

Transitioning the Transport and Land-use system

Author(s)

Switzer, Andrew

Publication date

2019

Document Version

Final published version

[Link to publication](#)

Citation for published version (APA):

Switzer, A. (2019). *Transitioning the Transport and Land-use system*. [Research HvA, graduation external, Universiteit van Amsterdam]. http://www.inplanning.eu/categories/8/articles/234?menu_id=phd-series§ion_title_for_article=InPlanning+PhD+Series

General rights

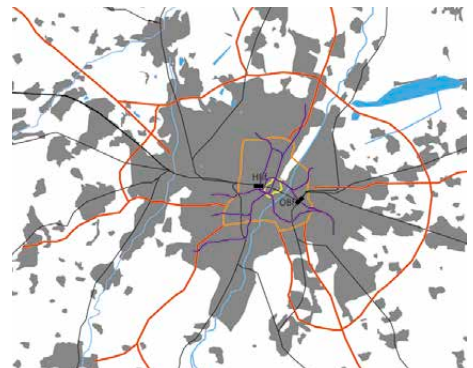
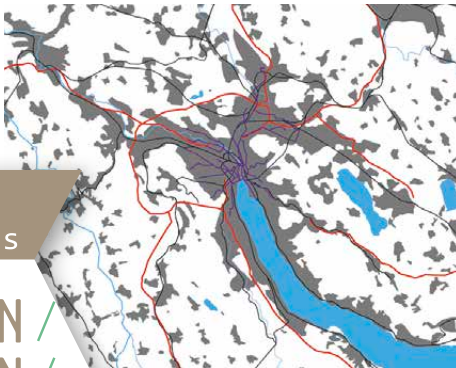
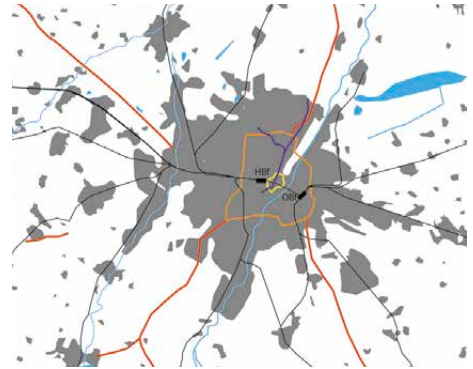
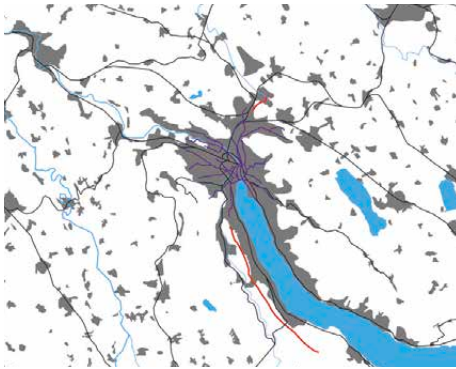
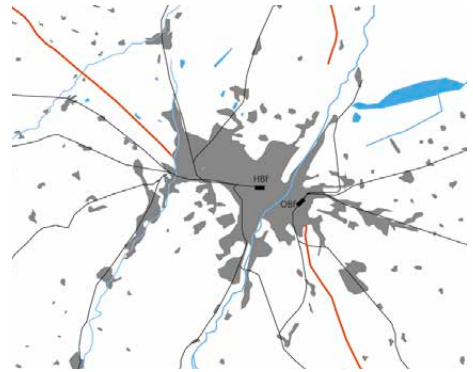
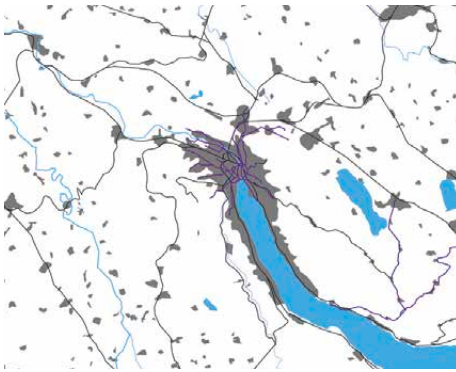
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please contact the library: <https://www.amsterdamuas.com/library/contact>, or send a letter to: University Library (Library of the University of Amsterdam and Amsterdam University of Applied Sciences), Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

Andrew Switzer

Transitioning the Transport and Land-use system



PhD
series

// IN //
PLAN //
/ NING

Transitioning the Transport and Land-use system

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor

aan de Universiteit van Amsterdam

op gezag van de Rector Magnificus

prof. dr. ir. K.I.J. Maex

ten overstaan van een door het College voor Promoties ingestelde commissie,

in het openbaar te verdedigen in de Agnietenkapel

op woensdag 16 januari 2019, te 10.00 uur

door

Andrew Wendell Switzer

geboren te Brampton, Canada

Promotiecommissie:

Promotores:

prof. dr. ir. L. Bertolini
prof. dr. J. Grin

Universiteit van Amsterdam
Universiteit van Amsterdam

Overige leden:

prof. dr. W.G.M. Salet
prof. dr. J.J.M. Hemel
dr. A.M.C. Loeber
prof. dr. E.J.M.M. Arts
dr. ir. R. van Nes
prof. dr. B. Truffer

Universiteit van Amsterdam
Universiteit van Amsterdam
Universiteit van Amsterdam
Rijksuniversiteit Groningen
TU Delft
Universiteit Utrecht

Faculteit: Faculteit der Maatschappij- en Gedragswetenschappen

Dit onderzoek maakte deel uit het onderzoeksproject *Strategy towards sustainable and reliable multi-modal transport in the Randstad* dat gefinancierd is door het onderzoeksprogramma *Duurzame Bereikbaarheid van de Randstad* van de Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO)

Contents

Overview of Articles 5
Figures and Tables 7

PREFACE 10

CHAPTER 1 14

**Transformative change in urban planning:
the potential of transition studies**

CHAPTER 2 36

**Transitions of transport and land-use systems in urban regions:
a heuristic framework**

CHAPTER 3 58

**Understanding transitions in the regional transport and land-use system:
Munich 1945–2013**

CHAPTER 4 90

**Geography in transport and land-use transitions:
a comparative case study of Munich and Zürich**

CHAPTER 5 136

**A reflexive approach to facilitate transport and land-use planning
coordination: a conceptualisation and an application in the Netherlands**

CHAPTER 6 160

Conclusions & Reflections

References 178

SAMENVATTING 208

ZUSAMMENFASSUNG 224

SUMMARY 242

Overview of Articles

Chapter 2: Switzer, A., Bertolini, L & Grin, J. (2013). Transitions of Mobility Systems in Urban Regions: A Heuristic Framework. *Journal of Environmental Policy & Planning*, 15(2), 141-160.

Chapter 3: Switzer, A., Bertolini, L & Grin, J. (2015). Understanding transitions in the regional transport and land-use system: Munich 1945 – 2013. *Town Planning Review*, 86(6), 699-723.

Chapter 4: Switzer, A. (submitted). Geography in transport and land-use transitions: a comparative case study of Munich and Zürich. Submitted to international peer-reviewed Journal .

Chapter 5: Switzer, A., Bertolini, L., Grin, J. & Brands, T. (submitted). A reflexive approach to facilitate transport and land-use planning coordination: a conceptualisation and an application in the Netherlands. Submitted to international peer-reviewed Journal.

Figures and Tables

Chapter 1

Figure 1.1: Sprawl Repair, an example of the application of the principles of New Urbanism

Figure 1.2: Stedenbaan in the Zuidvleugel region

Table 1.1: Focus of agency in bringing about transformative change

Chapter 2

Figure 2.1: The Multilevel Perspective

Figure 2.2: Transport Land-use Feedback Cycle

Figure 2.3: Transport Land-use Feedback Cycle

Figure 2.4: Conceptual model of the mobility system

Figure 2.5: The desired transition in the Mobility system

Figure 2.6: Model filled in after session

Chapter 3

Figure 3.1: Heuristic framework for transition in the transport and land-use system

Figure 3.2: Periods of transition in Munich 1945 – 2013

Table 3.1: Changes in practices of firms and households during the three periods of transition

Table 3.2: State of the system at the end of each transition

Figure 3.3: Siedlung am Hasenberg

Figure 3.4: Stachus 1959, called the most trafficked square in Europe

Figure 3.5: City development plan - separation of functions

Figure 3.6: City development plan - measurements of traffic volumes

Table 3.3: Thematic analysis of major transport and land-use plans (a)

Figure 3.7: Street picnic action of the group Aktion Maxvorstadt, 1971

Figure 3.8: Tram action organised by the Münchner Forum, 1979

Figure 3.9: City development plan 1975 - polycentric developments

Table 3.4: Thematic analysis of major transport and land-use plans (b)

Figure 3.10: City development plan - planned housing development

Table 3.5: Thematic analysis of major transport and land-use plans (c)

Figure 3.11: Protests against the 2. Stammstrecke in 2017

Figure 3.12: Münchner Ringparade 2017 an activity to promote cycling

Chapter 4

Figure 4.1: Heuristic framework for transition in the transport and land-use

Table 4.1: Relationship between forms of proximity and heuristic framework

Figure 4.2: Unplanned vs planned development of Zürich

Figure 4.3: Kremer & Leibbrand's proposed Expressstrassen crossing at Zürich central station

Figure 4.4: Naionalstrasse N3 (Sihlhochstrasse) - Part of the planned urban motorway crossing that was constructed

Figure 4.5: Alternative proposal of the ZAS 1959 for the Sihl river area as a second city

Figure 4.6: Broschure Aktionskomitee Pro Tiefbahn, 1961/1962

Figure 4.7: Newspaper advertismment Tiefbahn-Abstimmung

Figure 4.8: The planned U-Bahn in 1973

Figure 4.9: The planned S-Bahn in 1973

Figure 4.10: Advertisements against and for the U-Bahn, 1973

Figure 4.11: The mixed-use Glattpark development in Opfikon, north of Zürich

Figure 4.12: Glattalbahn at the regional Glattzentrum shopping centre

Figure 4.13: Advertisement for the Masseneinwanderungsinitiative, 2012, linking to spatial planning issues

Figure 4.14: Advertismet for new spatial planning legislation, 2013

Figure 4.15: The Munich region in the 1930s

Figure 4.16: The Munich region in the 1970s

Figure 4.17: The Munich region in the 1990s

Figure 4.18: The Munich region in the 2000s

Figure 4.19: The Zürich region in the 1930s

Figure 4.20: The Zürich region in the 1960s

Figure 4.21: The Zürich region in the 1980s

Figure 4.22: The Zürich region in the 2000s

Chapter 5

Figure 5.1: Heuristic framework for transition in the transport and land-use system

Table 5.1: Principles of reflexive planning approach, inspiration and application

Table 5.2: Actors and roles in the Amsterdam region

Figure 5.2: The metropolitan region of Amsterdam including the case study corridor and station area

Table 5.3: Workshop participants

Chapter 6

Figure 6.1: Heuristic framework for transition in the transport and land-use system (adapted from Switzer et al. 2013)

PREFACE

Writing a thesis in the social sciences is never the sole achievement of the author alone and this dissertation is no exception. I am enormously grateful to all those whose help, encouragement and support have I have had the privilege to enjoy during the past eight years. First and foremost, my promotores Luca Bertolini and John Grin who I would like thank for their patience, enthusiasm and creativity during this process. They inspired me and gave me the confidence to keep going. Further, I would like to thank the members of the *promotiecommissie* for their investment of time and energy in the evaluation and defense of this thesis.

This thesis would not have been possible without the countless people who contributed during the data collection. The interview respondents in Zürich and Munich took the time to welcome me to their cities and share their stories. A special thanks to Esther Germann and Matthias Hintzen who went the extra mile. I would especially like to thank the participants who took part in the workshops in Amsterdam. Their critical comments and reflections helped in strengthening this research. Finally, I would like to thank Maren Pannemann and Martin Ahrens for their editing of my *wissenschaftliches Deutsch* in the German summary.

Less directly, but no less importantly, the many colleagues at the University of Amsterdam contributed to both the quality of this research and the *gezelligheid* during the process. I benefited greatly at various moments from the feedback and inspiration of many members of the PUMA group as well as the meetings with the planners from the Rijksuniversiteit Groningen and the University of Alborg. The many roommates I had in three UvA buildings allowed for the necessary distraction, reflection and laughs. Without them the PhD process would have been difficult if not impossible to get through. Furthermore, I was able to profit from the support and inspiration of many other colleagues from the Urban Planning group, the secretariat GPIO and the rest of the department. I am grateful for the chances I had to undertake a number of activities beyond doing research during my time at the UvA. They allowed for the necessary variation in my work, but more importantly, they contributed to my development just as much as doing my research itself. Teaching and supervising theses were very rewarding activities from which I learned just as much as I taught the students. Especially enjoyable was teaching *Ruimtelijk Programmeren en Ontwerp* every June. In 2012 I was unexpectedly elected to the *Ondernemingsraad FMG*. This chance allowed me to experience the political and management side of the UvA as well as the diverse people and personalities involved in managing the university. Especially educative during my time in the OR was the crisis spring of 2015.

In 2016 I made the transition to the Urban Management master programme and research group at the Hogeschool van Amsterdam. In the past three years this has become not only a good work place, but a second home. This has just as much to do with the interesting work as with the intelligent, inspiring and very *gezellige* colleagues and friends who make going to work a pleasure. I would especially like to thank Sandra Bos and Stan Majoor for not only taking me on, but also having confidence during the long 'almost done' period of this dissertation and supporting its completion.

Beyond the university, the many friends I had or made during the writing of this dissertation contributed mostly indirectly to its completion. Drinking coffee with Janina rowing and swimming with Jaus, Boudewijn and Lennart or going to the film with Joandi provided the chance to relax and reload. During the whole of my PhD period I was involved with the journal *Rooilijn*. Editing an article or trying to solve an urgent problem was not always supportive of the fast completion of my dissertation, but was more often than not an enjoyable part of the past eight years. I was a pleasure to work with such a talented and dedicated editorial board, especially Arend Jonkman who played an important role during my two years as editor-and-chief and in editing several chapters of this dissertation. I would also like to thank him and Marie Morel agreeing to be my paranymphs and ensuring an orderly planning of the defense. Finally, and certainly last but not least, my parents and family far away in Canada. Without your support and love I would never have gotten this far. During the writing of this dissertation I have many warm memories of our meetings during the snowy Christmas period in Canada, in China or in Amsterdam or digitally through Skype.

In such a short preface you of course run the risk of forgetting important people or events. Given the length of my PhD period this is unavoidable. None the less I am grateful.

Amsterdam, 3 December 2018

CHAPTER 1

Transformative change in urban planning: the potential of transition studies

Urban areas are increasingly confronted with various sustainability related issues, both social and environmental. Despite decades of attention in policy and research, only small changes can be observed. For example, with regard to increased use of sustainable modes of transport or reduced mobility or improved quality of life. This suggests the necessity of new conceptual frameworks and strategies of action which are able support the fundamental changes needed to address these complex issues. This thesis aims to contribute to their development by exploring the potential of the research area of transition studies for urban planning, critically examining historical urban transitions and developing and employing a reflexive planning approach to this end. At the same time, it contributes to debates concerning space and the urban in transitions studies by studying a system in which particular place, rather than a socio-technical system (like agriculture or water management), constitutes the unit of analysis.

To set the stage, four questions are considered in this chapter:

- 1) What is the nature of the challenges facing urban planning? In answering this question, we gain a better understanding of the exact challenges facing transport and land-use planning in urban regions, to inform the selection of theories and the course of this research.
- 2) Which trends can be observed in planning research with regard to transformative change? This question results in an overview of the state of the art in urban planning research as to identify knowledge gaps with regard to conceptualising and supporting transformative change.
- 3) What is the potential of transition studies conceptually and in terms of action with regard to transformative change in planning? Transition studies has been identified as an promising research area with regard to transformative change. In answering this question, this potential is further explored and linked to the knowledge gaps considered in question 2.
- 4) Which trends can be observed in transition studies with regard to urban systems and space? By studying transitions that are spatial in nature, such as those in urban areas, this thesis offers the possibility of contributing to debates in transition studies as discussed. To do so they are discussed and knowledge gaps are identified.

Following this discussion, the approach employed in this study and the research questions are presented.

1.1 Urban planning challenges

The challenges that urban areas face include issues of quality of life, inclusivity,

health, safety and the environment (e.g. Kesselring, 2001, pp. 36; Litman & Laube, 2002; Pucher & Dijkstra, 2003; Gonz  les & Healey, 2005; Bertolini *et al.*, 2008; Banister *et al.*, 2011; Jones & Lucas, 2012). In light of this, many urban areas have undertaken endeavours to find ways “to contribute to social and economic welfare without damaging the environment or depleting environmental resources” (Nykvist & Whitmarsh, 2008, pp. 1373). Despite recognising the challenges at hand and attempting to take action (Banister, 2008; Curtis *et al.*, 2009; May & Marsden, 2010; Tan, 2013; Curtis, 2012), awareness among planning researchers and practitioners is growing that the incumbent ways of understanding and approaching problems, sometimes deeply rooted in social structures, are not only unable to offer adequate solutions, but, in some cases, actually exacerbate the problems they aim to solve or create unforeseen new ones (e.g. Litman & Burwell, 2006; Ferreira & Batey, 2011; N  ss *et al.*, 2014). Practices related to both mobility and the location and organisation of activities (housing, employment, recreation) are at the core of many of these issues (Cervero, 1998; V&W & VROM, 2004; DGE, 2005, Bertolini *et al.*, 2008; May & Marsden, 2010; VROM, 2010, pp. 17).

As being mobile is often not an activity that is undertaken for its own sake, but rather embedded in spatial practices, these will need to be considered simultaneously (see Shove & Walker, 2010; Shove *et al.*, 2015). Practices will vary per household or firm and are the result of more than a series of choices resulting from rational cost benefit analyses. They are related to a combination of socio-demographic, economic and cultural conditions, habit, as well as the attractiveness of locations or transport options and the availability of land. Some of these can be considered exogenous to conscious attempts by any one actor to exert influence at the local level. For example, economic cycles, preferences for a certain type of living or demographic trends. Others, such as the availability of land, transport options and to some extent the attractiveness of locations and modes of transport are the result of various decision making processes. These are processes involving transportation agencies and companies, property developers and various governments using a variety of policies (regarding policies see Bekkers *et al.*, 2012). Transport options are influenced by infrastructure investments and technological innovations, whilst zoning regulations and investments in property development shape the availability of land (Wegener & F  rst, 1999; Bertolini *et al.*, 2005; Boelens, 2005; Banister, 2008; Bertolini, 2009; Dennis & Urry, 2009; Bertolini, 2012; Geurs, 2014).

1.1.1 Attempts to address challenges

In research and practice, the coordination of land-use and transport planning, whereby the practices of households and firms are more oriented on sustainable

modes of transport is seen as a promising way to contribute to addressing several of the sustainability issues facing cities (Cervero, 1998; Bertolini & le Clercq, 2003; Banister, 2008; Curtis *et al.*, 2009; May & Marsden, 2010). The change sought is one towards a system in which transport and land-use are coordinated (as in ‘transit-oriented development’), so that the mode of transport used is the one, which achieves the most sustainable balance between individual and collective costs and benefits. In various countries, concepts from local to the regional levels embrace these ideas and policies have been developed to facilitate sustainable changes to the practices of households and firms (VROM, 1983, pp. 10-13; VROM, 1988, pp. 54-60; Bertolini, 1999, 2007; Bertolini & le Clercq, 2003; Dunphy *et al.*, 2003; Bertolini *et al.*, 2008; Curtis *et al.*, 2009). At the local level, an example development of dense developments surrounding stations characterised by a high quality of public space and a high degree of walkability and bikability (see Figure 1.1). At the regional level an example is the Dutch Stedenbaan programme (see Figure 1.2), which aims to coordinate distribute new housing and employment developments at station areas at a regional level combined with improved rail service in order to encourage sustainable mobility.

Despite this continued attention, attempts to bring these concepts into practice have proved challenging. In some cases, attempts at change have been made and led to the desired results, but in many others this is not the case (see Cervero, 1998; Curtis *et al.*, 2009; Mees, 2009; Pflieger *et al.*, 2009). That said, the history of planning evidences that fundamental change is possible (e.g. Blanc, 1993; Cervero, 1998; Bratzel, 1999; Schmucki, 2001; van der Cammen & de Klerk, 2003; Geels, 2005; Haefeli, 2008; Valderrama Pineda & Vogel, 2014). However, Banister *et al.* (2012, pp. 468) suggest that the “current organisational and institutional structures may be inappropriate when it comes to addressing climate change and transport, as transport is seen to be instrumental in maintaining and enhancing the global economy, rather than contributing to the need to keep within the environmental carrying capacity of the planet.” Accordingly, in recent years, a shift in transport and land-use planning debates can be observed from planning concepts, as discussed above, to policy instruments, measures, regulations and organisational forms and institutional structures (Bartholomew, 2007; Filion & McSpurren, 2007; Curtis *et al.*, 2009; Curtis & Low, 2012; Hormighausen & Tan, 2016).

1.1.2 Complexity in the transport and land-use system

Many of the historical studies mentioned above illustrate the complex causality resulting in emergent change in the urban system. We have seen that the change in the system of transport and land-use is dependent on the mobility and locational practices of individual households and firms. As stated, the decision


SPRAWL TYPES							TECHNIQUES						INCENTIVES/ BENEFITS		COMMUNITY UNITS				
S-6 SHOPPING CENTERS & STRIPS													T1		T2	T3	T4	T5	T6
							No Minimum												
							10 - 30 %												
							30 - 60 %												
							10 - 30 %												
							40 - 80 %												
							<ul style="list-style-type: none">• Introduce new building types and Residential/Office/Lodging/Civic uses• Connect Thoroughfares; add Streets in front of stores• Rationalize parking; Add garages• Define and make usable Open and Civic Space												

Figure 1.1: Sprawl Repair, an example of the application of the principles of New Urbanism (Tachieva, 2010)

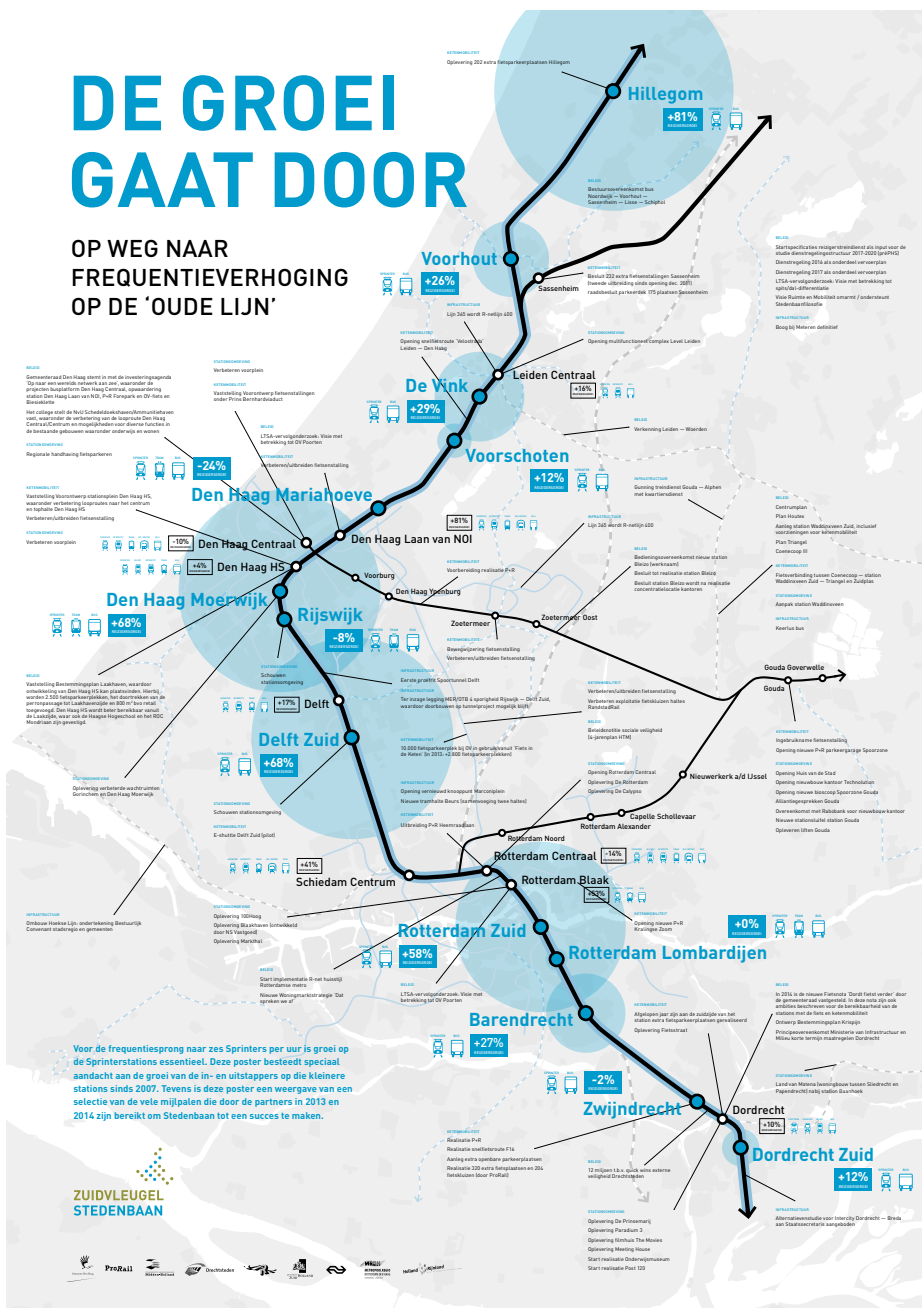


Figure 1.2: Stedenbaan in the Zuidvleugel region (Zuidvleugel Stedenbaan, 2014)

making processes affecting land-use (allowed densities, development locations) and transport networks (service frequencies, lines, roadways, connections) are the result of the collective actions of actors acting across scalar levels from the local to the international. Change can be seen as the result of many coordinated and uncoordinated actions and shifts in complex practices. In acting and exercising agency, these actors draw on institutionalised structures such as norms, roles, solution sets, problem definitions and codified regulations as well as exogenous developments, at a higher level of structuration (economy, culture, society, discourses). These structures do not predetermine agency. Rather, in acting, actors creatively interpret these structures based on their expectations of the future, opening up the possibility of structural change (Hoffman, 2013; Hoffman & Loeber, 2016). Actors can influence each other, or attempt to do so, with arguments, incentives or sanctions based on policy or otherwise thereby encouraging reflection, experimentation with new practices and possibly further structural change as a result. During a longer period, this can result in fundamental changes in the transport and land-use system.

The embeddedness of practices in complex, co-evolved and co-evolving systems as sketched above, has clear implications for attempts to bring about change in this system. Clearly, the centralized, directed management of change is an impossible endeavour. Recognising this, transport and land-use planning research has increasingly seen a shift towards a focus on persistent barriers to change whereby the complexity of the system including interdependencies with exogenous developments, both local, national and international is recognised and accounted for (Spies *et al.*, 2005; Switzer, 2010; VROM, 2010, pp. 25; Curtis & Low, 2012; Banister *et al.*, 2012; Tan, 2013).

When examining the system of transport and land-use as discussed above, we can observe a number of contemporary changes supportive of attempts to address the issues confronting urban areas. At the same time various factors still hinder change. Opportunities and barriers of shifting away from the dominance of the car – as epitome of non-sustainable practices – have provided a catalyst for research and policy. Debate has focused on the cultural, societal and economic importance of the car as well as vested interests (e.g. Sachs, 1990; Urry, 2004; Cass *et al.*, 2005; Dudley & Chatterjee, 2012; Sheller, 2012) and the embeddedness of the car in lifestyles and preferences of households (e.g. speed and convenience) (Geels *et al.*, 2012). Other recent developments such as ICT and the network society have an ambiguous impact on sustainability (e.g. Gössling, 2017). Finally, the emerging slow movement, urban lifestyles and the changing status of the car among younger generations (e.g. Munafò *et al.*, 2015; Hopkins & Stephenson, 2014) with related practices such as continued urban growth

(Stokes, 2013) and stabilisation of personal mobility per car in conjunction with growing use of bicycle or public transport (Dudley & Chatterjee, 2012; Delbosc & Currie, 2013, Goodwin & van Dender, 2013) can be seen as contributing to addressing sustainability issues. Still, research suggests that society as a whole is still becoming more car dependent (Jeekel, 2011).

Policy makers are increasingly realising that the mobility and land-use issues such as congestion cannot be addressed with existing policy paradigms. This has resulted in changes in thinking about problems and solutions, for example resulting in the abandonment of the 'predict and provide' paradigm (Geels *et al.*, 2012; Dudley & Chatterjee, 2012; Goodwin, 2012) and an increasing emphasis on multi-modal accessibility in urban areas embodied in movements such as New Urbanism, Compact Cities or Smart Growth and being increasingly embraced in cities around the world (Marshall, 2004; Banister, 2008; Curtis, 2008; Bertolini, 2009; Marchau *et al.*, 2010; Zijlstra & Avelino, 2012; Sheller, 2012). Specific case studies in a number of urban areas illustrate this in detail (see Tan, 2013; Curtis *et al.*, 2012), but still institutional structures and barriers are seen as proving obdurate to change (Tan, 2013; Curtis & Low, 2012). Interest groups favouring alternatives seem splintered, whilst the car coalition remains strong (Dudley & Chatterjee, 2012).

The challenge for transport and land-use planning is clear and urgent: developing both ways of understanding transformative change in a complex and emergent social system and methodologies to support transformative change in practice.

1.2 Transformative change in planning

The observed shift in debates surrounding transport and land-use planning discussed above is indicative for the more general shift in planning studies towards conceptualising transformative change to address pressing urban issues and an increasing interest in supporting pragmatic attempts to do this in practice. Before we discuss these, it is important to note that the radical or transformative change we discuss is not the opposite of incremental change (Marsden *et al.*, 2014; Grin, 2006; 2010). Grunwald (2007, pp. 259) distinguishes between disjointed and directed incrementalism. The latter involves "taking into account (normative) aspects of a distant future, of the impact of our present concepts of technology and society of the future, and the impact of such reflections on our present-day concepts and ideas" when acting, whilst this normative focus is absent in the former. As Lindblom (1979, pp. 520) has argued, a series of mutually supportive incremental steps over a prolonged period, embedded in processes of trial and error learning and mutual adjustment may be more likely to lead to major change than attempts to realise such changes in one big leap. The

characterisation of ‘transformative’ is in other words more about the outcome: how different from the current status quo, than about the process, which can be of a different nature (e.g. more or less incremental). The main point being that its orientation is reflexive (Grin, 2006).

This section considers recent planning research with regard to transformative change. Although planning has always focused on change, Beauregard (2005) notes that (traditionally) most planning theorists favour perspectives working within existing structures of power and privilege rather than those seeking to challenge them: “The goal of planning is not, however, the wholesale transformation of a society. Planners are not revolutionaries” (pp. 204). Planning is often more concerned with balancing various, sometimes contradictory, interests. Following criticisms that incumbent institutions, power relationships and practices are unable to bring about renewal needed to address social, economic, cultural and political changes/challenges (Albrechts, 2005) a gradual shift in the approach can be observed.

As we have seen above, planning takes place in complex societal systems. Recent planning research has begun to conceptualise exogenous factors similar to those discussed above or system internal moments of change and offer insights into how they can be utilised in facilitating transformation. In this regard, many scholars have emphasised the importance of agency in matching, anticipating, grasping (Dudley & Richardson, 2000; Filion & Mc Spuren, 2009; Albrechts, 2005; Healey, 2015) or even enlarging moments of change or structural opportunities, which can be both local or external (Healey, 2007, pp. 276). Pflieger *et al.* (2009) discuss: accidental events, crises, political change, technical innovation and changes at higher scalar levels, such as new programmes to subsidise innovation. Curtis & Low (2002), citing Torfing (2001, pp. 288), note that change starts with the dislocation of a policy path whereby the “limits to its capacity to inscribe and domesticate new events emerging at the local, national or global scales” become evident. Various studies provide indications into the focus of agency in relation to exogenous changes should take to promote fundamental change (see table 1.1).

Or course, as Pflieger *et al.* (2009) note, the combination of factors leading to change will be place specific as well as dependent on the technical (transportation systems), institutional, morphological (built environment) and political (policies) inertia. More generally, the importance of local specificity has been emphasised in planning (Healey, 2009; 2015). Healey (2009) notes that material and cultural history of urban area shapes what is desirable and possible. This short discussion shows that both in theory and practice planning is increasingly

Table 1.1 Focus of agency in brining about transformative change

Focus of agency	Source
Immanent critique of dominant paradigm, confronting paradigm on its own terms and showing it to be	(Dudley & Richardson, 2000)
Development of a coherent and well-articulated alternative paradigm	(Dudley & Richardson, 2000)
Politically effective individual actors	(Dudley & Richardson, 2000)
The existence of (or creation of) authoritative institutions standing outside and above the existing bureaucratic apparatus: exogenous institutions	(Dudley & Richardson, 2000)
The acknowledgement of multitude of publics and a more participative/deliberative/agonistic form of politics	(Albrechts, 2005)
The mobilization by these actors of networks of people with the capacity to exert influence	(Dudley & Richardson, 2000)
Strong leadership: key actors or organisations with dedication, expertise and courage	(Banister, 2005; 2008; Vergragt & Brown, 2007; Tan, 2013; Hormighausen & Tan, 2016)
A context conducive of experiments, innovations and learning	(Banister, 2008; Hull, 2008; Tan, 2013; Healey, 2015; Hormighausen & Tan, 2016)
A consistent long-term vision, combined with short-term actions	(Albrechts, 2005; Banister, 2008; Hull, 2008; Tan, 2013; Hormighausen & Tan, 2016)
Networking and knowledge exchange to share knowledge and exert political leverage	(Cross et al., 2013)
Political attention	(Filion & McSpurren, 2007; Bartholamew, 2007)
more specifically active citizen and lobby groups which can build critical mass and contribute to longevity of initiatives	(Hormighausen & Tan, 2016)
Community support	(Clifford et al., 2005)
which can be elicited by community engagement and storytelling making benefits clear.	(Harris & Moore, 2013; Banister, 2008)
Presence of education and educational institutes to raise awareness, retain focus and offer expertise	(Banister, 1996; 2008)

embracing the complexity of the urban setting and change within it in terms of the time scales, actors, sectors and scalar levels involved. Still, it also becomes clear that no integral framework of the transport and land-use system and ways of enabling its transformation exists that fully accounts for these many facets or offers a comprehensive understanding of processes of transformative change in the urban environment. Not only that, despite growth in recent years, the body of knowledge regarding how transformative change could be facilitated remains limited. This will be discussed in the next section.

1.2.1 Facilitating transformative change

Generally, traditional models of innovation were linear. This assumed a direct causal relationship between knowledge production and material impact in the real world, the predictability of actions and straightforward planning and gradual incremental change. The ensuing separation of disciplines and between research and practices was the result. It is becoming increasingly recognised that to address the necessity of fundamental change both new theories and ways of knowledge production will be needed that are able to create conditions favourable to the co-evolutionary development of new ways of thinking, organising and practicing (Loorbach, 2014). In planning, movement can be observed in this direction. For example, Healey (2009, pp. 451) emphasises that “framing work, like the process of probing the available knowledge about situations and issues, requires an expansive yet integrative, pluralistic yet synthetic, collective imagination,” which can lead to transformation of thinking about interests and trajectories. Important here is to consider the following: “who takes the initiative for change; what enjoys formal legitimacy and what other forms of legitimacy could buttress efforts; relations to others who are promoting ideas about urban futures or deploying resources, which result in place development; opportunities available to influence events and how to get nearer to other important levers in the process” (pp. 445-446); the position of strategy makers in governance context within landscapes of power dynamics and in debates and arguments. Recent planning research illustrates how this could be done in practice (see Healey, 2015) or has taken on the task of conceptualising and facilitating changes in understanding and approaching problems (Straatemeier *et al.*, 2010; Te Brömmelstroet, 2010; Tennøy, 2010; Næss, 2013; Soria *et al.*, 2016; Tennøy, 2016). For example, with regard to the way in which planning support systems are developed, the guiding thought is that “relevant innovations do not originate in an academic vacuum, but have to be developed in coproduction with intended users and in the context of their intended use. Only then can a reciprocal learning process between research and practice be activated in which original hypotheses about possible planning innovations are developed through iterative testing, reflection, and adaptation” (Straatemeier *et al.*, 2010, pp. 578).

Despite proving promising insights into how the learning process contributing to structural change could be facilitated, the experiments that have taken place in these studies have taken place in quasi laboratory settings with reduced complexity. Attempts at facilitating innovation in the real world (Bartholamew, 2007), suggest that more is needed than reflection and learning; this process must engage both conceptually and in its methods with incumbent practices and structures.

1.2.2 Knowledge gaps in planning

Based on this discussion a number of knowledge gaps can be identified related to:

- 1) **Structural opportunities/challenges:** the conceptualisation of the exogenous and system internal changes resulting in what have been termed structural opportunities. In periods of transformative change, these opportunities or moments of change related to both exogenous developments (e.g. climate change or economic crises) or system internal changes (e.g. increasing shortcomings of current, car oriented planning approaches) have been highlighted. However, their conceptualisation, and of their development and how they gain influence remain underdeveloped;
- 2) **Bottom-up societal initiatives:** initiatives established by engaged citizens and interest groups are seen increasingly as instrumental in bringing about innovation. In past transformative change, they can be observed as important in challenging dominant paradigms, starting experiments, exercising political influence and more generally exerting pressure for change. Despite this, their development, the way in which they gain influence in relation to more established actors and the aforementioned structural opportunities and their contribution to anchoring change is not fully understood;
- 3) **The practices of households and firms:** in planning, policy processes are often the object of study. However, the discussion above makes clear that sustainability cannot be achieved without change to intertwined practices. Based on the theoretical concepts discussed, the study of changes in practices in relation to the actions of institutional actors, initiatives and exogenous developments could offer extra explanatory power in understanding transformative change;
- 4) **The integration of the growing body of insights about how planning practice should change to be a force of change in light of the complexity of the urban reality.** The gap between planning knowledge and planning practice suggests that the linear model of knowledge development and dissemination is too simple. The development of new planning approaches

embracing the complexity of the urban environment with the involvement of practitioners as to improve the chance of learning and adoption of new concepts and knowledge would seem, based on the discussion, above to be a fruitful approach. Specific areas of focus should be:

- a. Finding a way to deal with conflicting interests in planning, as discussed above, which allows to find and exploit synergies with societal changes contributing to transformative change;
- b. Creating an environment supportive of transformative change through a collective process of learning leading to changes in structures and practices in the real world (see Merks, 2012, chapter 2).

In trying to address these knowledge gaps we turn to transition studies, where the *raison d'être* of the domain is to understand and facilitate transformative change.

1.3 The potential of transition studies for transformative planning

Transition studies is an area of study developed since the late 1990s drawing on diverse social theories (see Rip & Kemp, 1998; Geels, 2010) with the aim of both understanding transformative change and the pathways it takes (see Geels & Schot, 2007) and facilitate the governance of current attempts at transition. The object of study is the socio-technical system. This is a system for the organisation of a societal function (both production and consumption) and is characterised by co-evolution on a number of various dimensions, both social structures/institutions (e.g. norms, cognitive frameworks and discourses) and technological elements (artefacts) (Smith *et al.*, 2010). The focus has largely centred on the adoption of new technologies in sectors as energy, agriculture and transportation, although recent research has increasingly embraced the complexities of urban systems (e.g. Geels *et al.*, 2012; Vogel, 2014; Evans *et al.*, 2016; Sengers, 2016). Transition is considered structured social change that is the result of changes in intertwined systems that support each other (Grin *et al.*, 2010, pp. 1). Within a system, three levels can be distinguished: the landscape (quasi-autonomous macro-dynamics in culture, technology, society, politics, environment and the economy); the regime (stable social structures, practices and artefacts) and the niche (novel social structures, artefacts and practices). This 'multi-level perspective' (MLP; Geels & Schot, 2007) is seen as a middle-range theory (Geels, 2010; Smith, 2010). Transitions are seen as resulting "from the interaction between innovative practices, novelties, incremental change induced by actors who operate at the regime level and quasi-autonomous macro-dynamics, or the 'landscape' level" (Grin *et al.*, 2011, pp. 77). The conceptualisation of change presented is well suited to the developments we see in planning studies: attention for multiple actors, multiple levels of structuration

and sectors as well as the governance of transformative change. Below, per knowledge gap the potential contribution of transition studies is discussed.

- 1) **Structural opportunities/challenges:** as mentioned, transition studies conceptualises both the exogenous context (landscape and developments socio-technical systems) and how, through the interpretation by actors in regime and niche exogenous developments can exert pressure (Grin 2010, pp. 279-284, 297-300; Grin, 2012a);
- 2) **Bottom-up societal initiatives:** in transition studies these take the form of novel practices in the niche level which gain influence drawing on landscape and regime developments (Geels & Schot, 2010, pp. 81-89; Grin, 2006; 2010, pp. 271-274; Geels *et al.*, 2016). As such transition studies offers the potential to contribute to the understanding of how these develop and exert influence;
- 3) **The practices of users, households and firms, in the case of the transport and land-use system:** these have recently received considerable attention from authors emphasising the importance of practice theory in understanding societal transitions and integrating them into conceptual frameworks of transitions (e.g. Shove & Walker, 2010; Geels, 2011; Watson, 2012; Grin 2012b). As such transition studies offers the potential to account for their role in transitions;
- 4) **Governance concepts:** transition management (Loorbach, 2010; Kemp *et al.*, 2007; Roorda *et al.*, 2014) and reflexive design (Lissandrello & Grin, 2011, Bos *et al.*, 2009) offer a broad base of experience in how to facilitate learning and reflection in a deliberative process contributing to transformative change. Various authors offer ways to combine a rich understanding of the complexity of the current system, including its barriers to change with structured reflection about developments at the various structuration levels and in other systems (Bos *et al.*, 2009; Lissandrello & Grin, 2011; Schuitmaker, 2012; Roorda *et al.*, 2014; Irwin, 2015). These authors emphasise the importance of actively identifying and working with change agents (Roorda *et al.*, 2014), but also suggest the importance of focusing on the congruency of needs as a way to address seemingly conflicting short term interests (Grin & van der Graaf, 1996; Bos *et al.*, 2009).

1.4 Debates in transition studies

This research aims not only to contribute to planning studies, but also add to the body of knowledge in transition studies. It contributes to two debates in transition studies: (1) the debates regarding the conceptualisation of space and scale in understanding transitions and (2) the conceptualisation of

urban transitions where the historically developed and slowly changing built environment forms the artefacts, the interactions of various systems (energy, housing, transport etc.).

1.4.1 Space and scale in transitions

A growing body of work can be observed pertaining to space and scale in transition studies (see Coenen *et al.*, 2012; Næss & Vogel, 2012; Raven *et al.*, 2012; Binz *et al.*, 2014; Hansen & Coenen, 2015; Murphy, 2015; Sengers & Raven, 2015; Affolderbach & Schulz, 2016). This is a reaction to criticisms of transition studies as (1) insufficiently explaining geographical differences in transitions leading to the suggestion that transitions can happen anywhere and as having (2) a lack of attention for the scale with a focus primarily on the national level (see Bulkeley *et al.*, 2014). Interactions between actors at various scalar levels and locales have been ignored.

Given the importance of place specificity in transitions which are seen as “spatially and temporally differentiated processes and practices ... within specific contexts” (Coutard & Rutherford, 2010, pp. 723) understanding and supporting transitions in the urban context will be dependent on situated knowledge about the facets of the systems in question (see also Grin *et al.*, 2017). Accounting for contextual factors such as political environment and anticipatory knowledge of local transition managers (see Shove & Walker, 2007) has the potential to yield a richer understanding of “how local place-specificity shapes the formation of niches ... in and across different scales” (Hansen & Coenen, 2015, pp. 104). Sengers (2016) further supports this, emphasising that visions of the future - often seen as important in niche development - are place-based, spatially bounded and geographically specific. Conceptually, Coenen *et al.* (2010) suggest that proximity as discussed by Boschma (2005) provides a richer understanding of the development paths of niches in particular areas, but also emphasise that proximity advantages are, in some cases, the result of the actions of agents and not a priori given.

In terms of scale, many studies of transitions (e.g. energy, automobility) have tended to focus on the national level if they even discuss space at all. There appears to be also some conflation of the levels in the MLP with spatial levels. Affolderbach & Schulz (2016) emphasise that cities cannot be solely conceptualised at the niche level. The importance of studying the relationship between socio-technical spaces and other dimensions of space such as administrative and communicative, territories, and networks transcending them has also been suggested (Smith *et al.*, 2010). Coenen *et al.* (2012, pp. 976) state that “spatial context is all too often treated at best as a passive background

variable providing little causal explanation or theoretical purchase” and that transitions studies through the absence of attention for scales “overlooks the advantages, conflicts and tensions which arise in the wider networks of actors and institutions within which transition processes are embedded.”

Raven *et al.* (2012) and Affolderbach & Schulz (2016) have emphasised the value of taking a relational perspective with the potential of addressing these shortcomings. Building on the work of Coenen *et al.* (2010) on proximity, Raven *et al.* (2012) have proposed relational space where relative proximity is used to distinguish between niche (low proximity); regime (high proximity within a system) and landscape (high proximity across systems) whereby spatial scales are socially constructed through networks of actors and across territories. Coenen *et al.* (2012) also emphasise the delineation of regimes and niches based on networks. Berkhout *et al.* (2011) argue that niche (experiments) are embedded in transnational flows of knowledge, technology and other resources and assume their influence on local capability development, while Raven *et al.* (2012) suggest the trans-nationality of regimes. Sengers & Raven (2015), by presenting a spatialised niche model, have already attempted to address this. This model suggests the importance of narratives about local success/failure of transfer agents in hindering or supporting niche innovations, highlighting the multi-scalar networks and arenas in which these actors operate allowing for the transfer of ideas and ways of thinking. They suggest also more focus on the interplay between the local (actors, institutions, technology and resources) and networks of trans-local actors, something which can also contribute to better understanding the importance of local actors. That said, Hansen & Coenen (2015) suggest that the regime remains understudied in terms of geographical variation, although some (e.g. Späth & Rohrer, 2012) note regimes vary in their composition and strength between cities and regions.

1.4.2 Conceptual challenges in urban transitions

Studying transitions that take place in systems in urban areas, such as those in the transport and land-use system present a number of challenges. Empirical studies focusing on urban transitions (e.g. Sengers, 2016) have still tended to focus on transportation technologies as the object of transition, neglecting that the tight relationship between transportation and land-use means that land-use and urban form are also objects – not only contexts - of transition. With regard to the ‘technology’ or artefacts, critical planners and sociologists exploring the potential of transition studies have pointed out that the urban artefacts of buildings and infrastructure are much more obdurate than those in other systems (van Schaick & Klaasen, 2011) although Shove *et al.* (2015) have suggested that their use may change considerably (e.g. shared space in existing

streets or new functional mixes in existing buildings). Furthermore, cities always contain a diversity of ‘artefacts’, where no one type of artefact may be dominant (Næss & Vogel, 2012). Transitions will potentially be much more nuanced than the replacement of a dominant technology by another. For example, in the case of the European city where we already see a mix of transportation networks and forms of land-use transition could also involve ‘old’ artefacts (e.g. bike) or practices (e.g. mixed use). Moreover, artefacts such as historic buildings or urban district can also be cultural artefacts (Goss, 1988). Shove *et al.* (2015, pp.281) state that “infrastructures embody and carry historically specific ideas about normal and appropriate ways of living, effectively transporting these from one generation to the next.” These historic and cultural dimensions clearly add an additional layer of complexity in the urban environment.

The second challenge relates to the delineation of the system. In urban systems this is difficult given the tight relations between systems: a “multiplicity of webs of relations ... intersect and overlap in urban areas” (Healey, 2007, pp. 283). As some (e.g. Næss & Vogel, 2012) have noted a too narrow definition can lead to the suggestion that a sustainability transition has taken place where improvements were offset by less sustainable developments elsewhere. For example, increased densities in parts of a city or traffic management to reduce travel peaks, could be offset by increasing separation of functions or decreased densities elsewhere leading increased total traffic or even new (leisure) travel (see Munafò, 2015). In addition, as the discussion in section 1.1 suggests, transition will not (only) be a question of new technologies, but rather, one of shifting the balance in existing travel choices (e.g. towards the bike), ways of living/working (e.g. towards higher densities and emphasis on improved accessibility per alternative modes or even less mobility) and planning paradigms (e.g. prioritising these). The emphasis on practices by Shove *et al.* (2015), of which some are more sustainable than others, could provide an interesting way of theoretically addressing some of these concerns. For example, the study of conjoined practices and the nature of the links and bonds holding them together.

In sum, a number of interrelated conceptual and methodological challenges exist when attempting to study or support transitions aiming to address sustainability in transport and land-use: (1) the transformation of artefacts during transition and their influence on the course of the transitions; (2) the role of complex and interrelated practices, especially of households and firms; and (3) the numerous systems that converge in urban areas.

1.5 Summary and main research question

To conclude, transition studies would seem to have the potential in addressing

the four knowledge gaps in planning that are presented at the end of section 1.2. However, as researchers who have already attempted to study urban transitions have pointed out, the study of urban transitions will require more than the conceptual frameworks and methods used in other socio-technical domains. The built environment has both a cultural importance and in the city many systems and practices converge. The research discussed in 1.1 provides a starting point in the conceptualisation of the urban transport and land-use system to study urban transitions. However, the methodological challenges raised largely remain to be addressed. Space and place have recently been identified as knowledge gaps in the area of transition studies. The place-specificity of transitions has been largely embraced and taking a relational perspective in combination with a focus on interactions through inter-scalar networks, especially with regard to niche development have aided in addressing the aspatiality of transitions and the bias for the national level. Still, as discussed, there has been little attention for the understanding of how place-specificity matters in transitions; comprehensively understanding in which situations and for which purposes relations at different scales matter or focusing on spatial variations in regimes.

This thesis aims to address both the knowledge gaps identified in planning and those in transition studies by addressing this central question:

How can the conceptualisation of the transport and land-use system as a socio-technical system contribute to both understanding why and how transition takes place and facilitating current transition attempts?

1.6 Research approach and research questions

A three-step approach was employed to address this question. Each step is briefly highlighted here and discussed in more detail in the relevant chapters. The first step consisted of conceptualising the transport and land-use system as a socio-technical system including delineation of the system, the actors specific to the system and the interdependencies within it. The research discussed in sections 1.1 and 1.3 formed the basis for this exercise. To adequately answer the main research question, the resulting heuristic framework was employed empirically to consider the value in understanding and supporting transition attempts in the region of Amsterdam and refine it.

To study the value in understanding transitions historic ex-post case studies of transitions in the regional transport and land-use systems were carried out. The choice to focus on the regional level was informed by the understanding that an essential component of a transport and land-use transition are the

practices of households and firms. In planning and geography, the regional level has been seen as roughly corresponding to the functional urban area based on practices of households and firms and their interactions (Parr, 2004). Given the long period of time during which a transition takes place, a period of study from the 1945 to the present was selected. The choice for 1945 as starting point was made to be able to account for the post-war transition characterised by fundamental changes in many areas of the system resulting in increasing car mobility and spatial separation of functions. Initially, it was thought that the Second World War formed a caesura in urban planning; an assumption that in terms of deeper changes in thinking about urban transport and land-use or cultural and societal shifts proved overly simplistic. Finally, the pragmatic choice was made to consider developments in the period prior to 1945 when they were related to changes that manifested themselves in the cases study period. The cases selected, Munich and Zürich, were chosen based on three considerations related to the aim in using the results of the case studies to inspire reflexivity in supporting transitions (see point 4 in 1.3): (1) they were both cases where, based on secondary literature, transitions similar to that desired in many contemporary contexts (see 1.1.1), including the Amsterdam area as a potential 'receiving context' (see below), were seen to have taken place, (2) they were both located in Western Europe ensuring sufficient similarities in terms of societal, cultural, economic and political context between them and with the receiving context to ensure that practitioners would be open to learning from the cases, (3) at the same time the location in other contexts allowed for sufficient variation to account for the influence of context on the course and outcomes of transitions. The last phase of the research focused on developing a reflexive planning approach to aid in the development of strategies to facilitate transformative change in the transport and land-use system in order to address the pressing issues discussed in the beginning of this chapter. The case of application was the Amsterdam area. Progressive actors working at established organisations (municipalities, transport organisations and higher government levels) had already developed a vision of the future transport and land-use system and were actively working to realise it. In order to utilise the momentum and energy that were present and as the stakeholders were open to reflection and learning, rather than merely implementing their vision, we chose to take this as our starting point.

The sub-questions around which this thesis is structured and the corresponding methodologies are discussed below.

How can the regional transport and land-use system be conceptualised as a socio-technical system?

This question is addressed in chapter 2 by carrying out a literature review of the central concepts in the area of transition studies and theories focusing on change in transport and land-use planning. The result of this theoretical review is a heuristic framework combining the central elements of transition studies with Bertolini's (2012) interpretation of the transport and land-use feedback cycle (Wegener & Fürst, 1998). This cycle incorporates the key artefacts comprising the transport and land-use system as well as factors shaping its development (i.e. policy, activity and mobility demand as well as processes of demographic, societal and cultural change). The aim was to use this framework to carry out empirical research of historical as well as planning processes aiming at transport and land-use transitions. Following its development, the framework was tested and further refined in preparation for and following empirical research. In particular, in chapter 3 the concept of social structures is further developed and in chapter 4 the concepts of scale and place in transitions are further developed.

Why and how does transition take place in the regional transport and land-use system?

In Chapters 3 & 4 the framework developed in chapter 2 is used to carry out empirical research of historical transitions in two urban regions: Zürich and Munich. In these chapters, the usefulness of the framework is explored and conceptually refined to understand why and how transitions have taken place, or why they have not taken place. The refinements focus on the conceptualisation of structure, proximity and scale. Choosing two cases exhibiting an array of transition outcomes contributes to improving external validity of the findings. In chapter 3 hypotheses regarding these questions are generated using the case of Munich. In chapter 4 the hypotheses are further developed with the help of the case of Zürich.

How may the conceptualisation of the transport and land-use system as a socio-technical system be integrated in a planning approach to support transitions in this system?

This question is addressed in Chapter 5 by considering second order reflexivity with regard to existing social structures in the regime to be the starting point in transition. Drawing on insights in supporting reflexivity in planning (Healey, 2009; Hillier, 2007, Straatemeier *et al.*, 2009) and reflexive design (Schuitmaker, 2012, Bos *et al.*, 2009, Lissandrello & Grin, 2011; Irwin, 2015) an approach to support second order reflexivity in practice was developed. It aimed to encourage reflection on the causes of persistent problems ensuing from historically developed ways of approaching and addressing problems

as well as on new opportunities informed by a new image of the future and an appreciation of emergent developments in the landscape. To challenge incumbent ways of thinking we sought to go beyond compromises and aim for congruency (a course of action making sense for all actors involved, Bos *et al.*, 2009) and focus on new ways of defining and meeting the needs of key actors. Finally, the results were translated into concrete actions and interventions. The potential of this approach was tested by utilising it in a series of workshops carried out with planning professionals and niche actors in the Amsterdam region followed by interviews with the main participants and a comparison with traditional planning approaches.

In Chapter 6 the answers to these questions are discussed, reflection on the research is carried out and potential avenues for future research are presented.

CHAPTER 2

Transitions of transport and land-use systems in urban regions: a heuristic framework

Published as | Switzer, A., Bertolini, L. & Grin, J. (2013). Transitions of Mobility Systems in Urban Regions: A Heuristic Framework. *Journal of Environmental Policy & Planning*, 15(2), 141-160.

For a number of years, transport research has been devoted to the question of how to manage mobility in urban regions. The question is important because successfully managing urban-regional mobility can greatly reduce its environmental impact, decrease energy consumption, ensure that fewer traffic injuries take place and improve economic competitiveness and quality of life (e.g. Banister, 2008; Bertolini *et al.*, 2008; May & Marsden, 2010). The challenge is reaching a balance between reducing the negative effects of mobility and preserving the benefits it has brought society, such as increased quality of life, freedom and economic prosperity. In their efforts to address this issue, researchers have come to realise that co-ordinating transport and land-use planning at the city level can deliver a significant contribution (Banister, 2008; Cervero, 1998; May & Marsden, 2010). The underlying rationale is that if transport options are co-ordinated with the land-use densities and functions that are present at a certain location, and if for each trip, the most efficient choice from an economic and environmental perspective is rewarded, the mobility system can function most effectively (Bertolini & le Clercq, 2003). This is based on the idea that the transport and land-use systems are intertwined and influence each other (Wegener & Fürst, 1999). Consequently, the two systems can be considered as one. We use the term mobility system to describe this combined system. Recent years have seen considerable research about how the co-ordination between spatial planning and transportation planning can be realized (Banister, 2008; Cervero, 1998; Curtis *et al.*, 2009; Dunphy *et al.*, 2003; May & Marsden, 2010). Much is now known about what should be done in terms of design, as well as which measures should be taken and which governance strategies appear to be successful. Furthermore, examples from a number of countries show the results that can be achieved. However, in many contexts, implementation is lagging behind. It has become gradually clearer that the problems hindering a transition are not so much related to a knowledge gap about what should be done, but rather problems in the implementation of this knowledge (Banister, 2008; Bertolini *et al.*, 2008; May & Marsden, 2010).

The Netherlands is a case in point of a country where many attempts have been made to realize the type of integration described in the scientific publications discussed above, but where implementation has proved to be problematic. In the Netherlands, increasing attention has been devoted to improving the conditions for efficient travel choices (both in individual and collective terms) through the integration of all modes in the mobility system and co-ordination between transport supply and spatial development, as well as other incentives such as mobility pricing and marketing. Many of the plans and policy documents published in the Netherlands in recent years emphasise the importance of co-ordination between transport and land-use planning, as well as the integration

of different modes of transport at urban-regional level (MVROM, 2008, pp. 8, 2010a, pp. 15; MV&W *et al.*, 2006, pp. 51; OV-bureau Randstad, 2010, pp. 8). Essentially, plans aim to develop what can be considered an integral (land-use and transport) and multi-modal urban mobility system. Since the turn of the century, two main attempts have been made in the Randstad region of the Netherlands to achieve these goals (by Stedenbaan in the southern part and MRA-Net in the northern part). They aim to achieve better co-ordination of transport and land-use planning, integration between modes of transport and improved quality in public transport in order to address the needs of citizens and firms for increased flexibility while coping with negative impacts of mobility such as congestion and deterioration of the natural and human environment (Goudappel Coffeng, 2010; OV-Bureau Randstad, 2010).

Nevertheless, road and other public transport networks still do not function as a complete, integrated network in the polycentric Randstad region. They offer sub-optimal connections between the region's urban centres. The poor performance of the transport system has resulted in heavy congestion in the road network, which is seen as a threat to the environment, economy and quality of life of the Randstad (AmCham, 2009; OECD, 2007, 2010). Despite extensive attention to co-ordination of transport and land-use planning and the development of multi-modality with an integrated public transport network as the backbone of the urban region of the Randstad, few of the proposed interventions have been realised. This has served as motivation for much research that both implicitly and explicitly deals with barriers that have hindered the realization of these goals (de Boer, 2010; MVROM, 2010b, pp. 25; Spies *et al.*, 2005; Switzer, 2010; Tan & Bertolini, 2010). Related to this research, a number of reports in the Netherlands have increasingly begun to examine how barriers can be overcome (Commissie Everding, 2008; MVROM, 2010b; MV&W, 2008; Raad voor Verkeer en Waterstaat, 2011). Despite this input, implementation is still problematic and practitioners have, as in other countries, increasingly turned to researchers for advice on how to deal with this problem.

There are, as yet, no 'ready-made' answers. Despite the number of scientific publications dealing with ways of overcoming implementation barriers, there is still little insight into how transformative change of an obdurate mobility system can be brought about in a desired and fresh direction. There are, however, interesting insights in other domains, particularly in the area of transition studies. Considerable research has been carried out to understand why bringing about change in existing practices is often so difficult and unsuccessful, and how to deal with this (Geels & Schot, 2007; Grin *et al.*, 2004, 2010; Rotmans & Loorbach, 2010). In this depiction, so-called persistent problems obtain

their longevity from the fact that solutions tend to focus on new practices or new technologies, but neglect necessary changes in incumbent social (e.g. state and market institutions, dominant discourses, norms and heuristics) and material (artefacts) structures, which have inertia and may allow resistance against change in practices. The transition approach, rather than objectifying the socio-technical, opens it up as co-constituted by governance efforts (Smith & Stirling, 2007; for a discussion of some of the intricacies of governing long-term change, cf Voß *et al.*, 2009). Material and social structures are supposed to have co-evolved with each other and with the practices that they facilitate. To bring about change in one element is likely to require changes in other elements over a long period of time. Neglecting this connection, or failing to address it, generates persistence in problems. Conversely, transition studies have yielded insights into the ways in and the conditions under which changes in different elements may come to reinforce each other in a larger, coherent, long-term transformation – a transition leading to a novel ‘system state’ that privileges different practices.

This article attempts to understand how transition theory can be used to generate relevant insights into the development of the mobility system. In doing so, it hopes to contribute to a better conceptualisation of the mechanisms of change in the system and of the possibilities of influencing that change. Additionally, the application of the theories in transition studies to a specific socio-technical system provides the opportunity to test the usability of these theories in a practical case which has only partially and unsystematically been explored thus far. First, central concepts and insights of transition studies will be discussed and supplemented to strengthen the conceptual power of these theories. Following this, a discussion of how the mobility system can be conceptualized as a socio-technical system will take place. Key in this phase is the combination of the transport land-use feedback cycle, a commonly used conceptual model of how the artefacts in the mobility system evolve, with insights from transition science dealing with how social structures and actors contribute to the evolution of socio-technical systems. Finally, a focusgroup session in the Randstad will be used to test the usability of the model in a practice environment. The heuristic framework developed in the article will later be used to analyse and interpret cases of mobility transitions in the past and, finally, to explore strategies to support the attempts to bring about a transition in the Randstad.

2.1 Transition Studies

In order to remedy persistent problems, mutually coherent changes in all elements are necessary; and this can be achieved with a system innovation.

Different system innovations (in different elements) may, together, give rise to a transition of the wider system; a transition, as such, is a structured social change that is the result of changes in intertwined systems that support each other (Grin *et al.*, 2010, pp. 1). Transition studies are devoted to understanding the dynamics and governance of transitions. In this section, we discuss the main notions and insights of these issues that may help understand how to deal more effectively with persistent problems.

2.1.1 The Conceptual Foundations from the Transitions Perspective

The concept of co-evolution forms part of the basis of transition science. This means that the development of various sub-systems that make up a socio-technical system influence the development of other sub-systems in a way that is irreversible (Kemp *et al.*, 2007). According to Geels (2005a), these sub-systems are: socio-cultural, users, market, technological, policy and scientific.

A widely used concept from transition studies is the multi-level perspective (MLP) (Geels & Schot, 2007) (see Figure 2.1). Its basic claim is that “transitions result from the interaction between innovative practices, novelties, incremental change induced by actors who operate at what we call the regime level and quasi-autonomous macro-dynamics, or the ‘landscape level’” (Grin *et al.*, 2011, pp. 77). In MLP terms, transitions occur due to prolonged (typically several decades) co-evolution between and within various levels.

As discussed in more detail by Grin (2008), transition studies are rooted in socio-technical studies – more specifically, in studies of historical processes of socio-technical change (Geels, 2005b; Schot, 1998), as well as in a review of a range of theories about societal and technical change (Rip & Kemp, 1998). Common to both origins is the (loose) use of especially early evolutionary theory (e.g. Dosi, 1982; Nelson & Winter, 1977, 1982) as a canvas, as well as the notion of structuration – that structure is both the medium and the outcome of action (Giddens, 1984). The three ‘levels’ must, therefore, be understood not as geographical levels, but rather as levels of structuration and temporal scale. In line with such understanding, the unit of analysis may be chosen in a way that meets important criticisms of this point (Genus & Coles, 2008). Points of departure are the specific, interrelated set of practices one is interested in; regime and landscape may then be identified on a basis of how they express themselves in these practices (Grin, 2008). The fact that our choice for the mobility system in an urban region is comprised of a set of practices hanging together in a geographically delineated region is consistent with that idea.

2.1.2 Operationalising the Levels

In order to apply transition studies to mobility systems, it is necessary to discuss each of the levels of the MLP more operationally. The landscape is comprised of long-term exogenous trends (like Europeanization or the emergence of a network society), but may also include crises that may give rise to rapid change (e.g. the financial crisis). As Geels & Schot (2007) point out, it includes macro-political and macro-economic developments and deep cultural trends. Additionally, demographic and technological developments, as well as developments in the natural environment, are seen as part of the landscape. The quasi-autonomous nature of the landscape means that the developments here cannot be directly influenced, as such, by individual actors. However, the way in which they shape local practices and structures involves local agency. Furthermore, they are eventually the aggregate result of individual actions at multiple loci.

A regime can be considered to be the dominant configuration of the socio-technical system at a certain time and is composed of practices, rules and artefacts. Geels (2004) states that the practices of actors in a regime are supported by institutions or rules that, in some cases, can be internalised by these actors. These can be regulative (policy, laws, regulations and procedures), normative (roles and mechanisms that work through socialization, adaptation pressure, social authority and rewards and sanctions) and cognitive (belief systems, problem agendas and search heuristics which are deeply rooted and used to interpret problems). The material artefacts of a regime are intertwined with the practices and rules and have evolved in a co-evolutionary process (Smith *et al.*, 2010). Due to the presence of established practices, rules and artefacts, the regime exhibits a certain obduracy and can be considered to be path dependent. Socio-technical novelties are, by their nature, not dominant in the system, but can form an alternative for the regime. They have their own practices, rules and artefacts, which are not stable. In transition literature, the concept of the niche is often used to describe what we consider to be novelties. We suggest that (cf. Grin, 2010, pp. 265 ff) in a niche, novel practices, rules and artefacts can be developed while exposed to – or protected from – the influence of the regime. The niche offers protection from the influence of the regime where the practices, rules, and artefacts, which are not completely developed, can stabilize. In the early stages of the development of novelties, this instability means that it demands considerable effort from novelty actors to keep the practices, rules, and artefacts of the novelty stable (Geels & Schot, 2007). The distinction between a novelty and a regime is, however, according to Smith *et al.* (2010; cf. Genus & Coles, 2008), not entirely clear. Nevertheless, the functional definitions described above are more important

Increasing structuration
of activities in local practices

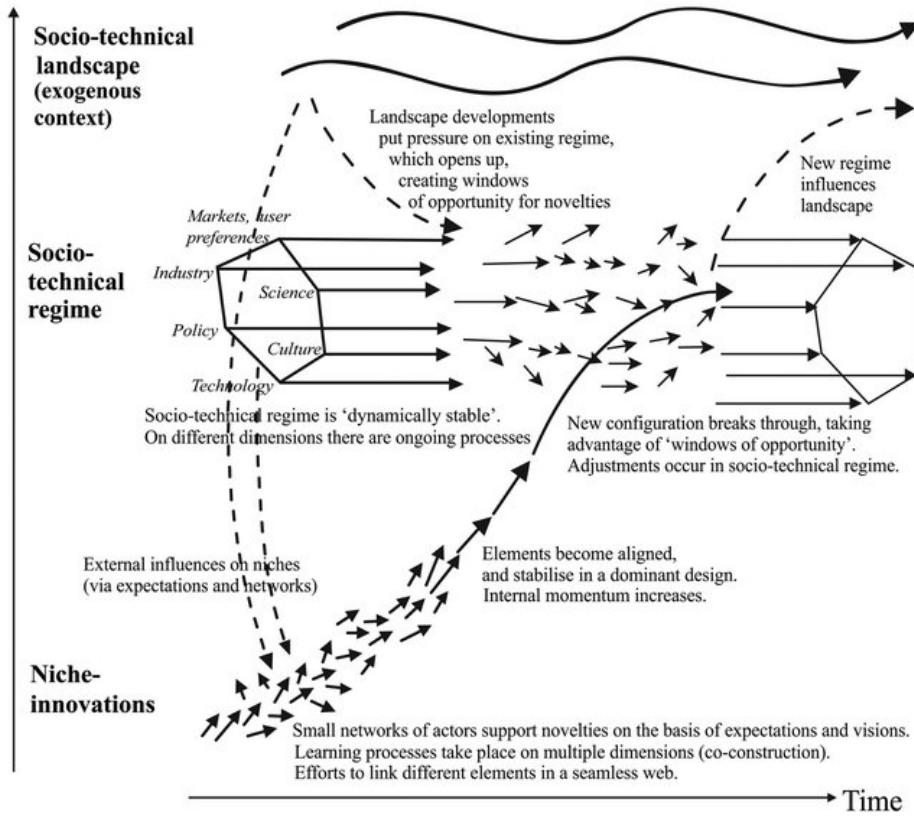


Figure 2.1: The Multilevel Perspective (Geels & Schot, 2007)

than the question of how much overlap there is between levels. Novelties may eventually develop into more full-fledged, stabilized structures or be incorporated in changes of the incumbent regime.

2.1.3 Understanding Transition Dynamics

Transitions occur due to prolonged co-evolution between and within various levels. The socio-technical perspective (by Geels & Schot, 2007, who base themselves on a sound review of different evolutionary approaches) and the complex systems view (by Rotmans & Loorbach, 2010, who combine the notion of co-evolution with complexity theory) have led to typologies of transition trajectories that represent how such reinforcement may develop over time. Abstracting from their differences, they both basically depict two main routes (Grin *et al.*, 2011): one starting with novel practices in the regime that either define, legitimate or bring about regime changes that enable further

development of novel practices, etc. and one starting from instabilities at the regime level (that may arise from landscape pressure, as well as from internal tensions within the regime) that create a need and room for novel practices, which then further destabilize and change the regime, and so on.

From a governance perspective, a crucial addition is that actors engaged in changes at these various levels actively and reflexively ‘reach out’ to changes at other levels (Grin, 2006, 2010, pp. 274 – 275), ‘translating’ developments at one level into the need for changes at another level (Smith, 2007). This focus on agency has been partly inspired by critics (e.g. Meadowcroft, 2007; Shove & Walker, 2007; Smith *et al.*, 2005) who have stated that in the MLP there is not enough attention on how actors may influence practices, rules and artefacts that form the regime and the landscape. To some extent, as far as novelties are concerned, it is already clear from transition studies that actors play a central role in establishing the practices, rules and artefacts of novelties and keeping them stable. The question as to how change can take place from within a regime, however, is much less trivial, as is the question of how novel practices may contribute to regime change rather than reproduce the incumbent regime.

Grin (2006, 2008, 2012) and Geels & Schot (2010) state that Giddens’ (1984) structuration theory helps understand the dialectic relationships between innovative agency and structure. Practices have a strongly structured and normalizing character. Through his actions, the actor creates a social life, but his freedom is limited by unintended consequences and known limitations (Jacobs, 1961). Through the reproduction of structure during the process of acting, the structure can change as a result of these limitations to the freedom of individuals. An example is the change in some social structures in the last decades as a result of the realization that our travel behaviour has negatively impacted the climate. The result is that some people have gradually attempted to make their travel behaviour more sustainable to limit these negative impacts. In other instances, however, the actions of individual actors are rather responsible for the continuation of the incumbent regime.

2.2 Transition Studies and Change in the Mobility System

In this section, we will depict the mobility system in urban regions in a way that we may relate it to transition studies. First, the main elements of the socio-technical system will be discussed. Next, the conceptual framework presented in the previous section will be applied to the mobility system to develop a new conceptual model for change in the mobility system. Finally, the model will be illustrated using examples of the various elements.

A number of authors (Batty, 2005; Bertolini, 2010; Healey, 2007; Karadimitriou, 2010) have described planning in urban areas as complex and open to social processes with evolutionary characteristics. This seems to support the conceptualization of an urban region as a complex system in the sense implied in the MLP. The mobility system in such a region, given the relationship between this system and the rest of an urban region, can likely be considered through this same perspective (Shove & Walker, 2010).

One of the main theories about how the mobility system changes is the transport land-use feedback cycle as for instance conceptualized by Wegener and Fürst (1999) (see Figure 2.2). According to this model, travel between the places where different activities take place generates demand for mobility, which needs to be accommodated by changes in the transport network. These changes lead to changes in accessibility at certain locations, which in turn, influence which land is developed and the characteristics (density, functions and design) of the development. In turn, land-use change influences which activities are undertaken and where this occurs, as well as the choice of transport mode.

Bertolini (2012) builds on the work of Wegener and Fürst (1999) by adding internal complexities and external influences to the model (see Figure 2.3). According to Bertolini (2012) land-use is influenced by not only accessibility, but also the availability of land, characteristics of the surroundings, spatial policy and the economic dynamics of the region. Activity patterns are also influenced by individual characteristics of households, businesses and the broader socio-economic context (and to a larger extent than spatial factors). The development of the transport system is influenced by not only mobility demand, but also by relatively autonomous supply developments (policy and

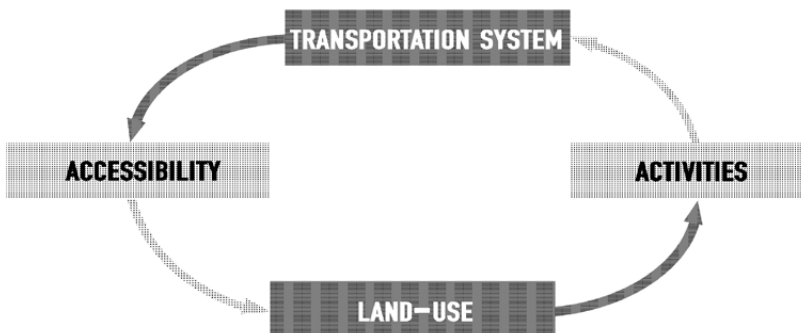


Figure 2.2: Transport Land-use Feedback Cycle (Wegener & Fürst, 1999)

technology). The reaction times also vary within the cycle. Activity patterns change rapidly, but changes in land-use and the transport network require much more time. This results in short-circuits and contradictory actions. For instance, a decrease in accessibility as the result of congestion can lead to changes in activity patterns without changes in land-use.

2.2.1 *The Conceptual Model of the Socio-Technical System Applied to the Mobility System*

The transport land-use feedback cycle shows how the development of artefacts that make up the mobility system influence each other. Bertolini (2012) has already made a first attempt to incorporate several nuances into the model, but still the role of actors is not explicit, nor is the role of exogenous developments.

The insights from transition studies discussed above can help articulate this further. In the mobility system, the land-use and the transport network (two main material regime elements) change relatively slowly (as regime elements usually do) and (as structuration theory tells us) rarely spontaneously. Individual competent actors' reflexive agency is important. Actors can be public policy-makers, property developers, public transport companies, interest groups (including companies, scientists and activists) and firms and citizens who make choices about where to live and work, how they spend their free time and the mode of transport they choose. The actions of these actors are influenced by the rules in the regime, as well as expectations about the future, and are a reaction to developments in the landscape, other systems or the actions of other actors.

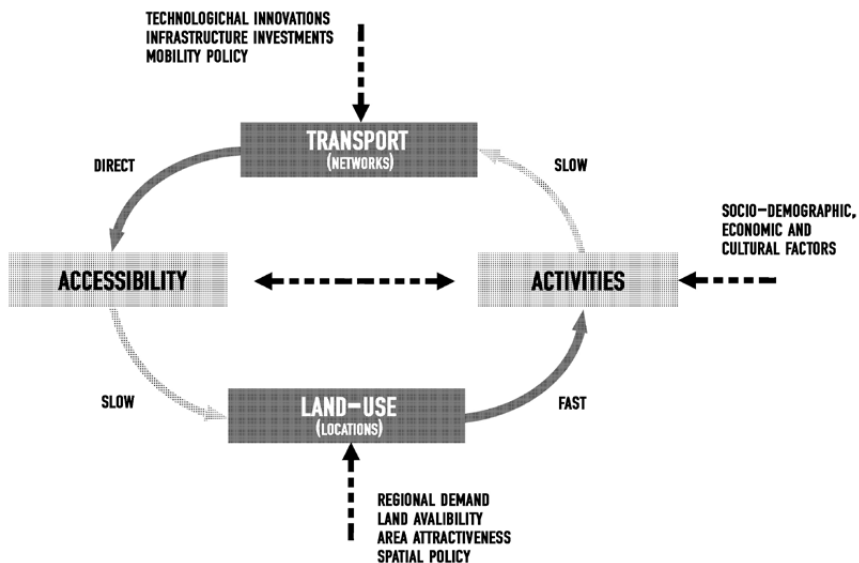


Figure 2.3: Transport Land-use Feedback Cycle (Bertolini, 2012)

Figure 2.4 shows how the mobility system can be re-conceptualized in a transition perspective. The scheme is primarily intended as a heuristic framework, explicitly based on the recognition that governance and the socio-technical shape each other, and designed to inform what Smith and Stirling (2007, pp. 364) have called reflexively acknowledging multiple framings of socio-technical practices. More specifically, by using the term ‘heuristic’, we mean that the scheme is primarily intended to structure the debate among different stakeholders, help them see interdependencies and dynamics in the urban mobility system (thus better understanding if and how change can be influenced) and both their and others’ possible roles therein. Furthermore, heuristic means that the scheme is a starting point and one that can and must be improved through the understanding brought by the stakeholders in a specific situation. In this, parallels can be drawn with emerging insights in the literature on the role of decision support tools, analytic models in general and policy-making, including in the field of transport and land-use planning (see e.g. Te Brömmelstroet & Bertolini, 2010, 2011).

Moving to the content of the scheme, in terms of land-use what we consider ‘spatial policy’ is determined by policy-makers from government, but also by property developers who place priority on developing certain locations. Furthermore, interest groups can also play a role in determining what land is made available for development and for which functions. It should be noted that the use of the word ‘policy’ in this context is quite broad and is an aggregation of government policy, but also the actions of businesses that are involved with the development of land or – as we will see later on – transport networks. Citizens and firms react to the availability of land and make choices about where to live, work and spend free time or to set up operations. Included here are decisions that citizens make regarding the mode of transport to be used. This and the decisions about activities generate demand for transport. This demand results in patterns in road or public transport network use which send a message to mobility policy-makers. In a process similar to that which determines land-use, policy-makers from government, transport companies and interest groups react to, anticipate and may even try to shape these developments on the demand side. Changes in accessibility as a result of these decisions are interpreted as opportunities and threats by the actors, mentioned above, that determine spatial policy. However, the choices of firms and households can affect accessibility conditions even without any mobility policy intervention (e.g. the impact of increased congestion). Conversely, changes in accessibility could lead to new activity and mobility choices even without the mediation of spatial policy (e.g. new location or transport choices following a decrease or increase in accessibility). In other words, the system can change in the absence of policy intervention, as well. This

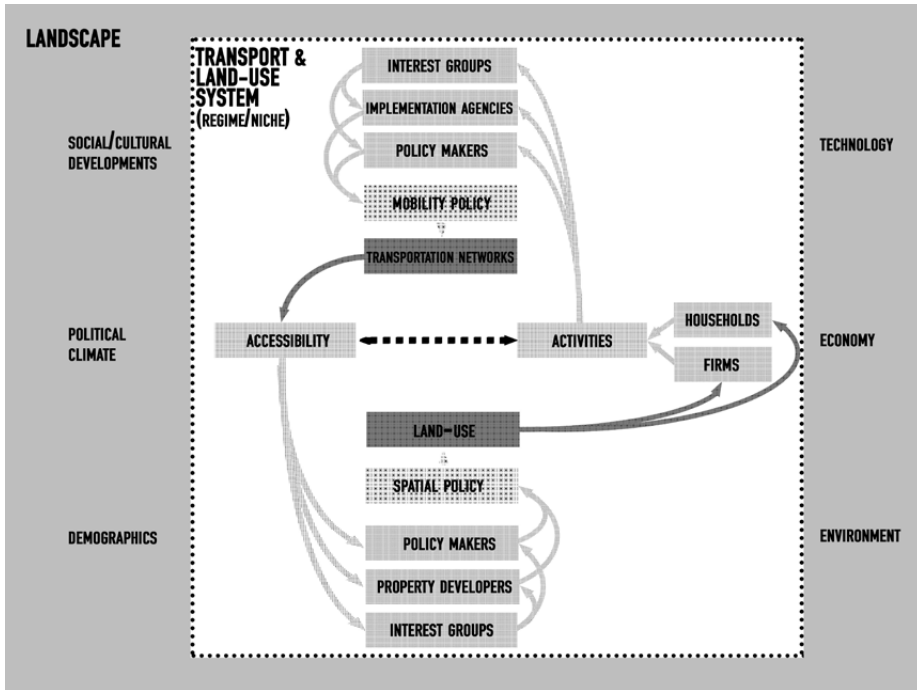


Figure 2.4: Conceptual model of the mobility system

Transportation network and land-use are two crucial material elements of the regime; other regime elements are not being mentioned. The green boxes refer to policy practices, the green ones to societal practices. The figure does not distinguish between incumbent and novel practices and associated structural elements

is indicated by the arrow linking accessibility and activities.

The landscape is composed of demographics, deep cultural trends, technology, macro-economic developments and macro-political developments. It is continually in flux and exerts pressure on actors in the mobility system with different intensities and at different speeds. In terms of the spatial components of the system, the growing preference for urban living can, for example, be explained based on these developments. Policymakers, property developers and interest groups react to (or anticipate and try to shape) these developments and the actions of others when developing spatial policy. Their practices are influenced by other regime elements, namely rules (not shown in the figure). Concerning mobility practices, the preferences of citizens in terms of modes of transport are influenced by economic, social and cultural trends. The choice of transport mode is one of the best-studied examples of how the structuring influence of regime and landscape can influence the choices of actors (Dennis & Urry, 2009; Dupuy, 1995, 2005; Sachs, 1990; Urry, 2004). Landscape development

may support the existing regime, but also create windows of opportunity for the emergence of novelties. The current rise of the bicycle in certain cities could be seen as an example of how change in the landscape is helping the emergence of a novelty. The increasing costs of car use (resulting from economic and environmental developments) and shifts in cultural preferences as a result of the changing image of the bicycle could be responsible for the increasing popularity of this mode of transport in some areas.

The impacts of landscape developments are, because of the presence of the stabilizing social elements of the regime (rules), delayed (Geels & Schot, 2007; Grin *et al.*, 2004; Smith *et al.*, 2010). Regulatory rules prevent certain actions and normative rules make certain actions preferable to others. Finally, cognitive rules determine, at a higher level of abstraction, how problems are defined and how solutions are sought. Under new conditions, these rules can lead to 'tunnel vision' because of their obdurate nature.

2.2.2 *Comments on the Model*

At first sight, it can be argued that an unlimited number of arrows could be added to the model shown in Figure 2.4. This especially goes for the interest groups because the category is so broadly defined and they could use a broad range of actions, including marketing campaigns, information campaigns and power (resources or social capital) to influence the decisions of other actors. Concrete examples could be businesses that appeal to emotions of individuals, scientists that attempt to diffuse knowledge and governments that attempt to influence the behaviour of citizens. All of these actors have their own interests whereby their actions cannot be considered neutral. It is also possible that one actor could represent several actors in the model. The government can function as policymaker, firm and interest group. The same is true for businesses, which can act as an interest group, but also make decisions about the location of the business.

In the mobility system structure can be considered to take form in three different ways. First, this is determined by developments that occur on a national or global scale – cultural, economic, social, demographic, environmental or technological developments are the most prominent types. Second, the aggregated preferences and needs of citizens form a part of the structure in which actors involved in planning the mobility system at the regional level are active. Third, the artefacts (existing built environment) and rules in the regime have a determining role. Structure and agency (the actions of individuals) must be seen together. However, the extent and speed with which this occurs varies. It can also not be ignored that feedback between actors and structure is present.

The rules in the regime have been created and are maintained through this process. Shocks or gradual developments in the landscape and signals from other actors can lead to developments in these structures. An example is the influence that scientists can have on the rules of policymakers. For instance, by sharing information about the functioning of the mobility system through learning-oriented work-shops, cognitive or normative rules could be changed (Straatemeier *et al.*, 2010). The aggregation of the decisions of all individual actors can influence the cultural, social and political landscapes. In terms of economic, environmental and demographic landscapes, the possible influence will be smaller. To keep the model simple, not all feedback lines are shown. However, the components and relationships depicted in Figure 2.4 can be considered as the primary ones.

Another observation that can be made is that the concept of the novelties offers insights into how innovations in the regional mobility system can be realised. Novelty actors are, to preserve simplicity, not separately shown in the model. As has been stated above, the novelty resembles the regime, but is characterised by less internal co-ordination. This means that similar social elements, as described above, are present, but less stable. It is expected that a novelty can be created as a consequence of the actions of one or more actors and subsequently stimulate other actors, leading to change in the system. According to Smith *et al.* (2010), the value of the novelty is the fact that lessons can be learned through experiments. Also, the supporting conditions can be created and institutions can be developed that stabilise the novel development. Examples in the present Dutch context are (at a lower level of structuration) the OV-Fiets (rental bikes that are available at many train stations at a low price), car sharing, TomTom navigation systems with multi-modal travel advice and (at a higher level of structuration) examples of transit-oriented development (TOD). Some examples, such as the OV-Fiets, are novelties in the transport system and have little to do with spatial developments. This is not to say that further development of this novelty could not influence spatial development patterns. TOD is an example of a novelty that has both a transport and a spatial component. None of these novelties have been able to overcome the mobility system regime, so far. However, they could hold the seeds of change. All regimes were once a novelty, including the current car-dependent regime (Geels & Schot, 2007).

2.3 Testing the Heuristic Value of the Conceptual Model in Practice

In May 2011, a focus-group session was carried out with stakeholders involved in transport and land-use planning in the Amsterdam region. The actors represented the NS (Dutch Railways), the City Region of Amsterdam, the

Province of Noord-Holland and the Municipality of Amsterdam. The objective of the session was to assess the usability of the conceptual model as a heuristic instrument (in the terms clarified in Section 2.2 above). Subsequently, the results of the session were pre-sented to participants for verification.

The session consisted of two parts. First, the research programme and the model were presented. Those present were told how the model was developed and were shown what were considered to be the desired transition based on policy documents, often produced by the same participating stakeholders (see Figure 2.5). Participants were given the opportunity to ask informative questions or criticize the interpretation.

In the second part of the session, participants had to fill in the model (as depicted in Figure 2.4) based on their day-to-day experiences in attempting to achieve a transition. Initially, the model received little criticism. The discussion started immediately and dealt primarily with barriers that hinder the realization of the desired transition. However, during the session, several suggestions were made to improve the model. It was suggested that the term ‘transport companies’ be replaced with ‘transport implementation agencies’ to reflect the fact that other actors, including Rijkswaterstaat (responsible for road construction) and the WGR+ regions (responsible for the development of public transport routes and tendering), among others, would also be covered by this term. Furthermore, as witnessed during earlier discussions of the model, it needed to be clarified that the boxes with different functions were about roles and not specific actors. For instance, an actor such as the NS can function as a property developer, a transport company (implementation agency) or a firm that makes choices about where to locate its offices. As far as mechanisms supporting or impeding the transition are concerned, the themes covered can be divided into two categories: barriers for the desired transition and system developments that are taking place. These are systematically handled below and are shown in their original form in Figure 2.6. It is important to note that the purpose of the discussion below is not to be exhaustive or consistent about the factors relevant for a transition of the mobility system in the Amsterdam region, but rather to document the sort of issues raised by the discussion of the model and, hence, be evidence of its heuristic value. A more comprehensive and coherent picture will be pursued in later phases of the research.

2.3.1 Barriers

Most time was devoted to discussing barriers in one form or another, as barriers for the desired transition in the region that underlie the persistence of mobility problems are the motivation for this research. One major problem

mentioned by participants of the focus group was a lack of continuity in political commitment and shifting priorities (e.g. liveability, sustainability, economic competitiveness, devolution), as well as a focus on short-term results. From a transition perspective, underlying this lack of political persistence is the difficulty of reflexively scrutinising relevant elements of the incumbent regime. Using the heuristic scheme (Figure 2.4), the following barriers were identified:

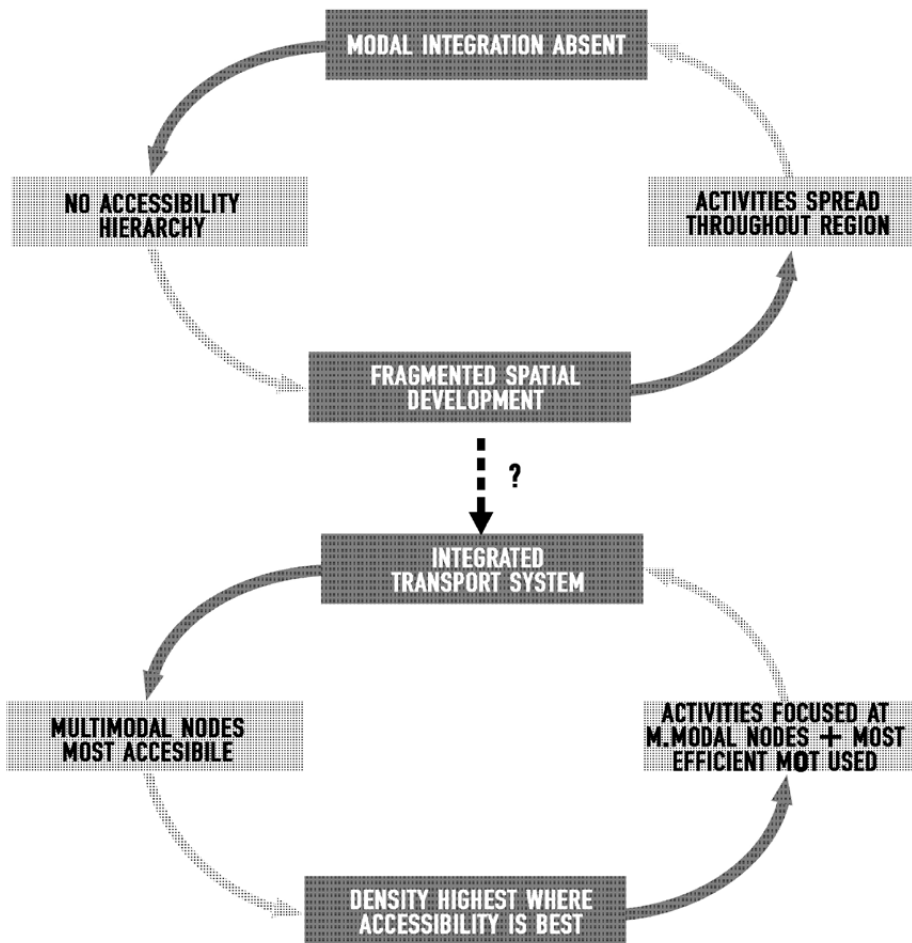


Figure 2.5: The desired transition in the Mobility system

- Transportation models (technology), used as a basis for policy-making, often do not include the bicycle and inter-modality. Investment assessment models (such as cost – benefit analysis) pose similar problems as they do not seem to adequately account for non-travel-related, longer-term implications.
- The institutional configuration of the administration of public transport is considered by some to be a barrier, while others see the lack of decisiveness and co-ordination between different administrative levels to be the real problem for TOD.
- Rules and laws in the form of concessions for public transport and the lack of legal instruments to support TOD were seen as a problem.
- Along the same lines, regulations dealing with nuisances, the separation of the parties that carry the costs and benefits from development and the separation of transport and land-use planning in government were seen as barriers.
- Along the same lines, regulations dealing with nuisances, the separation of the parties that carry the costs and benefits from development and the separation of transport and land-use planning in government were seen as barriers.

These barriers may serve as indicators of problematic regime elements that should be included in the transition (Grin, 2010; Grin *et al.*, 2004). Unhelpful in this transition were two other factors mentioned by participants in the discussion. First, an active public transport lobby that could promote public transport enhancement is lacking in the Netherlands (interest groups deal primarily with the equity aspects of public transport or local impacts of large infrastructure projects and not with improving performance). Second, the financial crisis has created a climate of risk aversion. Thus, strategies that focus on promoting sustainable mobility practices and rely on politicization of the environmental effects of the existing regime seem hardly promising as they require involvement of green-policy entrepreneurs, as well as risk-taking elected politicians (cf. Hysing, 2009). Yet, our heuristic framework could also help find developments in the mobility system that may be pivotal in raising sufficient social support for overcoming the barriers identified by reflexively scrutinizing incumbent practices and identifying alternatives, recognizing that doing so may constructively interact with changing the power differentials implied in the incumbent regime (cf. Grin, 2012; Meadowcroft, 2007). These are discussed below.

2.3.2 *Developments in the Mobility System*

During the focus-group session, Figure 2.5 also inspired some discussion about the direction in which the mobility system is developing, which novelties could

be emerging and what landscape trends might have relevant impacts, both facilitating and hampering a transition. This took us beyond mobility practices, rules and artefacts. On the transition-hampering side, and among other things, this was related to the future of public transport that in its present form is only suitable for certain groups at certain times in the day (students; rush hour) and cannot cope with the changing life patterns of many individuals (see Harms, 2003). At the same time, the opportunities for alternatives to the car seem to be changing more favourably due to another landscape trend – a growing preference for urban living has led to unprecedented growth in Amsterdam since the Second World War. Furthermore, businesses increasingly choose to locate where the right employees live as a result of a shrinking workforce (demographic change). Cultural preferences are also seen to be changing with an influence on the regime whereby people must justify why they choose to buy a car.

One of the novelties mentioned was the emergence of novel working practices. Specifically mentioned was *seats2meet* – a concept where workplaces and meeting facilities are available at major train stations – and was seen as something that could influence the preferences of business people to use public transport. According to some of those present, public transport can also benefit from the growing need for flexibility as it offers people the opportunity to be productive while travelling. Also, the status of the bicycle was seen to be changing as a result of individualization as it is increasingly being seen as a part of the identity of the owner (something that also occurred with the car in the past). A suggestion was made that additional transition dynamics be created through building alliances with other sectors (systems), such as water management, that aim to achieve similar goals (in this case, limiting building to urbanized areas) even if the reasons are different. Finally, the participants see the need for promoting changes in cultural preferences. Inspiration could come from different contexts. For instance in Asia, living near a public transportation node is seen as living in an accessible location, while in the Netherlands having access to a car is seen as having accessibility. This is partly due to different transport and land-use conditions, but is also a matter of perception.

2.3.3 *Evaluation*

During the session, the model, with minor modifications, was largely accepted and appreciated by participants. Furthermore, considerable new information was collected and shared about the development of the mobility system, barriers that inhibit its transition along the desired lines and, perhaps, emerging windows of opportunity. In conclusion, we think the exercise has demonstrated that the model has heuristic value for developing strategies, based on novel

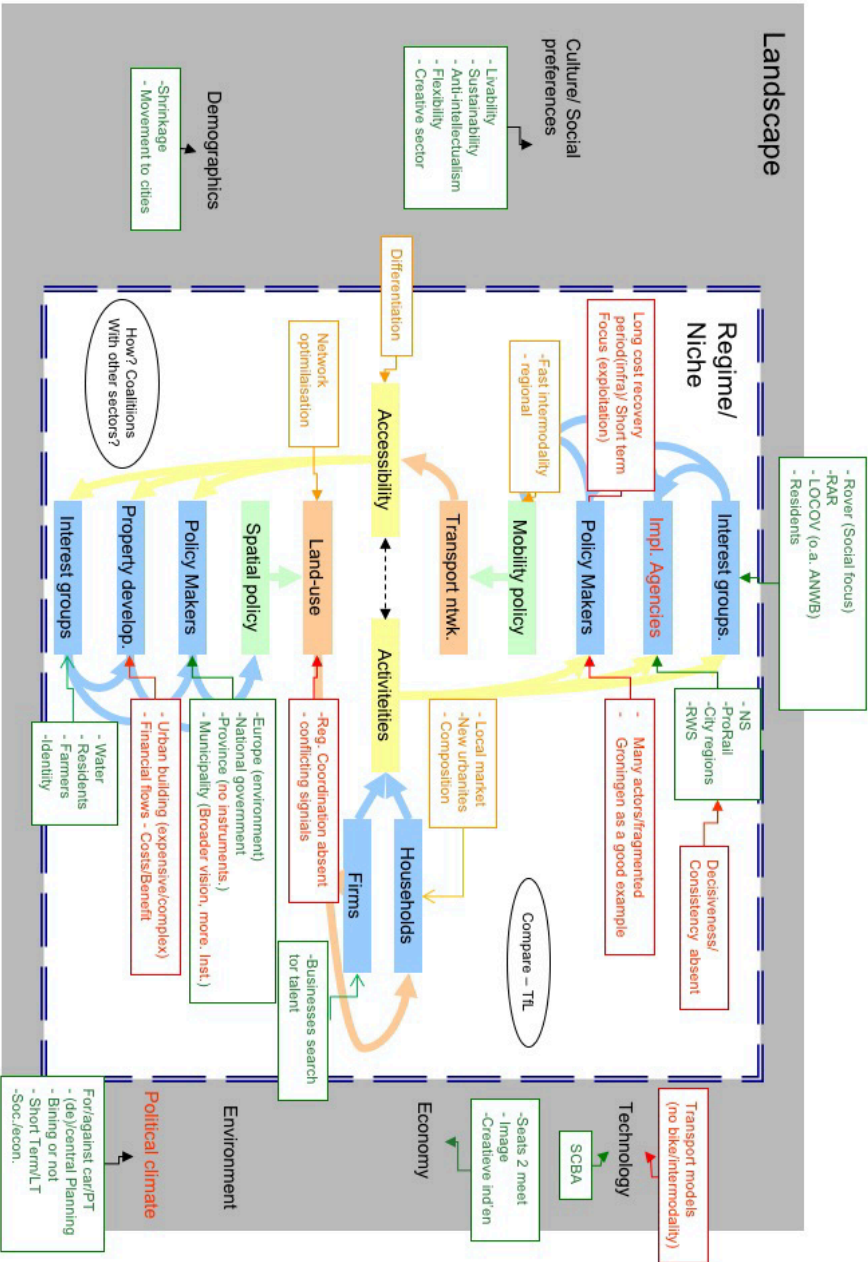


Figure 2.6: Model filled in after session. Green (new developments/suggestions); orange (solutions); red (barriers); black (suggestions for research).

visions of regional mobility systems. Of course, it is also important to note that the session only just touched up on the ultimate goal of the research – supporting the development of full-fledged transition strategies. In order to develop strategies with sufficient support to be implemented, a considerably more extensive exercise would be needed involving a more plural set of stakeholders in a longer time frame. Given the contested nature of visions and strategies, this would require appropriate iteration between ‘opening up and closing down’ (Voß *et al.*, 2006), as well as specialized methods and techniques (e.g. Elzen *et al.*, 2004; Störmer *et al.*, 2009; Truffer *et al.*, 2010). In addition, it would require the development of a set of transition pathways tailored to the mobility domain. To this and other points we turn in our conclusions.

2.4. Conclusions

To tackle the persistent problems that plague attempts to bring about transitions in regional mobility systems, it is first necessary to understand how the system functions and changes. Consequently, this article considers transition studies – an area of research devoted to understanding transitions in complex socio-technical systems. In this largely theoretical article, we have depicted the mobility system, composed of material artefacts (shown in the original transport land-use feedback cycle) and social practices (both shaped by and shaping social structures – rules), as being socio-technical in nature. Our combination of the transport land-use feedback cycle with the MLP has allowed for the development of a model of how the urban-regional mobility system develops and changes.

This system is characterized by co-evolution, which means that the social practices are developed together with the social structures and material artefacts and support each other. Competent agents determine the developments of the artefacts (technical components), but these actions are influenced by social structures such as regulative, normative and cognitive rules, as well as, of course, expectations about the future. Both actors in novelties and the regime react to the actions of others, as well as to external developments in the landscape such as political, cultural, demographic and political developments. In this fashion, change takes place in the mobility system.

The testing and refining of the model during a focus group session suggested that it can be a useful heuristic tool for analysing barriers and opportunities for transitions in mobility systems and for identifying some clues for transition strategies. In the next stages of the research, the developed model will be used as a framework, as is customary in transition studies, to study transitions that have already taken place so that the mechanisms of change can be better

understood. Ultimately, it is hoped that the insights generated will be useful in supporting processes attempting to bring about transitions in the urban-regional mobility system.

Clearly, additional work is needed in the form of trans-disciplinary exercises between ourselves as researchers and a wider set of stakeholders than those that could be involved in this first workshop. Yet, the above analysis has already provided some interesting insights on which these strategies could draw. Major developments at the landscape level exert pressures on the incumbent mobility regime. These developments may also guide the definition and elaboration of novel practices and associate regime elements. Some clues for designing these are suggested by novel practices. There seem to be possibilities for both strategies that promote pathways that depart from regime changes and for routes starting from developments at the level of the novelty. How to strategically connect the two kinds of pathways is another issue for further study.

While more work is thus clearly needed, we can already formulate the expectation that the transition studies lens points to, at the very least, the need of changes in the ways in which transport planning is taught and practiced. First, it shows how a transport plan aiming to facilitate the transition to sustainable urban mobility would have to cope with the systemic, multi-actor and multi-sector nature of urban mobility issues. This would require understanding of inter-relationships that go well beyond the transport sector and the ability to engage with actors and institutions that go well beyond the expert domain. Second, it shows how transformative change in the mobility system does not seem to be able to be predicted by models or prescribed by policies (still a dominant view in current transport planning). It seems, instead, to be a matter of cultivating promising socio-technical novelties while profiting from opportunities of regime change generated by landscape pressure. Old skills might still be useful, but new skills are also required.

A final thought concerns the boarder relevance of the approach beyond the highly context-specific characteristics of the application, which resulted in the model specifications documented in Figures 2.5 and 2.6. In other contexts, spatial and institutional conditions will be different, just as specific policy goals and strategies. For examples of other contexts, one only needs to think of North American cities, cities in emerging countries, or other European cities. However, we also expect a general value of the approach for two basic reasons. First, all cities are faced with the dilemmas of urban mobility: they depend on mobility, but present mobility patterns are not sustainable. Mobility problems are persistent problems and thus there is a need for transformative change or

a transition. The MLP is a conceptual tool that helps articulate this challenge. Second, in all contexts, mobility has a systemic nature with complex inter-relationships between transport and land-use components, and related actors and structures. The transport land-use feedback cycle helps to articulate these. Of course, further specifications beyond the notions, represented in Figure 2.4, need to be done in a local situation and in interaction with stakeholders as we have started to do in our focus group. This brings us back to the heuristic, rather than predictive or normative, character of the proposed framework.

Notes

1. Institutions are understood here as relatively coherent sets of rules and resources.
2. We define an actor as an acting individual, group or organization; the actor may exhibit more or less agency.

CHAPTER 3

Understanding transitions in the regional transport and land-use system Munich 1945–2013

Published as | Switzer, A., Bertolini, L & Grin, J. (2015). Understanding transitions in the regional transport and land-use system: Munich 1945 – 2013. *Town Planning Review*, 86(6), 699-723.

In practice and research there has been considerable attention on the coordination between transport and land-use planning, modal integration and the need for steps to be taken to realise both (Banister, 2008; Cervero, 1998; Curtis *et al.*, 2009; May & Marsden, 2010). However, the ensuing issue of how to tackle the obdurate problems that arise in attempts to radically adapt both existing planning and development practices and the structures in which they are embedded is still unsolved (see Banister, 2008; Bertolini *et al.*, 2008; May and Marsden, 2010; Tan, 2013). In the area of transition studies this type of radical change in structures and practices has been the focus of much research (see Geels & Schot, 2007; 2010; Grin, 2010; Rotmans and Loorbach, 2010). There, mobility has increasingly become the subject of study (e.g. Geels *et al.*, 2012). However, transitions in systems in which space and the urban environment in particular, are the object of study remain virgin territory (Næss & Vogel, 2012). We argue that transport and land-use planning research should devote more attention to how radical change takes place and that urban space in transitions has not been adequately conceptualised and researched.

To address these shortcomings, Switzer *et al.* (2013) have developed a heuristic framework of transitions in the regional transport and land-use system. In this paper we apply their framework to address the question of why and how transitions in the transport and land-use system at the level of the city region take place and empirically develop hypotheses. In the next section we give an overview of the framework which is supplemented in order to enable it to examine historic transitions. The framework is used to evaluate an embedded case study of historic transitions in the regional transport and land-use system of Munich, a city region where transition towards coordination between transport and land-use planning and transport planning, as well as modal integration has taken place.

3.1 Transitions in the regional transport and land-use system

Switzer *et al.*'s (2013) heuristic framework (Figure 3.1) integrates the transport land-use feedback cycle (Wegener & Fürst, 1999; Bertolini, 2012) and the multi-level perspective (MLP) of transitions (Geels & Schot, 2007). Three levels of the MLP can be distinguished:

- landscape: long-term exogenous trends such as macro political and economic developments, deep cultural trends as well as demographic change and general technological progress;
- regime: the dominant configuration of the system in an urban region which is composed of practices and structures characterised by coevolution and thus obdurate in nature;
- novelties: also composed of practices and structures, but in contrast to

the regime these are marginal and instable, requiring continuous effort from novelty actors to maintain them.

Embedded in the MLP is the logic of the transport land-use feedback cycle (Wegener & Fürst, 1999; Bertolini, 2012): changes in the patterns of land-use co-determine changes in location and travel choices of households and firms, which in their turn build up pressure for change of the transportation network; change in the latter influences the relative accessibility of locations, which in turn is a factor in land-use change.

3.1.1 Transition dynamics

Switzer *et al.* (2013) address the criticism of the MLP that there is not enough attention for agency in structural change (Meadowcroft, 2007; Shove & Walker, 2007; Smith *et al.*, 2005) by emphasising that reflexive actions of individual competent actors are essential for transition. In the transport and land-use system these competent actors are policy makers, property developers, transport implementation agencies and interest groups (e.g. businesses, scientists and activists) with respect to mobility and spatial policies, and individual firms and households with respect to mobility and spatial practices. These actors draw on existing structures, but can actively and reflexively seize developments at one level and connect them to change at another level, thus bringing about mutual reinforcement between dynamics at the different levels (Grin, 2006; 2010, pp. 274–75; Smith, 2007). An example is the demand for changes in the travel patterns (e.g. from car to public transport or biking) as a result of a growing environmental awareness in society as a whole. The double-ended arrows symbolise interaction between actors. This can take a number of forms such as exertion of power (e.g. political or economic), lobbying (e.g. a property developer lobbying a policy maker to be able to develop in a certain location or with higher densities), exchange of resources (e.g. financial resources, political support and knowledge). The single-ended arrows show signals to other actors as in the traditional transport and land-use feedback cycle or interventions in the artefacts (e.g. the construction of buildings or infrastructure).

Following Geels & Schot (2010), we see structure in the transport and land-use system as constituted by rules, and to add to this discourses (Grin, 2010; Hajer & Versteeg, 2005) and artefacts (as in the transport land-use feedback cycle: Wegener & Fürst, 1999; Bertolini, 2012):

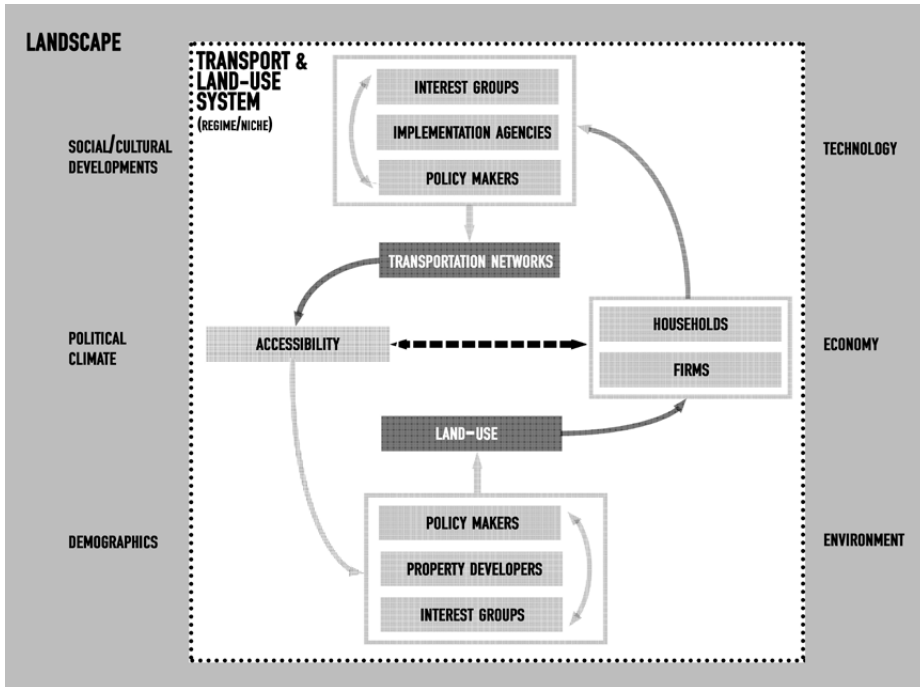


Figure 3.1 Heuristic framework for transition in the transport and land-use system (adapted from Switzer *et al.* 2013)

- Normative rules: tasks, obligations, responsibilities as well as behavioural rules and societal roles (e.g. social and organisational capital; vested interests, lifestyles and financial incentives);
- Cognitive rules: belief systems, problem agendas and search heuristics that are taken for granted and used unconsciously;
- Regulative rules: laws and regulations, contracts with formal sanctions for non-compliance;
- Discourses: “an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices” (Hajer & Versteeg, 2005, pp. 175); and,
- Artefacts: the physical components of the transport and land-use system (transport networks, patterns of land-use).

The intertwined nature of the forms of structure means that changes in a rule, artefact or discourse (taking on a new procedure, applying a new search heuristic, adding infrastructure or changing the discourse regarding urban development) can be hindered or expedited by the various forms of structure.

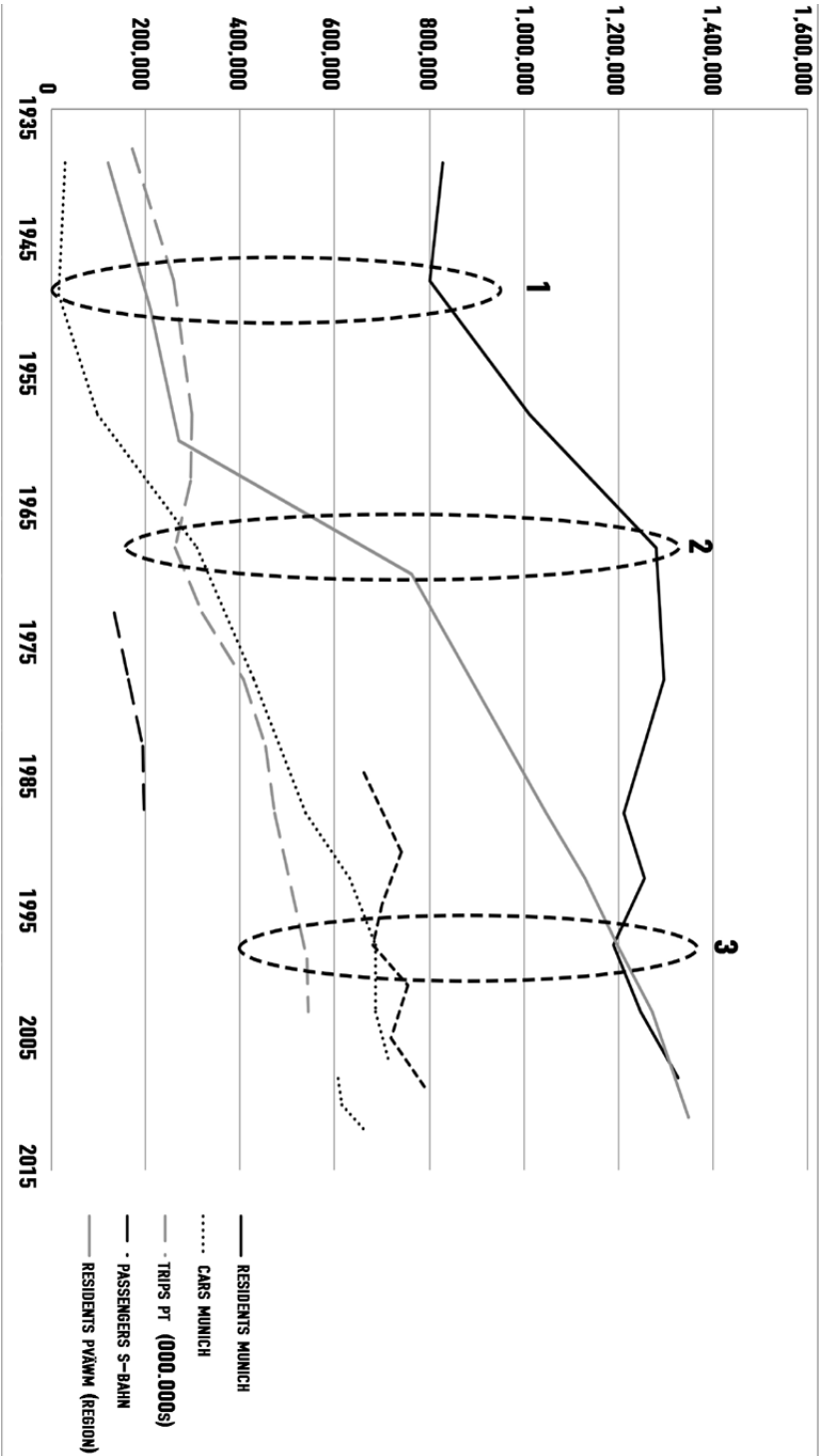


Figure 3.2: Periods of transition in Munich 1945 – 2013

Table 3.1: Changes in practices of firms and households during the three periods of transition

	Transition 1 (1945-1970)	Transition 2 (1970-1995)	Transition 3 (1995-present)
Households	Stabilisation ridership public transport Dramatic increase car ownership increase commuting to Munich 60 percent increase residents in Munich and in region	Increase car ownership and ridership as well as commuting - share to Munich decreases Decrease residents Munich (+/- 10 percent) Growth in region, especially in S-Bahn municipalities	Stabilisation ridership/ car ownership Growth of cycling - 17 percent Share commuters to Munich decreases further (33 percent) Population growth Munich and especially non-S-Bahn municipalities
Firms	Settlement of large firms 140.000 new jobs until 1961	Strong growth of service sector Regionalisation of employment	Continued regionalisation of employment, primarily near the city (60 percent in Munich) Importance of high-tech and services increases
Source	LA München (1963, pp. 4,7) Bätzing (2013)	Bätzing (2013) Guth <i>et al.</i> (2010) PÄWM (2010, pp. 4,5, 13, 26)	Guth <i>et al.</i> (2010) PÄWM (2010, pp. 4, 5, 11) Empirica (2005, 2011) Maute (1994, pp.164-167) Kürbis (2012)

A transition generally lasts 40 to 50 years (Kemp *et al.*, 2012) and is characterised by several phases: (i) pre-development (dynamic equilibrium in which the status-quo changes at the background); (ii) take-off (increasing momentum of structural change); (iii) acceleration (structural change becomes visible) and (iv) stabilisation (a new equilibrium is reached) (Grin *et al.*, 2010, pp. 5). At moments in which developments at one or more levels reinforce each other (positive feedback) rapid change can be observed, whereas a negative feedback can hinder change (Rotmans & Loorbach, 2010, pp. 129–131; see also Geels, 2011). Transitions are not clear-cut and may overlap.

3.2 Methodology

To address the question of why and how transitions in the transport and land-use system take place, a multiple embedded case study (see Yin, 2009, pp. 59) in the transport and land-use system of Munich since 1945 has been carried out. We consider a transition to be change within the socio-technical system by which dominant structures and practices are modified as a result of co-evolution of regime, novelties and landscape.

3.2.1 Cases

The point of departure for the analysis is the expectation that a radical change in practices of households corresponds with change in other parts of the socio-technical system, and thus a transition. Based on the analysis of available information about radical changes in practices of households in Munich we can distinguish three possible periods of transition. In particular, the ellipses shown in Figure 3.2 indicate possible phases of take-off and acceleration of a transition and were used to focus the detailed analyses as discussed below. The changes that took place are further elaborated in Table 3.1. The delineation is not clear-cut as the inertia of the development of artefacts means that it is possible that the landscape, discourses and some rules could be in pre-development of a following transition, while artefacts are being adapted conform the rules of the earlier transition.

3.2.2 Approach

Based on the recognition that structural change is the result of pressure on practices (Geels & Schot, 2010) and the resulting debate and conflict, we focus the analysis on ‘troubles’ (as defined by Wright Mills, 1959): difficulties encountered by individuals in their day-to-day practices, partly as a consequence of contested attempts to deal with the issues of their time. The troubles were identified by writing up a complete case study report of the period 1945–2011 (reaching further back to capture the pre-development phase of the first transition) based firstly on interviews (respondents listed in appendix A and indicated with a four

Table 3.2. State of the system at the end of each transition

Part of framework	End Transition 1	End Transition 2	Transition 3 2012
Interest groups	Space for car Address traffic chaos	Road construction too radical + car needed Role for public in planning process Retention tram	Support biking Regionalisation public transport
Implementation agencies	Public transport underground	Retention tram + expansion U-Bahn	Tram + S-Bahn
Transport policy makers	Car essential/ circulation important Create space for the car Public transport underground	Public transport before car Multimodal public transport Expansion road network	Space for bicycle Investments in public transport
Transportation networks	Ring and radial roads S-Bahn/U-Bahn	Expansion U-Bahn + retention tram Road construction continues	Expansion bicycle network + public transport in the city
Households	Rapid growth Increase car ownership Stabilisation PT use	Regionalisation Slower incr. car ownership PT use increases	Growth in city and region Commuting polycentric Incr. Bicycling in city
Firms	Rapid recovery Relocation of firms from east	Growth (technology + services) Limited decentralisation	Growth in region, high tech & services
Land-use	Separation of functions Expansion centre/city	Smaller scale interventions Retention & demolition historic	Housing in central city and in region
Land-use policy makers	Combination of historic and modern Development of housing at edge of city	Polycentricity & Liveability	Intensification around public transport
Property developers	High-rise housing and businesses in centre	Renewal city Expansion centre	
Interest groups	Modernise/retain of historic centre	Protection of character of city	Regional cooperation necessary

letter code in the text) and historical analyses cited in the text and supplemented by primary sources. Triangulating as such also contributes to the internal validity or credibility (Bryman, 2008, pp. 377). In selecting respondents, we used the framework of Switzer *et al.* (2013) to ensure that respondents representing the various most relevant types of actors were interviewed. In this sense our sampling was theoretical (Bryman, 2008, pp. 414). However, the selection of respondents resembles the snowball method (Bryman, 2008, pp. 148) whereby respondents, including researchers, were asked to indicate other relevant respondents followed by a description focused on the trouble. This included how the troubles arose as a result of the interaction between novelty, regime and landscape and finally how actors changed or attempted to change structures to address the underlying issues. Based on the descriptions of the three periods of transition, hypotheses were developed about why and how transitions take place in the regional transport and land-use system.

3.3 Transition 1

Munich, from 1945 until the mid 1960s changed as shown in the second column in Table 3.2. In this period we see two central troubles, firstly a shortage of space with the discussion focusing on how space could be (re)allocated to which functions and secondly traffic congestion leading to a discussion regarding the allocation of road space.



Figure 3.3: Siedlung am Hasenberg (Abendzeitung, 2014)

3.3.1 *Trouble: shortage of space*

In terms of land-use planning the central trouble was a shortage of space resulting from the interaction between existing spatial structure and landscape changes, namely considerable population increases supported by economic restructuring leading to employment growth in cities. This stability was due to the location of Munich in the American zone making it attractive for firms from the Soviet zone and the accommodation of refugees from the former east of the German Empire (Götschmann, 2013; Bruder, 2009, pp. 10).

Reconstruction

After the war a debate took place between proponents of the reconstruction and novelty actors who considered the destruction of the city as a chance to put their ideas into practice. Important is the development of ideas of modern city planning (Albers, 1996; Harlander, 1998; Zhu, 2007). Although in West Germany many radical proposals were made, existing norms, conflicts about the right combination of new and old and the elements of the built environment that had survived the war made it difficult to break with the past (Nerdinger, 1984; Albers, 1996; Harlander, 1998). Also of influence was the desire to promote individualisation in contrast to the collectivisation which endured under the National socialists and in the communist east. For example, homeownership was supported in order to weaken support for extreme the spatial separation of modes of transport, economic growth and owner-occupation were important (Nerdinger, 1984; Zhu, 2007, pp. 44).

Radical proposals were no exception in Munich and Bavaria (moving the city centre, collectivisation of property rights in Bavaria) but also, here actors supportive of the novelty could not secure important positions (see Nerdinger, 1984). The conservatism mentioned above was particularly strong in the regime in Munich: the mayor at the time considered massification and materialism as being connected to the national-socialism (Nerdinger, 1984). In light of this it is not surprising that an attachment to the historic city was instrumental in the decisions around the Meitinger Wiederaufbauplan (reconstruction plan, see Table 3.3) (Meitinger, 1946; MEXP3; Hiemen, 1984; Schmucki, 2001). Furthermore, infrastructure had survived the war further thwarting radical proposals (Himen, 1984; MEXP3). The plan took account of economic interests and traffic, namely spatial separation of modes of transport and modern centre forming. This relatively conservative plan was ultimately hindered due to issues around property rights which the Wiederaufbaugesetz (Reconstruction Act) in Bavaria, that was never adopted, was intended to address (Nerdinger, 1984; MEXP3). Subsequently, decisions were largely made on an uncoordinated ad-hoc basis.

Housing shortage

In Munich in 1959 the housing shortage was measured at 71,100 units (Bruder, 2009, pp. 10, 20). The federal minister of housing expressed his preference for Trabantenstadt (satellite city) while Munich government was a proponent of an edge city (Bruder, 2009, pp. 16–18). The choice was ultimately made for the edge developments such as the Siedlung am Hasenberg (Figure 3.3). In both cases the solutions put forth by policy makers were in keeping with experts. Those involved with the development of the Stadtentwicklungsplan (city development plan, STEP, see Figures 3.5 & 3.6 and Table 3.3) saw the closed blocks of the nineteenth century city as not compatible with modern transport whereas edge estates would alleviate pressure on the city centre (cf. discussion of STEP, 1963 in 'Rise in car ownership and responses to it' on the following page; Bruder, 2009, pp. 14, 23).

3.3.2 Trouble: traffic congestion

In the early 1950s the situation on Munich's streets was described as traffic chaos. A commonly used example was the congestion at Stachus, a central square in Munich (see Figure 3.4). The increasing car use and ownership can be attributed to the rise of the car novelty related to the landscape developments of economic growth, an increasing identification with American values and way of life (Klenke, 1995, pp. 37, 40; Schmucki, 1998) and the changes in land-use that resulted from the way in which troubles that arose due to a lack of space were resolved leading to functional separation. This can be linked to changing practices of households and firms, namely the concentration of firms in the centre and households at the city edge and in the region, leading to longer commutes (see Table 3.2).

According to Klenke (1995, pp. 35, 63) cultural changes, namely individualisation, became increasingly visible in federal policy where support for the car was seen to strengthen this and hinder collectivist threats (see also Gall, 2001). Even the public transport lobby was supportive of the car (Schmucki, 2001, 95). An ambiguous attitude towards the USA was however visible in terms of transportation planning. German experts were interested in the transportation planning there early on (e.g. Neumann & Feuchtinger, 1937). After the war this interest increased (e.g. Leibbrand, 1957; Feuchtinger, 1957) but went hand in hand with a critical examination of the developments there (e.g. Feuchtinger, 1948; König, 1948; Ströbl, 1955a), as discussed in the section on the next page.



Figure 3.4: Stachus 1959, called the most trafficked square in Europe (Süddeutsche Zeitung, 2015)

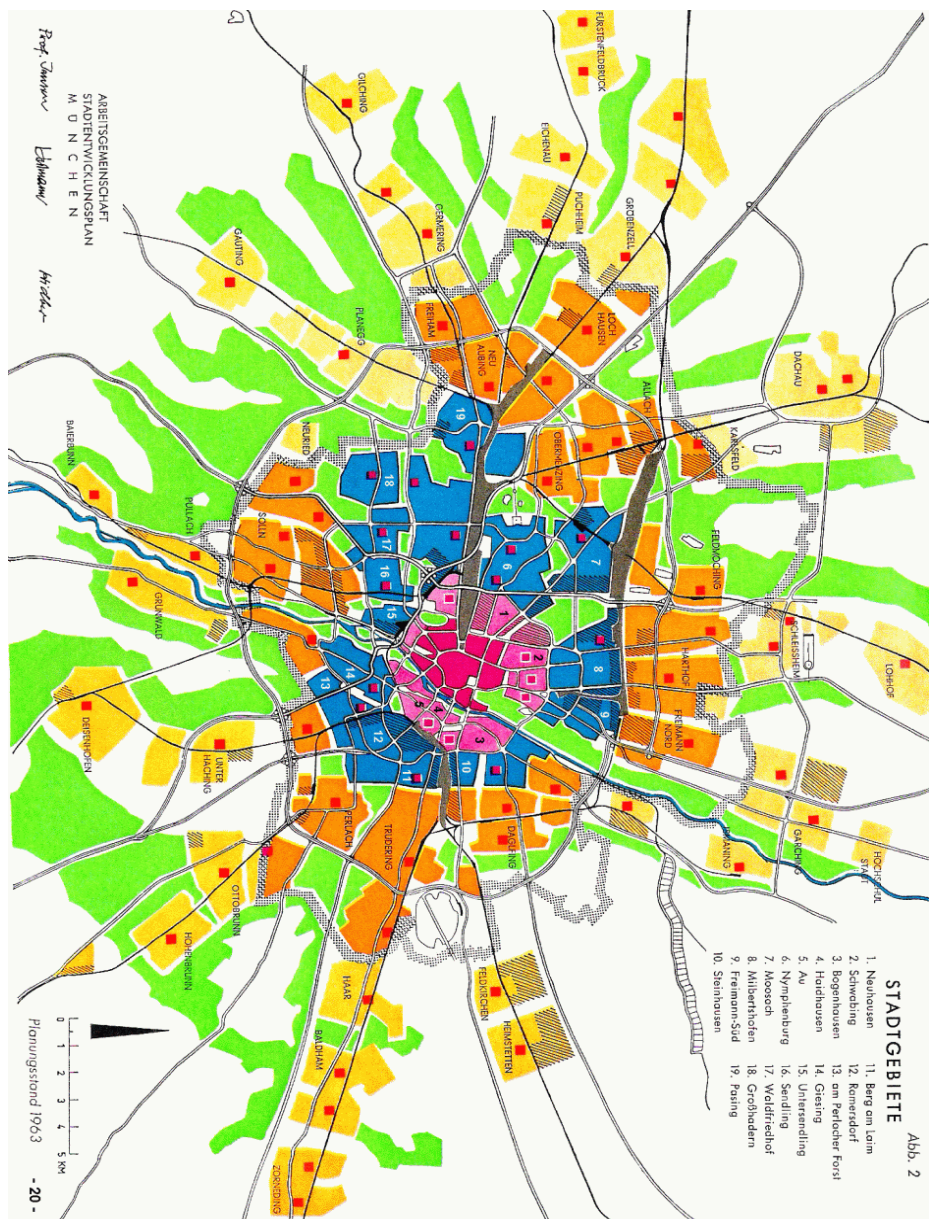


Figure 3.5: City development plan - separation of functions (LH München, 1963)

Table 3.3 Thematic analysis of major transport and land-use plans (a)

Plan	Point of departure	T&LU	Functions	Centre	Edge	Transport	Housing
Meit- inger	<ul style="list-style-type: none"> - Destruction city, modernisation - Car growth 	Integral	Separation industry and housing	<ul style="list-style-type: none"> - Reconstruction in the spirit of the historical centre - Arcades for road widening, no buildings in courtyards 	<ul style="list-style-type: none"> - Modernisation outside of centre - Housing estates possible there 	<ul style="list-style-type: none"> - Altstadtring, U-Bahn in the future - Adaptation to car where possible, necessity recognised 	<ul style="list-style-type: none"> - Combination old elements and modernisation in centre - Edge estates mentioned
STEP '63	<ul style="list-style-type: none"> - Continued growth, Munich as world city - Historic city is of exceptional value - Vitality and spatial quality of whole city of importance - Traffic management not sufficient for efficiency, good climate for firms, parking places, prevention of congestion 	Integral	Separation	<ul style="list-style-type: none"> - Political, economic and cultural centre - Vitality outside of office times through metropolitan functions and pedestrian area - expansion 	<ul style="list-style-type: none"> - Radical changes around central city (not demolition, but governance) - Housing in high densities surround public transport - Vital centre around PT-stop 	<ul style="list-style-type: none"> - Road expansion (rings) - Space for car in edge neighbourhoods, limits within Mittler Ring - PT where densities are high - Underground PT needed in centre - Increase number parking places, but maxima 	<ul style="list-style-type: none"> - Outside centre and at the edge of city and in region (supported by infrastructure investments – road, rail)

Sources: LH München 1963; Nerdingner 1984b; Maute 1994

Rise in car ownership and responses to it

In the first half of the twentieth century the novelty of the car was well developed (see Schmuck, 1996; Merki, 2002; Hölzinger, 2002). They describe a transition similar to Geels (2005) where the rise of the car was possible due to a combination of diminishing resistance, attempts at popularisation in part through technical innovation and support from higher echelons of society.

In contrast to the resistance to many novel ideas in land-use planning it was generally accepted that the car needed to be accommodated in the city. The major question was how and to what extent. The initial expectation that no urban motorways would be needed in Munich (Feuchtinger *et al.*, 1956) gave way under pressure from city councillors in the newspapers (Ströbl, 1951; 1953; 1955; SZ, 1953; Hahn & Althen, 1954) including *Süddeutsche Zeitung* and its *Verkehrsparlament* (Zimniok, 1964, pp. 31), in which domestic and international policy makers, interest groups (ADAC) and traffic engineers were represented (SZ, 1949; Ströbl, 1951). In the course of the 1950s planned interventions became increasingly concrete and radical (extensive networks of radial and ring roads) (Münchner Stadtrat, 1954; Fischer, 1955; Högg, 1958). Concurrently experts attained an increasingly prominent position. This was possible due to the uncertainty of policy makers under pressure to act and the expectation (and sometimes blind confidence) that solutions based on scientific insights could permanently resolve the troubles (see Verkehrsplanungs- und Werkausschuss, 1955, pp. 61; Münchner Stadtrat, 1954; 1959; 1961; Arbeitsgemeinschaft für die Verkehrsplanung München 1956, pp. 30; Planungs- und Koordinierungskommission, 1960; Feuchtinger *et al.*, 1956). The result was the STEP of 1963 in which the change in solutions is visible (LH München, 1963, cf. discussion in 'Reconstruction').

Public transport development

The discussion regarding the car in transport planning was not free of criticism. Early on it was realised that an American level of motorisation would be problematic given the historically developed artefacts. In Munich, public transport and the car were seen as complementary and necessary to guarantee the accessibility of the centre without destroying it. Mayor Vogel (SPD) was elected in 1960 partially due to his promise to solve the traffic problems with a focus on public transport as part of the solution for traffic congestion (Grauhan and Linder, 1974, pp. 90).

At the end of the 1950s, plans for underground public transport became more concrete. Both the Deutsche Bundesbahn (DB) and the municipality took interest in an east-west line under the central city (Linder, 1973, pp. 40). The

municipality wanted an underground tram (Unterpflasterstraßenbahn) and the DB a regional train (S-Bahn). Proponents of the S-Bahn argued that this would be the best solution for the housing shortage (Linder, 1973, pp. 102; 103; DB, 1960). The West German institutional arrangements meant that Munich was dependent on higher governments to finance public transport (Grauhan & Linder, 1974, pp. 91). In this period Bavaria invested in public transport, but because of the rural nature of the land, regional development and decentralisation were larger priorities than the development of Munich (see Gall, 2001). The municipality itself began increasingly to see that a radial metro (U-Bahn) was the better choice (Schmucki, 2001; Linder, 1973, pp. 106-107). The pressure on politicians to take action should not be underestimated. Grauhan & Linder (1974, pp. 91-92) conclude that for local policy makers every solution for the transport crisis was seen as better than nothing.

In contrast to the stable financing mechanisms for road construction there was no stable framework for financing public transport in West Germany (Hielscher, 1961; BMW & LH München, 1961). In the case of Munich, coalitions and activism played a determining role in the outcomes achieved. The pressure exerted through the initiative of Mayor Vogel on the federal cabinet by members of the CSU, governing party in the Bundestag and the Chamber of Industry and Commerce, resulted in the decision from the federal government to cover two-thirds of the costs of the S-Bahn. The financing of the U-Bahn was guaranteed in a similar fashion. The Städtelobby (City lobby) created upon the initiative of Mayor Vogel organised events such as a Fliegende Pressekonferenz (flying press conference) to attract attention to the traffic situation in West German cities (Stadt Bremen *et al.*, 1961; Vogel, 1960; 1961, Deutscher Städtetag, 1962). The result of this process was commitment to underground public transport from 1966 onwards as part of a broader change in cognitive and regulative rules at the federal level whereby the focus of transport policy goals broadened to include the health of the city (Bundesminister für Verkehr, 1964; GVFG, 1971). The arrival of a SPD minister of transport was both a symbol of the change and support of it. At the same time the U-Bahn-Amt (Department) was established with one goal: the construction of the U-Bahn.

3.4 Transition 2

From the early 1970s onwards the changes in the transport and land-use system (see column 3, Table 3.2) are increasingly related to the trouble of the changing character of the city as a result of the interventions from the previous transition. The debate focused on the objectives of planning and the necessity of the interventions.

The changes in transportation networks and land-use in the first transition period clearly affected locational choices and travel behaviour in the second transition. The improved accessibility of the central city as well as the emphasis on the scaling up of the centre, combined with the improved accessibility of the region with the arrival of the S-Bahn and through-road construction, made it possible to concentrate development in the centre and develop housing in the edge areas and in the region, as was already the case in the first period. Furthermore, the increasing growth of the service sector exacerbated this (Kohlmaier, 2007). For families, housing in the central city was expensive and many neighbourhoods were dilapidated (Linder, 1973, pp. 185, 188). Changing practices and road construction were framed as evidence of and leading to a loss of character of the city, the trouble observed in this period.

3.4.1 Trouble: loss of character of the city

From the late 1960s a supposed loss of character in Munich was criticised by interest groups which needs to be seen in the light of increasing national and international uncertainty regarding the impacts of modernisation on the environment (Club of Rome, UN Conference on the Environment of 1972; Klenke, 1995, pp. 84–85), democratisation as a result of economic development, a shift in priorities from reconstruction to participation in public life, environmental protection and equality of the sexes (Zhu, 2007, pp. 47) and economic stagnation after the oil crisis of 1973. The first conflict surrounds the demolition of historic buildings and housing in the central city to create space for offices and roads and the second, the abolition of the tram (see Figures 3.7 & 3.8).

Towards the end of the 1960s the changes in the urban fabric became an issue of discussion for students, architects and citizens united in fora such as the Münchner Bauforum. They expressed criticism about the radical change in the urban fabric (sometimes described as *Zerstörung*; destruction) and the loss of character and originality of the city and nature areas (Spiegel, 1968; Grauhan & Linder, 1974, pp. 103). According to these actors, alternatives to these interventions should have been considered (see Schmucki, 2001, pp.343; MLUP1; MINT1). In addition, the reliability of demographic and traffic forecasts was disputed. Critics saw these as methods in exploring possible scenarios rather than certain predictions of the future (Wallenborn, 1967a).

Initially, regime actors were shocked and reacted defensively to the opposition (see Klühspies, 2009), but quite quickly they were prepared to commit to making planning more open and to integrate the Bauforum in the planning process (Wallenborn, 1967b; Luther, 1968, MLUP1). In this period problem definitions

and heuristics changed rapidly as evidenced in the STEP of 1974/75 (see LH München, 1975, see Figure 3.9 & Table 3.4) as well as the statement of the successor of Mayor Vogel that Munich should become *kein Manhattan aber auch kein Museum* (not Manhattan but also not a museum) (Fischer, 1975). Grauhan and Linder (1974, pp. 104, 129) suggest that this rapid change in the regime was intended to depoliticise planning issues. In appraising these changes one should also take account of the pressure on Vogel within his own party, the SPD, due to a supposed loss of character of the city (Schmucki, 2001, pp. 345) and the extent of criticism both in relation to various issues (see Gerstenberg, 2014) and at the international level (see, for example Jacobs, 1961). In West Germany it became rapidly evident that Stadtentwicklungsplanung could not fulfil the expectations placed on it in light of demographic, cultural and economic change (Albers, 1996; Gnest, 2008; Mitscherlich, 1965; 2008). A shift towards participation in planning is visible in legislation (see, for example BBauG, 1976) and in practice planning became more incremental and fragmented (see Albers, 1996; Gnest, 2008).

In both Munich and nationally the process of change lasted until the early 1990s. Nationally, only limited reductions in financing for road construction can be observed, as can the double focus: technical solutions such as new fuels, catalytic converters and combinations of personal and public transport in addition to changes in travel behaviour (see, for example Klenke, 1995, pp. 104–105; Bratzel, 1999, pp. 207; Schmucki, 2001, pp. 164, for a more extensive discussion). Three conflicts can be distinguished in Munich:

- 1) Conflicts around the vision for the city – Schmucki (2001, pp. 345) writes that at the Stadtentwicklungsreferat (city development department), where the influx of new employees compared with other departments responsible for the U-Bahn, building construction and finance (U-Bahnreferat, Stadtbaureferat and Stadtkämmerei) was larger, practices changed more rapidly. Some projects (Isarparallele, Virualienmarkt) were stopped, but other projects (European Patent Department, Prinz-Carl-Palais tunnel) were carried out (MINT1). Resistance among residents of various neighbourhoods (see Figure 3.7; e.g. Aktion Maxvorstadt, exhibition Erholungsraum Stadt- Leben mit der Straße) and architects (e.g. Schleich, 1978) continued. Gradually the awareness of problems in the city grew, visible in the number of protests regarding planning issues (see Gerstenberg, 2014). According to Schmucki (2001, pp. 367, 371) it was only in the early 1980s that further change was visible (support from the CSU, downscaling of crossings, 30 km/h zones and traffic calming) (see, for example Ströbl,



Figure 3.7: Street picnic action of the group Aktion Maxvorstadt, 1971 (Klühspies, 2015, pp. 288)



Figure 3.8: Tram action organised by the Münchner Forum, 1979 (Klühspies, 2015, pp. 246)

Figure 3.9: City development plan 1975 - polycentric developments (LH München, 1975)

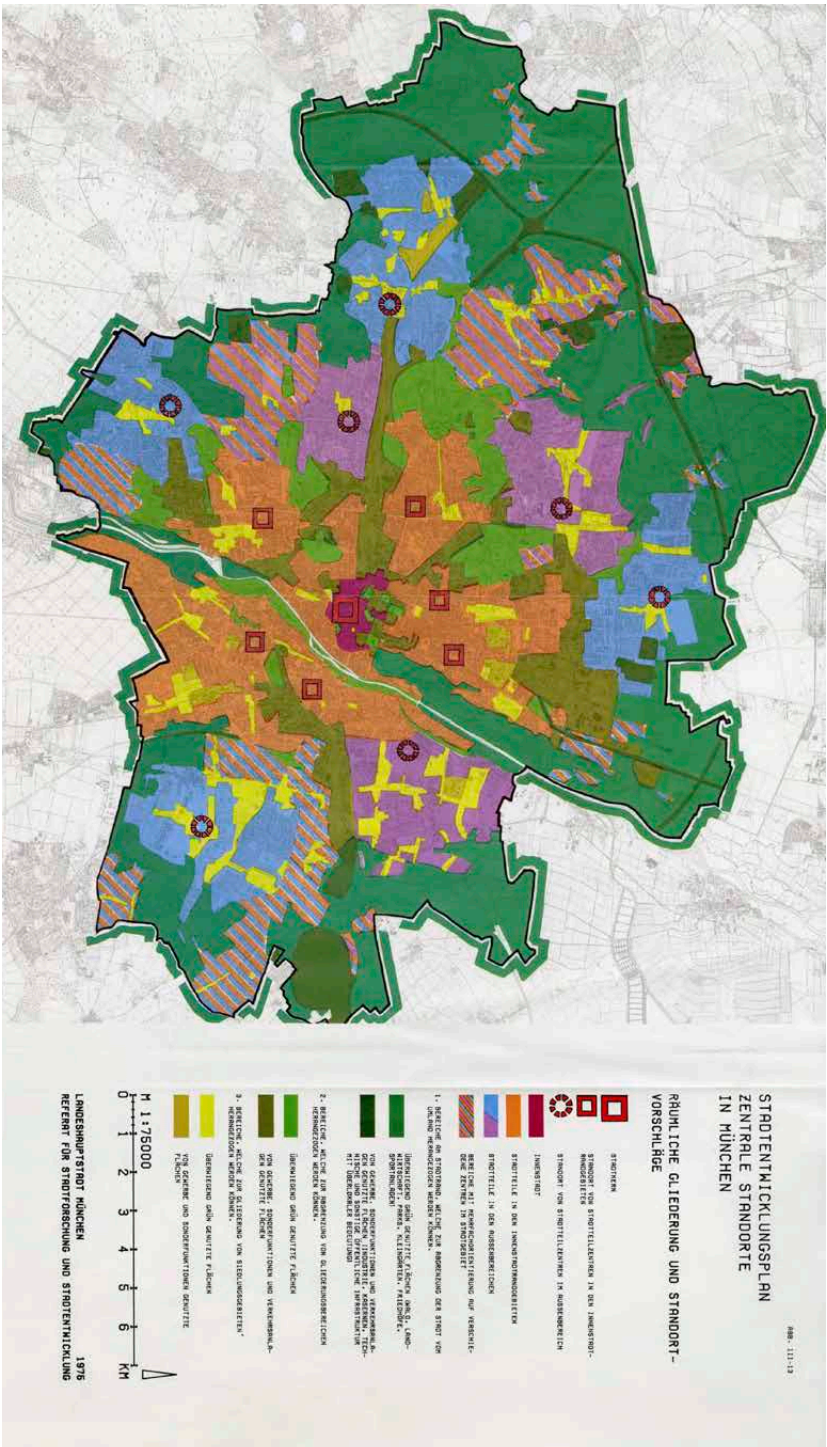


Table 3.4: Thematic analysis of major transport and land-use plans (b)

Plan	Point of departure	T&LU	Functions Centre	Edge	Transport	Housing
STEP ‘75	<ul style="list-style-type: none"> - Eternal prosperity history, improvement of quality, balance - Munich is attractive (housing in central city, no slums, balance housing/employment – this has to be maintained - Reduction of pressure (rent increased, environment, living environment) is objective - Expected intensification in the centre can result in traffic congestion 	Integral	<ul style="list-style-type: none"> Separation results in loss of quality Growth resulted in over dominance of government and consumption in centre and loss of originality and identity - Polycentric city - Retention and recovery of historic urban design has priority 	<ul style="list-style-type: none"> Housing construction in adjacent municipalities by the municipality Munich has to be stopped 	<ul style="list-style-type: none"> - Reduction of traffic for liveability and originality - Must support polycentricity - PT as means to reduce danger from cars - Tangential PT & P&R - Increase in attractiveness PT will lead to reduction auto in future - PT connections to developments outside of centre 	<ul style="list-style-type: none"> - Differentiation supply, social housing has priority - Demolition is necessary

Sources: LH München 1975; Maute 1994

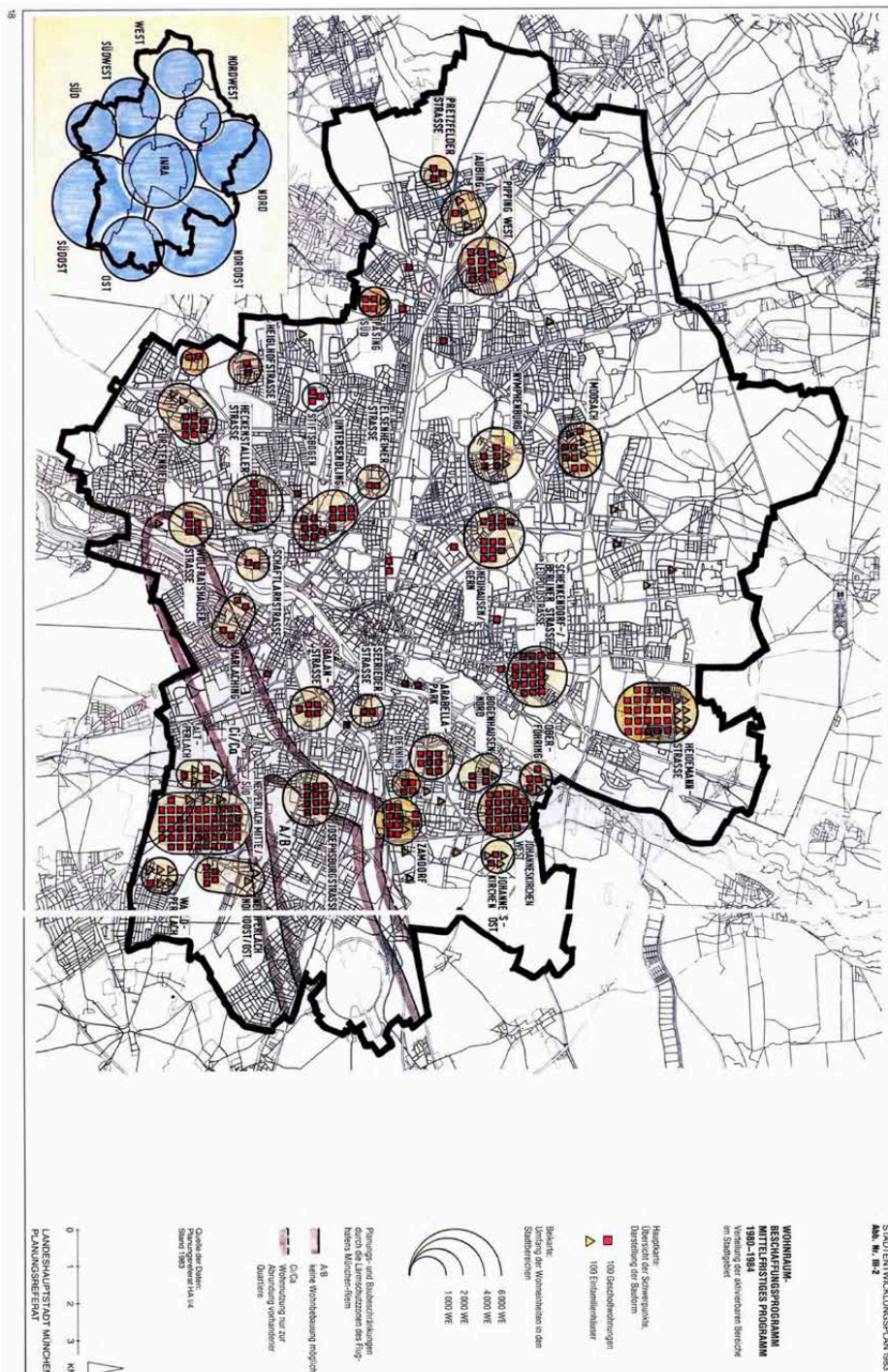


Figure 3.10: City development plan- planned housing development (LH München, 1983)

3.5: Thematic analysis of major transport and land-use plans (c)

Plan	Point of departure	T&LU	Functions	Centre	Edge	Transport	Housing
STEP '83	<ul style="list-style-type: none"> - STEP '75 is out-dated - Munich attractive for one person households, decreasing housing production/price increases in historic buildings - Density is high, selectivity is needed when considering functions - Intertwined with region - Take account of green spaces - PT central but car is essential 	Integral		<ul style="list-style-type: none"> - Developments support role as specialised centre of region - Supports subcentres 	<ul style="list-style-type: none"> - No satellite cities (too costly) - New development only if it does not damage ecological living environments 	<ul style="list-style-type: none"> - PT expansion central - Priority U-Bahn - Priority PT inside Mittler Ring, outside car where PT not possible - Coordination PT and car - Expansion of roads only in isolated cases - Pedestrian and bicycle network need to be expanded - Protection from exhaust 	<ul style="list-style-type: none"> - More construction and more affordable housing - Demolition of housing in centre - Support housing ownership - Balanced social structure - Coordination with region
PM 1998	<ul style="list-style-type: none"> - Employment and economic prosperity to be secured and supported - Protection of green areas - Environment central 	Integral	Mixing through new zones	-	<ul style="list-style-type: none"> - Compact urbanity - Densification 	<ul style="list-style-type: none"> - Cooperation with region important - PT supporting densification - PT as way to reduce socially and economically damaging traffic - Expansion of road network only where needed 	<ul style="list-style-type: none"> - Cooperation with region - Densification - Priority in centrum

Sources: LH München 1983; 2005; Maute 1994

1979; Roll, 1982) and the focus shifted towards stability (see LH München, 1983, Figure 3.10 & Table 3.5).

- 2) Conflicts around different public transport options – The U-Bahnreferat was able to secure a central position in the planning process in this time of financial austerity as the availability of funds came to determine which projects went ahead in the strategic plans of the Stadtplanungreferat (Grauhan & Linder, 1974, pp. 108). Also of importance was the continuity of financing by the federal government (80 percent) (Hass-Klau, 1984; Zimniok, 1981, pp. 159; MEXP 1&2; MINT1). Criticism was expressed with regard to the coordination of these investments with land-use and other modes of public transport (MINT1&2). From the start of the U-Bahn construction the tram was neglected but only at the moment that a plan was presented to fully abolish the tram (öV-Konzept 2000, 1982, pp. 27) did considerable resistance arise (within the Münchner Forum- see Figure 3.8, Aktion Attraktiver Nahverkehr, SPD and FDP and from councillors and residents along tram lines) (Fischer, 1982; Graupner, 1982; MINT2). For the transport company, abolishing the tram was an issue of progress while for opponents the tram was a part of a liveable city. The postponement of the plans (Müller, 1984) was followed by the electoral success of Georg Kronawitter (SPD) in 1984 with the slogan *so viel Trambahn wie möglich* (as much tram as possible) (Schmucki, 2001, pp. 382). Where only a few years earlier research showed that only the U-Bahn would result in increases in ridership, studies now showed that an expansion of the tram was the better option (Müller, 1984). Following this in 1988 the purchase of new rolling stock was approved followed by a plan that considered different modes of public transport integrally in 1990 (Müller-Jentsch, 1988; 1990; MINT1&2).
- 3) Conflicts around transport policy – In the late 1980s it was reported that a stalemate existed in transportation planning in Munich (Büsehemann, 1989). Examples of this are the rejection of a proposal of BMW for a blaue Zone with limitations for car use and the conflict regarding a tunnel in the Mittler Ring that exposed the division between the Green Party and the SPD who focused on liveability and the CSU, ADAC and chamber of industry and commerce who considered car accessibility as essential (Kesselring, 2001, pp. 113–116). According to Kesselring (2001, pp. 85, 117, 145) change occurred in this situation when the Green Party realised that cooperation with an organisation that was not focused on ecology (BMW) could be advantageous and

the departing CEO of BMW invited politicians and interest groups to discuss transportation issues together. The result was the agreement to make progress on issues where there was no principal disagreement (see BMW & LH München 1998, pp. 6). Issues of intensification of development around public transport and in central areas as well as parking policy received attention (see LH München, 2005, Table 3.5). This resulted in the depoliticisation of mobility policy. Conversely, with regard to issues where agreement was absent policy was not formulated or objectives remained unclear. Since 1995 and up to this day these actors have regular dialogue (Inzell-Initiative).

3.5 Transition 3

From the late 1990s onwards we observe two new troubles driving change in the transport and land-use system (see Table 3.2, column 4): those related to the regionalisation and the allocation of road space, specifically in relation to the bicycle. As this transition is still ongoing we are cautious in drawing conclusions, therefore this discussion is more descriptive in nature than the previous two.

3.5.1 Trouble: regionalisation

Due to the strong economic performance of the region of Munich, the region and the edge of the city have been experiencing considerable growth in terms of both population and employment (see Figure 3.2 and Table 3.2). Conflicting views on and responses to regionalisation are epitomised by the debate around a second S-Bahn tunnel under the central city (Brauer, 2009). The decision resulted in criticism from interest groups (Münchner Forum among others) who pointed out that these investments were contradictory to the idea of polycentricity and that it would have been better to invest these resources elsewhere in the city or in the region (Hutter, 2006; Bock, 2010; MLUP1 and MINT1, See Figure 3.11). Despite the continued criticism the tunnel was finally approved by the municipality and Bavaria (Bock, 2010; DB & BSMWIVT, 2012).

The awareness of the troubles arising from population growth and changing traffic flows is growing as Pütz (2006), Priebs (2006) and Habaoui-Engelhard (2008) show, but regulative rules (autonomy of municipalities and planning competencies) as well as the electoral system that emphasises individuals instead of parties, hinder change (Reiß-Schmidt, 2003; Haberer & Mailer, 2005; MEXP1&2; MTRP1; MINT1&2; MLUP1). The signals at higher levels are also contradictory. Nationally, the necessity of a regional approach is recognised (BMWBS & BBSR, 2009) as well instruments that support this but in Bavaria planning is seen as a hindrance and the policy attention has decreased (Gnest, 2008).



Figure 3.11: Protests against the 2. Stammstrecke in 2017 (TZ, 2017)



Figure 3.12: Münchner Ringparade 2017 an activity to promote cycling (Source: Radlhauptstadt München / Simone Naumann)

3.5.1 Trouble: allocation of road space

In the framing of this trouble one of the main arguments is the growth of cycling. This in turn is related to both the growth of young (25–29 years of age) residents in Munich in the areas surrounding the central districts (see Table 3.1), a group which is more likely to bike (SINUS-Institut, 2011), and the rising status of this mode of transport (BMVBS, 2012, pp. 10; SZ, 2012; Tibudd, 2012; Infas & DLR, 2010). In the case of the issue of road space conflicts have recently arisen between political parties (SPD and Grünen) who see cycling and more space for cycling infrastructure as positive, and the CSU and FDP who emphasise the importance of car accessibility (Völklein and Anlauf, 2011; Dachale, 2011). In addition, there are interest groups involved who have carried out actions to demand more space for cycling (see Tibudd, 2012 & Figure 3.12). Part of the explanation lies in the exceptionally rapid population growth in Munich (Kübis, 2012, LH München, 2011a) and unless successful efforts to support cycling are made (Lanzendorf & Busch-Geertsema, 2014) it is expected that congestion on roadways will grow and this conflict will remain.

3.6 Discussion and conclusions

The central question in this exploratory paper is that of why and how transitions in the regional transport and land-use system occur. In Munich, in the first period of transition we see a situation where the novelties of modern city planning and the car were well developed at the moment that ‘avalanche’ landscape change (Geels & Schot, 2007) took place (Second World War, division of Germany, orientation towards USA, Wirtschaftswunder). Troubles arose as a result of the related change in practices of households and firms in interaction with artefacts (housing and office stock, land-use and transport infrastructure). The lack of resistance towards the car and limited resistance towards modern city planning suggests that these novelties that were developed in the first half of the twentieth century, were becoming dominant in the regional transport and land-use system. Cognitive rules were largely shared among actors. Pressure from interest groups (newspapers, citizens, scientists and progressive city council members) was focused on the further development and implementation of solutions. In terms of land-use planning more radical cognitive rules were present (relocation of the city centre, modern city form in the centre, collective property rights). These were, however, contradictory to the normative attachment to the historic city and/or to the dominant liberalism. In Munich, but also in other West German cities proponents of related interventions did not secure central positions. More consensus existed with respect to what to do in the areas outside of the old centre and the importance of serving economic interests (space for the car and modern urban form). The discourse of a malleable society legitimated certain choices (role of engineers, integral Stadtentwicklungsplanung) and is evidenced

in the names of policy documents (*Ein Land plant seine Zukunft* – a Land (state) plans its future). Especially in this first period of transition the importance of the federal level is evident (e.g. its key role in financing transport infrastructure). Regulative and normative rules embodied in the actions of actors at the national and local level expedited the development of shared cognitive rules. The importance of interest groups is evidenced by the situation around underground public transport. In various constellations policy makers in Munich were able to act as interest groups at the national level to achieve change in cognitive and regulative rules there.

The start of the second transition resembles a specific ‘landscape shock’ (Geels & Schot, 2007). Novelty actors critical of anomalies in the discourse of the first period of transition took action in light of landscape changes, but also the interventions aimed at changing artefacts to conform to dominant cognitive rules. They defined these interventions as the second destruction of Munich. Just as the regime actors in the first period of transition emphasised the importance of the retention of the historic city and the economic vitality of it these actors referred to the loss of identity of the city. They argued that the planned interventions and those that were already carried out would achieve the opposite of what regime actors initially intended, and destroy rather than reinforce the identity of the city. The fact that this protest occurred in other West German cities and abroad strengthened the novelty and resulted in similar discussions at the national level. In this initial period resistance from regime actors was clearly visible. Shortly after this we observe changes in discourses (liveability and democracy instead of progress and technocracy), but contradictions between the text of policy documents and practices suggests differences in cognitive rules between actors and departments in the city government. Actors who were placed under pressure (Mayor Vogel) or new actors (*Stadtplanungsamt*) approached the situation much more differently than those who were well-established. The course of the second period of transition is characterised by stalemate and conflict regarding cognitive rules (problems and solutions). The old regime became weaker (e.g. public transport planning, meetings organised by BMW), but after the landscape shocks at the beginning of the period the rest of the period was relatively stable. Much of what was achieved resulted from conservative actions (impeding rather than realising developments).

The third period of transition is clearly different than the earlier periods as the object of study is a transition that is still unfolding. Economic, cultural, demographic and technological changes have influenced the practices of households and firms. Novelty actors met with resistance (biking, limiting car use) or that were ambiguous (urban living, regional cooperation) in the second

transition are increasingly being embraced by regime actors, even those for whom this would have been unthinkable in the second transition period (such as BMW, established parties and regional municipalities). With supportive changes in practices the novelties could be further strengthened resulting in shared cognitive rules leading to positive change instead of the prevention of undesirable developments.

Based on the description of how these transitions have taken place we propose for future elaboration and testing the following hypotheses on why and how transitions in regional transport and land-use systems take place:

- H1: Changes in the practices of households and firms create the pressure needed to realise transition (as captured by the emergence of foci of debate and conflict or 'troubles')
- H2: Interest groups interpret landscape changes and changes in practices to legitimise new structures and create pressure on the regime necessary for transition
- H3: The identity of the city is a powerful discursive element that can be used to delegitimise or legitimise structures and practices
- H4: Reaching shared cognitive rules enables change in the types of interventions in artefacts at the system level. Related to this hypothesis, two hypotheses with regard to how these shared rules can be reached:
 - a) Regulative and normative rules that are both open to conflict and effective in resolving it accelerate the reaching of shared cognitive rules.
 - b) Interest coalitions are a way to exert pressure to achieve change in cognitive rules at other scalar levels.

The contribution of this research to transition studies is that it shows that a transition in the built environment differs in a number of ways from transitions that have been previously researched. Firstly, the inertia of the built environment (transport and land-use) and the costs and timespans involved with changing it suggest that the transition pathway will rarely resemble radical pathways like technological substitution or de-alignment and realignment (see Geels & Schot, 2007). In contrast to other types of artefacts the normative attachment to the built environment seems a determining factor, not just its physical obduracy. This also results in the long-term nature of changes. Furthermore, the conceptualisation of spatial scale levels enables more attention to the interaction between different systems (e.g. regional and national).

The relevance of this research for planning lies in three aspects. Firstly, it shows that transition in the urban region is the result of dynamics in land-use planning as well as transportation planning. Secondly, the consideration of interaction between the two is necessary to understand change. Finally, and perhaps most importantly, attention to the demand side (practices of households and firms) as a key trigger for systemic change, the interplay between conflict and consensus and the role of interest groups to deliver radical change are relevant for planning which aims for transformative change. Practices of household and firms create the urgency for change. Interest groups play an important role as they can politicise and draw attention to troubles, and exert pressure to address them. Conflict is unavoidable in transition and should not be seen as negative. At the same time consensus between different interest groups needs to be reached and stability achieved to bring about change in the built environment and infrastructure. Policy makers remain important, but are only able to adjust the course of events.

In this embedded case study of Munich we have shown how the multidisciplinary conceptual framework of Switzer *et al.* (2013) can be used to structure research on historical transitions in the regional transport and land-use system. In this application of the framework the importance of interaction between various scalar levels has become clear – especially between the national and the local, but also between the international level and the Länder-level in Germany. Raven *et al.* (2012) emphasised the necessity of attention for scalar levels in addition to the levels of structuration in the MLP. In addition, Whitmarsch (2012) has been critical of the inclination to consider everything which does not fit into the definition of the system as being landscape. This remains to be fully explored, but there are indications that discourses, a major explaining factor of transition dynamics, change as a result of developments in various systems (e.g. democratisation as a result of criticism of top-down city planning in addition to conflicts in other areas). Follow-up research should devote more attention to the conceptualisation and operationalisation of scale as well as the interaction between various systems. In addition, the robustness of the hypotheses posed needs to be examined by testing them in other cases of literal replication (see, for example Yin, 2009, pp. 54) considering their transferability or external validity (Bryman, 2008, pp. 377). This also addresses the concern raised by Dewald & Truffer (2012), as well as Lawhon & Murphy (2012), that transitions research should devote more attention to the importance of place-specific characteristics in transition.

CHAPTER 4

Geography in transport and land-use transitions: a comparative case study of Munich and Zürich

Submitted as | Switzer, A. Geography in transport and land-use transitions:
a comparative case study of Munich and Zürich. Submitted to international
peer-reviewed Journal.

Urban transitions is a growing field of research being developed by scholars in both planning (e.g. Valderrama Pineda & Vogel, 2014; Switzer, 2015; Vogel, 2015) and transition studies (e.g. Geels *et al.*, 2012a; Sengers, 2016; Evans *et al.*, 2016; Frantzeskaki *et al.*, 2017). A transitions informed approach to urban planning is seen as having potential to both understand the transformative change that is needed to address pressing social and environmental issues and support transition attempts. However, empirical studies remain limited (e.g. Zijlstra & Avelino, 2011; Valderrama Pineda & Vogel, 2014; Sengers, 2016; Switzer *et al.*, 2015). Furthermore, conceptual and methodological challenges exist regarding the urban fabric as an object of transition, and place and scale (Næss & Vogel, 2012).

This paper explores how addressing these challenges can aid in understanding why urban transitions take place and how they unfold. It uses persistent problems in urban transport and land-use planning as an illustrative thematic focus. As part of a broader societal recognition of the side-effects of 'early modernisation' (Beck *et al.*, 2003), automobility and the corresponding urban form have become contested since the 1970s (e.g. Næss *et al.*, 1996; Woodcock *et al.*, 2007; Banister *et al.*, 2011). The coordination of transport and land-use planning is seen as an essential way to reduce demand for car travel, whilst retaining freedom of choice and economic benefits of a good accessibility (see Wegener & Fürst, 1999, Curtis *et al.*, 2009). However, as in other fields (see Grin *et al.*, 2010), persistent barriers have been observed hindering this transition (Tan, 2013; Curtis & Low, 2012).

This paper begins with a discussion of the debates in urban transitions, including the challenges mentioned above. Subsequently, a comparative study of transport and land-use transitions in two urban regions (Munich and Zürich) is carried out to illustrate how addressing the challenges identified adds explanatory power in understanding why and how urban transitions take place.

4.1 Challenges in urban transitions

With regard to the first challenge, the urban fabric as an object of transition, recent empirical studies of urban transitions (e.g. Sengers, 2016) have tended to focus on technologies as the object of transition. In doing so they neglect the tight relationship between transportation and land-use whereby the urban fabric is also an object – not only a context – of transition (Næss & Vogel, 2012). Switzer *et al.*'s (2013) heuristic framework (figure 4.1) is a first attempt to conceptually addresses this by integrating Bertolini's (2012) adaptation of Wegener & Fürst's (1999) transport land-use feedback cycle with the structuration levels of Geels & Schot's (2007) Multi-Level Perspective (MLP): landscape, regime

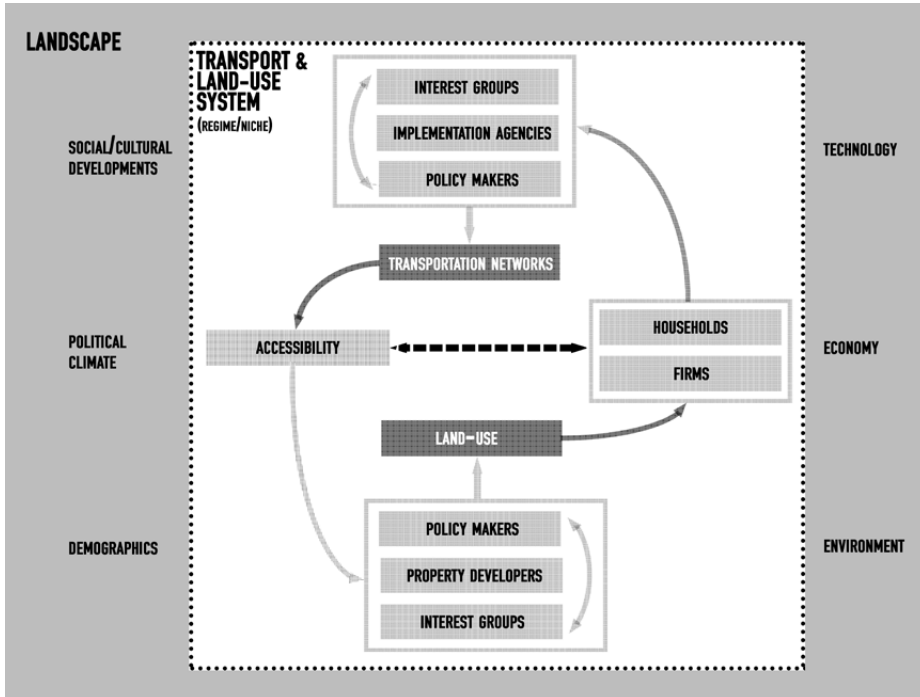


Figure 4.1 Heuristic framework for transition in the transport and land-use system (adapted from Switzer et al. 2013)

and niche. In the evolution of the system the agency of competent actors plays a pivotal role – something receiving increasing attention in transition studies. For example, Geels *et al.*'s (2016) refined transition pathways which attempt to explain “trajectories in terms of event-changes and rounds of moves and counter –moves” (pp. 898) by various groups of actors in addition to aggregate explanations of transitions in terms of alignments of trajectories between niche, regime and landscape levels. The general roles actors can play are represented in the middle box; whilst the various components of the landscape are shown outside of the box. The landscape comprises long-term, exogenous trends such as macro-political and economic change, deep cultural trends as well as demography and general technological progress. Following the transport land-use feedback cycle logic, long-term land-use patterns influence location and mobility choices of firms and households; these in turn influence decisions of transport network developers (policy makers/implementation agencies); the accessibility changes brought about by changes in the transport network affect decisions on land-use development taken by policy makers and developers; and so forth. The regime and niche levels – superimposed and ‘flattened out’ in figure 4.1 – are similar to the extent that they are both comprised of co-evolved transport and land-use structures and practices. They differ in two respects:

their dominance in the system and their stability. The regime represents the structures and practices of the incumbent transport and land-use system, which are inert and per definition obdurate. Novel structures and practices in the niche, from which a new transport and land-use system may arise, are instable and in flux, while better attuned to other systems and the landscape. In acting, actors usually reproduce structure, but under certain circumstances they reflexively interpret changes in the landscape or in the system and consequently explore new courses of action and call on others to do the same. In these cases, structural change can result (Grin, 2010, pp. 265-275; Smith, 2007).

Structure in the transport and land-use system can be seen as constituted by rules (Geels & Schot, 2010), discourses (Hajer & Versteeg, 2005) and artefacts. These are defined as follows: normative rules: tasks, obligations, responsibilities, behavioural rules and societal roles; cognitive rules: taken for granted and unconsciously used belief systems, problem agendas and search heuristics that determine which solutions are sought; regulative rules: laws and regulations, contracts with formal sanctions for non-compliance; discourses: an ensemble of ideas, concepts, and categories through which meaning is given to social and physical phenomena; artefacts: the physical components of the transport and land-use system¹.

Transition can be seen as a transformation in the transport-land use system in which dominant structures and practices change as a result of coevolution of landscape, regime and novel structures and practices in the niche (Geels & Schot, 2010). Empirical study of the case of Munich using Switzer *et al.*'s (2013) framework has delivered insights into why and how urban transitions take place (see box 4.1). In line with the findings in Geels *et al.* (2012b), Switzer *et al.* (2015) have suggested that more radical pathways (substitution or de-alignment/re-alignment, see Geels & Schot (2010) seem to be less frequent in the regional transport-land use system.

In terms of the second challenge, place and scale come in to play when studying urban transport and land-use transitions. This concerns both geographical differences in/the place specificity of transitions and interactions between actors at various scalar levels (see box 4.1, H4b and Bulkeley *et al.*, 2014). In transition studies the risk exists of conflating the levels in the MLP with spatial levels (e.g. national regimes vs. local niches). Coenen *et al.* (2012, pp. 976) state that transitions studies through the absence of attention for scales “overlooks the advantages, conflicts and tensions which arise in the wider networks of actors and institutions within which transition processes are embedded.” In reaction

¹ This is the same interpretation of structure as presented by Switzer *et al.* (2015). Accordingly text passages from this article were used in this paragraph

Box 4.1: Switzer et al.'s (2015) hypotheses regarding why and how transitions take place

H1: Changes in the practices of households and firms create the pressure needed to realise transition (as captured by the emergence of foci of debate and conflict, or 'troubles')

H2: Interest groups interpret landscape change and changes in practices to legitimise structures creating the pressure on the regime necessary for transition

H3: The identity of the city is a powerful discursive element that, when used can legitimise or delegitimise structures and practices

H4: Reaching shared cognitive rules enables change in the types of interventions in artefacts at the system level

Specifically related to how these shared cognitive rules can be reached:

- a) Regulatory and normative rules both open to conflict and effective in resolving it accelerate reaching of shared cognitive rules
- b) Interest coalitions are a way to exert pressure to achieve change in cognitive rules at other scalar levels

to various critiques a growing body of work has developed (see Næss & Vogel, 2012; Raven *et al.*, 2012; Coenen *et al.*, 2012; Binz *et al.*, 2014; Hansen & Coenen, 2015; Sengers & Raven, 2015; Murphy, 2015; Affolderbach & Schulz, 2016). The theoretical foundation of much of this work is the relational conceptualization of regime, niche and landscape based on proximity as discussed by Boschma (2005), see table 4.1. Raven *et al.* (2012) have proposed relational space where relative proximity is used to distinguish between niche (low proximity); regime (high proximity within a system) and landscape (high proximity across systems). Here scales are socially constructed in networks of actors and across territories. Berkhout *et al.* (2011) argue that niche (experiments) are embedded in transnational flows of knowledge, technology and other resources and assume their influence on local capability development. Related to this, Sengers & Raven (2015) have developed a spatialized niche highlighting both the importance of local narratives actors/transfer agents in hindering or supporting niche innovations, highlighting the multi-scalar networks and arenas in which these actors operate allowing for the transfer of ideas and ways of thinking. With regard to regimes, Raven *et al.* (2012) suggest their trans-nationality, but, as Hansen & Coenen (2015) indicate, the regime remains understudied in terms of geographical variation. The relationship between the various forms of proximity and the aspects of Switzer *et al.*'s (2015) framework is summarized in table 4.1.

Table 4.1 Relationship between forms of proximity (see Boschma, 2005) and heuristic framework

Type of proximity	Indicator	Aspect heuristic framework
Cognitive	Commonality cognitive base (Knowledge base and expertise)	Cognitive rules
Organizational	Control (informal to hierarchical networks)	Regulative/normative rules within and between organisations
Social	Social relations based on kinship, friendships and experience	Relations between actors
Institutional	Commonality of institutions	Normative and regulative rules
Geographical	Distance	Geographical inbedding of actors in urban region, artefacts

4.2 Methodology

By comparing the long-term transition dynamics in two transport and land-use systems this paper aims to (1) assess how place specific the hypotheses reported in box 4.1 are and (2) further articulate the emergent understandings on the role of proximity in transitions reported in table 4.1. Drawing on Switzer *et al.*'s (2015) case study of the regional transport and land-use system Munich, a comparative analysis was carried out with the case of Zürich. The regional level was selected as to encompass the practices of households and firms, which are increasingly regional. The cases were selected based on: comparability of the transport and land-use system prior to the first period of transition, roughly similar transitions based on location and mobility statistics and secondary sources, and variation in local and national context.

The discussion is structured around three periods of transition prior to and following major changes in location and mobility practices (see table 4.2) and artefacts (see Figures 4.15-4.20). The expectation is that these changes correspond with substantial changes in other parts of the system, i.e. a transition. Novel structures and practices leading to structural change in socio-technical systems is seen as resulting from pressures on current practices and attempts to address them (Geels & Schot, 2010). These pressures can be revealed by focusing on 'troubles' experienced in the daily practices of people and the contested attempts to address them (Wright Mills, 1959). The debates and conflicts surrounding

Table 2 Changes in practices of households and firms (T- transport and

		A. Munich (T1)		B. Zürich (T1)		C. Munich (T2)
T	1	Cars: 1949-1968 15.000- 310.000	1	Cars 1945-1969 (5.000- 103.000)	1	Cars 1968-1998 (+121%)
	2	Trips PT: 1938-1958 (+74 %), 1938-1968 (+53%)	2	Passengers PT 1939-1959 (+54%), 1939-1969 (+52%)	2	Trips PT 1969-1999 (+107%)
L	3	Residents city: 1948-1958 (+26%), 1958-1968 (+26%)	2	Residents city 1945- 1961 (+20%) 1961-69 (-5%)	3	Residents Munich 1968 - 1998 (-9%)
	4	Residents PVÄWM (region): 1939-1960 (+125%) 1960-1970 (+182%)	3	Residents agglomeration 1941- 60 (+68%) 1960-1970 (45%)	4	Residents PVÄWM (region) 1970-1998 (+57%)
	5	Relocation large firms 1945-1961 (+140.000 jobs)	5	Location of financial firms; 1950-70 +100.000 jobs in service sector (Galliker, 1997, pp. 200)	5	Regionalisation jobs, but Munich dominant

mobility/ L- land-use and spatial practice(s)

	D. Zürich (T2)		E. Munich (T3)		F. Zürich (T3)
1	Cars 1970-1989 (+25%) 1989-2000	1	Cars 1998-2007 (+4%) 2007-2012 (+9%)	1	Cars 2000-2011 (-2%)
2	Passengers PT 1969-2001 (+49%)	2	Trips PT1999-2012 (+23%)	2	Passengers PT 2001-2013 (+17%)
3	+ modal split PT to Zurich	3	Share cycling 2002-2011 (+7,3%) (Muschwitz & Monheim, 2011)	3	Passengers PT to Zurich 2000-2012 (+54%)
4	+ commuting within region (RZU, 2008, pp. 30)			4	Polycentric commuting (ZEXP4)
5	Population Zürich 1970-2000 (-17%)	4	Residents Munich 1998-2013 (+23%)	5	Residents Zürich 2000-2013 (+6%)
6	Population aggro 1970-2000 (+31 %)	5	Residents PVÄWM 1998-2011 (+13%)	6	Residents agglomeration 2000-2013 (+17%)
7	Increased regionalisation firms	6	Firms locate increasingly in the region, but Munich remains sominant (60% of employment) (Empirica, 2005;2011)	7	Back offices locate in region, headquarters in centre. Half of jobs in region in Municipality (Zürcher Kantonalbank & Kanton Zürich, 2011, RZU, 2008, pp. 37)
8	Greenfeild dev. retail (RZU, 2008:30; Schultz & Schilter, 2003)				

troubles were identified in case study reports of the period from 1945-2012, based on interviews and primary documents and scholarly analyses. In the analysis, per period, the prominent troubles are stated followed by narratives of the ensuing debates and in particular the interaction between MLP levels, and the role of proximity and strategies actors employed to influence the course and outcomes of these debates. The selection of interview respondents (see appendix A) was theoretically driven (Bryman, 2008, pp. 414). They fulfilled the roles shown in Figure 4.1. Triangulation between sources helped ensure internal validity and credibility (Bryman, 2008, pp. 377,379). Proximity was operationalised using the indicators shown in table 4.1, whilst the various forms of structure were operationalised as discussed in the previous section. Practices were operationalised as the mode of transport used/owned (mobility practices) and the population of persons or firms (location practices).

4.3 First period of transition

In the immediate post-war period, in both cases the most important troubles concerned a lack of space for urban development and traffic congestion.

4.3.1 Munich

In Munich, the discussion regarding urban space concentrated consecutively on the reconstruction of the city and on resolving the housing shortage. Although the urgency of reconstruction was apparent, opinions on how differed. Conservative groups, dominant in the regime (Mayor and Stadtbaurat: Meitinger, 1946) focused on the restoration of the historic city – something which should be considered against the backdrop of more general societal conservatism, which was more pronounced than in other areas of Germany (cf. Schlemmer & Woller, 2001). On the other hand, some niche actors active in (inter)national networks focused on rethinking the city saw the destruction during the war as a chance to modernise the city or even reconstruct it elsewhere (Nerdinger, 1984). Despite the conservatism of regime actors, locally and nationally, interventions were considered necessary to keep the city ‘alive’ (e.g. König, 1948). However, and notwithstanding the strength derived from social proximity in networks, the lack of cognitive proximity to the regime in land-use planning locally seems to have hindered niche actors. Ultimately, the absence of a legal basis for interventions in property rights and artefacts themselves hindered the implementation of *Aufbauplan* (Reconstruction plan, Table 3.3) incorporating many of these elements. Subsequently, the municipality chose to develop edge estates to accommodate rapid growth and to qualify for federal support (Bruder, 2009, pp.16-18, see Figure 3.3).

The *Aufbauplan* indicates that a general consensus was already reached in

the thinking about problems and solutions, i.e. a high degree of cognitive proximity with regard to transportation planning, evidenced by the the ad-hoc interventions of the late 1940s and early 1950s. With increasing car use, the calls to take action to address a supposed traffic chaos (see Figure 3.4) increased considerably in the early 1950s (e.g. Ströbl, 1953). Arguments focused on traffic safety, the economic importance of car accessibility and the social consequences of hindering it (Zimniok, 1964, pp. 31). Still, the development of concrete solutions took the better part of the decade. During this period, experts became increasingly prominent and plans increasingly comprehensive (e.g. the integral City Development Plan, Stadtentwicklungsplan - STEP, 1963 drafted by experts, Figures 3.5 & 3.6, Table 3.3), something illustrative of a more general belief in the malleability of society (cf. Blotevogel & Schnelhaas, 2011). The federal government supported road construction from 1960 onwards partially for ideological reasons (Switzer *et al.*, 2015), but left the exact routing to the municipalities (Klenke, 1995, pp. 33, 63).

Nationally and locally, public transport was embraced as a way of retaining urban accessibility without damaging the urban fabric (cf. Vogel, 1961). In Munich, both the municipality (underground tram) and the Deutsche Bundesbahn (S-Bahn) selected a route under the central city, resulting in a conflict over the use of the route (background Linder, 1973, pp. 55). Without a resolution, a concession to start construction for either party was not possible (Schmucki, 2001). To understand how this conflict was resolved, it is necessary to consider the financing of public transport. Institutional arrangements made construction without support of higher levels of government impossible. To get them on board, pressure was exerted (1) top-down from Bavaria to build a more regionally oriented S-Bahn and from Bavaria and the federal government to build an U-Bahn (underground) instead of the underground tram (Linder, 1973:, pp. 44-48,106,107); (2) bottom-up by the mayor of Munich with colleague mayors on the federal government to contribute to structurally fund public transport and by members of the Bundestag as well as economic interest groups on the federal cabinet in favour of the S-Bahn (Switzer *et al.*, 2015). In the later phases, social and organisational proximity facilitated actors in exerting pressure to change cognitive rules. After nearly ten years of negotiations, an agreement for federal-Land-municipal cost sharing was reached (see Switzer *et al.*, 2015). In the case of road and public transport planning, geographical proximity of various actors and the local conditions such as traffic congestion played an important role in limiting or favouring the development of cognitive rules. In addition, organisational proximity was used to influence the direction of how cognitive rules took shape whilst allowing local actors sufficient freedom make choices based on local conditions.

4.3.2 Zürich

In the 1930s and 40s, various actors framed the unplanned urbanisation ensuing from rapid population growth as problematic and developed proposals for regulatory changes and new planning concepts (e.g. Meili, 1944- Figure 4.2; Carol & Werner, 1949). Subsequently, however, priorities shifted (Blanc, 1996). Arguments to against these proposals related to fears of economic development. More generally, the prominent role of economic interest groups in decision making and the Konkordanzdemokratie – visible in the broad coalitions federally – hindered change for which support was not broad. Following expert criticism, measures limiting development rights were ruled unconstitutional. In the 1950s proposals were made plan land-use (regionally and nationally) and for modernisation (Zürich), but in both cases a lack of cognitive proximity between niche and regime can be observed preventing the development of the (legal) instruments needed to realise them (Koch, 1992, pp. 176; Galliker, 1997, pp. 177-180).

In contrast, the approach to addressing troubles in transportation planning and both the pace and extent of change differs considerably. Just as in Germany, interest groups (e.g. Automobil-Club Schweiz, Touring-Club Schweiz and individuals) used economic arguments to frame the trouble, thereby increasing the cognitive proximity between niche and regime (Bieri, 1960; ACS, 1960). The belief that allocating more space to the car was needed was broadly shared (gVK, 1957, pp. 14; Blanc, 1993, pp. 86; ZLUP3). Even critics of the scope of regime proposals were positive (e.g. Marti, 1953). Ad hoc interventions in the early post-war period were followed by the development of a Generalverkehrsplan (GVP, General transportation plan) amidst increasing traffic flows and the cries to structurally address problems. Some of the same actors working in Munich contributed to these plans, indicating how social proximity facilitated the exchange of ideas. As in Munich, the transportation system was seen as the only variable which could be influenced by policy. The abolition of the tram to free up space was a key issue. Automotive interest groups argued for replacement with (trolley)busses while many others argued for retention (e.g. Marti, 1953). In the early period, only one line was replaced. The proposals for the GVP presented in 1953 included: a motorway crossing in the city (see Figures 4.3, 4.4), a ring around the centre (Cityring) and a tramway under the central city (Tiefbahn). The choice for the routing of the motorways was seen as supporting the central city (Kremer & Leibbrand, 1953; Pirath & Feuchtinger, 1954).

The debate in Zürich was intertwined with the concurrent national motorway planning. Under pressure from interest groups, an advisory commission was established including representatives of these groups. In 1958 they initiated a

referendum resulting in federal competencies to plan and build motorways. The urban motorways, selected to justify investments and address urban traffic issues, were funded by the federal government and inspired by visits to the US to which members of the commission had cognitive proximity (Kammann, 1990, pp. 103). Although embraced by Zürich and other municipalities, the planning was delayed in the 1960s due to its complexity (Kammann, 1990, pp. 112-115) and increasing criticism (ZAS, see Figure 4.5, 1960, ZEXP9).

The Tiefbahn proposal was adopted by the municipality rejecting competing proposals for a U-Bahn as unrealistic (Stadtrat von Zürich, 1961). Despite the institutional simplicity compared to Munich, this plan as well as parts of the road plan foundered in a referendum on criticism of the breadth of problem definitions and solutions in the 1960s (e.g. Marti, 1956; Litz, 1967). See arguments for and against in Figures 4.6 and 4.7. Subsequently, changes were made to make a planning seen as 'comprised of illusions' more integral and realistic (Blanc, 1993, pp. 116-134). However, central premises remained largely unchanged (Stadtrat von Zürich, 1971). In this decision making geographical proximity played a crucial role: presence of critics to the early solutions delayed/prevented rash interventions.

4.4 Second period of transition

In both Munich and Zürich, the solutions proposed in the first period drew increasing criticism from the late 1960s onwards. Prominent troubles related to the identity of the city in terms of built environment and residents.

4.4.1 Munich

In Munich, young architects in the Münchner Bauforum and young members of the party of the mayor (SPD) criticised the changes in the identity and character of the city brought about by modernisation (Klühspies, 2009; Schleich, 1978). The organisational proximity between actors in the governing party facilitated the exertion of influence. This criticism can be seen as related to a broader societal concern regarding modernisation and growth (Klenke, 1995, pp. 84-85; Schmucki, 2001, pp. 345) and a shift toward incrementalism in planning. In light of changing societal discourses, problems were redefined. The first reaction of the city government was to try to undermine critics followed by promises to change heuristics and to involve critics in decision making. The subsequent period was characterised by contradictions: changing cognitive rules among some government actors on the one hand evidenced by strategic plans focusing on liveability and polycentricity (see Figure 3.9/3.10 & Table 3.4/3.5) and a stability in the area of public transport evidenced a continued focus on radial U-Bahn construction on the other (Schmucki, 2001, pp. 328).

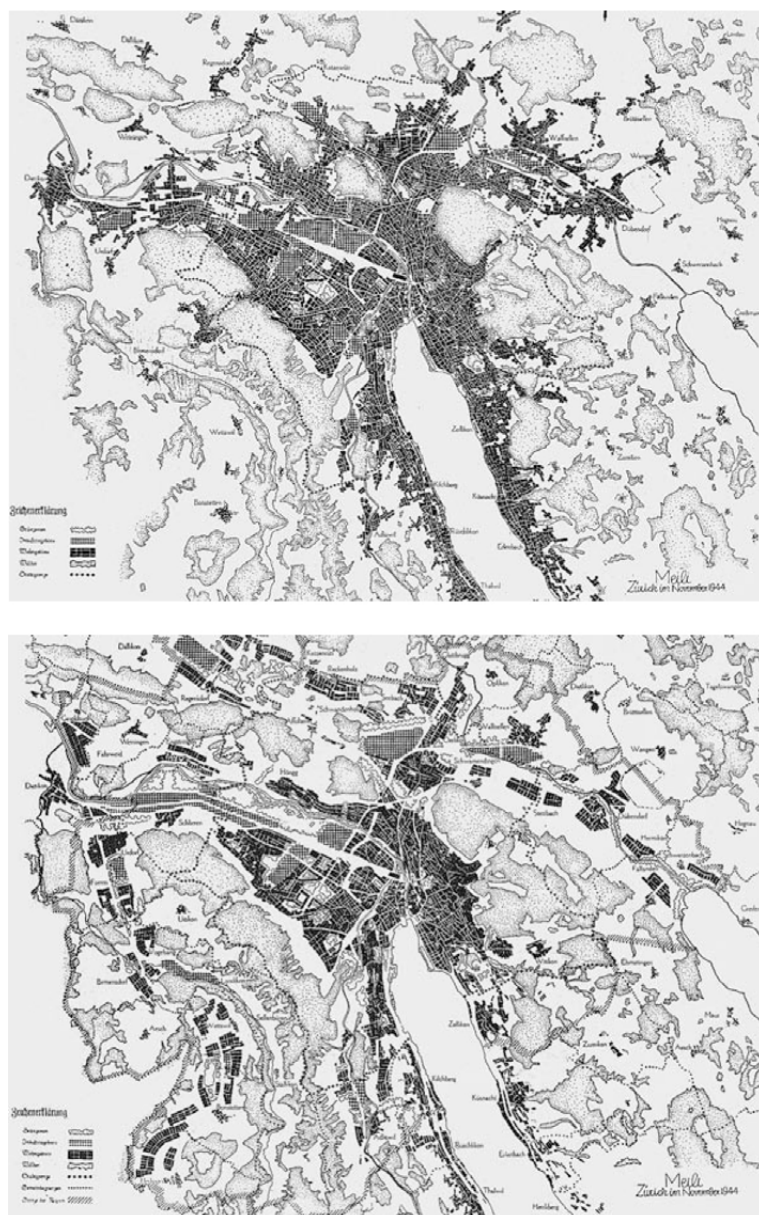


Figure 4.2: Unplanned vs planned development of Zürich (Meili, 1944)

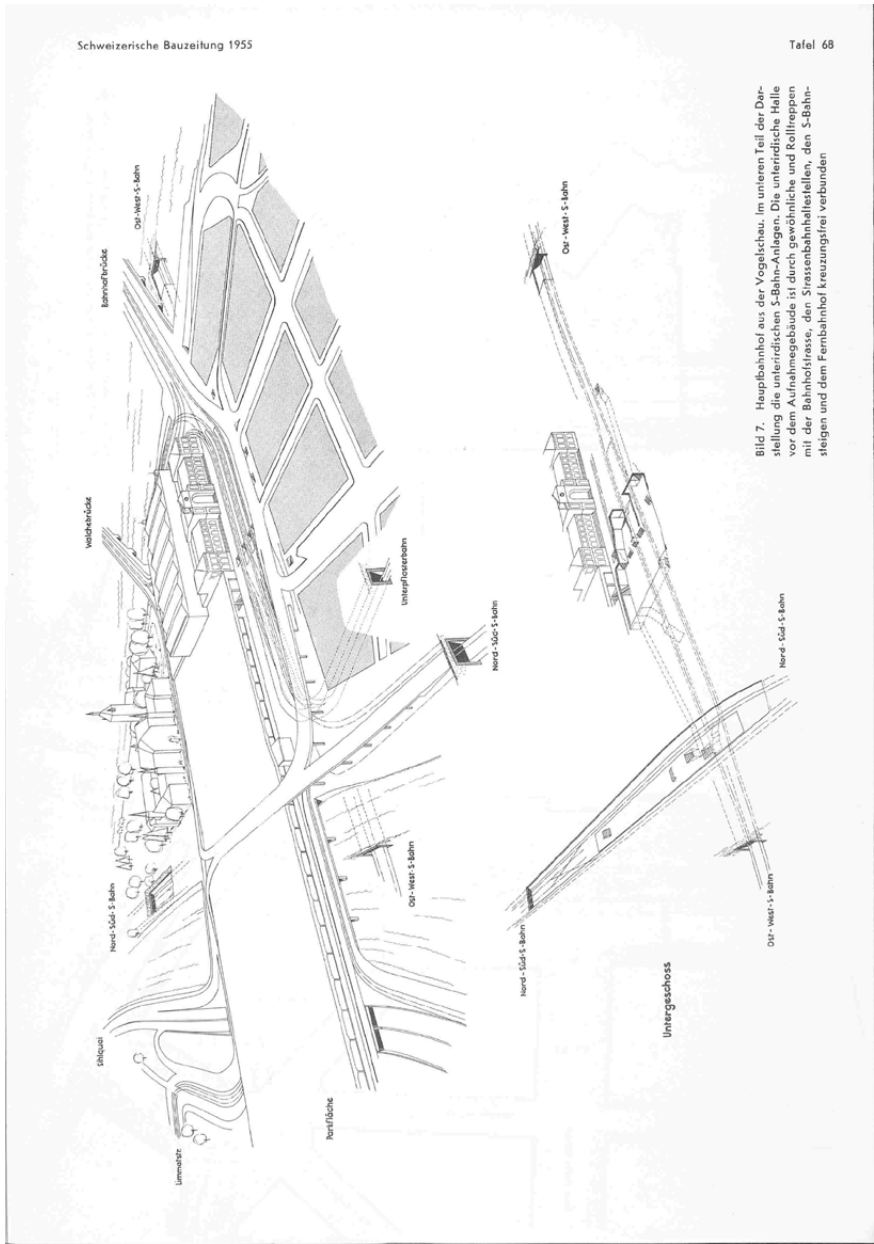


Figure 4.3: Kremer & Leibbrand's proposed motorway crossing at Zürich central station (Leibbrand, 1955)



Figure 4.4: Nationalstrasse N3 (Sihlhochstrasse) - Part of the planned urban motorway crossing that was constructed (<http://doi.org/10.3932/ethz-a-000987835>)

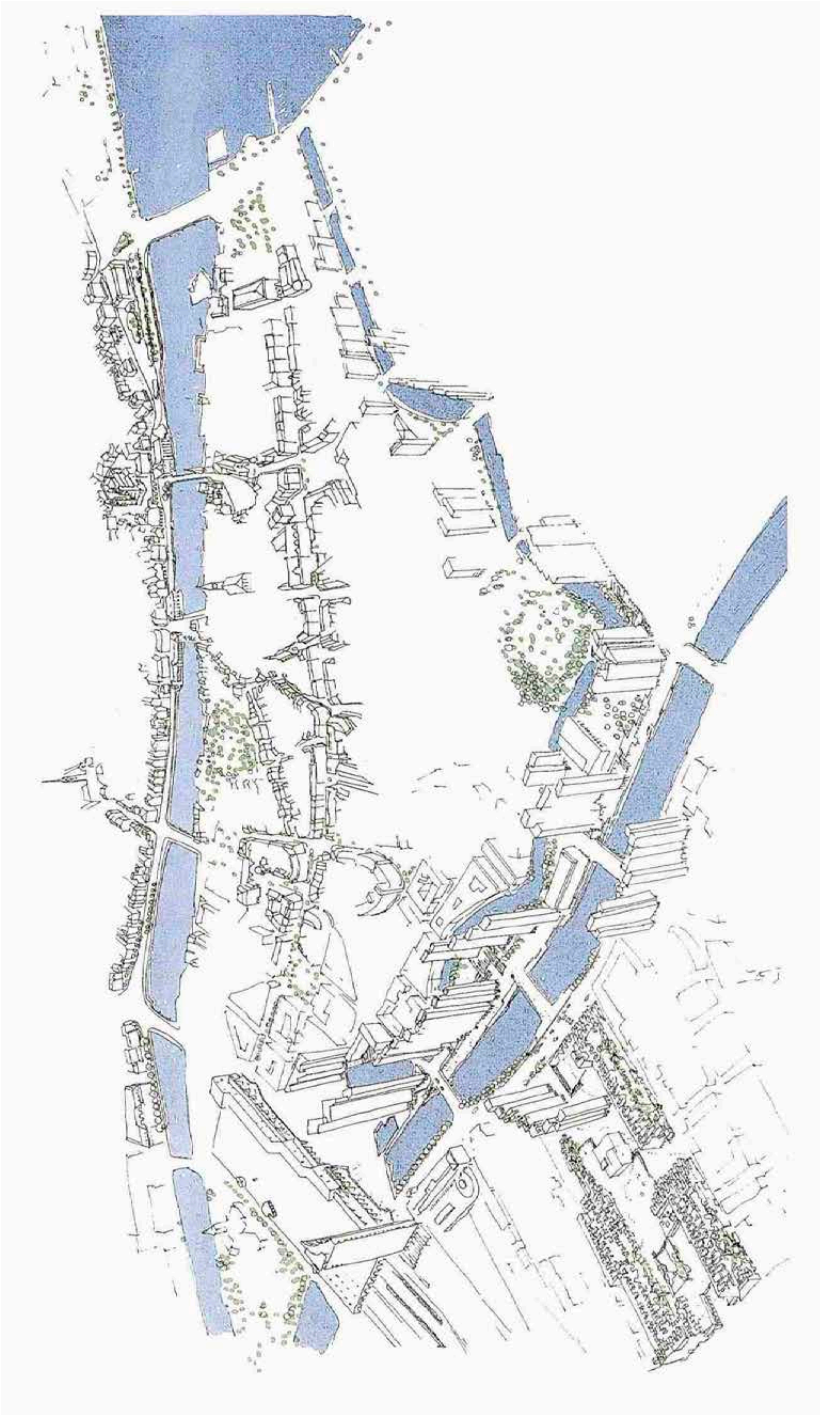


Figure 4.5: Alternative proposal of the ZAS 1959 for the Sihl river area as a second city (from Benidikt, 2000)

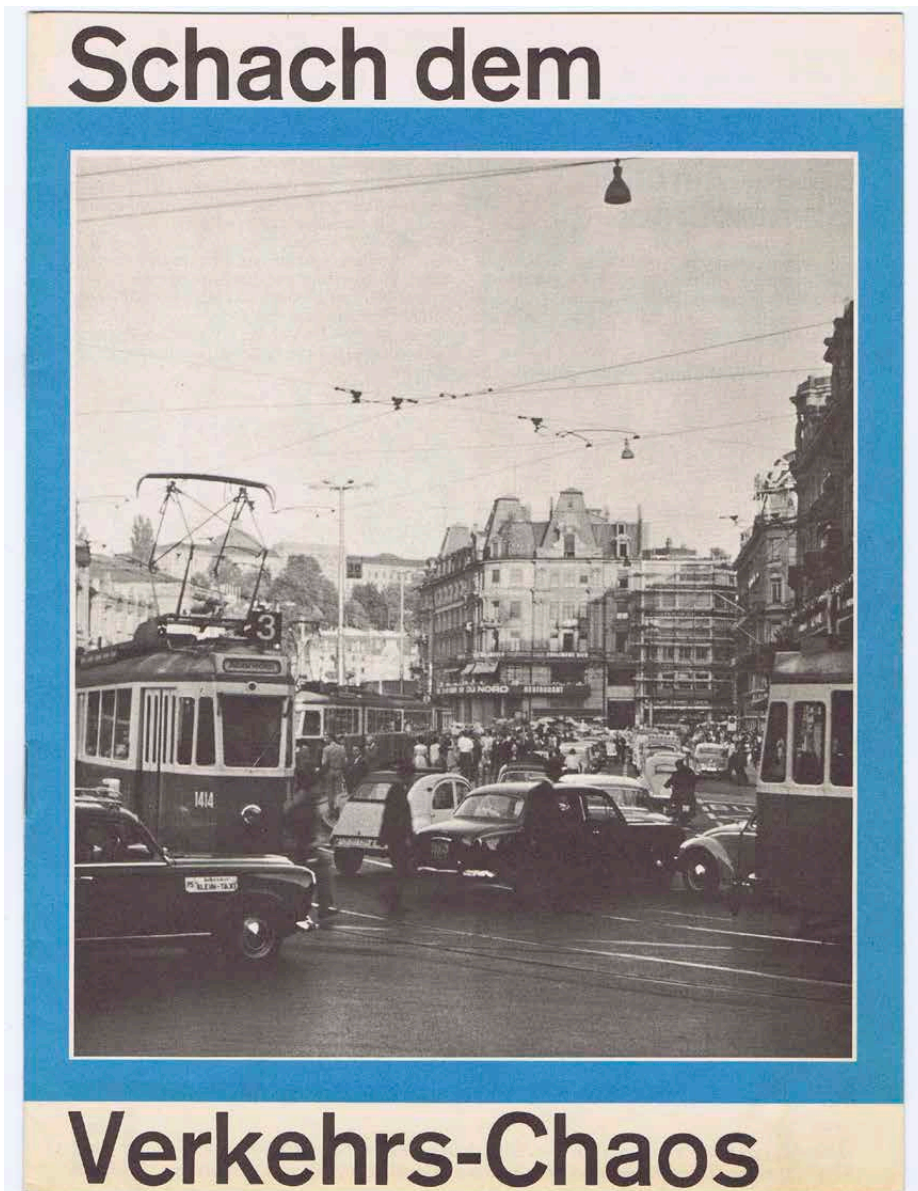


Figure 4.6 Broschüre Aktionskomitee Pro Tiefbahn, 1961/1962 (Source: Tram-museum Zürich)



Figure 4.7: Newspaper advertisement Tiefbahn-Abstimmung (Tagblatt, 31.3.1962 Source: Tram-museum Zürich)

The result was a partial realisation of the planned modernisation. Change was only possible under considerable protest from niche actors (Schmucki, 2001, pp. 378-382, e.g. Figures 3.7 & 3.8). The ensuing stalemate (see Kesselring, 2001, pp. 113-116) was effectively resolved by an initiative of car manufacturer BMW resulting in a change in roles in the planning process and agreements to move forward in areas in which consensus was present from 1995 onwards (BMW & LH München, 1998, pp. 4), an indication of the importance of geographical as well as social proximity.

4.5.2 Zürich

In Zürich, students and younger members parties such as the SP argued that interventions developed following the rejection of the Tiefbahn, especially the U-Bahn (Figure 4.8), would exacerbate negative developments such as population decline, accessibility problems and the increasing separation of housing and employment (Blanc, 1993, pp. 141-145; Bratzel, 1999, pp. 187; Schumacher, 1973; ZTRP1; ZEXP2; trends: table 4.1, see Figure 4.10). Although they recognised the issue of housing loss (Bratzel, 1999, pp. 169; Sidler, 1971), regime actors remained committed to attracting firms (Devicchi, 2010, pp. 55-56). Just as in Munich, the protests in Zürich focused on a broader criticism of the drawbacks of modernisation and the simple solutions offered to its side effects. It was argued that they were too focused on economic development and did not sufficiently account for the complexity of the systems in which was being intervened (Bratzel, 1999, pp. 199; Blanc, 1993, pp. 159-161; Blanc, 1996). Criticism and ensuing uncertainty can also be observed (inter)nationally and in other domains (see Koch, 1992, pp. 200, 248; RZU, 2008, pp. 21; Galliker, 1997, pp. 225; Hitz *et al.*, 1995). For example, criticism of troubles relating to public health, speculation and the environment culminating in legislation and federal powers in spatial planning (RZU, 2008, pp. 28; Bratzel, 1999, pp. 154, 191, ZEXP4,7; ZTRP4). It is probable that social and geographical proximity were supportive of this growing cognitive proximity, however no direct evidence was found.

Against the backdrop described, the sentiment in the city and among some proponents of the U-Bahn changed considerably in early 1973 leading to its rejection. Subsequently, a number of developments can be observed, such as:

- The newfound attention for liveability in the communication of economic interest groups (Blanc, 1993, pp. 179-186; ZLUP3) – albeit it has been suggested that the change did no go further than this (Galliker, 1997, pp. 232; Bratzel, 1999, pp. 171; Devecchi, 2010, pp. 55-57);

- Changes and leadership at various departments and a focus on learning, public transport and slower modes of transport (Berger *et al.*, 2009, pp. 13; Bratzel, 1999, pp. 177,189);
- The critical municipal reaction to the referendum on the motorway crossing and cantonal roads in the municipality (Y-Strasse) and the Cityring (NZZ, 1974, pp. 4; ZLUP3);
- New plans for public transport, especially the tram (Galliker, 1997, pp. 228);
- Municipal limitations on rent increases (Galliker, 1997, pp. 231).

Just as in Munich, change was made, but consensus was sometimes lacking. Tensions between economic interest groups and the municipality decreased in the 1990s whereby through more informal cooperation compromises became possible, for example regarding parking policy (Devecchi, 2010, pp. 83, 85). Just as in Munich, the effective resolution was still dependent on the geographical and social proximity of 'the right people at the right place at the time'. Interestingly, the S-Bahn (see Figure 4.9) that was built in the 1980s was compatible with both the old and the new regime. Legislation was approved in the 1970s and 80s and the construction was completed in 1990.

4.5 Third period of transition

Since the 1990s, various actors in both Munich and Zürich have drawn attention to troubles arising from changing practices of households and firms and criticising structures and practices in the regime.

4.5.1 Munich

The first trouble identified relates to regional growth. It is argued that ensuing bottlenecks cannot be addressed within existing regulatory frameworks or using existing cognitive rules prioritising the city centre (Hutter, 2006; Bock, 2010; MLUP1 & MINT1, see Figure 3.11)/ favouring municipal autonomy (Haberer & Mailer, 2005; EXP1&2; TRP1; INT1&2; LUP1). The second trouble has been raised by interest groups advocating a different allocation of road space in light of increasing bicycle usage, and to further stimulate it. The underlying problems are sometimes (see Völklein & Anlauf, 2011; Dachale, 2011), but not always recognised by the regime. With regard to regional public transport and planning, niche actors have been able to make little progress. Cognitive rules in the regime remain stable with little cognitive proximity between regime and niche. Organisational proximity between Munich and other levels have been suggested to have played a role here as decisions regarding financing at higher levels supported established cognitive rules and hampered change. In contrast, relatively more change has taken place with regard to cycling. Policy attention

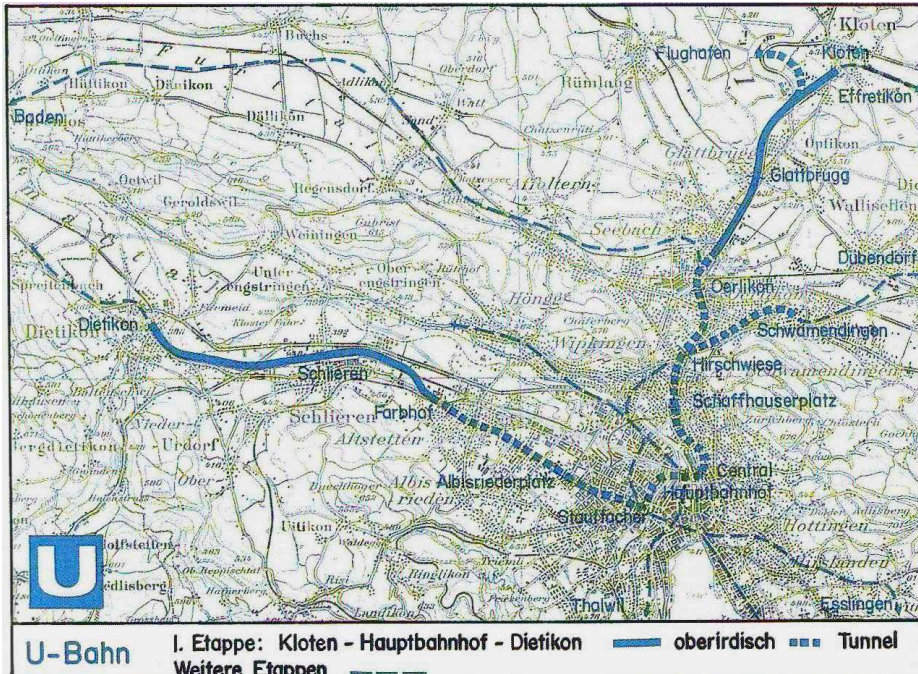


Figure 4.8 The planned U-Bahn in 1973 (Künzi, 1998, pp. 45)

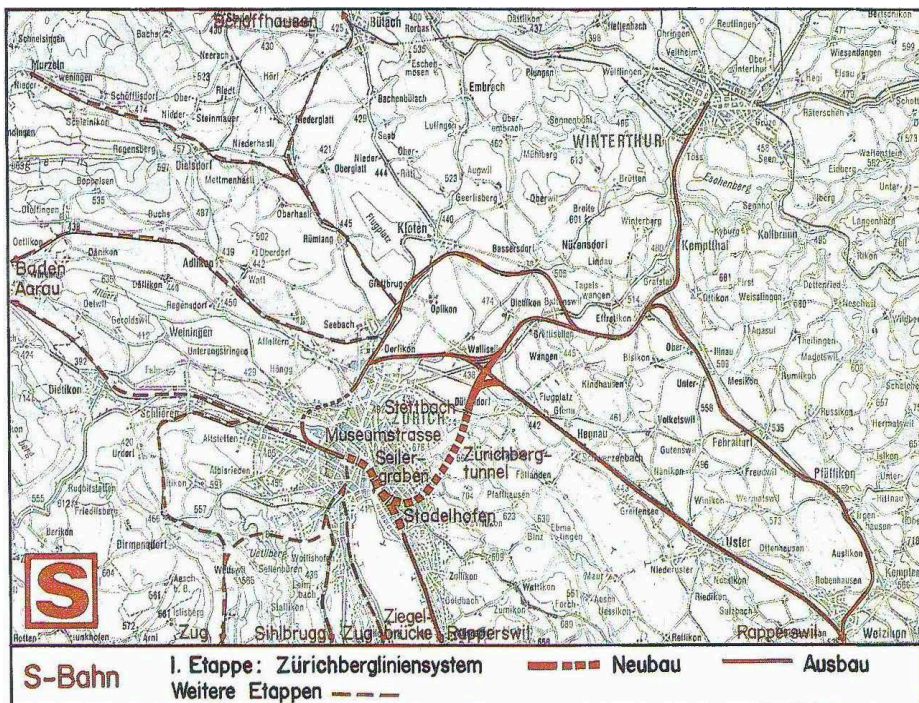



Figure 4.9 The planned S-Bahn in 1973 (Künzi, 1998, pp. 45)



Wir fordern Sofortmassnahmen zur Verbesserung des öffentlichen Verkehrs im Interesse einer wohnlichen Stadt.

Was bringt die U-Bahn uns, den Einwohnern von Zürich?

- Steigende Bodenpreise ● Höhere Mieten ● Abbruch von Wohnungen
- Büros statt Wohnungen ● Verdichtung der Stadtbewohner
- Längere Arbeitswege ● Grössere Haltestellenabstände
- Höhere Fahrkosten ● Dauerbaustellen in vielen Stadtteilen
- Förderung des privaten Verkehrs ● Lärm und Gestank
- Höhere Steuern ● Weniger Geld für Spitäler, Schulen etc.

Die U-Bahn bringt uns nur Nachteile

Deshalb: U-BAHN NEIN

Nein

Baslerkantonischer Rat der Stadt Zürich

**In 49 Städten der Welt
ist jung und alt mit der U-Bahn zufrieden**

Nur in Zürich wird sie schlecht gemacht

Als Bürger mit klarem Blick lassen Sie sich
die Zürcher U-Bahn von den Progressiven nicht vermiesen
und stimmen deshalb wie vor 2 Jahren

U-Bahn JA

Für ständiges Denken in Zukunft
B. W. Kisten / G. G. G.

Figure 4.10 Advertisements against and for the U-Bahn, 1973 (Source: Stadt Zürich)

has increased and space has been allocated. The changes in cognitive rules seem largely related to the pressure of interest groups (see Figure 3.12) against a background of increasing policy attention for cycling nationally.

4.5.2 Zürich

Just as in Munich, interest groups, including researchers, have emphasised the necessity of changing structures and practices to address what is seen as uncontrolled development and instead anchor it to the well-developed regional transport system (Lendi, 2006, 2010, Koll-Schretzenmayr & Schmid, 2003; IGSRO & ARE, 2004; Folio, 2012; ZEXP1; ZTRP3;). Examples include:

- Improvement of the quality of development in the regional centre of Opfikon from 1988 onwards by the municipality on the initiative of activists (see Figure 4.11);
- The überparteiliche Arbeitsgruppe Zürich Nord's regional development vision (Hitz *et al.*, 1995)
- The cantonal Richtplan, objective: regional transport and land-use coordination, including the regional Glattalbahn (see Figure 4.12)

The federal government has also devoted attention to the issue (Bundesamt für Raumplanung, 1996; Bundesrat, 2001, pp. 43). In Zürich, the resources that have been made available were used to improve regional public transport. At the same time the awareness of the troubles is becoming broader. This can be seen in conservationist initiatives directly (Zweitwohnungsinitiative – limit second homes & Landschaftsinitiative – limit new development) and indirectly related to planning (Initiative gegen Masseneinwanderung – limit immigration; link to planning see Moser, 2014, Figure 4.13). Some criticise public transport investments as increasing sprawl and question the desirability of (population) growth at the cost of quality of life and the environment (ZEXP1; ZTRP7; ZEXP6; ZEXP9; ZLUP3, Schärer, 2011). At present, there are signs of further changes in the regime at both levels (e.g. stricter national spatial planning legislation, referendum advertisement in Figure 4.14). In this period the role of proximity seems limited to increasing cognitive proximity between niche and landscape: troubles emphasised by niche actors resonated with a more general concern that regarding the development of the country.

4.6. Discussion and conclusions

This concluding section considers the contributions to debates discussed in section 2, specifically: (1) the extent to which are Switzer *et al.*'s (2015) single case hypotheses are place specific; (2) contributions to addressing the knowledge gaps related to place and scale in urban transitions.

4.6.1 The urban fabric as an object of transition: towards more general hypotheses

The validity of each hypothesis in Zürich will be discussed below. Where the evidence supports an amendment of the hypothesis, the Munich case will be used to test if it also supports the amendment. The original formulation of the hypotheses is in box 4.1 above.

Hypothesis 1

A comparison of the three periods of transition in Zürich supports this hypothesis. Changes in the practices of households and firms, often related to more general changes in the landscape were observed in creating pressure in the first period with regard to transportation planning where transition was the most extensive. In the second period changing practices can also be observed, namely the decreasing population of the inner city which resulted in pressure on the plans for the U-Bahn and the further modernisation of the city centre. This contrasts with Munich in the same period where a comparable change in practices cannot be observed and the pressure for transition was lesser. Finally, in the third period practices are also changing (e.g. growth of the region and increasing mobility), which coincides with increasing criticism of spatial and mobility policy.

Hypothesis 2

In Zürich we see support for this hypothesis. In the periods where transition took place the activities of interest groups were essential in framing landscape changes and changes in practices as problematic and thereby actively creating the troubles. That said, we may further specify the hypothesis, stipulating that the pressure can be seen as dependent on a passive resonance of cognitive rules (e.g. problem definitions/solutions) with the landscape or stable regime structures. For instance, the conclusion that limiting free mobility was problematic and the proposed technical solutions based on the predictability of future needs/demand in transportation planning in the first period. Conversely, when this is absent (e.g. in Zürich land-use planning troubles) it is difficult to maintain pressure for change - even if changes in practices of households or firms are present and considered problematic by niche (and some regime) actors. Although the reduced pressure could be the result of a threshold in changes in practices not being reached, the reduced urgency of the troubles as a result of changing discourses seems to support the amendment of this hypothesis.

In Munich, a similar shift in attention for troubles as in land-use planning in Zürich cannot be observed. Still, in the second period of transition a situation can be observed where troubles were widely acknowledged (changing character of the city), but that proposed solutions did not resonate with stable structures



Figure 4.11: The mixed-use Glattpark development in Opfikon, north of Zürich (Source: Gebietsmarketing Glattpark)



Figure 4.12: Glattalbahnhof at the regional Glattzentrum shopping centre (Source: Simon Vogt)



Figure 4.13: Advertisement for the Masseneinwanderungsinitiative, 2012, linking to spatial planning issues (Source: Überparteiliches Komitee gegen Masseneinwanderung)



Figure 4.14: Advertisement for new spatial planning legislation, 2013 (Source: Pro Natura Zürich)

in landscape and regime which remained focused on road construction and underground public transport.

Therefore, I add a condition to the hypothesis:

The extent of pressure depends on the resonance of propagated cognitive rules with structures and discourses in the landscape or stable structures in the regime

Hypothesis 3

The second period in both cases and the third in Zürich support this hypothesis, albeit the focus in Zürich differed from the case of Munich upon which the hypothesis was based. In Zürich niche actors used arguments focusing on changes to the functional dimension of the identity in the city (loss of housing might lead to a different type of city).

Regarding why transition takes place, adding the case of Zürich illustrates the importance of considering the first three hypotheses in conjunction with one another. In the second period of transition, although the troubles were not universally recognised, the extent of protests resulting from interest groups emphasising the changing identity of the city as well as economic overheating and considerable population decline seem to have made regime actors (policy makers) more receptive to arguments of niche actors. Furthermore, the direct democracy offered a way to exert further pressure on the regime.

Hypothesis 4

The fourth hypothesis relates to how transport and land-use transitions take place. In the first period the pressure for change in Zürich was similar to that in Munich. However, the extent to which shared cognitive rules (solutions) were reached differed. In contrast to Munich, in Zürich debates continued until the end of the transition period. Just as in the first period, the second transition period in Zürich was characterised by discussion and debate regarding cognitive rules (problems and solutions) as evidenced by conflicts between various actors.

The correlation between the extent to which transition took place and the extent to which cognitive rules were shared suggests support for this hypothesis in the first two transition periods in Zürich. I now move to discussing the two further specifications of hypothesis 4.

Specification a

The case of Zürich supports this specification of the hypothesis, but suggests also that established cognitive rules also play a role in addition to normative

and regulative rules. This can be observed at a number of moments. Firstly, the delay of a broad discussion of alternatives until motorway routes had attained a formal status related to the choice to make the motorway planning a federal responsibility. This regulative rule which codified a cognitive rule that it was the best solution to act rashly and limited the necessity to take account of other actors. Secondly, the reluctance to take sufficient account of objections and criticism in the case of the Tiefbahn. This relates to normative and cognitive rules, but also the absence of regulative rules similar to those in Munich that encouraged varying viewpoints. Thirdly, the complexity of the routes selected arising from the choice for urban motorways as an essential component of a solution for the transportation trouble in conjunction with artefacts (tram and compact city) resulted in delays once the Tiefbahn was rejected. This relates to the normative rule that the cities should be involved just as the cognitive rule that the motorways should address urban traffic troubles. Furthermore, in Zürich, the referendum, especially in the second transition, can be seen as a way to facilitate conflict and reach consensus, or in any case an outcome that is seen by most actors as legitimate.

Whereas in Switzer *et al.*'s (2015) study of Munich it appears that normative and regulative rules largely contributed to reaching shared cognitive rules, in the comparison with Zürich it becomes evident that that in the first period in Munich cognitive rules also played a role in shaping new rules. This is visible in a pragmatic attitude and the flexibility of regime actors whereby consensus and compromises solutions were preferred to stalemate (e.g the case of urban motorways and the underground public transport).

Therefore, I propose to amend this specification of hypothesis 4:

Rules both open to conflict and effective when attempting to resolve it accelerate reaching shared cognitive rules

Specification b

In the case of Zürich, there is not an example of attempts to influence actors at higher levels as observed in Munich. In follow-up research other cases where similar attempts have been made should be examined to test and refine this hypothesis and examine the conditions under which it is valid. Elsewhere, Courtard & Rutherford (2010) have observed similar coalition formation – in this case between national and local actors to influence regional planning.

The amended hypotheses further show the importance of considering space as the object, not just the context of transition. In the periods of transition urban space and changes to it and its use were in many cases the driving factor

influencing how transportation technologies were integrated in to the local socio-technical systems.

4.6.2 Place and scale in urban transitions: towards a better understanding

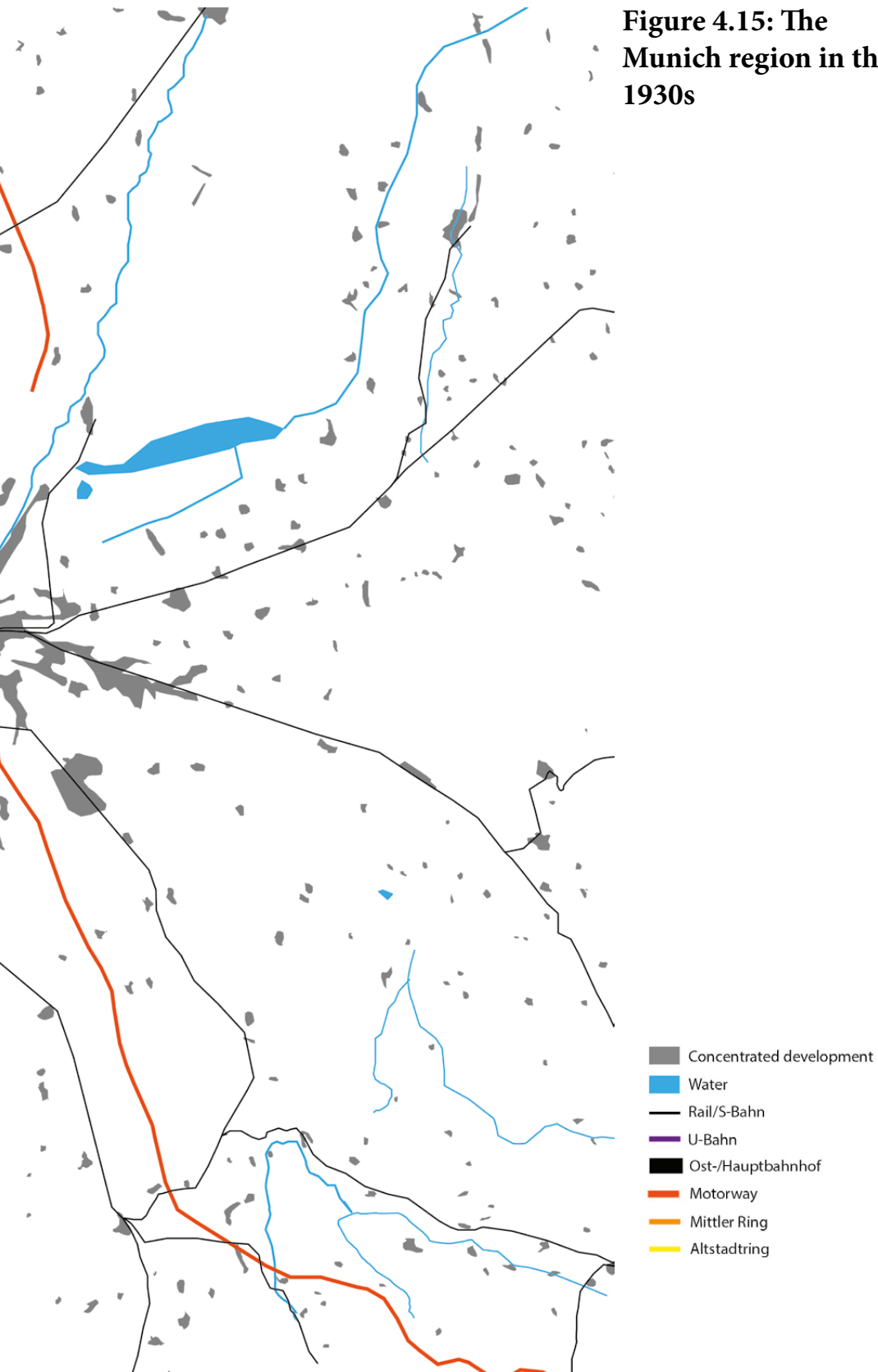
The comparative case study above suggests that explicitly adding proximity to the analytical framework offers additional explanatory power when studying both why and how transitions take place. For example, cognitive proximity can be observed in the first transition as we see the importance of a degree of cognitive proximity to provide fertile ground for information exchange (leading to change in local cognitive rules). In both cases there was locally a high degree of cognitive proximity regarding problems and solutions in the transport domain making the transfer of new ideas relatively easy (e.g. from Germany and the US) which shaped the development of cognitive rules, for example with regard to urban motorways. In the first period in the case of land-use planning in both cases the lack of cognitive proximity, most visibly with the regime, hindered the broad recognition of troubles and solutions advocated by niche actors, whereas in the case of Zürich advocates of allocating more road space to the car framed this as supporting economic development increasing cognitive proximity. Organisational and social proximity seem to provide channels to exert influence on debates at other scalar levels as witnessed in Munich in the first period in the case of public transport. Finally, in the same period organisational proximity in its hierarchical form can be observed as influencing how the transition takes place through regulative rules. This said, in the federal states studied there was in many cases ample freedom for both cities in the implementation of policies, and use of federal programmes. The importance of geographical proximity becomes apparent especially in terms of niche development as the troubles in the urban system are concentrated in a spatially bounded area (traffic, living conditions etc). Of course, novel practices elsewhere, developments in other systems or in the landscape can increase the sensitivity for troubles which can result in cognitive and organisational proximity in the form of networks which can be strengthened through various legitimations strategies or the exertion of power.

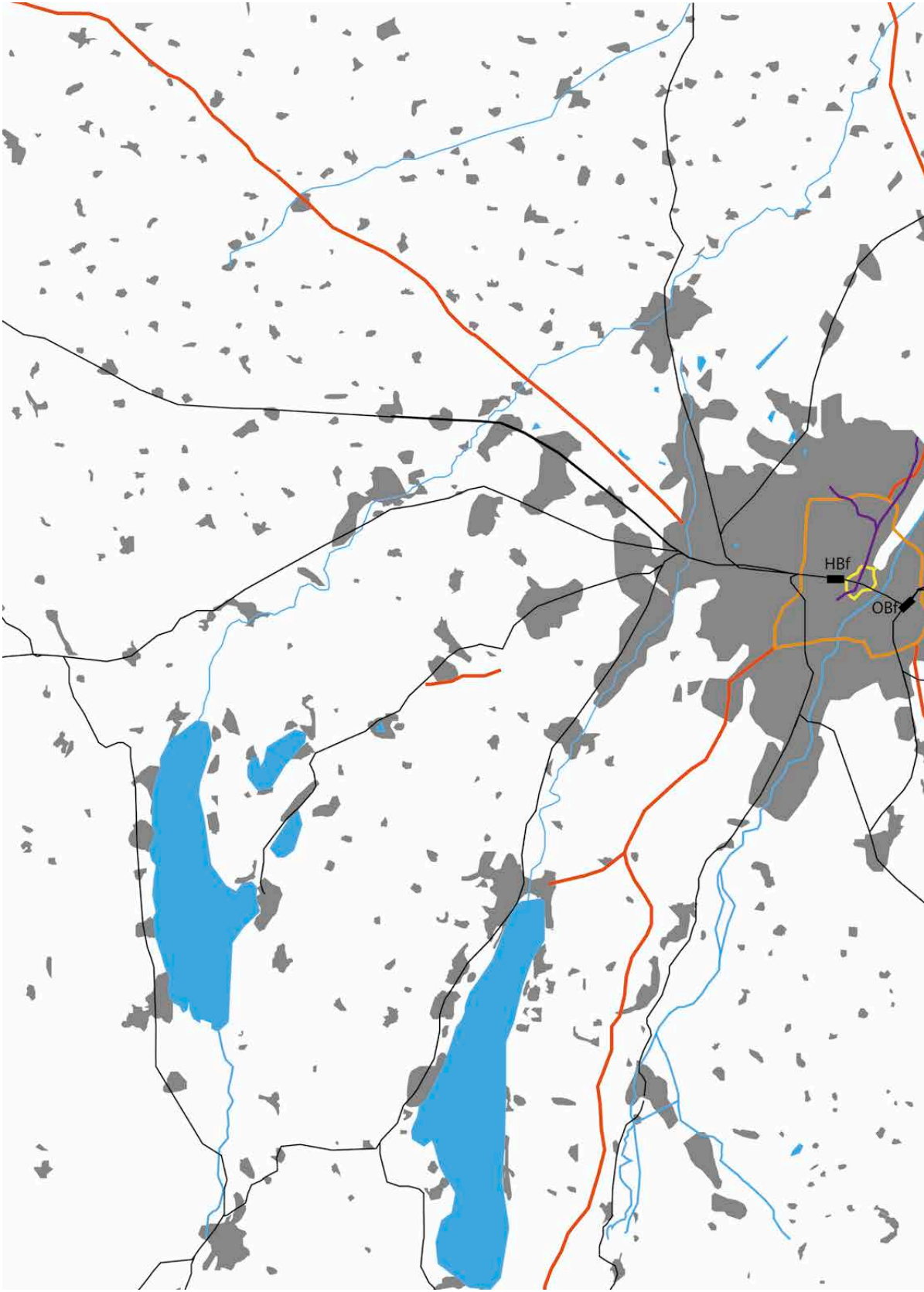
This paper has explicitly distinguished between the MLP levels of structuration, temporal scales (in the sense of Braudel) and spatial levels from local to the international where different, but (partially) congruent niches, regimes and landscapes can be observed. Congruence arises when other sorts of proximity than geographic exist. Therefore, regimes and niches can be delineated based on proximity in terms of formal and informal networks discourses and rules. Geographic proximity might not be a necessity, but can support the development of other sorts of proximity, especially in the case of the development of novel structures and practices. To further unravel this, scalar dynamics, in future

research dealing with the geography of transitions it could be fruitful to focus on the developments of novel practices and structures at the international level (as opposed to our focus on the regional/local level) considering how problem definitions and solutions are transferred between locales in different countries. Building on this study, the strategies of actors and the use of power or influence in addition to legitimization strategies to influence actors from other areas could be of particular importance. Network analyses such as that of Binz & Truffer (2011) and Sengers & Raven (2015) could provide a useful starting point.

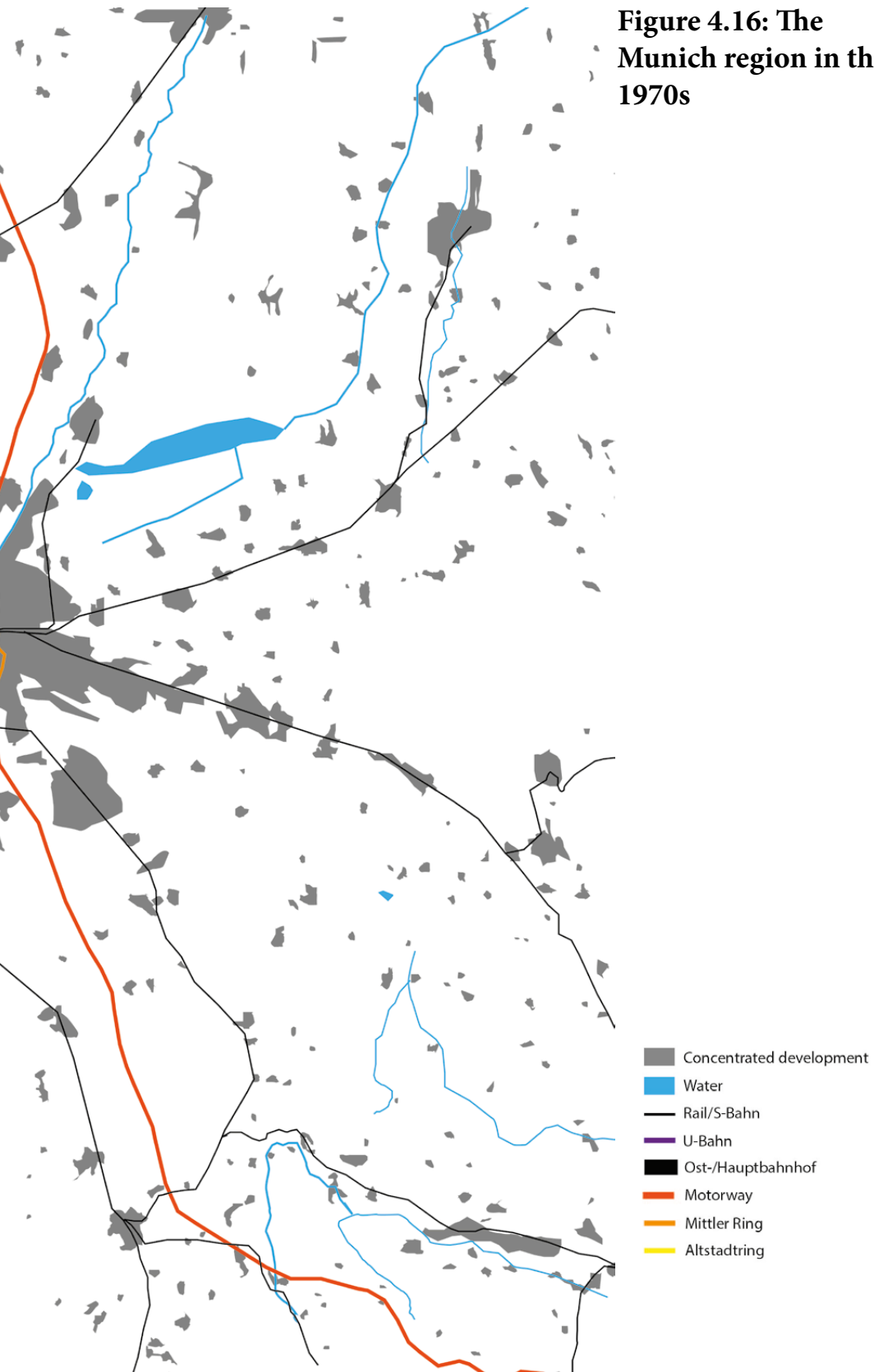


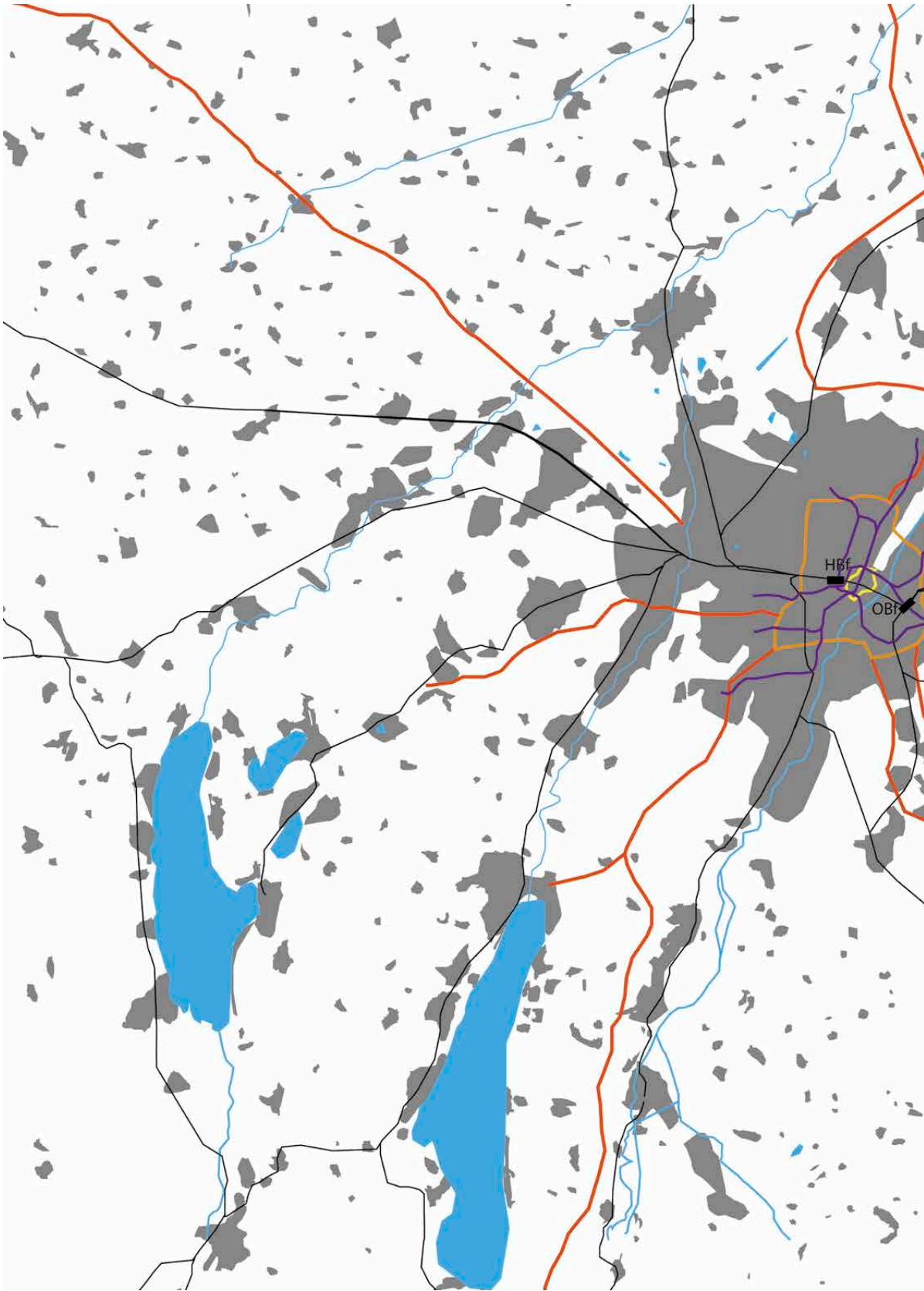
**Figure 4.15: The
Munich region in the
1930s**



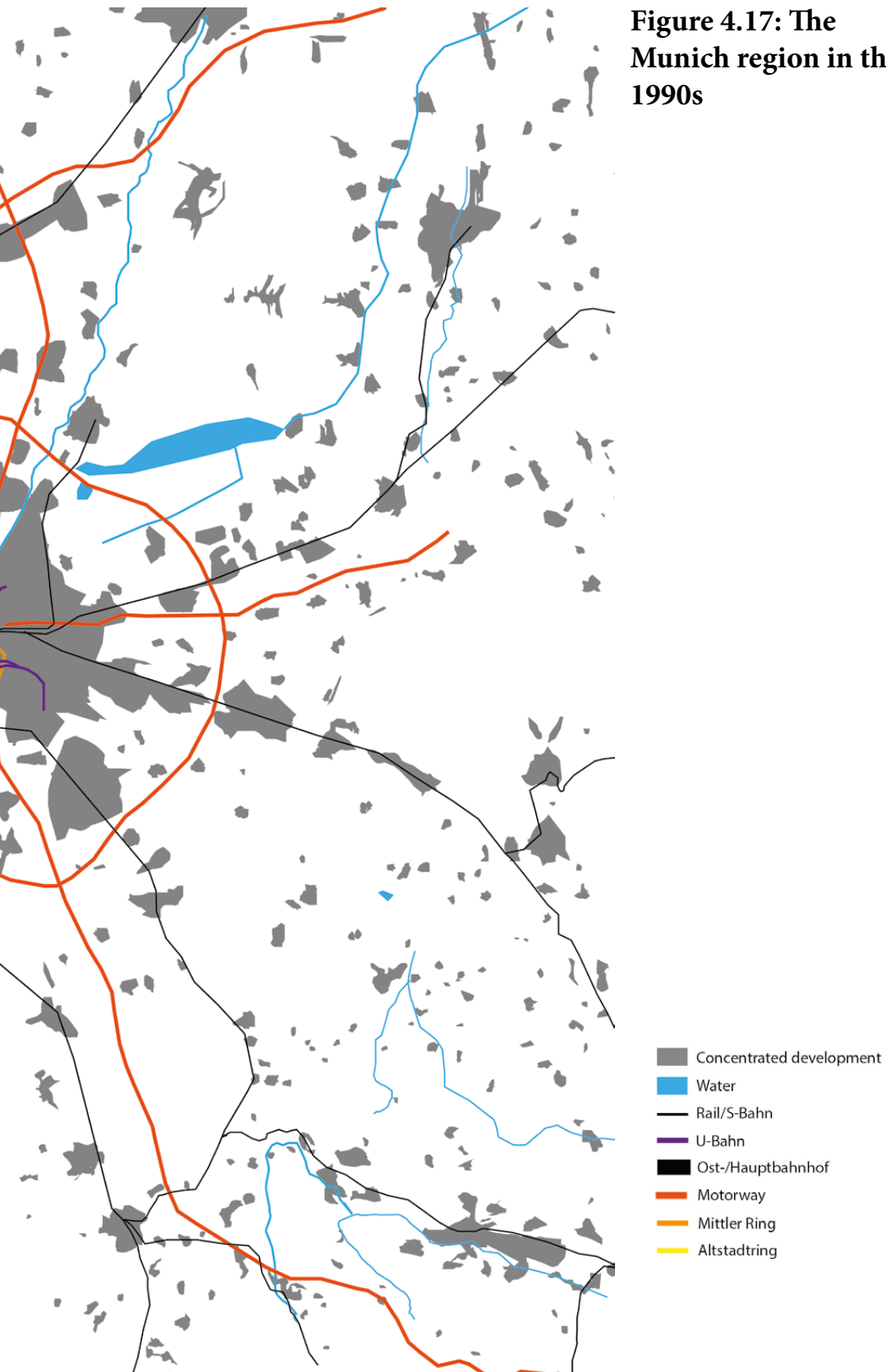


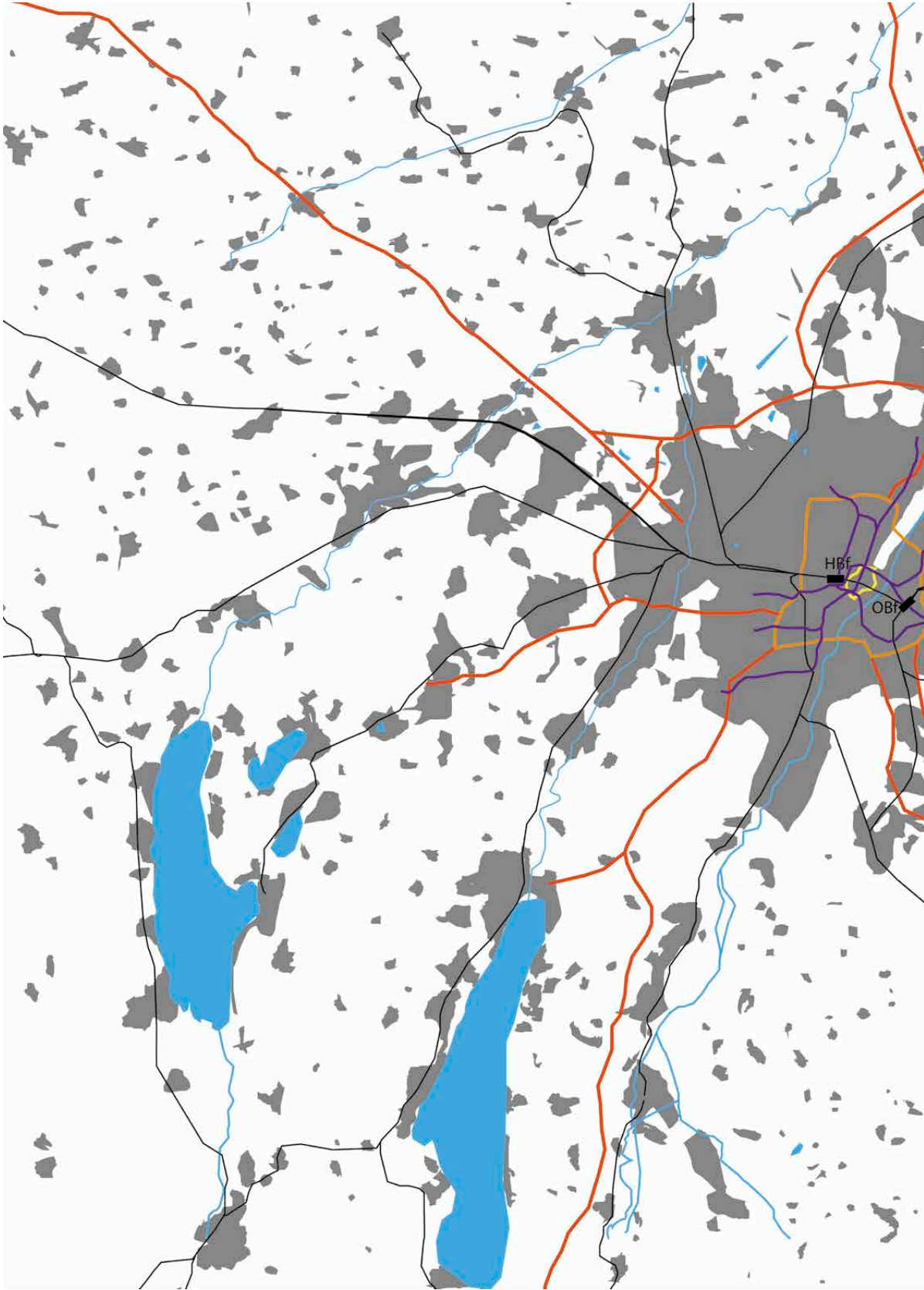
**Figure 4.16: The
Munich region in the
1970s**



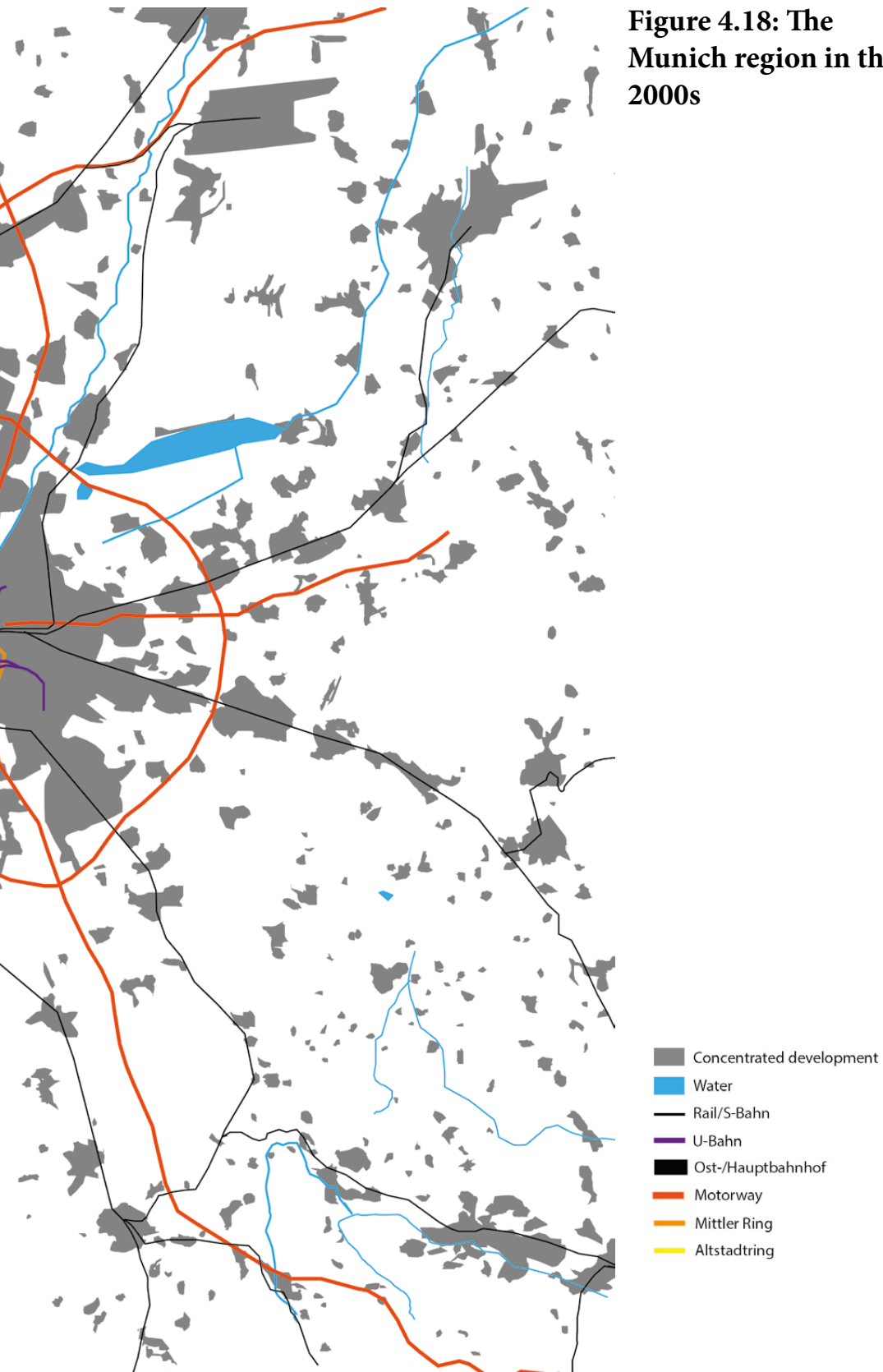


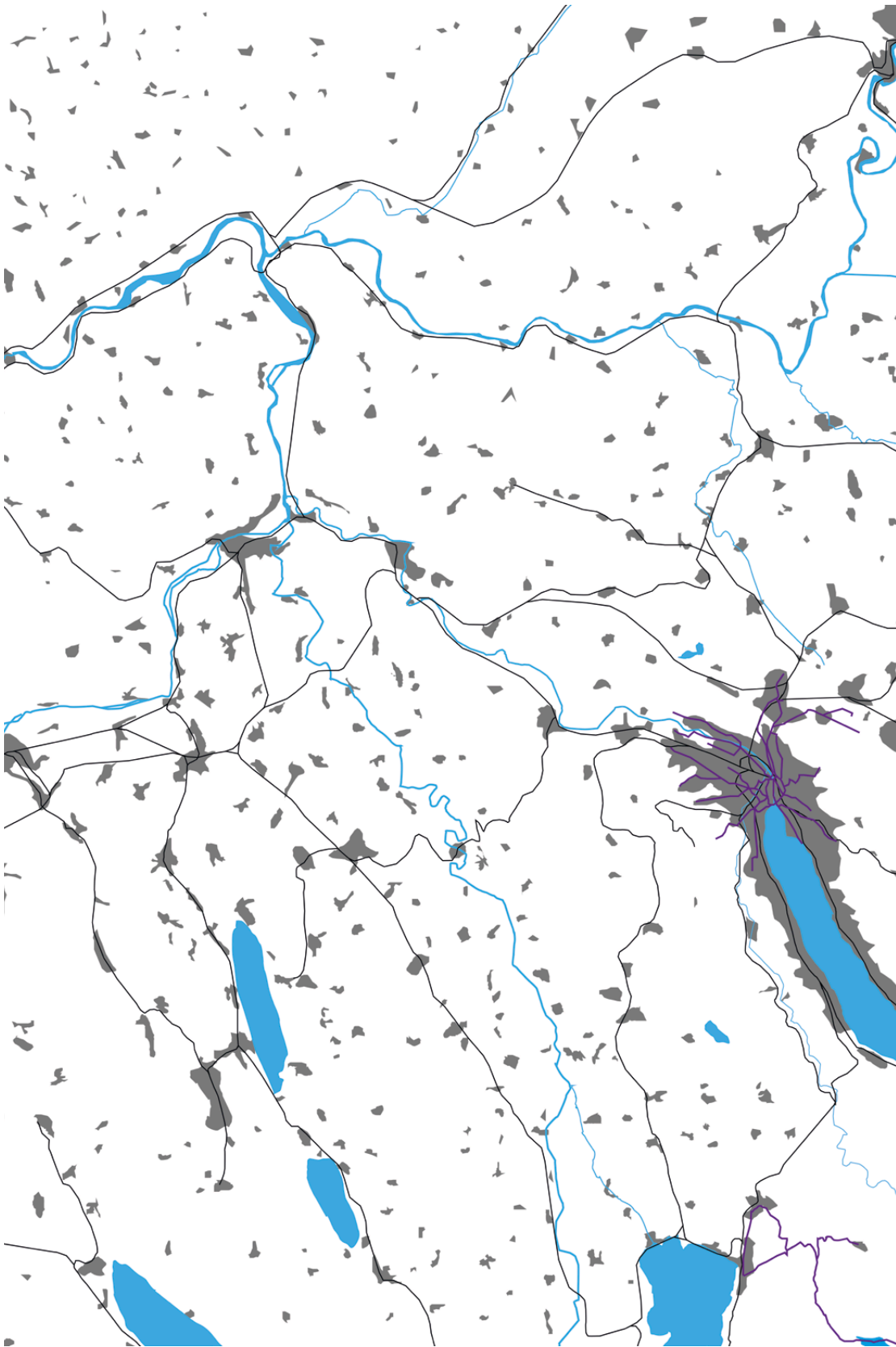
**Figure 4.17: The
Munich region in the
1990s**



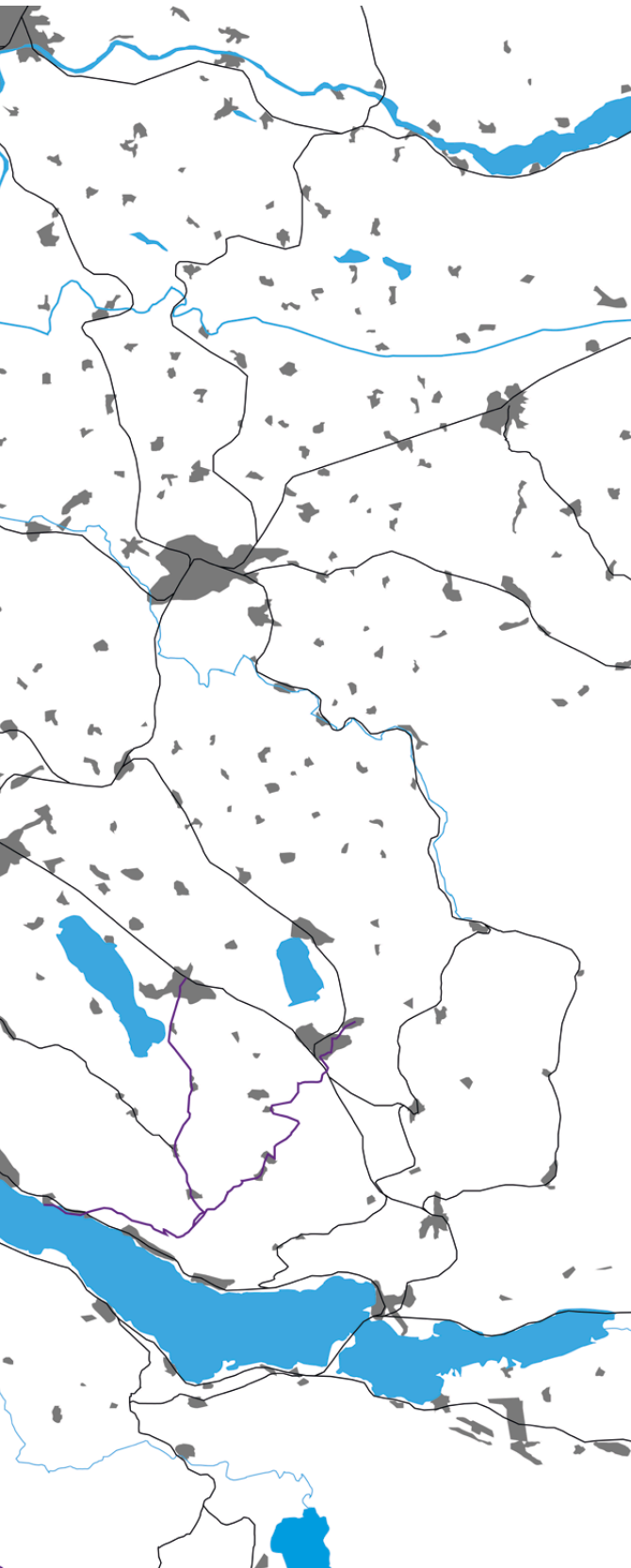


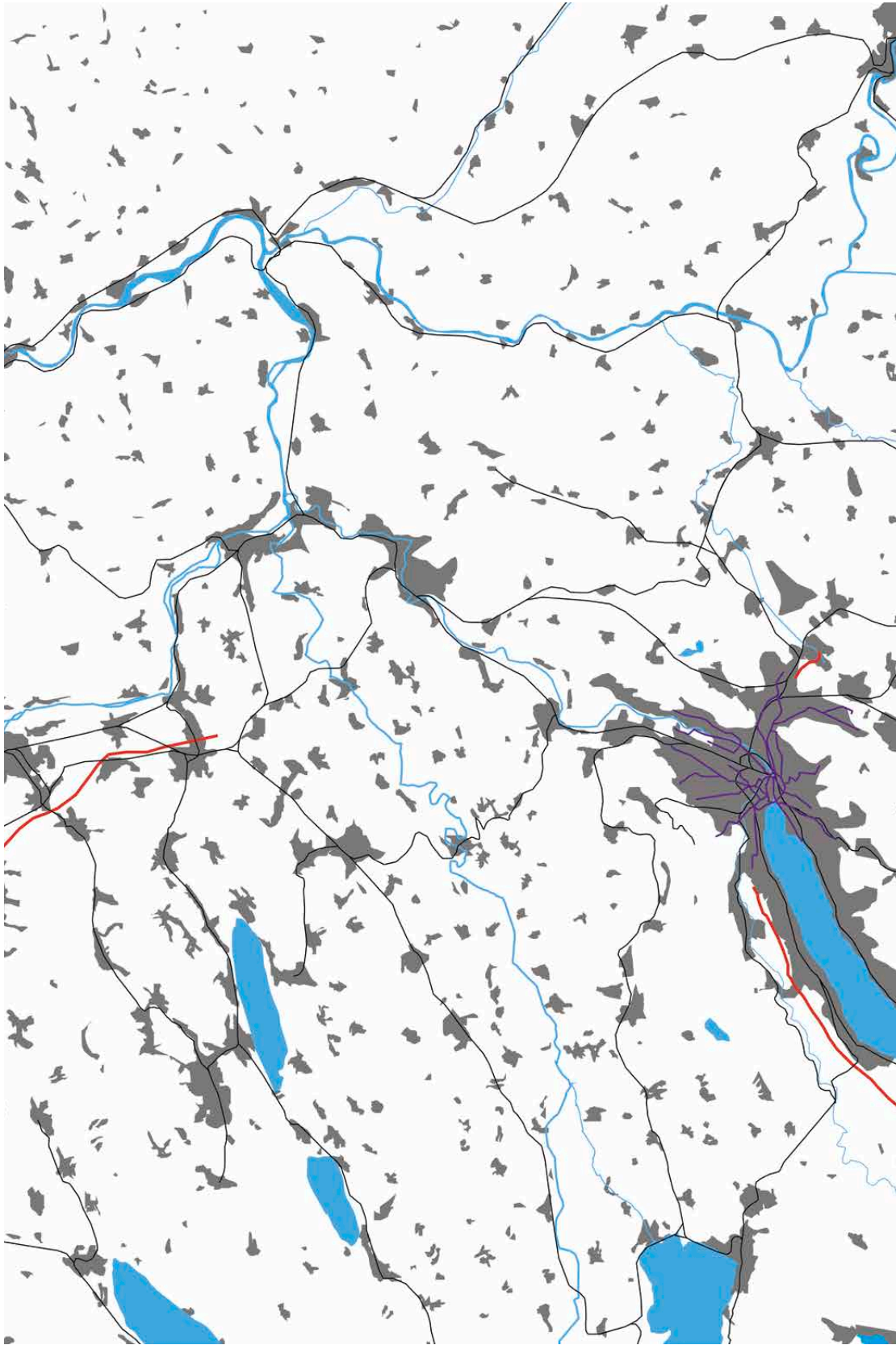
**Figure 4.18: The
Munich region in the
2000s**



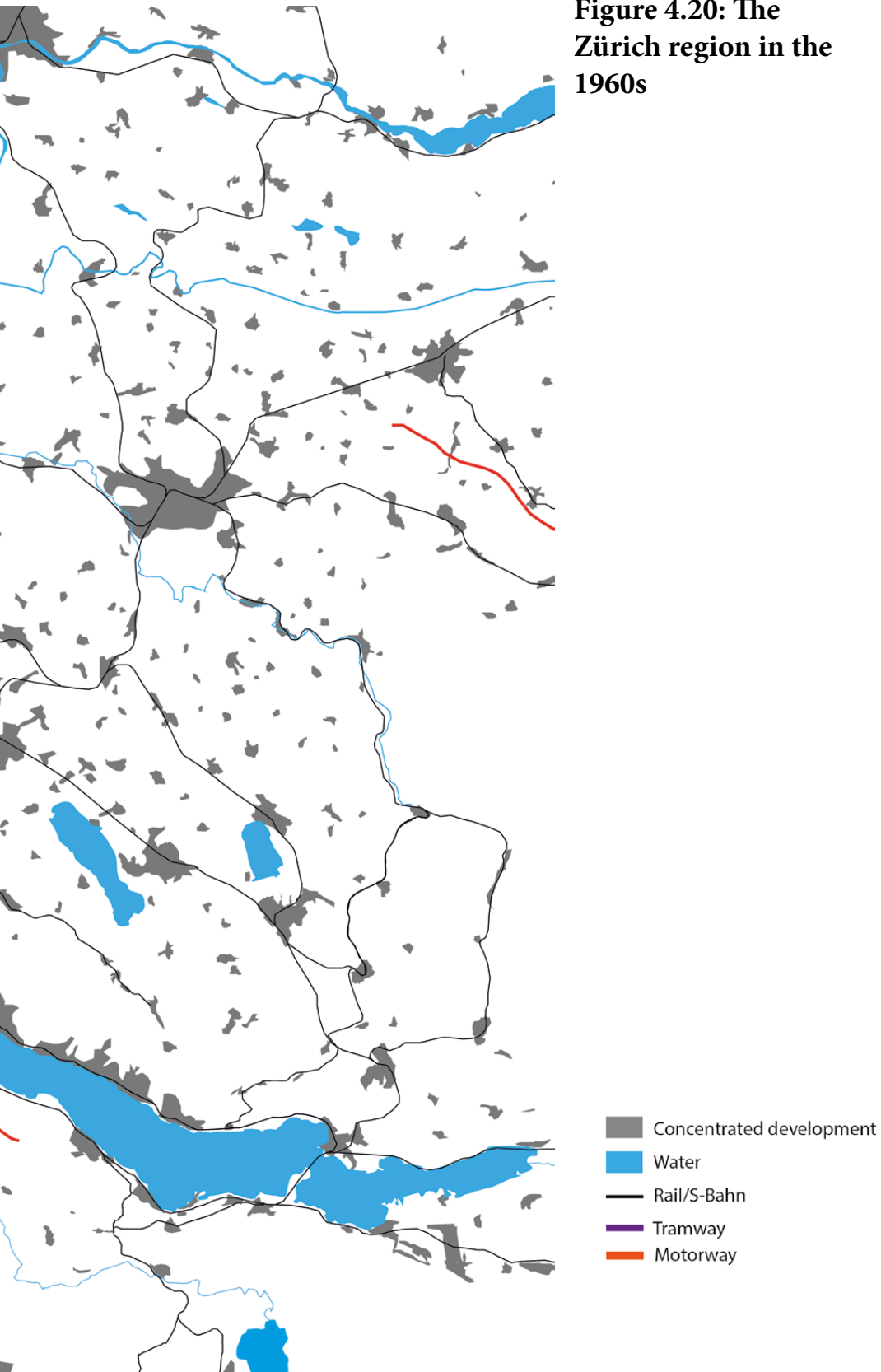


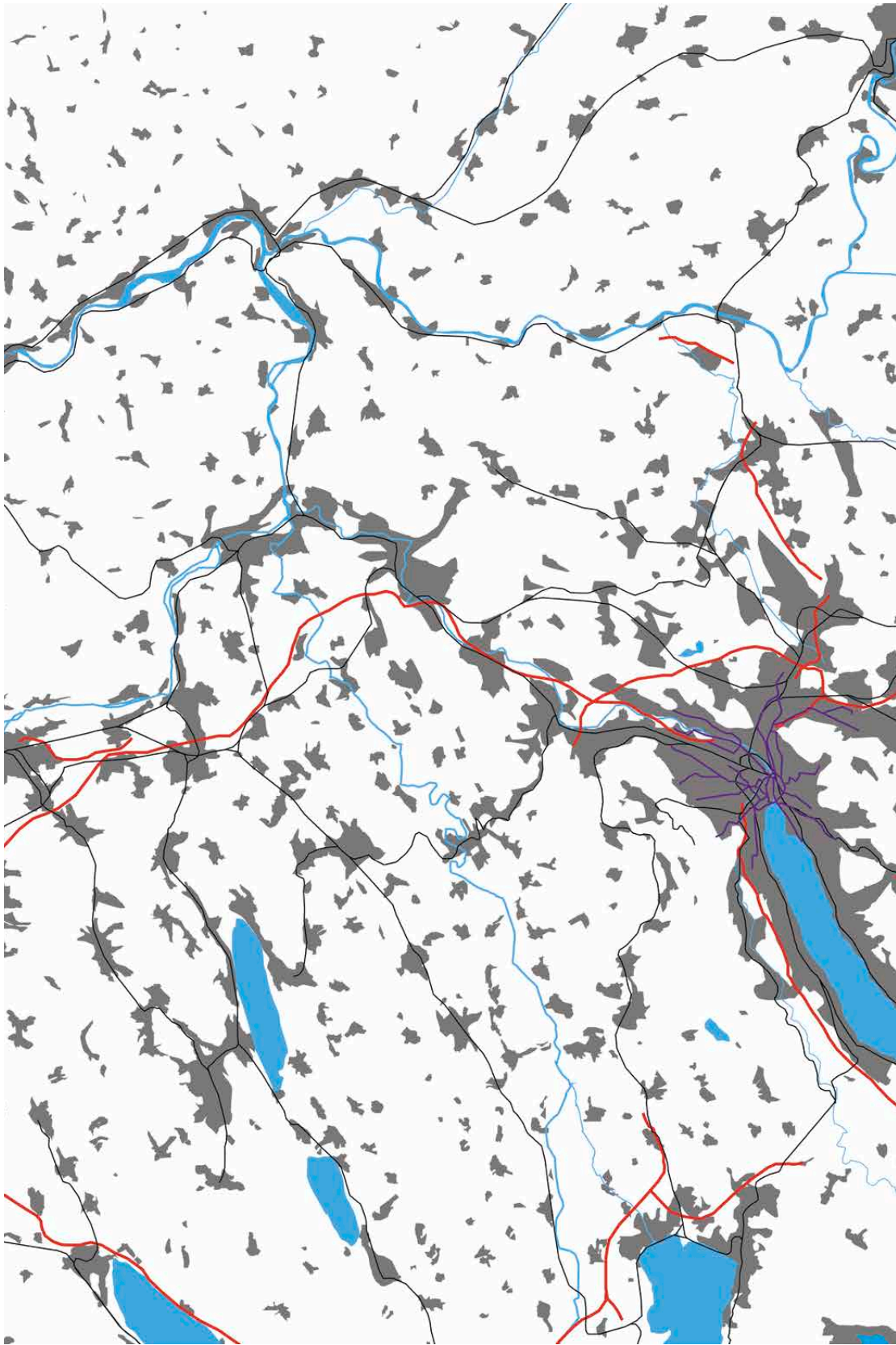
4.19: The Zürich region in the 1930s



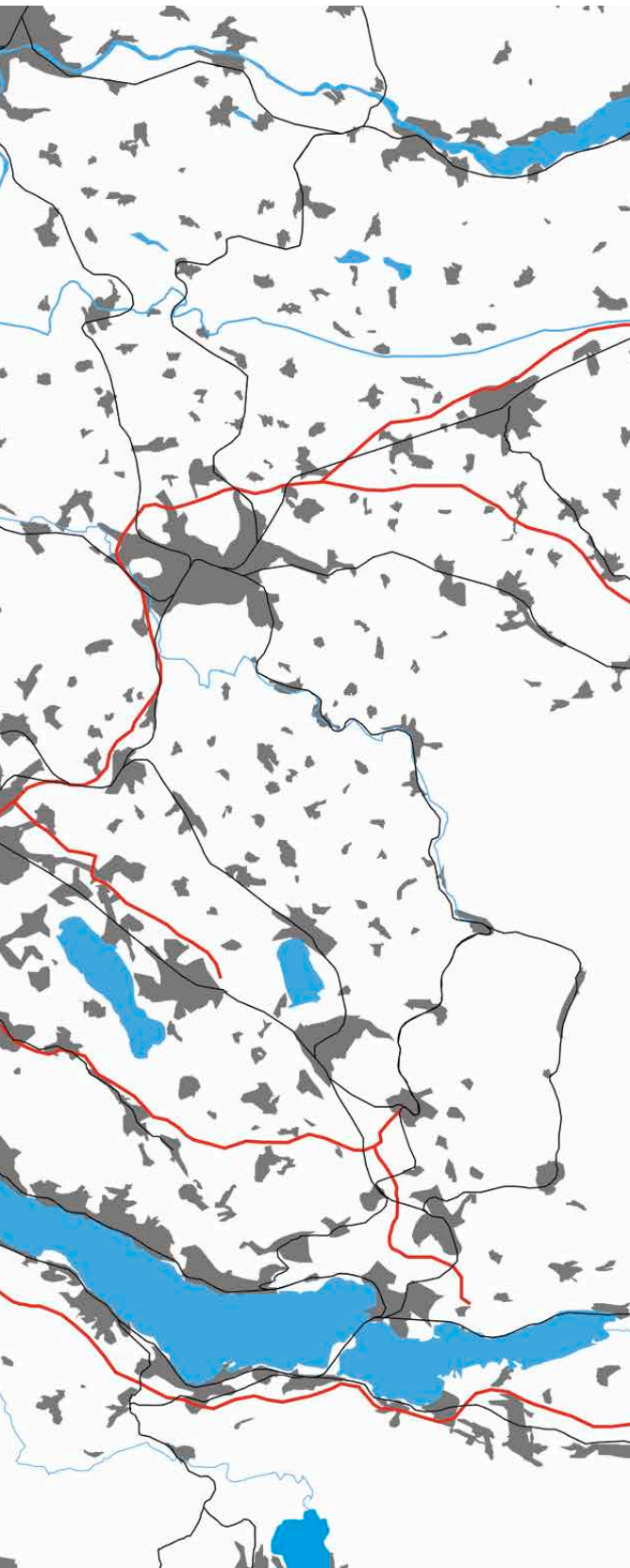


**Figure 4.20: The
Zürich region in the
1960s**

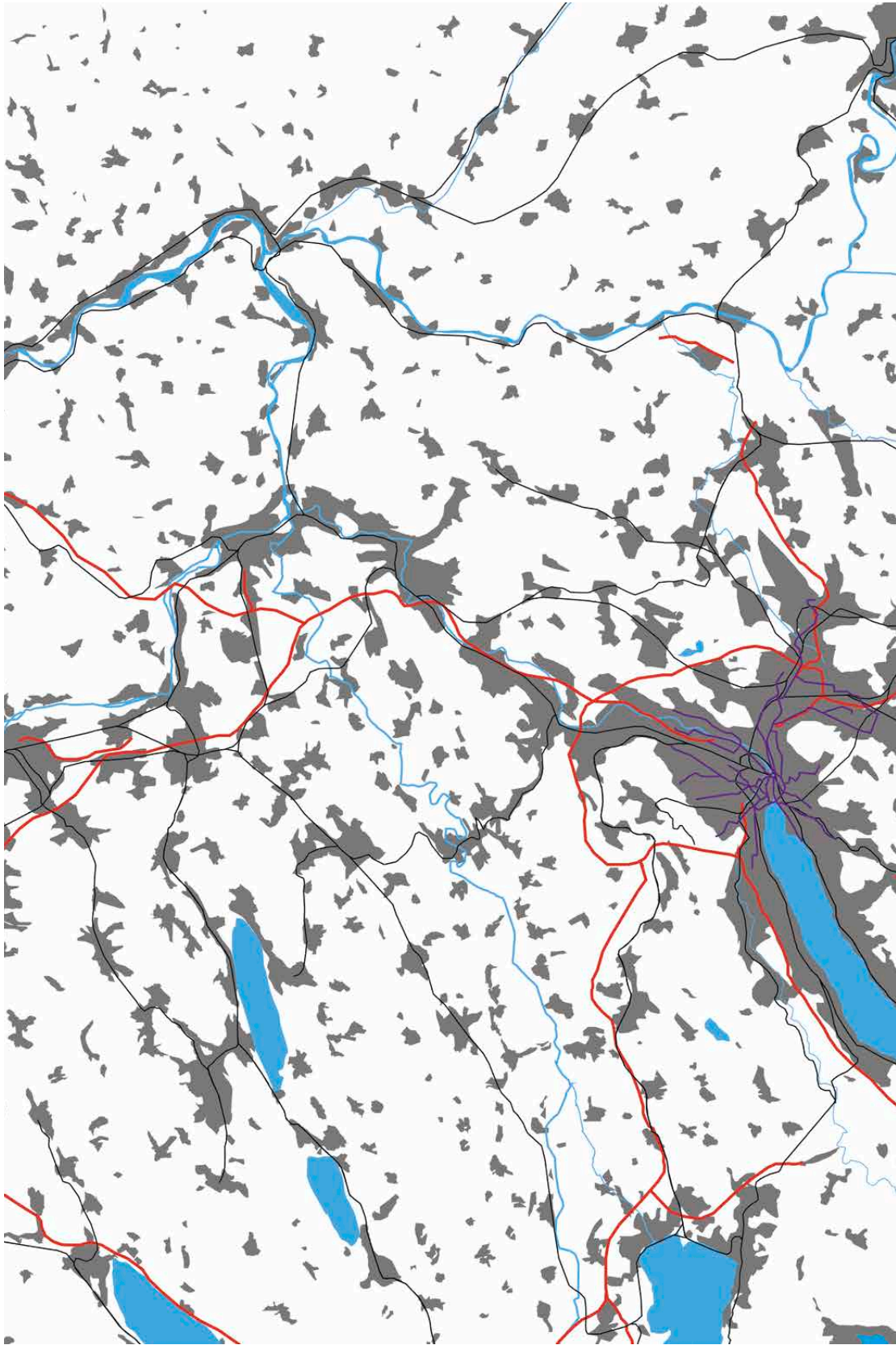




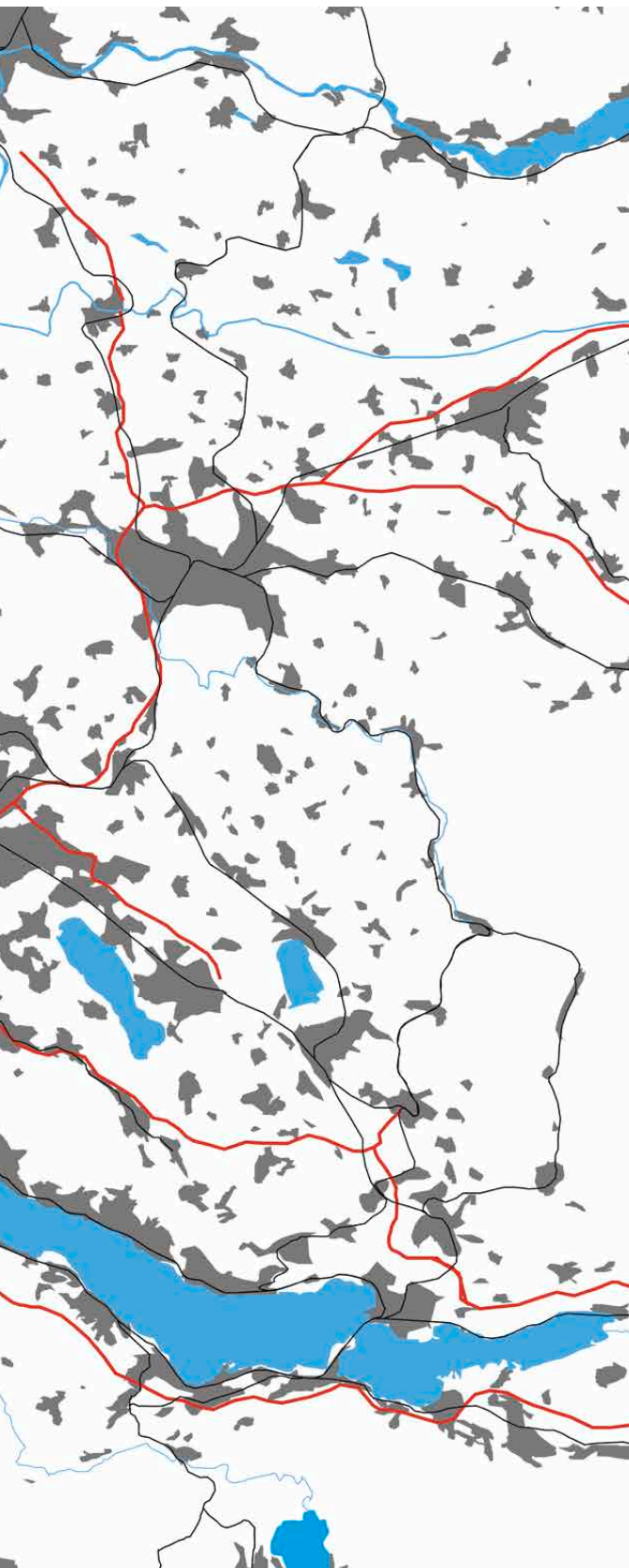
**Figure 4.21: The
Zürich region in the
1980s**



- Concentrated development
- Water
- Rail/S-Bahn
- Tramway
- Motorway



**Figure 4.22: The
Zürich region in the
2000s**



CHAPTER 5

A reflexive approach to facilitate transport and land-use planning coordination: a conceptualisation and an application in the Netherlands

Submitted as | Switzer, A., Bertolini, L., Grin, J. & Brands, T. A reflexive approach to facilitate transport and land-use planning coordination: a conceptualisation and an application in the Netherlands. Submitted to international peer-reviewed Journal.

Cities and urban regions increasingly confront the negative side-effects of modernisation in the areas of transportation and urban planning. On the one hand, increasing mobility through motorised transport has brought considerable benefits. Individuals enjoy increased freedom to organise their lives in terms of residential and work locations as well as how, where and with whom they spend their free time. Furthermore, mobility has enabled more efficient organisation of business processes. Yet, the focus on accessibility through (auto)mobility, has become increasingly seen as having adverse side effects, in terms of: the environment (e.g. greenhouse gas emissions, fossil fuel consumption), urban liveability (e.g. air quality, nuisances) (Bertolini *et al.*, 2008; Pucher & Dijkstra, 2003; Banister *et al.*, 2011), traffic safety, harm to economic development (Litman & Laube, 2002), congestion costs (Kesselring, 2001, pp. 36) and social exclusion and isolation (Jones & Lucas, 2012). Through the tight relationship between transport and land-use (see Wegener & Fürst, 1999, Bertolini, 2012; Geurs, 2014) the increase in mobility is both one cause and a result of changes in land-use and spatial practices including urban sprawl, separation of functions and increasing land-use (Newman & Kenworthy 1999; Næss *et al.*, 1996). Thus, when addressing transportation related challenges, one should take account of land-use and spatial practices; whilst transportation networks and mobility practices must be considered when addressing land-use planning challenges.

The Netherlands is a case in point of this pattern. In the 1950s and 60s planning institutions, heuristics and practices were developed to address the issues of the post-war period: housing shortage and increasing traffic congestion arising from individual consumption and industrialisation. In addition, these institutions, heuristics and practices were shaped by more generic trends, especially cultural inclinations such as Americanisation and the emergence of mass consumption (see Mom & Filarski, 2008, pp. 247, 249 and more generally: Urry, 2007 and Zijlstra & Avelino, 2012). Attempts to address these issues were generally considered successful as evidenced by economic growth, increasing housing quality and the possibilities for personal development (Brand, 2002, pp. 91-116; Jeekel, 2011).

Growing physical mobility, often per car, went hand in hand with, and was often actively supported by, land-use policy and property development (van der Cammen & de Klerk, 2003, pp. 231). This yielded, however, the aforementioned unintended, and for many actors and institutions unforeseen, negative side-effects. The increasing visibility of these side-effects since the 1970s can be partially attributed to their politicisation by new social movements (van der Cammen & de Klerk, 2003, pp. 237). The response has been the adaptation of ways of approaching and addressing problems, leading to new planning

concepts and practices (see also Zijlstra & Avelino, 2012). However, problems have been shown persistent.

To overcome that persistence, in the Netherlands attempts to adapt the land-use and transportation system are being undertaken (e.g. the focus on promoting the use of the bicycle or policy support for compact cities, Geurs & van Wee, 2006; Snellen *et al.* 2005). Yet, research shows that urban densities are still decreasing and that the separation of functions is increasing (Brand, 2002, pp. 91-116; Jeekel, 2011). In reaction, more fundamental proposals have been developed (PNH & VDM; 2013, PNH, 2011, pp. 42-43; 2013) resonating with similar international ones (Tan, 2013; Curtis, 2012; Curtis *et al.*, 2009; Banister, 2008; May & Marsden, 2010). A common thread through these proposals is that the coordination of transport and land-use is propagated as a manner to address the disadvantages of (auto)mobility and sprawl by emphasising the concentration of activities in areas with a high degree of public transport accessibility, often train stations and by fostering the use of non-motorised modes by mixing functions (see e.g. Bertolini & le Clercq, 2003). Obviously, these proposals would represent a transformatieve change in the transport and land-use system.

In this paper we see this type of transformative change a transition in the transport and land-use, i.e. as a coherent set of profound changes in land-use and mobility practices and the structures in which these are embedded (Grin *et al.* 2010, pp. 3; Smith *et al.*, 2010). As a corollary, 'second-order reflexivity' is needed: changes that "reflect on and confront not only the self-induced problems of modernity, but also the approaches, structures and systems that reproduce them" (Voß & Kemp, 2006, pp. 6). Unsurprisingly, such profound changes are likely to encounter resistance from actors with vested interests in current practices, as well as structural (i.e. institutional, discursive and infrastructural) inertia (Tan, 2013; Curtis, 2012; Bratzel, 1999, pp. 2-7, 283-294). This has yielded reports on how structures and practices would need to change to bring about transport and land-use coordination (e.g. Uitvoeringsalliantie centrum-en knooppuntontwikkeling 2010; PBL, 2014) and research identifying factors that can contribute to this shift (Tan, 2013; internationally: Switzer *et al.* 2015; Baumann & White, 2012). Still, critics (e.g. Smit *et al.*, 2014) note that more fundamental assumptions have remained unchanged and unchallenged. For example, they conclude that policy makers' assumption of a transformable society takes too little account of societal demand and changes in locational and mobility practices so that firms and households needs are met while becoming more sustainable.

The objective of this paper is to contribute to the development of a planning

approach for the transport and land-use system that may be better able to support a transition in this system than current approaches. One set of inputs are promising proposals in planning research to facilitate changes in heuristics in transport and land-use planning, so as to address barriers in an experimental environment outside of the normal planning process, but related to actual planning problems (Straatemeier *et al.*, 2010, Beukers, 2014, Soria *et al.*, 2016). We will integrate these with reflexive design, a method developed within transition studies, and successfully applied in such areas as livestock farming (Bos *et al.*, 2009; Schuitmaker, 2012), health care (Schuitmaker, 2012) and sustainable port planning (Lissandrello & Grin, 2011). This method takes the notion of reflexivity discussed above as a point of departure. It aims to adapt and enrich proposals for profound change in practices that run into anticipated or experienced barriers, rooted in the incumbent system, so that they include structural changes to mitigate these barriers (Grin *et al.*, 2004; Bos & Grin, 2008). The underlying idea is to thus promote constructive interference between novel practices and structural change (Bos & Grin, 2012), which is at the core of transition dynamics (Geels & Schot, 2010, pp. 45-51). Through elaborating this synthesis into a planning approach (section 5.1), applying that approach to the case of the urban region of Amsterdam (sections 5.2 & 5.3) and analysing the proceedings of that case (section 5.4), we seek to answer our central questions: How may a synthesis between recent approaches to transport and land-use planning and reflexive design help to improve such planning, and what do the experiences gained with that approach in the region of Amsterdam teach us? We will translate lessons learned to the growing body of knowledge dealing with reflection in planning and design studies (e.g. Schön, 1983, Schön & Rein, 1994; Healey, 1997, 2009; Innes & Booher, 1999, 2010; Hillier, 2007; Marsden & Docherty, 2013) and more specifically reflexive modernisation (e.g. Gleeson, 2010; Jeekel, 2010, pp. 43-57; Lissandrello & Grin, 2011; Irwin, 2015).

5.1 Understanding and ‘doing’ reflexive modernisation in transport & land-use planning

As stated, the transformative change being sought can be seen as aiming to further modernise the transport and land-use system in order to deal with its current flaws. This process of adapting societal structures and practices to address the unintended, or unexpectedly severe, side-effects of first or early modernisation, has been termed reflexive modernisation (see Beck *et al.*, 1997; 2003). Second-order reflexivity as defined above is at its core. (Voß & Kemp, 2006, pp. 6). We see the path leading to fundamental change as being one of a number of incremental steps, but leading to a general objective. This can be seen as Grunwald (2007, pp. 259) describes as directed incrementalism. It involves “taking into account (normative) aspects of a distant future, of the impact of

our present concepts of technology and society of the future, and the impact of such reflections on our present-day concepts and ideas” when acting. The characterisation of ‘transformative’ is in other words more about the outcome (how different from the current status quo) than about the process, which can be of a different nature (e.g. more or less incremental) the main point being that its orientation is reflexive (Grin, 2006; Voß *et al.*, 2009).

Reflexive design (Grin *et al.*, 2004; Bos *et al.*, 2009; Lissandrello & Grin, 2011) may be seen as a form of action research, aimed to support changes in structures and practices in order to address the negative side-effects of early modernisation. Key is knowledgeable and reflexive actors’ assessment of “both the immediate and unfolding impact of their prior strategies in relation to earlier intentions and anticipated outcomes in light of strategic assessments of the conduct of others and with the benefit of a degree of hindsight” (Hay & Wincott, 1998, pp. 956) or their “temporally constructed engagement ... of different structural environments – the temporal – relational contexts of action – which, through the interplay of habit, imagination and judgment, both reproduces and transforms those structures in interactive response to the problems posed by changing historical situations” (Emirbayer & Mische, 1998, pp. 970).

To support such an understanding of transport and land-use planning, Switzer *et al.*’s (2013) heuristic framework (figure 5.1) provides a useful starting point. It encompasses the relationship between feedback into mobility and locational practices of households as well as the set of related practices and structures in which these are situated. As such, it facilitates the mapping and understanding of the dynamics of and interdependencies between the transport and land-use system. At its core is Bertolini’s (2012) interpretation of the transport land-use feedback cycle (Wegener & Fürst, 1999) and the multi-level perspective of transition studies (MLP – Geels & Schot, 2007; Smith *et al.*, 2010). The MLP depicts transitions – whereby reflexive modernisation represents a transition with specific objectives – as the convergence of changes at three levels of socio-technical structuration: landscape, regime and niches. The regime is the dominant configuration of the practices and structures that constitute the transport and land-use system in an urban region. For example, the current configuration of the transport and land-use system including the distribution of densities and functions in the urban region, the built environment, the mobility and locational practices of households and firms in time and space, physical infrastructures and social structures. Social structures may be comprised of (Hajer & Versteeg, 2005 & Geels & Schot, 2010): normative rules (tasks, obligations, responsibilities, behavioural rules and societal roles); cognitive rules (taken for granted and unconsciously used belief systems, problem agendas and

search heuristics that determine which solutions are sought); regulative rules (laws and regulations, contracts with formal sanctions for non-compliance); discourses: an ensemble of ideas, concepts, and categories through which meaning is given to social and physical phenomena¹.

Normally, this the regime is a self-reproducing configuration. This is at the basis of its inertia vis-à-vis transformative initiatives. However, regime instabilities and/or dynamics may constructively interact with changes at the other two levels. The landscape, comprising “long-term exogenous trends such as macro political and economic developments, deep cultural trends as well as demographic change and general technological progress” (Switzer *et al.*, 2015, pp. 700) (e.g Europeanization and the emergence of network society). These may exert pressure on incumbent practices and structures in the regime. The niche comprises novel practices and structures, which are marginal compared to those in the regime, but can form the basis for a new regime through transforming incumbent structures and / or emergent new ones. Niches develop on the margins of the regime (Smith, 2007) in reaction to landscape pressure and regime dynamics.

¹ This is the same interpretation of stucture as presented by Switzer *et al.* (2015). Accordingly text passages from this artile were used in this paragraph

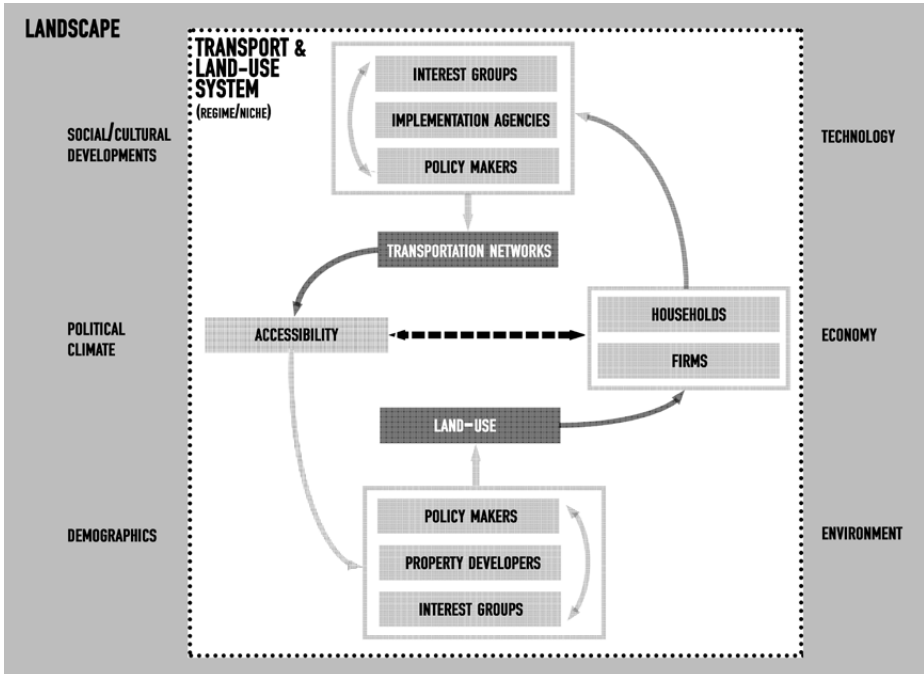


Figure 5.1 Heuristic framework for transition in the transport and land-use system (adapted from Switzer et al. 2013)

The coherent changes in practices and structures implied in a transition may occur as a result of the (second-order reflexive) agency of competent individuals such as “policy makers, property developers, transport implementation agencies, and interest groups (e.g. businesses, scientists and activists)” together with firms and households shaping mobility and spatial practices... Actors may draw on existing structures, but they can also actively and reflexively seize developments at one level and connect them to change at another level, thus bringing about mutual reinforcement between dynamics at the different levels” (Switzer, *et al.*, 2015, pp. 700-701) resulting in new structures and practices (Grin, 2006, 2010, pp. 274-275; Smith, 2007). An example is linking a growing environmental societal awareness to car use and subsequently exerting pressure to change travel patterns (e.g. from car to public transport, or biking). As discussed in the previous section, reflexive design may help translate structurally embedded barriers to an innovative practice into such opportunities for systemic change.

Drawing on the previous experiences in bringing about second-order reflexivity in planning and related disciplines, we develop an approach to facilitate reflection contributing to urban transport and land-use transitions (Table 5.1). In keeping with the ideas of reflexive design and directed incrementalism, transformative change can arise from many iterations of reflection, design, action, monitoring. This approach aims at the first two and could inform the latter two, if embedded in or adopted by a proper, authoritative planning arrangement.

We operationalised the approach in four main steps, to be carried out in successive workshops:

- 1) Development of a future vision (section 5.3.1 below)
- 2) System analysis (section 5.3.2 below)
- 3) Redefining structures and practices (section 5.3.3 and section 5.3.5 below)
- 4) Assessment of strategies (5.3.4 below)

To promote the inclusivity of new participants and to allow for adaptation based on new insights, the process described below included a number of iterations and refinements of various steps, especially 1-3.

5.2 Methodology

To gain insight into the potential contribution of the reflexive planning approach we have applied it in a series of four workshops in the Amsterdam region.

5.2.1 The case

The case was the policy process aiming to improve coordination between transport and land-use formulated in a number of detailed proposals and

concepts in order to address issues of sustainability and liveability (OV-bureau Randstad, 2010; PNH & VDM, 2013). This region was selected as the side effects of early modernisation have become especially visible in light of increasing growth both economically and demographically and as regime actors were prepared to reflexively engage with their practices .

The Metropolitan region of Amsterdam (MRA, see Figure 5.2) is composed of 36 municipalities in the provinces of Noord-Holland and Flevoland and has 2,410,960 residents (O&S, 2016). Amsterdam, Almere and Haarlem are the largest centres. Since 2012 the population has grown with 3.4 percent and an increase of 18.3 percent is expected until 2040. The economy is also growing after stabilising during in the crisis years of 2010/2011 (O&S, 2016, pp. 61). The main regime mobility and spatial policy roles shown in the heuristic framework of Figure 5.1 are fulfilled by the actors shown in Table 5.2.

5.2.2 Participants

Following a well-known guideline from transition studies (Loorbach, 2007, pp. 88-90; Grin *et al.*, 2010, pp. 151-160) and studies on participatory design for sustainability more generally (Van Asselt & Rijkert-Klomp, 2003; Kasemir *et al.*, 2003; Van de Kerkhof, 2004, pp. 71-74), for the reflection on the problems associated with incumbent practices, participants were selected who can be considered to have insider knowledge of the regime and at the same time to be interested in changing it (see Table 5.3). In historic transitions regime actors who are open for change have are important in changing the regime internally (Switzer *et al.*, 2015; Ottosson & Magnusson, 2013; Geels & Schot, 2010). They enable the articulation of niche innovations and their relations with the incumbent regime dimensions by creating common ground (Smith, 2007). The participants also had considerable experience working with other actors at various scalar levels and with niche actors. Finally, in sessions and meetings they had been seen to have recognised the limitations of the current ways of working and were open to learning about new approaches. As such they were able to think critically about the developments in the system and their role in it. Once we further reflected on how practices and structures could change in the future, potential niche actors were involved (see Table 5.3). These actors were selected from a larger group of possible participants based on three criteria: (1) Experience in actively developing novel practices beyond the regime; (2) Ability to think abstractly about the dynamics of the transport and land-use system and their role, (3) Knowledgeability of changes in the land-use transport; (4) Preparedness to participate in the workshops.

Table 5.1 (a): Principles of reflexive planning approach, inspiration and application

Principle	Inspiration	Application
Reflection on persistent problems resulting from iterational agency (past patterns of thought/action)	<p>Bos et al. (2009): systematic analysis of the functions and processes and their relationships in the current situation including 'wicked' links as well as in the desired situation.</p> <p>Schuijtmaker (2012): Historically informed system analysis and inductive system analysis focusing on manifestation of regime elements in novel practices contributes to unravelling persistent problems and ultimately overcoming them</p>	System analysis scrutinising the of premises of early modernity focusing on opportunities and constraints for transition.
Identification of opportunities informed by a different image of the future resulting from projective agency	<p>Bos et al., (2009): formulate attractive future visions in which main challenges are addressed</p> <p>Lissandrello & Grin (2011:245): Reflexivity possible through process that goes beyond communicative and strategic "rationalities and beyond the co-evolution of interdependence of interests ... to engage with the creative reconfiguration of the present, experimenting with the capacity for change... in which habits, imagination and judgement of actors are the basis of a conscious reflection on planning for the future"</p> <p>Irwin (2015): Focus on understanding the whole system (context) in order to solve problems for a part</p>	Development of a future vision addressing side effects early modernity
	<p>Healey (2009): "Framing through sense making requires expansive yet integrative pluralistic yet synthetic collective imagination and can lead to transformation of thinking about interests and trajectories." (pp 451) Consider: "who are initiators, what is formal legitimacy and what other forms could buttress efforts; relations to others promoting ideas about urban futures or deploying recourses resulting in place development; opportunities available to influence events and how to get closer to other important levers in the process; position of strategy makers in governance context within landscapes of power dynamics and in debates and arguments; material and cultural history of urban area shaping what is desirable and possible." (pp. 445-446)</p> <p>Hillier (2007:76): "Practitioners of spatial planning and governance should be more open to acceptance of practice as fluctuating processes in which change, difference and agonism are immanent; hat representations/ perceptions and attention are selective and non-neutral, driven by constant network perturbations; that space, place and governance are activities of 'groping experimentation'.. which create an open reading frame for the emergence of unprecedented events 'that strategies and plans are diagrams of temporary fixities in flows of turbulence'"</p>	<p>Redefining structures and practices based on changing power differential in regime/ niche in relation to the landscape, other systems or internal dynamics whilst contributing to the future vision and accounting for the needs of key stakeholders</p>

Table 5.1(b): Principles of reflexive planning approach, inspiration and application

Principle	Inspiration	Application
Aim for structural change through congruency	Bos et al. (2009) :the intended outcome should be understood neither as value consensus nor as a mere ‘tit-for-tat’ compromise, but rather as congruency: a course of action on the way modernization in a specific instance should proceed, which makes sense for each of the actors involved”	Redefining structures and practices based on changing power differential in regime/ niche in relation to the landscape, other systems or internal dynamics whilst contributing to the future vision and accounting for the needs of key stakeholders
Focus on needs of stakeholders to broaden scope of potential solutions	Bos et al. (2009:139) : methodological and substantial reasons to start with needs: methodological: translating needs of central actors into design requirements allows for formulation independent of perceived possible solutions and solutions space leading to a broader array of options, it stimulates more fundamental reflection on the needs of actors; substantial: the aim of RIO is to synthesize the needs from different actors into design, rather then trading them off against each other Irwin (2015) Reconceiving how needs are met can contribute necessary for transition	
Develop, test and refine concrete interventions contributing to future vision	Bos et al., (2009) : make proposals and develop actual interventions to lower or remove regime barriers for future vision and establish pilotis and trials in niche experiments Straatemeier et al. (2010:578) : “Relevant innovations do not originate in an academic vacuum, but have to be developed in coproduction with intended users and in the context of their intended use. Only then can a reciprocal learning process between research and practice be activated in which original hypotheses about possible planning innovations are developed through iterative testing, reflection, and adaptation”	Assessment of strategies through modelling contribution to sustainability objectives

Table 5.2(a): Actors and roles in the Amsterdam region

Role	Actor(s)	Responsibility/Policy document	Main policy instrument(s)	Financing
Policy maker	Municipality	Spatial and transportation planning/ Structural vision (structuurvisie)	Zoning Plan (bestemmingsplan) Servicing land (active land policy) in some municipalities	Active land policy Municipality fund (Gemeentefonds) Taxes Lease of land (Erfpacht)
	City Region (SRA)	Regional transportation planning/ Regional Transport Plan (RVVP)	Public transport concession Infrastructure investments	Brede doeluitkering (BDU, lump sum transfer)
	Province of Noord-Holland	Regional spatial & transport planning/ Structural vision (structuurvisie)	Public transport concession Infrastructure investments Ordinances (verordening) Amendment to bestemmingsplan (impassingsplan)	Brede doeluitkering (lump sum transfer) Surcharge on motor vehicle tax (opcenten) Province fund (Provinciefonds)
	National government (Ministry of Infrastructure & Environment, I&M)	Spatial and transportation planning (increasing focus on national interests, decentralisation, Voogd & Wolfier, 2010:87)/ Structural vision (structuurvisie)	Ordinances (AMvB's) Lump sum transfers (BDU) Railway concession (whole rail network in case study region) Infrastructure investments	General taxes Motor vehicle tax Petrol tax

Table 5.2(b): Actors and roles in the Amsterdam regio

Role	Actor(s)	Responsibility/Policy document	Organisation form/ ownership	Financing
Property developers	Private developers	Develop public and private property	Various	Sale of developed land
	Housing corporations	(Social) Housing development	Foundation	Previously: government subsidies and loans, Now: commercial property and market sector housing (Needham, 2007:68-69)
Transport developers	(Commercial) transport companies	local/regional public transport for concession period (max 10 years)	Company in public/private ownership	Fares Subsidy (City region & province)
	Nederlandse Spoorwegen	Concession holder for national and some regional rail networks	N.V. ownership Ministry of Finance	Fares Retail in stations
	Rijkswaterstaat	National roadways, waterways and water systems	Implementation agency	Largely ministry I&M

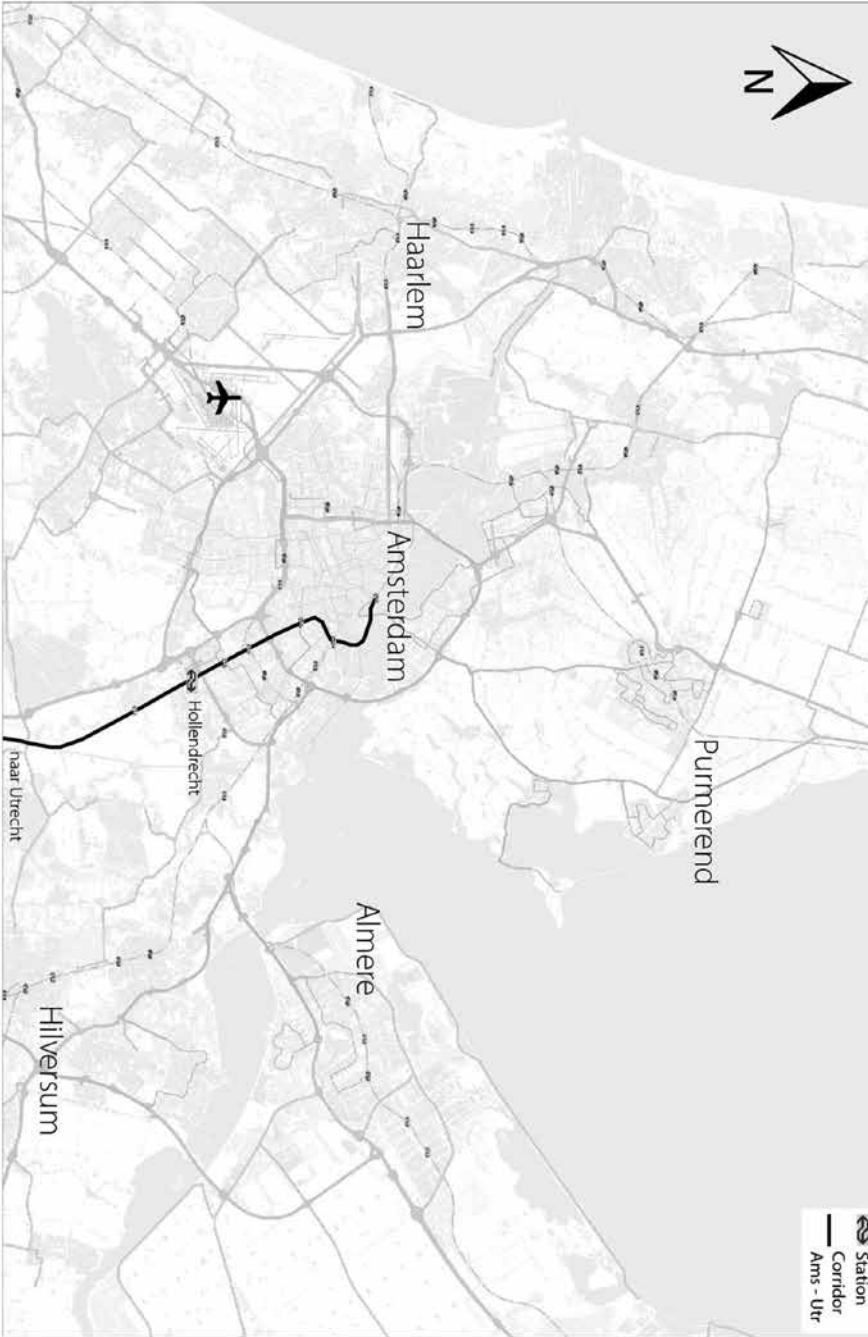


Figure 5.2: The metropolitan region of Amsterdam including the case study corridor and station area

5.2.3 Workshops and reflection

To support the process of reflection, the research team carried out desk research and analyses at various moments: for example, the synthesis of policy documents in the future vision or model analyses of the contribution of interventions to addressing the issues of sustainability and liveability. During the workshops, the first author was responsible for the organisation and the second led the discussion at various moments. In line with Schuitmaker's (2012) approach to reflexive design, to shed a new, reflexive light on the contemporary transport and land-use system and its problem, findings from our earlier historical studies into the transition (e.g. Switzer *et al.*, 2015) through which these systems emerged and the associated criticism and debate were used. The third and fourth author, as well as various guest researchers (see Table 5.3), stimulated reflection among participants and suggested links between new developments and challenges. All workshops were audio recorded. Below we discuss the ways in which we set up the workshops so as to encourage reflection and elucidate the results of this process with attention for indications of new practices or structures.

5.3 Doing reflexive planning in the Amsterdam region

5.3.1 Development of a future vision

To guide the search process during both the first and second workshops, the second author led reflective discussions on the vision that was presented early in the meeting. This early version of the vision, oriented towards liveability and sustainability, was distilled from documents developed by the organisations the participants represented. Reflexivity was, again, supported by the above mentioned historical analysis. The vision was then further developed on basis of reflections during the workshops.

In the original version, the transport and land-use system in the future vision combines the following main elements:

- Transport networks: modes of transport are integrated in one system in which transfers between modalities are simple;
- Accessibility: Nodal points where various modalities converge are well accessible per all modes of transport;
- Land-use: densities are coordinated with accessibility meaning that densities are highest at nodal points;
- Activities: more households and firms choose to concentrate their activities at these nodal points than in less accessible areas. They choose the most individually and collectively efficient mode of transport to connect their activities or a combination of modes.

Table 5.3: Workshop participants

		Workshop	1	2	3	4
Organisation	Niche/ Regime	May 11	Sep-13	Jan-14	Mrt 14	
<i>Policy Makers</i>						
Municipality Amsterdam	R	1	1	1	1	
Stadsregio Amsterdam	R	1	1	1	0	
Provincie Noord-Holland	R	1	0	2	2	
Ministerie van I&M	R	0	1	0	0	
<i>Transport Developers</i>						
NS	R	1	0	0	0	
Ring Ring	N	0	0	0	1	
<i>Property Developers</i>						
Bouwfonds	R	0	Interview	0	0	
ODE Place	N	0	0	0	1	
<i>Interest group</i>						
Vereniging Deltametropool	R/N	0	1	1	0	
Glamormaniest	N	0	0	0	1	
<i>Researchers</i>						
Planning		1	0	0	2	
Transportation Planning		0	1	0	0	

The discussion added:

- 1) *Nuances*: for instance, attention for the connections between areas with different types of land-use and dominant modes of transport or functional mixing (e.g. city vs. rest of region) and the coordination of the level of density and urban form with the type of transport node (e.g. lower densities at regional stations with a predominant residential function).

- 2) *Relation to higher-level objectives*: for instance, freedom of choice, the more efficient use of infrastructure and the safety at stations.

In comparison to the current configuration of the transport and land-use system this can be seen as a niche. It is present in some areas, but far from mainstream.

5.3.2 System analysis

Reflection on the past and the future developments in the region was carried out simultaneously. In a plenary discussion, a first application of the heuristic framework (figure 5.1) to the Randstad (Switzer *et al.*, 2013), updated by the first author, was further ‘filled in’ by participants drawing on their background knowledge, daily experiences and observations. The discussion focused on the following elements (see Appendix B):

- *Barriers*: historically developed and dominant structures and practices seen as hindering the realisation of the future vision. For example, the revenue model of municipalities that has made them dependent on income from land development, sometimes leading to development insufficiently accounting for the accessibility of the area;
- *Threats*: (potential) changes in dominant structures and practices or the landscape that are seen as hindering the realisation of the future vision. For example, changes in needs of firms with regard to office space combined with slow changes in heuristics of property developers resulting in an office bubble making it difficult to concentrate employment at well accessible nodal points in the transport network;
- *Chances*: (potential) changes in dominant structures and practices or the landscape seen as supporting the realisation of the future vision (e.g. decreasing demand for a traditional suburban lifestyle including house, garden and car);
- *Neutral developments*: (potential) changes in dominant structures and practices or the landscape that are neither seen as supportive of the realisation of the future vision nor hinder it. For example, the rise of new forms of property development including (collective) private commissioning of construction.

5.3.3 Redefining structures and practices: first attempt

Based on the above discussion, in workshop 2 we considered how practices and structures in the regime would need to be changed if one were to address barriers while taking account of the threats, developments and chances. The workshop started with individual reflection, followed by the mutual discussion of views during a plenary discussion. The aim was to generate a broad spectrum of ideas before selecting a few promising ones for further consideration.

The research team helped participants to constructively interact with power differentials by showing how these were implied in the regime and thus may change through transition dynamics (cf. Grin, 2012; Meadowcroft, 2007). This opened up incremental strategies in which, for instance, a structural change at some time (e.g. creating governance arrangements that would connect land-use and transport planning) might reduce inertia and resistance faced by societal initiatives in a later stage (see Appendix C).

Another basic principle used was that solutions should not be ‘tit for tat’ compromises, but rather that congruency should be sought through deliberation to deliver solutions that make sense to all actors (Grin & Van de Graaf 1996; adopted in reflexive design, cf. Bos & Grin, 2012). Finally, and also part of the reflexive design approach (Bos *et al.*, 2009, pp. 142-143; Lissandrello & Grin, 2011), the discussion was strategically informed by analysing landscape developments and niche initiatives that could challenge the regime (Elzen *et al.*, 2004; Zijlstra & Avelino, 2012). Various types of solutions could be distinguished.

- *Governance strategies*: focus on the user and attention for lifestyles. The government facilitates initiatives developed by private actors and citizen groups. In concrete terms the government could create a regional information point for transit-oriented development or more generally, facilitate the spatial coordination of functions with accessibility at locations. This information point could connect initiatives, share knowledge and create space for experiments. The government, as facilitator, would be responsible for ensuring continuity, possibly in partnership with others, and supporting coherence and coordination at the regional level.
- *Legal frameworks*: more instruments for urban regions to facilitate regional coordination or the reform of transport concessions to encourage development near public transport
- *Financial frameworks*: the development of new forms of value creation to make it possible for other, less conservative parties, to develop property or a more integral revenue model for municipalities to reduce the dependence on land revenues.
- *Combining knowledge*: the integration of accessibility considerations in locational policy and making knowledge about this available to support the coordination of transport and land-use planning.
- *Behaviour and demand*: transport demand management including attention for the necessity of mobility in light of digitalisation.

5.3.4 Assessment of strategy

At the end of workshop 2, participants were asked to indicate how the artefacts in the transport and land-use system (infrastructure and urban structure) could look like if the solutions proposed were realised (cf Späth & Rohrer, 2010). The intention was to be able to further study the contribution of solutions by carrying out a multi-objective optimisation and analyses of various combinations of infrastructure and spatial scenarios (see Brands *et al.*, 2014). Based on these suggestions as well as the solutions developed, the first and fourth author translated these into spatial and infrastructural scenarios between workshops and assessed them (see appendix D).

In workshop 3, the resulting analyses and optimisation were presented to facilitate reflection (Fischer *et al.*, 2009; see also Beukers, 2014, pp. 177). Despite the intention to use them deliberatively (magnitudes of potential contributions to the future visions) rather than striving for a detailed level of prediction accuracy, the discussion centred on: the validity of the results in general (e.g. the absence of corrections for extra public transport use), limitations of the model in relation to the policy debate (e.g. absence of cycling) and decisions of the research team (e.g. absence of extreme scenarios in the optimisation exercise or in terms of planning control in the scenario's).

Nevertheless, with regard to the policy debate, the value of the analyses was recognised as indicating the magnitude of the impacts of various measures. Most importantly, participants drew the conclusion that in order to have an impact on the issues mentioned much more radical changes would be needed – an insight that most of them lacked so far. The question here is whether this is possible without changes in cultural and societal preferences (i.e. changes in the landscape – see Figure 5.1).

Based on the areas of expertise of participants and researchers, during workshop 3 the decision was taken to focus on the issue of governance strategies linking transport and land-use developments in workshop 4. Participants suggested the idea of involving niche actors in order to gain more insight into how radical change could take place.

The niche actors who participated are involved in the following initiatives: RingRing (neighbourhood initiative to support biking thus changing the practices of households), Urban space agency (place making and temporary developments leading to new ways of using space), Glamour Manifest (local organisation supporting redevelopment and reduction of mono-functionality in a business park in Amsterdam thus developing new ways of using urban space/changing practices of local firms).

5.3.5 Redefining structures and practices: further elaboration

In workshop 4, to broaden the scope of potential solutions, participants were first asked to reflect individually on the (future) needs of households and firms – the key actors that the transport and land-use planning should serve – followed by a plenary discussion (for the final results see appendix E).

In two groups, one focusing on the local station level) and the other focusing on the urban-regional railway corridor the question of how the new practices and structures proposed would contribute to the future vision. The choice for the two scalar levels was informed by the insight that barriers, tensions and conflicts at one scale level may often be mitigated by linking it to changes at a higher scalar level (Späth & Rohrer, 2014). More specifically, here the corridor was thought to be a suitable higher scale because it offers a balance between complexity and manageability (Chorus, 2012, pp. 143-172). Given the background, knowledge and experience of both niche and regime actors the rail corridor between Amsterdam and Utrecht and the station area of Holendrecht were selected (see Figure 5.3). It connects the historic centre of Amsterdam with 1970s and 1980s estates and offices, business parks and the academic hospital at the eastern edge of the city. Participants chose a wide interpretation of the corridor including the metro line parallel to part of the rail line and connecting various institutes of higher education. Station Holendrecht is located in a rail viaduct separating the housing estate from the other functions to the northwest of the nature and agricultural area of the Groene Hart .

In line with Bos *et al.*'s (2009, pp. 139-141) outline of reflexive design, participants were encouraged to consider how the new practices and structures proposed would contribute to the future vision while taking account of needs, exploiting chances, addressing barriers and taking advantage of developments in the system and landscape. In addition, strategies for bringing about this change and the roles that various actors should play were explored. In each group, members of the research team led the discussion encouraging the participants to be creative and make connections between the results of earlier reflection exercises. In terms of physical and functional mix (Bos *et al.*, 2009, pp. 140-141), changes and image improvement solutions proposed focused on: (a) Strengthening the unique identity of the station areas along the corridor through increased functional complementarity with a focus on spatial quality and image (e.g. adding housing for students, families and seniors, linking stations to green areas and transformation of nearby offices), (b) improving the safety of and variation along (bicycle) routes as well as way finding to the station area and along the corridor, (c) positioning the area (e.g. marketing it as a green urban park with good links to the national airport). In terms of governance,

a platform or corridor organisation to start and facilitate initiatives through information exchange and create incentives to connect land-use and transport was proposed (related to increasingly facilitative role for government). In this arrangement, local actors could: (a) contribute to tailoring general solutions to the local context and making them more concrete and (b) play a valuable role in the slow and difficult work of building and maintaining a network in the area in which legitimacy and support need to be realised. This is an area in which the municipality has less expertise and for which resources are increasingly limited. A map of rules of the game (e.g. minimum densities) could be a way for the government to protect the public interest and ensuring democratic control whilst allowing more sharing of decision making power and creating flexibility for local variation.

5.4 Reflections & Conclusions

To explore the extent to which this planning approach could be a start of further steps of transition toward reflexive modernisation, semi-structured interviews (Bryman, 2008, pp. 196) with participants representing regime organisations who had attended at least three of the workshops were held 4-5 months after the workshops to examine the extent to which they had reflected on structures, their practices and those of others and how change could take place (see Interview Protocol in appendix F).

The interviews suggest that this approach may contribute in two general ways to the body of knowledge regarding reflexivity in transition studies and in planning. In terms of planning, it shows the value of accounting for the complexity of the whole socio-technical system and temporality when developing planning strategies. In the interviews, regime participants alluded to this noting the following two ways in which this approach differs from the approach used in their daily practice.

- 1) *Deeper, and more abstract reflection:* Attributed to the greater breadth and depth of reflection in the first workshops where attention was devoted to the facets and actions of various actors including what the participants experienced in their work as well as the broader landscape changes and the relationship between complex processes. In conventional approaches the focus is much more specific, dealing with a concrete case or certain challenges and reflection and discussion on the objectives and models used is not possible.
- 2) *More innovative, and more concrete solutions:* This was primarily related to the presence of the niche actors who presented simple and effective strategies which was sometimes a direct answer to the shortcomings of the solutions developed by policy makers.

In many ways these observations pinpoint the main contribution that this approach could make to a planning more oriented towards transformative change. It demands, somewhat paradoxically, both more abstraction (in the sense of having enough critical distance to conceive of radically different ways of doing things) and more concreteness (in the sense of exploring these ways by means of practical experiments, stimulating and facilitating initiatives by others). As such, it resonates with recent commentaries demanding an overhaul of transport research and planning to address the challenges of reflexive modernisation (Schwanen *et al.* 2011; Marsden & Docherty 2013) as well as those arguing that knowledge production featuring design characteristics facilitating phronetic judgment, contextually synthesizing – guided by a collective orientation (e.g. sustainability / livability) – differing views on problems and solution while opening up the range of what may be feasible is necessary for transformative learning (see Loeber, 2007).

Providing further insight into reflexivity in terms of outcomes, the strategies developed differed from existing policy documents in the case study region (e.g. Uitvoeringsalliantie Centrum- en knooppuntontwikkeling, 2010; PNH & VDM, 2013; Taskforce Ruimtelijke winst, 2013) in terms of sharing responsibility with non-governmental actors (households, business) and strategies selected in relation to chances resulting from landscape and niche pressure on the regime.

In terms of transitions, it shows the importance of system specific knowledge in terms of causal links when developing strategies. This means that more is needed than general knowledge about the conceptualisation and processes of transitions. The specific knowledge proved especially important when identifying links between the transport and land-use system and other systems (e.g. ICT and energy) as well as identifying points at which structures and practices in the regime were changing or under pressure (e.g. the growth of new forms of property development) or where changes detrimental for the future vision were taking place. This facilitated the expansive yet integrative pluralistic yet synthetic collective imagination that Healey (2009) describes as necessary for transformative change.

Although the use of the approach developed seem promising, there is still room for improvement as well as much work ahead if we take the claim seriously that the novel practices and structures can contribute to radical and lasting change in the transport and land-use system at the societal level. Below we consider the ways in which we shaped reflection, and make recommendations that may be beneficial for follow-up research with regard to the change of the land-use and transport system as well as transition attempts more generally.

5.4.1 Development of future visions

The types of actors involved in the workshops was motivated by the importance of the articulation of the niche with the regime discussed in section 5.2. This resulted in a much less radical future vision than probably would have been the case if progressive niche actors had made it. However, through in particular the reflection on the assessment of the impacts of the vision (see 5.4.3) they became aware of the necessity of more radical solutions to address sustainability challenges. One way in which this could be facilitated is by involving niche actors with various bodies of knowledge at the stage where the future scenarios are being developed. They could bring the needed creativity in developing the future scenarios challenging the taken-for-grantedness of incumbent structures and practices as well as identifying points where these are under pressure.

The devotion of more attention to projective agency through the further development of the future scenarios as a viable and plausible way to fulfil the (redefined) needs of a broader array of actors is one point of attention. Two such actors in our case are the large property developers and the transportation companies (see Table 5.2). Concrete foci could be contracts and revenue models. This could contribute to building support amongst actors occupying an influential position in relation to other regime actors whose (short term) interests are not directly served by the types of changes suggested.

5.4.2 System Analysis

In the system analysis a number of barriers arising from incumbent structures, practices, investments, differing interests and the availability of knowledge and neutral developments that could emerge to be barriers (e.g. the increasing influence of firms on decision making) were identified. A more thorough system analysis focusing in particular on how and why the various 'wicked links' identified developed (e.g. concession system, municipal dependence on land development revenues), the functions they fulfil and pressure increasing as a result of developments in other systems (e.g. electricity) could aid in identifying points of attention which could be exploited in the development of novel practices. Three ways of addressing this can be identified: (1) broadening the group of participants through greater involvement of actors seen as hindering change (e.g. property developers) and actors trying to bring about change (e.g. actors taking bottom-up initiatives); (2) carrying out exploratory research in a number of cases where participants are active to supplement their analysis; (3) active experimentation in practice with trying to bring about the proposed changes in structures and practices.

5.4.3 Reflection on strategies through assessment

Despite the awareness that reflection could be hindered by critiques of scenario choices and methods and attempts to pre-empt this by continually involving participants, a considerable part of workshop 3 was devoted to discussions of: the validity of results, and assumptions made, limitations of the transport model used (e.g. sufficient attention for cycling). That said, the value of model assessments was still clear as they gave an indication of the types and scale of interventions that would be needed to contribute as desired to addressing the challenges mentioned in the introduction. Even when issues with regard to accuracy/validity persist of the modelling arise, the ensuing discussions in the workshops show that the value of using the models is in the facilitation of reflections on the limitations of solutions sought by participants leading to the embrace of more fundamental types of solutions. Finally, the models can be useful in convincing other external actors, for example in organisations that regime actors represent, when attempting to mainstream novel practices. At the same time, the nature and presentation of models could be more geared towards this deliberative use (see Straatemeier *et al.* 2010).

5.4.4 Reflection on needs

In contrast to the other types of reflection, the contribution of the reflection on needs underlying requirements and wishes expressed by participants is not clear. Many of the solutions proposed addressed the needs of stakeholders, however, the time and attention devoted was insufficient to develop new ways of addressing needs. For example, the corridor organisation may offer a way for government, through its involvement, to ensure that interventions serve the common good with fewer financial burdens. However, there was no time to fully explore the implications. Furthermore, explicitly taking account of the needs of regime actors (e.g. profit of private companies) could be supportive of the development of the trust needed for second-order learning and structural change as can the preparedness to openly discuss preconceived positions (for more over this see Beukers, 2014, pp. 177 and Grin, 2010, pp. 282-284) whilst considering the needs of a broader spectrum of firms and households can inspire the development of new solutions that could enjoy broader societal support.

5.4.5 Redefining Structures & Practices

The solutions developed to contribute to the future vision as discussed in sections 5.3.1 and 5.4.1 can be seen as addressing certain barriers or threats such as the reduced resources available to government, by involving a broader array of groups, residents, institutes and residents in the corridor and station-area development. Still, others remain to be addressed such as the pre-investments in land and the differing interests of national and local government. Moving

beyond the scope of this paper, when broadening the array of participants or moving towards the carrying out experiments in practice issues relating to power and vested interests will become increasingly important (see Avelino & Wittmayer, 2016; Hoffman, 2016) given that transitions are deeply political and contested (Meadowcroft, 2011). As Majoor *et al.* (2017) illustrate, this is even the case when organisations principally support participating in a process of experimentation, learning and transformative change.

5.4.5 General comments

Turning to more general remarks, in future research and transition experiments, the lessons from historic transitions could help in making decisions regarding the process, focus points and the roles of actors (see Switzer *et al.* 2015). For example, the importance of interest groups in building legitimacy for new structures and practices. Furthermore, these could aid in creating awareness that the current structures and practices are the result of earlier transitions and are not self-evident, thus opening opportunities to consider fundamentally different structures and practices (see Schuitmaker, 2012). This is in line with other research which has shown the value of learning from other contexts value of learning from other contexts (e.g. Chorus, 2012). Moving beyond the development of strategies, further issues that still need to be addressed are preventing niche fragmentation and to ensure that the collaborative efforts remain focused and retain momentum

CHAPTER 6

Conclusions & Reflections

The scientific objective of this research was to explore the heuristic value and general usefulness of conceptualising the regional transport and land-use system as a socio-technical system and employing the concepts of transition studies in understanding and supporting transformative change in this system. Transformative change was seen as necessary to address increasingly urgent social and environmental sustainability related issues facing transport and land-use planning in urban areas, which, despite decades of attention in policy and research, only limited improvements can be observed. What comprises the regional transport and land-use system is discussed in 6.1 and represented graphically in figure 6.1. With respect to transition studies, the aim was to understand if and how the conceptualisation of multi-level transitions dynamics could be adapted for application to a socio-technical system in which the historically evolved built environment is an important form of structure and where place and interscalar relations are central to understanding the system and its dynamics.

These objectives were addressed by answering the following main research question:

How can the conceptualisation of the transport and land-use system as a socio-technical system contribute to both understanding why and how transition takes place and facilitating current transition attempts?

6.1 Answers to sub-questions

This was further articulated in three sub-questions. The answers to these sub-questions are discussed below, followed by a more general answer to the main research question and a reflection on this research and on potential avenues for future research.

Sub-question 1: How can the regional transport and land-use system be conceptualised as a socio-technical system?

The answer to this question spans the four preceding chapters. In chapter 2, the conceptual foundation was laid. The heuristic framework (Figure 6.1) encompasses the structuration and temporal levels of the multi-level perspective (landscape, regime and niche) as well as the agents and the physical artefacts in the transport and land-use system. The system is seen as being composed of structures (artefacts, rules and discourses) and practices which are co-evolved and sustain each other. When acting, agents in the regime and niche: draw

on and are constrained by structures, utilise their expectations for the future, interpret the landscape and react to one another. The (differences in) inertia of these structures results in the obduracy that can be observed in attempts at transition. Although, as pointed out in section 2.2.2, the heuristic framework is a simplification of reality, it incorporates and operationalises important aspects of the complexity of the regional transport and land-use system. These are the quasi-autonomous or exogenous landscape (culture/societal preferences, demographics, technology, political climate and the economy); structures as comprised of artefacts, rules (cognitive, normative and regulative) and discourses; niches comprising novel structures and practices that are in flux; the practices of households and firms as important drivers in the evolution of the system; and, finally, the conceptualisation of the evolution of the socio-technical system as a result of pressure between the levels. The heuristic framework with its multi-level, multi-actor and multi-sector focus has proven to be a useful tool in mapping change in the transport and land-use system and identifying barriers and chances (chapters 2 & 5). By systematically focusing on the landscape, the practices of households and firms, niches, and developments in other sectors, it has helped in pinpointing weaknesses in the current regime and developing strategies to increase pressure. An example from the application of the reflexive planning approach discussed in chapter 5 is the development of strategies building on the growing popularity of urban living and increasing bicycle use and involving new, non-traditional actors in planning. Through its focus this approach differs considerably from conventional planning approaches (see 6.3).

In chapters 3 & 4 the framework was supplemented during the study of historic transitions. Firstly, with the concepts of troubles and issues (section 3.2.2). Troubles can be defined as difficulties encountered by individuals in their day-to-day practices, partly as a consequence of contested attempts to deal with the issues of their time (Wright Mills, 1959). In so doing they represent the points where momentum and pressure on incumbent structures and practices can develop or is already developing. The use of these concepts to structure historical studies and support the identification of strategic opportunities in current transition attempts are discussed in the following sections. Secondly, the concepts of geographic scale and proximity (section 4.1.2) have added additional explanatory power in terms of the dynamics taking place between actors in different locales and the structuration levels of the Multi-level perspective. Regimes and niches can be defined based on various types of proximity. In terms of cognitive proximity, local and national systems can be seen as distinct and commonalities could exist between regimes and niches at the international level. Niches spanning a number of locales through networks can contribute to the development of legitimacy and provide channels for the strategic exertion of influence.

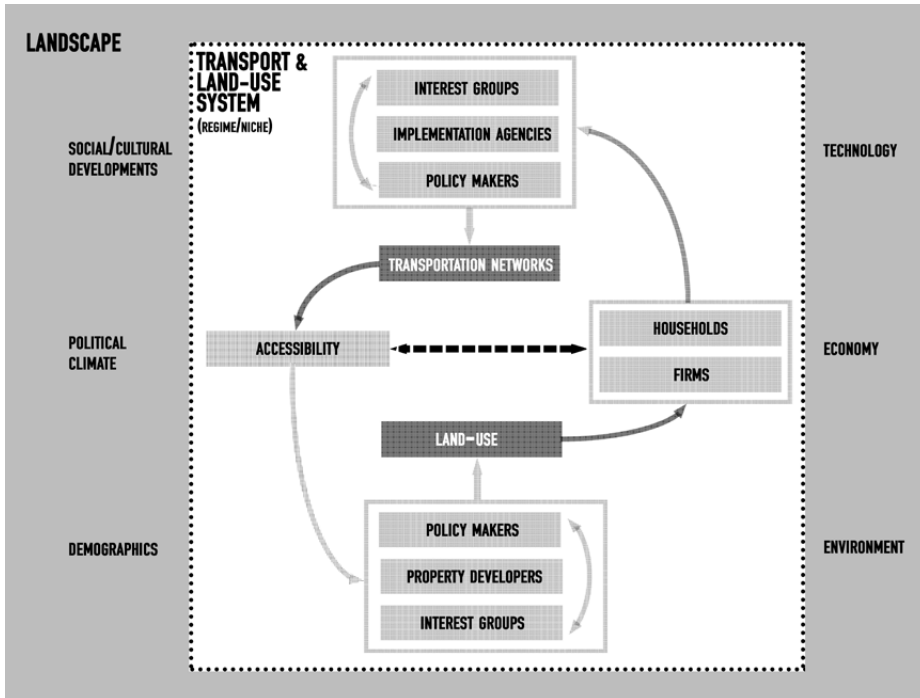


Figure 6.1 Heuristic framework for transition in the transport and land-use system (adapted from Switzer et al. 2013)

Sub-question 2: Why and how does transition take place in the regional transport and land-use system?

This question was answered by carrying out two historical embedded case studies focusing on periods of transition in the regional transport and land-use systems in Munich and Zürich (Chapters 3 & 4). The analyses focused on troubles identified based on extensive case study reports using secondary and primary sources. The answers to this question provide indications as to the conditions needed to make transition possible and courses of action (agency) that can contribute to transition in light of these conditions.

In creating the pressure for transition, changes in the locational or mobility practices of firms and households, often related to the changes in the landscape have been seen to be very important. Examples include the rise of the car or increasing use of the bicycle which are closely tied to interrelated cultural, societal, demographic and economic developments. The cultural association of the car with freedom and the economic prosperity of the post-war period or the recent preference for urban lifestyles supportive of biking (sections 3.3.2

& 3.5.1) are cases in point. In the transport and land-use system troubles were seen as ensuing from the tension between rapidly changing practices and more slowly changing artefacts. The consequence is the increasing visibility of the shortcomings of incumbent ways of understanding and dealing with issues (e.g. the pressure on the strict separation of modes of transport in light of increasing bike use as discussed in section 3.5.1). This is encompassed in the following hypothesis:

H1: Changes in the practices of households and firms create the pressure needed to realise transition (as captured by the emergence of foci of debate and conflict, or 'troubles')

The understanding of troubles and potential solutions is a social process and can be influenced by legitimisation attempts and framing. The historic case studies show the importance of (creating) resonance with stable regime and landscape structures and discourses to build legitimacy. During more successful periods of transition this can be observed. For example, in the first period where - car gained a prominent role, densities decreased and functions were separated - new ways of perceiving problems (congestion of both traffic and high densities) and solutions (smooth traffic flows and functional separation) resonated with the societal importance of economic growth, freedom and anti-collectivism as well as the cultural importance of the city. This is evidenced by the arguments that modernisation was a way to save the city, whereas those problematising unrestrained growth and advocating development controls failed to achieve resonance (see section 4.3). In all periods of transition, interest groups were instrumental in (de)legitimizing rules, framing troubles and exerting pressure for change. This is encompassed in the following hypothesis:

H2: Interest groups interpret landscape change and changes in practices to legitimise structures creating the pressure on the regime necessary for transition.

The extent of pressure depends on the resonance of propagated cognitive rules with structures and discourses in the landscape or stable structures in the regime

The identity of the city with regard to the composition of the population and the built environment featured prominently in attempts of niche actors to legitimize or delegitimize structures and practices in several periods of transition. This is encompassed in the following hypothesis:

H3: The identity of the city is a powerful discursive element that, when used can legitimise or delegitimise structures and practices

Turning to how transitions take place, when the pressure for change was present as discussed above, the greatest extent of change can be observed when actors occupying central positions in established institutions (governing parties, planning agencies or businesses) shifted from supporting the status quo to embracing novel structures and practices or were replaced by actors doing so. A comparison of Munich and Zürich illustrates this. In Munich in the first period of transition actors reached consensus regarding road construction and public transport development relatively quickly and were able to deliver considerable change. In contrast, in Zürich in the same period despite similar pressure for change the failure to reach consensus regarding the types of solutions to be implemented resulted in limited and ad-hoc changes to physical artefacts. For a more extensive discussion see sections 4.3 and 4.6. The following hypothesis encompasses this:

H4: Reaching shared cognitive rules enables change in the types of interventions in artefacts at the system level

It is of course impossible to predict if and when consensus will be reached, but regulative, normative and cognitive rules can be supportive. Rules supporting or requiring interaction between a wide array of interests for decision making, whereby it is difficult or impossible for one actor alone to make major decisions, seem to be important. This enables an exchange of views necessary to fully understand the complexity of the system, whereby ensuing solutions are more feasible. For example, in Munich early in the post-war period regulations and norms required interaction and consensus to move forward in the area of transportation planning. This resulted in initial delays and conflicts, but the pragmatic approach that many actors took allowed for the abandonment of less feasible solutions enjoying less support (see section 4.3.1). In contrast, early conflicts took place to a much lesser extent in Zürich due to a strong desire to make rapid progress, regulations and norms requiring less interaction in addition to changes in regulations and procedures to expedite decision making. Subsequently, problems with the feasibility or support for planned interventions emerged at a much later stage requiring significant and time-consuming changes, also discussed in 4.3.2. That said, conflict in itself can also lead to stalemates as observed in both cases in both the first and second periods (see section 4.4). Just as important, however, appears to be the pragmatism to move beyond short term interests and finding ways to redefine interests to achieve mutually acceptable solutions. For example, the preparedness to allow an other

party to develop an underground line in Munich to make the overall realisation of underground public transport possible of redefining problems of parking places or mobility per car as integral transportation issues in order to make more acceptable solutions possible. The following specification of the fourth hypothesis encompasses this:

- a) *Rules both open to conflict and effective when attempting to resolve it accelerate reaching shared cognitive rules.*

Finally, building alliances around shared interests to act strategically and exert pressure on actors, for example in other sectors or at other scalar levels, was seen as an important way to challenge the traditional hierarchical relations and reach consensus in various systems across scalar levels. The coalitions that were formed between the mayors of Munich and other German cities to exert influence on federal decision making are an example of this (see section 4.3.1). This is encompassed in the following specification of the fourth hypothesis:

- b) *Interest coalitions are a way to exert pressure to achieve change in cognitive rules at other levels.*

Sub-question 3: How may the conceptualisation of the transport and land-use system as a socio-technical system be integrated in a planning approach to support transitions in this system?

This question was answered by developing and employing a planning approach to facilitate second order reflexivity in the transport and land-use system. Second order reflexivity concerns reflection on and the confrontation of “not only the self-induced problems of modernity, but also the approaches, structures and systems that reproduce them” (Voß & Kemp, 2006, pp. 6). The aim was to support the development of new solutions to address persistent transport and land-use planning challenges, which can be seen as the unintended, or unexpectedly severe, side-effects of earlier solutions in such a way as to pre-empt the development of new side-effects. This approach accounts for the dynamics between levels in the MLP and draws on experiences with strategies aiming to bring about reflexivity in planning and in transition studies. The approach was applied in the region of Amsterdam and more specifically in the policy process aiming to improve coordination between transport and land-use. It was carried out with progressive actors representing established organisations of government, interest groups and, to a limited extent, property developers (niche actors within the regime) and niche actors (see section 5.3.2). The approach made use of a number of steps which can be performed iteratively leading to experiments aimed at changing practice:

- 1) **Development of a future vision:** the formulation of a future vision of the transport and land-use system including structures and practices as discussed in 6.1 to contribute to sustainability objectives. As such, this can provide an orientation point for further reflection and refinement of changes in the system. In the application, the future vision aimed at the coordination of transport and land-use. Generally, this was seen as a regional transit-oriented development strategy, whereby functions are concentrated around well accessible nodal points in the transportation network distributed in the region so that the mode of transport, which achieves the most sustainable balance between individual and collective costs and benefits is used (see section 5.2.1).
- 2) **System analysis:** scrutinising of the of premises of early modernity focusing on opportunities and constraints for transition in terms of structures and practices in the system, but recognising at the same time that these structures still can fulfil valuable functions. The aim here is to identify opportunities informed by a different image of the future accounting for dynamics in the landscape, regime, niches and other sectors. The heuristic framework (Figure 6.1) can help structure this discussion. In the application, the heuristic framework was used to identify:
 - a. *Barriers:* historically developed, and dominant, structures in the regime and practices seen as hindering the realisation of the future vision, such as revenue models;
 - b. *Threats:* changes in dominant structures and practices or the landscape seen as hindering the realisation of the future vision, such as changes in practices of firms resulting in reduced demand, which makes it difficult to develop offices in well accessible areas);
 - c. *Chances:* changes in dominant structures and practices or the landscape seen as supporting the realisation of the future vision, which can be interpreted as troubles (see discussion in 6.1), such as decreasing demand for suburban living;
 - d. *Neutral developments:* changes in dominant structures and practices or the landscape that are neither seen as supportive of the realisation of the future vision nor hinder it, such as collective private commissioning of housing construction.
- 3) **Redefining structures and practices:** based on changing power differential in regime/niche in relation to the landscape, other systems or internal dynamics, whilst contributing to the future vision and accounting for the needs of key stakeholders. In the application this was carried out in two steps (see 5.3). In the first step, participants focused how practices and structures in the regime would need to

be changed if one were to address barriers to transition while taking account of the threats, developments and chances. This resulted in new ideas regarding: financial frameworks (e.g. an integral revenue model for municipalities); governance strategies (e.g. government facilitates societal initiatives); legal frameworks (e.g. more instruments for urban regions to direct development); the combination of knowledge (e.g. the integration of knowledge about accessibility in decision making regarding locational policy); and the management of demand (e.g. traffic demand management). In the second step participants developed strategies at the station area and corridor levels. These strategies linked to those in the first step and focused on physical and functional mix changes and image improvement (e.g. distinct and strong identities of stations in the corridor) and governance (e.g. multi-actor platforms or organisations to facilitate station and corridor development).

- 4) **Assessment of strategies:** through modelling the contribution of the strategies developed to sustainability objectives. Interdisciplinary knowledge (e.g. system modelling) can be used to reflect on the potential contributions of concrete interventions to sustainability objectives. In the application, a model analysis of a number of detailed scenarios related to the future vision was carried out. Although the accuracy of the model in extreme situations was subject of criticism, it led to the realisation that more extreme options than policy makers traditionally consider would be needed to reach policy objectives.

The approach can be seen as novel in the planning field in terms of combining abstract reflection and strategy development with the design of concrete testable measures (in experiments or scenario modelling), something supportive of the learning processes necessary for structural change. In addition, involving actors with experience in developing novel practices relatively early in plan making provided inspiration and insight into what change strategies could work and how they could be brought into practice. In this regard, the governance solutions suggested indicated ways of combining local substantive knowledge and strategy making attuned to the local circumstances, whilst ensuring broader societal objectives (environmental and social sustainability) receive sufficient attention.

Although promising, this approach had a number of limitations related to the limited scope of this exploratory research: (1) it was tested with an ideal group of actors, niche actors generally supportive of a comparable future vision and regime actors who had acknowledged the necessity of change, whereby power and vested interests played only a limited role; (2) the limited breadth and depth of the system analysis; (3) the limited breadth and depth of the

exploration of needs; (4) the limited extent to which knowledge of historical transitions such as those discussed in 6.2 were utilised to encourage reflection; and, most importantly, (5) the lack of experimentation in practice with the strategies developed. Still, the answer to this question presents a potential way of addressing the fourth knowledge gap presented in 1.2.2.

The answers to the three sub-questions provide indications of the contributions of this research to the knowledge gaps identified in planning and transition studies. In the following section, I draw on these answers to discuss the contributions to the knowledge gaps presented in sections 1.2 and 1.4 and as such answer the main research question: How can the conceptualisation of the transport and land-use system as a socio-technical system contribute to both understanding why and how transition takes place and facilitating current transition attempts? In doing so the limitations of this research and avenues for future research are considered.

6.2 Transformative change in planning

As discussed in chapter 1, in recent years planning studies has increasingly focused on understanding transformative change, embracing complexity and uncertainty, evolutionary theory and concepts such as path dependency and experimentation. In empirical studies, exogenous structural developments have received growing attention as opening and closing windows of opportunity for change. Reflecting societal developments, the array of actors receiving attention as shaping the development of urban areas has shifted from the traditional focus on policy makers and firms to include citizens, lobby or community groups and knowledge institutes.

6.2.1 Structural opportunities and challenges

This research indicates the importance of responding to structural opportunities and challenges in order to increase the chance of bringing about fundamental change in urban development. The introduction of the structuration levels of the MLP and the idea of the socio-technical system allows the more precise operationalisation of these exogenous events (e.g. landscape, regime or other systems) in exploratory studies as well as aiding in mapping developments in attempts to support transitions. The heuristic value of these concepts was especially evident in the prescriptive use of the heuristic framework as part of a reflexive planning approach (see chapter 5). For example, the differentiation of various aspects of the landscape supported practitioners in systematically identifying relevant exogenous developments and subsequently developing strategies to capitalize on them. The descriptive use of the heuristic framework resulted in the insight that the relative importance of the various types of

structural opportunities or challenges is not a priori given. Instead, the importance depends, to a considerable extent, on the problem definitions of actors and the active framing of problems. In both Zürich and Munich, the most prominent historic transitions were observed when the troubles driving them were of a concrete and local nature, and they could link into stable rules in local society (e.g. value of the city, role of the state). This also became visible during the testing of the planning approach where problems, needs and visions were closely related to the concrete local/regional level rather than at the abstract level of society (e.g. livability or quality of life). This research suggests the importance of linking broad, abstract societal challenges to local, concrete challenges (troubles) or framing these broader issues, for example regarding sustainability, in a way that they are tangible for local actors. As such this research aids in finding practical ways for identifying and grasping structural events, the importance of which is discussed in the literature review in planning in section 1.2. In addition, it indicates the importance of local actors in shaping the way in which these structural events exert influence.

6.2.2 Bottom-up initiatives

This research indicates the importance of so called bottom-up initiatives or niches in bringing about transformative change in urban development. An important nuance relates to the delineation of niches. This research showed that a dichotomy whereby niches are synonymous with grassroots or bottom-up initiatives and the regime with established organisations is too simple. The historical case studies in chapters 3 & 4 showed that a more complex conceptualisation is needed. The members of established political parties in Munich and Zürich or employees for the local government who challenged the status quo could be seen as part of the niche in terms of problem definitions and propagated solutions. The delineation of regimes and niches rather based on proximity in terms of rules therefore adds explanatory power. Niche actors within existing organisations play an important role in exerting and sustaining the pressure for change. Furthermore, defining niches based on proximity opens the possibility, as was observed in chapters 3 & 4 and in previous transitions research (see 1.3.1), that niches are not bound to one scalar level. Based on similarities in rules, niches and regimes beyond the local can be distinguished in organisations (inter)nationally or in a number of locales. Coalitions between actors spanning a number of locales was observed to be an effective strategy to exert pressure for change at higher scalar levels. As such this research contributes to the understanding of what niches in the transport and land-use are, how they develop and gain influence through networks and the links between niches inside and outside established organisations. It provides insight into the types of strategic action that contribute to the outcomes discussed in table 1.1.

The importance of this discussion for planning practice is twofold. Firstly, in building legitimacy for new ways of approaching and dealing with problems, working in coalitions comprised of a broad array of progressive actors in established organisations as well as representatives of non-establishment organisations can increase the chances of bringing about transformative change. Actors from both types of organisations can complement each other's understanding of changing dynamics in the regime, landscape and the emergent practices of households and firms. Further, given the political nature of transition, coalitions including actors from established organisations can contribute to building support from within to strengthen the pressure on existing structures and practices. Secondly, working in networks with actors in other locales seeking to achieve related objectives can make it possible to apply pressure on incumbent structures and practices on a number of fronts. This is especially important given the continued importance of (supra) national decision making in creating the conditions for transformative change in urban development. To some extent, planning practice and research have already focused on networks. For example, by looking at exchanges between practitioners in various locales and policy transfer by which ideas can flow (e.g. Tan, 2013, pp. 175). An important improvement could be the strategic consideration of how networks and exchanges could support or facilitate the exertion of pressure on incumbent structures and practices and building consensus for novel ones. In keeping with the previous section, and with policy transfer literature more generally, the local institutional context and debates will clearly need to be accounted for.

6.2.3 *Practices of households and firms*

Positioning the practices of households and firms prominently in the conceptualisation of why and how transformative change takes place used in this research was observed to offer additional explanatory power in understanding the development of urban areas. In both historical case studies, the changing practices of households and firms were observed as exerting concrete and visible pressure on incumbent structures and practices. Although planners discuss households and firms (see Bertolini, 2012; Vogel & Næss, 2012; Smit *et al.* 2014), attempts to influence their behaviour (Schwanen *et al.*, 2011) still do not fully account for the complexity or meaning of practices (see Shove *et al.* 2012; 2015). The heuristic framework focusing on transport and land-use as one system as well as practices explicitly makes a start, as does the attention for needs and changing practices linked to sociological and cultural meaning (e.g. biking, slow living) identified during the application of the planning approach discussed in chapter 5. Still there is much more room for improvement, for example by using interdisciplinary knowledge, integrating a variety of research traditions and methods such as practice theories (see also Schwanen *et al.*, 2011).

6.2.4 Changes in planning practice to be a force of change

The planning approach developed as an answer to the third sub-question contributes to understanding how planning could be a force of change to address societal sustainability challenges. In this approach, knowledge development with regards to problems and solutions was carried out in co-creation with traditional and non-traditional actors. It suggests a way in which planning could be better attuned with emergent societal developments and actors as well as challenge self-evident structures and practices. By taking the needs of key actors as a starting point, the approach aims to address the challenge of conflicting short-term interests, which can hinder more fundamental change. Focusing on needs and weighing interests collectively contrasts with traditional planning processes where the government largely weighs (sometimes competing) interests to arrive at a decision. The critical reflection ensuing from the introduction of new forms of knowledge, the attention for societal shifts, the focus on the needs of the users of the system and structured reflection on the impacts of current actions on the future system has proved promising. Still, it was limited in a number of ways:

- 1) **Interdisciplinarity and work forms.** The disciplines involved and approaches to stimulate reflexivity were limited. In terms of approaches there is a much richer array of options which could be considered for various objectives: system analysis (e.g. reconstruction of theories of action to arrive at a shared structuring of problems; socio-technical problem analysis and cognition model to gain detailed insight in the causes of persistent problems; and principled negotiation to gain insight in to conflicting interest – see Merkx, 2012); redefining structures and practices (e.g. backcasting where paths towards a desirable future are developed, something suitable when trends and structures are part of the problem (Vogel, 2014, pp. 65) or the constructive conflict methodology which aims to facilitate learning about the diversity of perspectives on the problems and potential solutions; strategic assumption surfacing and testing, aimed at making various world views explicit, to challenge them and develop a shared worldview; and the soft-systems methodology, where the aim is to reach consensus on action rather than worldviews, see for the last three Merkx, 2012)
- 2) **Conflicting interests and power.** The experimentation with the new planning approach stopped in an early phase, before encounters with conflicting interests could take place. The historical case studies, however, show that transition is a contested and political process often initiated by non-mainstream interest groups. Real world experiences evidence the challenges related to power which can be encountered, especially when working with more established actors such as the

government (e.g. Majoor *et al.*, 2017; Hooijer *et al.*, 2017). Powerful incumbent roles, procedures and ways of working can be seen to easily endanger attempts to collaboratively learn and experiment with the aim of supporting second-order reflexivity, and thereby transformative change, in practice. As Hodson & Marvin (2012, pp. 437) point out, the language of transitions can be mobilised to reproduce the status quo, whilst Pel (2016) suggests that what he terms ‘capture’ by incumbent actors is not always negative for those being captured. This relates to calls in transition studies to devote more attention to the politics of transitions (see Truffer *et al.*, 2015; Avelino *et al.* 2016 and the special issue on the politics of transition: in the *Journal of Environmental Policy & Planning* (2016, issue 5).

- 3) **Legitimacy.** The approach presented is in a certain sense more participatory than traditional planning approaches. However, in contrast to traditional planning, which is sanctioned by democratically elected governments, questions of legitimacy can arise in novel planning approaches. For example, ensuring those less vocal or lacking the means, time or ambition to participate are still represented, or ensuring that more general societal interests are still accounted for even when they are not present in the area of the city which is the focus of attention. This is in line with other calls to focus on this issue (see Frantzeskaki *et al.*, 2018, pp. 11). Voß *et al.* (2009) emphasise the importance of the inclusiveness and fairness of the process, as well as the development of linkages to established democratic institution, whilst Hendriks (2009) emphasises that legitimacy and accountability will need to be incorporated in designs. Further, she suggests a range of possibilities for how this could be done from embedding transition arenas closely to the institutions of representative democracy, such as those discussed in Majoor *et al.* (2017), to more radical proposals where citizens are actively engaged in debates.

The approach used was based on the assumption that by fostering a process of learning based on second order reflexivity transformative change could be facilitated. A central component was concrete experiments to test, refine and ultimately anchor new ways of thinking, role relations and approaches. In addition to the points of attention mentioned above, a further point that future research will need to tackle is understanding what the significance of these experiments is with respect to the reconfiguration of socio-technical systems or in catalysing broader systemic transitions as Bulkeley *et al.* (2015, pp. 23) point out. An important point of attention is that of what is commonly referred to as upscaling. Bulkeley *et al.* (2015, pp. 241) emphasise the diversity of

conceptualisations in terms of what this means from enlargement in one place or replication elsewhere to the transfer of essential elements or the incorporation of salient lessons in other institutional arenas.

6.3 The city and space in transition studies

Below, the contributions of this thesis to the debates in transition studies discussed in section 1.4 are considered. As discussed in section 1.4 debates in transition studies have increasingly focused on questions of space and scale and the study of urban transitions. The study of transitions in urban areas where questions of space and scale are always present is seen as having the potential to contribute to these debates.

6.3.1 Space and scale in transitions

The first debate concerns space and scale in transitions. In addition to finding evidence supporting earlier research on (urban) transitions in emphasising the place-specificity of transition (e.g. Coutard & Rutherford, 2010; Coenen *et al.*, 2012; Hansen & Coenen, 2015; Truffer *et al.*, 2015; Sengers, 2016; Grin *et al.*, 2017), this research shows the importance of the built environment and infrastructure in shaping the course of transition. As such it provides empirical support for Affolderbach & Schulz's (2016) suggestion that the city should not only be seen as places where niches can develop. The troubles that arose and created the pressure for transitions were of a local, place-specific nature, as were many of the arguments framing the troubles, the regimes and even particular aspects of the landscape (e.g. demographics, culture and economic development). More importantly, the historically developed artefacts influenced the range of possibilities. For example, the tram in Zürich which delayed the desired motorway development in the first period (see 4.3.2).

Building on the work of Raven *et al.* (2012) and Affolderbach & Schulz (2016), this research provides empirical support for the usefulness of proximity in distinguishing between structuration levels and geographic scalar levels as well as to follow the exchange of ideas and the exertion of power between locales and between niche and regime in the urban area. The exchange of ideas through knowledge networks where a certain cognitive or social proximity existed can be observed in the historical case studies discussed in chapters 3 and 4. For example, inviting experts from abroad to share ideas or drawing inspiration from study visits, for instance to the USA to study modern transportation planning in the 1950s. The role of networks has already received some attention in transition studies (e.g. Coenen *et al.*, 2012; Sengers, 2016). Flows of ideas through them account for the commonalities between regimes and niches between locales. That said, this research indicates that the influence of exchanges

through networks on the course of transitions should not be overemphasised. In the cases studied in this thesis, decisions with regard to the development of the city were still taken in the urban region itself or nationally. In many cases new ideas from elsewhere influenced the way in which decisions which were already made were implemented or supported decisions that had already been made (e.g. urban motorways). In future research it would therefore be beneficial to focus on what the influence of these exchanges is also in terms of framing and understanding problems: is the awareness of troubles something which is primarily local or do exchanges through networks at higher scalar levels also play a role?

A further contribution of this research is in understanding the exertion of influence through social and institutional proximity networks. Focusing on social and institutional proximity offers more explanatory power in understanding the exertion of influence and shaping the course of transitions. It is hardly surprising that through hierarchical networks influence is exerted. For example, in the decision to construct the motorway network in Switzerland or to require consensus regarding the construction of public transport in Munich. More interesting is the way in which proximity between regime actors in various urban areas as well as between those operating nationally and locally allowed for the exertion of influence. In Munich, for instance, local actors utilized these networks to shape national decision making regarding public transport. Finally, a high degree of proximity between niche and regime actors, for example in the party of the mayor of Munich in the second period of transition, allowed critics of the developments in the city to exert influence creating the pressure for transition.

6.3.2 Conceptual challenges in urban transitions

The first challenge when studying urban transitions has to do with the artefacts in the system. In this regard, the most important contribution of this research is that it shows the normative importance of the identity of the city in legitimizing particular courses of action. This relates to the notion of the city as an artefact in terms of the historic and culturally valuable built environment, its socio-economic composition and its economic vitality. This differs from other systems where the intrinsic value of artefacts is much less present. As such, this influences the course that transition takes. Still, drawing on the identity or value of the city was only seen as effective in exerting sufficient pressure for change when the arguments used resonated with deeper changes in discourses and cognitive structures at the societal level. For example, the resonance of arguments to adapt the city to preserve its economic vitality with the growth discourse in the first period of transition in both Munich and Zürich or the resonance of arguments

regarding the changing character of the city with the growing societal concerns regarding the impacts of a limited focus on the environment, health and quality of life in the second period. Further, with regard to artefacts, this research shows, as evidenced by the types of troubles identified, that urban transitions centre just as much on the allocation of existing artefacts (infrastructures and buildings) as on building new ones. Urban space, due to its accessibility to all, has been seen to allow for experiments that are not so much concerned with new technologies, but rather with new ways of seeing and using urban space or infrastructure. This opens the possibility of democratizing experiments and transitions. For example, the bike activists as seen in Munich or the experiments with separating modes of transport in the first period of transition.

A second contribution of this research relates to the delineation of the system. This research saw changes in practices (intertwined mobility and locational practices) as the starting point in studying transition. Such a focus on practices and subsequently related changes in artefacts, rules and discourses could be a way of addressing the concerns regarding the delineation of the system and what can be considered a transition in the urban setting. Following this focus, urban transitions should be seen as more than only changes in technologies or increased densities, or a change in thinking, but rather as a change in various rules in the system, discourses, artefacts, and, most importantly, the practices of households and firms. Including practices makes not only a conceptual contribution, but also contributes to explaining why urban transitions take place. Changes in practices seem essential in creating the pressure necessary for change. The concreteness and visibility of the troubles ensuing from the confrontation between changing practices and limited change in the built environment provided visible support for those arguing for changes in the allocation and construction of urban space. When practices do not change it seems difficult to maintain political pressure in light of other competing concerns. The study of historical transitions touched on the cultural, socio-economic and demographic factors influencing practices, which also featured centrally in the planning approach presented in chapter 5. Especially when trying to support modern day transition attempts, it is important to understand how practices are changing in a specific area (as illustrated in the East/Southeast of Amsterdam in chapter 5), as well as at a higher level (corridor) to account for and relate to changes taking place. That said, devoting more study to how practices are changing and the potential to exert influence on them to aid in addressing issues such as sustainability and liveability would be an interesting next step. The work presented in chapter 5 by including local 'niche' actors provides interesting insights into how the governance could be organised. The influencing mentioned is then not the result of government, but rather of engaged stakeholders of which the government is but one.

6.5.4 General contributions

Moving beyond the debates presented in the introductory chapter, two more general contributions of this research can be identified. Firstly, this research shows how the generic theories of transition studies can be supplemented with system specific knowledge of casual links as represented in the transport and land-use feedback cycle to make empirical research possible. Secondly, this research contributes to debates regarding the course of transitions. For example, how transitions start. Sengers (2016, pp. 13) emphasises the starting point as being “vague conceptual images inspired by far-flung ideals [in the midst of change agents] which are then further substantiated and articulated as ‘urban imaginaries’ – shared understandings of what constitutes a desirable future city that are able to attract a wider following”. This research however tends to support Hofmann’s (2016) conclusions that transitions rather commence around concrete challenges and obstacles that are faced in a system. Of course, here creativity is also needed. As we have seen, what a problem is in a system as complex as the transport and land-use system with various overlapping systems is hardly self-evident. Actors with new ideas about what problems are and how the city and urban region should develop were instrumental in sensitizing actors with more established views. In that sense troubles seem to need visionaries who draw attention to them presenting salient new visions of how the city should be, but at the same time concrete and visible troubles are needed to latch on to. Otherwise, as we have seen, it is difficult to build support and legitimise new practices.

References

- Abendzeitung (2014). *Ausstellung: Die Siedlung Neu-Hasenberg*l. Retrieved from <https://www.abendzeitung-muenchen.de/inhalt.im-kulturzentrum-2411-ausstellung-die-siedlung-neu-hasenberg.4736708b-39f9-4553-ba2e-b0c21c91f045.html>
- Affolderbach, J. & Schulz, C. (2016). Mobile Transitions: Exploring Synergies for Urban Sustainability Research. *Urban Studies*, 53(9), 1942-1957.
- Albers, G. (1996). Entwicklungslinien der Raumplanung in Europa seit 1945. *disP*, 127, 3-12.
- Albrechts, L. (2005). Creativity as a Drive for Change, *Planning Theory* 4(3), 247-269.
- American Chamber of Commerce in the Netherlands (AmCham) (2009). *Voorbij de crisis – Fundamenten en perspectieven voor onze toekomst*. Retrieved from <http://www.amcham.nl/files/File/2009%20Priority%20Points%20-%20NL.pdf>.
- Arbeitsgemeinschaft für die Verkehrsplanung München (1956) *Gutachten zur Verkehrsplanung Münchens*. München: Ingenieurbüro Dorsch-Gehrmann & F.H. Kocks.
- Automobil-Club der Schweiz Zürich (ACS, 1960, 11 November). Generalversammlung. *Neue Zürcher Zeitung*, pp. 22-23.
- Automobil-Club der Schweiz Zürich (ACS, 1962, 1 March). Offener Brief an die Stimmbürger der Stadt Zürich: Leer einlegen!. *Die Tat*, pp. 13.
- Asselt, M. van, & Rijkens-Klomp, N. (2002). A look in the mirror: Reflection on participation in Integrated Assessment from a methodological perspective. *Global Environmental Change-Human and Policy Dimensions*, 12 (3), 167- 184.
- Avelino, F. & Wittmayer, J.M., (2016). Shifting power relations in sustainability transitions: a multi-actor perspective. *Journal of Environmental Policy and Planning*, 18 (5), 628-649.
- Avelino, F., Grin, J., Jhagroe, S. and Pel, B., (2016) The Politics of Sustainability Transitions, *Environmental Policy & Planning*, 18(5), 557-567.
- Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15(2), 73-80.
- Banister, D. (2005). Overcoming barriers to the implementation of sustainable transport. In P. P. Rietveld & R. R. Stough (Eds.), *Barriers to sustainable transport institutions, regulations and sustainability*. (pp. 54-68). Oxford: Spon Press.
- Banister, D., Anderton, K. Bonilla, D. Givoni, M. & Schwanen, T. (2011). Transportation and the environment. *Annual Review of Environment and Resources*, 36, 247-270.

- Banister, D., Schwanen, T., & Anable, J. (2012). Introduction to the special section on theoretical perspectives on climate change mitigation in transport. *Journal of Transport Geography*, 24, 467–470.
- Bartholomew, K. (2007). Land use-transportation scenario planning: promise and reality', *Transportation*, 34(4), 397-412.
- Batty, M. (2005). *Cities and Complexity: Understanding Cities Through Cellular Automata, Agent-Based Models, and Fractals*. Cambridge: MIT Press.
- Bätzing, W. (2013) Bevölkerungsentwicklung (19./20. Jahrhundert), In: *Historisches Lexikon Bayerns*, Retrieved from http://www.historisches-lexikon-bayerns.de/artikel/artikel_44452.
- Baumann, C. & White, S. (2012). Making better choices: a systematic comparison of adversarial and collaborative approaches to the transport policy process. *Transport Policy*, 24:83-90.
- Bayerisches Landesamt für Statistik und Datenverarbeitung (2005). *Statistisches Jahrbuch für Bayern*. München: BLS
- Beauregard, R. A. (2005). Introduction: institutional transformations. *Planning Theory*, 4(3), 203–207.
- Beck, U., Bonns, W. & Lau, C. (2003). The Theory of Reflexive Modernisation. Problematic, Hypotheses and Research Programme. *Theory, Culture & Society*, 20(2), 1-33.
- Beck, U., Giddens, A & Lash, S. (1997). *Reflexive modernization*. Cambridge: Polity Press.
- Bekkers, V. (2012). *Beleid in beweging: achtergronden, benaderingen, fasen en aspecten van beleid in de publieke sector*. Amsterdam: Boom Lemma.
- Benidikt, H. (2000). Die Stadtvision der ZAS und ihre Bedeutung für Zürich: Zürcher Arbeitsgruppe für Städtebau 1959-89: eine Dokumentation. *Schweizer Ingenieur und Architekt*, 20, 432-444.
- Berger, H.-U.; Güller, P.; Mauch, S.; Oetterli, J. (2009). *Verkehrspolitische Entwicklungspfade in der Schweiz*. Zürich: Rüegger Verlag.
- Berkhout, F., Wiczorek, A.J., Raven, R.P.J.M. (2011). Avoiding environmental convergence: a possible role for sustainability experiments in latecomer countries?. *International Journal of Institutions and Economics*, 3(2), 367–385.
- Bertolini, L. (1999). Spatial Development Patterns and Public Transport: The Application of an Analytical Model in the Netherlands. *Planning Practice & Research*, 14(2), 199-210.
- Bertolini, L. (2007). Evolutionary urban transportation planning? An exploration. *Environment & Planning A.*, 39 (8), 1998-2019 .

- Bertolini, L. (2009). *De planologie van mobiliteit*. Amsterdam: Vossiuspers.
- Bertolini, L. (2010). Complex systems, evolutionary planning? In: G. de Roo & E.A. Silva (Eds.), *A Planner's Encounter with Complexity*, (pp. 81–98). Farnham, UK: Ashgate.
- Bertolini, L. (2012). Integrating mobility and urban development agendas: A manifesto. *disP – The Planning Review*, 48(1), 16–26.
- Bertolini, L. & Clercq, F. le. (2003). Urban development without more mobility by car? Learning from Amsterdam, a multimodal urban region. *Environment and Planning A*, 35(4), 575–589.
- Bertolini, L. le Clercq, F. & Kapoen, L. (2005). Sustainable accessibility: a conceptual framework to integrate transport and land use plan-making. Two test-applications in the Netherlands and a reflection on the way forward. *Transport Policy*, 12(3), 207–220.
- Bertolini, L., Clercq, F. le & Straatemeier, T. (2008). Urban transportation planning in transition. *Transport Policy*, 15(2), 69–72.
- Beukers, E. (2014). *Shaking up the Cost Benefit Analysis Process*. Amsterdam: Universiteit van Amsterdam.
- Bieri, E. (1960, 11 November). Leidensgeschichte einer Verkehrssanierung. *Neue Zürcher Zeitung*. pp. 22.
- Binz, C. & Truffer, B. (2011). Technological innovation systems in multiscalar space. Analyzing an emerging water recycling technology with social network analysis. *Geographica Helvetica*, 66, 254–260.
- Binz, C., Truffer, B. & Coenen, L. (2014). Why space matters in technological innovation systems – Mapping global knowledge dynamics of membrane bioreactor technology. *Research Policy*, 43(1), 138–155.
- Blanc, J-D. (1993). *Die Stadt – ein Verkehrshindernis*. Zürich: Chronos Verlag.
- Blanc, J-D. (1996). Planlos in die Zukunft: Zur Entwicklung der Raumplanungspolitik in der Nachkriegszeit. *disP*, 124, 3–9.
- Blotevogel, H.H. & Schelhaas, B. (2011). Geschichte der Raumordnung. In K. Borchard (Ed.) *Grundriß der Raumordnung und Raumentwicklung* (pp. 75–201). Hannover: Akademie für Raumforschung und Landesplanung.
- BMW & Landeshauptstadt (LH) München (1998) (Eds.). *Verkehrprobleme gemeinsam lösen. Eine Initiative von BMW und der Landeshauptstadt München: Dokumentation vom 3. Plenumworkshop am 26.06.98 – Inzell III im Rathaus Unterhaching* Retrieved from <http://www.inzellinitiative.de/shared/Inzell-III.pdf>
- Bock, W. (2010). 80 Prozent für den zweiten S-Bahn-Tunnel. *Abendzeitung*. Retrieved from <http://www.abendzeitung.de/muenchen/rathaus/174781>

- Boelens, L. (2005). *Fluviologie: Een nieuwe benadering van ruimtelijke ordening*, Retrieved from [http://www.urbanunlimited.nl/uu/downloads.nsf/10/FAA14EA3F5CB3492C1256F89004605AB/\\$file/inaugural+lecture+bilingual.pdf](http://www.urbanunlimited.nl/uu/downloads.nsf/10/FAA14EA3F5CB3492C1256F89004605AB/$file/inaugural+lecture+bilingual.pdf)
- Boer, W. de (2010). *Samenwerking is niet genoeg!: Het belang van coalitievorming bij de ontwikkeling van stationslocaties*. Master thesis, Amsterdam: Universiteit van Amsterdam.
- Bos, A.P, Groot Koerkamp, P.W.G., Gosselink, J.M.J. & Bokma, S. (2009). Reflexive interactive design and its application in a project on sustainable husbandry systems. *Outlook on Agriculture*, 38(2), 137-145.
- Bos, A.P. (2010). *Reflexief interactief ontwerpen (RIO)*. Wageningen: Wageningen UR Livestock Research.
- Bos, A.P. & Grin, J. (2008). "Doing" Reflexive Modernisation in Pig Husbandry: The Hard Work of Changing the Course of a River. *Science Technology & Human Values*, 33, 480.
- Boschma, R. (2005). Proximity and Innovation: A critical assessment' *Regional Studies*, 39(1):61-74
- Brand, A. (2002). *Het stedelijke veld in opkomst, de transformatie van de stad in Nederland gedurende de tweede helft van de twintigste eeuw*. Amsterdam: University of Amsterdam.
- Brands, T., Wismans, L.J.J. & van Berkum, E.C. (2014) Multi-objective optimization of multimodal passenger transportation networks: coping with demand uncertainty, presented at the OPT-I conference, Kos Island, Greece 4-6 June 2014.
- Bratzel, S. (1999). *Erfolgsbedingungen umweltorientierter Verkehrspolitik in Städten: Analysen zum Policy-Wandel in den „relativen Erfolgsfällen“ Amsterdam, Groningen, Zürich und Freiburg (i. Brg.)*. Basel: Birkhäuser Verlag.
- Brauer, G. (2009). 2. *S-Bahn-Stammstrecke: Kommt der S-Bahn-Südring? Noch ist alles offen*, In: Münchner Forum Standpunkte 1/2009. Retrieved from http://www.muenchnerforum.de/literatur/standpunkte_2009_01.pdf
- Brömmelstroet, M. te (2010). *Making planning support systems matter*. Amsterdam: Universiteit van Amsterdam.
- Bruder, C. (2009). *Die Münchner Großsiedlung am Hasenberg: Siedlungsarchitektur, Stadtsoziologie und städtebauliche Leitbilder*. München: Ludwig-Maximilians-Universität.
- Bryman, A. (2008). *Social research methods*. Oxford: Oxford University Press.
- Bulkeley H, Castán Broto V and Maassen A (2014). Low-carbon transitions and the reconfiguration of urban infrastructure. *Urban Studies*, 51(7), 1471–1486.
- Bulkeley, H., Castán Broto, V & Edwards, G.A.S (2015). *An Urban politics of climate change: Experimentation and the governance of socio-technical transitions*. London: Routledge.

- Bund Schweizer Architekten (BSA, 1935). Die Eingabe des BSA an den Bundestrat betreffend Landesplanung, reprinted In: E. Winkler, G. Winkler, M. Lendi (1979), *Dokumente zur Geschichte der schweizerischen Landesplanung* (pp. 39-45). Zürich: Institut für Orts-, Regional-, und Landesplanung, ETH Zürich.
- Bundesamt für Raumentwicklung (ARE, 2004) *Räumliche Auswirkungen der Zürcher S-Bahn- eine ex-post Analyse: Zusammenfassung*, Bern.
- Bundesamt für Raumplanung (1996) *Grundzüge der Raumordnung*, Bern.
- Bundesbaugesetz (BBauG) (1976) (BGBl 1976 I S.2256) Bundesministerium der Justiz: Bonn.
- Bundesminister für Verkehr (1964). *Bericht der Sachverständigenkommission über eine Untersuchung von Maßnahmen zur Verbesserung der Verkehrsverhältnisse der Gemeinden Bundestags-Drucksache IV/26*. Retrieved from <http://dipbt.bundestag.de/doc/btd/04/026/0402661.pdf>
- Bundesministerium für Verkehr (BMV) & Landeshauptstadt München (LH München) (1961, 25 February) *Gemeinsame Presseerklärung über das Ergebnis der Dienstbesprechung* (B+R 3742). Stadtarchiv München, München.
- Bundesministerium für Verkehr Bau und Stadtentwicklung (BMVBS) en Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) (2009). *Integrierte Stadtentwicklung in Stadregionen. Projektabschlussbericht*. Retrieved from http://www.bbsr.bund.de/cln_032/nn_187652/BBSR/DE/Veroeffentlichungen/BBSROnline/2009/DL_ON372009,templateId=raw,property=publicationFile.pdf/DL_ON372009.pdf
- Bundesministerium für Verkehr, Bau und Stadtentwicklung (BMVBS) (2012). *Nationaler Radverkehrsplan 2020*. Berlin: Hausdruckerei.
- Bundesrat (2001). *Agglomerationspolitik des Bundes*. Bern: Bundesamt für Raumentwicklung, ARE und Staatssekretariat für Wirtschaft.
- Burckhardt, L, Frisch, M. & Kutter, M. (1955). *achtung: Die Schweiz: Ein Gespräch über unsere Lage und ein Vorschlag zur Tat*. Basel: Handschin.
- Büsehemann, K.H. (1989). Unter die Räder gekommen. *die Zeit*. Retrieved from <http://www.zeit.de/1989/42/unter-die-raeder-gekommen>
- Cammen, H. van der & Klerk, L. de (2008). *Ruimtelijke ordening: van Grachtengordel tot VINEX-wijk*. Houten: Spectrum.
- Carol, H. & Werner, M. (1949). *Städte - wie wir sie wünschen*. Zürich: Regio-Verlag.
- Cass, N., Shove, E., & Urry, J. (2005). Social exclusion, mobility and access. *The Sociological Review*, 53(3), 539-555.
- Cervero, R. (1998). *The Transit Metropolis: A Global Inquiry*. Washington, DC: Island Press.
- Chorus, P. (2012). *Station area developments in Tokyo and what the Randstad can learn from it*. Amsterdam: Universiteit van Amsterdam.

- Clifford, S., Blackledge, D., May, T., Jopson, A., Sessa, C., & Haon, S., (2005). *PLUME - Planning and Urban Mobility in Europe*. Retrieved from https://trimis.ec.europa.eu/sites/default/files/project/documents/20060821_165628_94536_PLUME%20Final%20Report.pdf
- Coenen, L., Benneworth, P., Truffer, B., (2012). Toward a spatial perspective on sustainability transitions. *Research Policy*, 41 (6), 968–979.
- Coenen, L., Raven, R., Verbong, G., (2010). Local niche experimentation in the energy transitions: a theoretical and empirical exploration of proximity and disadvantages. *Technology in Society*, 32 (4), 295–302.
- Commissie Versnelling Besluitvorming Infrastructurele Projecten (Commissie-Elverding) (2008) *Sneller en Beter Besluiten*. Den Haag: Ministerie van Verkeer en Waterstaat.
- Coutard, O. & Rutherford, J. (2010). The rise of post-network cities in Europe? Recombining infrastructural, ecological and urban transformation in low carbon transits. In H. Bulkely, V. Castán Broto, M. Hodson & S. Marvin (Eds.), *Cities and low carbon trsition*, (pp. 107-125). Abingdon: Routledge.
- Coutard, O. & Rutherford, J., (2010). Energy transition and city-region planning: understanding the spatial politics of systemic change. *Technology Analysis & Strategic Management* 22, 711-727.
- Cross, R., Ernst, C., & Pasmore, B., (2013). A bridge too far? How boundary spanning networks drive organizational change and effectiveness. *Organizational Dynamics*, 42(2), 81–91.
- Curtis, C. (2012). Transitioning to Transiti-Oriented Development: The case of Perth, Western Australia. *Urban Policy and Research*, 30(3), 275-292.
- Curtis, C. & Low, N. (2012) *Institutional Barriers to Sustainable Transport*. Farnham: Ashgate.
- Curtis, C., Renne, J. & Bertolini, L. (2009). *Transit-Oriented Development: Making It Happen*. Aldershot: Ashgate.
- Dachale, H. (2011) Gemeinsame Sache. *Süddeutsche Zeitung*. Retrieved from <http://sz.de/1.1071698>.
- Delbosc., A. & Currie, G. (2013). Causes of youth lisencing decline: a synthesis of evidence. *Transport Reviews*, 33(3), 271-290.
- Dennis, K. & Urry, J. (2009). *After the Car*. Cambridge, UK: Polity Press.
- Deutsche Bahn (DB) & Bayerisches Staatsministerium für Wirtschaft, Infrastruktur, Verkehr und Technogologie (BSMWIVT) (2012). Zell: „Der Weg für die 2. Stammstrecke ist frei“. Retrieved from <http://www.2.stammstrecke-muenchen.de/aktuelles-termine/aktuelle-informationen/details/zeil-der-weg-fuer-die-2-stammstrecke-ist-frei?>

- Deutsche Bundesbahn (DB) (1960, 18 July) *Vorstand an München, Betreff Beteiligung der Deutschen Bundesbahn an der Lösung innerstädtischer Verkehrsprobleme in München* (B+R 3742). Stadsarchiv München, München.
- Deutscher Städtetag (1962, August) *Verkehrsprobleme in der Städte* (B+R 3362). Stadsarchiv München, München.
- Devecchi, L. (2010). *Governing Zürich 1973-2007: Urbane Regime und Stadtentwicklungspolitik*, Zürich: Universität Zürich.
- Dewald, U. & Truffer, B. (2012). The local sources of market formation: explaining regional growth differentials in German photovoltaic markets. *European Planning Studies*, 20(3), 397–420.
- DG Environment (2005) *Expert working group on sustainable urban transport plans*. Brussels.
- Die Tat (1963, 23 October) Vom Wunschbild zur Wirklichkeit: Ein Gespräch mit Architekt Hanz Litz, *Die Tat*. pp. 4
- Dosi, G. (1982). Technological paradigms and technological trajectories: A suggested interpretation of the determinants and directions of technical change. *Research Policy*, 6(3), 147–162.
- Dudley, G & Chatterjee, K. (2012) The Dynamics of Regime Strength and Instability: Policy Challenges to the Dominance of the Private Car in the United Kingdom. In: F. Geels, R. Kemp, G. Dudley & G. Lyons. (Eds.) *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport* (pp. 83-104). New York: Routledge.
- Dudley, G. & Richardson, J. (2000). *Why does policy change? Lessons from British transport policy 1945-99*. London & New York: Routledge.
- Dunphy, R. T., Myerson, D. L., Pawlukiewicz, M. & Urban Land, I. (2003) *Ten Principles for Successful Development Around Transit*, Washington, DC: Urban Land Institute.
- Dupuy, G. (1995). *L'Auto et la ville*. Paris: Flammarion.
- Dupuy, G. (2005). Ville et automobile: du libre choix à la dépendance. *Pouvoirs locaux*, 66(3), 79–85.
- Elzen, B., Geels, F. W., & Green, K. (2004). Sociotechnical scenarios as a tool for transition policy: An example from the traffic and transport domain, in: B. Elzen, F. W. Geels, & K. Green (Eds.) *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy* (pp. 251 – 281). Cheltenham: Edward Elgar.
- Emirbayer, M. & Mische, A. (1998). What is agency?. *American Journal of Sociology*, 103(4), 962–1023.

- Empirica (2005). *Erwerbstätigenprognosen und Flächenbedarfsprognosen für die Landeshauptstadt München und die acht Landkreise der Region 14*. Retrieved from www.muenchen.de/rathaus/dms/Home/Stadtverwaltung/Referat-fuer-Stadtplanung-und-Bauordnung/Publikationen/Erwerbstaetigenprognose.pdf
- Empirica (2011). *Erwerbstätigenprognosen und Flächenbedarfsprognosen für die Landeshauptstadt München und die acht Landkreise der Region 14*. Retrieved from <http://www.wirtschaft-muenchen.de/publikationen/pdfs/Final-Langfassung.pdf>
- Evans, J, Karvonen, A. & Raven, R. (Eds.) (2016). *The experimental city*. London & New York: Routledge.
- Ferreira, A. & Batey, P. (2011). On why planning should not reinforce self-reinforcing trends: A cautionary analysis of the compact city proposal applied to large cities. *Environment and Planning B: Planning and Design*, 38(2), 231-247.
- Feuchtigner, M. (1957). Ein internationaler überblicküber die Frage ‘Verkehrsstockungen im Stadtzentrum. *Internationales Archiv für Verkehrswesen*, 9(12), 270-278.
- Feuchtinger, M. (1948). Wiederaufbau und Stadtverkehr. *Bauen und Wohnen*, 2-3:52-55.
- Feuchtinger, M., Rucker, A. & Schlums, J. (1956) *Verkehrsuntersuchung über das Fernverkehrsstraßennetz im Raum München 1951-1955* (Hochbau 1092). Stadtsarchiv München, München.
- Fiedler, K. (1953) *Protokoll Kommission für verkehrstechnische Fragen* (V.E.a.12). Stadtsarchiv Zürich, Zürich
- Filion, P. & Mc Spurren, K. (2007). Smart Growth and Development Reality: The Difficult Coordination of Land Use and Transportation Objectives. *Urban Studies*. 44, 501-523.
- Fischer, H. (1955, 12 April). *Wiederaufbaureferat an OB Wimmer, Betreff: Schnellstraßenprojekt* (Hochbau 1092). Stadtsarchiv München, München.
- Fischer, O. (1975, 24 June). Kronawitter zur Zukunft der Stadt: Kein Manhattan, aber auch kein Museum. *Süddeutsche Zeitung*, pp. 17.
- Fischer, O. (1982, 25 November). So wird die Trambahn zur Strecke gebracht. *Süddeutsche Zeitung*. pp. 17.
- Fischer, T. B., Kidd, S., Jha-Thakur, U., Gazzola, P., & Peel, D. (2009). Learning through EC directive based SEA in spatial planning?: Evidence from the Brunswick Region in Germany. *Environmental Impact Assessment Review*, 29(6), 421-428.
- Flueler, N. (1973). Fragen eines Laien zur U-Bahn- oder Geht es anders nicht eventuell auch?. *Tages-Anzeiger Magazin*, 4(14), 10.
- Frantzeskaki, N., Castán Broto, V, Coenen, L & Loorbach, D. (2017). *Urban Sustainability Transitions*. London: Routledge.

- Gall, A. (2001). Gute Straßen bis ins kleinste Dorf! "Verkehrspolitik und Landesplanung 1945 bis 1976", In: T. Schlemmer & H. Woller (Eds.) *Bayern im Bund. Die Erschließung des Landes 1949-1973* (pp.119-204), München: R. Oldenburg Verlag.
- Galliker, H.-R. (1997). *Tramstadt: Öffentlicher Nahverkehr und Stadtentwicklung am Beispiel Zürichs*. Zürich: Chronos Verlag.
- Geels, F. W., Kern, F., Fuchs, G., Hinderer, N., Kungl, G., Mylan, J., Neukirch, M. & Wassermann, S (2016). The enactment of socio-technical transition pathways: A reformulated typology and a comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990–2014). *Research Policy*, 45(4), 896–913.
- Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33(6-7), 897–920.
- Geels, F. W. (2010). Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. *Research Policy*, 39, 495–510.
- Geels, F. (2005). *Technological Transitions and System Innovations A Co-Evolutionary and Socio-Technical Analysis*. Cheltenham: Edward Elgar.
- Geels, F. W. (2005a). Processes and patterns in transitions and system innovations: Refining the co-evolutionary multi-level perspective. *Technological Forecasting & Social Change*, 72(6), 79–85.
- Geels, F. W. (2005b). The dynamics of transitions in socio-technical systems: A multi-level analysis of the transition pathway from horse-drawn carriages to automobiles (1860 – 1930), *Technology Analysis & Strategic Management*, 17(4), 445–476.
- Geels, F. W. & Schot, J. W. (2010) A typology of transition pathways. In: J. GrinJ. Rotmans & J. Schot (Eds.) *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change* (pp. 29–53), London: Routledge.
- Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1): 24–40.
- Geels, F.W. & Schot, J.W. (2007). Typology of socio-technical transition pathways. *Research Policy*, 36(3), 399–417.
- Geels, F.W., Dudley, G. & Kemp, R. (2012). Findings, Conclusions and Assessments of Sustainability Transitions in Automobility, In: Geels, F., Kemp, R, Dudley, G. and Lyons, G. (Eds.) *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport* (pp. 335-374), New York: Routledge.
- Geels, F.W., Kemp, R., Dudley, G. & Lyons, G. (Eds.) (2012). *Automobility in Transition?: A Socio-Technical Analysis of Sustainable Transport*. London: Routledge.
- Gemeinderätliche Verkehrskommission (gVK, 1957, 15 February). *Ein Beitrag zur Zürcher Verkehrsreform: Bericht über eine Studienreise nach Stuttgart und München* Stadsarchiv Zürich, Zürich

- Gemeindeverkehrsfinanzierungsgesetz (GVFG) (1971). (BGBl. I.1971 S.1109) Bundesministerium der Justiz: Bonn
- Genus, A. & Coles, A. M. (2008). Rethinking the multi-level perspective of technological transition, *Research Policy*, 37(9), 1436–1445.
- Gerstenberg, G. (2014). *Proteste in München seit 1945*. Retrieved from <http://protest-muenchen.sub-bavaria.de/>
- Geurs, K. (2014). *Dynamiek in Mobiliteit en Bereikbaarheid*, Enschede: Universiteit Twente.
- Geurs, K. & Wee, B. van (2006). Ex-post evaluation of thirty years of compact urban development in the Netherlands. *Urban Studies*, 43(1), 139–160.
- Giddens, A. (1984). *The Constitution of Society: Outline of the Theory of Structuration*. Berkeley: University of California Press.
- Gleeson, B. (2000). Reflexive modernization: The re-enlightenment of planning?. *International Planning Studies*, 5(1), 117–135.
- Gnest, H. (2008). *Entwicklung der überörtlichen Raumplanung in der Bundesrepublik von 1975 bis heute*. Hannover: ARL.
- González, S. & Healey, P. (2005). A Sociological Institutional Approach to the Study of Innovation in Governance Capacity. *Urban Studies*, 42(11), 2055–2069.
- Goodwin, P. (2012). Providing Road Capacity for Automobility: The Continuing Transition, in: F. Geels, R. Kemp, G. Dudley & G. Lyons (Eds.) *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport* (pp. 140–159), New York: Routledge.
- Goodwin, P & Dender, K. van (2013). 'Peak car' - themes and issues. *Transport Reviews*, 33(3), 243–254.
- Goss, J. (1988). The built environment and social theory: Towards an architectural geography. *The Professional Geographer*, 40(4), 392–403.
- Gössling, S. (2017). ICT and transport behavior: A conceptual review, *International Journal of Sustainable transportation*, doi.org/10.1080/15568318.2017.1338318
- Götschmann, D. (2013). Wirtschaft (nach 1945), *Historisches Lexikon Bayerns*, Retrieved from http://www.historisches-lexikon-bayerns.de/artikel/artikel_46361
- Goudappel Coffeng (2010). *MRAnet: Een HOV-systeem voor Metropoolregio Amsterdam (concept-eindrapportage)*. Amsterdam: Goudappel Coffeng.
- Grabathuller, C. (1999). Der Verkehr als heimlicher Stadt- und Landesplaner. In M. Koch & W.A. Schmid (Eds.), *Die Stadt in der Schweizer Raumplanung* (pp. 73–79), Zürich: VDF Hochschulverlag.
- Grauhan, R. & Linder, W. (1974). *Politik der Verstädterung*. München: Athenäum.
- Graupner, H. (1982). Das Trambahn-Versprechen halten!’, *Süddeutsche Zeitung*, 7. Dezember, 38(281):9

- Grin, J. (2006). Reflexive modernization as a governance issue – or: Designing and shaping re-structuration. In: J.Voß., D. Bauknecht & R. Kemp (Eds.) *Reflexive Governance for Sustainable Development* (pp. 54–81), Cheltenham, UK: Edward Elgar.
- Grin, J. (2008). The multi-level perspective and the design of system innovations. In: J. C. J. M. van den Bergh & F. Bruinsma (Eds.), *Managing the Transition to Renewable Energy: Theory and Macro-regional Practice* (pp. 47–80), Cheltenham, UK: Edward Elgar.
- Grin, J. (2010). Understanding Transitions from a Governance Perspective. In: J. Grin, J. Rotmans & J. Schot (Eds.), *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change* (pp. 223–319), London: Routledge.
- Grin, J. (2012). The governance of transitions and its politics. Conceptual lessons from the earlier agricultural transition and implications for transition management. *International Journal of Sustainable Development*, 15(1-2), 72–89.
- Grin, J. (2012b). Changing government, kitchens, supermarkets, firms and farms: the governance of transitions between societal practices and supply systems. In: G. Spaargaren, A. Loeber, & P. Oosterveer (Eds.), *Food Practices in Transition. Changing Food Consumption, Retail and Production in the Age of Reflexive Modernity* (p. 35-56). London/New York: Routledge.
- Grin, J. & Graaf, H. van de (1996). Technology Assessment as learning. *Science, Technology and Human Values*, 20(1), 72-99.
- Grin, J., Felix, F., Bos, B. & Spoelstra, S. (2004). Practices for reflexive design: Lessons from a Dutch programme on sustainable agriculture. *International Journal of Foresight and Innovation Policy*, 1(1–2), 126–149.
- Grin, J., Rotmans, J. & Schot, J. (2010). *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*. London: Routledge.
- Grin, J., Schot, J. & Rotmans, J. (2011). On patterns and agency in transition dynamics: Some key insights from the KSI programme. *Environmental Innovations Societal Transitions*, 1(1), 76–81.
- Grin, J., Frantzeskaki, N., Castan Broto, V. & Coenen, L. (2017). Sustainability Transitions and the City: Linking to transition studies and looking forward, In: N. Frantzeskaki; V. Castan Broto; L. Coenen (Eds.), *Urban Sustainability Transitions* (pp. 359-368), New York/London: Routledge.
- Grunwald, A. (2007). Working Towards Sustainable Development in the Face of Uncertainty and Incomplete Knowledge. *Journal of Environmental Policy and Planning*, 9(3-4), 245-262.
- Guth, D., Holz-Rau, C., Killer, V. & Axhausen, K.W. (2010). Räumliche Dynamik des Pendelverkehrs in Deutschland und der Schweiz: Das Beispiel München und Zürich, *disP*, 47:12-28

- Habaoui-Engelhard, N (2008). Überörtliche Verkehrsplanung in der Region München aus Sicht der Gemeinden. Ergebnisse einer Kommunalumfrage. *ECTL Working Paper* 42. Retrieved from http://www.vsl.tu-harburg.de/Archiv/wp/ECTL_Working_Paper_42.pdf
- Haberer, T & Mailer, M. (2005). Abstimmung der Entwicklungsplanung in Stadtregionen. *Internationales Verkehrswesen*, 12, 561-564.
- Haefeli U. (2008). *Verkehrspolitik und urbane Mobilität. Deutsche und Schweizer Städte im Vergleich 1950-1990*, Stuttgart: Franz Steiner Verlag.
- Hahn, A. & Althen, A.W. (1954, 22 October). In München: Mobilmachung gegen das Verkehrs-Chaos. *Süddeutsche Zeitung*, pp. 4.
- Hajer, M. & Kesselring, S. (1999). Democracy in the risk society? Learning from the new politics of mobility in Munich. *Environmental Politics*, 8(3), 1-23.
- Hajer, M. & Versteeg, W. (2005). A Decade of discourse analysis of environmental politics: achievements, challenges, perspectives. *Journal of Environmental Policy & Planning*, 7(3), 175-184.
- Hansen, T. & Coenen, L. (2014). The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field. *Environmental Innovation and Societal transitions*, 17, 92-109,
- Harlander, T. (1998). Stadtplanung und Stadtentwicklung in der Bundesrepublik Deutschland: Entwicklungsphasen seit 1945. *disP*, 132:4-9.
- Harms, L. (2003). *Mobiel in de tijd: Op weg naar een auto-afhankelijke maatschappij, 1975 – 2000*. Den Haag: Sociaal en Cultureel Planbureau.
- Harris A. & Moore S. (2013). Planning Histories and Practices of Circulating Urban Knowledge. *International Journal of Urban and Regional Research*, 37(5), 1499–1509.
- Harris-Lovett, S.R., Binz, C., Sedlak, D.L., Kiparsky, M. & Truffer, B. (2015). Beyond User Acceptance: A Legitimacy Framework for Potable Water Reuse in California. *Environmental Science & Technology*, 49, 7552-7561.
- Hass-Klau, C. (1984). German urban public transport policy. *Cities*, 1(6), 551-556.
- Hay, C. & Wincott, D. (1998). Structure, agency and historical institutionalism, *Political Studies*, 46, 951-957.
- Healey, P. (1997). *Collaborative Planning - Shaping places in fragmented societies*. London: MacMillan Press.
- Healey, P. (2007). *Urban Complexity and Spatial Strategies: Towards a relational planning for our times*. Abingdon: Routledge.
- Healey, P. (2009). In search of the “Strategic” in spatial strategy making. *Planning theory & Practice*, 10(4), 439-457.

- Healey, P. (2015). Civil society enterprise and local development. *Planning Theory & Practice*, 16(1), 1-27.
- Heiden, N. van der, Kübler, D. Buser, P. (2010). *Die Stadt Uster in ihrem regionalen Kontext: Eine Governance-Analyse in der Zwischenstad*. Retrieved from http://www.ipz.uzh.ch/forschung/publikationen/ZuerchpolEva/ZPE_8_Uster.pdf
- Hendriks, C. (2009). Policy design without democracy? Making democratic sense of transition management. *Policy Sciences*, 42(4), 341–368.
- Hielscher (1961, 5 June). *Entwurf des Vortrags, Verkehrsausbau und Finanzierungsfrages* (B+R 3360). Stadsarchiv München, München.
- Hillier, J. (2007). *Stretching Beyond the Horizon: A multiplanar Theory of Spatial Planning and Governance*. Aldershot: Ashgate.
- Himen, H. (1984). Die Erhaltung der städtebaulichen Physiognomie als Prinzip des Wiederaufbaus in München. In: W. Nerdinger (Ed.), *Aufbauzeit Planen und Bauen München 1945-1950* (pp. 19-31). München:Verlag C.H. Beck.
- Hitz, H., Schmid, C. & Wolff, R. (1995) Boom, Konflikt und Krise – Zürichs Entwicklung zur Weltmetropole. In: H. Hitz, U. Lehrer, R. Keil, K. Ronneberger, C. Schmid, R. Wolff, *Capitales Fatales: Urbanisierung und Politik in den Finanzmetropolen Frankfurt und Zürich* (pp. 208-273), Zürich: Rotpunktverlag.
- Hodson, M. & Marvin, S. (2012). Mediating Low-Carbon Urban Transitions? Forms of Organization, Knowledge and Action. *European Planning Studies*, 20 (3), 421-439.
- Hoffman, J. (2016). *From resistance to transformation: politics of experimentation with new energy systems*. Amsterdam: Universiteit van Amsterdam.
- Hoffman, J. G. (2013). Theorizing power in transition studies: the role of creativity and novel practices in structural change. *Policy Sciences*, 46 (3), 257-275.
- Hoffman, J.G. & Loeber, A.M.C., (2016). Exploring the Micro-politics in Transitions from a Practice Perspective: The Case of Greenhouse Innovation in the Netherlands. *Journal of Environmental Policy & Planning*, 18(5), 692-711.
- Högg, W., (1958). Entgegnung Högg, vormaliger Baureferent vor Fischer, *Der Baumeister* 6:429-430. In: Schmucki, 1998.
- Hollmann, H. (1965). *Das Problem der Trabantenstadt im Raum Zürich*. Bremen: Hollmann.
- Hölzinger, M. (2002). *Strategische Bedeutung von Lobbyarbeit im Spiegel der historischen Entwicklung der verkehrspolitischen Rahmenbedingungen in Deutschland*. Trier: Universität Trier.
- Hoojer, L., Switzer, A., Nijs, K. de, Kluck, J. (2017) Klimaat in de stad. In: S. Majoor, M.Morel, A. Straathof, F. Suurenbroek & W. van Winden, *Laboratorium Amsterdam* (pp. 152-164), Bussum: Uitgeverij Troth.

- Hopkins, D. & Stephenson, J. (2014). Generation Y mobilities through the lens of energy cultures: a preliminary exploration of mobility cultures, *Journal of Transport Geography*, 38, 88-91.
- Hormighausen, J. R. & Tan, W. (2016). Institutional Innovations for Sustainable Mobility: Comparing Groningen (NL) and Phoenix (US). *Transportation Research Procedia*, 19, 151-163.
- Hull, A., (2008). Policy integration: What will it take to achieve more sustainable transport solutions in cities?. *Transport Policy*, 15(2), 94–103.
- Hutter, D. (2006). Keine Innovation ohne zweiten S-Bahn-Tunnel. *Süddeutsche Zeitung*, 27. Januar. Retrieved from http://www.tunnelaktion.de/presse-files/SZ_270106a.jpg
- Hysing, E. (2009). Greening transport – explaining urban transport policy change. *Journal of Environmental Policy & Planning*, 11(3), 243–261.
- Innes, J.E. & Booher, D.E. (1999). Consensus Building and Complex Adaptive Systems – A Framework for Evaluating Collaborative Planning. *Journal of the American Planning Association*, 65(4), 412-423.
- Innes, J.E. & Booher, D.E. (2010). *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*. Oxford: Routledge/Taylor and Francis.
- Institut für angewandte Sozialwissenschaft (Infas) & Deutsches Zentrum für Luft- und Raumfahrt (DLR) (2010). *Mobilität in Deutschland 2008. Kurzbericht*. Retrieved from http://www.mobilitaet-in-deutschland.de/pdf/MiD2008_Kurzbericht_I.pdf
- Internationale Gesellschaft der Stadt- und Regionalplaner (IGSRO) Bundesamt für Raumentwicklung (ARE) (Eds.) (2004). *Urbaner Raum Schweiz-Herausforderungen an die Raumordnungspolitik, in Raumplanung in der urbanen Schweiz*. Chur: RegioPlan AG.
- Irwin, T. (2015). Transition Design: A Proposal for a New Area of Design Practice, Study, and Research. *Design and Culture*, 7(2), 229-246.
- Jacobs, J. (1961). *The Death and Life of Great American Cities*, New York: Random House.
- Jeekel, H. (2011). *De autoafhankelijke samenleving*, Delft: Eburon.
- Jones, P., & Lucas, K. (2012). The social consequences of transport decision-making: clarifying concepts, synthesising knowledge and assessing implications, *Journal of Transport Geography*, 21(1), 4-16.
- Kammann, G. (1990). *Mit Autobahnen die Stadt retten?*. Zürich: Chronos Verlag.
- Kanton Zürich (1958). *Bericht der vom Regierungsrat eingesetzten Expertenkommission für Regionalplanungsfragen*, Zürich.
- Kanton Zürich (1995). *Kantonaler Richtplan*, Zürich.

- Karadimitriou, N. (2010). Cybernetic spatial planning: Steering, managing or just letting go? In: J. Hillier & P. Healey (Eds.) *The Ashgate Research Companion to Planning Theory* (pp. 425–446). London: Ashgate.
- Kasemir, B., Jäger, J., Jäger, C.C., Gardner, M.T., Clark, W.C., Wokaun, A. (2003). *Public Participation in Sustainability Science: A Handbook*. Cambridge: Cambridge University Press.
- Kemp, R., Geels, F.W. & Dudley, G. (2012). Introduction: Sustainability transitions in the automobility regime and the need for a new perspective. In: F.W. Geels, R. Kemp, G. Dudley & G. Lyons (Eds.), *Automobility in Transition? A sociotechnical analysis of sustainable transport* (pp. 3–28). Routledge, New York.
- Kemp, R.; Loorbach, D & Rotmans, J. (2007). Transition management as a model for managing processes of co-evolution towards sustainable development. *The International Journal of Sustainable Development and World Ecology*, 14(1), 78–91.
- Kemp, R., Rotmans, J. & Loorbach, D. (2007). Assessing the Dutch energy transition policy: How does it deal with dilemmas of managing transitions. *Journal of Environmental Policy and Planning*, 9(3–4), 315–331.
- Kesselring, S. (2001). *Mobil Politik: Ein soziologischer Blick auf Verkehrspolitik in München*, Berlin: Edition Sigma.
- Kerkhof, M. van de (2004), *Debating Climate Change. A Study of Stakeholder Participation in an Integrated Assessment of Long-term Climate Policy in the Netherlands*. Utrecht: Lemma Publishers.
- Kesselring, S. (2001). *Mobil Politik: Ein soziologischer Blick auf Verkehrspolitik in München*, Berlin: Edition Sigma.
- Klenke, D. (1995). *Freier Stau für freie Bürger: Die Geschichte der bundesdeutschen Verkehrspolitik 1949–1994*. Darmstadt: Wissenschaftliche Buchgesellschaft.
- Klühspies, K. (2009). *München – nicht wie geplant*. Retrieved from <http://kluehspies.de/download.php?292457397ecb34a7bcec3b58095de7ee>
- Klühspies, K. (2015) *München nicht wie geplant*. München: Franz Schiermeier Verlag.
- Koch, M. (1999). Achtung: Die Stadt Schweiz – oder: zu viel Stad im Land?. In M. Koch & W.A. Schmid (Eds.), *Die Stadt in der Schweizer Raumplanung* (pp. 19–24). Zürich: VDF Hochschulverlag.
- Koch, M. (1992). *Städtebau in der Schweiz 1800–1990*. Zürich: Verlag der Fachvereine.
- Kohlmaier, G. (2007). Regionale Wirtschaftsentwicklung in Bayern im letzten Vierteljahrhundert. *Bayern in Zahlen*, 8, 334–350.
- Kolb, D. A. & Fry, R. E. (1974). *Toward an applied theory of experiential learning*. Cambridge: MIT Alfred P. Sloan School of Management.
- Koll-Schretzenmayr, M. (2008). Hans Marti und die Jugendjahre der schweizerischen Landesplanung. In C. Ruedin & M. Hanak (Eds.), *Hans Marti Pionier der Raumplanung* (pp. 32–38). Zürich: GTA Verlag.

- Koll-Schretzenmayr, M. & Schmid, W.A. (2003). Agglomerationspolitik in der Schweiz: Einsichten und Ausblicke am Beispiel der "Glatttal-Stadt". *disP* 152, 4-14.
- Kommission für verkehrstechnische Fragen (KVF, 1953). Verkehrsreglungsanlage Kreuzung Bleicherweg/Stockerstrasse, Protokoll der Kommission für verkehrstechnische Fragen 20 October 1953.
- König, D. (1948). Nahverkehrsplanung im Rahmen der städtebaulichen Neugestaltung. *Verkehr und Technik* 1(1/2), 10-12.
- Kremer, P. & Leibband, K. (1953). *Generalverkehrsplan für die Stadt Zürich*. Zürich.
- Kübis, I. (2012). Einwohnerentwicklung und Attraktivität der Wissensmetropole München. In: Bundesinstitut für Bau-, Stadt- und Raumforschung (Ed.) *Die Attraktivität großer Städte* (pp. 17-28), BBSR:Bonn.
- Künzi, H. (1998). *Zürichs öffentlicher Verkehr und seine S-Bahn. Neujahrsblatt auf das Jahr 1998*. Zürich: Beer.
- Kuttler, A. (1999). Die Stadt in der Raumplanungsgesetzgebung des Bundes, in M. Koch & W.A. Schmid (Eds). *Die Stadt in der Schweizer Raumplanung* (pp.41-45). Zürich: VDF Hochschulverlag.
- Landeshauptstadt (LH) München (1963). *Stadtentwicklungsplan mit Gesamtverkehrsplan: Gekürzte Fassung*. München: Baureferat.
- Landeshauptstadt (LH) München (1975). *Stadtentwicklungsplan 1975*, München: Stadtentwicklungsreferat.
- Landeshauptstadt (LH) München (1983). *Stadtentwicklungsplan 1983*, München: Referat für Stadtplanung und Bauordnung.
- Landeshauptstadt (LH) München (2002, 2003, 2004, 2007). *Jahreszahlen*. Retrieved from <http://www.muenchen.de/rathaus/Stadtfinfos/Statistik/Verkehr/archiv.html>
- Landeshauptstadt (LH) München (2005). *Münchens Zukunft gestalten: Perspektiv München – Strategien, Leitlinien, Projekte*. München: Referat für Stadtplanung und Bauordnung.
- Landeshauptstadt (LH) München (2010). *Fortschreibung Perspektiv München 2010* (Entwurf). München: Referat für Stadtplanung und Bauordnung.
- Landeshauptstadt (LH) München (2011). *Demografiebericht München – Teil 2*. München, Referat für Stadtplanung und Bauordnung.
- Latscha, W. (1963). Der öffentliche Verkehr in der Stadtregion. *Der öffentliche Verkehr*, 19(11).
- Lawhon, M. & Murphy, J.T. (2012). Socio-technical regimes and sustainability transitions: insights from political ecology. *Progress in Human Geography*, 36(3), 354-378.

- Lehrer, U. (1995). Grossstadt Schweiz: die Architektur des flexiblen Raumes. In: H. Hitz, U. Lehrer, R. Keil, K. Ronneberger, C. Schmid, R. Wolff (Eds.), *Capitales Fatales: Urbanisierung und Politik in den Finanzmetropolen Frankfurt und Zürich* (pp. 188-205). Zürich: Rotpunktverlag.
- Leibbrand, K. (1955) Generalverkehrsplan für die Stadt Zürich, Kurzfassung des Gutachtens Kremer/Leibbrand. *Schweizerische Bauzeitung*, 37, 550-553
- Leibbrand, K. (1957). Über Stadtplanung und Verkehrsplanung in den USA auf einer Verkehrstagung in Chicago. *Internationales Archiv für Verkehrswesen*, 9(17), 381-387.
- Lendi, M. (2006). Zur Geschichte der schweizerischen Raumplanung. *dISP*, 167, 66-83.
- Lendi, M. (2010). *Probleme als Schubkraft für die Raumplanung*. Retrieved from <http://dx.doi.org/10.3929/ethz-a-006309367>
- Lendi, M. (2011). Demokratie und Infrastruktur – ein Responsum. *UPR- Zeitschrift für Wissenschaft und Praxis*, 31(11), 422-431.
- Lindblom, C. E. (1979). Still Muddling, Not Yet Through. *Public Administration Review* 39(6): 517-526.
- Linder, W. (1973). *Der Fall Massenverkehr*, Frankfurt a.M.: Athenäum Verlag.
- Lissandrolo, E. & Grin, J. (2011). Reflexive Planning as Design and Work: Lessons from the Port of Amsterdam. *Planning Theory & Practice*, 12(2), 223-248.
- Litman, T. & Burwell, D. (2006). Issues in Sustainable transportation. *International Journal for Global Environmental Issues*, 6(4), 331-346.
- Litman, T. & Laube, F. (2002). *Automobile dependency and Economic Development*, Victoria Transport Policy Institute: www.vtpi.org.
- Litz, H. (1967). Das Leitbild der Zürcher Stadtplanung; Referat gehalten am 16. Januar. *Schweizerische Bauzeitung*, 85(13), 232-234.
- Loeber, A. (2007). Designing for Phronesis: Experiences with transformative learning on sustainable development. *Critical Policy Studies*, 1(4), 389-414.
- Loorbach, D. (2014). *To Transition! Governance Penarch in the New Transformation*. Inaugural Speech, Erasmus Universiteit Rotterdam.
- Loorbach, D. (2007). *Transition Management: New Mode of Governance for Sustainable Development*. International Books.
- Loorbach, D. (2010). Transition Management for Sustainable Development: A prescriptive, complexity-based governance framework. *Governance*, 23(1), 161-183.
- Lüdtkke, A., MarBolek, I., Saldern, A. von, (1996). Einleitung. In: A. Lüdtkke, I. MarBolek & A. von Saldern (Hg). *Amerikanisierung: Traum und Alptraum im Deutschland des 20. Jahrhunderts* (pp. 6-33), Steiner Verlag: Stuttgart.

- Luther (1968, 2 January). *Brief an OB Vogel Betreff Diskussions-Forum für Fragen der Stadtentwicklung und des Städtebaus* (B+R 3983). Stadtsarchiv München, München.
- Majoer, S., Morel, M., Straathof, A., Suurenbroek, F. & Winden, W. van (Eds.) (2017) *Laboratorium Amsterdam*. Bussum: Uitgeverij Troth.
- Marchau V.A.W.J., Walker, W.E. & Wee, G.P. van (2010). Dynamic adaptive transport policies for handling deep uncertainty. *Technological Forecasting and Social Change*, 77, 940-950.
- Marsden G., Ferreira A., Bache, I., Flinder, M. & Bartle, I. (2014). Muddling through with climate change targets: a multi-level governance perspective on the transport sector. *Climate Policy*, 14(5), 1–20.
- Marsden, G. & Docherty, I. (2013). Insights on disruptions as opportunities for transport policy change. *Transportation Research Part A: Policy and Practice*, 51:46-55.
- Marshall, S. (2004). *Streets & Patterns*. London & New York: Spon Press.
- Marti, H. (1953). Verkehrsprobleme der Zürcher Innenstadt. *Neue Zürcher Zeitung*. pp. 7.
- Marti, H. (1956, 11 November). Offene Fragen an die Verkehrsplaner. *Neue Zürcher Zeitung*. pp. 8.
- Marti, H. (1966). Bericht des Delegierten für die Stadtplanung Arch. Hans Marti, an den Stadtrat von Zürich, 17.3.
- May, A. & Marsden, G. (2010). Urban transport and mobility. Paper presented at the International Transport Forum, May 26–28, Leipzig, Germany.
- Meadowcroft, J. (2007). Who is in charge here? Governance for sustainable development in a complex world. *Journal of Environmental Policy & Planning*, 9(3), 299–314.
- Meadowcroft, J. (2011). Engaging with the politics of sustainability transition. *Environmental Innovation and Societal Transitions*, 1(1), 70–75.
- Mees, P. (2010). *Transport for Suburbia: Beyond the Automobile Age*. London: Earthscan.
- Meili, A. (1933). Allgemeines über Landesplanung. *Die Autostrasse*, 2, 17.
- Meili, A. (1944). *Zürich heute und morgen. Wille oder Zufall in der baulichen Gestaltung* (Sonderdruck). Zürich: Neue Zürcher Zeitung.
- Meitinger, K. (1946). *Das neue München, Vorschläge zum Wiederaufbau*. München: Münchner Graphische Kunstanstalten. In: Himen (1984).
- Mercx, F. (2012). *Samenwerken aan werkzame kennis: Methoden en technieken voor kenniscocreatie*. Den Haag: Rathenau Instituut.
- Merki, C.M. (2002). *Der holprige Siegeszug des Automobils, 1895-1930. Zur Motorisierung des Straßenverkehrs in Frankreich, Deutschland und der Schweiz*. Wien: Böhlau.

- Mez, J & Bühler, E. (1998). Functional and spatial segregation in the Swiss financial sector: pink-collar ghetto and male bastion. *Environment and Planning A*, 30, 1643-1660.
- Ministerie van Verkeer en Waterstaat (MV&W) (2008). *Strategisch Kennisagenda 2010 – 2020*. Den Haag.
- Ministerie van Verkeer en Waterstaat (V&W) & Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (VROM) (2004) *Nota Mobiliteit: naar een betrouwbare en voorspelbare bereikbaarheid*. Den Haag.
- Ministerie van Verkeer en Waterstaat (MV&W), Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (MVROM), Ministerie van Landbouw, Natuur en Voedselkwaliteit, Ministerie van Economische Zaken (2006). *Nota Ruimte: Ruimte voor Ontwikkeling*. Den Haag.
- Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (VROM) (1983) *Structuurschets stedelijke gebieden, deel d: regeringsbeslissing*. 's Gravenhage.
- Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (VROM) (1988) *Vierde nota over de ruimtelijke ordening: op weg naar 2015, deel a: beleidsvoornemen*, 's Gravenhage: SDU
- Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (MVROM) (2010a). *Stedelijke ontwikkeling en Mobiliteit – Handvatten voor gemeenten*. Den Haag
- Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (MVROM) (2008). *Structuurvisie Randstad 2040: Naar een duurzame en concurrerende Europese topregio*. Den Haag.
- Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (MVROM) (2010). *Centrum- en knooppuntontwikkeling ontrafeld: Aanbeveling van de Uitvoeringsalliantie Centrum- en knooppuntontwikkeling*. Den Haag.
- Mitscherlich (2008) [1965]. *Die Unwirklichkeit unserer Städte: Anstiftung zum Unfrieden*. Berlin: Suhrkamp Verlag.
- Modder, J. & Uum, E. van (2014). *Meer rendement van spoor en stations*, Retrieved from <http://kennisdeling.verdus.nl/upload/documents/MeerRendementRapport.pdf>.
- Mom, G.P.A. & Filarski, R. (2008). *Van transport naar mobiliteit : de mobiliteitsexplosie (1895-2005)*. Zutphen: Walburg Pers.
- Moser, P (2007). Pendelstrukturen im Großraum Zürich; Entwicklungen und Perspektiven. *Informationen zur Raumentwicklung*, 34(2), 131-139,
- Moser, P. (2014). Gewachsene Skepsis gegenüber der Zuwanderung. *Neue Zürcher Zeitung*. Retrieved from <http://www.nzz.ch/aktuell/schweiz/gewachsene-skepsis-1.18256568>
- Müller-Jentsch, E. (1988, 6/7 June). Neue Trambahn- teurer als U-Bahn-Züge. *Süddeutsche Zeitung*, pp. 13.

- Müller-Jentsch, E. (1990, 14 December). Freie Fahrt in Finanzierungslücken?. *Süddeutsche Zeitung*, pp. 21.
- Müller, T. (1984, 8 February). Prognose für die Trambahn. *Süddeutsche Zeitung*, pp. 13.
- Munafò, S. (2015). *Cadres de vie, modes de vie et mobilités de loisirs: les vertus de la ville compacte remises en cause?*. Lusanne: EPFL.
- Munafò, S., Kaufmann, V., Christie, D., Vincent-Geslin, S. & Ravalet, E. (2015). Dispositions et usages de l'automobile et des transports publics entre 1994 et 2011. *Revue d'Économie Régionale & Urbaine*, 5, 753-782.
- Münchner Stadtrat (1954). *Besprechung mit Herrn Oberbaurat Schoener am 4.11.1954 in der Sache 'Zusammenführung der während des Dritten Reichs nach München herangeführten 3 Autobahnen (B+R 349)*. Stadsarchiv München, München.
- Münchner Stadtrat (1959, 15 December). Tiefbahn-Beschluß des Stadtrates (U-Bahnreferat 3). Stadsarchiv München, München.
- Münchner Stadtrat (1961, 20 October). *Sitzung der Vollversammlung des Stadtrats, vertraulich* (B+R 3968). Stadsarchiv München, München.
- Münchner Verkehrsverbund (MVG) (2010). *Verbundbericht 2010*. München.
- Murphy, J. T. (2015). Human geography and socio-technical transition studies: Promising intersections. *Environmental Innovation and Societal Transitions*, 17, 73-91.
- Muschwitz, C. & Monheim, H. (2011). *Kurzfassung des Endberichts zur Evaluation „Radlhauptstadt München“*. Retrieved from <http://www.ris-muenchen.de/RII2/RII/DOK/SITZUNGSVORLAGE/2497925.pdf>
- Næss, P. (1996). Workplace Location, Modal Split and Energy Use for Commuting Trips. *Urban Studies*, 33(3), 557-580.
- Næss, P., & Vogel, N. (2012). Sustainable urban development and the multi-level transition perspective. *Environmental Innovation and Societal Transitions*, 4, 36-50.
- Næss, P., Strand, A. Næss, T. & Nicolaisen, M. (2011). On their road to sustainability? The challenge of sustainable mobility in urban planning and development in two Scandinavian capital regions. *Town Planning Review*, 82 (3), 285-315.
- Næss, P., Andersen, J., Nicolaisen, M. S., & Strand, A. (2014). Transport Modelling in the Context of the 'Predict and Provide' Paradigm. *European Journal of Transport and Infrastructure Research*, 14(2), 102-121.
- Næss, P., Hansson, L., Richardson, T. & Tennøy, A. (2013). Knowledge-based land use and transport planning? Consistency and gap between 'state-of-the-art' knowledge and knowledge claims in planning documents in three Scandinavian city regions. *Planning Theory & Practice*, 14(4), 470-491.

- Nelson, R. R. & Winter, S. G. (1977). In search of a useful theory of innovation, *Research Policy*, 6(1), 36–76.
- Nelson, R. R. & Winter, S. G. (1982). *An Evolutionary Theory of Economic Change* Cambridge, MA: Belknap Press.
- Nerdinger, W. (1984). Wiederaufbau oder Neubau? In: Nerdinger, W. (Ed.), *Aufbauzeit Planen und Bauen München 1945-1950* (pp. 9-19). München: Verlag C.H. Beck.
- Neue Zürcher Zeitung (NZZ, 1963, 12 December). Die Luftschlösser. *Neue Zürcher Zeitung*. pp. 4.
- Neue Zürcher Zeitung (NZZ, 1974, 30 September). Unbrauchbares Resultat?. *Neue Zürcher Zeitung*., pp. 31.
- Neumann, E. & Feuchtinger, M. (1937). Anforderung und Durchbildung großstädtischer Verkehrsbauwerke, gezeigt am Beispiel New York. *Die Bautechnik*, 12 (12), 141-145; (16), 207-211; (18), 230-233, In: Schmucki (1998).
- Newman, P. W. G. & J. R. Kenworthy (1999). *Sustainability and Cities: Overcoming Automobile Dependence*. Washington, DC: Island Press.
- Nykqvist, B., & Whitmarsh, L. (2008). A multi-level analysis of sustainable mobility transitions: Niche development in the UK and Sweden. *Technological Forecasting and Social Change*, 75(9), 1373–1387.
- OECD (2007). *Territorial Review van de OESO: Randstad Holland*. Retrieved from <http://www.oecd.org/dataoecd/45/40/38980902.pdf>.
- OECD (2010). *OECD Economic Surveys: Netherlands*. Retrieved from <https://zoek.officielebekendmakingen.nl/blg-69879.pdf>
- Onderzoek & Statistiek (O&S, 2016). *Metropoolregio Amsterdam in cijfers 2016*, Amsterdam: Gemeente Amsterdam.
- Ottosson, M. & Magnusson, T. (2013). Socio-technical regimes and heterogeneous capabilities: the Swedish pulp and paper industry's response to energy policies. *Technology Analysis & Strategic Management*, 25(4), 355-368.
- OV-Bureau Randstad (2010). *Randstadnet 2028: de belofte aan de reiziger*. Utrecht.
- ÖV-Konzept 2000 (1982). *Untersuchung der MVV-GmbH und der Landeshauptstadt München zu einem Netz der Oberflächenverkehrsmittel mit Alternativen*, München.
- Parr, J. B. (2004). Perspectives on the City-Region. *Regional Studies*, 39(5), 555-566.
- Pasqualetti, M. J. (2011). Social Barriers to Renewable Energy Landscapes, *Geographical Review*, 101(2), 201-223.
- Pel, B. (2016). Trojan horses in transitions: A dialectical perspective on innovation 'capture'. *Journal of Environmental Policy & Planning*, 15(5), 673-691.
- Pesch, U. (2015). Tracing discursive space: Agency and change in sustainability transitions. *Technological Forecasting & Social Change*, 90, 379 388.

- Peter, H. (1935). Landesplanung in der Schweiz. Reprinted in: E. Winkler, G. Winkler, M. Lendi (1979), *Dokumente zur Geschichte der schweizerischen Landesplanung* (pp. 29-31). Zürich: Institut für Orts-, Regional-, und Landesplanung, ETH Zürich.
- Pflieger, G, Kaufmann, V, Pattaroni, L, & Jemelin, C, (2009). How Does Urban Public Transport Change Cities? Correlations between Past and Present Transport and Urban Planning Policies. *Urban Studies*, 46(7), 1421–1437.
- Pirath, C. & Feuchtigener, M.E. (1954). *Generalverkehrsplan für die Stadt Zürich*, Stuttgart.
- Planbureau voor de Leefomgeving (PBL, 2014). *Kiezen én delen: strategieën voor een betere afstemming tussen verstedelijking en infrastructuur*. Den Haag.
- Planungs- und Koordinierungskommission (1960, 15 March). *Niederschrift über die Sitzung der Planungs- und Koordinierungskommission* (RSP 733/11). Stadtarchiv München, München.
- Planungsverband Äußerer Wirtschaftsraum München (PÄWM, 2003). *Region München 2003 Ausführliche Datengrundlagen*. München.
- Planungsverband Äußerer Wirtschaftsraum München (PÄWM, 2012). *Region München 2012 Ausführliche Datengrundlagen*. München.
- Priebs, A. (2006). Suburbane Siedlungsflächen: Wucherung oder gestaltbare Stadtregion. In: A. von Saldern (Ed.), *Stadt und Kommunikation in bundesrepublikanischen Umbruchzeiten* (pp.147- 162). Stuttgart: Franz Steiner Verlag.
- Provincie Noord-Holland (PNH, 2011). *Structuurvisie Noord-Holland 2040*, Haarlem.
- Provincie Noord-Holland & Vereniging Deltametropool (VDM, 2013). *Maak Plaats!*, Haarlem: Provincie Noord-Holland.
- Pucher, J. & Dijkstra, L. (2003). Promoting safe walking and cycling to improve public health: lessons from the Netherlands and Germany. *American Journal of Public Health*, 93(9), 1509–1517.
- Pütz, M. (2006). Steuerung der Siedlungsentwicklung auf regionaler Ebene am Beispiel der Metropolregion München. In: H. Job & M. Pütz (Eds.), *Flächenmanagement* (pp. 169-188). Hannover:ARL.
- Raad voor Verkeer en Waterstaat (2011). *Over belangen, beleid en burgers. Zes inzichten over overheidssturing in het domein van Verkeer en Waterstaat*. Den Haag.
- Rat von Sachverständigen für Umweltfragen (SRU) (1973). *Auto und Umwelt*. Wiesbaden.
- Raven, R., Schot, J & Berkhout, F. (2012). Space and scale in socio-technical transitions. *Environmental innovation and societal transitions*, 4(1), 63-78.
- Real, W.H (1950). *Erfahrungen und Möglichkeiten bei der Aufstellung von Richtlinien für die Stadtplanung. unter besonderer Berücksichtigung der Verhältnisse in der Stadt Zürich*. Zürich: ETH Zürich.

- Regionalplanung Zürich und Umgebung (RZU, 2008). *Galerie der Ideengeschichte: 50 Jahre RZU 1958-2008*. Retrieved from <http://www.rzu.ch/sites/default/files/Studien-Projektberichte/Ideengeschichte.pdf>.
- Reiß-Schmidt, S. (2003) Herausforderungen und Chancen kooperativer Regionalentwicklung. Perspektiven für die region München. *dISP*, 152, 71-79.
- Rip, A. & Kemp, R. (1998). Technological change, in: S. Rayner & E.L. Malone (Eds.), *Human Choice and Climate Change* (pp. 327-399) Columbus, OH: Batelle Press.
- Rohracher H. & Späth, P. (2014). The interplay of urban energy policy and socio-technical transitions: The eco-cities of Graz and Freiburg in retrospect. *Urban Studies*, 51(7), 1415-1431.
- Roll, E. (1982, 17 May). Radl-Premiere in S- und U-Bahn. *Süddeutsche Zeitung*, pp.10.
- Roorda, C., Wittmayer, J., Henneman, P, Steenbergen, F. van, Frantzeskaki, N., Loorbach, D. (2014). *Transition management in the urban context: guidance manual*. DRIFT, Erasmus University Rotterdam, Rotterdam.
- Rossiter, J.R. & Lilien, G.L. (1994). New "Brainstorming" Principles Australian. *Journal of Management*, 19(1), 61-72.
- Rotmans, J. & Loorbach, D. (2010). Towards a beter understanding of transitions and their governance: A systematic and reflexive approach. In: J. Grin & J. Rotmans J. Schot (Eds.), *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change* (pp. 105-222). London: Routledge.
- Sachs, W. (1990). *Die Liebe zum Automobil. Reinbek bei Hamburg*. Reinbeck bei Hamburg, Germany: Rowohlt Verlag.
- Samenwerkingsverband Zuidvleugel (2015). *Monitor Stedenbaan 2014*. Retrieved from http://www.zuidvleugel.nl/sites/www.zuidvleugel.nl/files/documenten/monitor_2014_web_hr.pdf
- Schaick, J. van & Klaasen, I. T. (2011). The Dutch Layers Approach to Spatial Planning and Design: A Fruitful Planning Tool or a Temporary Phenomenon?. *European Planning Studies*, 19(10), 1775-1796.
- Schärer, C. (2011). Die S-Bahn hat ihre Unschuld verloren. *Tages-Anzeiger*. Retrieved from <http://www.tagesanzeiger.ch/schweiz/standard/Die-SBahn-hat-ihre-Unschuld-verloren-/story/24569283>
- Schilling, R. (1969). Zürichs „grosse“ Zukunft. *Schweizerische Bauzeitung*, 87(17), 325-327.
- Schleich, E. (1978). *Die zweite Zerstörung Münchens*. Stuttgart: J.F. Steinkopf Verlag.
- Schlemmer, T & Woller, H. (2001). Einleitung. In: T. Schlemmer & H. Woller (Eds.) *Die Erschließung des Landes 1948 bis 1973* (pp. 1-33). München: R. Oldenbourg Verlag.

- Schmuck, A. (1996). *Wege zum Verkehr von Heute: Daten, Fakten und Meinungen zu 50 Jahren Verkehr und Verkehrspolitik in der Bundesrepublik Deutschland: (1945 - 1995)*. Hannover: Grütter.
- Schmucki, B. (1998). Schneisen durch die Stadt - Sinnbild der »modernen« Stadt. Stadtautobahnen und amerikanisches Vorbild in Ost- und Westdeutschland, 1925-1975. *Werkstatt Geschichte*, 21, 43-63.
- Schmucki, B. (2001). *Der Traum vom Verkehrsfluss. Städtische Verkehrsplanung seit 1945 im deutsch-deutschen Vergleich*. Frankfurt a.M.: Campus.
- Schön, A.D. (1983). *The Reflective Practitioner*. New York: Basic Books.
- Schön, A.D. & Rein, M. (1994). *Frame Reflection: Towards the Resolution of Intractable Policy Controversies*. New York: Basic Books.
- Schot, J. (1998). The usefulness of evolutionary models for explaining innovation: The case of the Netherlands in the nineteenth century. *History and Technology*, 14(3), 173-200.
- Schuitmaker, T.J. (2013). Identifying and unravelling persistent problems. *Technological Forecasting & Social Change*, 79(6), 1021-1031.
- Schultz, B. & Schilter, R. (2003). *Publikumsintensive Einrichtungen: Konsum und Freizeit*. Zürich: Institut für Raum- und Landschaftsentwicklung.
- Schumacher, F. (1973, 9 May). U-Bahn - ein Projekt des Grössenwahnsinns. *Tages-Anzeiger*. pp. 17.
- Schwanen, T., Banister, D. & Anable, J. (2011). Scientific research about climate change mitigation in transport: a critical review. *Transportation Research Part A: Policy and Planning*, 45(10), 993-1006.
- Sengers, F. & Raven, R. (2015). Toward a spatial perspective on niche development: The case of Bus Rapid Transit. *Environmental Innovation and Societal transitions*, 17, 166-182.
- Sengers, F. (2016). Cycling the city, re-imagining the city: Envisioning urban sustainability transitions in Thailand. *Urban Studies*, 54(12), 2763-2779.
- Sengers, F. (2016). *Transforming transport in Thailand: experimenting for transitions in sustainable urban mobility*. Eindhoven: Technische Universiteit Eindhoven.
- Sheller, M. (2012). The Emergence of New Cultures of Mobility: Stability, Openings and Prospects. In: F. Geels, R. Kemp, G. Dudley & G. Lyons (Eds.), *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport* (pp.180-204), New York: Routledge.
- Shove, E., Watons, M. & Spurling, N. (2015). Conceptualising connections: energy demand, infrastructures and social practices, *European Journal of Social Theory*, 18(3), 274-287.

- Shove, E. & Walker, G. P. (2007). CAUTION! Transitions ahead: politics, practice, and transition management. *Environment and Planning A*, 39(4), 763–770.
- Shove, E. & Walker, G. (2010). Governing transitions in the sustainability of everyday life, *Research Policy*, 39(4), 471–476.
- Sidler, G.B. (1971). Wohnstadt – Geschäftsstadt. *Schweizerische Bauzeitung*, 89(25), 642–643.
- Simon, A. (2011). Mehr Stadt an der Glatt. *Hochparterre : Zeitschrift für Architektur und Design*, 24(1-2), 20–27.
- SINUS-Institut (2011). *Fahrrad-Monitor Deutschland*. Retrieved from <http://edoc.difu.de/edoc.php?id=E124SHZD>
- Smit, N., Janssen-Jansen, L & Tan, W. (2014). Tunnelvisies en cirkelredeneringen in kennisuitwisseling knooppuntenbeleid, presented at the Colloquium Vervoersplanologisch Speurwerk, 20–21 November, Eindhoven.
- Smith, A., Stirling, A. & Berkhout, F. (2005). The governance of sustainable sociotechnical transitions. *Research Policy*, 34(10), 1491–1510.
- Smith, A. (2007) Translating sustainabilities between green niches and sociotechnical regimes. *Technology Analysis & Strategic Management*, 19(4), 427–450.
- Smith, A. & Stirling, A. (2007). Moving outside or inside? Objectification and reflexivity in the governance of socio-technical systems. *Journal of Environmental Policy & Planning*, 9(3–4), 351–373.
- Smith, A., Stirling, A. & Berkhout, F. (2005). The governance of sustainable sociotechnical transitions. *Research Policy*, 34(10), 1491–1510.
- Smith, A., Voß, J. & Grin, J (2010). Innovation studies and sustainability transitions: Perspective and its challenges: The allure of the multi-level perspective and its challenges. *Research Policy*, 39(4), 435–448.
- Snellen, D., Hilbers, H. & Hendriks, A. (2005). *Nieuwbouw in Beweging: Een analyse van het ruimtelijk mobiliteitsbeleid van VINEX*. Rotterdam: NAI Uitgevers.
- Soria, J., L. Bertolini, & Brömmelstroet, M. te (2016). An experiential approach to improving the integration of knowledge during EIA in transport planning. *Environmental Impact Assessment Review*, 56, 188–199.
- Späth P, Rohrer H (2010). ‘Energy regions’: The transformative power of regional discourses on socio-technical futures. *Research Policy*, 39(4), 449–458.
- Späth, P. & Rohrer, H. (2012). Local Demonstrations for Global Transitions – Dynamics across Governance Levels Fostering Socio-Technical Regime Change Towards Sustainability. *European Planning Studies*, 20(3), 461–479.
- Spiegel, der (1968). *Städtebau München. Blindes Treiben/* 22(31), 80–81. Retrieved from <http://www.spiegel.de/spiegel/print/d-45995992.html>.

- Spies, W., Spapens, J., Nizet, L., Reede, M., Faling, W. & Karssenberg, H. (2005). *De herstructureringsmethode van Zuidvleugel en Zuid-Holland: Stedenbaan*. Retrieved from <http://www.reurba.org/downloads/ReUrbA-method%20and%20Stedenbaan.doc>
- Stadt Bremen, Düsseldorf, Essen, Frankfurt am Main, Hannover, Köln, München und Stuttgart (1961, 10 February). *Niederschrift über die Besprechung zwischen der Städte Bremen, Düsseldorf, Essen, Frankfurt am Main, Hannover, Köln, Münchner und Stuttgart* (B+R 3702). Stadtsarchiv München, München.
- Stadtrat von Zürich (1956, 17 February). *Untergrundbahn, Vernehmlassung zur Nachträgen zum Konzessionsgesuch*, Protokoll Stadtrat der Stadt Zürich.
- Stadtrat von Zürich (1961a). Gesamtplan und Kreditvorlage für die I. Bauetappe der Tiefbahn', Protokoll der Stadtrat der Stadt Zürich, 20 January 1961.
- Stadtrat von Zürich (1964). Motion von O. Baumann und 34 Mitunterzeichnern über den Bau einer Untergrundbahnlinie zwischen Stadtzentrum und Oerlikon, Zwischenbericht, 14.2 (480).
- Stadtrat von Zürich (1971). U-Bahn Zürich, Weisung Nr. 128 des Stadtrates an den Gemeinderat vom 21. Januar 1971.
- Stadtrat von Zürich (1961b). Tiefbahn oder Untergrundbahn. Bericht an den Gemeinderat, Zürich.
- Störmer, E., Truffer, B., Dominguez, D., Gujer, W., Herlyn, A., Hiessl, H., Kastenholz, H., Klink, A., Markard, J., Maurer, M., Ruef, A. (2009). The exploratory analysis of trade-offs in strategic planning. Lessons from Regional Infrastructure Foresight. *Technological Forecasting and Social Change*, 76(9), 1150 – 1162.
- Straatemeier, T., Bertolini, L., Brömmelstroetm M. te, & Hoetjes, P. (2010). An experiential approach to research in planning. *Environment & Planning B*, 37(4), 578-591.
- Ströbl, J. (1951, 27 November). Bürger wehren sich gegen den Tot. *Süddeutsche Zeitung*, pp. 4 B.
- Ströbl, J. (1953, 5. March). Die Verkehrsflug steigt – die Dämme brechen. *Süddeutsche Zeitung*, pp. 7.
- Ströbl, J. (1955, 3/4 December). Fahrgäste – bestellt und nicht abgeholt. *Süddeutsche Zeitung*, pp. 10.
- Ströbl, J. (1979, 22 June). Königsplatz – schweriges Operationsfeld. *Süddeutsche Zeitung*, pp. 13.
- Süddeutsche Zeitung (SZ) (1949, 3/4 December). Der Tot fährt durch die Straßen der Städte. pp. 4.
- Süddeutsche Zeitung (SZ) (1953, 1/2 July). Krieg oder Frieden auf der Fahrbahn. 4.

- Süddeutsche Zeitung, SZ (2012). *Vorfahrt fürs Fahrrad*. Retrieved from <http://sz.de/1.1334136>
- Süddeutsche Zeitung (2015) *Ein Bild von einer Stadt*. Retrieved from <http://www.sueddeutsche.de/muenchen/jubilaumsaktion-jahre-sz-ein-bild-von-einer-stadt-1.2616614>
- Switzer, A. (2010). *Trust in the process: The role of inter-actor trust in planning processes in policy networks*, Master thesis, Universiteit van Amsterdam.
- Switzer, A., Bertolini, L & Grin, J. (2013). Transitions of Mobility Systems in Urban Regions: A Heuristic Framework. *Journal of Environmental Policy & Planning*, 15(2), 141-160.
- Switzer, A., Bertolini, L & Grin, J. (2015). Understanding transitions in the regional transport and land-use system: Munich 1945 – 2013. *Town Planning Review*, 86(6), 699-723.
- Tachieva, G. (2010) *Sprawl Repair Manual*, Washington, D.C: Island Press
- Tages-Anzeiger (TA, 1957). Fußgänger befürworten eine Untergrundbahn, 65(3):3.
- Tan, W. (2013). *Pursuing Transit-oriented Development: Implementations through institutional change, learning and innovation*. Amsterdam: Universiteit van Amsterdam.
- Tan, W. & Bertolini, L. (2010). Barriers to transit oriented developments in the Netherlands: A luxury problem. Presented at the AESOP congress, Helsinki, Finland.
- Taskforce Ruimtewinst (2014). *Taskforce Ruimte: assist Zuid-Kennemerland en IJmond*. Haarlem: Provincie Noord-Holland.
- Te Brömmelstroet, M. & Bertolini, L. (2010). Integrating land-use and transport knowledge in strategy-making. *Transportation*, 37(1), 85–104.
- Te Brömmelstroet, M. & Bertolini, L. (2011). The role of transport-related models in urban planning practice (introduction to the theme issue). *Transport Reviews*, 31(2), 139–143.
- Tennøy, A. (2010). Why we fail to reduce urban road traffic volumes: Does it matter how planners frame the problem?. *Transport Policy*, 17, 216 – 233.
- Tennøy, A., Hansson, L., Lissandrello, E. & Næss, P. (2016). How planners' use and nonuse of expert knowledge affect the goal achievement potential of plans: Experiences from strategic land use and transport planning processes in three Scandinavian cities. *Progress in Planning*, 109, 1-32.
- Tibudd, M. (2012). Kampf um jeden Millimeter. *Süddeutsche Zeitung*. Retrieved from <http://sz.de/1.1455640>
- Torfin, J. (2001). Path-dependent Danish welfare reforms: the contribution of the new institutionalisms to understanding evolutionary change. *Scandinavian Political Studies*, 24(4), 277-309.

- Truffer, B., Störmer, E., Maurer, M. & Ruef, A. (2010). Local strategic planning processes and sustainability transitions in infrastructure sectors. *Environmental Policy and Governance*, 20(4), 258–269.
- Truffer, B., Murphy, J.T. & Raven, R. (2015). The geography of sustainability transitions: contours of an emerging theme. *Environmental Innovation and Societal Transitions*, 17, 63–72.
- Überparteiliche Arbeitsgruppe Zürich-Nord (AGZN, 2013). *Zur Zukunft der Stadt im Glattal: Nennen wir sie Glattalstadt*. Retrieved from http://www.flughafenregion.ch/documents/Thesenpapier_Glattalstadt_Ueberparteiliche_AG_ZH_Nord_2013.pdf
- Uitvoeringsalliantie Centrum- en knooppuntontwikkeling (2010). *Centrum- en knooppuntontwikkeling ontrafeld*. Retrieved from www.deltametropool.nl/site/getfile.php?id=69
- Urry, J. (2004). The 'system' of automobility. *Theory Culture Society*, 21(4-5), 25–39.
- Urry, J. (2007). *Mobilities*. Cambridge: Polity Press.
- Valderrama Pineda, A. F. & Vogel, N. (2014). The Case of Personal Transportation and Urban Form in Copenhagen: 1947 to the Present. *Transfers*, 4(2), 4–22.
- Vergragt, P. J., & Brown, H. S., (2007). Sustainable mobility: from technological innovation to societal learning. *Journal of Cleaner Production*, 15, 1104–1115.
- Verkehrsplanungs- und Werkausschuss (1955, 11 November). *Niederschrift über die Sitzung des Verkehrsplanungs- und Werkausschusses* (B+R 2174). Stadsarchiv München, München.
- Vogel, H.J. (1960, 18 May). *Brief Vogel an Bockelmann OB Frankfurt a.M.* (B+R 3702) Stadsarchiv München, München.
- Vogel, H.J. (1961). Die Verkehrsprobleme der Großstadt. *Verkehr und Technik* 4/1961 (B+R 3361). Stadsarchiv München, München.
- Vogel, N. (2015). *Transition in the making: A critical dispute on urban transition processes toward sustainable mobility*. Aalborg: Department of Development and Planning, Aalborg University.
- Völklein, M. & Anlauf, T. (2011). Stad der Speichen. *Süddeutsche Zeitung*, Retrieved from <http://sz.de/1.1194530>
- Voogd, H & Woltjer, J. (2010). *Facetten van de Planologie*, Alphen a/d Rijn: Kluwer.
- Voß, J. & Kemp, R. (2006). Sustainability and Reflexive Governance: Introduction. In J-P. Voß, D. Bauknecht & R. Kemp (Eds.), *Reflexive Governance for Sustainable Development* (pp. 3–31). Cheltham: Edward Elgar.
- Voß, J.P., Bauknecht, D. & Kemp, R. (2006). 'Reflexive governance. A view on the emerging path. In: J-P. Voß, D. Bauknecht & R. Kemp (Eds.) *Reflexive Governance for Sustainable Development* (pp. 419–437). Cheltenham: Edward Elgar.

- Voß, J.-P., Smith, A. & Grin, J. (2009). Designing long-term policy: Rethinking transition management. *Policy Sciences*, 43(4), 275–302.
- Walder, H. (1961). Eine Warnung vor dem Zürcher Tiefbahnprojekt. *Tages-Anzeiger*, 69(28):3
- Wallenborn, J.K. (1967a, 13 December). *Die Münchner Stadtplanung im Aufbruch zur Stadtentwicklung* (B+R 3983). Stadtsarchiv München, München.
- Wallenborn, J.K. (1967b, 17 December). *Brief an OB Vogel* (B+R 3983). Stadtsarchiv München, München.
- Walter, P. (1952, 13 March). Paul Walter notiert. *Die Wochen Zeitung*.
- Watson, M. (2012). How theories of practice can inform transition to a decarbonised transport system. *Journal of Transport Geography*, 24, 488–496.
- Wegener, M., & Fürst, F. (1999). *Land-Use Transport Interaction: State of the Art*. Dortmund: IRPUdd.
- Whitmarsh, L. (2012). How useful is the Multi-Level Perspective for transport and sustainability research?. *Journal of Transport Geography*, 24(2), 483–487.
- Woodcock, J., Banister, D., Roberts, I., Prentice, A. & Edwards, P. (2007). Energy and transport. *The Lancet*, 370, 1078–1088.
- Wright Mills, C. (1959). *The social imagination*, New York: Oxford Press.
- Yin, R. (2008). *Case Study Research*, London: Sage.
- Zhu, M. (2007). *Kontinuität und Wandel städtebaulicher Leitbilder. Von der Moderne zur Nachhaltigkeit. Aufgezeigt am Beispiel Freiburg und Shanghai*. Doktorarbeit: TU Darmstadt.
- Ziebel, B. (1999). Perspektiven der Stadtentwicklung: Neue Attraktoren zwischen Stadt innen und Stadt aussen, in M. Koch & W.A. Schmid (Eds.), *Die Stadt in der Schweizer Raumplanung* (pp.129-133), Zürich: VDF Hochschulverlag.
- Zijlstra, T. & Avelino, F. (2012). A socio-spatial perspective on the car regime. In: F. Geels, R. Kemp, G. Dudley. & G. Lyons. (Eds.) *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport* (pp. 160-179). New York: Routledge.
- Zimniok, K. (1964). *Untersuchung zur Entwicklung der Massenverkehrsmittel in der Landeshauptstadt München, Teil4* (B +R 3746). Stadtsarchiv München, München.
- Zimniok, K. (1981). *Eine Stadt geht in den Untergrund. Die Geschichte der Münchner U- und S-Bahn im Spiegel der Zeit*, München:Heinrich Hugendubel.
- Zürcher Arbeitsgruppe für Städtebau (ZAS, 1960). *Beitrag der ZAS zur Generalverkehrsplanung und zur städtebaulichen Gestaltung des Sihlraumes*. Zürich.

- Zürcher Kantonalbank & Kanton Zürich (2011) *Kanton Zürich in Zahlen 2011*. Retrieved from http://www.zkb.ch/etc/ml/repository/prospekte_und_broschueren/corporate/zuerich_in_zahlen/zuerich_in_zahlen_2011_pdf.File.pdf
- Zürcher Woche (1953, 10 Juli). Zürich muss sich entscheiden!. *Zürcher Woche*, pp. 28.
- Zuidvleugel Stedenbaan (2014). *Poster Monitor 2014*, Retrieved from http://www.zuidelijkerandstad.nl/sites/www.zuidvleugel.nl/files/documenten/monitor_2014_poster_web_0.pdf

SAMENVATTING

Dit proefschrift richt zich op de vraag hoe het toepassen van theorieën en concepten uit het vakgebied van transitiestudies kan helpen om transformatieve verandering in stedelijke regio's beter te begrijpen en handvatten kan bieden om de urgente duurzaamheidsopgaven waar zij voor staan aan te pakken. Hierbij staat, in het bijzonder, de ruimtelijke ontwikkeling en mobiliteit centraal. Het proefschrift wordt uit drie stappen opgebouwd: het ontwikkelen van een heuristisch raamwerk, historische casestudies van ruimte- en mobiliteitstransities in de stedelijke regio's van München en Zürich en de ontwikkeling en toepassing van een reflectief planningsbenadering in de regio Amsterdam.

In transitiestudies vormen transities het onderzoeksobject. Deze kunnen worden beschouwd als gestructureerde maatschappelijke veranderingen als gevolg van veranderingen in op elkaar inwerkende systemen (Grin e.a., 2010, pp. 1). Juist dit soort maatschappelijke veranderingen krijgen in de planologie steeds meer aandacht, maar de conceptualisatie daarvan en de ontwikkeling van methoden en technieken om ze te bevorderen blijven achter. In transitiestudies is al veel onderzoek hiernaar. Zo kan transitiestudies de planologie goed aanvullen. Tegelijk, kan de planologie bijdragen aan de ontwikkeling van transitiestudies. Door de focus op de ruimte in de planologie ontstaan kansen om kennishiaten in de transitiestudies rondom de geografie van transities te adresseren. Hieronder wordt de aanleiding voor dit onderzoek geschetst, gevolgd door een uiteenzetting van de kennishiaten in de planologie en transitiestudies waaraan dit proefschrift een bijdrage beoogt te leveren. Vervolgens worden de onderzoeksvragen en de antwoorden daarop samengevat. Tot slot wordt ingegaan op de bijdragen van dit onderzoek aan de kennishiaten evenals mogelijke richtingen voor vervolgonderzoek.

Duurzaamheid als maatschappelijke en onderzoeksopgave

De opgave van de verduurzaming van de stedelijke regio vormt de concrete en urgente maatschappelijke aanleiding voor dit onderzoek. Stedelijke regio's worden steeds meer geconfronteerd met het duurzaamheidsvraagstuk, hetzij op milieugebied, hetzij op sociaal gebied. In vele steden wordt hier werk van gemaakt (zie paragrafen 1.1.1 en 1.1.2). De planologie, waar het bewerkstelligen van duurzame stedelijke mobiliteit centraal staat, vormt hierop geen uitzondering. Echter, ondanks aanhoudende aandacht kunnen slechts kleine verbeteringen worden waargenomen. In het kielzog van kritiek in de planologie op haar voorkeur om binnen bestaande structuren te werken in plaats van ze uit te dagen (Albrechts, 2005; Beauregard, 2005) wordt toenemende aandacht aan transformatieve verandering besteed. In de planologie zien wij dit terug in een verschuiving in het wetenschappelijk debat van een focus op welke ruimte- en mobiliteitsconcepten toegepast moeten worden om te verduurzamen zoals

knooppuntontwikkeling naar de vraag hoe de transformatieve verandering kan worden bewerkstelligd die nodig is om de duurzaamheidsopgave het hoofd te bieden (zie paragraaf 1.1.2). Uit recent onderzoek blijkt dat huidige conceptuele raamwerken en handelingswijzen vaak niet toereikend zijn. Als het om transformatieve verandering gaat slaat transformatief hier vooral op de uitkomst – een andere configuratie van het ruimte- en mobiliteitssysteem dan de huidige – in plaats van op het proces. Dit kan ook incrementeel zijn. Rondom transformatieve verandering in de planologie kunnen vier kennishiaten worden onderscheiden:

- 1) **Structurele kansen/uitdagingen:** exogene en systeem-interne veranderingen kunnen tot structurele kansen/uitdagingen leiden voor transformatieve verandering. Voorbeelden van het eerste zijn klimaatverandering of een economische crisis en van het tweede de toenemende tekortkomingen van autogerichte planningsbenaderingen. De aandacht voor dergelijke veranderingen als iets wat de ruimte schept voor het ontstaan van nieuwe werkwijzen is in de planologie toegenomen (Dudley & Richardson, 2000; Curtis & Low, 2002; Albrechts, 2005; Healey, 2007, pp. 276; Filion & McSpuren, 2009; Pflieger e.a., 2009; Healey, 2015). Echter, de conceptualisatie van structurele kansen en uitdagingen en kennis over hoe zij invloed uitoefenen blijft beperkt. Dit is van belang om te begrijpen waarom en hoe transformatieve verandering plaatsvindt en om strategieën te ontwikkelen om deze te bevorderen.
- 2) **Bottom-up maatschappelijke initiatieven:** in de planologie neemt de aandacht voor de rol van initiatieven van betrokken burgers en belangenorganisaties toe als aanjagers van transformatieve verandering (Clifford e.a., 2005; Bartholamew, 2007; Filion & McSpurren, 2007; Banister, 2008; Harris & Moore, 2013; Hormighausen & Tan, 2016). In transitie in het verleden hebben zij een doorslaggevende rol gespeeld door dominante paradigma's ter discussie te stellen, experimenten op te zetten en druk voor verandering uit te oefenen (bijvoorbeeld Blanc, 1993; Schmucki, 2001). Desondanks bestaat weinig kennis over hoe deze initiatieven invloed kunnen krijgen in relatie tot gevestigde actoren, de relatie tussen hun opkomst en structurele kansen en hun rol bij het consolideren van transformatieve verandering.
- 3) **De rol van de praktijken van huishoudens en bedrijven:** in de planologie vormen beleidsprocessen vaak het onderzoeksobject. Toch, de verduurzaming van het ruimte- en mobiliteitssysteem is afhankelijk van huishoudens en bedrijven die hun vestigings- en mobiliteitsgedrag veranderen. Hun praktijken zijn ingebed in de leefstijlen en voorkeuren

(Geels e.a. 2012). Zoals onderzoek naar praktijken (Shove & Walker, 2010; Shove e.a. 2015) laat zien, zou aandacht voor praktijken ons beter in staat kunnen stellen om transformatieve verandering te begrijpen.

- 4) **De doorwerking van nieuwe inzichten in de praktijk:** De hoeveelheid kennis over hoe de planologische praktijk zou moeten veranderen om transformatieve verandering te bevorderen in het licht van de complexiteit van het stedelijk sociaal systeem neemt alsmaar toe. Recent onderzoek richt zich op de vraag hoe met behulp van multi-actor kenniscocreatie leren en verandering in de praktijk kunnen worden bevorderd (Straatemeier e.a., 2010; Te Brömmelstroet, 2010; Tennøy, 2010; Næss, 2013; Soria e.a., 2016; Tennøy, 2016). Desondanks blijven twee uitdagingen bestaan: (a) het vinden van een manier om om te gaan met tegenstrijdige belangen die het mogelijk maakt om structurele kansen voor verandering te benutten; (b) het scheppen van een leeromgeving die in contact staat met de praktijk zonder dat gevestigde, en daardoor machtige, denk- en werkwijzen domineren.

Ruimte en schaal in transitiestudies

Kennis en inzichten uit het vakgebied van transitiestudies hebben de potentie om aan het adresseren van deze kennishiaten bij te dragen. Dit vakgebied richt zich op het vraagstuk van transformatieve veranderingen in zogenaamde socio-technische systemen. In socio-technische systemen, zoals het ruimte- en mobiliteitssysteem in de stedelijke regio, zijn technologie of fysieke artefacten met sociale structuren en praktijken verweven. Verandering in het ene gaat (vrijwel) altijd gepaard met verandering in het andere. Wanneer het ene niet verandert vindt verandering in het andere moeilijk plaats. Daarnaast hangt verandering in het systeem samen met exogene ontwikkelingen daarbuiten, in het zogenaamde landschap of met nieuwe structuren en praktijken in niches. Onderzoek naar stedelijke transities biedt tegelijk de gelegenheid om twee kennishiaten in transitiestudies (beter) te adresseren:

- 1) **De conceptualisatie van ruimte en schaal bij transities:** traditionele concepties van transities zijn gebaseerd op het meerlagenperspectief (MLP). Transities zijn het gevolg van wisselwerking tussen de drie lagen in dit perspectief: niche – nieuwe structuren en praktijken; regime – gevestigde structuren en praktijken in samenhangende domeinen zoals wetenschap, beleid en markten; en landschap – macro-ontwikkelingen op de lange termijn zoals klimaatverandering of economische conjunctuur (Geels & Schot, 2007). De aandacht voor de geografie van transities is in de afgelopen jaren toegenomen (Coenen e.a. 2012; Næss & Vogel, 2012; Raven e.a., 2012; Binz e.a., 2014; Hansen

& Coenen 2015; Murphy, 2015; Sengers & Raven, 2015; Truffer e.a., 2015; Affolderbach & Schulz, 2016). Ondertussen wordt erkend dat transitie afhankelijk zijn van de context waarin zij zich afspelen (Coutard & Rutherford, 2010; Coenen e.a., 2012) en dat daarmee rekening houden kan helpen om beter te begrijpen waarom en hoe zij plaatsvinden (Hansen & Coenen, 2015, pp. 104). Raven e.a. (2012) hebben een relationeel model ontwikkeld waar de lagen van het MLP op basis van verschillende soorten nabijheid worden gedefinieerd: lage nabijheid (niche), hoge nabijheid binnen een socio-technisch systeem (regime), hoge nabijheid over de grenzen van systemen heen (landschap). Empirisch onderzoek laat de meerwaarde van dit model zien als het gaat om netwerken tussen nicheactoren die de uitwisseling van ideeën tussen geografische gebieden bevorderen (bijvoorbeeld Sengers & Raven, 2015). Echter, het blijft nog beperkt. Aandacht is nodig voor: wat de relatie is tussen de verschillende soorten nabijheid, waarom en waartoe relaties tussen schaalniveaus belangrijk zijn en hoe het regime geografisch kan worden geconceptualiseerd (zie Hansen & Coenen, 2015).

- 2) **De conceptualisatie van stedelijke transitie:** de afgelopen jaren hebben critici op twee uitdagingen gewezen als het om het bestuderen van stedelijke transitie gaat. Ten eerste de gebouwde omgeving. Deze is stabiel dan andere technologieën (van Schaick & Klaasen, 2011), met als gevolg dat een veelvoud aan verschillende soorten artefacten uit diverse periodes van transitie naast elkaar blijven bestaan (Næss & Vogel, 2012). In sommige gevallen hebben deze ook een historische of culturele betekenis (Goss, 1988; Shove e.a., 2015). Hoewel het gebruik daarvan aanzienlijk kan veranderen (Shove e.a., 2015), is nog niet bekend hoe de gebouwde omgeving of infrastructuurnetwerken de koers van transitie beïnvloeden. Empirisch onderzoek in steden heeft zich vooral gericht op technische deelsystemen, zoals vervoerstechnologieën (bijvoorbeeld Sengers, 2016). Een tweede uitdaging is de afbakening van het systeem. In de stad zijn, door diverse netwerken en relaties, systemen nauw met elkaar vervlochten. Dit heeft als gevolg dat het voordeel van gerichte interventies zoals verhoogde dichtheden of verkeersmanagement teniet zouden kunnen worden gedaan door ontwikkelingen elders in de stad (Næss & Vogel, 2012). Kansrijker dan de focus op deelsystemen lijkt daarom een focus op de praktijken van huishoudens en bedrijven (zie Shove e.a., 2015).

Onderzoeksvragen en aanpak

Door de volgende hoofdvraag te beantwoorden beoogt dit proefschrift een

bijdrage te leveren aan de hierboven besproken kennishiaten maar ook praktische handvatten te leveren aan praktijkmensen die aan stedelijke transitie werken.

Hoe kan de conceptualisatie van het regionaal ruimte- en mobiliteitssysteem als een sociaal-technisch systeem bijdragen aan zowel het begrijpen van waarom en hoe transitie plaatsvindt als het bevorderen van hedendaagse transitiepogingen?

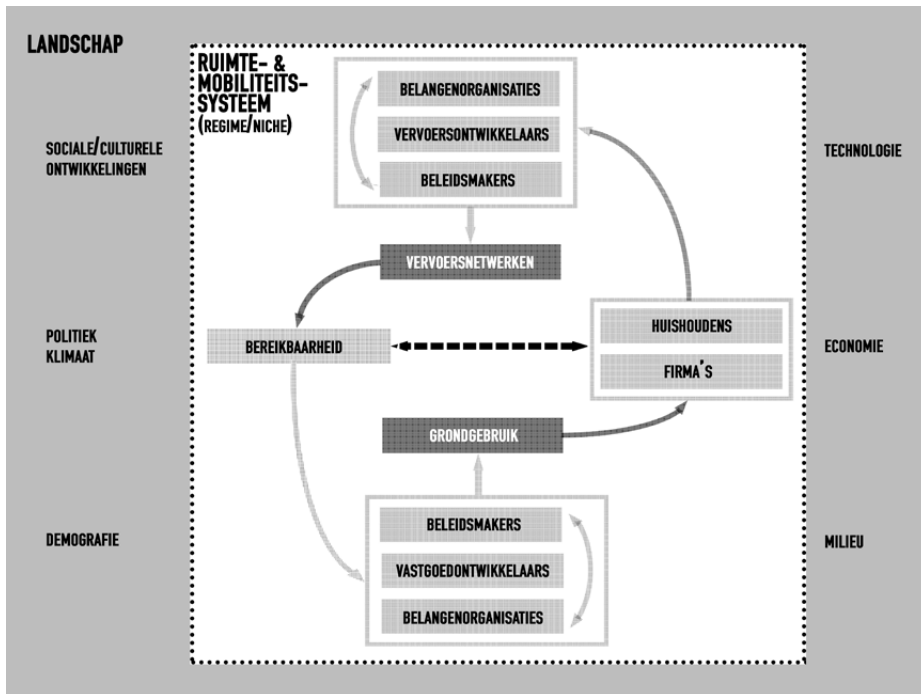
Deze vraag is uiteen gesplitst in de volgende drie deelvragen.

Hoe kan het regionaal ruimte- en mobiliteitssysteem als een sociaal-technisch systeem worden geconceptualiseerd?

Deze vraag is beantwoord door middel van een literatuurbeschouwing en theoretische synthese van transitieliteratuur evenals literatuur over de evolutie van het ruimte- en mobiliteitssysteem. Het heeft geresulteerd in een heuristisch raamwerk dat het ruimte- en mobiliteitsfeedbackcyclus (Bertolini, 2009; Wegener & Fürst, 1998) combineert met het MLP. Het ruimte- en mobiliteitssysteem bestaat uit structuren en daarmee samenhangende praktijken van verschillende soorten actoren. Meestal handelen actoren naar deze structuren, maar zij kunnen daarvan afwijken. Door dit handelen worden structuren gereproduceerd of veranderd. De actoren en de fysieke structuren, de zogenaamde artefacten, worden weergegeven in de grafische weergave van het raamwerk (zie onderstaande figuur). De overige structuren zijn:

- Regulatieve regels: gecodificeerde regels zoals wet- en regelgeving;
- Normatieve regels: taken, verplichtingen, verantwoordelijkheden, evenals gedragsregels en maatschappelijke rollen, zoals sociaal en organisatiekapitaal, gevestigde belangen, leefstijlen en financiële prikkels;
- Cognitieve regels: geloofssystemen, probleemdefinities en -agenda's en heuristieken die onbewust worden gebruikt en als gegeven worden beschouwd;
- Discoursen: het samenstel van ideeën, concepten en categorieën waardoor betekenis aan sociale en fysieke verschijnselen wordt verleend.

In de grafische weergave van het raamwerk wordt geen onderscheid gemaakt tussen regime en niche. In de niche zijn immers dezelfde soorten praktijken en structuren aanwezig als in het regime, maar zij zijn minder gestructureerd en daardoor vaak instabiel. Het landschap wordt gezien als bestaand uit quasi-autonome of, vanuit het perspectief van de actoren in het systeem gezien, exogene ontwikkelingen van cultuur of maatschappelijke voorkeuren, demografie,



Heuristisch raamwerk van het ruimte- en mobiliteit (op basis van Switzer e.a., 2013)

technologie, het politieke klimaat en de economie. In het raamwerk spelen de praktijken van huishoudens en bedrijven een centrale rol bij de ontwikkeling van het systeem. Gedurende meerdere decennia kan transitie plaatsvinden. Dit is het gevolg van het reflexief handelen van actoren en groepen en het samenspel tussen praktijken en structuren in niche en regime evenals ontwikkelingen in het landschap. Het toepassen van dit raamwerk om strategieën te ontwikkelen om een transitie naar betere afstemming tussen ruimtelijke ontwikkeling en verkeer en vervoer te bevorderen in de regio Amsterdam heeft zijn meerwaarde laten zien. Deze toepassing heeft nieuwe soorten oplossingen opgeleverd die zowel rekening houden met een bredere scala aan belangen als aansluiten op de veranderende praktijken van huishoudens en bedrijven. Bij de studie van historische transitie is dit model eveneens bruikbaar gebleken. Hiertoe is het concept van 'troubles' gebruikt om beter zicht te krijgen op de plekken waar druk op gevestigde structuren aan het toenemen is of kan ontwikkelen. Troubles zijn moeilijkheden die mensen aantreffen in het dagelijks leven. Een tweede toevoeging om de dynamiek van transitie te begrijpen is het concept van nabijheid. Het definiëren van regimes en niches op basis van nabijheid, waarvan geografische nabijheid maar één soort is, heeft het mogelijk gemaakt om de transitiedynamiek binnen en tussen geografische gebieden beter te begrijpen.

Waarom en hoe vindt transitie plaats in het regionaal ruimte- en mobiliteitssysteem?

Deze vraag is beantwoord door middel van een vergelijkende casestudie van ruimte- en mobiliteitstransities in de stedelijke regio's van München en Zürich in de periode sinds de Tweede Wereldoorlog. Deze regio's zijn gekozen om een drietal redenen:

- 1) Op basis van secundaire bronnen kunnen meerdere periodes van transitie sinds de Tweede Wereldoorlog worden onderscheiden: de eerste periode waar de modernisering van de stad en het opvangen van de auto snel werden omarmd gevolgd door een breuk daarmee rondom de jaren zeventig (tweede periode) en een kanteling van praktijken (regionalisering en toenemende fietsgebruik in München) sinds de jaren negentig, de derde periode. Het was van belang dat transities of transitiepogingen hadden plaatsgevonden om inzicht te krijgen in de mechanismes daarachter;
- 2) In beide regio's was de initiële toestand van het systeem vergelijkbaar;
- 3) Er is sprake van variatie van regionale en nationale context, wat het mogelijk maakte om rekening te houden met contextuele factoren.

Met behulp van het heuristisch raamwerk en de concepten die in deelvraag één zijn uiteengezet is in 2012 in beide gebieden kwalitatief onderzoek gedaan. Deze casestudies hebben geresulteerd in drie hypothesen over waarom transitie plaatsvindt:

H1: Veranderingen in de praktijken van huishoudens en bedrijven zorgen voor de druk die nodig is voor transitie zoals het zich manifesteert in het ontstaan van de foci van debat en conflict, oftewel troubles.

De mate waarin de druk om te veranderen ontstaat hangt voor een wezenlijk deel van veranderingen van de praktijken van huishouden en bedrijven af. Een voorbeeld is de eerste periode van transitie na de Tweede Wereldoorlog in beide casussen waar toenemend autogebruik en de suburbanisatie voor steeds zichtbaardere problemen zorgde omdat de verdeling van wegruimte in de steden grotendeels onveranderd bleef. In deze periode werd vaak gesproken van een verkeerschaos en heerste alomtegenwoordig grote druk om te veranderen. In de tweede periode van transitie vanaf de jaren zeventig zien wij weinig verandering in de praktijken van huishoudens en bedrijven, welke in samenhang staat met een beperkte mate van druk voor verandering.

H2: Belangenorganisaties duiden veranderingen in het landschap en in praktijken om structuren legitimiteit te verlenen en zodoende druk op het regime op te voeren.

De mate van druk hangt af van de weerklank van voorgestelde cognitieve regels met structuren of discoursen in het landschap of stabiele structuren in het regime.

Deze hypothese betekent dat druk van veranderende praktijken of van het landschap niet uit zichzelf ontstaat. Milieuvervuiling, schade aan de stad of het wegtrekken van bevolking moeten eerst geproblematiseerd worden voordat zij druk op gevestigde structuren en praktijken in het regime kunnen uitoefenen. Bijvoorbeeld in de jaren vijftig waren het journalisten en wetenschappers die de beperkte mate waarin de auto in de steden ruimte toegekend kreeg bekritiseerden. In de jaren zeventig waren het jonge architecten die de negatieve impact van het kritiekloos nastreven van de modernisering van de stad aan de kaak stelden tegen een achtergrond van de toenemende bewustwording van de negatieve invloed van het moderne leven. De casus van Zürich laat zien dat wat een probleem is afhangt van de weerklank met bredere discoursen en probleemdefinities. Voor de Tweede Wereldoorlog nam de druk toe om in te grijpen in de ruimtelijk ontwikkeling van de regio Zürich en Zwitserland als geheel. Na de oorlog is een kanteling waarneembaar op maatschappelijk niveau. In het licht van de toenemende spanningen tussen het Westen en het Oosten werd alles wat naar collectivisme rook in toenemende mate argwanend aangekeken. Als gevolg daarvan nam het draagvlak voor interventies in de grondmarkt af.

H3: De identiteit van de stad heeft een discursieve kracht die kan worden ingezet om praktijken en structuren te legitimeren of de-legitimeren.

In beide regio's zien wij, vooral in de periode vanaf de jaren zeventig, dat belangenorganisaties aanspraak maakten op de identiteit van de stad om de huidige praktijken ter discussie te stellen. In München ging het vooral om het veranderen van de fysieke identiteit van de stad. De modernisering werd soms die tweede *Zerstörung Münchens* genoemd. In Zürich daarentegen werd sociale identiteit van de stad als woonplaats onderwerp van discussie, naar aanleiding van de verdringing van inwoners door de toename van werkgelegenheid. Dit viel samen met het referendum over de U-Bahn, waarvan de plannen voor snelwegbouw en de modernisering van de stad afhankelijk waren. In het daaropvolgende referendum werd de gecombineerde U-/S-Bahn afgewezen. Hierdoor werden beleidsmakers gedwongen om hun oplossingsrichtingen en probleemdefinities ter discussie te stellen.

De vierde hypothese heeft te maken met hoe transities plaatsvinden en luidt:

H4: Het bereiken van gedeelde cognitieve regels maakt verandering in de interventies in artefacten op het niveau van het systeem mogelijk.

Een vergelijking tussen München en Zürich illustreert deze hypothese. In München zien wij dat een verandering van artefacten en daarbij een verdere versterking van een transitie in de eerste periode na de Tweede Wereldoorlog slechts mogelijk werd als er sprake was van een breed gedragen beeld (cognitieve regels) van de precieze soort interventies die in de gebouwde omgeving gepleegd moesten worden. In Zürich werd deze overeenstemming omtrent de bestaande stad nooit bereikt. Hierdoor bleven interventies in de gebouwde omgeving beperkt en grotendeels ad-hoc. In de regio was dit niet het geval. Hier werd de S-Bahn in combinatie met een uitgebreid snelwegennet gerealiseerd, hetgeen daar tot een verregaande transitie heeft geleid. Twee specificaties van deze hypothese gaan over hoe deze gedeelde cognitieve regels bereikt kunnen worden:

a) Regels die zowel conflict bevorderen als effectief zijn bij het oplossen daarvan versnellen het bereiken van gedeelde cognitieve regels.

De eerste periode van transitie in beide regio's laat dit goed zien. In München zorgden juridische richtlijnen en sociale normen ervoor dat afstemming moest plaatsvinden tussen diverse belangen om voortgang te boeken met de ontwikkelingen van het vervoersnetwerk. Dit zorgde aanvankelijk voor vertraging, maar door het uitgebreide debat en de pragmatische houding van actoren uiteindelijk voor plannen die beter rekening hielden met de complexiteit van de stad. Hierdoor waren zij uiteindelijk haalbaarder en konden zij op meer draagvlak rekenen. In Zürich was het ontbreken van initieel conflict het gevolg van een samenspel van een sterke wens om snelle voortgang te maken, regels en normen die minder interactie noodzakelijk maakten tussen verschillende instanties en aanpassingen van regels om snelle besluitvorming mogelijk te maken. Vervolgens stuitten de plannen echter op haalbaarheidsproblemen en nam kritiek toe met tijdrovende wijzigingen als gevolg. In beide steden zien wij gevallen waar conflict tot patstellingen heeft geleid. Pragmatisme en de bereidheid om verder te kijken dan kortetermijnbelangen en belangen te herdefiniëren zijn net zo belangrijk om voortgang te maken. Voorbeelden hiervan zijn de bereidheid van de gemeente in München om een geplande ondergrondse verbinding over te laten aan de Deutsche Bundesbahn om voortgang te maken met ondergronds openbaar vervoer of het aanpakken van verkeer- en vervoersproblemen als geheel in plaats van een smalle focus op het maximaliseren van parkeerplekken.

- b) Belangencoalities zijn een manier om druk uit te oefenen om veranderingen in cognitieve regels op hogere schaalniveaus te realiseren.*

Het ontwikkelen van allianties rondom gedeelde belangen is een effectieve manier om druk uit te oefenen op actoren in andere sectoren of op andere schaalniveaus. Zo kan met hiërarchische verhoudingen worden omgegaan om consensus tussen schaalniveaus te bereiken. Een voorbeeld hiervan zijn de coalities die opgericht zijn door de burgemeester van München en collega burgemeesters om druk op de landelijke besluitvorming uit te oefenen.

Hoe kan de conceptualisatie van het ruimte- en mobiliteitssysteem als een sociaal-technisch systeem geïntegreerd worden in een planningsbenadering om transitiepogingen te ondersteunen?

Deze vraag werd beantwoord door een planningsbenadering gericht op het bevorderen van tweede-orderreflexiviteit en het toepassen daarvan in het planproces rondom knooppuntontwikkeling in de regio Amsterdam. Dit werd gedaan met een serie van vier workshops in de periode 2011 tot 2014 gehouden met niche-actoren en progressieve actoren in gevestigde organisaties zoals overheden, belangenorganisaties, vervoers – en vastgoedontwikkelaars. Bij tweede-orderreflexiviteit gaat het om het ontwikkelen van oplossingen voor hardnekkige uitdagingen die de onbedoelde, of onverwacht extreme, neveneffecten zijn van oplossingen voor eerdere problemen zonder dat nieuwe neveneffecten ontstaan. Het heuristisch raamwerk ontwikkeld als antwoord op de eerste deelvraag werd gebruikt om reflectie van deelnemers te structureren. De benadering kent vier stappen die iteratief kunnen plaatsvinden:

- 1) **De ontwikkeling van een toekomstvisie** van het ruimte- en mobiliteitssysteem. Deze kan als een oriëntatiepunt dienen voor reflectie en de uitwerking van gewenste veranderingen in het systeem. In de casus Amsterdam was de visie een systeem waar functies geconcentreerd zijn rondom goed bereikbare knooppunten in het vervoersnetwerk op regionaal niveau zodat in de mobiliteit een duurzaam balans bereikt wordt tussen individuele en collectieve kosten en baten (zie 5.4.1).
- 2) **Systeemanalyse.** Het heuristisch raamwerk is gebruikt om de volgende te identificeren: barrières, zoals het verdienmodel van gemeenten; bedreigingen, zoals afnemende vraag naar kantoorruimte; kansen, zoals afnemende vraag naar suburbane woonmilieus en neutrale ontwikkelingen, zoals de opkomst van collectief particulier opdrachtgeverschap in de woningbouw. Deze ontstaan wanneer niche, regime en landschap (niet) veranderen.

- 3) **Herdefiniëren van structuren en praktijken.** Dit vond plaats in twee stappen en beoogt congruente oplossingen te ontwikkelen die aan de behoeften van centrale stakeholders voldoen. Ten eerste zijn strategieën ontwikkeld die rekeninghouden met of benutten de barrières, bedreigingen, kansen en ontwikkelingen die geïdentificeerd zijn in de systeemanalyse. Er waren vijf soorten: (1) financiële raamwerken zoals een integraal verdienmodel voor gemeenten; (2) governance-strategieën, zoals een faciliterende rol voor de overheid; (3) juridische raamwerken, zoals een vergroot instrumentarium voor gemeenten om ontwikkeling te sturen; (4) de combinatie van kennis, zoals de integratie van kennis over bereikbaarheid in het vestigingsbeleid; en (5) vraagmanagement. Vervolgens zijn strategieën ontwikkeld op het niveau van een OV-corridor en een station langs de lijn. Deze richten zich op de functionele mix langs en profilering langs de lijn evenals op de governance zoals multi-stakeholderplatforms om station- en corridorontwikkeling te faciliteren.
- 4) **Assessment van strategieën.** Hier is gebruik gemaakt van interdisciplinaire kennis, in dit geval van verkeerskunde, planologie en transitiestudies, om te reflecteren op bijdragen van voorgestelde interventies aan het langetermijndoel van verduurzaming.

Al bleef de toepassing van deze benadering beperkt tot een reeks van vier workshops verspreid over een jaar lijkt de benadering kansrijk. Het is vernieuwend in de planologie door de combinatie van abstracte reflectie en concrete interventies en de ruimte geboden aan nieuwe actoren.

Bijdragen aan kennishiaten en toekomstige onderzoeksrichtingen

Achtereenvolgens worden de bijdragen aan de vier kennishiaten in de planologie rondom transformatieve verandering en aan de twee kennishiaten in transitiestudies besproken. Bij enkele van deze hiaten worden richtingen voor vervolgonderzoek uiteengezet.

- 1) **Structurele kansen/uitdagingen:** De introductie van de lagen van het MLP heeft een preciezere operationalisering van deze kansen en uitdagingen mogelijk gemaakt. De bruikbaarheid daarvan was terug te zien in de benadering ontwikkeld ter beantwoording van de derde deelvraag. Zo konden deelnemers systematisch relevante ontwikkelingen identificeren in de drie lagen en in andere systemen. De historische casestudies hebben een kanttekening geplaatst bij het belang daarvan. Dit staat niet vooraf vast, maar hangt van de weerklang met probleemdefinities en de framing van problemen af.

In zowel Zürich als München waren de troubles waaruit de hoogste druk voortvloeide van lokale aard en sloten aan op stabiele structuren, bijvoorbeeld de waarde van de stad of de rol van de staat. Voor de praktijk betekent dit dat het belangrijk is om een verbinding te leggen tussen grote maatschappelijke en lokale uitdagingen op een wijze die ze tastbaar maakt.

- 2) **Bottom-up maatschappelijke initiatieven:** Dit onderzoek laat het belang van initiatieven of niches zien bij de totstandkoming van transformatieve verandering in de stad. Dat gezegd hebbende zijn de grenzen van niches vaak vager dan soms wordt aangenomen. In Zürich en München waren niches ook vertegenwoordigd binnen gevestigde organisaties zoals politieke partijen of gemeentelijke diensten. Daarbinnen oefenden ze invloed uit. Dit pleit voor een afbakening van niches op basis van nabijheid in termen van de drie soorten regels. Daarnaast kunnen niche (en regime) het lokaal niveau overstijgen. Coalities tussen lokale niches kunnen belangrijk zijn om druk uit te oefenen voor verandering. In twee opzichten is dit van belang voor de praktijk: (1) samenwerking tussen actoren in gevestigde en nieuwe organisaties kan de kans op verandering vergroten. De kennis van nieuwe actoren kan tot nieuwe inzichten bij actoren in gevestigde organisaties leiden, terwijl actoren in deze organisaties een belangrijke rol kunnen spelen om het draagvlak voor verandering van binnen te vergroten; (2) coalities met gelijkgezinden in andere geografische locaties kan, mede in het licht van het toenemende belang van supranationale besluitvorming, tot verhoogde druk op bestaande structuren en praktijken leiden. In vervolgonderzoek verdient dit aspect meer aandacht.
- 3) **De rol van de praktijken van huishoudens en bedrijven:** De expliciete focus hierop heeft het mogelijk gemaakt om beter te begrijpen hoe de druk ontstaat die tot stedelijke transitie leidt. De benadering en de aandacht voor de behoeften van centrale stakeholders evenals de sociologische en culturele betekenis van praktijken, bijvoorbeeld rondom fietsen of 'slow living', zijn een goed begin. Toch zou meer en interdisciplinaire onderzoeks aandacht voor hoe praktijken veranderen het mogelijk maken om transitie beter te begrijpen en om effectievere transitie strategieën te ontwikkelen.
- 4) **De doorwerking van nieuwe inzichten in de praktijk:** De reflexieve planingsbenadering ontwikkeld ter beantwoording van de derde deelvraag laat zien hoe planning, door beter aan te sluiten op maatschappelijke ontwikkeling en door vanzelfsprekende structuren en praktijken ter discussie te stellen zou kunnen bijdragen aan

het ontwikkelen van oplossingen voor de duurzaamheidsopgave. Het neemt de behoeften van actoren als het uitgangspunt en richt zich op het collectief wegen van belangen om verder te reiken dan kortetermijnbelangen die transformatieve verandering kunnen verhinderen.

Al lijkt de benadering veelbelovend, er bestaan vier aandachtspunten voor vervolgonderzoek:

- a. *Interdisciplinariteit en werkvormen.* In de benadering bleef de interdisciplinariteit beperkt tot het betrekken van planologen, transitieonderzoekers en verkeerskundigen en was het soort werkvormen eveneens beperkt. Per stap is een rijk palet aan methoden en technieken beschikbaar dat verder verkend kan worden (zie 6.4.4);
- b. *Tegenstrijdige belangen en macht.* Het werk met de benadering bleef beperkt tot een vroeg stadium. De historische transitie bestudeerd ter beantwoording van de tweede deelvraag laten zien dat transitie een omstreden en politiek proces is dat vak geïnitieerd wordt door nieuwe actoren. Recente experimenten met gevestigde actoren (zie Majoor e.a., 2017; Hooijer e.a., 2017) laten zien welke uitdagingen zich kunnen voordoen rondom macht wanneer er gewerkt wordt met deze actoren. Bestaande rolverhoudingen, procedures en werkwijzen kunnen een gevaar kunnen vormen voor gezamenlijke pogingen om te leren en experimenteren. Deze vraagstukken krijgen in transitiestudies steeds meer aandacht (zie 6.4.4). Zodat benaderingen zoals de reflexieve planningsbenadering besproken hier daadwerkelijk kunnen bijdragen aan transitie moeten nieuwe werkwijzen worden ontwikkeld om met macht en tegenstrijdige belangen om te gaan;
- c. *Legitimiteit.* Alhoewel de planningsbenadering meer participatief is dan traditionele benaderingen, bestaat het risico op gedwongen of vrijwillige uitsluiting van bepaalde actoren. De opgave is om ervoor te zorgen dat diegenen van wie de tijd, middelen of belangstelling ontbreekt nog vertegenwoordigd zijn en dat rekening gehouden wordt met algemene maatschappelijke belangen die niet aanwezig zijn in het deel van de stad waarin gewerkt wordt. Zoals in transitiestudies is benadrukt moeten vraagstukken van de legitimiteit onderdeel van het ontwerp en experimenten zijn (zie 6.4.4).

Daarnaast blijven er twee algemene aandachtspunten. Ten eerste, het belang van deze experimenten bij de reconfiguratie van het socio-technische systeem of als aanjager van bredere systeemtransities en, ten tweede, het opschalen van nieuwe structuren en praktijken (vgl. Bulkeley e.a., 2015, pp. 23, 241).

De conceptualisatie van ruimte en schaal bij transities

De bevindingen van dit onderzoek staven die van de reeds besproken studies als het gaat om de plaatspecificiteit van stedelijke transities. De troubles die ontstonden waren lokaal van aard, evenals de argumenten die de troubles frameden, regimes en aspecten van het landschap (demografie, cultuur en economische ontwikkeling). Het concept van nabijheid biedt een bruikbare manier om een onderscheid te maken tussen de structuratielagen van het MLP en geografische schaalniveaus en om de uitwisseling van ideeën en de uitoefening van macht tussen plekken en tussen niche en regime te volgen. Bijvoorbeeld de uitwisseling van ideeën waar er al sprake was van cognitieve of sociale nabijheid, zoals over de verkeersplanning tussen de VS, Duitsland en Zwitserland, of de uitoefening van macht tussen schaalniveaus, zoals is besproken in de toelichting op de specificatie b van de vierde hypothese. Toch lijkt de daadwerkelijke invloed van stromen van ideeën door netwerken op de koers van transities beperkt. In de historische casestudies was het veel eerder het geval geweest dat grote besluiten op basis van regionale of landelijke debatten plaatsvonden en dat nieuwe ideeën van elders de uitwerking daarvan beïnvloedden, zoals bijvoorbeeld bij de keuzes rondom de binnenstedelijke aanleg van snelwegen in Zürich. Om beter zicht op de precieze invloed van stromen van ideeën door netwerken te krijgen is verder onderzoek nodig. Het gaat om de vraag of de bewustwording van troubles vooral een lokale aangelegenheid is of dit beïnvloed wordt door deze bovenlokale uitwisselingen.

De conceptualisatie van stedelijke transities

Rondom de rol van artefacten heeft dit onderzoek laten zien dat het normatieve belang van de gebouwde omgeving is om bepaalde praktijken en structuren te legitimeren (zie hypothese 3). Het gaat hier om de identiteit van de stad oftewel de historische en culturele waarde van de gebouwde omgeving, de plaatselijke sociaaleconomische samenstelling en de economische ontwikkeling. Toch bleef het relatief belang van een aanspraak hierop beperkt. De argumenten die gebruikt werden sloegen alleen aan wanneer er sprake was van weerklank met veranderingen van discoursen of cognitieve regels in de samenleving. Bijvoorbeeld de weerklank van argumenten voor modernisering met het groeidiscours in de eerste periode van transitie of argumenten om veranderingen in het karakter van de stad te beperken met toenemende kritiek op een eenzijdige focus op groei ten koste van het milieu, gezondheid en levenskwaliteit in de

tweede periode. Met betrekking tot transitiepaden zien wij dat het bij stedelijke transitie vaker gaat om een verandering van het gebruik van artefacten dan het vervangen daarvan. Experimenten en initiatieven die wij zijn tegengekomen in de historische transitie richten zich meer op verandering van het gebruik van artefacten dan puur de ontwikkeling van nieuwe technologieën. Een tweede bijdrage van dit onderzoek betreft de afbakening van het systeem. Dit onderzoek zag veranderingen in praktijken als het startpunt en volgde daarmee samenhangende veranderingen in structuren. Zodoende kan een transitie gezien worden als meer dan een verandering van vervoerstechnologieën of toenemende dichtheden, maar eerder een samenhangende verandering van regels, artefacten, discoursen en de praktijken van huishoudens, bedrijven en andere actoren.

ZUSAMMENFASSUNG

Diese Dissertation beschäftigt sich mit der Frage, wie die Anwendung von Theorien und Konzepten aus dem Bereich der Transitionsstudien sowohl dabei helfen kann, transformative Veränderungen in städtischen Regionen besser zu verstehen, als auch als Hilfestellung dienen kann, um die Transition mit dem Ziel die dringliche Herausforderungen im Bereich der Nachhaltigkeit, mit denen diese Regionen konfrontiert werden, konkret umzusetzen. Insbesondere stehen die Siedlungsentwicklung und der Verkehr im Mittelpunkt der Betrachtung. Diese Arbeit besteht aus drei Teilen: Erstens, die Entwicklung eines heuristischen Rahmens, zweitens, historische Fallstudien von Siedlungs- und Verkehrstransitionen in den Stadtregionen München und Zürich und, drittens, die Entwicklung und Anwendung einer reflexiven Planungsvorgehensweise in der Amsterdamer Region. Transitionen als Objekte der Forschung können als strukturierte gesellschaftliche Veränderungen bezeichnet werden, die infolge von Veränderungen in zusammenhängenden und sich gegenseitig bedingenden Systemen stattfinden (Grin *et al.*, 2010, pp. 1). Genau derartige gesellschaftliche Veränderungen ziehen im Forschungsbereich der Raumplanung vermehrt Aufmerksamkeit auf sich, aber ihre Konzeptualisierung und die Entwicklung von Methoden und Techniken um diese Veränderungen zu befördern, bleiben zurück. Viele der Studien zu Transitionen setzen sich aber gerade damit auseinander. Auf diese Art und Weise können die Transitionsstudien die Raumplanung gut ergänzen. Gleichzeitig kann die Raumplanung zur Entwicklung von Transitionstudien beitragen. Indem die Raumplanung sich auf räumliche Fragen fokussiert, besteht die Chance bestehende Wissenslücken in den Transitionstudien bezüglich der Geografie von Transitionen zu füllen. Weiter unten wird der Anlass diese Arbeit skizziert und es werden die Wissenslücken in der Raumplanung und den Transitionstudien dargelegt, zu denen diese Arbeit einen Beitrag zu leisten beabsichtigt. Danach werden die Forschungsfragen und die zugehörigen Antworten und Ergebnisse zusammengefasst. Abschließend werden die Beiträge dieser Arbeit zu den festgestellten Wissenslücken und hinsichtlich möglicher künftiger Forschungsziele erörtert.

Nachhaltigkeit als gesellschaftliche Herausforderung und Aufgabe der Forschung

Die nachhaltige Gestaltung der städtischen Region stellt den konkreten und dringlichen gesellschaftlichen Anlass dieser Arbeit dar. Diese Regionen werden immer häufiger mit Herausforderungen der Nachhaltigkeit konfrontiert, entweder im Umweltbereich, oder im Bereich des Sozialen. In vielen Städten werden bereits zahlreiche konkrete Schritte unternommen (siehe Abschnitt 1.1.1 und 1.1.2). Die Raumplanung, bei der die Verwirklichung nachhaltiger urbaner Mobilität im Mittelpunkt steht, stellt hier keine Ausnahme dar. Allerdings und trotz anhaltender gesellschaftlicher Aufmerksamkeit, lassen

sich in diesem Bereich nur kleine Fortschritte beobachten. Wesentliche hierzu geäußerte Kritik in der Raumplanung ist, dass diese es bevorzugt innerhalb bestehender Strukturen zu arbeiten, anstatt diese grundsätzlich herauszufordern (Albrechts, 2005; Beauregard, 2005) ; daher wird transformativer Veränderung eine wachsende Aufmerksamkeit entgegengebracht. In der Raumplanung sehen wir eine Verlagerung des Schwerpunktes der Debatte weg von Siedlungs- und Mobilitätskonzepten die zwecks der Nachhaltigkeit angewendet werden sollen, beispielsweise *transit-oriented development* (zu Deutsch: ÖPNV-orientierte Siedlungsentwicklung), hin zu der Verwirklichung der transformativen Veränderungen die notwendig ist der Herausforderung der Nachhaltigkeit die Stirn zu bieten (siehe Abschnitt 1.1.2). Anhand neuer Forschungsergebnisse zeigt sich, dass die derzeitigen konzeptionellen Rahmen und Vorgehensweisen oft nicht genügen. Wenn von transformativer Veränderung die Rede ist, bezieht sich transformativ hier vor allem auf die Ergebnisse - eine andere Konfiguration des Siedlungs- und Verkehrssystems als die aktuelle - und nicht auf die Prozesse. Diese können auch inkrementell sein. Bezüglich transformativer Veränderung lassen sich in der Raumplanung vier wesentliche Wissenslücken unterscheiden.

- 1) **Strukturelle Chancen und Herausforderungen:** Exogene und system-interne Einflüsse können strukturelle Chancen bzw. Herausforderungen für transformative Veränderung herbeiführen. Beispiele für exogene Faktoren sind der Klimawandel oder eine Wirtschaftskrise und für system-interne Faktoren die wachsenden Unzulänglichkeiten der autogerechten Stadtplanung. Die Aufmerksamkeit, wie derartige Veränderungen Möglichkeiten schaffen können für die Entwicklung neuer Vorgehensweisen, hat sich in der Raumplanung in den letzten Jahren verstärkt entwickelt (Dudley & Richardson, 2000; Curtis & Low, 2002; Albrechts, 2005; Healey, 2007, pp. 276; Filion & McSpuren, 2009; Pflieger *et al.*, 2009; Healey, 2015). Allerdings bleibt die Konzeptualisierung struktureller Chancen und Herausforderungen und das Wissen darüber, wie sie Einfluss ausüben, beschränkt. Dies ist jedoch wichtig, will man verstehen warum und wie transformative Veränderung stattfindet und Strategien entwickeln, um diese zu befördern.
- 2) **Gesellschaftliche bottom-up Initiativen:** In der Raumplanung nimmt die Aufmerksamkeit für die Rolle von Initiativen engagierter Bürger und von Interessenverbänden als Treiber transformativer Veränderung zu (Clifford *et al.*, 2005; Bartholamew, 2007; Filion & McSpurren, 2007; Banister, 2008; Harris & Moore, 2013; Hormighausen & Tan, 2016). Weil diese Initiativen dominante Paradigmen zur Debatte stellen, Experimente organisieren und Veränderungsdruck ausüben, haben sie in vergangenen Transitionen eine entscheidende Rolle gespielt (z.B. Blanc, 1993; Schmucki, 2001). Trotzdem

ist wenig darüber bekannt, wie diese Initiativen Einfluss erwerben, insbesondere im Vergleich zu etablierten Akteuren, über die Beziehung zwischen ihrem Aufstieg und den strukturellen Chancen und über ihre Rolle bei der Konsolidierung struktureller Veränderung.

- 3) **Die Rolle der Praktiken von Haushalten und Unternehmen:** In den Planungswissenschaften stellen Politikprozesse oft das Forschungsobjekt dar. Doch die nachhaltige Entwicklung des Siedlungs- und Verkehrssystems hängt davon ab, ob Haushalte und Unternehmen ihr Ansiedlungs- und Mobilitätsverhalten ändern. Ihre Praktiken sind eingebettet in Lebensstile und Präferenzen (Geels *et al.*, 2012). Wie Praktikenforschung zeigt (Shove & Walker, 2010; Shove *et al.*, 2015) könnte mehr Aufmerksamkeit für Praktiken es uns ermöglichen transformative Veränderung besser zu verstehen.
- 4) **Der Impact neuer Einsichten in der Praxis:** Das Wissen darüber, wie die Planungspraxis sich verändern sollte, um transformative Veränderung, im Licht der Komplexität des städtischen sozialen Systems, zu fördern wächst allmählich. Jüngste Forschungen beschäftigen sich mit der Frage, wie, mit Hilfe von Multi-Akteur-Wissens-Kokreation, -das voneinander Lernen und Veränderung in der Praxis- gefördert werden können (Straatemeier *et al.*, 2010; Te Brömmelstroet, 2010; Tennøy, 2010; Næss, 2013; Soria *et al.*, 2016; Tennøy, 2016). Trotzdem bestehen zwei Forschungsaufgaben fort: (a) Die Entwicklung einer Vorgehensweise, um mit gegensätzlichen Interessen umzugehen, damit es möglich wird strukturelle Chancen für Veränderung zu nutzen; (b) die Schaffung einer Lernumgebung, die in Verbindung steht mit der Praxis, ohne dass etablierte, und dadurch mächtige, Denk- und Handlungsweisen dominieren.

Raum und Maßstabebene in Transitionstudien

Das Wissen und die Einsichten aus dem Forschungsbereich der Transitionstudien haben das Potential zur Füllung obenstehender Wissenslücke beizutragen. In diesem Fachgebiet befasst man sich mit der Frage transformativer Veränderungen in sogenannten soziotechnischen Systemen. In soziotechnischen Systemen, wie dem stadtreionalen Siedlungs- und Verkehrssystem, sind Technologien oder physische Artefakte mit Sozialstrukturen verflochten. Veränderung in einem Bereich geht (fast) immer mit Änderungen anderenorts einher. Wenn ein Bereich sich nicht verändern kann oder will, findet Änderung in dem anderen nur schwerlich statt. Außerdem hängt Veränderung im System mit exogenem Wandel zusammen, in der sogenannten Landschaft oder mit neuen Strukturen und Praxen in Nischen. Forschung über städtische Transitionen bietet somit gleichzeitig die Gelegenheit, zwei Wissenslücken der Transitionstudien (besser) zu füllen.

- 1) **Die Konzeptualisierung von Raum und Maßstabsebenen bei Transitionen:** Traditionelle Konzeptualisierungen von Transitionen basieren auf der Mehrebenenperspektive (Multi-level perspective, MLP). Transitionen gehen aus der Wechselwirkung zwischen den drei Ebenen der MLP hervor: Nische (1.) - neue Strukturen und Praktiken; Regime (2.) – etablierte Strukturen und Praktiken in zusammenhängenden Domänen; und Landschaft (3.) - langfristiger Wandel wie der Klimawandel oder die wirtschaftliche Konjunktur (Geels & Schot, 2007). In den letzten Jahren haben sich Transitionsforscher in zunehmendem Maße der Geografie von Transitionen gewidmet (Coenen *et al.*, 2012; Næss & Vogel, 2012; Raven *et al.*, 2012; Binz *et al.*, 2014; Hansen & Coenen 2015; Murphy, 2015; Sengers & Raven, 2015; Truffer *et al.*, 2015; Affolderbach & Schulz, 2016). Mittlerweile wird anerkannt, dass Transitionen kontextbedingt sind (Coutard & Rutherford, 2010; Coenen *et al.*, 2012) und dass die Berücksichtigung des Kontextes uns besser verstehen lässt, warum und wie sie stattfinden (Hansen & Coenen, 2015, pp. 104). Raven *et al.* (2012) haben ein relationales Modell entwickelt, in dem die Ebenen der MLP auf Grund verschiedener Arten von Nähe definiert werden: niedrige Nähe (Nische), hohe Nähe innerhalb eines soziotechnischen Systems (Regime), hohe Nähe über Systemgrenzen hinweg (Landschaft). Empirische Forschungen zeigen den Mehrwert dieses Modells, welches Netzwerke zwischen Nischenakteuren betrachtet, welche den Austausch von Ideen zwischen geografischen Gebieten fördern (z.B. Sengers & Raven, 2015). Doch es ist begrenzt. Einige Fragen bestehen fort: Was ist die Beziehung zwischen den verschiedenen Arten von Nähe, wieso und wozu sind Beziehungen zwischen den Maßstabsebenen wichtig und wie können die Regime geografisch konzeptualisiert werden (sehen Sie Hansen & Coenen, 2015).
- 2) **Die Konzeptualisierung städtischer Transitionen:** In den letzten Jahren haben Kritiker auf zwei Forschungsaufgaben bezüglich städtischer Transitionen hingewiesen. Erstens, die bebaute Umgebung. Diese ist stabiler als andere Technologien (van Schaick & Klaasen, 2011), mit der Folge, dass eine Vielzahl verschiedenen Arten von Artefakten aus verschiedenen Transitionsperioden neben einander fortbestehen (Næss & Vogel, 2012). In einigen Fällen sind diese auch historisch oder kulturell bedeutend (Goss, 1988; Shove *et al.*, 2015). Obschon ihre Verwendung sich stark verändern kann (Shove *et al.*, 2015), ist noch nicht bekannt wie die bebaute Umgebung oder Infrastrukturnetze den Lauf von Transitionen beeinflussen können. Empirische Forschung in Städten hat sich bisher vor allem mit technischen Teilsystemen, wie zum Beispiel den Verkehrstechnologien, auseinandergesetzt (z.B. Sengers, 2016). Die

Begrenzung des Systems stellt die zweite Herausforderung dar. In der Stadt sind, wegen der Verschiedenheit an Netzwerken und Beziehungen, alle Systeme eng mit einander verflochten. Dies hat zur Folge, dass die Vorteile gezielter Interventionen, wie Verdichtung oder Verkehrsmanagement, aufgehoben werden können durch Entwicklung in anderen Teilen der Stadt (Næss & Vogel, 2012). Deswegen scheint ein Fokus auf die Praktiken der Haushalte und Unternehmen (siehe Shove *et al.*, 2015) aussichtsreicher als ein enger Fokus auf Teilsysteme.

Forschungsfragen und Vorgehen

Diese Dissertation leistet dadurch einen Beitrag, die obenstehenden Wissenslücken zu füllen, indem sie nachstehende Hauptfrage beantwortet. Zudem beabsichtigt sie die Unterstützung von Praktikern, die an städtische Transitionen arbeiten.

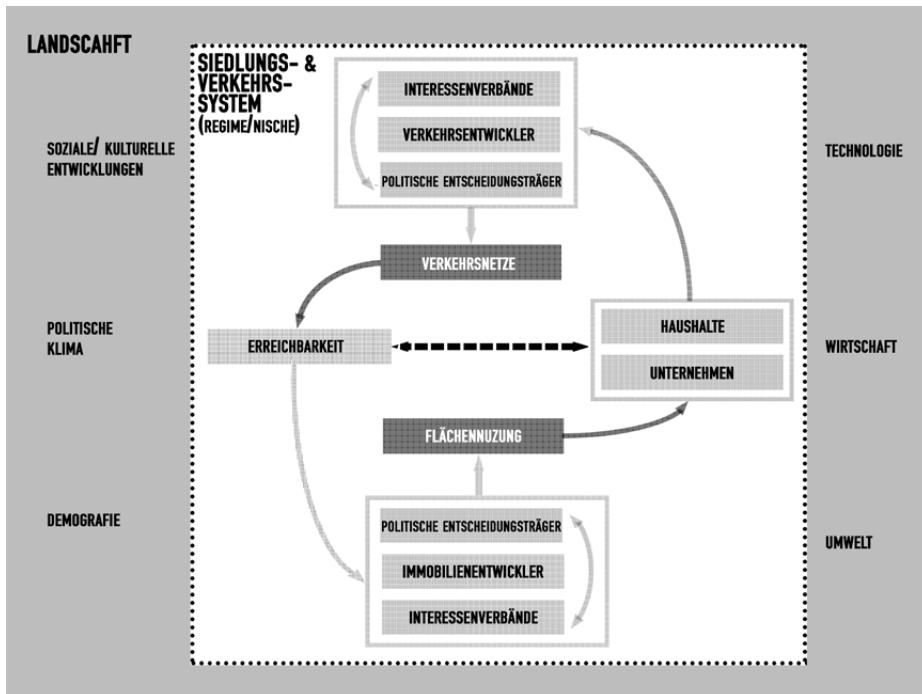
Wie kann die Konzeptualisierung des stadtreionalen Siedlungs- und Verkehrssystems als ein soziotechnisches System einen Beitrag dazu leisten, sowohl zu verstehen, warum und wie Transition stattfindet, als auch die gegenwärtigen praktischen Versuche von Transition zu fördern?

Anhand nachstehender Teilfragen wird die Hauptfrage beantwortet.

Wie kann das stadtreionale Siedlungs- und Verkehrssystem als ein sozialtechnisches System konzipiert werden?

Mittels einer Literatursauswertung und einer theoretischen Synthese der Literatur von Transitionstudien und der Literatur zur Evolution des Siedlungs- und Verkehrssystems wurde diese Frage beantwortet. Das Ergebnis ist ein heuristischer Rahmen, der den Regelkreis von Siedlungsentwicklung und Verkehr (Bertolini, 2009; Wegener & Fürst, 1998) mit der MLP kombiniert. Das Siedlungs- und Verkehrssystem besteht aus Strukturen und den damit zusammenhängenden Praktiken verschiedener Akteure. Meist handeln Akteure innerhalb dieser Strukturen, aber sie können davon auch abweichen. Durch dieses Handeln werden Strukturen reproduziert oder verändert. Die Akteure und die physikalischen Strukturen, die sogenannte Artefakte, sind wiedergegeben in der grafischen Darstellung des Rahmens (siehe nachstehende Darstellung). Die übrigen Strukturen sind:

- Regulative Regeln: kodifizierte Regeln, wie Gesetze und Anordnungen
- Normative Regeln: Aufgaben, Pflichten, Verantwortlichkeiten,



Heuristisches Rahmen des Siedlungs- und Verkehrssystems (nach Switzer *et al.*, 2013)

sowie Verhaltensregeln, gesellschaftliche Rollen (z.B. soziales und Organisationskapital, etablierte Interessen, Lebensstile und finanzielle Anreize);

- Kognitive Regeln: Glaubenssysteme, Problemdefinitionen und –agenden und Heuristiken, die unbewusst angewendet werden und als Faktum angesehen werden;
- Diskurse: die Gefüge von Ideen, Konzepten und Kategorien mit denen soziale und physikalische Erscheinungen ihre Bedeutung erhalten.

In der grafischen Darstellung des Rahmens wird nicht zwischen Regime und Nische unterschieden. In der Nische gibt es schließlich gleichartige Strukturen und Praxen wie im Regime, aber sie sind weniger strukturiert und dadurch oft instabil. Die Landschaft wird aus der Sicht von Akteuren im System als quasi-autonom betrachtet. Sie besteht aus exogenem Wandel von Kultur oder gesellschaftlichen Präferenzen, der Demografie, Technologie, dem politischen Klima und der Wirtschaft. Im heuristischen Rahmen wird den Praktiken von Haushalten und Unternehmen eine bedeutende Rolle bei der Entwicklung des Systems zugeschrieben. Während mehrerer Jahrzehnte kann eine Transition stattfinden. Diese ist die Folge des reflexiven Handelns von Akteuren und

Gruppen und des Zusammenspiels zwischen Praktiken und Strukturen in der Nische und dem Regime sowie einem Wandel der Landschaft. Die Anwendung des Rahmens, um Strategien zur Förderung einer Transition zur besseren Abstimmung zwischen Siedlung und Verkehr zu entwickeln, hat in der Amsterdamer Region seinen Mehrwert bewiesen. Dieses Vorgehen hat zu neuen Lösungsansätzen geführt, die sowohl eine breite Reihe von Interessen berücksichtigen, als auch an die sich verändernden Praktiken von Haushalten und Unternehmen anschließen. Bei historischen Fallstudien war dieses Modell auch von Nutzen. Zwecks historischer Forschung ist das Konzept von ‚troubles‘ angewendet worden, um die Stellen, an denen Druck auf etablierte Strukturen wächst oder sich entwickeln kann, besser zu lokalisieren. Troubles sind Schwierigkeiten, die Menschen in ihrem alltäglichen Leben vorfinden. Eine zweite Ergänzung des Rahmens, um die Dynamik von Transitionen besser zu verstehen, ist das Konzept der Nähe. Die Definition von Regimen und Nischen auf Grund der Nähe, von der geografische Nähe nur eine Art ist, hat es ermöglicht, Transitionsdynamiken sowohl innerhalb von als auch zwischen geografischen Gebieten besser zu verstehen.

Warum und wie findet Transition im stadtregionalen Siedlungs- und Verkehrssystem statt?

Mittels einer vergleichenden Fallstudie von Siedlungs- und Verkehrstransitionen in den städtischen Regionen München und Zürich in der Periode seit dem zweiten Weltkrieg wurde diese Frage beantwortet. Diese Regionen sind auf dreierlei Gründen ausgewählt worden:

- 1) Auf Grundlage sekundärer Quellen lassen sich mehrere Transitionsperioden seit dem zweiten Weltkrieg unterscheiden: die erste Periode, in der die Modernisierung der Stadt und die Anpassung ans Auto begrüßt werden, gefolgt von einem Bruch in den siebziger Jahren (zweite Periode) und die dritte Periode; eine erneute Änderung von Praktiken (Regionalisierung und wachsende Fahrradnutzung in München) seit den neunziger Jahren. Um Einsicht in die zugrunde liegenden Mechanismen zu erhalten, war es wichtig, dass Transitionen oder Transitionsversuche stattgefunden hatten;
- 2) In beiden Regionen war die initiale Lage des Systems vergleichbar;
- 3) Die nationalen und regionalen Kontexte sind unterschiedlich, was es ermöglicht kontextuelle Faktoren zu berücksichtigen.

Mithilfe des heuristischen Rahmens und der Konzepte, welche in der ersten Teilfrage erörtert wurden, hat in 2012 in beiden Fällen eine qualitative Forschung vor Ort stattgefunden. Diese Fallstudien ergaben drei Hypothesen darüber, warum Transition stattfindet.

H1: Veränderungen der Praktiken von Haushalten und Unternehmen führen zu dem für Transitionen notwendigen Druck, wie dieser sich in den Schwerpunkten von Debatte und Konflikt, beziehungsweise Troubles manifestiert hat.

Das Maß, in dem Veränderungsdruck entsteht, hängt im Wesentlichen davon ab, wie die Praktiken von Haushalten und Unternehmen sich verändern. Ein Beispiel ist die erste Transitionsperiode nach dem Zweiten Weltkrieg mit einer wachsenden Pkw-Nutzung und Suburbanisierung, die zu stets sichtbarer werdenden Problemen führte, weil die Verteilung im Straßenraum unverändert blieb. In dieser Periode war oft von einem Verkehrschaos die Rede und es herrschte überall ein großer Veränderungsdruck. In der zweiten Transitionsperiode ab den Siebzigern ist nur eine geringe Veränderung der Praktiken von Haushalten und Unternehmen zu beobachten, was dann in Zusammenhang mit einem geringen Änderungsdruck steht.

H2: Interessenverbände deuten Veränderungen in der Landschaft und in den Praktiken, um Strukturen zu legitimieren und somit Druck auf das Regime zu erhöhen.

Das Maß des Drucks hängt von der Resonanz vorgestellter kognitiver Regeln mit Strukturen oder Diskursen in der Landschaft oder stabilen Strukturen im Regime ab.

Diese Hypothese bedeutet, dass Druck von sich verändernden Praktiken oder der Landschaft nicht aus sich selbst entsteht. Umweltverschmutzung, Schaden an der Stadt, der Wegzug von Einwohnern müssen erst von Akteuren problematisiert werden, bevor sie Druck auf etablierte Strukturen und Praktiken im Regime ausüben können. In den Fünfzigern kritisierten beispielsweise Journalisten und Wissenschaftler den fehlenden Platz für das Auto. In den Siebzigern, vor einem Hintergrund wachsender Bewusstwerdung der negativen Folgen des modernen Lebensstils, prangerten junge Architekten die nachteiligen Folgen des kritiklosen Strebens nach einer Modernisierung der Stadt an. Der Fall Zürich zeigt, wie sehr die Wahrnehmung eines Problems von der Resonanz in einem breiteren Diskurs und dessen Problemdefinitionen abhängig ist. Vor dem Zweiten Weltkrieg wuchs der Druck in die Siedlungsentwicklung in der Zürcher Region und in der Schweiz einzugreifen um der schnellen Verstädterung Schranken zu setzen. Nach dem Krieg ist eine Wende auf gesellschaftlicher Ebene zu beobachten. Im Licht der zunehmenden Spannungen zwischen Westen und Osten wurde alles, was den Anschein des Kollektivismus besaß, in zunehmender Maße argwöhnisch angesehen. Folglich verringerte sich die Unterstützung für staatliche Interventionen im Bodenmarkt.

H3: Die Identität der Stadt besitzt eine diskursive Kraft, die angewendet werden kann, um Praktiken und Strukturen zu legitimieren oder zu delegitimieren.

In beiden Regionen können wir vor allem in der Periode ab den Siebzigern beobachten, dass Interessenverbände Anspruch auf die Identität der Stadt erhoben und die geltenden Praktiken zur Diskussion stellten. In München beschäftigten sie sich vor allem mit der sich verändernden physikalischen Identität der Stadt. Die Modernisierung wurde gelegentlich die zweite Zerstörung Münchens genannt. In Zürich hingegen wurde die soziale Identität der Stadt als Wohnort zur Debatte gestellt, anlässlich der Verdrängung von Einwohnern als Folge der wachsenden Beschäftigung. Dies fiel zusammen mit einer Abstimmung zur kombinierten U-/S-Bahn, von der die Pläne zum Bau der *Expressstrassen* (Stadtautobahnen) und zur Modernisierung der Stadt abhingen. An den Wahlurnen wurde die U-/S-Bahn vom Volk abgelehnt. Dadurch wurden die politischen Entscheidungsträger dazu gezwungen, erneut ihre Lösungsansätze und Problemdefinitionen zu überdenken.

Die vierte Hypothese bezieht sich auf die Frage, wie Transitionen stattfinden und lautet:

H4: Das Erreichen geteilter kognitiver Regeln ermöglicht Veränderung der Interventionen in Artefakten auf Systemebene.

Ein Vergleich der Fälle München und Zürich veranschaulicht diese Hypothese. In München wurde eine Änderung von Artefakten, und damit eine weitere Stärkung der Transition in der ersten Periode nach dem Zweiten Weltkrieg erst möglich, als die präzise Konzeptualisierung von Interventionen (kognitive Regeln) in die bebaute Umgebung eine breite Unterstützung fand. In Zürich wurde ein derartiger Konsens bezüglich der bestehenden Stadt nie erreicht. Dadurch bleiben die Interventionen in die gebaute Umgebung beschränkt und größtenteils ad-hoc. In der Region München war das nicht der Fall. Dort wurde die S-Bahn in Zusammenhang mit einem umfangreichen Autobahnnetz verwirklicht, was zu einer weitgehenden Transition geführt hat. Zwei Spezifikationen dieser Hypothese beziehen sich darauf, wie geteilte kognitive Regeln erreicht werden können:

a) Regeln die sowohl konfliktfördernd als auch bei ihrer Lösung effektiv sind, beschleunigen das Erreichen geteilter kognitiver Regeln.

Die erste Transitionsperiode in beiden Regionen veranschaulicht diese Spezifikation. In München bewirkten gesetzliche Richtlinien und soziale Normen, dass zwischen unterschiedlichen Interessen abgestimmt werden musste, damit ein Fortschritt bei der Entwicklung des Verkehrsnetzes erzielt werden konnte. Anfänglich führte dies zu Verzögerungen, aber wegen der ausführlichen Debatte und der pragmatischen Haltung von Akteuren berücksichtigen die Pläne letzten Endes besser die Komplexität der Stadt. Dadurch waren sie realisierbarer und konnten mit breiterer Unterstützung rechnen. In Zürich war das Fehlen initialer Konflikte die Folge eines starken Wunsches zügigen Fortschritt zu erzielen. Regeln und Normen die weniger Interaktion zwischen verschiedenen Instanzen erforderten und Anpassungen an Regeln, damit der Entscheidungsprozess beschleunigt werden konnte führten hierzu. Anschließend stießen die Pläne auf Probleme der Realisierbarkeit und wuchs die Kritik, was zeitraubenden Änderungen zur Folge hatte. In beiden Städten existierten Fälle, in denen Konflikte zu einer Pattsituation geführt haben. Pragmatismus einerseits und die Bereitschaft weiter vorzuschauen und Interessen dabei neu zu definieren, ist genauso wichtig um Fortschritt zu erzielen. Beispiele dessen sind die Bereitschaft der Stadt München, die geplante unterirdische Verbindung der Deutschen Bundesbahn zu überlassen, um einen Fortschritt beim unterirdischen ÖPNV zu erzielen, oder das integrale Angehen von Verkehrsproblemen in Zürich, anstatt eng auf die Maximierung von Parkplätzen zu fokussieren.

b) Interessenkoalitionen sind eine Weise, um Druck zur Verwirklichung von Veränderungen kognitiver Regeln auf höheren Maßstabebenen auszuüben.

Die Entwicklung von Allianzen ist eine effektive Weise, Druck auf Akteure in anderen Sektoren oder auf andere Maßstabebenen auszuüben. Damit kann mit hierarchischen Verhältnissen umgegangen werden, um Konsens zwischen Akteuren auf verschiedenen Maßstabebenen zu erzielen. Die Koalitionen, die vom Münchener Oberbürgermeister und seinen Kollegen gegründet worden sind, um Druck auf Entscheidungsprozesse auf Bundesebene in Bezug auf die Finanzierung von öffentlichem Nahverkehr auszuüben stellen ein Beispiel dar.

Wie kann die Konzeptionierung des Siedlungs- und Verkehrssystems als ein soziotechnisches System in eine Planungsvorgehensweise zur Unterstützung von Transitionsversuchen integriert werden?

Diese Frage wurde mit der Entwicklung einer Planungsvorgehensweise, die die Förderung von Reflexivität zweiter Ordnung und ihre Anwendung in

der Amsterdamer Region in einem Planungsprozess zur Transit-oriented Development untersucht, beantwortet. Die Anwendung fand in einer Serie von vier Workshops in der Periode von 2011 bis 2014 statt, in der Nische-Akteure und progressive Akteure aus etablierten Organisationen, wie Behörden, Interessenverbänden, Verkehrs- und Immobilienentwicklern involviert waren. Bei der Reflexivität zweiter Ordnung handelt es sich um die Entwicklung von Lösungen für Herausforderungen, die unbeabsichtigte, oder unerwartet extreme, Nebenwirkungen von Lösungen von früheren Problemen darstellen, ohne dass dadurch neue Nebenwirkungen auftreten. Der heuristische Rahmen, entwickelt zur Beantwortung der ersten Teilfrage, wurde zur Strukturierung der Reflektion der Teilnehmer angewendet. Die Vorgehensweise besteht aus vier Schritten, die iterativ stattfinden können:

1) Die Entwicklung eines Leitbilds des Siedlungs- und Verkehrssystems.

Dies kann als Orientierungspunkt bei der Reflektion und der weiteren Ausarbeitung der erwünschten Veränderungen des Systems dienen. Im Falle Amsterdams war das Leitbild ein System, in dem Funktionen um gut erreichbare Verkehrsknotenpunkte auf regionaler Ebene herum konzentriert sind, damit ein nachhaltiges Gleichgewicht zwischen individuellen und kollektiven Kosten und Nutzen erreicht wird (siehe 5.4.1).

2) Systemanalyse. Der heuristische Rahmen wurde zur Identifikation folgender Punkte angewendet: Barrieren, wie das Erlösmodell von Kommunen; Bedrohungen, wie die sinkende Nachfrage nach Bürofläche; Chancen, wie die abnehmende Nachfrage nach suburbanen Wohnumgebungen und neutrale Entwicklungen, wie der Aufstieg von Bauherrengemeinschaften. Chancen entstehen, wenn Nische, Regime und Landschaft sich (nicht) verändern.

3) Neudefinierung von Strukturen und Praktiken. Dies fand statt in zwei Etappen und beabsichtigt die Entwicklung kongruenter Lösungen, die den Bedürfnissen zentraler Beteiligten entsprechen. Erstens sind Strategien entwickelt worden, die die bei der Systemanalyse identifizierten Barrieren, Bedrohungen, Chancen und Entwicklungen berücksichtigen oder nutzen. Das ergab vier Arten von Strategien: (1) finanzielle Rahmen, wie ein integrales kommunales Erlösmodell; (2) Governance-Strategien, wie eine unterstützende Rolle durch die Regierung; (3) juristische Rahmen, wie ein vergrößertes kommunales Instrumentarium zur Lenkung der Siedlungsentwicklung; (4) Die Kombination von Wissen, wie die Integration von Wissen über Erreichbarkeit in die Standortpolitik; und (5) Nachfragemanagement. Danach sind von den Teilnehmern Strategien entwickelt worden auf der Ebene eines schienengebunden ÖPNV-Korridors

und einer Haltestelle an dieser Linie. Diese Strategien richten sich auf die funktionelle Zusammensetzung und Profilierung der Haltestellen an der Linie entlang sowie auf die Governance. Beispiel sind Plattformen zur Unterstützung der Entwicklung von Haltestellen und des Korridors, in denen alle Beteiligten maßgeblich in die Entscheidungsfindung einbezogen sind.

- 4) **Die Evaluation und Bewertung der Strategien.** Dazu ist verschiedenes Fachwissen zur Anwendung gekommen, in diesem Fall von Verkehrsingenieuren, Raumplanern und Transitionsforschern. Ziel war es, die Beiträge der vorgeschlagenen Interventionen an dem langfristigen Ziel der nachhaltigen Entwicklung zu messen.

Obwohl diese Anwendung der vorgestellten Vorgehensweise sich auf eine Serie von vier Workshops beschränkte, erscheint sie vielversprechend. Innovativ in der Raumplanung war sowohl die Kombination abstrakter Reflektion und konkreter Interventionen als auch die Einbeziehung neuer Akteure wie die obengenannten Nischen-akteure.

Beiträge zur Schließung der Wissenslücke und künftige Forschungsfragen

Nachfolgend werden die Beiträge anhand der vier Wissenslücken in der Raumplanung bezüglich transformativer Veränderung und bezüglich der zwei Wissenslücken der Transitionstudien erörtert. Einige davon bieten Richtungen für Folgeforschung die hier besprochen werden.

- 1) **Strukturelle Chancen/Herausforderungen:** Die Aufnahme der Ebenen der MLP in den heuristischen Rahmen hat eine genauere Operationalisierung dieser Chancen und Herausforderungen ermöglicht. Ihre Brauchbarkeit veranschaulicht sich bei der Beantwortung der dritten Teilfrage. So konnten Teilnehmer systematisch relevante Entwicklungen auf den drei Ebenen identifizieren, sowie in anderen Systemen. Die historischen Fallstudien haben zu einer wichtigen Beobachtung geführt. Die Bedeutung von Chancen und Herausforderung steht nicht im Voraus fest, sondern kommt auf die Resonanz mit Problemdefinitionen und das Framing von Problemen an. Sowohl in Zürich als auch in München waren die ‚troubles‘, aus denen das Höchstmaß an Druck hervorging, lokaler Art und sie schließen an stabile Strukturen, beispielsweise den Wert der Stadt, oder die Rolle des Staates, an. Für die Praxis bedeutet dies, dass es wichtig ist eine Verbindung zwischen den großen gesellschaftlichen und den lokalen Herausforderungen herzustellen, auf eine Art und Weise, die ihre Verbindungen nachvollziehbar machen.

- 2) **Gesellschaftliche bottom-up Initiativen:** Diese Arbeit zeigt die Bedeutung von Initiativen oder Nischen bei der Verwirklichung transformativer Veränderung in der Stadt. Allerdings ist die Begrenzung von Nischen oft verschwommener als manchmal angenommen wird. In Zürich und München waren Nischen auch innerhalb etablierter Organisationen, wie politischer Parteien und der Stadtverwaltung vertreten. Dort übten sie ihren Einfluss aus. Dies spricht für eine Begrenzung von Nischen auf Grund der Nähe bezüglich kognitiver, normativer und regulativer Regeln. Daneben können Nische und Regime die lokale Maßstabsebene übersteigen. Koalitionen zwischen lokalen Nischen können von Bedeutung sein bei der Ausübung von Veränderungsdruck. In zweierlei Hinsicht ist dies für die Praxis wichtig: (1) Zusammenarbeit zwischen Akteuren in etablierten und neuen Organisationen kann die Chance auf Veränderungen vergrößern. Das Wissen neuer Akteure kann zu neuen Einsichten bei Akteuren in etablierten Organisationen führen, während Akteuren in etablierten Organisationen eine bedeutende Rolle zukommt bei der Vergrößerung der Unterstützung für Veränderungen von innen; (2) Koalitionen mit Gleichgesinnten in anderen geografischen Gebieten kann, auch im Hinblick auf die wachsende Bedeutung supranationaler Entscheidungsprozesse, zum erhöhten Druck auf etablierte Strukturen und Praktiken führen. In der Folgeforschung sollte diesen Aspekten mehr Aufmerksamkeit entgegengebracht werden.
- 3) **Die Rolle von Praktiken von Haushalten und Unternehmen:** Der nachdrückliche Fokus hierauf, hat es ermöglicht besser zu verstehen wie der Druck, der zu urbanen Transitionen führt, entsteht. Die Vorgehensweise und die Aufmerksamkeit, die sie den Bedürfnissen zentraler Beteiligten sowie der soziologischen und kulturellen Bedeutung von Praktiken wie Radfahren oder ‚Slow Living‘ schenkt, sind ein guter Anfang. Doch könnte mehr und interdisziplinäre Forschung nach der Frage wie Praktiken sich verändern, es ermöglichen Transitionen noch besser zu verstehen sowie effektive Transitionsstrategien zu entwickeln.
- 4) **Die Impact von neuen Einsichten in der Praxis:** Die reflexive Planungsvorgehensweise entwickelt zur Beantwortung der dritten Teilfrage zeigt wie die Raumplanung, indem sie besser an den gesellschaftlichen Wandel anschließt und indem sie selbstverständliche Strukturen und Praktiken zur Debatte stellt, einen Beitrag zur Entwicklung von Lösungen der Nachhaltigkeitsherausforderungen leisten könnte. Die Vorgehensweise nimmt die Bedürfnisse von Akteuren als Ausgangspunkt und richtet sich darauf, Interessen kollektiv abzuwägen, um weiter zu blicken als die kurzfristigen Interessen, die transformativer Veränderung im Wege stehen können. Auch wenn die Vorgehensweise vielversprechend erscheint, gibt es doch vier Schwerpunkte für Folgeforschung:

- a. *Interdisziplinarität und Methoden.* Bei der Vorgehensweise beschränkte sich die Interdisziplinarität auf die Einbeziehung von Raumplanern, Transitionsforschern und Verkehrsingenieuren und waren die Methoden begrenzt. Per Schritt besteht eine breite Palette von Methoden und Techniken, mit denen weiter experimentiert werden kann (siehe 6.4.4.);
- b. *Widersprüchliche Interessen und Macht.* Die praktische Arbeit mit der erprobten Vorgehensweise hört in einem frühen Stadium auf. Die historischen Transitionen, erforscht zur Beantwortung der zweiten Teilfrage, zeigen dass eine Transition ein umstrittener und politischer Prozess ist, der oft von neuen Akteuren initiiert wird. Aus jüngeren Experimenten mit etablierten Akteuren (siehe Majoor *et al.*, 2017; Hooijer *et al.*, 2017) gehen eine Zahl von Herausforderungen in Bezug auf Macht hervor, die eintreten können, wenn mit diesen Akteuren gearbeitet wird. Bestehende Rollenverteilungen, Prozeduren und Methoden können eine Gefahr bilden für gemeinsame Versuche, zu lernen und zu experimentieren. Diesen Fragen wird in Transitionstudien inzwischen wachsende Aufmerksamkeit entgegengebracht (siehe 6.4.4). Damit Vorgehensweisen, wie die hier besprochenen, tatsächlich zur Transition beitragen können, sind neue Methoden zu entwickeln, um mit Macht und widersprüchlichen Interessen umzugehen.
- c. *Legitimität.* Obschon die Planungsvorgehensweise ein höheres Maß von Partizipation als herkömmliche Vorgehensweisen ermöglicht, besteht ein Risiko eines erzwungenen oder freiwilligen Ausschlusses bestimmter Akteure. Die Aufgabe besteht darin dafür zu sorgen, einerseits, dass diejenigen, denen die Zeit, Mittel oder das Interesse fehlen, dennoch vertreten sind und andererseits, dass breitere gesellschaftliche Interessen, die nicht vertreten sind in dem Teil der Stadt, in dem gerade gearbeitet wird, auch Berücksichtigung finden. Ein Beispiel der breiteren gesellschaftlichen Interessen ist der Bau von Wohnraum im Falle eines überspannten städtischen Wohnungsmarktes. Wie in Transitionstudien betont wird, müssen Fragen der Legitimität auch Gegenstand von Entwürfen und Experimenten sein (siehe 6.4.4).

Dazu bestehen zwei allgemeine Themen fort. Erstens, die Bedeutung dieser Experimente bei der Rekonfiguration des soziotechnischen Systems oder als Antreiber breiterer Systemtransitionen, und, zweitens, das Upscaling neuer Strukturen und Praktiken (vgl. Bulkeley *et al.*, 2015, pp. 23, 241).

Die Konzeptualisierung von Raum und Maßstabsebenen bei Transitionen

Die Ergebnisse dieser Arbeit bestätigen die bereits angesprochenen Studien, was die Kontextbedingtheit städtischer Transitionen angeht. Die ‚troubles‘, die sich ergaben waren lokaler Art, sowie die Argumente, die diese Troubles

framten. Auch die Regime und Aspekte der Landschaft (Demografie, Kultur und wirtschaftlicher Wandel) können als lokal betrachtet werden. Das Konzept der Nähe bietet eine nützliche Weise zwischen den Strukturebenen der MLP und geografischen Maßstabsebenen zu unterscheiden, sowie den Austausch von Ideen und die Ausübung von Macht zwischen Orten und zwischen Nische und Regime zu verfolgen. Beispiele sind der Austausch von Ideen, wo schon von kognitiver und sozialer Nähe der Rede war, wie zwischen Verkehrsplanern in den USA, Deutschland und der Schweiz, oder die Ausübung von Macht zwischen Maßstabsebenen, wie bereits besprochen bei der Erläuterung von Spezifikation b der vierten Hypothese. Doch scheint der tatsächliche Einfluss von Ideenflüssen über Netzwerke auf den Lauf von Transitionen eher begrenzt. In den historischen Fallstudien war es eher der Fall, dass große Entscheidungen auf Grund regionaler oder nationaler Debatten getroffen wurden und dass neue Ideen von anderswo ihre Ausarbeitung beeinflussten, wie zum Beispiel bei den Entscheidungen zur Gestaltung der Zürcher *Expressstrassen*. Um zu einer besseren Einsicht in den genauen Einfluss von Ideenflüssen über Netzwerke zu gelangen, ist weitere Forschung notwendig. Die Frage ist, ob die Bewusstwerdung von ‚troubles‘ vor allem eine lokale Angelegenheit ist oder ob diese vom Austausch auf höheren Maßstabsebenen beeinflusst wird.

Die Konzeptualisierung städtischer Transitionen

In Bezug auf die Rolle von Artefakten hat diese Arbeit die normative Bedeutung der bebauten Umgebung bei der Legitimierung bestimmter Praktiken und Strukturen aufgezeigt (siehe Hypothese 3). Wichtig war vor allem die Identität der Stadt, beziehungsweise der historische und kulturelle Wert der bebauten Umgebung, der lokale sozioökonomische Zusammensetzung und wirtschaftliche Entwicklung der Stadt. Doch bleibt die relative Bedeutung des Erhebens von Anspruch darauf eher beschränkt. Die Argumente die eingesetzt wurden kamen nur gut an, wenn die Rede von Resonanz mit Veränderungen von Diskursen oder mit kognitiven Regeln in der Gesellschaft war. Ein erstes Beispiel ist die Resonanz von Argumenten für die Modernisierung mit dem Wachstumsdiskurs in der ersten Transitionsperiode. In der zweiten Periode stellt die Resonanz von Argumenten zur Hemmung der Veränderungen des Charakters der Stadt mit der wachsenden Kritik auf einen einseitigen Wachstumsfokus auf Kosten der Umwelt, Gesundheit und Lebensqualität ein weiteres Beispiel dar. In Bezug auf Transitionspfade sehen wir, dass es sich bei urbanen Transitionen öfter um eine andere Verwendung von Artefakten handelt als um ihre Ersetzung. Experimente und Initiativen in historischen Transitionen, denen wir begegnet sind, beschäftigten sich mehr mit der Veränderung der Verwendung von Artefakten als pur mit der Entwicklung neuer Technologien. Ein zweiter Beitrag dieser Arbeit hat mit der Begrenzung des Systems zu tun.

Sie betrachtet Veränderungen von Praktiken als den Startpunkt einer Transition und verfolgt die damit im Zusammenhang stehenden Veränderungen von Strukturen. Somit kann eine Transition gesehen werden nicht nur als eine Veränderung von Transporttechnologien oder erhöhte Dichten, sondern eher als eine zusammenhängende Veränderung von Regeln, Artefakten, Diskursen und die Praktiken von Haushalten, Unternehmen und anderen Akteuren.

SUMMARY

This thesis focuses on the question of how the application of theories and concepts from transition studies can aid in better understanding transformative change in urban areas and support attempts to address the urgent sustainability issues they are confronted with. In doing so, it concentrates on transport and land-use in particular. This thesis consists of three parts: the development of a heuristic framework, historic case studies of transport and land-use transitions in the urban regions of Munich and Zürich and the development and application of a reflexive planning approach in the region of Amsterdam. In transition studies transitions are the object of study. These can be seen as structured societal changes resulting from changes in intertwined systems that support each other (Grin *et al.*, 2010, pp. 1). Exactly this type of societal changes is receiving increasing attention in planning studies, but their conceptualisation and the development of methods and techniques to support them are lagging behind. In transition studies, considerable research has been carried out dealing with these issues. As such, transition studies can contribute to planning studies. At the same time planning has the potential to contribute to the development of transition studies. The focus on space in planning studies offers the chance to address knowledge gaps in transitions with regard to the geography of transitions. Below, the motivation for this research is discussed, followed by a discussion of the knowledge gaps in (transport) planning and transition studies to which this dissertation aims to contribute. Subsequently, the research questions and the answers to them are considered. Finally, the contributions of this research on the knowledge gaps and possible avenues for future research are examined.

Sustainability as a societal and research challenge

The challenge of making urban regions more sustainable was the concrete and urgent societal motivation for this research. Urban regions are increasingly confronted with the issue of sustainability, both in terms of the environment and society. Many cities have undertaken action to address this (see sections 1.1.1 and 1.1.2). Transportation planning, where the realisation of sustainable urban mobility is at the forefront of attention, is no exception. Despite continued attention, only limited improvements can be observed. In the wake of criticisms of its focus to on working within existing structures instead of challenging them (Albrechts, 2005; Beauregard, 2005), attention for transformative change in urban planning is increasing. In transport planning this can be seen in a shift in the scientific debate from a focus on the transport and land-use concepts that should be applied to improve sustainability (e.g. Transit-oriented development) towards the question how the transformative change that is necessary to meet the sustainability challenge can be brought about (see paragraph 1.1.2). Recent research shows that incumbent conceptual frameworks and approaches are insufficient. When discussing transformative change transformative primarily

concerns the outcome – a different configuration of the transport and land-use system that the current one – rather than the process. This can be more or less incremental. In planning, a number of knowledge gaps surrounding transformative change can be distinguished.

- 1) **Structural chances/challenges:** exogenous and system internal changes can result in structural chances or challenges for transformative change. Examples of the first are climate change or an economic crisis and of the second shortcomings in car centric planning approaches. The attention for such changes as something that can create the space for the development of new approaches has increased in planning (Dudley & Richardson, 2000; Curtis & Low, 2002; Albrechts, 2005; Healey, 2007, pp. 276; Filion & McSpuren, 2009; Pflieger *et al.*, 2009; Healey, 2015). However, the conceptualisation of these structural chances and challenges and knowledge regarding how they exert influence remains limited. This is important in understanding why and how transformative change takes place and to develop supportive strategies
- 2) **Bottom-up societal initiatives:** in planning, the attention for the role that initiatives of involved citizens and interest groups can play in bringing about transformative change has increased (Clifford *et al.*, 2005; Bartholamew, 2007; Filion & McSpurren, 2007; Banister, 2008; Harris & Moore, 2013; Hormighausen & Tan, 2016). In past transitions they have played an important role by challenging dominant paradigms, setting up experiments and exerting pressure for change (e.g. Blanc, 1993; Schmucki, 2001). Despite this, little knowledge exists about how these initiatives can attain influence in relation to established actors, the relation between their development and structural chances and their role in consolidating transformative change.
- 3) **The role of the practices of households and firms:** in planning studies policy processes are often the object of study. However, the sustainability of the transport and land-use system depends on households and firms making different locational choices and changing their mobility behavior. Their practices are embedded in lifestyles and preferences (Geels *et al.* 2012). As research dealing with practices (Shove & Walker, 2010; Shove *et al.*, 2015) shows, attention for practices can enable us to better understand transformative change.
- 4) **The impact of new insights in practice:** The body of knowledge regarding how planning practices should change to support transformative change in light of the complexity of the urban social system is growing steadily. Recent research focuses on the question

of how multi-actor knowledge co-creation can support learning and change in practice (Straatemeier *et al.*, 2010; Te Brömmelstroet, 2010; Tennøy, 2010; Næss, 2013; Soria *et al.* 2016; Tennøy, 2016). Despite this, two challenges remain: (a) finding a manner to address contrasting interests in such a way that makes it possible to exploit structural changes for change; (b) creating a learning environment in contact met practice, but avoids that established, and because of this powerful, ways of thinking and acting dominate.

Space and scale in transition studies

Knowledge and insights from transitions studies has the potential to address these knowledge gaps. This discipline focuses on transformative changes in so-called socio-technical systems. In socio-technical systems, such as the transport and land-use system in the urban region, technologies or psychical artefacts are intertwined with social structures and practices. Changes in the one goes (almost) always hand in hand with change in the other. When one does not change, it is difficult for change in the other to take place. In addition, change in the system is related to exogenous developments in the so-called landscape and novel structures and practices in niches. That said, focusing on urban transitions has the potential to (better) address two knowledge gaps in transition studies.

- 1) **The conceptualisation of space and scale in transitions:** Traditional conceptions of transitions are based on what is known as the multi-level perspective (MLP). Transitions result from interaction between the three levels in this perspective: niche – novel structures and practices; regime – established structures in related domains such as science, policy, markets; and the landscape- macro-developments at the long term such as climate change or economic conjuncture (Geels & Schot, 2007). The attention for the geography of tensions has increased in recent years (Coenen *et al.*, 2012; Næss & Vogel, 2012; Raven *et al.*, 2012; Binz *et al.*, 2014; Hansen & Coenen 2015; Murphy, 2015; Sengers & Raven, 2015; Truffer *et al.*, 2015; Affolderbach & Schulz, 2016). It has been acknowledged that transitions depend on the context in which they take place (Coutard & Rutherford, 2010; Coenen *et al.*, 2012) and that accounting for this can aid in better understanding why and how they take place (Hansen & Coenen, 2015, pp. 104). Raven *et al.* (2012) have developed a relational model where the levels of het MLP are defined based on various types of proximity: low proximity (niche), high proximity within a socio-technical system (regime) and high proximity across systems (landscape). Empirical research has shown the added value of this model with regard to networks between niche

actors which facilitate the exchange of ideas between geographic areas (e.g. Sengers & Raven, 2015). However, it remains limited. Attention is needed for: what the relationship between various types of proximity, why and to which end relations between scalar levels are relevant and how geographic aspects of the regime can be conceptualised (see Hansen & Coenen, 2015).

- 2) **The conceptualisation of urban transitions:** In recent years, critics have pointed out two challenges related to studying urban transitions. Firstly, the built environment. This is more stable than other technologies (van Schaick & Klaasen, 2011) meaning that a variety of artefacts from a number of periods of transition exist next to one another (Næss & Vogel, 2012). In some cases, these also have a historic or cultural meaning (Goss, 1988; Shove *et al.*, 2015). Although their use can change considerably (Shove *et al.*, 2015), it is not yet known how the built environment or infrastructure networks can influence the course of transitions. Empirical research has focussed primarily on technical sub-systems, such as transport technologies (e.g. Sengers, 2016). The second challenge is the delineation of the system. In the city, diverse systems are closely intertwined with one another through various relations and networks. This means that focused interventions such as increasing densities or traffic management could be counteracted by developments elsewhere in the city (Næss & Vogel, 2012). Therefore, a focus on the practices of household and firms (see Shove *et al.*, 2015) offers more potential than focusing on sub-systems.

Research questions and approach

By answering the following main research question, this dissertation aims to make a contribution to the knowledge gaps discussed above as well as to support practitioners working on urban transitions.

How can the conceptualisation of the transport and land-use system as a socio-technical system contribute to both understanding why and how transition takes place and facilitating current transition attempts?

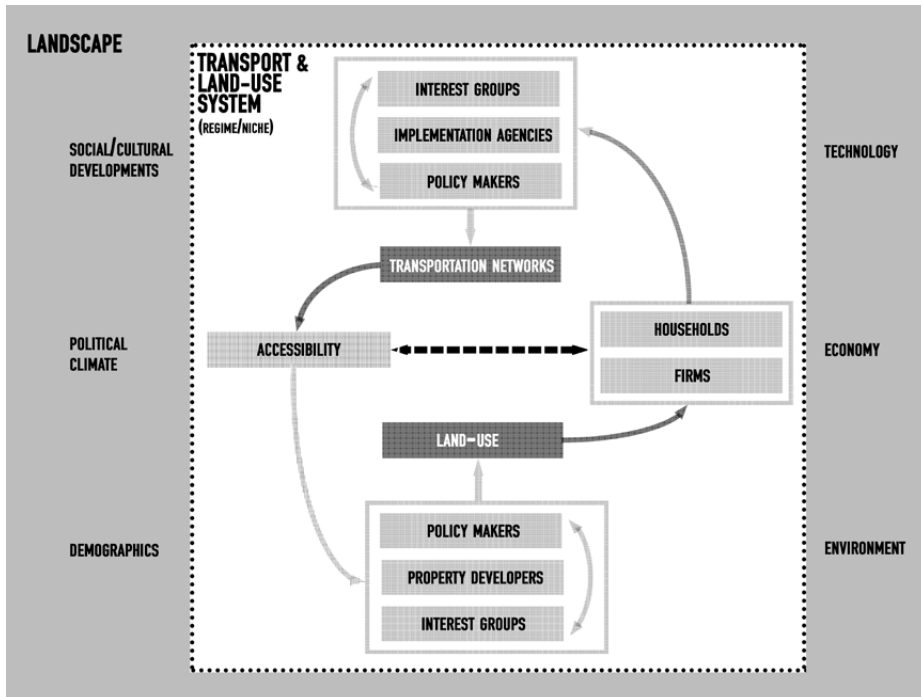
This question was split into the following three sub-questions

- 1) *How can the regional transport and land-use system be conceptualised as a socio-technical system?*

This question was answered by carrying out a literature study and a theoretical synthesis of literature from transition studies as well as literature regarding the evolution of the transport and land-use system. The result was a heuristic framework combining the transport and land-use feedback cycle (Bertolini, 2009; Wegener & Fürst, 1998) and the MLP. The transport and land-use system is composed of structures and the related practices of different types of actors. More often than not these actors act in conformance to structures, but they can also deviate from them. Through action structures are reproduced or change. The actors and the physical structures, the so-called artefacts, are shown in the graphical presentation of the framework (see the figure below). The other structures include:

- Regulative rules: codified rules such as laws and regulations;
- Normative rules: tasks, obligations, responsibilities as well as behavioural rules and societal roles (e.g. social and organisational capital; vested interests, lifestyles and financial incentives);
- Cognitive rules: belief systems, problem agendas and search heuristics that are taken for granted and used unconsciously;
- Discourses: an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena.

In the depiction of the framework no distinction is made between regime and niche. In the niche the same types of practices and structures are present as in the regime, but they are less structured and, because of this, instable. The landscape is seen as being composed of quasi-autonomous, or in the perspective of actors in the system, exogenous developments of culture or societal preferences, demographics, technology, political climate and the economy. In the framework the practices of households and firms play a central role in the development of the system. During a period of many decades, transition can take place. This is a result of the reflexive action of actors and groups and the interaction between practices and structures in niche and regime as well as developments in the landscape. The application of the framework to develop strategies supportive of a transition towards improved coordination between transport and land-use in the region of Amsterdam has shown its added value. This application resulted in new types of solutions that account for a broad scale of interests and connect to the changing practices of households and firms. In studying historic transitions the model was also useful. To make this possible the concept of 'troubles' was introduced to better identify the places where pressure on incumbent structures is present or can develop. Troubles are difficulties that people experience in their daily lives. A second addition to is the concept of proximity. The definition of regimes and niches based on proximity, where geographic proximity is but one



Heuristic framework for transition in the transport and land-use system (adapted from Switzer et al. 2013)

type, has made it possible to better understand transition dynamics within and between geographic areas.

Why and how does transition take place in the regional transport and land-use system?

This question was answered by carrying out a comparative case study of transport – and land-use transitions in the urban regions of Munich and Zürich in the period since the Second World War. These regions were selected for a number of reasons:

- 1) Based on secondary sources, a number of periods of transition can be distinguished since the Second World War: the first period where the modernisation of the city and the accommodation of the car were embraced followed by a break in the 1970s (second period) and a shift in practices (regionalisation and increasing bicycle use in Munich) since the 1990s, the third period. In order to gain insight in transition mechanisms, it was important that transitions or transition attempts had taken place.

- 2) In both regions the initial condition of the system was comparable;
- 3) Variation in regional and national context, which made it possible to account for contextual factors.

Using the heuristic framework and the concepts discussed in the first sub-question, qualitative research was carried out in 2012 in both areas. These case studies have resulted in the following three hypotheses regarding why transition takes place:

H1: Changes in the practices of households and firms create the pressure needed to realise transition (as captured by the emergence of foci of debate and conflict, or 'troubles')

The extent to which the pressure for change exists is dependent for a considerable part on changes in the practices of households and firms. An example is the first period of transition after the Second World War in both cases where increasing car use and suburbanisation resulted in increasingly visible problems as the distribution of road space in the cities remained largely unchanged. In these periods there was often mention of a traffic chaos and the general pressure for change was large. In the second period of transition from the 1970s little change in the practices of households and firms can be observed, which correlates to limited pressure for change.

H2: Interest groups interpret landscape change and changes in practices to legitimise structures creating the pressure on the regime necessary for transition.

The extent of pressure depends on the resonance of propagated cognitive rules with structures and discourses in the landscape or stable structures in the regime

This hypothesis means that the pressure ensuing from changing practices or from the landscape does not come into being on its own. Pollution, damage to the city, or residents abandoning the city first need to be problematised before they exert pressure on incumbent structures and practices in the regime. For example, in the 1950s journalists and researchers criticised the limited amount of space allocated to the car. In the 1970s young architects criticised the impact of the unquestioned pursuit of the modernisation of the city against a background of increasing awareness of the negative impacts of modern life. The case of Zürich illustrates well that what is considered a problem depends on the residents with broader discourses and problem definitions. Prior to the Second World War,

the pressure to intervene in the land-use development of the region Zürich and in Switzerland on the whole increased. After the war, however, a societal shift can be observed. In light of increasing tensions between the West and East everything which had an element of collectivism was seen as suspicious. As a result, the support for interventions in property markets decreased.

H3: The identity of the city is a powerful discursive element that, when used can legitimise or delegitimise structures and practices

In both regions, especially in the period from the 1970s onwards, we can observe that interest groups evoked the identity of the city to criticise then current practices. In Munich this focused primarily on the physical identity of the city. The modernisation was sometimes called *die zweite Zerstörung Münchens*, the second destruction of Munich. In contrast, in Zürich the social identity of the city as a place for residents was subject of debate as a result of increasing displacement by employment growth. This coincided with the referendum about the U-Bahn, upon which the plans for motorway construction and the modernisation of the city were dependent. In the subsequent referendum the combined U- and S-Bahn was rejected. As a result, policy makers were forced to reconsider solutions and problem definitions.

The fourth hypothesis relates to how transitions take place and reads as follows:

H4: Reaching shared cognitive rules enables change in the types of interventions in artefacts at the system level

A comparison of Munich and Zürich illustrates this hypothesis. In Munich we see that a change in artefacts and, with it, a further strengthening of the transition in the first period after the Second World War was only possible because broadly shared idea (cognitive rules) of the exact types of interventions which should be carried out in the built environment was present. In Zürich this consensus regarding the existing city was never reached. Because of this, interventions in the built environment remained limited and largely ad-hoc. In the region this was not the case. Here the S-Bahn in combination with an extensive motorway network was realised which contributed to a transition there. Two specifications regarding how these shared cognitive rules can be reached are:

a) Rules both open to conflict and effective when attempting to resolve it accelerate reaching shared cognitive rules

The first period of transition in both regions supports this specification. In

Munich legal regulations and social norms required coordination between diverse interest in order to make progress in the development of the transport network. This resulted in initial delays, but ultimately, because of the extensive debate and the pragmatic approach of actors, in plans that were better attuned to the complexity of the city. Because of this, they were also more realistic in the end and attained broader support. In Zürich the absence of the initial conflict resulted from a combination of a strong desire to make rapid progress, rules and norms that required less interaction between various organisations and adaptations of rules to make rapid decision making possible. Following this, the plans faced problems in terms of feasibility and the criticism increased with time consuming changes a result. In both cities cases conflict resulted in stalemates. Pragmatism and the preparedness to move beyond short time interests and redefine interests is just as important to make progress. Examples of this include the preparedness of the municipality of Munich to allow the Deutsche Bundesbahn to realise an underground line to make progress on underground public transport or the decision to address transportation problems as a whole rather than narrowly focusing on maximising parking places.

b) Interest coalitions are a way to exert pressure to achieve change in cognitive rules at other scalar levels

The development of alliances around shared interests can be an effective way of exerting pressure on actors in other sectors or at other scalar levels. As such, hierarchical relations can be dealt with in order to reach consequences across a number of scalar levels. An example is the collations that were established by the mayor of Munich and colleague mayors to exert pressure on the national decision making.

How may the conceptualisation of the transport and land-use system as a socio-technical system be integrated in a planning approach to support transitions in this system?

This question was answered through a planning approach to support second-order reflexivity and the application of it in the planning process surrounding Transit-oriented Development in the Amsterdam region. This was done in a series of four workshops that took place between 2011 – 2014, which were organised with niche actors and progressive actors in established organisations such as government, interest groups, transport and property developers. Second-order reflexivity concerns that development of solutions for persistent challenges resulting from the unintended, or unexpectedly extreme, side-effects of solutions developed for earlier problems in such a way that prevents that new

side-effects arise. The heuristic framework which was developed as an answer to the first question was utilized to structure the reflection of participants. The approach was composed of four steps which can be carried out iteratively:

- 1) **The development of a future vision** of the transport and land-use system. This can function as a point of orientation when working out desired changes in the system. In the case of Amsterdam, the future vision was a system where functions are concentrated around highly accessible nodal points in the transport network so that a sustainable balance in mobility is achieved between individual and collective costs and benefits (see 5.4.1).
- 2) **System analysis.** The heuristic framework was used to identify the following: barriers, such as the revenue model of municipalities; threats, such as decreasing demand for office space; chances, such as declining demand for suburban living and neutral developments, such as the growth of collective particular commissioning of housing. These arise when niche, regime and landscape (do not) change.
- 3) **Redefining structures and practices.** This took place in two steps with the aim of developing congruent solutions that satisfy the needs of central stakeholders. First, strategies were developed that account for or exploit the barriers, threats, chances and developments identified in the system analysis. There were five types: (1) financial frameworks, such as an integral revenue model for municipalities; (2) governance strategies, such as a facilitating role for the government; (3) legal frameworks, such as more instruments for municipalities to steer development; (4) the combination of knowledge, such as the integration of knowledge about accessibility in locational policy; and (5) demand management. Subsequently, strategies were developed at the level of a public transport corridor and a station on the same line. These focused on the functional mix and the profiling along the line as well as the governance (e.g. multi-stakeholder platforms to facilitate station and corridor development).
- 4) **Assessment of strategies.** Here, interdisciplinary knowledge was used. In this case from transportation engineering, planning and transition studies, to reflect on the contribution of proposed interventions on the long term objective of sustainability.

Although the application remained limited to a series of four workshops during one year, the approach was seen as promising. In the area of urban planning it was innovative through the combination of abstract reflection and concrete interventions and the space that was afforded to new actors.

Contributions to knowledge gaps and avenues for future research

Below the contributions to the four knowledge gaps in planning concerning transformative change and the two knowledge gaps in transition studies are discussed. In some cases, avenues for future research are discussed.

- 1) **Structural chances/challenges:** The introduction of the levels of the MLP has made a more precise operationalisation of these changes and challenges possible. The usefulness of this was visible in the approach that was developed to answer the third sub-question. Participants were able to systematically identify relevant developments on the three levels and in other systems. An important note resulting from the historic case studies is that the importance is not a priori given, but rather depends on the resonance of problem definitions and the framing of problems. In both Zürich and Munich, the troubles which resulted in the highest pressure were of a local nature and resonated with stable structures (e.g the value of the city or the role of the state). For planning practice, this indicates the importance of making connections between large societal and local challenges in such a way that they become tangible.
- 2) **Bottom-up societal initiatives:** This research has shown the importance of initiatives or niches in bringing about transformative change in the city. That said, the borders of niches were much less clear than is sometimes assumed. In Zürich and Munich niches were also represented within established organisations, such as political parties or municipal departments. There they exerted influence. This supports a delineation of niches based on proximity in terms of the three types of rules. In addition, niches (and regimes) can transcend the local level. Coalitions between local niches were seen to exert important pressure for change. This is important for practice in two respects: (1) Cooperation between actors in established and new organisations can increase the chance that change will take place. The knowledge of new actors can lead to new insights among actors in established organisations, while actors in these organisations can play an important role in increasing support for change within them; (2) In light of the increasing importance of international decision-making, collations with like minded actors in other locales can increase pressure on incumbent structures and practices. In follow-up research this should receive more attention.
- 3) **The role of the practices of households and firms:** The explicit focus on this has made it possible to better understand how the pressure develops that leads to urban transitions. The planning approach and the attention for the needs of key stakeholders as well as the sociological

and cultural meaning of practices (e.g. biking or slow loving) are a good starting point. However, more interdisciplinary research attention for how practices change could make it possible to better understand transitions and develop more effective transition strategies.

- 4) **The impact of new insights in practice:** The reflexive planning approach developed to answer the third research question shows how, by being better attuned to societal developments and by challenging self-evident structures, planning can contribute to the development of solutions for sustainability challenges. It takes the needs of key actors as the starting point and focusses on the collective weighing of interests with the aim moving beyond short term interests that can stand in the way of transformative change.

Although the approach seems promising, there are four points of attention for future research:

- a. *Interdisciplinarity and work forms.* Interdisciplinarity remained limited to involving planners, transitions researchers and transportation engineers and the types of work forms was also limited. Per step a rich pallet of methods exists which can be further explored (see 6.4.4).
- b. *Conflicting interests and power.* The experimentation with the new planning approach stopped in an early phase. The historic transitions studies in answering the second sub-question show that transition is a contested and political process that is often initiated by new actors. Resent experiments with established actors (see Majoor *et al.*, 2017; Hooijer *et al.*, 2017) show the types of challenges that can arise with regard to power when working with these actors. Incumbent roles, procedures and ways of working can endanger attempts to collaboratively learn and experiment. These issues are receiving increasing attention in transition studies (see 6.4.4.). In order that approaches such as the reflexive planning approach discussed here are able to contribute to transition, new ways of working will need to be developed to deal with power and conflicting interests;
- c. *Legitimacy.* Although the planning approach developed is more participative than traditional approaches, the risk of forced or voluntary exclusion of certain actors remains. The challenge is therefore to ensure that those who do not have the time, means or interest to participate are still represented and that more general societal interests that are not present in the area of city in which work takes place are accounted for. As has been emphasised in transition

studies, questions of legitimacy will also need to be subject of design and experimentation (see 6.4.4).

In addition, two more general points of attention remain: Firstly, the importance of these experiments with regard to the reconfiguration of the socio-technical system or as the starting point of broader systemic transitions, and, secondly, the upscaling of novel structures and practices (cf. Bulkeley *et al.*, 2015, pp. 23, 241).

The conceptualisation of space and scale in transitions

This research supports existing studies with regard to the place-specificity of urban transitions. The troubles that came about were of a local nature as well as the arguments that framed these troubles, the regimes and aspects of the landscape (demographics, culture and economic development). The concept of proximity offers a useful way of distinguishing between the structuration levels of the MLP and geographic scalar levels and to follow the exchange of ideas and the exertion of power between places and between niche and regime. For example, the exchange of ideas where social and cognitive proximity existed surrounding the transportation planning between the USA, Germany and Switzerland or the exertion of power between scalar levels as discussed in the explanation of specification b of the fourth hypothesis. Still, the overall influence of flows of ideas through networks on the course of transition seems limited. In the historic case studies, it was rather the case that major decisions were made based on regional and national debates and new ideas from elsewhere influenced the way in which these were worked out. For instance, the decision making with regard to motorways in Zürich. Further research is needed to better understand the exact influence of the flows of ideas through networks. The question is whether the awareness of troubles is primarily a local question of if it is influenced by these supra-local exchanges.

The conceptualisation of urban transitions

With regard to the role of artefacts, this research has shown what the normative importance of the built environment is in legitimising certain structures and practices (see hypothesis 3). This concerns the identity of the city or the historic and cultural importance of the built environment, but also the local socio-economic composition and the economic development. Still, the relative importance of drawing on the identity of the city seems limited. The argumentation used was only effective when it resonated with changing discourses or cognitive rules at a societal level. For example, the resonance of arguments for modernisation of the city with the growth discourse in the first period of transition or of arguments to limit changes to the character of the

city with increasing criticism of the one-sided focus on growth at the cost of the environment, health and quality of life in the second period. With regard to transition pathways, we see that urban transitions more often seem to follow a pathway where the use of artifacts changes rather than that they are replaced. Experiments and initiatives that were observed in the historic transitions were more focused on the use of artefacts than purely on the development of new technologies. A second contribution of this research concerns the delineation of the system. This research saw changes in practices as the starting point and followed the related changes in structures. As such, a transition can be seen as more than changes in transportation technologies or increasing densities, but rather as an interrelated change in rules, artefacts, discourses and practices of households, firms and other actors.

Appendix A: Interview respondents in Zürich & Munich

Code	Function /Organisation
Munich	
MEXP1	Researcher Transport and Land-use TU München
MEXP2	Researcher Transport and Land-use TU München
MTRP1	Employee Münchner Verkehrsverbund
MEXP3	Researcher Planning History Ludwig-Maximilians-Universität München
MINT1	Member Münchner Forum/Aktion Attraktiv Nahverkehr (AAN)
MINT2	Member Münchner Forum/Aktion Attraktiv Nahverkehr (AAN)
MLUP1	Planner, Referat für Stadtplanung und Bauordnung Stadt München
Zürich	
ZEXP1	Jouranlist – Spatial Planning & Transport
ZTRA1	Employee Netzentwicklung SBB
ZTRA2	Employee Verkehrsplanung, ZVV
ZTREXP1	Employee Dokumentation Verkehrsbetriebe Zürich
ZEXP2	Historian Planning - Transportation, Universität Luzern
ZTRA3	Employee Verkehrsbetriebe Zürich, 1970s-2000s
ZTREXP2	Professor ETH Zürich
ZTREXP3	Historian - Transportation Universität Basel
ZTRA4	Employee Tiefbauamt, Stadt Zürich - 1970s-2010s
ZPLEXP1	Researcher in Planning, ETH Zürich
ZTREXP3	Researcher History of theSBB, Universität Zürich
ZEXP3	Researcher, Politician 1980s-2010s
ZTREXP4	Professor Political Science, Universität Bern
ZTRA5	Professor Transportation ETH Zürich, 1970s-2000s Employee Verkehrsbetriebe Zürich 1960s-1970s
ZTRA6	Employee Verkehrsbetriebe Glattal 1990s-2010s
ZTRA7	Direction Verkehrsbetriebe Zürich, 1960s-1970s, Direction SBB, 1970s-1990s
ZTREXP5	Activist, Member Kantonsrat, Transport Planner
ZPLN1	Spatial Planner Kanton Zürich
ZTRA8	Politician Zürich 1970s-1980 Direction ZVV 1990s-2000s
ZTRA9	Head - Federal Dept. Environment, Transport, Energy, Communications
ZPLEXP3	Professor for Law, ETH Zürich, 1960s-1990s
ZPLN2	Private Planner
ZTRA10	Employee Transport PlanningKanton Zürich
ZPLN3	Politician Zürich 1970s-200s
ZTRA11	Activist 1970s

Appendix: B Results of system analysis

System analysis	
Chances	Car use/driving licenses decreasing
	Personal mobility decreasing
	Demand traditional suburban lifestyles decreasing
	Bicycle use among seniors higher than expected
Barriers	Regulations hinder market innovation
	Knowledge about accessibility limited (developers/government)
	Government risk averse
	Current land-use structure not favourable for public transport, land positions could worsen this
	Municipal pre-investments in land sometimes not at accessible locations, construction preparation, land rights
	Interest differences national government - NS (accessibility – profit) – regional transport companies (optimisation of prosperity)
Threats	Sense of uncertainty
	No market for functional mixing (offices)
	Real-estate bubble (offices) due to changing needs
	Professionalization of management = decreasing attention for contents and leadership
Neutral developments	Education level increasing
	Aging population
	Change in relationship place/activity, travel not always needed due to ICT
	Importance of traditional interest groups decreasing
	Decreasing integration financing: infrastructure central, spatial planning decentral + fewer resources for government
	Influence of firms on politics increasing
	Increasing speed of change in society
	Always online, continual access to (travel) information
	Rise of new forms of property development (cooperatives, self construction)
	Concerns about climate increasing
	Importance of electricity increasing (E-auto's)

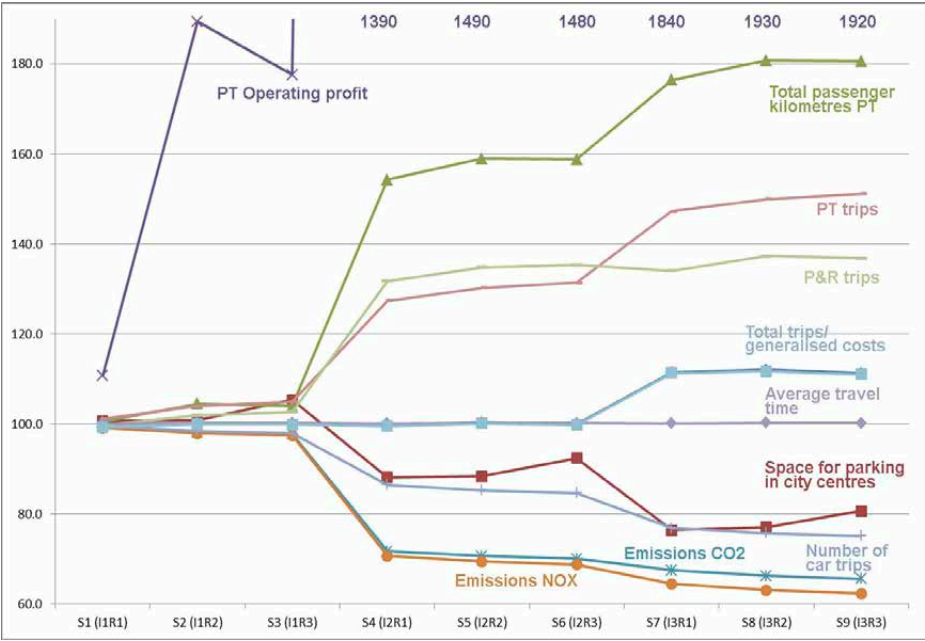
Appendix C: Results of reflection on the redefinition of structures and practices

Redefining structures & practices	
Governance	Customer central/attention for lifestyles (green, seniors)
	Change governance + shift focus of initiative to other actors
	Government flexible with trends and prepared to take risks
	Governance structures connecting land-use and transportation planning
	Government combines initiatives in programme (regional locket for initiatives)
	Partnerships to guarantee continuity of small-scale projects. Government asks for initiatives (condition – cooperation transport company)
	Linking politics and content – possible success formula in discussions with national government
	Large scale investments remain necessary. Focus needs to shift towards influencing demand, but then roles must change
	Experiments: government creates space and connects, small-scale custom solutions, but not ad hoc
Legal Frameworks	More instruments for urban regions
	Hard shared agreements necessary. Reform concession
	Building freeze not around public transport
Financial frameworks	Support changing of functions (offices)
	More integral revenue model for municipalities
Combining Knowledge	Accessibility database, data sharing
	Planning support system
	Faster adaption of transportation models
	Accessibility as central ingredient in locational policy
Behaviour and demand	Minimilisation of mobility needed for activities?
	Influencing of demand

Appendix D: Infrastructure and spatial scenarios (chapter 5)

	TS1 PHS	TS2Car to PT I	TS3 Car to PT II
Transport	Investments to increase frequencies as planned in the programme high frequency rail, investments in road construction as currently planned.	Pt as in IS1 + general increase in speed pt. road pricing (4ct/km) and road construction as currently planned.	Pt and road pricing as in IS2, and reduction of road capacity compared with current plans (50% in urban areas, 25% elsewhere)
Land-use			
LUS1 Conservative TOD			
Job growth oriented on public transport nodes, population growth in zones with good and average PT accessibility.	S1	S4	S7
LUS2 TOD à la Deltametropool			
Job growth only around stations, almost all population growth near stations	S2	S5	S8
LUS3 Regional Urbanity			
Decrease of jobs and population in zones with a poor PT accessibility, concentration around 5 IC stations in city and region. Densities similar to Amsterdam.	S3	S6	S9

Appendix D(2): assessment outcomes infrastructure and spatial scenarios



Appendix E: Needs of key actors (chapter 5)

Households	Firms (businesses, government, education)
<i>Resident</i>	<i>Employer</i>
Clean air/ healthy environment/ diversity	Policy continuity
Safety (children)	Affordable transport for employees
Freedom	Short and direct connections
Flexibility/ space for initiatives	Robust accessibility - alternatives
Facilities/ shops accessible	Access to healthy, happy and good employees
Social contacts (friends/family)	Safety
Accessibility	Creativity and diversity
Adequate housing	Efficiency
<i>Employee (also student/pupil)</i>	<i>Customers</i>
Facilities near station	Diversity - affordable transport options
PT nearby	Reliability transport networks
Safe walking and bicycle routes	
Green/nature	
Chances in the labour market	
<i>Consumer/recreant</i>	<i>Supplier</i>
Activities nearby PT	Access to destination (also in the centre)
Shops/nature nearby	Proximity of customers
Influence on surroundings	
Fun	
<i>Passenger</i>	<i>Co-producer</i>
Information	Proximity of other businesses
Comfort	
Good/frequent/fast PT	
Safety/ pleasant trip	
Wi-Fi everywhere	
Smooth transfers	
Quality of public space	

Appendix F: Interview protocol (chapter 5)

- 1) Were the insights from transition studies as integrated in the heuristic framework useful to analyse the challenge of coordinating transport and land-use planning in the region of Amsterdam? (further discuss why and how)
- 2) Were the analyses and the insights from transition studies useful in developing strategies to address the coordination challenge mentioned above? (further discuss why and how)
- 3) Is the approach applied in the workshops different than the conventional planning process surrounding coordination between transport and land-use? (further discuss in which ways)
- 4) Did the workshops stimulate you to reflect on the way in which your organisation or others attempt to bring about coordination between transport and land-use planning? (further discuss how and why)
- 5) Have you used the insights from the workshops in your daily work? (if yes, what was the impact?, if not why?)
- 6) Have you shared what was discussed in the workshops with others in your organisation? (if yes, how was this received?, if not, why?)

Transitioning the Transport and Land-use system

How can transport and land-use transitions in urban regions be understood and supported? This question is increasingly relevant for researchers and policy makers alike given the growing urgency of sustainability issues confronting cities and the limited improvements can be observed despite continued policy attention, for example Transit-oriented development policies. To tackle this question, this thesis draws on theories and concepts from transition studies. This has led to a richer conceptualisation of transitions and the extent to which policy makers can actively influence them. Transport and land-use transitions can be seen as resulting from the interaction between established and novel structures and practices and exogenous developments. In historic case studies carried out in Munich and Zürich, we see that in transitions that have taken place troubles, or difficulties that people experience in their daily lives, play an important role in focusing political debates. In the process of reaching consensus regarding problems and solutions, interest groups, coalition building and both implicit and explicit societal rules open to conflict and supportive of its resolution play a pivotal role. To aid in supporting transition attempts, a reflexive planning approach has been developed and tested in the region of Amsterdam. The breadth of the focus in this approach in terms of developments considered and actors involved resulted in potential solutions that differed from traditional policy in terms of innovativeness and the extent of support for them.



Andrew Switzer (MSc.) works since 2016 as senior researcher in the research group Coordination of Urban Issues and as lecturer in the professional Master programme in Urban Management at the Amsterdam University of Applied Sciences (Hogeschool van Amsterdam). From 2015-2018 he was editor-in-chief of the Dutch language planning journal *Rooilijn* and from 2010-2015 he worked as a PhD researcher and lecturer in the Department of Geography, Planning and International Development Studies of the University of Amsterdam. Andrew's research interests include social learning in transitions, urban governance, transport and land-use planning and urban development in post-Soviet countries.

// IN /
PLAN /
/ NING

WWW.INPLANNING.EU