Joint Accessibility Design

A framework to improve integrated transport and land use strategy making

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Chapter 1

INTRODUCTION

Transportation and urban development share a close interconnection, particularly evident from the start of the industrial revolution in the 19th century and the introduction of streetcars and trains (Muller 2004). Today, bolstered by the speedy advances in ICT and the expanding opportunities for virtual, rather than physical mobility, there is growing speculation about the impending decline in the role of transportation in cities (Meyer & Miller 2001). The outcome, however, is far from clear. Rather than replacing transport, ICT seems to generate additional mobility opportunities and actually combines with transport to yield new forms of physical-virtual mobility (Graham & Marvin 1997; Wheeler et al. 2000; Janelle 2004; Aguiléra et al. 2012; Cohen-Blankshtain & Rotem-Mindali 2016), both ICT and transport are embedded in a new social and economic world, defined by steadily increasing flows of people, goods and information. Examples of increased mobility include the regionalization and internationalization of industrial production, the expansion of global business service networks, and international migration and tourism. The growth and diversification of mobility is increasingly being seen as both a consequence of and an enabling factor for contemporary lifestyles: “the right to work, to accommodation, to training, now incorporates an implicit right to mobility” (Ascher 2003, p.23). Conceptualizing contemporary society in terms of a ‘network society’ (Castells 1996) and the ‘age of access’ (Rifkin 2000) aptly capture the increasing importance of flows, including physical movement, for urban life.

There is, however, an associated cost. The growth of mobility has major negative environmental impacts (local and global) and also adversely affect quality of life and the economic performance of cities via congestion, emissions (pollution and GHG), noise, disruption of communities, traffic collisions, use of non-renewable energy, and solid waste. Further complicating the problem, the implementation of measures to mitigate these impacts means that infrastructure expansion becomes even more costly. This exacerbates already growing concerns about how to finance such expansion, particularly in the light of the still very uneven access to means of mobility and a growing role of private sector in transport.

infrastructure delivery (Graham & Marvin 2001). These concerns are also driving the growing broad consensus among government, industry, and sector professionals on the need to shift towards ‘sustainable mobility’ (European Commission 2017; WBSCD 2001; Banister 2005). The willingness to deal with the adverse impacts of mobility as mentioned above and take action to shift the paradigm is growing. However, despite some encouraging examples like Freiburg (Banister 2005), progress is slow, and looking at some indicators, such as transport GHG emissions, even non-existent.

Shift in paradigm needed

Under these conditions, the traditional ‘predict and provide’ approach to urban transportation planning is no longer a viable option (Owens 1995). This approach rests on two main assumptions: (i) the reliability of predictions of future mobility demand (or at least enough consensus on this), and (ii) readiness to provide the transport system expansion needed for the predicted growth. The uncertainty surrounding the outcomes of these processes means that reliable predictions are very difficult, and that the underlying assumptions are increasingly being contested. Even if it seems that growth in demand is to be expected the means (political, financial) for materially providing for the predicted growth through system expansion are simply not there. The alternative ‘demand management’ or ‘predict and prevent’ (Owens 1995) approach is, however, also problematic because it underplays the value of mobility as an essential condition for active participation in urban social and economic life. The crucial challenge is finding a balance between, on the one hand, providing people, households and firms with access to the spatially and temporally dispersed resources they need (e.g., education, work, retail, knowledge and recreation) and, on other hand, reducing the negative impacts (CO₂ emissions, pollution, noise, accidents, decline of public space). There is broad consensus that the integration of transport and land use policies is an essential step towards sustainable mobility and effective transportation planning, especially at the level of city-regions (Banister 2005; Hull 2010; Bertolini 2017). Access to opportunities depends both on the features of the transport system (speed, travel costs) as well as the land use system (densities, opportunities). However, real-life planning practice is marked by a persistent separation of the transport and land use planning processes, with some positive exceptions (Hull 2010). The resulting policy inconsistencies need to be addressed through better integration.
This situation requires urban transportation planners to apply a more ‘constructivist’, design-oriented approach (Bertolini et al. 2008). The term ‘design’ is not intended to encompass only technical design of transportation systems or cities at the macro or micro level. Instead, it is a conceptual approach, highlighting the need for a more deliberate and creative engagement in the public debate on the cities we need and want, and the role of transport. The planning context is characterized by fundamental disagreement regarding the planning goals (to prioritize the economy or the environment?) as well as uncertainty about the planning means (the future transportation and telecommunication options). The traditional role of urban transportation planners as neutral experts – as ascribed by the ‘predict and provide’ approach and implied by the ‘demand management’ approach – is no longer viable. Instead, strategic engagement in the political process of defining problems and solutions, i.e. ‘policy design’, is needed. This also emphasizes the need for different types of knowledge and tools to be used to support integrated transport and land use strategy making. The currently deployed tools have been developed to facilitate the traditional approach of improving transport system efficiency and are not suited to support a more holistic policy design process with multiple stakeholders and diverging values and goals (Willson 2001; te Brömmelstroet 2010).

The central hypothesis in this research is that accessibility is a concept that could fuel more integrated transport and land use strategy making (Handy & Niemeier 1997; Curtis 2008; Halden 2002; Nuzzolo et al. 2014; Silva & Pinho 2010). First, as stated above, the quality of accessibility relates to features of both the transport and the land use system, thus uncovering the interdependencies between the two and identifying the potential trade-offs and synergies. It could provide a common language that stimulates communication between the two disciplines. Second, accessibility can be related to wider social and economic goals (e.g., access to jobs, education or customers), making it possible to discuss planning goals in a more normative way (how much access do we provide, for which purpose and for whom?). Accessibility is also well-suited for the policy design phase, where both the land use strategy and the transport strategy still have to be developed. Is it better to develop locations that are already accessible or not? Should transport investments reinforce existing accessibility patterns or enable new ones? First introduced in the groundbreaking paper by Hansen (1959), accessibility is a well-known concept in scientific research circles.
(Handy & Niemeier 1997; Geurs et al. 2015; Kwan & Weber 2003); however, until recently its use in planning practice was limited. A valuable recent contribution to understand the limited use of accessibility instruments in planning practice and identify ways to increase the use has been the COST Action TU 1002 (2012; 2014). This research project brought together over 100 researchers and 80 practitioners from 22 countries to discuss, test and improve the user-friendliness of 20 accessibility instruments from Europe and Australia, most still in the development phase (Silva et al., 2017; Papa et al. 2015). The accessibility framework developed as part of this dissertation was one of the central elements in the COST Action TU 1002, allowing the group of researchers to test and co-develop a suite of accessibility tools with practitioners. Furthermore, during the COST Action TU 1002 it became apparent that bridging the implementation gap of accessibility instruments is less dependent on improving their usability than on improving their added value in terms of learning (i.e. their usefulness). This required a shift in emphasis from focusing on the tool itself to the process of using it. This dissertation aims to support this shift by connecting theory and practice, thereby enabling planning professionals to employ accessibility as a concept and tool in their daily planning practice.

1.1 Research questions

The central research question of this thesis is formulated as follows:

How can transport and land use planners use the concept of accessibility in planning practice, and how does this improve integrated transport and land use strategy making on a regional level?

This question is answered through four sub-questions:
1. **Why** is accessibility a planning concept that could stimulate integrated transport and land use strategies on a regional level?
2. **How** can we test and improve the usefulness of accessibility as a planning concept?
3. **How** can planners use the concept of accessibility to develop integrated transport and land use strategies on a regional level?
4. **What** is the impact of using accessibility as a planning concept on the integration of transport and land use strategies on a regional level?

The main concepts used in this research are synthetically characterized below.
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Accessibility can be measured in many ways; however, the basic notion is that accessibility shows the potential for human interaction, defined as the number of opportunities that can be reached within a particular travel time and/or associated internal costs (Hansen 1959; Handy 2008; Kwan & Weber 2003).

Strategy making is a widely debated concept with many definitions. Following among others the relational perspective of Healey (2006) and the work of Friedmann (1987), in this research strategy making is defined as “a virtual construction site where planning actors actively link different types of knowledge to make sense of the complexity of urban problems and develop possible long-term actions for improvement”.

Usefulness is defined following Pelzer’s (2016) approach as the added value that accessibility instruments have in terms of enabling learning and providing process support that foster integration of transport and land use strategies.

Integration of transport and land use strategies. There is a two-way interaction between transport and land use as represented by the transport and land use feedback cycle. As described in Chapter 5 “The distribution of different land uses co-determines where activities (e. g. living, working, recreating) take place. The spatial distribution of activities creates the need for a transport system that offers people and goods the opportunity to travel or be transported from one activity to the other. In turn, “the distribution of infrastructure in the transport system combined with existing land use patterns creates opportunities for spatial interaction and can be measured as accessibility” (Wegener & Fürst 1999, p. vi). Finally, the quality of accessibility co-determines where different types of land uses are developed, which then influences the spatial distribution of activities and starts the cycle anew. Integrated strategies could be defined as strategies that are aware of the interdependencies and trade-offs, between the transport and land use system described above and lead to policies for the transport and land use system that reinforce each other”.

The regional level is roughly defined as the area in which most daily activities take place, the so-called daily urban system. It was deliberately chosen as the focus of this research because most daily travel takes place on this level, and there is much to be gained from integrating transport and land use strategies.
The Netherlands provide the context for the study. As a small country with one of the highest population densities in the world, spatial and transport planning have always been a major factor in the Netherlands. Since the end of World War II, the national government has been exercising tight control over spatial planning and the housing market (van der Cammen & de Klerk 1993). During most of the post-war period, state-of-the-art National Spatial and Transportation Planning documents have been published every ten years, to guide transport and land use integration in a top-down manner (Straatemeier 2013). However, during the last part of the 20th century, this power structure changed significantly: the grip of the national government on land use planning and the housing market was deliberately weakened, due to the perceived high costs of the social welfare state. Subsequently, the national government transferred some of its tasks and infrastructure funding to the provinces and new metropolitan governments. While spatial and transport planning in the Netherlands has been held up frequently as a good practice example in the planning world (Tan et al. 2014), the results on the ground – especially in the last two decades – have been mixed. Regional governments struggle with the same issues with respect to transport and land use integration as regions elsewhere (e.g. different ways of funding transport and land use development in a multi-actor environment) (Neuman & Hull 2009).

1.2 Outline, research steps & methodologies

This thesis is made up of four submitted research articles (chapter 2-5) an introduction (chapter 1) and a conclusion and discussion section (chapter 6). Below the different research steps and methodologies are discussed to introduce the different chapters. This research encompasses four case studies in total. Some of the cases are part of more than one chapter albeit for different reasons. The table below summarizes the cases that have been used and their role in each of the chapters. This will be discussed in more detail as part of the research steps.

Chapter 1

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Case</th>
<th>Purpose</th>
<th># and role of transport- and land use professionals</th>
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</table>
| 2       | Amsterdam Metropolitan Region | Case was used as an illustration to explore the usefulness of accessibility as a planning instrument | in-dept interviews (2#)  
Role: reflection |
| 3       | “Zuidvleugel”, City of Almere  
2x City of Amsterdam*  
City of Breda* | The two cases in this chapter are used to illustrate the experiential research methodology | ex ante In-dept interviews (#4)  
attended workshops (#5-15 in each case)  
filled in questionnaires (#5-15 in each case)  
Role: participation and reflection |
| 4       | “Zuidvleugel”  
City of Almere | The two cases in this chapter are used to describe the development of the Joint-Accessibility-Design framework. | ex ante In-dept interviews (#4)  
attended workshops (#5-15 in each case)  
filled in questionnaires (#5-15 in each case)  
Role: participation and reflection |
| 5       | City of Rotterdam  
City of Almere | The two cases in this chapter are used to describe the type of transport and land use strategies developed by practitioners with the help of the Joint Accessibility Design framework | ex ante In-dept interviews (#4)  
attended workshops (#5-15 in each case)  
filled in questionnaires (#5-15 in each case)  
ex post In-dept interviews (#4)  
Role: participation and reflection |

**TABLE 1.1** Description of the different case studies, their purpose and the # and role of practitioners involved. Cases with a * are not part of this research.

Setting the scene: Why is accessibility and interesting planning concept to stimulate transport and land use integration?

The first phase of the research (Chapter 2) started with a review of three strands of academic literature, supplemented by in-depth interviews with academics and planning professionals. First, the academic literature on accessibility analysis was reviewed, to understand the history of accessibility as a concept and the ways in which accessibility can be measured, and to explore possible applications in planning practice. Second, the literature on transport and land use integration was reviewed to identify barriers that hamper integrated transport
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and land use strategy making. This review was supplemented with 10 in-depth interviews with planning professionals from the Netherlands, from both transport and land use planning, to discuss the findings from the literature review and to explore typical barriers in the Dutch context. Third, the literature on strategic planning and the use of information in planning was reviewed, to explore fruitful ways of providing information that can stimulate strategy making in planning practice.

The insights from the literature informed the illustrative case study of the Amsterdam region, in which we explored the use of accessibility as a planning concept. The case study looks at how accessibility on a regional level can be measured so that it is scientifically grounded and provides information that planning professionals can understand and use. The accessibility analysis was compared with the spatial patterns of different economic activities in the Amsterdam region to see if the analysis relates to the real-life spatial pattern of economic activities. This case concluded with a reflection on current planning strategies and how planning for accessibility might lead to different strategies. These outcomes were discussed with local planning professionals. Based on the literature review and the illustrative case study of the Amsterdam region, a first draft of a framework for accessibility as a planning concept was designed. Five in-depth interviews with academics and researchers familiar with the concept of accessibility complemented this first phase. These interviews were used to examine and improve the framework titled Joint Accessibility Design.

A research methodology to test and improve accessibility instruments

A new methodology – the experiential case study – was specifically designed for this research, discussed at length in Chapter 3. The new methodological approach was developed for several reasons. First, since the aim of this research is to examine whether the use of accessibility as a planning concept improves current transport and land use strategy making, it is important not only to describe a possible intervention, but to test it in a controlled and academic setting that also sufficiently represents the context of its intended use in planning practice. This research does not follow the traditional ‘explanatory science’ approach, opting for change- or design-oriented research instead (van Aken 2005). Second, the co-production of the Joint Accessibility Framework with transport and land use professionals stimulates as described in Chapter 3: “a
reciprocal learning process in between research and practice in which original hypotheses about possible planning innovations are developed through iterative testing, reflection and adaptation.” This learning process focuses not only on combining knowledge from research and practice but also on linking explicit knowledge (i.e. accessibility analyses) to the practitioners’ ‘tacit’ knowledge. Finally, the testing and improving logic is applied in a sequence of case studies and reflections, whereby the outcome of the previous study provides input for an improved intervention in the subsequent case study. The underlying logic for this is research design follows the logic of the experiential learning cycle, as developed in the field of education by Kolb and Fry (1975). Chapter 3 discusses the application of the experiential case study methodology in both this and two other research projects, demonstrating the evolution of the planning innovation or interventions as a result of this approach and elaborating recommendations for utilizing this type of methodology in academic planning research.

Testing and improving Joint Accessibility Design in three cases

In the third step of the research we applied this research design in three sequential experiential case studies in the Netherlands. In these case studies the framework was used and commented on by professionals in the field of transport and land use planning to develop integrated transport and land use strategies. In each case study cycle, we reflected on the Joint Accessibility Design framework and improved it for the next cycle. These multiple reflections on concrete experiences with the framework are needed to understand whether the adaptation of the Joint Accessibility Framework made after the first test actually led to better planning innovations.

The first case study was carried out in “de Zuidvleugel”, the southern part of the Randstad, which is the most urbanized area in the Netherlands. The second case study took place in Almere, a new town in the Amsterdam Metropolitan Area built during the 1970s; and the final case study was carried out in the city of Rotterdam, the second largest city in the Netherlands. The first case study is more extensively discussed in Chapter 4, while Chapter 5 covers the second and third case. Between five and fifteen planning professionals from both transport and land use planning were involved in each case study. The case selection was based on several criteria:
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• All cases represent regions or cities dealing with urgent policy questions related to both transport policy and land use policy, as well as the interactions between the two.
• Practitioners were willing and interested to test a new concept and process, and to take the time to reflect upon its usefulness.
• The professionals involved are the senior policy makers within their cities and are representative of transport and land use professionals working in other cities or consultancies in the Netherlands.
• Data and models to calculate different accessibility measures for different modes of transport were readily available.

The framework was applied to the real-life planning issues faced by the practitioners. Each of the cases studies took place over a period of approximately 6 to 9 months. During this period different workshops and accessibility analyses were conducted. Chapter 4 and 5 explain and illustrate all the steps of the Joint Accessibility Framework. Chapter 4 focuses on the intervention itself, whereas Chapter 5 focuses on the impacts the intervention had on integrated transport and land use strategy making. At the beginning of Chapter 5 and in the conclusions, the final Joint Accessibility Design framework is presented, as was applied in the last case study. It is important to note that following the experiential iterative research design, the framework was modified between each case studies. The case studies serve to provide answers to research questions three (How can planners use the concept of accessibility to develop integrated transport and land use strategies?) and four (What is the impact of using accessibility as a planning concept on the integration of transport and land use strategies?). A triangulation of different techniques was used to analyse the results of the workshops and the different case studies as a whole. The techniques used were:

• The workshops were audio recorded, so that comments made about the instrument and the outcomes of the analysis could be verified.
• All participants were asked to fill in a short questionnaire after each workshop, sharing what they learned, if the results were relevant for planning practice and what could be improved.
• In-depth interviews were held before and after the workshops to help interpret the findings.
• Two researchers attended each workshop. The first researcher supervised the modelling of accessibility and presented the outcomes, while the second
researcher chaired the discussion and facilitating the workshop. Both wrote down their observations from the workshops separately.

- The conclusions of the workshops were laid down in documents, to be verified by the practitioners and could be used after the cases for policy development.

Impact of Joint Accessibility Design on integrated transport and land use strategy making

As the final step in the research, we reflected on the outcomes of the different cases and the impact of using the Joint Accessibility Design framework to answer the following questions: Did the application of the framework lead to more integrated solutions being discussed than in current planning practice, as was hypothesized? Was the effect limited to the workshops, or extended further? Chapter 5 discusses the impact of the Joint Accessibility framework on the integration of transport and land use strategies in two cases. The transport and land use feedback cycle developed by (Wegener & Fürst 1999) was used to identify what constitutes integrated transport and land use strategy making, and whether this approach could be applied to the results of the cases. It might be expected that more accessibility informed strategies would be conceived during workshops where accessibility is used as a planning framework; however, important questions remained unanswered: Did the strategies developed during the workshops have an impact on the policies elaborated and implemented by the participants, and did the experience have a lasting impact on their thinking? To answer these questions, the information collected during the case studies was supplemented five years later by a review of relevant policy documents produced after the interventions and in-depth, retrospective interviews with leading figures among the original participants.
References


Chapter 1


