köln 2022). This example highlights both the strength of cycling advocacy in Cologne and the slow pace of infrastructural change that has earned the city a poor reputation. Despite such criticism, the cycling infrastructure in the inner city has improved drastically over the last ten years. This also becomes apparent in the most recent cycling survey, where the city was featured in the category "catching up". Cycling promotion in general, enabling cycling against one-way-streets and bike sharing were mentioned as positives in Cologne (ADFC 2022).

This is in part due to the Cycling plan the city introduced in 2016, which is analyzed in detail in this research project. It contains many concrete measures, out of which about half are fully implemented as of writing this thesis. Many larger projects however, are still missing (Stadt Köln 2024c). The city also published a broader mobility plan in 2014, which set the city's current target of reaching two thirds of trips made by cycling, walking and public transportation (Stadt Köln 2014). In 2017, the 65% of all trips were made using these modes (Stadt Köln 2020). According to its latest survey, the city has reached this goal with cars only constituting 25% of all trips made in Cologne. Overall, compared to other large German cities, Cologne's mode share of cycling is above average (Greenpeace e.V. 2017). The relatively poor perception of Cologne's cyclists thus stands somewhat in contrast to the city's modal split reality and lived cycling culture.

In 2020, the city also published its broader City Vision "Perspectives 2030+", which covers all major planning subjects. This strategy is guided by models of sustainability, notably the Leipzig Charta and the United Nations's Sustainable Development Goals (SDG), but largely lacks concrete and precise targets (Stadt Köln 2020). Cologne is currently working on the publication of a SUMP.

5.1.1.4 Vienna

Vienna is the largest city in my sample, with around 1.8 million inhabitants. Cycling was a mass phenomenon in the 1930s in Vienna (Zach 2020; Hachleitner et al. 2013). However, the decline of cycling after the second world war was more severe than in the other cities. The automobility breakthrough after the war led to a drastic reduction of cycling during the 60s and 70s (Zach 2020). In addition to cars, planners also focused especially on public transport, dedicating no attention to cycling (Stadt Wien 2024c). This led to the almost complete disappearance of cycling as a visible transport mode in the 60s. In fact, Vienna's cycling network continued to shrink until a turning point was reached in 1983 due to a focus on public transport and car mobility (Stadt Wien 2024c; Schober 2021).

In a city dominated by cars and public transport, the increase of cycling started very slowly and funding only got increased by the 2000s. Cycling gained more traction during the 2010s. In this decade, the government formulated new cycling ambitions to raise the mode share to 10% by 2015 and created a dedicated planning position for cycling within the city government (Stadt Wien 2024c).

Today, Vienna is actively investing in new cycling infrastructure. The city has a vibrant bottom-up cycling advocacy scene, with various groups pushing for improved cycling conditions (Hachleitner et al. 2013). However, vehicle numbers remain high, indicating ongoing reliance on cars and public transport is still regarded as the city's backbone in terms of transportation (Stadt Wien 2014). The current goal of the city is to reduce the mode share of cars to 20%, with cycling playing an important role in achieving this goal (Stadt Wien 2014). Despite the resurgence of cycling, the situation can still not be regarded as a bike boom, with a current mode share of cycling of around 10% in 2023 (Zach 2020; Mobilitätsagentur Wien 2024). Nevertheless, the city is relatively active in the construction of infrastructure, performing different annual "cycle path campaigns" (Radwegoffensive) (Mobilitätsagentur Wien 2023; Stadt Wien 2024d). Explicitly following Copenhagen's model, Vienna also started a monitoring program on its cycling situation. These reports yield mixed results, with perceived safety and overall satisfaction increasing, but only 44% of people agreeing that cycling is prioritized over car traffic (Mobilitätsagentur Wien 2016). Notably, besides a short bicycle street plan, Vienna is the only city in my sample that does not publish any form of dedicated cycling concept or strategy. The mobility agency has a website informing about current projects, but this cannot be considered an overarching strategy. Instead, the overall mobility plan is the only strategic document with a focus on cycling.

Vienna frames its broad future urban development strategy under the umbrella term 'smart city', with its "Smart City Vienna" strategy. For a smart city strategy, Vienna puts a large emphasis on climate action, inserting the prefix "climate" to its most current version of the strategy ("Smart

(Climate) City Vienna"). Scholars note that from its onset in 2014, the strategy was heavily leveraged as a branding strategy to attract business and create economic growth and to increase Vienna's competitive position internationally (Exner, Cepoiu, and Weinzierl 2018, 339; Smigiel 2020). This strategy is working for the city, which is increasingly requested for its expertise on smart city governance and is even regarded as a leader by some scholars (Smigiel 2020, 8; García Fernández and Peek 2020; Madreiter et al. 2021). More critical observers see the usage of the smart city branding as an empty signifier, advancing a depoliticized consensual urban governance model (Exner, Cepoiu, and Weinzierl 2018). Independent of this debate, as a future vision, the strategy emphasizes technological innovation, quality of life and conservation of resources the most (Wien.info 2024; Stadt Wien 2022). The strategy is very holistic covering all major aspects of urban development. Internationally it is closely connected to the United Nations SDGs, similar to Cologne's strategy (Stadt Wien 2024b).

5.1.1.5 Brussels

The Brussels Capital Region (BCR) consists of 19 municipalities and marks the core of the larger metropolitan area with 1.2 million inhabitants. Despite the complex governance structure, transport visions are written for the entirety of the region, exceeding the municipal borders (Kębłowski and Bassens 2018, 5). Post world war II, Brussels heavily embraced car-centric urban planning, resulting in a city with a reputation for high car share and congestion problems, which prevails to this day. The city also has a robust public transport network (de Séjournet et al. 2022, 5). In the post-war era, cycling played next to no role in Brussels, up to the early 2000s. In 1999, cycling constituted 1% of the city's modal split (Henry, Ermans, and de Smet d'Olbecke 2020).

During the last decade, the city has created plans leaning more strongly into the concept of sustainable mobility (UCI 2019; Newmark 2022; Kębłowski and Bassens 2018). The city published an ambitious sustainable urban mobility plan called "Good Move", aiming to reduce car mobility, especially in the inner-city, favoring soft-modes of transportation (Brussel Mobiliteit 2021). Adopting the neighboring Flemish "STOP" principle, transport planning is now supposed to prioritize pedestrians and cyclists (Newmark 2022). Besides this, a bike sharing scheme was launched as a public-private partnership back in 2009 (UCI 2019). Nowadays, Brussels is actively promoting cycling and other sustainable transport modes through online campaigns, such as "#bikeforbrussels". However, especially the reduction of cars within the Good Move plan sparked fierce opposition among residents in some districts (Hernández-Morales and Coi 2024; Van Parijs 2023). Protesters voiced concerns about gentrification and marginalization due to the focus on an 'livable city' as part of the good move plan (Cokelaere 2022).

Brussels cycling levels have continuously risen since 2000. Despite that, cycling levels are the lowest among the cities in my analysis: 2019 cycling made up about 4% of all trips in the city (FOD

Mobiliteit en Vervoer 2019). The city now also has a vibrant activist scene (Newmark 2022). The COVID-19 massively accelerated cycling trips in the Belgian capital. As the city already had plans to foster cycling in place, it was able to swiftly create 50km of pop-up bike lanes, which although politically contested, continued to exist after the pandemic (Adam et al. 2023; de Séjournet et al. 2022). An analysis of mobility data during the lockdown suggests that cycling was an important leisure activity for many residents, but later became increasingly used as a way of commuting (de Séjournet et al. 2022, 11). Nowadays, Brussels features an exceptionally high share of electric bikes, making up a third of all bicycle trips in the city, which is likely due to Brussels hilly topography (Newmark 2022).

Brussels recently published it's wider Sustainable Development Plan for 2050. In line with the mobility plan, it envisions Brussels as an accessible and inclusive city, embracing the concept of a 10-minute city where essential services and amenities are within a short walking or cycling distance. Compared to the other cities however, the plan does not have a single outstanding focus.

5.2 Data Selection

This thesis conducts a qualitative content analysis using computer-assisted qualitative coding. The primary data source are official strategies referring to cycling. As indicated before, the type of published documents varies drastically between the cities. According to EU regulations, all cities above 100.000 inhabitants are required to publish a Sustainable Urban Mobility Plan (May 2015), which would provide a more standardized data source than what is currently available. However, at this state, only two cities in my selected sample have published a SUMP. Many cities have published dedicated cycling strategies, which do not qualify as SUMPs, making it impossible for this analysis to rely on a singular standardized data source. Thus, the concrete documents have been chosen on a case-by-case basis.

Copenhagen has published a plethora of cycling-related documents, while Vienna lacks a solely focused cycling strategy. For plans to be included into the analysis, they need to be future-oriented documents sketching out plans for a possible future. This excludes backward-looking documents like mobility reports. Given my focus on future imaginaries, I also refrain from analyzing purely technical design manuals. Such documents contain little information regarding my research interest. During the first coding round, the document selection was finalized, after reading through all possible publications. Some documents were removed from the final analysis. This mostly applied to Copenhagen. Here, the bicycle prioritization plans for bike lanes and parking, the mobility reports as well as the "cycling focus" (*Cykelfokus*) document were removed from the document selection. This has been decided in line with the above criteria, since these documents are either technical manuals, detailing concrete things like intersection designs or backward-looking reports. The same applies to Amsterdam's mid-term evaluation of its' bicycle strategy.

A general drawback of using strategic planning publications is that their publication dates range substantially, making them not ideal for comparison. However, the development of such plans takes a long time, so cities do not publish them on regular schedules. Opting only for very similar documents published in certain years would thus severely limit the available cases. These drawbacks thus simply reflect the planning reality in Europe and are thus hard to avoid in a comparative project. Additionally, it might even be possible to identify trends which are contingent on the publication date of plans, so that this drawback can be turned into an object of analysis.

For each case, the official websites and additional sources have been consulted in order to identify the corresponding documents. All documents have been downloaded. For the case of non-German or non-English language publications, the documents were translated into English language using DeepL Pro's document translation feature, which allows for a translation of PDF documents while retaining their original formatting (DeepL SE 2023). The processed documents were loaded into the qualitative data analysis software MAXQDA for computer-assisted qualitative data analysis (VERBI Software 2021). This led to the creation of a final corpus, consisting of a total of 19 primary documents. Taken together, all plans are 1374 pages long.

Table 1: Document Selection

City	Document Name	Year published	Document Type	Length (Pages)	Coded Pages	Citation Code	translated
Copenhagen	Copenhagen Cycling Strategy	2011	Cycling Strategy	16	16	C1	no
Copenhagen	Green Mobility Plan	2012	Mobility Plan	84	40	C2	yes
Copenhagen	Green Mobility Plan 2017 Update	2017	Mobility Plan	30	22	C3	yes
Amsterdam	Amsterdam Mobility Plan	2013	Mobility Plan	80	39	A1	yes
Amsterdam	Long-Term Bicycle Plan 2017-2022	2017	Cycling Strategy	90	67	A2	no
Cologne	Cycling Mobility Concept Inner City	2016	Cycling Strategy	157	110	K1	no
Cologne	Mobility Plan 2025	2014	Mobility Plan	28	20	K2	no
Cologne	Cologne Perspectives 2030+	2020	City Vision	260	23	K3	no
Vienna	Masterplan Cycling Streets Vienna	2019	Cycling Strategy	22	13	W1	no
Vienna	Urban Mobility Plan Vienna	2014	Mobility Plan (SUMP)	128	58	W2	no
Vienna	Smart Climate City Strategy Vienna	2022	City Vision	136	27	W3	no
Brussels	Brussels Bike Action Plan	2018	Cycling Strategy	51	29	B1	yes
Brussels	Good Move: Regional Mobility Plan 2020-2030	2021	Mobility Plan (SUMP)	292	108	B2	yes

Table 1 presents the final document selection. It consist of two to three documents per city. For all cases, this sample features both purely cycling-related documents, like cycling strategies, as well as broader mobility plans. This is necessary due to the diversity of publications across cities, but also helpful from an analytical standpoint: The inclusion of broader mobility plans allow for an analysis of the status of cycling against other modes of transportation. The differences between

the document length and coded pages is due to the fact that especially the broader mobility plans and city visions contain many pages which are not cycling-related and thus not coded. In the cycling strategies, some sections were also left out if they contained no information regarding my research interest.

5.3 Analysis

5.3.1 Coding Process

All documents have been coded in an inductive manner in a first exploratory coding round. Here, codes were created based on emerging patterns and new codes were constantly added and adapted. Whenever an argumentative pattern occurred repeatedly, a code reflecting this statement was created. Once all documents have been analyzed once, and the coding scheme reached a level of robustness, so that no further codes are required in order to capture information relevant to my research interest. The final coding scheme is applied in a second coding round. Here, no further changes are made to the codebook.

In order to later analyze co-occurrences of individual codes, the coding units were created in relatively large units of text, such as paragraphs instead of only coding individual sentences. This way, the co-occurrence measurement can register the overlap of two codes in the most reliable way, compared to measuring with a tolerance of +1/-1 line, which would lead to inaccuracies. This is in line with the approach of coding so-called 'units of meaning', which is an established practice in the literature on coding. It ensures that all statements are comprehensible by only reading the coded segment, even if taken out of context (Rädiker and Kuckartz 2019, 74). Another common coding rule I apply is that immediate repetitions are not coded. This includes for example graphical visualizations of a textual argument, which immediately follows the original argument or not coding headlines which convey the same message as the following text block. In this case, only one of the two messages are assigned a code. This is done to prevent repetitive sections of the document from inflating certain codes, which would hinder a comparative analysis.

In the case of broader city visions and transport plans, cycling-related or otherwise relevant sections were marked. This way, only these relevant sections of these plans needed to be coded in the second coding round. This is done by selecting all passages, which are explicitly mentioning or implicitly reference to the topic of cycling. For purely cycling-related strategies, the full documents have been coded in both coding rounds.

Using the finalized codebook and coding scheme, a second coding round was conducted. Here, all previously assigned codes were deleted and the new coding scheme was applied scratch to all documents from scratch. During the coding process, documents were coded in parallel, instead of consecutively analyzing all documents from one city first and then moving on to other cities. This prevents biases in the application of the coding scheme. In parallel to the systematic coding

process, general observations about the document, which do not correspond to specific codes are analyzed as well and are documented using research memos. This could for example include aspects like the writing style of certain documents, or how much previous knowledge a given document is required of the reader in order to follow the argumentation.

As a second coder is not available in the scope of this research project, I refrain from conducting a possible third coding round, which is typically used to increase inter-coder reliability by introducing a second coder (Rädiker and Kuckartz 2019).

5.3.2 Coding Scheme Development

The first important step for computer-assisted qualitative content analysis is the creation of a robust coding scheme. Using qualitative coding allows for more reliable results compared to simple qualitative readings of the documents. Given the explorative nature of this research project (to my knowledge, cycling plans have not yet been comparatively analyzed at all), the development of the coding scheme was primarily conducted in an inductive, data-driven manner. Compared to a deductive approach, the coding scheme is not purely derived from the existing literature, but also from the data. The full coding scheme is visualized in table 2. It consists of roughly 50 codes distributed among eight categories. Each line represents an individual code. It is beyond the scope of this thesis to fully elaborate on each code individually. Instead the following section gives an quick overview of how this scheme was developed.

Contrary to analytical strategies like Grounded Theory (B. G. Glaser, Strauss, and Strutzel 1968), the process was still informed by the literature review, containing deductive elements. The codes in the coding scheme generally cluster around different relevant academic discourses: One section entirely deals with the relationship between cycling and other modes of transport, especially cars. This is informed by the above-cited publications in the theoretical framework mentioning the importance of automobility for cycling (Urry 2004; Bruno 2022; Cox 2019) as well as the multi-level-perspective framework which sees cycling as one transport regime against others (Geels 2012; Canitez 2019). Regarding the multi-level perspective, several codes are aimed at operationalizing transitions towards sustainable mobility following this logic. Given the important role of the car regime, the relationship between cyclists and cars has been specifically analyzed. Especially if one mode has priority over the other one was carefully measured with dedicated codes. Here, prioritizing cycling over cars can be interpreted as indicative of a regime change on the regime level. Additionally, strategic niche management efforts are operationalized through a code which investigates the role of experiments, pilot projects and living labs. This operationalizes the creation of protected niches for cycling, in line with the strategic niche management theory. Lastly, as true regime change only occurs on a higher systemic level than individual cycling related projects, I included a code measuring the creation of new cycling related governance structures,

such as new building regulations or the creation of new departments in city administrations. Such measures fundamentally change the transportation planning process by either dedicating new resources or prioritizing cycling in important planning stages. This aims at operationalizing the most transformative types of measures in favor of a transition towards sustainable mobility.

Other examples of a literature-guided development of the coding scheme is a code category on governance structures, aiming at measuring references to trends related to urban governance such as inter-city competition or knowledge exchange, as well as influences of international or EU governance bodies (Maltese, Gatta, and Marcucci 2021; Michelini, Dametto, and Michel 2023; Peters and Pierre 2012). Another group of codes reflects academic debates on the impacts and benefits of cycling, such as health, environmental or economic benefits (Fraboni et al. 2022; Handy, van Wee, and Kroesen 2014). The codes measuring the types of cycling related policies are also following a common structure in the existent literature, which typically distinguishes between hard infrastructural measures and soft policies, like campaigns (Pucher and Buehler 2008; Harms, Bertolini, and Brömmelstroet 2016). The coding scheme further entails codes which measure if cities make use of direct future imaginaries, local measures or broad policy targets, operationalizing pragmatic and more optimistic visionary planning practices respectively in line with the literature on future imaginaries cited above.

Although the literature review underscores the importance of certain topics, some topics could not adequately be reflected in the coding scheme. This limitation applies particularly to issues such as transport justice, gender, and power structures, as highlighted by critical transport studies, because they were rarely represented and mostly in a general sense. Furthermore, differentiating between types of challenges for implementing cycling measures and a distinction between different types of cyclists, like leisure cyclists, new cyclists or commuters had to be dropped as well. Consequently, to avoid an excessively complex coding scheme, these topics were either excluded or consolidated into broader categories.

Conversely, it is important to understand the coding scheme as the outcome of a thematic analysis conducted during the initial coding round. Thus, the coding scheme reflects the overarching themes found in the documents. Given the inductive nature of the coding process, all thematic cycling-related categories present in the documents are also reflected in the final coding scheme.

After the first coding round, the entire coding scheme consisted of 80 codes, including sub-codes. These were then reassessed and consolidated into 53 codes falling into 8 categories. All codes with less than 10 occurrences were this removed or merged with other codes. During the entire process, a codebook was created using MAXQDA's code memo tool, describing the contents and specific applications of each code. The full codebook can be found in the appendix.

Table 2: Coding Scheme

Category	Code	Brief Description/ Example
Status Quo Assessment	1. Deficits: Not good enough	1. Self-reported deficits for cycling
	2. Already Strong	2. Self-reported strengths for cycling
Level of Planning/ Pragmatism	3. Future Vision	3. Usage of imaginaries of a future state for cycling
	4. Broad Targets	4. Formulation of broad future targets, often without clear measures (e.g. 20% more cycling)
	5. Local Measures	5. Formulation of local measures, like concrete street redevelopments or specific cycling highways
Types of Policy	6. Measures reducing cycling convenience	6. E.g. price increase for bike parking
	7. Increased Cycling Budget	7. Increased funds for cycling projects
	8. Smart/ Digital/ Innovation	8. 'Smart'-branded solutions using technology (e.g. intelligent traffic lights, adaptive streets)
	9. Experimentation/Living Labs/temporary/Pilot	9. Usage of experimental methods to test new policies (e.g. pilots for traffic-reduced streets, living labs testing new apps…)
	10. Soft Measures	
	11. Mobility Hubs/ Service Stations/ Repair Cafés	11. Residual category for stationary bundling of bike-related services
	12. Campaigns/ Education/ Promotion	12. Informational, promotional or educational campaigns (e.g. bike schools)
	13. Hard: Infrastructure	
	14. Cycling Network	14. References to a cycling network
	15. Cycle paths	15. Construction, maintenance or upgrading of cycle paths
	16. Enabling Cycling	16. Measures aimed at enabling cycling, often without major infrastructure changes (e.g. opening one-way-streets)
	17. Long Distance Paths	17. References to long-distance/ regional cycle paths
	18. Bike Parking	18. References to bike parking
	19. Bike Sharing (BSS)	19. References to bike sharing systems
Relationship to other Modes	20. Safety	20. References to safety of cyclists, does not include 'secure parking' or theft
	21. Car Regime	
	22. Acknowledgment of Automobility Regime	22. E.g. references to past planning ideals of a car-centric city
	23. Problems caused by Cars	23. Stating drawbacks of car mobility
	24. Reduce Car Convenience	24. Measures that reduce convenience for drivers, no direct connection to cycling (e.g. parking fees, speed limits)
	25. Competitive Position against other Modes	
	26. Cycling > Cars	26. Measures that prioritize cycling over cars (e.g. repurpose car lane as bike lane)
	27. Cars > Cycling	27. Measures that prioritize cars over cycling (e.g. car traffic volumes are considered before cycling infrastructure)
	28. Walking/PT > Cycling	28. Measures that prioritize walking and PT over cycling
	29. Conflict in SQ	29. References to conflicts between users of different modes of transport
	30. Harmonic Vision	30. Envisioning of harmony between users of different modes of transport
	31. Multimodality	31. E.g. links between PT and cycling, park & ride etc.
Benefits of Cycling	32. Health	32. References to health benefits for cyclists
	33. Speed/ Fast	33. Cycling as a fast and efficient mode of transport
	34. Mobility Justice/ Social Reasons/ Accessibility	34. References to cycling increasing accessibility or justice (e.g. through low entry costs)
	35. Cheap/ Space-efficient/ easy to implement	35. Cycling measures as cheap and quick to implement, space-efficient
	36. Economic Growth	36. Links between cycling and economic growth
	37. Climate Change/ Environment/ Pollution	37. Environmental benefits of cycling (e.g. air quality, carbon emissions…)
	38. Livable City	38. Links between cycling and attractive streetscapes
Governance & Stakeholders	39. New Governance Structures	39. Establishment of new governance structures for cycling (e.g. cycling taskforce, building regulations mandating bike parking…)
	40. City Cooperation	40. References to city cooperation
	41. Role Model to other Cities	41. The city serves as a role model to other cities
	42. Learning from other Cities	42. References to best-practices from other cities
	43. Regional/ Local Cooperation	43. Cooperation beyond the city borders (e.g. regional cycling highways)
	44. International Level	44. References to international governance (e.g. SDG, Leipzig Charta)
	45. EU level	45. References to EU governance (e.g. SUMP, EU air quality standards)
	46. Citizens/ Participation	46. References to participatory processes and citizen input
	47. Non-Profit/ Civil Society/ Professionals	47. E.g. References to interest groups
	48. Business	48. Cooperation with businesses
Special Target Groups	49. Logistics	49. Cycling as a mode for urban logistics (e.g. commercial cargo bikes)
	50. Diversity of Cyclists	50. Different types of cyclists (e.g. different speeds, family, leisure)
	51. Children/ Schools	51. Cycling measures dedicated to children
Challenges	52. General	52. Catch-all category for challenges related to cycling planning
	53. Too many Cyclists	53. Challenges due to overcrowding of cycling infrastructure

6 Results

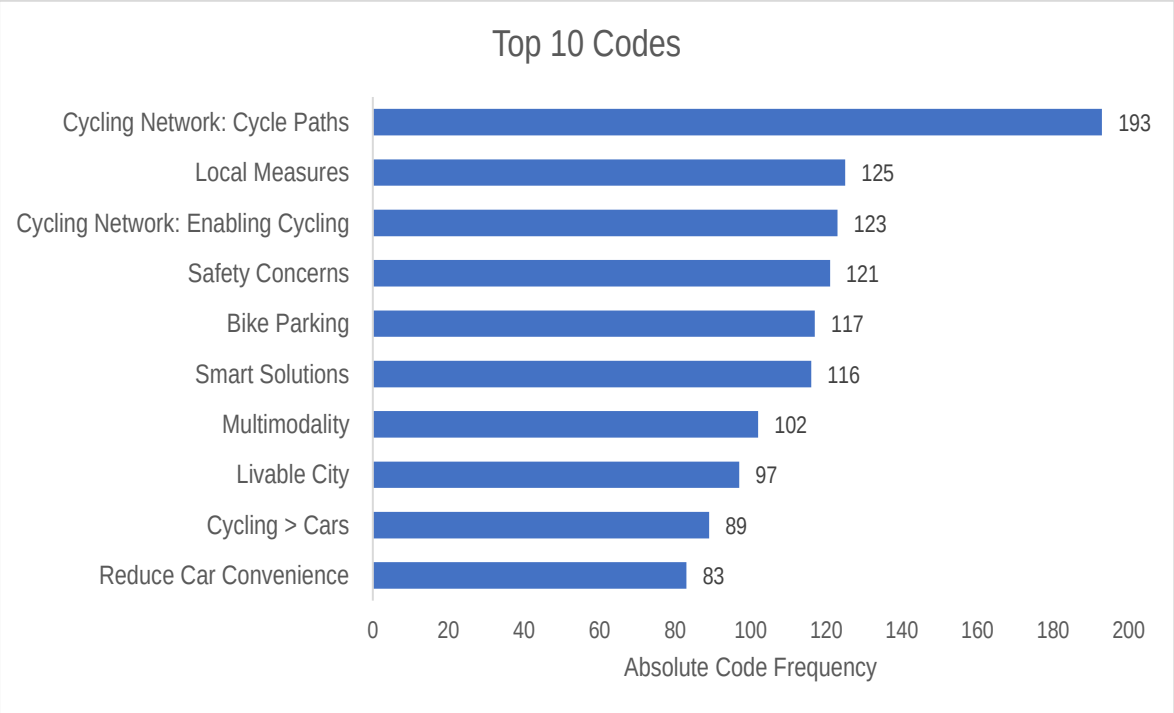

Figure 4: Absolute Code Frequencies of most-used Codes

A total of 2574 codes have been assigned to the primary documents during the analysis. To get a first grasp of the results, figure 4 shows the most used codes in absolute terms. Among the major categories, the most common codes relate to the types of implemented measures. Here, the codes referring to the cycling network overall account for 420 coded elements. This is mostly driven by the subcodes measuring "cycle paths" (193) and "enabling cycling" (123). This finding is rather unsurprising, as the installment of new cycling infrastructure is an undisputed core aspect of promoting cycling. Still, the prominence of the "enabling cycling" code might be surprising. This code indicates measures which don't entail the construction of traditional cycling infrastructure, but enable cycling by legalizing or prioritizing it without bigger infrastructure measures. Examples are the construction of cycling streets, legalizing cycling against one-way streets, reducing car speeds and thus making streets safe enough for cycling.

The result of the code "local measures" indicates that overall, the planning documents contain many detailed implementation plans for specific local areas, such as particular street redevelopments. The code indicating safety considerations is also featured prominently across all documents, with 121 occurrences, indicating a large emphasis on safety overall.

Other frequently occurring codes are "bike parking" with 117 occurrences and "smart solutions" with 116 applications. This code measures everything related to smart-branded technological solutions, like smart routing, apps, smart traffic lights and so on.

The category measuring the benefits of cycling promotion features frequently as well, with a total of 320 codes. Here, “livable city” makes up the largest share (97), followed by speed (44), environmental reasons (43) and health considerations (40). Lastly, the codes measuring the relationship between cycling and cars appear frequently too, with the code indicating priority of cycling over cars applying in 89 cases and the code measuring a reduction of car driving convenience applying 83 times.

6.1 Comparative Results

Looking at the data across cases makes it possible to compare the different cities. In order to make the results of the coding analysis meaningfully comparable, the data needs to be preprocessed. Given the drastically deviating length of the different planning documents (see table 1), a comparison of absolute values makes little sense, as it would introduce a bias towards longer documents. Naturally, a longer document contains more information on cycling and thus features higher code frequencies. For instance, an extensive cycling strategy will mention bike lanes more often than a shorter one. To account for this bias, relative values are calculated. This is done by dividing the absolute code occurrences by the number of pages containing codes per city. Given the broad nature of my coding scheme, the resulting metric largely respects all cycling-related sections of the plans. This approach is more appropriate than dividing by the number of all pagers or words, as not all sections of each plan are relevant to cycling. This way, I arrive at meaningful values for all types of documents. Overall mobility plans naturally talk less about cycling than dedicated cycling strategies do. By using numbers relative to the coded pages (containing cycling-related information), these documents become comparable. Naturally, this method also has drawbacks. It tends to overestimate code frequencies in densely written documents with more content per page. However, the results have been compared to alternative calculations, like code frequencies relative to the number of words. The findings remain relatively robust and the method described above is considered best suited for my analytical purposes.

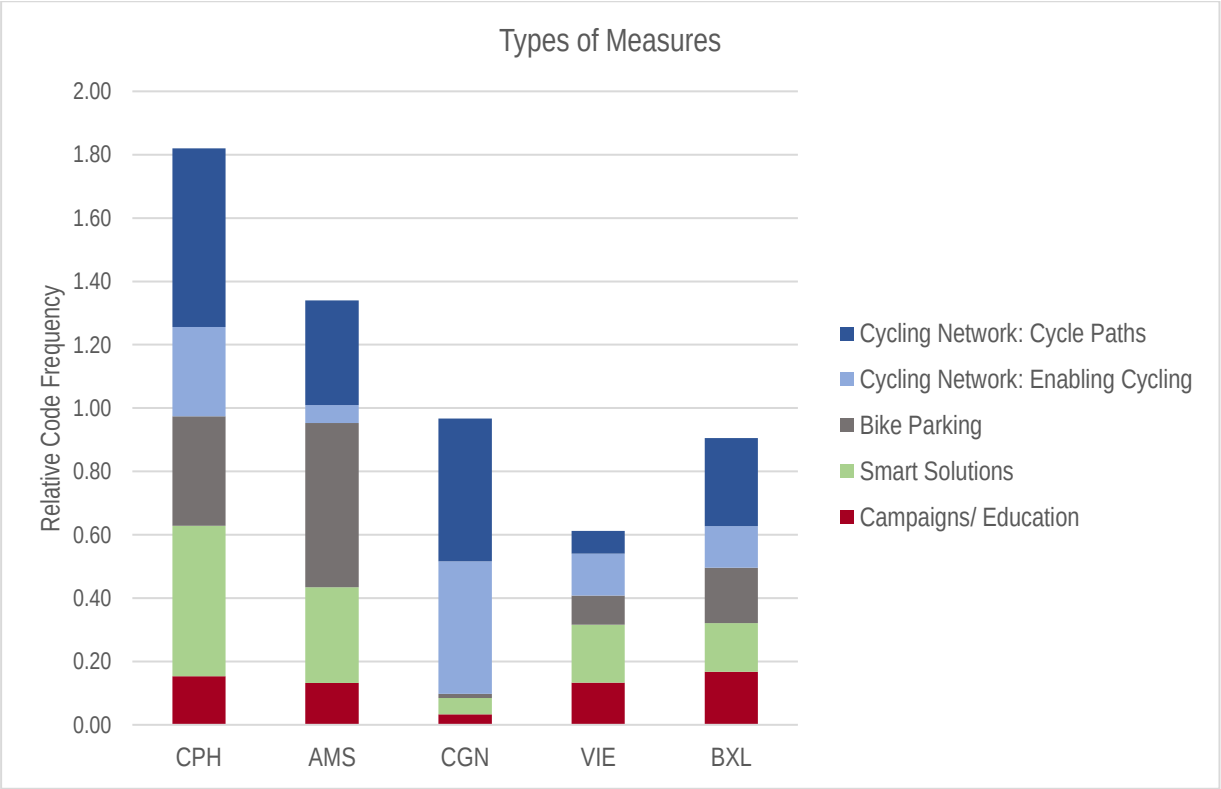

Figure 5: Relative Code Frequencies of different Types of Cycling Measures

Given it's prominence in absolute frequency, I start by comparing the different types of policy measures across the individual cities. Figure 5 compares the most relevant codes indicating specific types of measures across the five cities. The first noticeable finding is that Copenhagen reports the most about different types of measures. The prominence of infrastructural measures also becomes obvious with the two main codes indicating the development of a cycling network (colored blue) being prominent in many cities. However, this varies drastically: Amsterdam dedicates more attention to bicycle parking compared to its network and Vienna addresses cycle paths surprisingly rarely. Cologne constitutes the other extreme, where almost all of the addressed topics are dedicated to the city's cycling network, leaving little room for other topics[1]. Besides that, Cologne dedicates the most attention to the "enabling cycling" category, making this the most salient type of measure. Apart from Vienna's negligence towards cycling paths, Brussels and Vienna feature a relatively even spread of the different types of measures. Smart-branded measures are most prominent in Copenhagen, followed by Amsterdam. Lastly, soft measures like promotional campaigns are of secondary importance in most cities. Apart from Cologne, there are no major differences between the cities. However, given their reduced focus on infrastructure, these are given more relative prominence in Vienna and Brussels.

[1] The absence of bike parking and campaigns is addressed in Cologne cycling strategy, as those were explicitly excluded for this document.

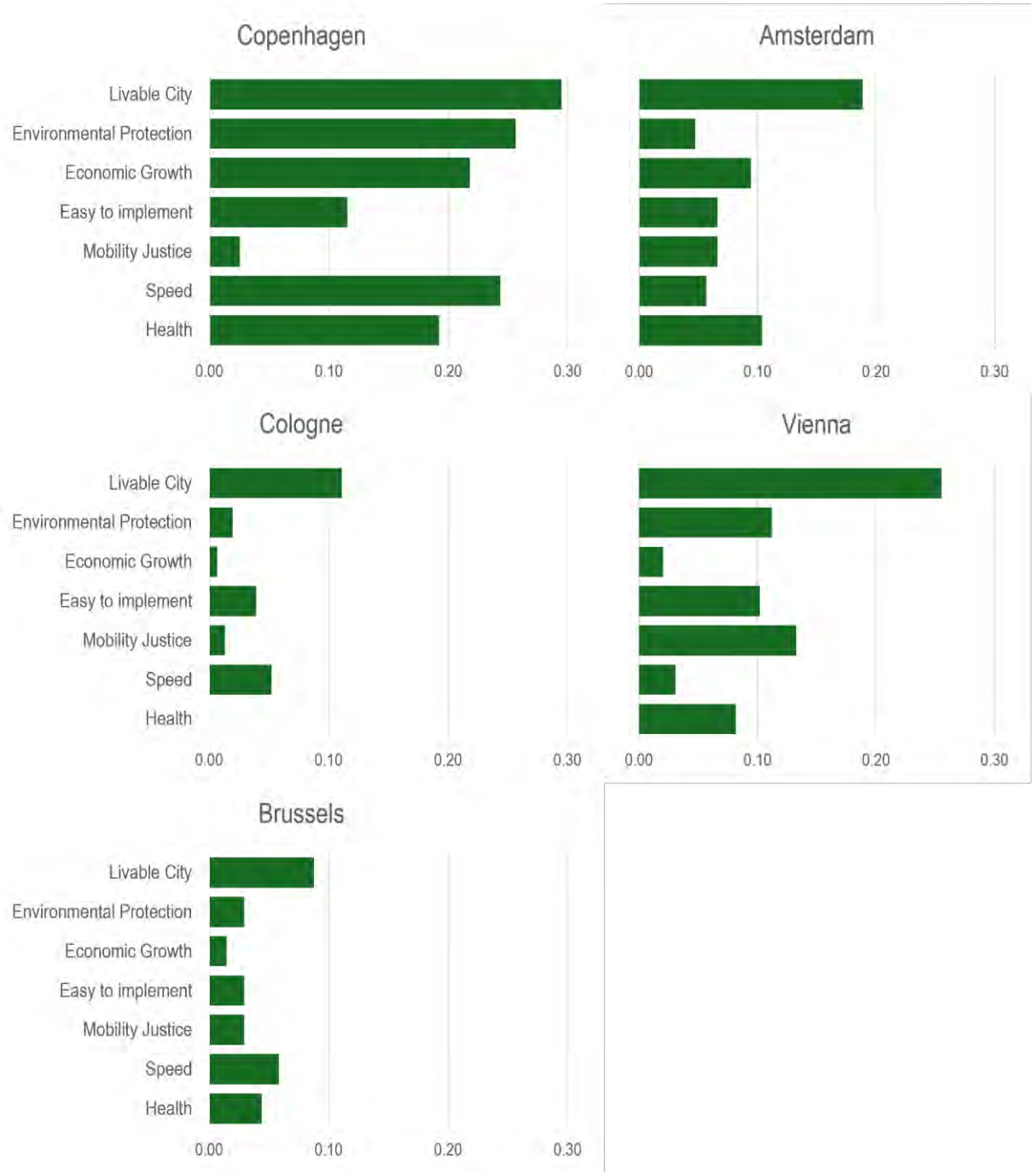

Figure 6: Relative Code Frequencies of Benefits of Cycling by City

Figure 6 shows how the cities compare when it comes to the reasons for promoting cycling. Similar to the previous graph, it is noticeable that the cities dedicate different amounts of attention to communicating these positives associated with cycling. Strikingly, Copenhagen's documents feature benefits of cycling way more than any other city. Of course, some of the variance can be attributed to different plan layouts and rhetorical styles, but the differences remain substantial.

Overall, out of all reasons in favor of cycling, the "livable city" coded is used the most across all cities. The other codes are spread much more evenly, with environmental, health and speed reasons being prominent as well. Interestingly, Cologne does not mention health benefits at all,

while Copenhagen rarely discusses social benefits or justice considerations. Vienna mentions social benefits the most, while disregarding the speed advantages of cycling. This is also in line with Vienna not addressing cycling paths a lot, as shown in figure 5. One category which divides the cities is the "economic growth" code. Only Amsterdam and Copenhagen use this rhetoric frequently, while it plays a minor role in the other cities. This pattern holds true for mentioning businesses (figure 9) within the strategic documents, which is also predominantly done by Copenhagen and Amsterdam.

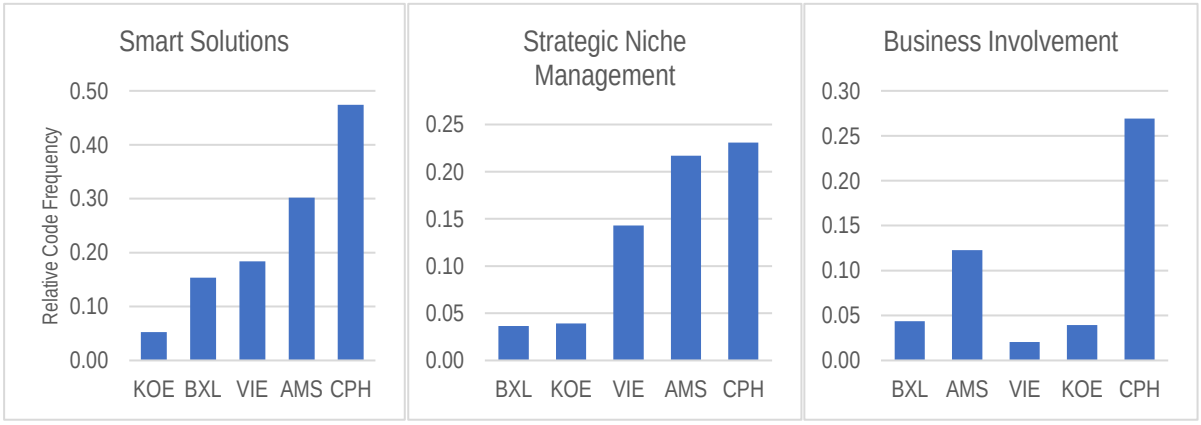

Figure 7 (left): Relative Code Frequencies of Smart Solutions (8) by City.

Figure 8 (middle): Relative Code Frequencies of Strategic Niche Management (9) by City.

Figure 9 (right): Relative Code Frequencies of Business Involvement (48) by City.

Similar patterns can also be observed for the "smart solutions" and "strategic niche management" codes. The latter captures the use of measures aligned with strategic niche management, including pilots, tests, experimentation, or temporary solutions. Here Amsterdam and Copenhagen are again leading with Vienna being third, as can be seen in Figure 8.

The last major category of the coding scheme deals with the interaction of cycling and other modes of transport. The results for the multimodality code (figure 10) demonstrate that Copenhagen places by far the highest emphasis on it. Cologne dedicates the least amount of attention to it, while the other cities behave similarly and fall somewhere in the middle. Regarding multimodality, the analysis also revealed that cycling is more or less exclusively considered in conjunction with public transport. While the combination of cycling with driving and walking was mentioned in some plans, these codes were measured too rarely to be included into the analysis.

There are a several codes dealing with the relationship between cycling and cars. Due to some of these codes featuring relatively rarely in the documents, I aggregated some of the data to avoid too many visualizations. Some cities clearly acknowledge the past decades of car dominance in their planning documents. However, this does not happen often (16 occurrences). Much more commonly, the planning documents explicitly or implicitly identify problems caused by cars.

Figure 11 presents these two codes aggregated. As can be seen, the role of cars is clearly the most prominent in Cologne, followed by Copenhagen. This also holds true when it comes to the codes measuring a reduction of car convenience and the code indicating measures prioritizing cycling directly over car traffic, which are summarized in Figure 12. Interestingly, these are more dominant in the cities which have smaller mode shares of cycling, while the two cycling-heavy cities feature such measures less often.

One last notable observation across all cities, is that the codes reflecting questions of city governance do generally not appear often. There is relatively little reflection on topics like international governance level or inter-city cooperation. The only code that appears frequently is that of citizen participation. This may be explained by a natural bias of such planning documents: Each city wants to claim full ownership of ideas and thus refrains from overly referring to inputs from elsewhere, apart from highlighting the role of participation.

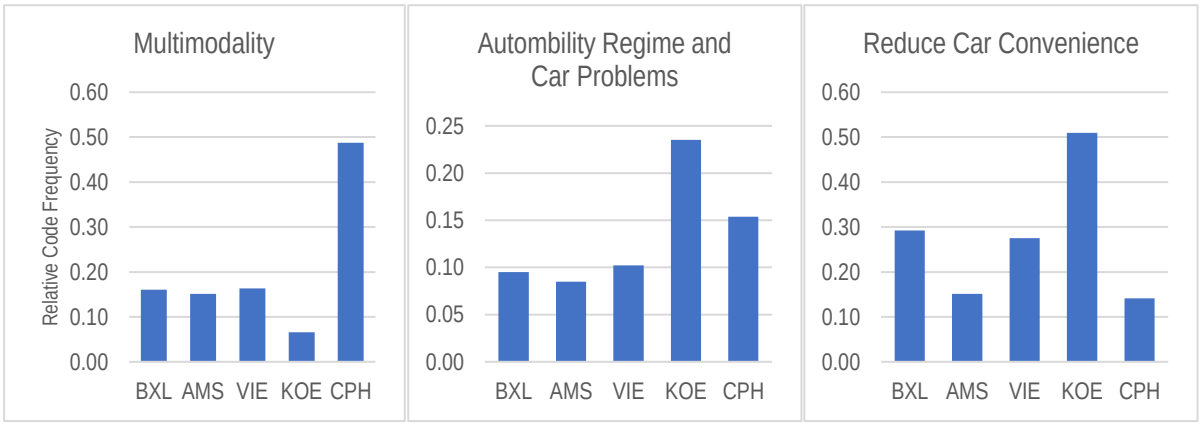

Figure 10 (left): Relative Code Frequency of Multimodality by City (31).

Figure 11 (middle): Relative Code Frequencies of the codes 22 "Acknowledgment of Automobility Regime" and 23 "Problems caused by Cars" by City.

Figure 12 (right): Relative Code Frequencies of the codes 24 "Reduced Car Convenience" 26 and "Cycling > Cars" by City.

Besides the quantified frequencies, MAXQDA also allows for an analysis of similarities in the application of codes using cluster analysis. Figure 13 shows how the codes in my analysis are distributed into clusters, based on their co-occurrence in the documents. Two codes are considered as co-occurring when they are both applied to an overlapping section of text (or image). Mere proximity of two codes, such as them occurring on the same page is not considered in this analysis. Figure 13 shows a 'code map', which indicates code similarity. For this map, the codes on local measures, broad targets and self-assessment of the status quo on cycling have been removed, as they function more as meta codes and their inclusion makes little sense from a logical point of view. Here, lines represent the co-occurrence of codes with thicker lines indicating higher co-occurrence. The data is presented in five clusters, which is manually chosen by the researcher. The light-blue cluster is the least interesting, showing the codes which don't co-occur with many

other codes, which is why their labels are not shown for visibility reasons. Besides this cluster, the analysis reveals four meaningful clusters of codes. The yellow cluster is mostly about infrastructure development. Here, the concrete measures frequently co-occur with statements about safety, indicating safety improvements and safe networks. The development of bike lanes also co-occurs with priority over cars a lot, which is logical in cases where bike lanes are created at the cost of car infrastructure, like parking or a car lane. The green cluster largely correlates with my code category on the benefits of and motivations for cycling promotion. This indicates that these arguments typically occur together, for example in a section advertising the advantages of cycling. Interestingly, these arguments also co-occur with the code indicating concrete future imaginaries, demonstrating that these are largely written with positive sentiment illustrating advantages of a future with more cycling, such as clean air. The orange cluster illustrates a section which may be described as ‘smart’ and ‘innovative’ cycling. It contains the code on experimental measures, business cooperation, mobility hubs and smart innovation. This includes sections mentioning mobility as a service applications offered by businesses. In relative proximity to this cluster is the dark-blue cluster on multimodality. Here, bicycle parking and bike sharing strongly co-occur with multimodality, illustrating that these aspects are often combined in the planning documents.

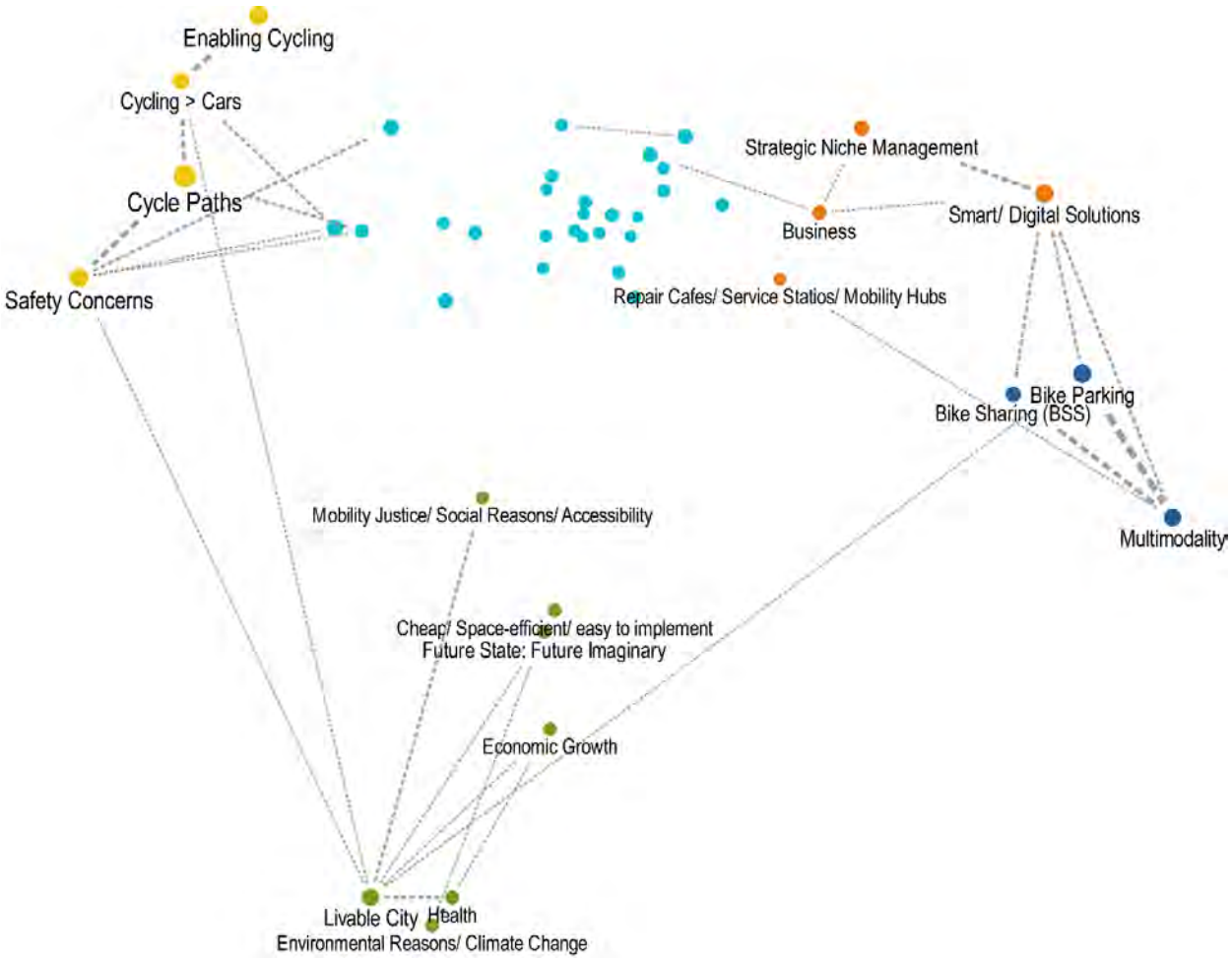

Figure 13: Code Clusters across all documents. Proximity indicates similarity between codes.

6.2 Results by Cities

Following the descriptive comparative analysis, this section analyzes each city's document in more detail. The analysis is based on the code frequency analysis, code co-occurrences per city, as well as my purely qualitative memos created during the coding process.

6.2.1 Copenhagen

The strategic documents published by the Danish capital present the city as a clear leader when it comes to cycling. This is already expressed by the name of the cycling strategy "Good, Better, Best". Subtracting the codes with negative self-assessments from the positive ones yields a positive ratio outweighing critical reflections with a score of +0.09, underscoring this perception. Copenhagen's plans portray the city as a clear role model to other cities, making this code apply more often than in any other city. This fits well in the city's overall image as a leader in cycling, with the city's strategy even being referred to as a "bible" of cycling planning (Elesawy 2021, 136).

When it comes to the density of the documents, Copenhagen lives up to its reputation. Especially the cycling strategy, but also the other documents are densely filled with relevant sections when it comes to my coding scheme, which is reflected in Copenhagen leading many of the metrics

presented earlier. The writing style is also unique: Copenhagen's documents are the closest to being a future vision or an imagined future. In the cycling strategy, the future state of the city in 2025 is branded as "the city of cyclists" (C1, 22, 27, 28). Furthermore, the mobility plan features many so-called "snapshots from the future", which follow individual persons in their mobility behavior, demonstrating the desired future state. A good illustration being the following quote, illustrating the high quality of the new cycling infrastructure and resulting travel speed:

> *"Aksel ripped the bike out of the bike rack in front of his apartment […]. He was in a hurry […]. He was in the fast lane all the way down the cycle path along […]. When the green wave was replaced by a red light at Nørrebro Station, he noticed that the front wheel was going flat. He looked at his watch and breathed a sigh of relief when he realized it had only taken ten minutes. At Kongens Nytorv, he made a quick pit-stop at the bike service island, filled up the front tire and took a sip of water. […] At the end of Nyhavn, he crossed the new bridge to Holmen […]. Aksel quickly found a free space in a bike rack in front of the building, parked the bike and ran into the main entrance, two minutes before class started..."* (C2, 78)

Throughout the documents, benefits of cycling are constantly mentioned next to specific local measures, as already demonstrated in figure 6. Contrary to many other cities, the codes measuring the advantages of cycling also feature a clear cluster in the Copenhagen documents, similar to the general code map shown in figure 13. This illustrates that these codes frequently co-occur together, creating larger segments of portraying the benefits associated with cycling. Cycling is primarily connected to livable city, health and climate benefits. However, unlike the other cities, these sections also include rhetoric focused on economic growth. Copenhagen's documents follow a clear green growth rhetoric and see cycling as a precondition for this, by being an efficient, green mode of transport (C2, 19).

Besides that, Copenhagen also focuses on its infrastructure development. The codes on the cycling network are very prominent, as already demonstrated (figure 5). Compared to Amsterdam, this likely reflects the how city achieved its current state: While in Amsterdam, cycling levels increased without much effort from the municipality, Copenhagen fostered this development more proactively through infrastructure construction. The plans also feature many concrete local infrastructure improvements. The hard infrastructure codes mostly co-occur with safety and speed arguments, forming an overall focus on comfortable, safe and importantly fast cycling network, which is called PLUS network. The strategies also commonly refer to big infrastructure investments, such as dedicated cycling bridges (C1, 23).

Another central focus of Copenhagen's bike planning is the multimodality, co-occurring strongly with bike parking and also but to a lesser degree repair stations and mobility hubs. The city also leads strongly in pushing the idea of multimodality compared to the other cities. Interestingly, this

is also frequently mentioned in conjunction with bike sharing schemes, which are a priority in the plans. As of writing this thesis, however, Copenhagen's official bike sharing scheme has been terminated without a replacement.

Although not forming a distinct code cluster, there is a strong focus on smart, technological solutions in Copenhagen. This is paired with the aforementioned green growth rhetoric and the most references to businesses out of all cities. Modern, smart solutions like smart traffic control systems, adaptive LED signage (C2, 19; C1, 15) and street designs which change their lane configuration adaptively over the course of a day, to accommodate for different transport flows at different times (C2, 55). This is often paired with experimentation, which is indicative of strategic niche management for novel technologies. Copenhagen also leads in this category, presenting itself as a "laboratory for green mobility solutions" (C3, 26), but almost exclusively uses experimentation in conjunction with new technologies, not social innovation.

There are many more noteworthy aspects in Copenhagen's dense documents, which cannot be listed in detail due to space restrictions, like a high focus on regional cooperation and long-distance bicycle paths, a network increasingly aiming to accommodate different speeds of cyclists, and also a relatively frequent usage of campaigns, validating Gössling's (2013) findings.

6.2.2 Amsterdam

The style of Amsterdam's documents vary from the positive self-image of Copenhagen's document. The documents contain an even amount of critical and positive self-assessments evening out close to zero at a score of -0.01. In terms of types of measures, Amsterdam's planning is evenly distributed. However, there is a clear and unique focus on bike parking. The first of two code clusters revealed by the analysis forms around this: Bike parking frequently co-occurs with the codes on smart solutions, multimodality and experimentation. This indicates that the city emphasizes novel and often technological solutions to make bike parking garages more efficient and thus improve the combination of bike and train travel (A2, 40, 45). The focus on parking is also connected to creating space on the city's narrow historic streetscapes, which is a major concern in the city's documents.

A second clear-cut cluster is formed by the combination of local measures and cycling paths. This demonstrates the city's relatively high focus in improving its cycling network. The documents are fairly concrete and contain many local measures, like individual street redevelopment or specific infrastructure investments like cycling bridges. Although the city separates its network into a fast Plus network and a broader main network with less dedicated infrastructure, there is little emphasis on enabling cycling through measures like bicycle streets. This can likely be explained by the fact that processes associated with this code are mostly completed in Amsterdam.

When it comes to the advantages of cycling, they play a much smaller role compared to Copenhagen. However, these are still present. The livable city code stands out, followed by health considerations and economic growth, while the other advantages are evenly distributed. The focus on growth is similar to Copenhagen, with both of these mature cycling cites identifying a connection between cycling and economic growth. However, this is less pronounced here.

The lack of explaining societal benefits associated with cycling is also observed in a purely qualitative reading: Throughout the documents, it seems that an assumed consensus exists that cycling is positive, making explicit justifications obsolete. This is underlined by the cycling strategy having a full chapter on 'bikenomics', elaborating in detail on the societal gains through cycling promotion, like space-efficiency, health, cost-efficiency, growth as well as social aspects, like fostering social interactions (A2, 83ff.). However, these explanations are pushed out of the main strategy into the appendix, suggesting that these benefits are already known to many readers.

Overall, Amsterdam's documents convey the image of a very mature cycling regime, where cycling seems to have attained the highest status out of all transport modes. The strategies treat cycling increasingly like car planning used to be treated, which is something other studies have also reported (Nikolaeva, te Brömmelstroet, et al. 2019). There is talk of optimizing parking and traffic flows, as well as funding big infrastructure projects (A2, 6, 28). Amsterdam is also the only city reporting problems like overcrowding of cycling paths and even introduces measures reducing cycling convenience, like increasing bike parking fees (e.g. A1, 43). Benefits of cycling are furthermore strongly backed up by a rich set of observational and survey data. These documents are very evidence-based. In sum, this creates an image of an increasingly neoclassical treatment of cycling. This is further increased by the city's focus on economic impact of cycling, such as increasing the value of public space, which bears resemblance to Copenhagen's approach. To a degree, this stands at odds with the city's vision as a circular city and may be explained because the cycling strategy being older than the doughnut economics plans. However, focusing increasingly on economic and financial aspects related to cycling may also simply be an expression of taking this mode of transport more seriously or as serious as car- and public transport planning is commonly facilitated.

Campaigns also play an important role in the city's approach to cycling promotion, but in a different way compared to other cities: Instead of promoting cycling to increase its modal share, Amsterdam dedicates a large section to a campaign called "better cycling", which focuses on advertising a more respectful way of cycling (A2, 55). This further underlines the impression of cycling being the dominant transport regime.

Instead of featuring concrete future imaginaries, Amsterdam is mostly portrayed as being an enormously attractive city which needs to protect its status against increasing pressures, namely

overcrowding. The future ideal is thus an idealized and improved status quo. The ambition of the city is also not primarily to increase cycling in the city, as this is already achieved. Rather, the city's current status quo needs to be better organized and maintained against pressures like tourism. This is illustrated by these quotations from the foreword of the cycling strategy:

"*Few things in this world go together so well as Amsterdam and bicycles"* (A2, 3) *"this way, we can also keep the city healthy, attractive and accessible for the future"* (A2, 5)

6.2.3 Cologne

Cologne's planning documents portray the city in a rather negative way. Weighing critical self-assessments against positive one yields a ratio of -0.19, by far the most negative out of the sample. This is further exemplified with the code on challenges applying relatively often throughout the city's documents. The negative self-description even forms a small cluster of co-occurrences, with the codes on safety, traffic-related conflicts and deficits commonly occurring jointly. This overall fits the negative perception of Cologne's cycling infrastructure described earlier (see chapter 5.1.1.3), but the documents still feature a remarkably self-critical tone overall.

Turning to the types of measures, Cologne places the highest focus on building a cycling network. As indicated in figure 4, no city emphasizes the codes on building infrastructure and enabling cycling as much as Cologne. The cycling concept outlines a desired state of two different networks: Separated cycle tracks along major car axis and a fine network of cycling on the streets in speed-reduced smaller streets, similar to Amsterdam's network division. In Cologne, the focus on "enabling cycling" is particularly pronounced. The city places high emphasis on creating cycling streets, allowing cycling against one-way streets and reducing speeds to enable cyclists to safely use existing streets. Dedicated bicycle paths play an important role as well, but are less dominant in comparison. Both networks also serve as car networks. In the cycling concept, cycling network improvements are typically planned in a very concrete and local way, creating a strong co-occurrence of infrastructure codes with the code on "local measures". The cycling concept also contains many schematic sketches of to-be-implemented intersection improvements (e.g. K1, 100).

The relationship towards cars is given especially high attention. No other city acknowledges the presence of an automobility regime as often, likely due to Cologne's post-war rebuilding following the ideal of a car-centric city. The current documents identify this as a cause of problems for cycling. The plans thus entail many measures reducing car access and convenience overall, such as reducing on-street parking and introducing speed limits. Often, cycling measures are directly implemented at the cost of cars, like removing a car lane in favor of a cycling track. Thus, in terms of concrete measures, Cologne features many measures that advance a sustainable transition away from cars and towards more cycling, as operationalized by Bruno (2022). However, while the city

reduces car convenience spatially, rhetorically the documents do not convey this message: The framing is often car-centric. A typical argumentative pattern being that car traffic decreased at a given street, and thus bike lanes can be created. This still places car traffic at the center of transportation planning. Cologne's mobility plan also still emphasizes that car access to all parts of the city must be ensured (K2, 7f.). There is thus a discrepancy between the city's planned measures and employed rhetoric.

Another notable aspect of Cologne is its strong emphasis on citizen participation. This is identified as an important topic across all documents and is dedicated entire chapters. For instance, the cycling concept frequently sketches out concrete debates at workshops including citizens. I also identify citizen input as the driving motivating force behind cycling promotion. Instead of highlighting environmental or health benefits, it is often stated that cycling improvements are demanded in participatory programs.

The analysis of Cologne's documents reveals one last cluster, namely the combination of bike sharing, multimodality and smart measures. However, while the codes co-occur strongly, they are only given limited attention quantitatively in the document, revealing that this is not a priority in Cologne's bicycle planning documents.

Overall, there are many topics which are notably absent from Cologne's documents: The codes indicating smart and experimental solutions barely appear, just as codes on bike parking and soft measures like campaigns. The latter two are directly mentioned in the cycling concept as not being part of this strategy, but also don't appear in any other planning documents, despite the city being active in this regard, much like Vienna when it comes to cycling paths. Lastly, Cologne does not highlight benefits of cycling. The livable city frame is used relatively often, but other positives are limited to pragmatic reasons, like speed improvements or easy implementation. Environmental, social or health benefits play next to no role.

Another qualitative observation is the reactive nature of the documents: Cycling measures can be implemented, because car traffic decreased. This pragmatic, demand-oriented approach is even directly acknowledged in the mobility plan:

"in practice there has been no clear prioritization of certain modes of transport, but rather a pragmatic and sometimes situational planning and implementation of measures based on the necessities." (K2, 9)

Overall, Cologne's plans stand out for their localized solutions and pragmatic character. This goes hand in hand with a reduced role of car traffic. What is mostly lacking, is any type of envisioned future state. Thus, there is very little talk of innovation or experimenting with novel solutions and limited focus on the advantages associated with cycling. Overall, the communicative effort of

'selling' the planned measures seems low. Cologne therefore constitutes the opposite extreme to Vienna. It must be noted that this slightly changed with the city's most recent city vision and likely the upcoming SUMP, but at this point these aspects are absent from Cologne's cycling-related officially published documents.

6.2.4 Vienna

As indicated in the case selection chapter (chapter 5.1), Vienna is an outlying case with not having published a dedicated cycling strategy. Instead, the main document for the analysis is the general mobility plan. The analysis also includes a dedicated "cycling-street strategy", which is a document solely focusing on cycling streets, as well as the smart city vision. There is no single striking finding that stands out for Vienna in comparison to the other cities. Indicated by the fact that Vienna barely leads in any code categories.

Nevertheless, there are noteworthy findings: The first outstanding finding is a relative lack of attention dedicated to constructing a cycling network. Despite the cycling streets strategy being included, Vienna's documents feature the least measures on infrastructure. The only category that is prominently features in this regard is the city's bike sharing scheme, being commonly connected to multimodality. However it lacks the direct connection to train stations and bike parking featured in other cities. Campaigns play a relatively larger role, but this does not stand out compared to the other cases. These findings can likely be explained by the lack of cycling strategy, as the city is clearly building new infrastructure through it's "cycle path campaigns", but does not follow a published vision or plan in this aspect (Stadt Wien 2024d).

Vienna's documents are written in a rather broad style. They feature many broad targets, second only to Copenhagen, but lack concrete implementations plans and local measures. This is also backed by a purely qualitative reading of the mobility plan, which reads more like a wish list than a concrete planning document. Figure 14 illustrates this point, comparing the usage of codes indicating "broad targets" against local measures. Here, Vienna is strongly leaning towards targets without clear implementation, positioning the city's planning documents clearly as future visions rather than small-scale pragmatic planning documents. This future-oriented document style is further demonstrated by a relatively high occurrence of the code on future imaginaries. However, instead of presenting a desired future state, Vienna often rather presents the city's own best-practice examples, such as its new-built district "Seestadt Aspern" (W2, 62), which is a new-built district located 10km outside the city center. It is one of Europe's largest urban development projects and follows the model of transit-oriented development. It further serves as a district for experimenting with new innovation, often linked to transport (Stadt Wien 2024a; aspern.mobil LAB 2024; Pojani and Stead 2018).

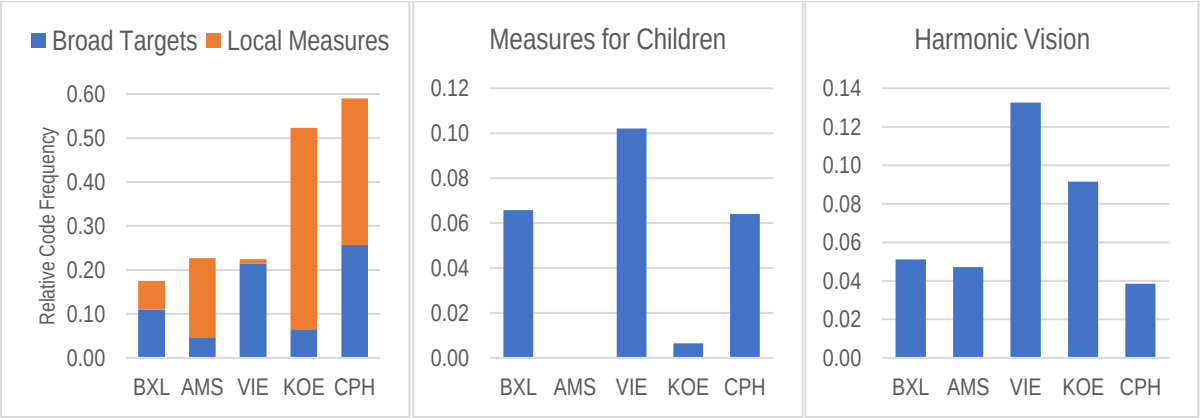

Figure 14 (left): Relative Code Frequency of Local measures (5) compared to broad targets (4) by City.

Figure 15 (middle): Relative Code Frequency of measures dedicated for children and schools (51) by City.

Figure 16 (right): Relative Code Frequency of a harmonic state between different modes of transport (30) by City.

Fitting this broad future-oriented the writing style is a largely positive rhetoric in the documents. Vienna places considerable emphasis on the positive aspects of cycling. Here, the city focuses on the livable city and climate-related aspects, but notably also on social reasons (see figure 6). Frequently occurring terms like "fairness" and "harmonic coexistence" (*miteinander*) illustrate this (W2, 70f., 113). This is applied to a vision of different transport modes co-existing in harmony, which is a code where Vienna clearly leads (see figure 16), but also to marginalized groups of people, like wheelchair users, highlighting social aspects. These perspectives are accompanied by a focus on children and schools (see figure 15). In this context, cars are also regarded as clearly negative and harmful, something that is otherwise not prominent in the Viennese documents. This rhetoric is relatively close to the sustainable mobility paradigm, with Vienna also emphasizing the connection of transport and a compact, polycentric urban fabric which reduces the need to travel.

Vienna also stands out on a more abstract conceptual level of writing: The city refers to experimentation and strategic niche management relatively often, even directly referring to "technical and social innovations" (W3, 36). Besides this, governance topics appear more frequently than in other cities, mentioning city cooperation relatively often, as well as direct mentioning of the UN SDGs, the Paris Agreement and the EU level as a relevant body (W2, 13; W3, 18).

6.2.5 Brussels

Brussels' documents present the city with a relatively negative self-assessment. The ratio of the codes measuring if a city perceives itself as good or lacking with regards to cycling is negative at -0.07. This is in line with Brussels' low modal share of cycling. When it comes to specific local characteristics, Brussels leads in featuring the code indicating regional or local cooperation, reflecting the capital regions 19 municipalities and their required coordination. Furthermore, the hilly character of the city is acknowledged many times (e.g. B1, 11).

Analyzing code co-occurrences reveal two interesting clusters: First, there is a clear-cut cluster on smart cycling solutions, which features the codes on smart measures, bike sharing and multimodality. This is emphasized by the frequent mentioning of mobility-as-a-service (MaaS) solutions in Brussels plans and a focus on micromobility in the SUMP (B2, 70). Lastly, this cluster co-occurs with the code on mobility hubs like bike stations or repair cafes, underscoring the innovative framing.

The second cluster is strongly connected to the code indicating safety considerations, which is Brussels most frequent code, indicating the priority of safer cycling infrastructure. However, this code is mostly used in a positive, future-oriented way, highlighting a safe and comfortable cycling network of the future, as indicated by co-occurrences with the codes on cycling paths, livable city, environmental protection and speed. In Brussels, this also entails a clear reduction of cars, which is a code frequently co-occurring with codes from this cluster.

In addition to these clusters, several other notable aspects stand out in the Brussels case: As presented in figure 5, the types of cycling measures are spread relatively evenly, without one specific aspect standing out. This was also observed qualitatively, with the Brussels documents being well-balanced between different topics and types of measures. In line with this balance, Brussels is leading when it comes to soft measures, especially campaigns. These are mentioned as one major pillar of cycling promotion in the cycling strategy and are dedicated a full chapter (B1, p.6, 25ff.). Brussels employs campaigns especially in connection with children, as is indicated by a high co-occurrence of these two codes. Furthermore, Brussels gives a higher emphasis to using cycling for logistical purposes than any other city (figure 17).

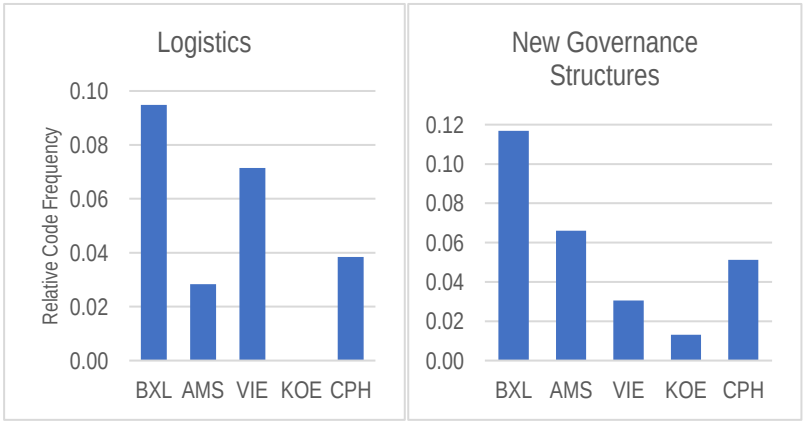

Figure 17 (left): Relative Code Frequency of Cycling application for Logistics (49) by City.

Figure 18 (right): Relative Code Frequency of New Governance Structures (39) by City.

The code indicating the installation of new governance structures appears most frequently in Brussels. This is interesting, as this often captures a deeper systemic change than other measures. Concrete examples from Brussels include new planning requirements for bicycle parking in urban

development projects (B1, 15, 21f.), police task forces tackling bicycle theft (B1, 22), new monitoring structures and the creation of new positions for cycling coordination within the administration (B1, 32). In this context, the Flemish 'STOP' principle should also be listed, which establishes a general priority of walking, cycling and public transport over car traffic. This principle is applied and referred to throughout Brussels planning documents (B1, 9; B2, 74).

Another interesting observation is that the Good Move SUMP featured a much higher than average attention to academic debates, also outside of traditional transport planning. Especially striking here is the focus on social aspects of transport justice, illustrating structural injustices shaped by gender, reduced mobility or poverty (B2, 42ff, 155) and the reappropriation of urban space using community centers (B2, 155). While this does not go into great depth, this is the closest any of the cities comes to tackling issues in line with the scholarship on critical transport or political economy approaches to mobility (e.g. Kębłowski and Bassens 2018).

Besides that, the Good Move plan also places higher than average emphasis on citizen participation and indicator-based monitoring approaches, in line with the recently updated SUMP guidelines (Rupprecht Consult 2019).

6.3 Results by Document Type, Date and Country

This section investigates if patterns in the results are driven by meta-variables, namely the document type, publication date and country of origin. Given the four different types of documents (cycling strategy, mobility plan, SUMP, city vision), an investigation of differences along the document types as well as the publication circumstances seems appropriate for two reasons: First, it generates insights into how the different types of data compare and reveals if there are any meaningful temporal trends. Second, this serves as a robustness check to investigate if the results are driven by document type or publication date: If one particular type of document features specific codes disproportionately, this becomes apparent here.

The analysis reveals that general mobility plans including SUMP place higher emphasize on smart-branded solutions, references to business and car-related issues, compared to the other document types. This is unsurprising, as these are all topics which are related with the wider mobility system and not limited to cycling. Especially aspects like multimodality, BSS and MaaS are expected to feature primarily in broader, integrated mobility plans.

When it comes to dedicated cycling strategies, the findings are also unsurprising: Network-related cycling infrastructure, dedicated cycling campaigns and safety considerations are overrepresented in this document type, illustrating a focus on concrete cycling promotion. These measures only concern the cycling regime and much less the overall mobility system. Cycling strategies also feature cycling related new governance structures much more often than other

documents. This could point to cycling strategies being the most effective tool for successful implementation of long-term institutionalized cycling promotion. The lack of dedicated cycling strategies thus also explains the above reported findings for Vienna, where cycling infrastructure planning was notably absent.

Lastly, there are some aspects which are shared by SUMP and city visions. These documents feature more future imaginaries more than the other document types. This makes sense, as city visions are typically used to sketch out broader future visions compared to traditional transportation plans. In the case of SUMP, this is likely attributed to vision-building being a concrete requirement in the EU guidelines (Rupprecht Consult 2019, 10). Additionally, these two document types unsurprisingly feature codes related to international city governance more often. This includes codes on international and EU cooperation as well as the "learning from other cities" category, pointing to an increased focus on best-practices, as described in the literature.

The particularities of the City Visions and SUMP could be explained by temporal trends, as these may be regarded as more typical contemporary planning documents. However, an analysis of the documents by publication date does not identify any meaningful temporal trends in my sample. This is especially surprising for the codes on smart solutions, as ongoing digitalization might suggest an increasing focus on this topic, as well as the codes on international city governance. Both code sets feature negative trends when it comes to the correlation with the publication date.

Overall, these findings are largely unsurprising, except for the absence of any temporal trends. Cycling strategies feature dedicated cycling measures more often while mobility plans emphasize multimodality, even in their chapters on cycling. Lastly, SUMP and city visions make higher usage of imaginaries. These differences don't drive the results to an extent where the city comparison would be driven by the document type or publication year, underlining the validity and robustness of the above-presented findings.

An additional variable that might account for variation between the different cases is the country level. Each case is situated in a different country and is thus embedded in a different planning culture (Knieling and Othengrafen 2015). A research project without multiple cases per country cannot truly test if the country level is the deciding factor driving the results. However, given that my analysis includes several documents per case (and thus per country), it is possible to investigate whether all documents from one case are similar to each other. This is not the case. There are vast differences between different types of documents per case. Thus, the type of documents seems to play a much more crucial role than the country of origin. Using MAXQDA's feature 'document map', it is possible to map all different documents on one map, based on similarity of occurring codes. The feature includes different metrics to calculate the similarity. Regardless of which metric is used, the documents do not cluster by case. A document map is

presented in the appendix. These findings are also confirmed by a qualitative reading: Documents from one country are vastly different, especially in writing style.

6.4 Results by Cycling Regime Status

The case selection of this analysis is facilitated in such a way that the different cases feature as much variety as possible when it comes to the state of their cycling regimes. The results demonstrate that for some aspects, the cycling regime can serve as an explanation for differences across cities, while in other aspects, the cases do not align by cycling regime status.

When it comes to the implementation of certain measures, the analysis revealed that the two leading cities – Copenhagen and Amsterdam – place much higher emphasis on smart solutions (see figure 7). A possible interpretation would be that when it comes to the basics of cycling promotion, like constructing a convenient and safe network of cycling infrastructure, these cities are so far along, that there is a reduced need to tackle these measures, which leaves more room to focus on more 'niche' features like smart tools. A similar logic may appear when it comes to bike parking: This can be regarded as a secondary infrastructure, which is initially less important than a coherent network. Also, higher cycling rates naturally produce more crowded bicycle parking facilitate, making this a more important measure for mature cycling regimes.

Interestingly, Amsterdam and Copenhagen are much more active when it comes to the implementation of experimentation and other strategic niche management tools. They often apply this to smart and technological innovations, but not exclusively. This heightened focus suggests that these tools are effective in achieving higher cycling shares, lending support to this basic thesis of the strategic niche management school. The pairing of experimentation with smart technologies may either be rooted in a technologically optimist view being dominant in these cities (which seems plausible especially in Copenhagen) or because these cities have previously conducted experiments with other tools, such as traffic reduced streets and have observed positive results which are now being translated. Either way, these cities emphasis of strategic niche management suggests, in line with the theory, the effectiveness of such tools. However, the other cities do not make much use of this toolkit. In Vienna, this is at least used to some degree, but overall, the findings suggest that there is much untapped potential in the three cities with lower cycling levels.

Another aspect where Copenhagen and Amsterdam stand out is the usage of data-driven and evidence-based planning and monitoring. Both cities can rely on much more data and resources to promote cycling in targeted ways, as revealed by a qualitative reading of the documents. Vienna's approach of adopting Copenhagen's monitoring scheme seems promising. Lastly, Amsterdam and Copenhagen share a focus on economic aspects and business. This may again be indicative of stronger pro-growth narratives in these city. For Copenhagen, this likely applies, but for Amsterdam, given the city's doughnut strategy, this is questionable. The focus on cycling from

a more economic activity may also be indicative of a mentality of 'taking cycling seriously', which also applies to economic logics that are typically applied more when it comes to car and transit planning. This bears similarities to the increased data-focus.

While these aspects clearly show a divide between the two cities with the highest cycling share and the other cities, this isn't as clear-cut for other aspects of the data. There is a stronger focus on smart technologies, but when it comes to overall distribution of types of measures, the five cities portray a mostly heterogeneous image: Looking at infrastructure for example, Cologne and Copenhagen stand out, while the employment of campaigns is distributed evenly across cases. These are only two examples where the mode share of cycling cannot serve as an explanation for the findings. Thus, I conclude that the two 'flagship cities' have some commonalities in which they behave differently from other cities. Overall however, the differences in cycling levels cannot comprehensively explain the differences found between the cities.

One key aspect where this is true is the usage of the tool of future imaginaries. The different cities employ this to a vastly different degree: Copenhagen makes strong usage of clear and direct imaginaries, sometime even adopting storytelling focus on how measures shape citizen's lives, as illustrated by the quote on page 44. In Amsterdam however, this focus does not exist. Vienna and Brussels feature more usage of graspable future visions than the Dutch capital. Lastly, Cologne's planning documents employ next to no future imaginaries, an issue which is investigated further in chapter 7. To visualize this relationship, figure 19 presents a schematic visualization of the usage of future imaginaries in relationship to the cities' cycling regime status.

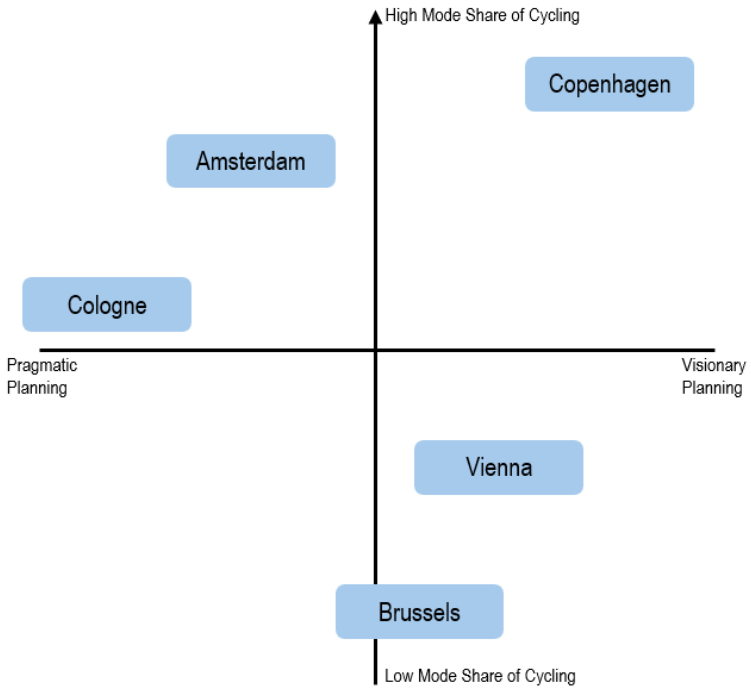

Figure 19: Pragmatic Planning vs. Visionary Planning in relation to Cycling Mode Share

6.5 Towards different Future Imaginaries

Regarding the research question, my analysis makes it possible to sketch out thematic future imaginaries for each city. However, the analysis also revealed that different cities emphasize the issue of future imaginaries quite differently: Some clearly leverage the role and communicative power of future imaginaries, making active usage of such rhetorical figures, like Copenhagen. Other cities put much less emphasis on creating such future visions, thus requiring more interpretative effort to recreate them. Despite the cities using imaginaries as a tool to varying degrees, my coding analysis still makes it possible to identify latent imaginary constructions, even if these are less directly articulated in some cases. The following section summarizes this per city.

6.5.1 Imaginaries per City

Copenhagen presents itself as a leading city when it comes to cycling, showcasing continued investments into its robust and high-quality cycling network. Here, the city highlights prestigious flagship projects, such as the new 'Cirkelbroen' bridge (C1, 23) designed by artist Ólafur Elíasson, underscoring its commitment to modern cycling infrastructure. In addition to this, the city heavily emphasizes the aspect of multimodality. A significant focus is also placed on the implementation of novel smart technologies to enhance cycling. The plans thus sketch out a future marked by technological optimism paired with green innovation. This is coupled with an emphasis on businesses, growth and speed. Copenhagen effectively uses imaginaries as a tool to describe the aspired future state, strongly underscoring the associated benefits.

Amsterdam's planning documents emphasize the role of bicycle parking, especially with a connection to multimodality. Much like Copenhagen, this is done with a focus on smart solutions and businesses. Cycling is identified as a contributor to economic growth. Instead of describing a desirable future state, the city stresses its already high cycling levels and attractiveness. Instead of looking forward, the desired future is thus one that maintains the currently existing benefits against overcrowding pressures. Amsterdam's planning documents convey an image of a very mature, potentially dominant cycling regime, which is increasingly being managed like car planning is in many other cities. Thus, the city seeks to protect its current status by optimizing its infrastructure like bike parking. For that, it strongly advocates experimentation with novel technologies.

The documents published by the city of Cologne stand out in many regards. Despite relatively high cycling levels, the status quo is presented rather critical. In terms of contents, there is a pragmatic focus on cycling infrastructure development. Here, the city dedicates special attention to enabling cycling into all parts of the city. This often entails easy-to-implement measures like opening one-way streets for cycling or building cycling streets. This often comes at the cost of cars, which progressively loose inner-city space. Rhetorically, the dominance of the automobility regime is not

challenged as much. In terms of a future imaginary, Cologne's documents contain little future vision and don't focus on communicating the benefits of cycling. If anything, this would be a future where the city has a comfortable, exhaustive and safe cycling network, in line with guidelines from technical cycling manuals. Finally, a strong emphasis is placed on citizen participation, which are driving cycling promotion.

In many respects, Vienna stands in direct contrast to Cologne. Despite the city featuring much lower levels of cycling, it features a more positive rhetoric. With a lack of a dedicated cycling strategy, the cities documents lack plans for concrete implementation of cycling infrastructure. Instead, these documents are mostly future-oriented and envision a harmonic future state. Here, cycling plays a more important role in fostering a climate-friendly and socially just transport reality. In line with sustainable mobility discourses, there is also a focus on dense-city planning in order to reduce the need to travel. The documents thus place high attention on social justice and inclusiveness. The business and growth focus of the city's smart city framework is not dominant in the cycling-related subsections.

Brussels is the city where cycling played the smallest role in recent decades. Nonetheless, the city has clear ambitions to change this: As a city with little cycling infrastructure, the construction of a safe and comfortable bicycle network is a clear priority. In conjunction with that, Brussels documents emphasize the usage of novel technologies and recent trends, like mobility as a service (MaaS), micromobility and multimodality. Overall, Brussels documents feature a relatively even distribution of topics and themes, envisioning a future which is in line with contemporary discourses of sustainable mobility. This entails a close link between transportation and spatial planning, envisioning a future with polycentric neighborhoods having lively low traffic streets which are quiet and comfortable spaces due to a reduction of car traffic. This people-centric narrative also emphasizes issues of social justice.

6.5.2 Five Future Imaginaries

The section above demonstrated that overall, the planning documents of the five cities feature a high degree of heterogeneity. To fully answer the research question of how different cities imagine the future of cycling, I zoom out of the individual city level in order to identify larger clusters. Based on the in-depth analysis presented above, I identify five different future visions which stand out: 'Smart Cycling', 'Integrated Cycling', 'Cycling in the Livable City', 'Inclusive Mobility' and lastly 'Safe Cycling Networks'.

Out of these five clusters, the last vision cannot be regarded as a fully-fledged sociotechnical imaginary, as it does not touch on wider societal impacts outside of cycling and thus does not fully match the definition of being about social order (Jasanoff and Kim 2009). I thus refer to this simply as a 'future vision'.

6.5.2.1 Smart Cycling

This future imaginary represents a vision in which cycling is strongly enhanced by the integration of novel technologies. It is characterized by a belief that technological solutions can address many existing challenges for contemporary cycling systems, creating a vision of technological optimism. Smart Cycling is very efficiency-driven, aiming to increase traffic volumes and optimize cycling flows by implementing technological solutions like smart streets, signage and lighting systems.

Technological experimentation plays an important role in this future. Businesses are often depicted at the forefront of innovation, developing new technologies to enhance the cycling experience. Such technologies, like smart traffic lights using real time data or app-based bike sharing systems are commonly implemented using pilots, creating protected niches to mature the technology, in line with strategic niche management.

Moreover, the smart cycling narrative can be easily connected to green growth rhetoric and economic considerations. By stressing efficiency gains through technology, smart cycling helps increasing productivity while lowering carbon emissions, thus connecting cycling to broader goals of carbon neutrality and climate protection.

Smart Cycling is most prominent in Copenhagen and Amsterdam. While smart narratives are to a degree also present in Vienna and Brussels, only Copenhagen and Amsterdam connect this to a more economic rhetoric of growth opportunities.

6.5.2.2 Integrated Cycling

This imaginary refers to a vision of cycling being a part of a larger connected, multimodal mobility system. It places high emphasis on the integration of different modes of transport, primarily the integration of cycling and public transport. The focus lies on creating a future where switching from and to the bike is as seamless as possible, providing speed gains and comfort, making it time-competitive to using the car.

Key elements of integrated cycling include the development of parking facilities at public transit stations, forming transportation hubs and the integration of cycling into Mobility as a Service platforms, using digital technology. Bike-sharing systems and mobility hubs are crucial components of this vision, providing flexible and convenient options for urban travelers.

Integrated Cycling does overlap with Smart Cycling, especially when it comes to app-based solutions, like bike sharing or route planning, but also routing at bike parking facilities. Both visions share the employment of new technologies in order to improve cycling efficiency, but the focus on technology is less pronounced here than in smart cycling. While Smart Cycling primarily focuses on improving cycling in isolation, here the focus is more creating a system which is capable of providing alternatives to car users, thus overcoming the dominance of automobility.

Given the overlap to the 'Smart Cycling' imaginary, 'Integrated Cycling' is again most prevalent in Copenhagen and Amsterdam. Both cities emphasize multimodality much stronger than the other cities. However, Brussels is also part of this list. The city shares a strong focus on MaaS solutions which aim to connect cycling with other modes of transport.

6.5.2.3 Cycling in the Livable City

Cycling in Livable Cities focuses on using cycling as a tool to enhance urban livability and attractiveness. This future imaginary emphasizes the role of urban planning and design in promoting polycentric neighborhoods, which reduce the need for transportation, in line with the 15-minute city concept and the sustainable mobility paradigm (Moreno et al. 2021; Banister 2008). Due to reduced distances, many trips can thus be made by bicycle.

This future imaginary is thus not limited to simply changing mobility patterns: Instead, street redesigns, the incorporation of greenery, the creation of public spaces, and the redistribution of urban space are central to this vision, making streetscapes more 'livable'. The role of cycling is primarily one of being an alternative to car travel, reducing the negative aspects of automobility. Thus, this scenario is the most critical of cars, advocating for a significant reduction in car use. The reduced focus of cars thus lowers the monetary costs of mobility, enhancing social justice.

The livable city vision also features the most references to climate change, environmental protection and pollution, underscoring the ecological benefits of the advocated measures. Cycling is not the primary focus of this imaginary, but is seen as an important enabler, as it is highly compatible with this future vision and provides the opportunity to still travel medium-distances.

This imaginary is mostly employed by Brussels and Vienna. While all cities make high usage of the idea of a livable city, only Brussels and Vienna truly subscribe to this imaginary, connecting transport to spatial planning. On its own, the term 'livable city' itself thus becomes somewhat of an 'empty signifier', which is used by all cities, but does no longer convey much meaning.

6.5.2.4 Inclusive Mobility

Inclusive Mobility envisions a future where transportation is accessible to everyone, regardless of their background or physical abilities. This future imaginary focuses on addressing the structural deficits that prevent certain groups from fully participating in urban mobility. Accessibility is a core principle.

In this vision, cycling is regarded as a mode that enables such a future. It does not come with high monetary entry burdens and a coherent network aims at making all parts of the city accessible by bike, not just the inner city. This limits the reliance on other modes, which is in line with research on transport poverty (e.g. Martens 2013). Regarding concrete cycling promotions, it is ensured that cycling infrastructure and services are designed to meet the needs of a diverse set of users,

including children, elderly and those feeling insecure. Thus, cycling classes and educational campaigns promoting cycling to population groups who do not yet have access to it play a crucial role. This is often paired with a harmonic and people-centric rhetoric. Technical planning aspects like transport volumes or traffic plans play no role here.

It must be noted that empirically, this imaginary is the least present in the documents analyzed. But these themes are nonetheless present in the data, which is why it is included here. This imaginary overlaps with 'Cycling in the Livable City', but to a lesser degree then the first two imaginaries. This imaginary in primarily present in Brussels and Vienna. However, Amsterdam needs to be mentioned as well. The city makes high usage of the term 'accessible', but uses it in a more shallow way, as in 'making areas accessible for cycling', than the two other cities, which connect it closer to social justice considerations.

6.5.2.5 Safe Cycling Networks

Finally, Safe Cycling Networks constitutes the last future vision, which is not considered to be full future imaginary. Here, the focus lies on the construction and maintenance of a comfortable, safe and coherent, easy-to-understand cycling network. Safety is the primary concern, with an emphasis on designing infrastructure that protects cyclists from traffic. Bicycle access is ensured to all parts of the city, and ideally to bordering municipalities as well. This imaginary vision is mostly technical, with a focus on engineering. The communication thus often revolves around concrete intersection upgrades, which enhance safety or cycling volumes.

This vision is purely related to cycling infrastructure and thus only covers a single aspect of the socio-technical cycling system (Canitez 2019, 173), which is why I don't classify it as a fully developed future imaginary. An expansion and development of cycling networks can be seen as a precondition for the other imaginaries, as this is often necessary to increase the quality of the cycling experience. But this vision is solemnly concerned with the experience and infrastructure of cycling, without connecting it to other goals or issues like, technological innovation, transport justice, urban design or other forms of mobility. The goal is less about a better societal functioning, but simply about an increase in cycling levels.

Nevertheless, this it is highly present in the documents and does clearly describe a desired future, necessitating the inclusion in this list. This vision strongly applies in Cologne and Copenhagen, which both feature a strong focus on providing a comfortable cycling network. In Copenhagen and the other cities however it is paired with other imaginaries while in Cologne this is the only observable vision of the future.

In line with the theoretical framework, which illustrated the different strands of academic literature on urban transportation planning, it is now possible to situate these imaginaries on a

scale, ranging from neoclassical planning to critical transport theory. This is illustrated in figure 20. As is indicated by the graphic, it must be stressed that all four future imaginaries fall under the umbrella term of 'sustainable mobility discourses' and thus largely match the idea of the sustainable mobility paradigm. This illustrates a dominance of sustainable mobility discourses in strategic cycling plans. However, the imaginaries focusing more on technological fixes are often closer to neoclassical thinking, with its emphasis on rationality and efficiency. On the other side of the scale, 'Inclusive Mobility' falls closer to critical theory, while still mostly operating within sustainable mobility discourses. The graph also illustrates that the vision of a better cycling network falls short of qualifying as a full imaginary. The future vision of cycling infrastructure may be regarded as in line with sustainable mobility, as a shift towards active modes is an important part of the discourse, but the isolated view on cycling with limited interactions to broader societal themes or transport modes makes it hard to position it on this scale. The affiliation towards specific academic discourses also matches a placement of the future imaginaries on a scale ranging from social to technological innovation, in line with the literature on socio-technical imaginaries and socio-technical regimes. The Smart- and Integrated- Cycling imaginaries are leaning more towards technological innovation, while especially Inclusive mobility describes a future achievable through social innovation.

Inspecting the city affiliations to certain future visions, it becomes apparent that Brussels has the broadest scope. This is in line with the city's documents also featuring the widest range when it comes to different types of measures. On the other extreme, Cologne does not feature any full imaginary, which is something that is further explored in the next chapter.

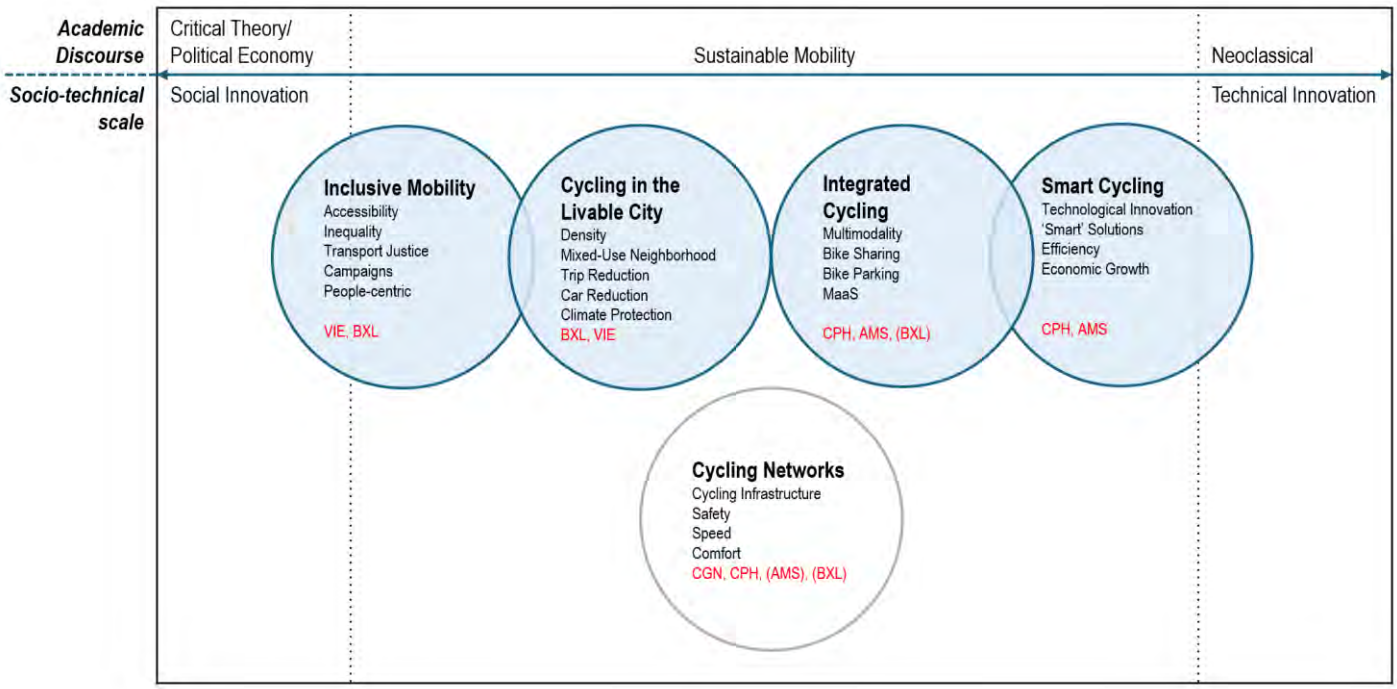

Figure 20: Five different future visions placed within Academic Discourses on Urban Transport and Socio-technical Innovation. Blue circles indicate a future imaginary. City affiliation to each vision is displayed in red.

7 Case Study: Shifting Cycling Planning in Cologne

In this case study, I conducted two background interviews aimed at examining why Cologne's documents stand out by not featuring any future imaginaries and if the implementation of the Sustainable Urban Mobility Planning (SUMP) changes this.

7.1 Research Outline

The findings of my coding analysis demonstrate that Cologne presents a unique case among the cities studied. Unlike others, Cologne lacks a comprehensive mobility plan, with its primary planning document being notably brief (under 30 pages). The city's planning efforts exhibit a strong focus on infrastructure and local measures, with a pronounced emphasis on enabling cycling. While there is a spatial reallocation of space from cars to cyclists, the dominance of cars remains largely unchallenged rhetorically. In turn, notably absent from Cologne's planning documents are significant topics such as cycling campaigns, smart solutions, and experimental planning practices. Benefits of cycling are underemphasized, instead measures are often legitimized through citizen participation. This results in an overall pragmatic yet unimaginative approach to urban mobility planning, characterized by low communicative efforts and a near-total absence of imaginaries that align with the four identified future imaginaries.

Cologne is currently in the process of creating its first sustainable urban mobility plan (SUMP). Here, the planning is currently at the stage of creating a new mission statement '*Leitbild*', already indicating a potential shift away from the older, pragmatic approach to transport planning. The new plan will mark a shift from traditional cycling transport planning towards a more integrated approach, covering all transport modes. Cologne thus constitutes an interesting case to study how the implementation of the SUMP process changes cycling planning and the development of future visions. To investigate this potential transition, I conducted interviews with the authors of Cologne's 2016 inner-city cycling concept and the company responsible for writing the current SUMP. Unfortunately, interview requests towards the city administration remained unanswered.

These interviews were designed to explore the relationship between the city and the planning agencies involved, and to validate my initial findings against the perspectives of the document authors. I also sought to uncover explanations for the specific areas where Cologne's planning approach stands out or falls short, thus going from the mostly descriptive analysis towards causal questions. This follow-up thus analysis serves to critically examine the findings from the initial coding analysis. The first research question guiding these interviews reads: What explains Cologne's pragmatic and non-visionary approach to cycling planning?

A second focus of the interviews is to elaborate on the impact of the new SUMP planning approach, particularly in terms of whether this document type introduces a shift from Cologne's traditionally

pragmatic approach towards a more imaginative and visionary one. Drawing on the established literature, SUMPs are noted for their emphasis on an envisioning process, suggesting a potential shift in planning paradigms. Therefore, my second research question reads: How does the SUMP change Cologne's cycling planning, and does it introduce a shift from a pragmatic approach towards a more imaginative one?

The interviews provide an opportunity to investigate, in broader terms, how the SUMP concept influences planning practices when it comes to future imagining. My aim is to investigate the impact of the SUMP process on the urban planning landscape. For this, Cologne serves as a fitting case, as it is faced with the changes at the moment. Previous analyses indicate that SUMP in cities like Vienna and Brussels place a stronger emphasis on business, smart solutions, and car-reducing policies compared to other types of planning documents. Given that Rupprecht Consult, the company responsible for Cologne's SUMP, is also the author of the SUMP guidelines shaping the EU's transport planning process, this interview offered a unique opportunity to explore these aspects in greater detail.

Translated versions of the questionnaires guiding the interviews can be found in the appendix. Both interviews were conducted in a semi-structured manner, using interview guidelines of around 20 questions per interview.

7.2 Interview Results

The first interview was conducted with Peter Gwiasda, one of the main authors of Cologne's 2016 inner-city cycling concept, analyzed in detail during the coding analysis. The document was written by the planning office 'VIA Köln', which operates as a cooperative working on mobility planning with a focus on environmentally friendly modes of transport (*Umweltverbund*). Peter Gwiasda is a founding member.

The interview revealed that the process of cooperating with the city on the cycling concept worked well and was characterized by an intensive exchange. After winning the tender, there were no major challenges for VIA. The planners were given largely a free hand when it came to writing the strategy and could thus create their own targets and strategy for Cologne. As inspiration, the planners used their own earlier works as well as the German ERA guidelines for constructing cycling infrastructure, on which Mr. Gwiasda had also worked himself. For the cycling strategy, the planners formulated the goal of enabling cycling in all of Cologne's street network, which was an innovative idea at the time.

When asked about the pragmatic character of Colgone's plans, Mr. Gwiasda revealed a personal reluctance against using big words and a clear preference for pragmatic planning. Furthermore, he stressed that at the time of writing, the political climate was very favorable to cycling

promotion. There was a consensus across the entire political spectrum that cycling needed to be promoted in Cologne. Leveraging this consensus, the planners facilitated two major workshops, inviting a wide range of stakeholders, even including traditionally not cycling friendly actors like the German automobile association (ADAC). Thus, there was less of a need to elaborate on the potential benefits of cycling, as no major party needed to be convinced that cycling promotion was beneficial. Mr. Gwiasda stressed that this lack of ideological fight about cycling was unique to Cologne compared to other cities VIA had worked on. He further stressed that the plans needed to be as pragmatic and small-scale as they are, because there was a lack of experience and expertise when it came to cycling planning in Cologne. For example, there was a lack of knowledge in the city's construction yard on how to design cycling-friendly infrastructure and the city's planners were often no dedicated cycling planners, facilitating the need for detailed, localized solutions in the planning documents. These concrete measures also served the function of demonstrating how things could be done to the general public. The participatory process had further revealed that citizens cared more about practical improvements on their personal routes instead of arguing about broad general future targets for cycling.

Discussing the role of cars vis-à-vis cycling, the interview revealed similar patterns: The planners were not interested in ideological debates, hence chose careful formulations when it came to discussing the role of cars. This explains the rhetorical dominance of cars in the document. Instead, the planners concentrated on redistributing space from cars to cyclists wherever they did not face opposition, which was possible more often than they had previously expected. Thus, the overall political pro-cycling consensus explains the large number of measures where cyclists take priority over cars.

The interview revealed that communicative measures and bike parking were excluded from the tender, explaining their omission. Bike parking was managed internally by the city administration. It is important to note that this explains the omission of these topics in the cycling concept, but there are also no other publications by the city focusing on these topics. The focus on enabling cycling through cycling streets and opened one-way streets is explained by Cologne's urban fabric. Mr. Gwiasda stated that this approach was particularly suited for the city's wide network of small streets. When discussing activists' criticism of lacking separation between cyclists and cars, he explained how German planning used to be influenced by Dutch cycle paths, but the differences in street design between the two countries often led to unsatisfactory cycle paths, as the Dutch model could not be easily transferred to Germany. Instead, paint-based infrastructure is seen as a pragmatic tool often yielding better results in German cities, pointing to problems of applying best-practices from elsewhere.

When asked about the impact of the cycling concept, Mr. Gwiasda expressed that he is mostly content. He stressed that the city started seeing visible improvements in its cycling infrastructure since 2017 and pointed to a steep increase in cycling levels in Cologne, which I discussed earlier. Furthermore, he stressed that comparable German cities, like neighboring Düsseldorf do not have nearly as much progress. However, he also pointed out bureaucratic challenges when it comes to the implementation of larger measures. He further confirmed Colgone's negative reputation, but deemed this unjustified, stressing that Cologne is not good in 'marketing' it's progress. Lastly, the interview revealed some lasting aspects of the cycling concept exist that could not be extracted through the document analysis: During the process of creating the cycling concept, the city created five new cycling planning positions, thus increasing institutional capacity for cycling planning. Similarly, the participatory online portal employed by the planners remained open even after the publication was finished, leading to lasting change within the city administration.

In a final set of questions, I leveraged the interview for further background information on cycling in Cologne. Here, Mr. Gwiasda revealed that the political climate has worsened in the last years, with conservative parties campaigning more on pro-car policies. He also stressed that the city split up its transport planning department, now consisting of one department more focused on cars and one on 'sustainable transport', which creates conflicts between the two departments. This constitutes the opposite of an integrated planning approach and is thus seen as highly problematic. When asked about the upcoming SUMP, Mr. Gwiasda welcomed the integrated approach reflecting all modes of transport in a single plan, which could help bridging regrettable conflicts between cycling- and pedestrian activists. An integrated approach could reveal more synergies between different modes. Especially the role of MaaS and mobility hubs is welcomed, as these can advance a true position of competitiveness of sustainable modes against cars. This view bears strong similarities to the Dutch focus on the bike-train integration. Lastly, the larger-scale long-term future vision of the SUMP is also seen as positive, but Mr. Gwiasda expressed his concern about this being a very ambitious target. He stressed that it is hard to create such a broad consensus, especially in larger cities.

The second interview was conducted with Stefan Gabi, a Senior Consultant at Rupprecht Consult. Rupprecht Consult is a Cologne-based consulting firm which specializes in sustainable urban mobility. Their core products are the based around the work on the SUMP. The company authored the official EU guidelines for SUMP (Rupprecht Consult 2019). In Cologne, the company was commissioned to work on the first stage of the city's SUMP, namely creation of a mission statement (*Leitbild*) as well as working on the external communication and project management for Cologne's SUMP.

The interview with Mr. Gabi revealed interesting insights on the upcoming SUMP for Cologne. The project is conducted in two different and entirely separate phases: The first phase is about crafting a mission statement, an analysis of the status quo and scenario building. Hence, this stage is fully limited to strategic planning. The second phase will then tackle more concrete measures and is scheduled to start in 2025.

At this point, drafts of the mission statement and the status quo analysis are published online on the city's website. Due to these documents being published very late in my research process, a detailed coding analysis could no longer be conducted. Furthermore, these don't constitute the final SUMP yet, as parts of the first phase and the entire second phase are still not published. However, based on a first reading combined with the interview data it is already possible to identify some major trends. The new plan now includes five "target visions" (*Zielbild*) which also focus on wider areas than a narrow transport focus, like participation in society, travel comfort and environmental and health benefits (Stadt Köln 2024a). This constitutes a drastic departure from the previous transport planning documents in Cologne. The new SUMP thus puts much greater emphasis on future imaginaries than any of the previous documents. This was also confirmed by Mr. Gabi, who stressed that the new plan will feature an overarching future vision, in line with the EU's SUMP criteria. Interestingly, the interview revealed that the large emphasis on the mission statement was actually chosen by the city of Cologne, and exceeds the SUMP criteria and the extent of vision-building in other cities' SUMP. He stressed that city officials deliberately chose the separation in two phases, in order not to get stuck in detailed planning too early. This also sparked criticism, as the city might use valuable time with so much emphasis given to crafting a future vision instead of local transport planning. Although cycling plays a major role in the new plan, the SUMP will not fully replace the cycling concept, lacking such detailed planning. Instead, Mr. Gabi expects this document to be updated in the future, to match the SUMP. This way, the SUMP will concentrate on future imaginaries and the cycling strategy might be more technical, focusing on concrete implementation measures. A detailed analysis of which future imaginaries Cologne pursues is not possible at this stage, but a clear departure from the purely technical focus on safe cycling infrastructure is already evident. A first reading of the published sub-sections suggests overlap with the imaginaries on integrated cycling, livable city, and inclusive mobility.

Mr. Gabi further stressed that the current publication was approved unanimously by the city council, indicating a remarkable consensus. This is similar to the consensus on cycling when the cycling concept was formulated and thus confirms Mr. Gwiasda's assessment of Cologne being relatively free of ideological debates around transport planning. When it comes to the process of creating the new SUMP, the interview revealed a positive relationship between the consultancy and the city. However, in line with Mr. Gwiasda's assessment, Mr. Gabi also noted a relative siloing of different city departments, which is however improving as the project moves on.

The last part of the interview zoomed out of Cologne's case and centered on general implications of the SUMP planning process on urban transport planning. When asked about the key differentiation between conventional transport planning and the SUMP process, Mr. Gabi indicated that the focus on citizen participation is much more pronounced. In Cologne, this even includes a process of citizen input from randomly selected citizens. He further elaborated that under the SUMP process, there is no longer a focus on mere transportation planning, but all parts of urban life. He also highlighted that the SUMP process emphasizes regional transport planning much more than previously, with regional SUMPs soon becoming mandatory as well. This is an aspect that was previously often neglected.

Mr. Gabi underscored the growing influence of the EU on urban transport planning, emphasizing the increasing importance of best practices from other regions. The EU's Green Deal agenda heightened the urgency for the European Commission to swiftly influence urban transport planning, recognizing the critical need to address climate change. Here, the SUMP serves as a tool to speed up changes in urban mobility. The focus on narrative ideas and future visions is meant to equip cities with a tool to convince both policymakers and citizens alike. This is very close to the double-function of future imaginaries described in the literature, stressing that imaginaries describe a desired future state, but at the same time function as a tool to achieve this state (Tozer and Klenk 2018). Mr. Gabi also sees the EU's influence as driving a harmonization of transport planning, stressing that even advanced countries like the Netherlands or Denmark are slowly adapting their planning frameworks to match the SUMP criteria. When asked about criticism towards the SUMP approach, he indicated that the approach has largely received positive resonance, but some see the emphasis on envisioning processes as taking up valuable resources and time, given the urgency to transition towards more sustainable urban transport.

7.3 Interpretation of Interview Results

The interviews revealed key insights into Cologne's planning process. Being at the state of transitioning from traditional transport planning towards the SUMP approach made Cologne an interesting case. The first interview revealed background information as to why Cologne's documents stand out by being so pragmatic and non-visionary and thus contributed to the first research question. A lack in expertise on the side of the city administration necessitated the pragmatic focus, while political consensus reduced the need for rhetorical justification of why cycling promotion is important. Turning to the second research question focusing on the impact of the SUMP process on the planning processes, the city radically departs from the pragmatic approach as part of the ongoing SUMP process in favor of a more imaginative one. Cologne even dedicates a higher-than average amount of resources into creating future visions. The insights on the upcoming plan definitely speak to Cologne being strongly affected by the EU's influence on

urban transport planning, as the new SUMP is distinctively different from the city's previous documents. The increased focus on creating a positive future visions is welcomed by both experts and strongly embraced by the city, just as the concept of an integrated mobility plan instead of focusing on individual modes. However, the more imaginary planning approach also sparked some criticism for its lengthy and resource intensive process.

Especially the first interview further served as a method of validating the previous analysis. The major themes and priorities of Colgone's documents were largely confirmed through the interview and Mr. Gwiasda did not object to the assessments of my analysis. However, some aspects which could not be extrapolated from the pure document analysis were also revealed. For instance, the impact of the cycling concept in enlarging the cycling planning department in the city administration could only be uncovered through background interviews. Thus, in a larger research project, it would likely add to the insights if such interviews were conducted for all included cases. This however, was beyond the scope of this research project.

8 Discussion

This thesis contributed a range of findings, contributing to the understanding of contemporary cycling planning in Western Europe. A key contribution of this project is the comparative approach, yielding interesting insights on how different European cities compare in their cycling planning. This approach also enabled the core findings: One major finding is that in their current state, the different plans of the five cities are vastly different. All plans are highly localized and tailored to the specific context of the city. To a degree, this is surprising given the trends of harmonization in urban transport planning. Furthermore, as many of these documents are written by external consultancies, closer similarities and 'off-the-shelve'-plans could have been expected, but this is not the case empirically. When it comes to similarities between the plans, the employed measures are naturally not unique in every city. However, the role of city networks and implementing best practices from elsewhere does not (yet) play a major role in plans analyzed.

The case selection in this study aimed at including a wide range of cities when it comes to the cycling status. To some extent, this did structure the results. Notable, the two leading cities emphasized some aspects of cycling more than the other cases, for instance the connection between cycling and economic growth, as well as the usage of experimental policies. However, it cannot be concluded that the status of the cycling regime explains the difference between these cities' planning documents.

Despite the vast differences, this study identified five reoccurring future visions across the plans, out of which four can be considered future imaginaries. Again, a key finding here is that cities vary drastically when it comes to the usage of future visions and imaginaries in their planning

documents, with Copenhagen and Cologne constituting opposites ends of a spectrum. While Copenhagen intensively leverages the benefits of communicating a clear vision, which also contributes to improving the current cycling situation, the remaining cities leave untapped potential in this regard. This way, Copenhagen can be seen as a frontrunner not just in cycling planning, but also in its communication of its approach. The second part of the analysis has demonstrated that this is likely to change in other EU cities as well, as planning under the most recent SUMP guidelines leads to a drastic increase of usage of future visions.

Considering the four imaginaries identified, there are some trends which are coherent with the existing literature. Some of the imaginaries bear great resemblance to Urry's theorized future developments, notably his concept of the 'fast mobility city' and the 'livable city' (Urry 2016), lending some empirical evidence to his purely theoretical conceptions, although he doesn't touch much on cycling.

The presence and popularity of the smart cycling imaginary is consistent with studies of imaginaries in other policy domains, like carbon neutrality and air quality plans, which also report an emphasis on smart-branded technological measures (Tozer and Klenk 2018; Gross, Buchanan, and Sané 2019). Interestingly, this focus on smart innovation holds true for cycling, although it is a technology that has remained fundamentally unchanged over a century. Such trends like 'smartification' of cycling are also found within the cycling literature, a finding which is consistent with my work, especially in Copenhagen and Amsterdam (Nikolaeva and Nello-Deakin 2020, 309f.; Nikolaeva, te Brömmelstroet, et al. 2019). Out of the observed imaginaries, smart cycling falls closest to neoclassical transport approaches. Here, the focus on economic growth can be interpreted as an indication of the belief that transport contributes to economic growth, which is a characteristic of neoclassical transport approaches (Nikolaeva, Adey, et al. 2019; Urry 2009; Hickman and Banister 2014). My research, as well as other cycling studies, observes a growing trend in cycling planning to increasingly prioritize considerations of traffic flow and efficiency, mirroring the approaches traditionally applied to car planning (Nikolaeva and Nello-Deakin 2020, 315; Nikolaeva, te Brömmelstroet, et al. 2019). My study confirms such observations primarily for the case of Amsterdam. The smart cycling imaginary can further be interpreted as a result of neoliberalization processes, which have also been reported in the context of cycling in other cities (Spinney 2018). Nevertheless, this imaginary can be situated closer to sustainable discourses than neoclassical transport: Cycling is clearly prioritized over cars, but the means of achieving this are predominantly of technological nature, in line with a large share of the literature on sustainable mobility (Kębłowski and Bassens 2018; Banister 2008).

The imaginaries of integrated cycling and cycling in the livable city can firmly be attributed to sustainable approaches to transport planning. Both stress key aspects of the sustainable mobility

paradigm. These are mostly unsurprising findings, given the importance of cycling within sustainable transport planning. It is in these imaginaries that cars are mostly addressed: For integrated cycling, the focus lies on being time-competitive against car traffic by combining sustainable modes, while for the livable city imaginary, cycling is seen as a replacement for cars in order to create more pleasant neighborhoods. The increased focus on bike sharing is frequently observed in the literature, although its usefulness in empirically contested (Médard de Chardon 2019; Félix, Cambra, and Moura 2020). The existence of these imaginaries as well as the frequency of the livable city code across all cases thus point to the dominance of sustainable discourses within municipal transport planning, especially when it comes to cycling. This illustrates a departure from a decade long dominance of neoclassical approaches.

The inclusive mobility imaginary is an interesting finding: To a degree, this is consistent with sustainable discourses, which introduced questions like transport justice and accessibility to the transport literature (Lucas 2006; Lucas et al. 2016). However, this imaginary even branches into critical transport discourses, for example when addressing socio-economic inequalities shaping transport behavior or regarding transport as a basic need, as is the case in Brussels and Vienna. Such inclusions in the mobility plans can be interpreted as evidence against a full hegemony of neoliberalism in transport planning, although it must be noted that such narratives play a relatively small role empirically in my analysis.

The multi-level perspective serves as a helpful theoretical lens for this thesis. My analysis generated several noteworthy implications in this regard: First, Amsterdam and Copenhagen have been found to make much higher usage of experimental planning methods, as advocated within the literature on strategic niche management. Their success in increasing cycling levels can thus be interpreted as evidence for the effectiveness of such methods. This is in line with Bruno's theorization that such cities have already successfully built up protected niches (Bruno 2022). For the other cases, there is thus untapped potential in this regard. Furthermore, the analysis of the plans demonstrated the dominant status of the cycling regime in Amsterdam, suggesting a regime shift away from the automobility regime. Following Geels' own work, many elements of the reported future imaginaries can be interpreted as manifestations of intellectual niches, such as a focus on mobility justice or smart cycling (Geels 2012, 475). Given that I found these in mainstream plans and not niches like advocacy groups points to the successful popularization and circulation of such intellectual niches towards broader planning circles. This way, my research adds to the multi-level perspective by looking at top-down government plans instead of bottom-up niche processes, which is a typical bias of the literature (Geels 2019). While the MLP framework proved to be a very helpful framework, the trend of integrated mobility is challenging to accommodate using the MLP. Geels (2012) regards each transport mode as its own regime, making

it hard to conceptualize integrated mobility using this framework. Future conceptual research could thus refine the MLP framework in this respect.

Interestingly, the historical legacy of cycling is not addressed in any of the plans. References to past times with high cycling levels, are notably absent from all plans, except for one occasion in Copenhagen. Thus, no city employs a narrative of rediscovering an old technology, or going back to a desirable past state, as suggested in the literature (Shove 2012; Schipper, Emanuel, and Oldenziel 2020).

Much of the cited literature emphasizes the complicated relationship between cars and cycling. Somewhat surprisingly, this is frequently and directly addressed in the plans. The cities with lower cycling levels even tend to thematize the issue more often, suggesting that the cycling-car relationship is most present when it comes to implementing concrete measures instead of broader, more harmonic mobility visions. The prevalence of measures reducing car convenience can be interpreted as some evidence for a decline of some transport taboos, notable the mitigation of car emissions (Gössling and Cohen 2014, 7). However, it is important to note that these cities often have ambitions to promote cycling, which may suggest a sample bias in the analysis. And even in my sample, the level of addressing cars directly varies strongly. Given that, it has been challenging to standardize and assess sustainability as measured by a reduction of car convenience within this context, as suggested by Bruno (2022).

Another important finding is that the type of published planning documents matters. Dedicated cycling strategies have been found to contain more local measures and go further when it comes to changing existing governance structures than general transport plans, like the creation of dedicated department or new positions for cycling promotion, as found in Brussels and Cologne. The absence of detailed planning documents is a critical issue in itself, as even if a city actively builds new cycling infrastructure the lack of a publication of a strategy reduces the possibility of scrutiny and accountability from civil society, as the public is less informed about the plans. This is the case in Vienna.

Building on this, the findings of this study also contribute to an understanding of how the SUMP planning process changes the transport planning process in the EU. Despite frequently observed trends of a harmonization of transport planning through best practices and city networks, the effects of this were found to be relatively small, given the diversity of the analyzed documents. This can to a degree be explained by some plans being relatively old at this point. The increasing adoption of the EU SUMP concept is very likely to change this. The SUMP in Brussels and Vienna already put higher emphasis on issues like mode integration and multimodality and vision-building. The case study on Cologne highlights the strong influence of the SUMP practice, with the city drastically changing its communication- and planning style towards a more proactive,

imaginary and vision-focused transport planning. The SUMP process is also likely to further accelerate a move away from neoclassical planning models, emphasizing proactive vision building and participatory processes instead of predict-and-provide methods. Future research should investigate this further. It will be interesting to observe how cities compare once the SUMP is widely adopted, further opening pathways for more standardized comparisons across cities in the EU.

8.1 Limitations

As with any research project, there are some limitations which are inherent to the research design. By design, this thesis focuses on communication of cycling planning rather than practice. If a city claims to be particularly innovative, my research cannot test the credibility of this. The comparative approach does somewhat reduce this limitation, as it provides contextualization for individual cases. The implementation of the planned measures was not subject of this analysis. An interesting avenue for future research could thus be to analyze if the usage of imaginaries leads to swifter implementation measures or sways public opinion.

An inherent drawback of an analysis with few cases is limited generalizability. For example, drawing conclusions about document types on the basis of only two SUMP is challenging. This is a common trade-off between internal and external validity. On this spectrum, this study was situated in the middle, with five cases making it impossible to analyze all nuances in each case, but still enabling an in-depth analysis of all future-oriented planning material. The follow-up analysis for Cologne further increased validity for this single case. In a larger study, such deeper analyses of each case would increase internal validity. With more resources, it would also have been possible to conduct further interviews with cycling advocacy groups or city officials, which was beyond the scope of this research project.

It must also be noted that all analyzed documents were published pre-pandemic. Especially for cycling, in some places the pandemic changed how cycling was regarded, as outlined in the city profile for Brussels. Similar to this, it must be kept in mind that the publication dates of the plans analyzed vary quite a lot. Some documents were published more than 10 years apart from each other. In such a long time, planning practices can change considerable. However, all of the analyzed material is still the current state of material available in each respective city. Thus, there is no way of truly addressing this shortcoming until newer documents are published.

Since my study analyzed data from five different countries, it may be argued that the observed differences can simply be attributed to the country variable. National planning cultures may for example explain the stylistic differences when it comes to the usage of future visions. Without systematically including further cases from the same countries, this cannot be dismissed. However, this study was set out as a first exploratory analysis aimed to uncover differences in

future cycling imaginaries across borders. Thus, this kind of research is required before diving into explanations of why cities differ. Future research could expand on explaining the differences across countries.

Another criticism towards my study is a top-down bias. As demonstrated in the city profile section, city governments are only one important actor when it comes to cycling planning. In most cities, civil society and activists play an important role too. Thus, conducting background interviews with advocacy groups would have been a fruitful addition to this study, but would have reduced the number of analyzed cases. From a multi-level perspective's viewpoint, my focus on top-down structures can actually be regarded as a strength, as the niche-focus of such research often creates a bottom-up bias within this literature so far (Geels 2019).

9 Conclusion

This thesis set out to answer the research question of how different European cities across different cycling regimes compare in their future imaginaries on cycling. Using a comparative research design, this study addressed key gaps within the literature on cycling: A scarcity of comparative studies and lack of scholarly engagement with urban mobility plans and cycling strategies, apart from a few studies concentrating on the most well-known cities. This study conducted an in-depth coding analysis of all relevant cycling-related strategy documents in five European cities, covering a broad range of cycling status: Copenhagen, Amsterdam, Cologne, Vienna and Brussels.

This study draws from a wide range of literature, addressing urban transport studies, cycling studies, the transition literature and works on future imaginaries. Combining insights from the multi-level perspective and works on socio-technological imaginaries provided a strong theoretical underpinning for the empirical analysis, conceptualizing cycling as a socio-technical regime which stands in a relation with other transport regimes, notably that of automobility.

This study conducted an in-depth coding analysis of 13 cycling-related official documents of 1374 pages. An encompassing coding scheme with over 50 codes was developed to compare the documents in a thematic way.

This study has generated three key findings: First, the analyzed cities all published vastly different plans, both rhetorically and in terms of measures covered. There is a wide variety between the different cities' documents, ranging from a focus on cycling infrastructure to bike parking and smart applications. The plans are generally highly localized and each city focuses on a unique set of measures. Second, the plans also vary in their usage of future imaginaries. Copenhagen strongly uses future scenarios and visions of a future state to illustrate how cycling can benefit the city. The other cities make varying usage of this, with Cologne focusing the least on future visions. This has

important implications, as future imaginaries are powerful tools, which shape public expenditure. Third, using co-occurrence, cluster analysis and qualitative memos, the coding analysis made it possible to identify four different future imaginaries: *Smart cycling* focuses on technological innovation, efficiency and economic growth. *Integrated cycling* focuses on multimodality, bike sharing and mobility-as a service. *Cycling in the livable cities*, deals with attractive neighborhoods through a combination of more cycling mobility and land use policy and short travel distances. Lastly, *inclusive mobility* emphasizes the role of cycling in addressing transport-related inequalities, transport justice and accessibility concerns. The coding analysis made it possible to determine the five cities' affiliation to the respective visions of the future. Drawing from the literature, it is further possible to locate these imaginaries within academic discourses on transport. Here, discourses around sustainable mobility dominate the documents, but elements of neoclassical and critical approaches were also identified. Furthermore, some imaginaries tend to focus more on technological innovation, while others emphasize social innovation.

Following the coding analysis, a follow-up case study on Cologne was conducted, which was identified as an outlying case for the lack of usage of future imaginaries. Using expert interviews, I established that this was caused by a combination of favorable political climate and a lack of planning expertise in the city administration. This pragmatic approach to cycling promotion is almost certain to change with the city's upcoming sustainable urban mobility plan, demonstrating the influence of EU policymaking on urban transportation.

There are numerous opportunities for further research, based on this study. Comparative studies on cycling are still rare, so future research might expand on this by systematically assessing differences across countries or by including cities from regions other than Western Europe. The impact of the EU's SUMP concept on urban transport should also be further investigated. The increasing harmonization of transport planning provides interesting research opportunities. Building on the future imaginaries identified in this study, future research could expand on this explorative design, investigation questions of how the presence of certain imaginaries shapes cycling planning, for example when it comes to acceptance of cycling promotion or speed of implementation. Lastly, novel developments surrounding cycling should be incorporated into future research: In many places, cycling promotion has faced an increasing amount of backlash, leading to a strong politization surrounding cycling. The impacts of this and backlash against a reduction of cars in cities like Brussels and Berlin should be analyzed in future research.

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11 Appendix

11.1 Codebook

Status Quo Assessment (Self-reported)

- **1. Deficits: Not Good Enough**: Acknowledgment of existing deficits in cycling; simple declarations of a desire to improve do not count here.
- **2. Already Strong**: Self-reported positives about the current cycling situation, such as high or increasing numbers of cyclists; may also include cultural aspects.

Level of Strategy / Future Horizon

- **3. Future State: Future Imaginary**: Explicitly expressed future visions for cycling; includes broader visions like a 15-minute city if connected to cycling. (*We already have many people cycling*)
- **4. Broad Targets**: General goals such as increasing the share of cyclists or aiming for a specific mode share by a certain year. Typically without clear implementation plans (*we want to increase environmentally friendly modes to 80% of mode share by 2040)*
- **5. Local Measures**: Specific measures that are implemented at a local level, including street redevelopment or singular campaigns. Should name concrete locations, like street names.

Types of Policy

- **6. Measures Reducing Cycling Convenience**: Measures that make cycling less convenient, e.g., increased parking fees for bicycles.
- **7. Increased Cycling Budget**: Policies related to financial investment in cycling, such as increased budgets or funding for new infrastructure or bike purchase schemes. *(Schemes to lease bikes, new infrastructure investments)*
- **8. Smart/Digital/Innovation**: Technology-driven measures like smart traffic lights, cyclist counting, or smart routing apps; includes e-bikes and temporary street re-use.
- **9. Experimentation/LL/Temporary/Pilot/Test**: Measures strategic niche management. Is cycling fostered in protected niches? Usage of experimental methods like pilot projects or trial runs within protected spaces.
- **10. Soft Measures**: Non-infrastructural measures
    - **11. Repair Cafés / Service Stations / Mobility Hubs**: Small-scale facilities such as bike repair stations, mobility hubs, repair cafés, or e-bike charging points. Does not cover large transport hubs (train stations)

    - **12. Campaigns/Education/Promotion**: Includes events, informational campaigns, and promotional activities aimed at encouraging cycling.

- **13. Hard: Infrastructure**: Includes physical cycling infrastructure.
    - **14. Cycling Network**: References to broader cycling networks. *(PLUS Network)*
        - **15. Cycle Paths/Bike Lanes**: Construction, maintenance, or upgrading of cycle paths, including comfort upgrades. Also includes larger infrastructure (like bridges) if it primary serves to create a bike path.
        - **16. Enabling Cycling**: Measures that allow cycling where it was previously not permitted; includes lower-effort infrastructure changes and reduced car convenience measures like speed limits, opening one-way streets, waiting zones for cyclists, removal of cobblestones, shared bike lanes (no separation), opening parks for cycling, bumpers, speed limits.
        - **17. Long-Distance Paths**: Infrastructure supporting long-distance or regional cycling routes.
    - **18. Bike Parking**: Infrastructure for bike parking; includes references to charging points when applicable.
- **19. Bike Sharing (BSS)**: Includes all types of bike-sharing systems, including regular bikes, e-bikes, and cargo bikes.

Other Modes and Relationship to Cycling

- **20. Safety Concerns**: Discussions on cycling safety; focused on safety measures, does not include bike theft. Measures dedicated to improving cycling safety.
- **21. Car Regime**: Codes related to the dominance of cars in transport planning.
    - **22. Acknowledgment of Automobility Regime**: Recognition of the past or current dominance of car-centric planning. *(Car-centric post-war planning…)*
    - **23. Problems Caused by Cars**: Drawbacks of car mobility, such as congestion or pollution, endanger livability. Not about conflicts → Code 29.
    - **24. Reduce Car Convenience**: Measures that reduce convenience for drivers, not directly related to cycling. Used when cycling is not the main topic, otherwise check if Code 26 is applicable.
- **25. Competitive Position Against Other Modes**: Evaluation of how cycling competes with or relates to other transport modes.
    - **26. Cycling > Cars**: Measures that explicitly prioritize cycling over cars, such as repurposing car lanes for bike use. *(Maximize car waiting times at the cost of cyclists, car sanction enforcement to clear cycle paths, car parking removal for cycling infrastructure…)*
    - **27. Cars > Cycling**: Instances where car planning dominates over cycling; prioritization of car flow over cycling infrastructure. Does not necessarily mean improvements for cars at the cost of cycling, but is more a thinking logic: Consider cars before cycling. *(If*

car flows are low enough, we can create a bike lane, The car traffic here does not allow space for a bike lane)

    - **28. Walking/PT > Cycling**: Measures that prioritize walking and public transport over cycling.

- **29. Conflict in SQ**: References to conflicts between different modes of transport.
- **30. Harmonic Vision**: Visions of harmonious relationships between various modes. This is more about sharing public space, not about switching between modes → Code 31. *(Mixed Traffic Zones)*
- **31. Multimodality**: Mentions of multiple modes in conjunction, such as park-and-ride or car-sharing when cycling is also included. Only code if cycling is mentioned. Car + PT does not count.

Benefits of Cycling

- **32. Health**: References to health benefits of cycling, including reduced pollution. Includes societal and personal benefits.
- **33. Speed/Fast**: Emphasizes cycling as a quick and efficient transport mode.
- **34. Mobility Justice/Social Reasons/Accessibility**: Cycling as a means to improve accessibility and social equity, recognizing its lower cost and accessibility for diverse groups, gender differences *(justice improvements because cycling is cheaper than other modes, justice improvements because children can use bikes, not cars)*
- **35. Cheap/Space-Efficient/Easy to Implement**: Benefits of cycling in terms of low cost, space efficiency, and ease of implementation.
- **36. Economic Growth**: Links between cycling and economic growth, including the attraction of talent and business opportunities. If health aspects are monetized (costs society less care) this is in here as well.
- **37. Climate Change/Environment/Pollution**: Environmental benefits of cycling, such as reducing emissions and improving air quality.
- **38. Livable City**: Cycling as a contributor to livable and attractive urban environments.

Governance & Stakeholders

- **39. New Governance Structures**: Changes to governance related to cycling, such as new cycling task forces, regulations, or monitoring practices. *(Building requirements, monitoring practices, integrate cycling into urban planning, cycling police…)*
- **40. City Cooperation**: References to cooperation between cities.
    - **41. Role Model to Other Cities**: When a city serves as a benchmark for others.
    - **42. Learning from Other Cities**: Instances of cities demonstrating best practices from others.
- **43. Regional/Local Cooperation**: Collaboration beyond city borders, including regional cycling initiatives.

- **44. International Level**: References to international agreements or networks influencing cycling policy. *(SDG, Leipzig Charta, City Networks…)*
    - **45. EU Level**: Specific references to EU policies or standards, like SUMP or air pollution limits set by EU.
- **46. Citizens/Participation**: Involvement of citizens in cycling planning or references to civil society movements. Not, if they are simply being listed and there is no connection to planning implied.
- **47. Non-Profit/Civil Society/Professionals**: Involvement of non-profits, civil society, or professionals in cycling initiatives.
- **48. Business**: Collaboration with businesses in promoting or supporting cycling.

Special Target Groups

- **49. Logistics**: Cycling as a mode for urban logistics, including commercial cargo bikes.
- **50. Diversity of Cyclists**: Recognition of the diversity among cyclists, including different speeds, abilities, and usage scenarios. *(Electric and non-electric bikes, leisure and commuter cyclists)*
- **51. Children/Schools**: Cycling measures specifically targeted at children or schools.

Challenges

- **52. General Challenges**: Catch-all category for challenges related to cycling planning and implementation.
- **53. Too Many Cyclists/Cycling as a Problem**: Issues related to overcrowding infrastructure or stress caused by a high number of cyclists.

11. 2 Interview Guidelines

Both interviews were conducted in German. The guidelines below are translated versions. The interviews were conducted in a semi-structured conversational manner and the questions below served as guidelines. Therefore, the order and contents were adapted following the conversation.

11.2.1 Interview 1: Peter Gwiasda (VIA)

1. Introduction of the Interviewee
   Briefly introduce the interviewee, including their background and relevant experience.
2. Introduction of VIA
   Provide an introduction to VIA, including its role and mission.
3. Personal Role in the Bicycle Concept
   Discuss the interviewee's personal role and contributions to the bicycle concept.
4. Contractual Relationship: Scope and Objectives
   What was the assignment from the city? What were the objectives of the strategy? General impressions of the collaboration with the City Administration.
5. Division of Responsibilities with the City of Cologne
   How much substantive input was provided by the city, and how much was VIA able to decide independently?

6. Challenges and Constraints for VIA
   Were there any challenges, obstacles, or restrictions faced by VIA during the project?
7. Sources of Inspiration
   What sources of inspiration were used (e.g., cycling guidelines, other cities as models), or was the concept developed entirely locally from scratch?
8. Data and Knowledge Base
   The concept includes numerous assessments of the status quo (network analysis, accident analysis). Was there a need to establish a data and knowledge base initially? What was the data situation in the city?
9. Detailed and Pragmatic Approach
   Compared to other cities, the concept is quite detailed and pragmatic, with fewer general visions. Is this perception correct: the document's purpose is to improve cycling rather than outline a future vision or a target state (e.g., "Cologne will become a cycling city" or "Enhancing quality of life")?
10. Focus on Participation
    The concept places a significant emphasis on participation. How did this come about? The impression is that there was a desire to create maximum legitimacy and broad consensus, including stakeholders like the Chamber of Commerce and ADAC.
11. Lack of Focus on Cycling Benefits
    Simultaneously, there is little mention of the advantages of cycling (livable city, air quality, environmental protection, efficiency, etc.). Why is this the case?
12. Relationship with Car Traffic
    The concept prioritizes space allocation for cycling but maintains a relatively high status for car traffic (e.g., "car volume allows for bike lanes," truck planning, parking concepts, and car routes are taken as given, with cycling planned around them). Discuss this approach.
13. Absence of PR and Bicycle Parking in the Strategy
    Why are public relations and bicycle parking not included in the strategy? Where are these aspects planned, if at all? Was this due to the city's assignment?
14. Focus on Inner City
    The bicycle traffic concept is limited to the inner city. What about the rest of Cologne?
15. Significant Emphasis on Accident Statistics
    The concept devotes considerable space to accident statistics. What is the reasoning behind this unique focus?
16. Reactive vs. Proactive Approach
    The phrasing often suggests a reactive rather than proactive approach to promoting cycling. Is this indicative of the planning culture in the City of Cologne?
17. Types of Measures Implemented
    The measures frequently involve opening existing infrastructure for cyclists (e.g., opening one-way streets, creating bicycle streets) rather than constructing classic bike paths. Is this a unique Cologne approach? Does this align with the ERA (Guidelines for Cycling Facilities)? Are these measures still considered up-to-date? Some activists are saying: "Paint isn't infrastructure."
18. Expert Assessment: State of Cycling and Political Climate
    Provide an expert assessment of the current state of cycling and the political environment in comparison to other cities, as well as to the time when the bicycle traffic concept was developed.
19. Evaluation of Implementation Progress
    How do you evaluate the progress of implementation? Has it been fast or slow? The city indicates that around 40 out of approximately 70 measures have been implemented.
20. Changes in Planning Over the Last 10 Years
    Ten years later, what changes have occurred in planning? What major trends do you observe?

21. Introduction of the Sustainable Urban Mobility Plan (SUMP)
    With the EU now mandating the Sustainable Urban Mobility Plan, do you have any thoughts on this? Will integrated transportation planning be better? Do you believe this will significantly impact cycling?

11.2.2 Interview 2: Stefan Gabi (Rupprecht Consult)

1. **Introduction of the Interviewee**
   Provide a brief introduction of the interviewee, including their background and relevant experience.
2. **Introduction of Rupprecht Consult**
   Present Rupprecht Consult, including its role and mission in transportation planning.
3. **Personal Role in the Cologne SUMP**
   Discuss the interviewee's personal role and contributions to the Sustainable Urban Mobility Plan (SUMP) for Cologne.
4. **Contractual Relationship: Scope and Objectives of the SUMP**
   What was the assignment from the city? What are the objectives of the SUMP? General impressions of the collaboration with the City of Cologne. Were there any challenges or obstacles?
5. **Anticipated Style of the Cologne SUMP**
   How will the Cologne SUMP be like? Previous documents have been either very detailed and pragmatic (like the bicycle traffic concept) or vague (like the "Mobility 2025" plan). The SUMP is expected to have a guiding vision—is that correct? How will it differ?
6. **Documents the SUMP Will Replace or Complement**
   Which existing documents will the SUMP replace or complement? How specific and localized will it be in terms of detailed planning, such as for cycling?
7. **Unique Aspects of the Cologne SUMP Compared to Other Cities**
   Are there any distinctive features of the Cologne SUMP compared to those of other cities?
8. **General Impression of Transportation Planning in Cologne**
   What is your general impression of transportation planning in Cologne? According to previous interviews on cycling, transportation has become more politicized than before. Do you agree?
9. **Expectations from the SUMP**
   What are your expectations of the SUMP? What can it achieve?
10. **Trends Introduced by the SUMP**
    What are the core aspects that the SUMP approach will change in transportation planning compared to previous methods?
11. **Influence of the EU and SUMP on Transportation Planning**
    How has the EU influenced transportation planning through the SUMP? Has the focus shifted to more interconnected approaches similar to city network trends, emphasizing best practices?
12. **Key Publications and Events in Transportation Planning**
    What have been the key publications or events in transportation planning (e.g., Sustainable Development Goals, Paris Agreement, EU White Paper)?
13. **SUMP Guidelines: Clear Narratives and Argumentative Chains**
    The SUMP guidelines include clear narratives and arguments (such as improved quality of life and air quality, growth through attractive cities and sustainable mobility). Is the intention to provide cities with a template for advocacy and persuasion?
14. **Vision Building in the SUMP Process**
    The SUMP process emphasizes vision building, which is my research focus. Why is this important? What is expected from this approach? In Cologne's case, there was little visioning previously, but now a guiding vision exists.

15. **Varied SUMP Adoption Across Cities**
    In my case studies, different cities have adopted SUMP in various ways. Flagship cities often don't discuss SUMP—do they even have one? Are existing plans sometimes simply renamed or declared to have SUMP status (e.g., Copenhagen, Vienna)?
16. **Observation: SUMP Prominence Among "Catch-Up" Cities**
    The SUMP appears to be more prominently used by "catch-up" cities rather than "frontrunners." Is SUMP a tool to create uniform conditions so that "lagging" cities can also catch up?
17. **Criticism of the SUMP Concept and Sustainable Mobility**
    Are you aware of any criticisms of the SUMP concept or sustainable mobility in general? Some criticisms of sustainable mobility (though not widespread) suggest it overlooks power structures, depoliticizes content, or is overly optimistic about technology. Are you familiar with these critiques? What are your thoughts?

11.3 Supplementary Graphs

11.3.1 Cluster of Codes per City (Code Map)

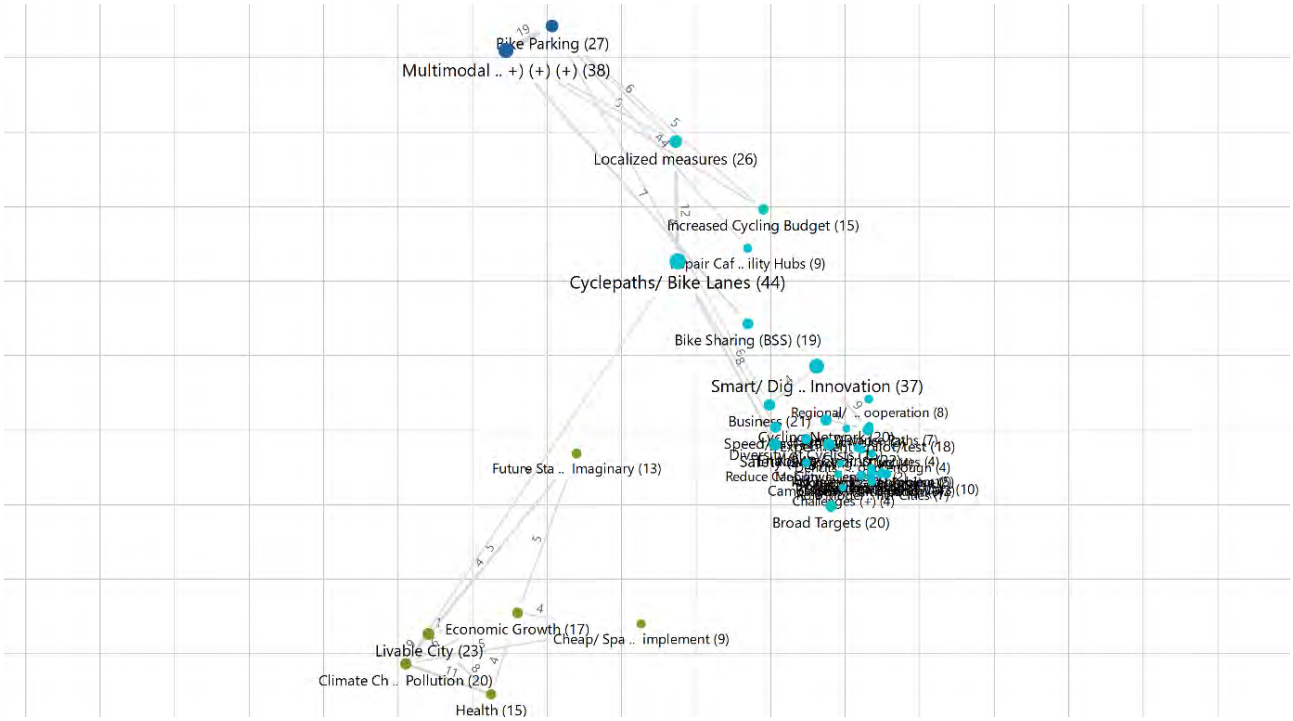

Figure 21: Copenhagen Code Map

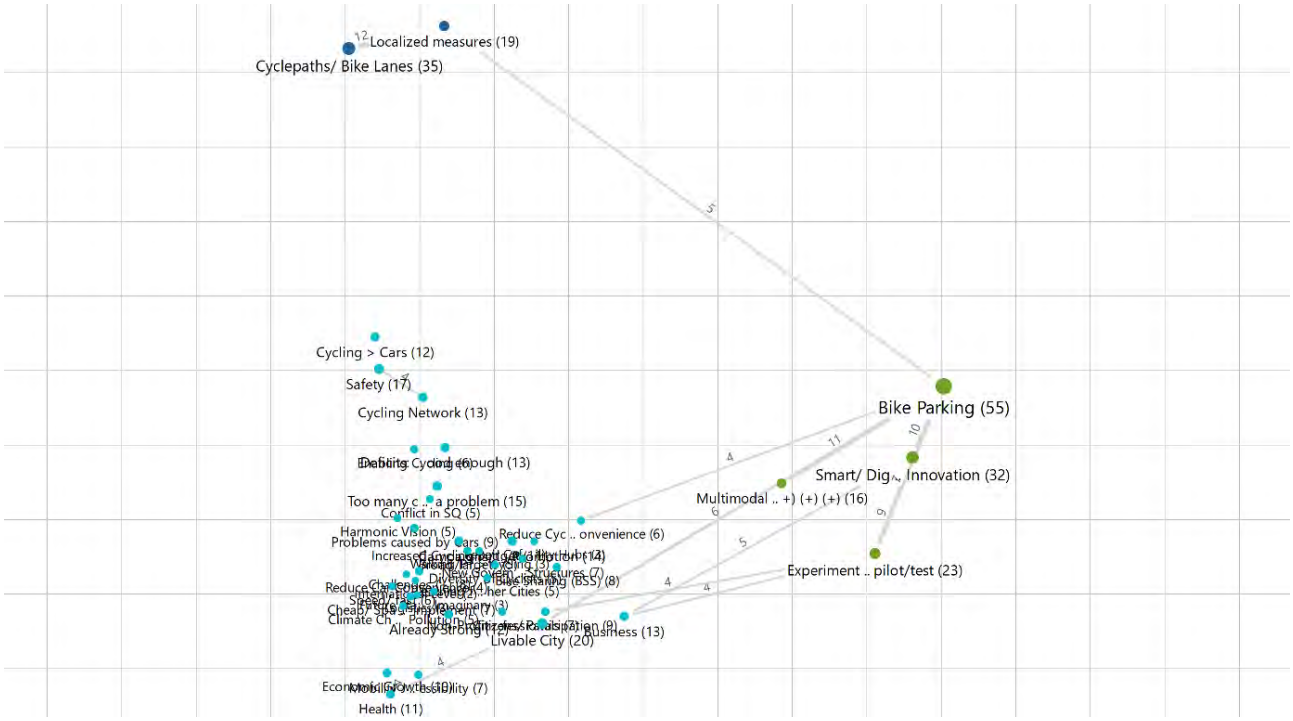

Figure 22: Amsterdam Code Map

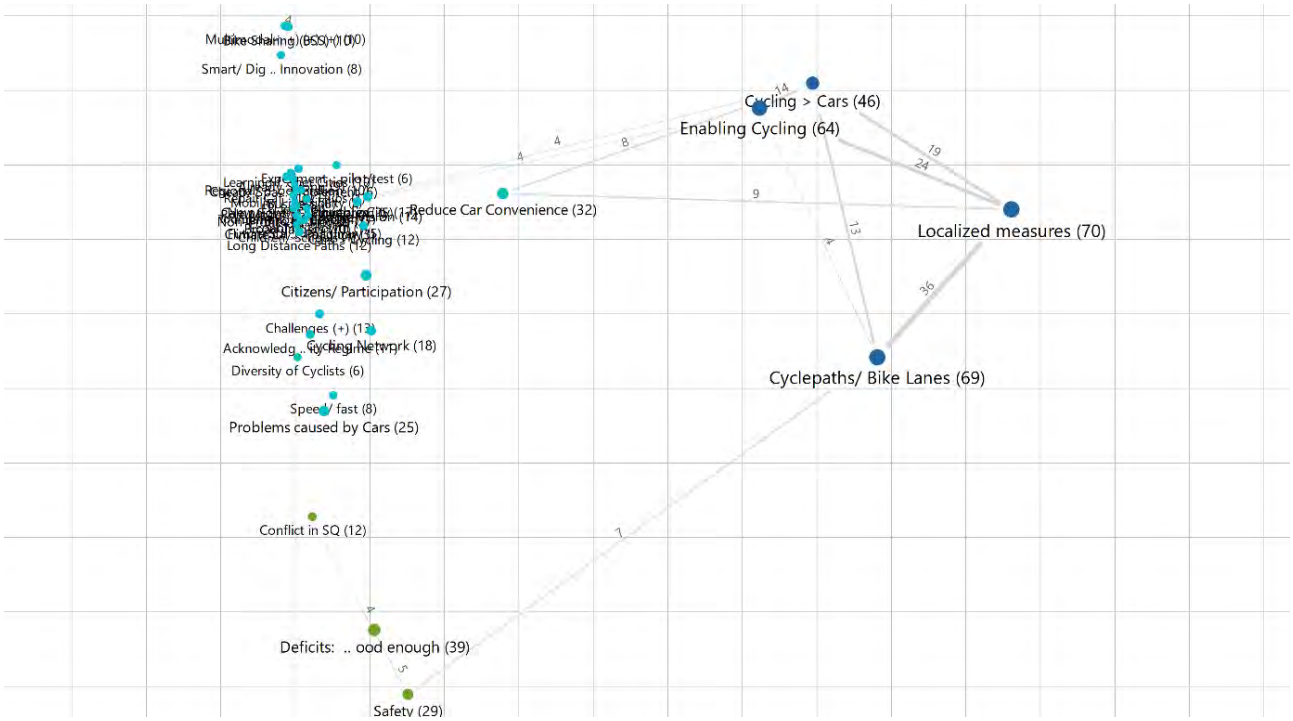

Figure 23: Cologne Code Map

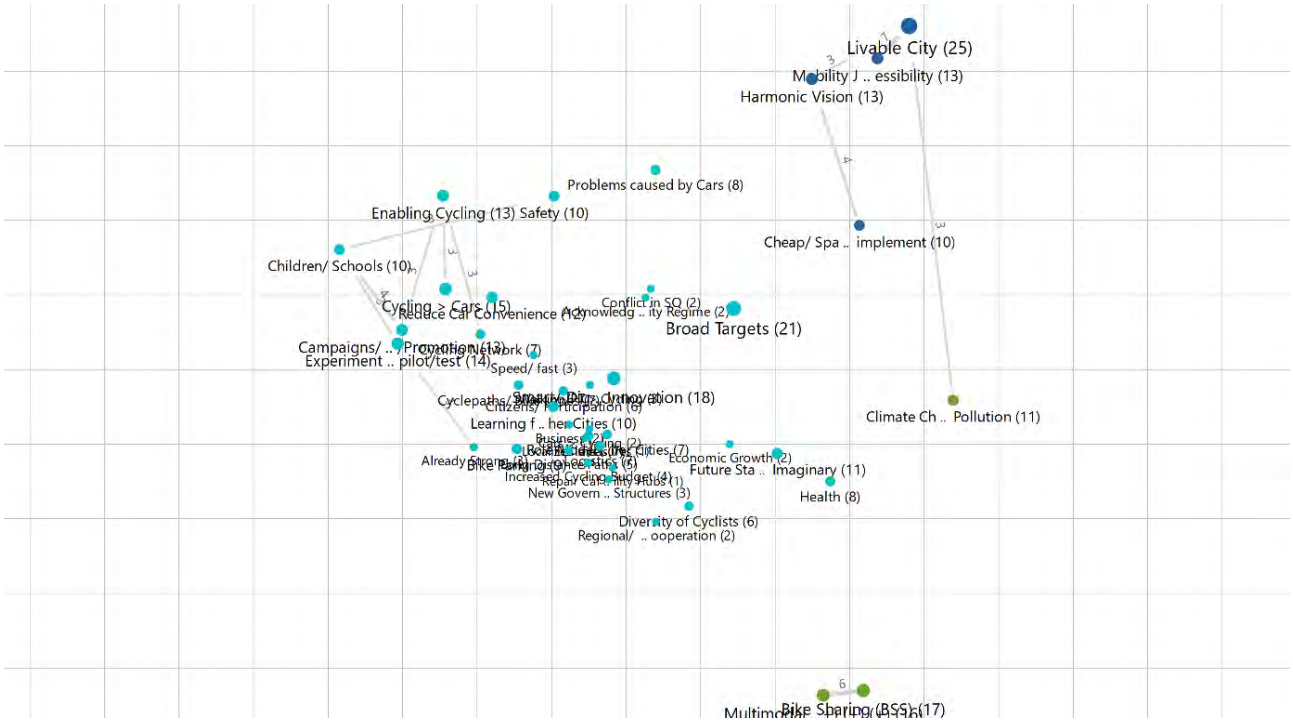

Figure 24: Vienna Code Map

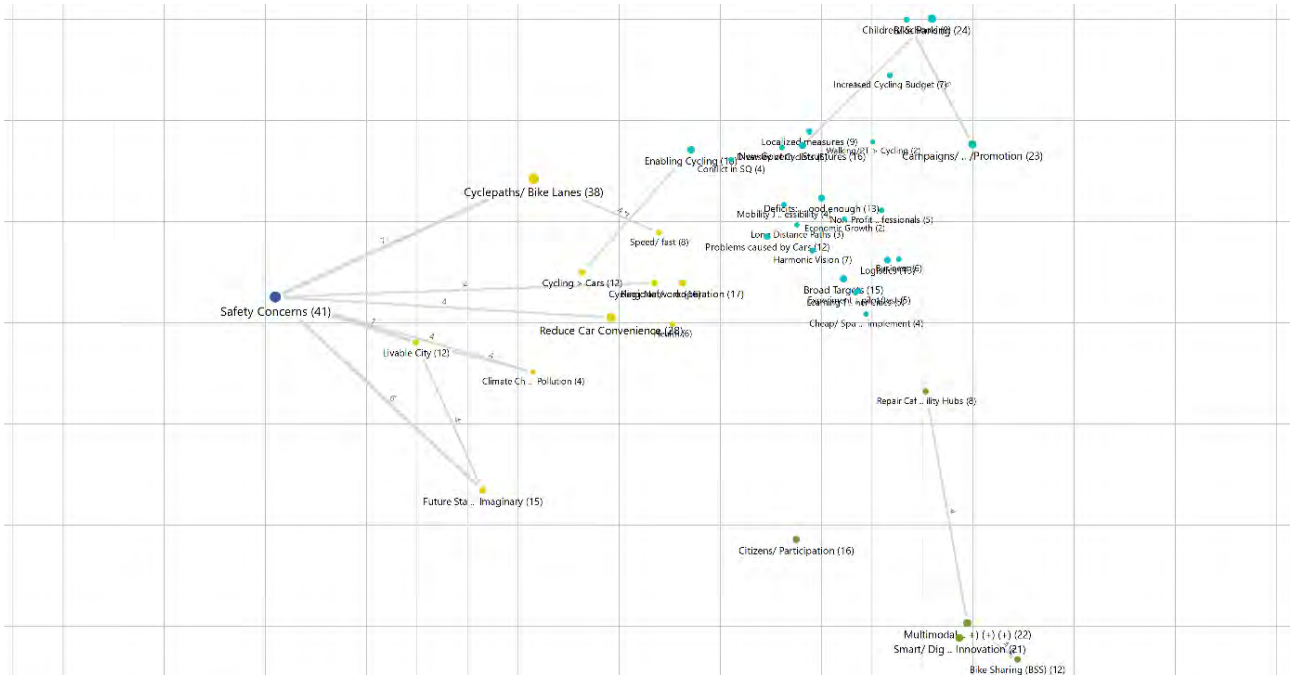

Figure 25: Brussels Code Map

11.3.2 Document Map

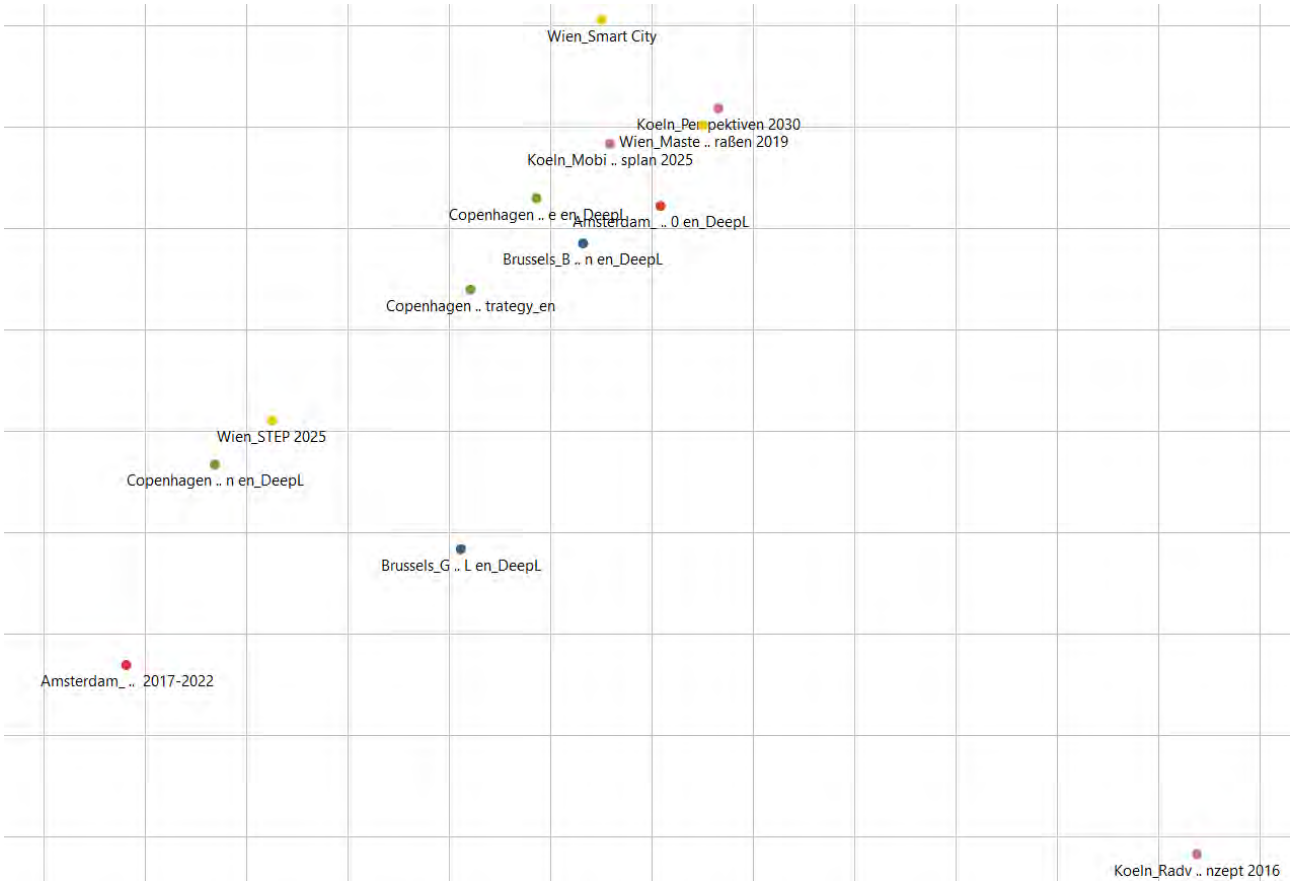

Figure 6: Document Map of all analyzed Documents