Luca Bertolini:
Planning Mobility

Abstract

Contemporary lifestyles and business practices are increasingly dependent on mobility. In order to thrive, places seek ever better physical and virtual connections to other places. At the same time, the negative impacts of mobility on natural and social environments are growing dramatically, as is the public outcry for their reversal. Planners are faced with a difficult dilemma: how to rejoin the essential role of mobility in enhancing societies' and cities' welfare and well-being with the lack of sustainability of present mobility practices? This first dilemma is compounded by a second one: how to overcome the tension between the increasingly borderless nature of the action spaces of mobile households and firms with the much more limited and fragmented scope of policy arenas and research agendas? The paper argues that coping with these dilemmas requires understanding and managing the deep intertwining of mobility, spatial developments, and broader socio-economic and cultural processes, but also coming to terms with the many, irreducible uncertainties of the challenge. concludes that only a more intensive and critical interaction between different disciplines – at the very least integrating transport and spatial planning, but reaching further - and between planning science and planning practice can achieve this.

1. Setting the scene

We live in a quintessentially mobile society. Contemporary lifestyles and business practices increasingly depend on mobility, both physical and virtual. In order to thrive, places seek ever better connections to other places. At the same time, the negative impacts of this 'hypermobility' (Jotin Khisty and Zeitler, 2001) on natural and social environments are growing dramatically, as is the public outcry for their reversal. Policy-makers across the world are faced with a difficult but urgent dilemma: how to rejoin the essential role of mobility in enhancing society's welfare and well-being with the lack of sustainability of present mobility practices? This first dilemma is compounded by a second one: how to overcome the tension between the increasingly borderless nature of the action spaces of mobile households and firms with the still limited and fragmented scope of policy arenas and research agendas? Both dilemmas are especially manifest in cities, where both the positive role and the negative impacts of mobility are highest (May and Marsden, 2010).

Mobility has thus become central to the very object of planning, cities, but the full implications seem not to have been drawn. Urban planning still seems to see mobility as just one among many particular concerns, rather than a central, structuring perspective on the development of cities. On the other end of the spectrum, transport planning, while of course focusing on mobility issues, still seems to ignore the broader, long term implications for the quality of life in cities. Furthermore, both urban and transport planning seem to lack awareness of the deeply contested and yet pressing nature of mobility issues, and thus the need to acknowledge the irreducible uncertainty surrounding planning goals and means, and yet to act in the face of it.

Planning the contemporary city requires on one side understanding and managing the deep intertwining of mobility, spatial developments, and broader socio-economic and cultural processes, and on the other side coming to terms with the many, irreducible uncertainties of this challenge. A much more intensive and critical interaction between different disciplines – at the very least fully integrating transport and urban planning - and between planning science and planning practice seem to be necessary to achieve this. This paper aims at contributing some conceptual steps in this direction. In the first section, the notion of a mobile society will be articulated. Second, the consequences for cities will be dwelled upon. Third, the two core dilemmas of mobility planning – 'dependency vs. lack of sustainability' and 'borderless action spaces vs. bounded and fragmented policy and research' - will be discussed. Fourth, the features of a planning able to cope with these dilemmas will be introduced. In the conclusions, implications for planning education and research will be drawn.

2. A mobile society

While mobility has been always part of human life, interaction between developments in transport and telecommunication technologies and developments in the economic, social and cultural sphere have made mobility a defining characteristics of modern societies (Castells, 1996; Graham and Marvin, 2001; Laarsen et al., 2006; Sheller and Urry, 2006). People's daily lives are made up of a growing diversity of activities and locations, and mobility holds all of this together. People live in one place, work in a second, and shop, care for another person, or seek entertainment in another. Thanks to mobility, there are a great number of options available when it comes to living, working, leisure or social contacts. These enable people to take advantage of the specific characteristics of different places, thereby fulfilling an increasing variety of wishes and needs.

Business processes are also becoming more and more spatially articulated. When we reconstruct the creation of a product or service, we often discover that the management, the administration, the production and the distribution departments are each at a different location. Although those different locations may be in the same region, they are often in different places, or even countries. Sometimes different firms are involved, with one company being a supplier or buyer of the other. However, the process can just as easily be organized within one and the same company, with the many-branched value chains of transnational corporations being perfect examples. This spatial articulation allows firms, just like households, to make use of the differences between locations to meet a growing variety of requirements. At one location it might be the concentrations of qualified employees or high-quality facilities while, at the other, it might be the cheap land or labor (Castells, 1989; 1996)

Modern lifestyles and business processes are thus inextricably linked to mobility. But there is a paradox. While mobility brings freedom it also becomes a necessity. Without mobility, we cannot get access to basic services and take part in social and economic life. We *have to* move. Sheller and Urry (2000) speak in this respect of the 'coercive flexibility' of automobility, Ascher (2003) of the need to recognize a 'right to mobility'. How true these statements are becomes clear if mobility options declines, for example as a consequence of worsening congestion, or more expensive

fuel. The loss of mobility due to unexpected events (such as extreme weather conditions) heavily disrupts daily routines and forces painstaking adaptations. In cities around the world congestion on the roads and delays in public transport services are some of the most widely and heatedly debated issues, as they directly impinge on the quality of life. An investigation in the Amsterdam region revealed for instance a positive correlation between the level of stress and the duration of the daily commute (O+S Amsterdam, 2008). Elsewhere more is at stake: the difference in mobility options between population groups exacerbates unequal access to work and essential facilities, and therefore people's very life chances (Anand and Tiwari 2006; Venter et al., 2007; Coveney en O' Dwyer, 2009).

The process of spatial disintegration of activities and reintegration by means of mobility gradually unfolded during the industrial revolution. In the second half of the previous century it became a generalized condition in Western societies. It has now become a worldwide phenomenon. The progress in transport and telecommunication technologies means that, over the years, the effort and costs involved in mobility have decreased spectacularly while, correspondingly, the mobility options for households and firms have spectacularly increased. Transport and telecommunications are both responsible for this process. From the historical point of view, telecommunications and transport have been subject to almost parallel growth trends (Grübler, 1990). However, in the recent past, there has been considerable speculation that the current tumultuous developments in telecommunications would cause this pattern to change (Martin, 1978; Toffler, 1980). The physical movement of people and goods was expected to become more and more unnecessary. Telecommunications would replace physical contacts between people. It would become possible to control the production of services and goods remotely. However, practice to date has emphasized the lasting role of physical mobility. There has been no simple replacement of transport by telecommunications, but rather a mix of partial replacement, the generation of new mobility and the creation of new physical and virtual combinations (Ascher, 1995; Graham and Marvin, 1996; Graham, 1997; Mokhtarian, 1998; Wheeler et al. 2000; Janelle, 2004; Larsen et al., 2006; Schwanen at al., 2008). Social or business relationships which are digitally maintained need to be regularly reconfirmed by physical encounters. Mobile telephones are primarily used to arrange meetings or to coordinate matters while travelling from one place to another. Services and products are offered on the Internet which, when purchased, translate into considerable flows of goods and people. Remote coordination and the material circulation of freight seamlessly combine in the production and distribution of artifacts. The net result of all this, at least for the time being, is the continuing growth of physical mobility. In 2007 the average Dutch person travelled over 32 km per day (Statistics Netherlands, 2009). By comparison, during the XVII century, the so called Golden Age of the Netherlands, this was approximately the distance someone travelled in *one year* (Dijst and Kapoen, 1998). Worldwide, km traveled per person per day have moved from 3,7 in 1950 to 13,1 in 1997 (from 12,3 to 45,6 in industrialized regions, from 1 to 7,2 in the rest of the world), resulting in a staggering total of 2,628 and 14,951 billion passenger-km per year in 1950 and 1997 respectively (WBCSD, 2001). This trend is deemed to continue in the foreseeable future. WBCSD (2004) expects passenger-km to grow between 2000 and 2050 at an average of 1.7% per year worldwide, up to 74,036 billion, with China and Latin America experiencing the higher growth rates (3.0% and 2.9 %) and several non OECD countries narrowing (the former Soviet

Union), or even closing (Eastern Europe) their 'mobility opportunity gap' with the industrialized world.

3. Cities on the move

In the wake of this exploding mobility, the human phenomenon that we call 'city' has changed profoundly. Before the industrial revolution almost all activities involving urban dwellers took place inside the city's walled limits. Back then there was an almost direct relationship between the city as a physical phenomenon (the buildings) which the Romans called *urbs* and the city as a social phenomenon (the people and the activities), referred to as the *civitas*. The allegorically urbanized landscape which Ambrogio Lorenzetti painted in the town hall of Siena in the fourteenth century portrays this magnificently (Figure 1). There is a hard line between the town (on the left hand side) and its surroundings (on the right hand side). City life takes place inside the city walls while outside there is peace and quiet. There is a strong overlapping between *urbs* and *civitas*.

Figure 1 Ambrogio Lorenzetti: *Effetti del buon governo in città e in campagna*. Source: Wikipedia

Today the situation is totally different. *Urbs* and *civitas* actually appear to have become disconnected. Activities between the inhabitants of cities now take place at numerous locations and in all kinds of ways, while households and firms inside the same city may scarcely have any links with each other (Dematteis, 1988; Graham and Marvin, 2001). The image of a city that Google Earth displays (see Figure 2) has very little in common with Ambrogio Lorenzetti's Siena. It is a city without any clear boundaries, a city of dissipated activities and changeable links. It is a city where the traditional urban centers, the squares and streets of the historic city, appear to be losing their dominant role and where new centers seem to be appearing, as first observed in the United States (Fishman, 1989; Garreau, 1991) but later also in Europe (Ascher, 1995; Sieverts, 1997) and in the rest of the world (Castells, 1996).

There are two essential features which make cities attractive and vital (Jacobs, 1961; 1970; Lynch, 1980). The first is a wide variety of people, businesses and activities. The second is a large number of exchanges between all the different actors. Diversity and exchanges make cities attractive for people because they make them places that offer unique freedom of choice as regards lifestyles. 'City air makes you free' was a

text that adorned city gates as long ago as in the Middle Ages. Diversity and exchanges also make cities attractive for firms because it turns them into places where far-reaching processes of economic specialization and integration can take place and where large and articulated markets exist. Historic city centers were, for a long time, the focal points of almost all diversity and exchanges. Nowadays that is no longer the case. They have become places among many, albeit with their own specialization (e.g. tourism) but, as a result, a relatively limited variety of people, firms and activities. The same appears to apply, however, to new urban areas. After all, functional specialization is a defining characteristic of suburban residential areas and industrial estates.

Figure 2 Amsterdam and environs. Source: Google Earth

Urban diversity and exchanges have to be sought elsewhere. In a mobile society, it seems to be the case that the places at which all those flows of people, goods and information come together, such as transport interchanges (highway junctions, railway stations, airports), offer the greatest diversity and possibilities for exchanges (Castells, 1989; 1996; Garreau, 1991). It is in these 'mobility environments' (Bertolini and Dijst, 2003) that the spatially fragmented lifestyles and commercial processes of the city physically come together.

4. Two dilemmas

The deep-rooted link between mobility and urban development confronts policymakers with two fundamental dilemmas. The first dilemma concerns the tension between the need of mobility and its negative effects. On the one hand, mobility has become an essential condition for social emancipation and economic development, as we have witnessed. However, on the other hand, the negative effects of mobility are also becoming more and more obvious, with energy consumption, greenhouse gas emissions, air pollution, noise pollution, accidents, the severing of landscapes and communities being just a few poignant examples. It is making it increasingly difficult to find a political basis by which to meet the growing need for mobility through the construction of new infrastructure and it is making transport projects substantially more expensive due to mitigation and compensation. There are also the negative effects within the mobility system itself, such as congestion for those who drive or ride and exclusion for those who do not. In the developed world technology is expected to help on some fronts, but on others (most notably including nonrenewable energy consumption and greenhouse gas emissions) progress will most likely not be enough to balance for the explosive growth in mobility. In the developing world, even the solution of basic issues as appropriate mobility infrastructure, equity in access, congestion, air pollution, noise, and accidents is not in sight (WBCSD, 2001). Mobility appears to have become the victim of its own success.

The result is that the dominant approaches to mobility policy of the past are no longer usable. This applies in the first instance to the so-called ‘predict and provide’ approach of the Sixties and Seventies (Owens, 1995; Marvin and Guy, 1999). This was based on predicting the mobility growth, followed by the building of infrastructure to accommodate that growth. The resources for keeping up with the ever-growing mobility demand no longer exist. Moreover, recognition of the negative effects of mobility means it is undesirable simply to continue in this way. An alternative approach was in its heyday in the Eighties and Nineties, spurred on as it was by the energy crisis and growing environmental awareness. This was sometimes referred to as ‘predict and prevent’ (Owens, 1995). The idea was that the predicted mobility demand in fact had to be avoided, primarily by discouraging car use and by promoting alternative means of transport or by replacing mobility with telecommunications. This approach too is no longer useable since it ignores the degree to which the well-being of households and the viability of firms have become dependent on rapid and cheap mobility. The fierce societal resistance to road pricing in many countries has made this all too clear. A new approach to mobility policy is now emerging which is trying to find a balance between the two. It is trying to identify forms of mobility which acknowledge the need and desirability of mobility and, at the same time, can reduce its negative effects. This is what is generally meant by ‘sustainable mobility’ and is supported by a growing array of actors spanning academia and the profession (e.g. Banister, 2005), government (e.g. European Commission, 2007) and business (e.g. WBCSD, 2001). However, and in spite of the apparent consensus, progress on the ground shows limited and difficult (Banister, 2005; 2008; May and Marsden, 2010).

Basically there are two strategies for making urban mobility more sustainable (May and Marsden, 2010). The first is to reduce the negative effects of the wholesale use of

cars and trucks, for example by means of cleaner fuels, more efficient engines, or traffic management measures. The success of this approach depends very much on radical technological innovations and for that reason it is surrounded by uncertainties. Moreover, not all the problems can be solved using technology. An example is the consumption of space; another is the livability of streets and neighborhoods. The second strategy tackles the problem closer to the source and tries to find alternative ways of providing households and firms with access to activities and resources that are important to them. This usually means that access is offered using transportation means other than cars or trucks, or through a more efficient use of cars and trucks. This is no easy task since those alternative means of transportation are not readily available, as illustrated by the never-ending but still unfinished search for ways of getting people out of their cars and onto public transport.

However, classic contrasts like that of cars versus public transport do not appear to be productive. Researchers and policymakers are becoming more and more convinced that smarter combinations or measures are necessary which attempt to increase *both* individual awareness *and* freedom of choice (Banister, 2008). The emerging philosophy is to allow people themselves to choose how they wish to move about, but to make the social and environmental implications of those choices visible and tangible and offer alternatives. Do not force people to abandon their cars and trucks but allow them to pay for the harmful effects and inform them of alternatives, for example in the form of different routes, times, means of transportation, or destinations. In the long term we can perhaps, in this way, shift from a situation in which whether to purchase a car, or a truck, or not is all-decisive for additional mobility behavior to a situation in which an assessment is made on a case by case basis as to which mobility option is most suitable (multi-mobility). This may mean going on holiday or to a home mall by a rented or shared car, but going to work on public transport and to school by bicycle. Understanding how mobility practices are embedded in space seems an essential condition to pursue this strategy. This is, accordingly, the focus of the first of the three building blocks discussed later on in the paper.

The second dilemma policymakers are confronted with due to the deep-rooted link between mobility and urban development has to do with scale, as a result of the fact that the action spaces of mobile households and firms are not tied to clear territorial borders, despite this generally being the case for policy arenas (Brenner, 2004; Healey, 2007; Salet and Thornley, 2007). This is most evident in urban regions. The urban region is the scale level at which the daily activities and mobility patterns increasingly take place. However, there is often no clear administrative framework at that level of scale. Although there have been enough initiatives, such as the setting up of metropolitan regions and more flexible partnerships between municipalities, no strong urban regional administration has been created in many places as yet. Indeed, the question is whether this will ever come about, hampered as it is by a long-term administrative tradition based on nation states (be they federal or unitary) and municipalities. This tradition has deep roots in both formal and symbolic institutions which for instance make people feel linked with a municipality rather than with a region. It is also physically perceptible in the existing transport systems, usually developed to serve local or national and not regional levels of scale. The mismatch is visible every day in traffic jam related problems: motorways designed with a view to covering long distances are overburdened with massive flows with a much smaller

scope. Overfull, unreliable local trains tell the same story. However, just as the institutions, the transport systems are slow to change.

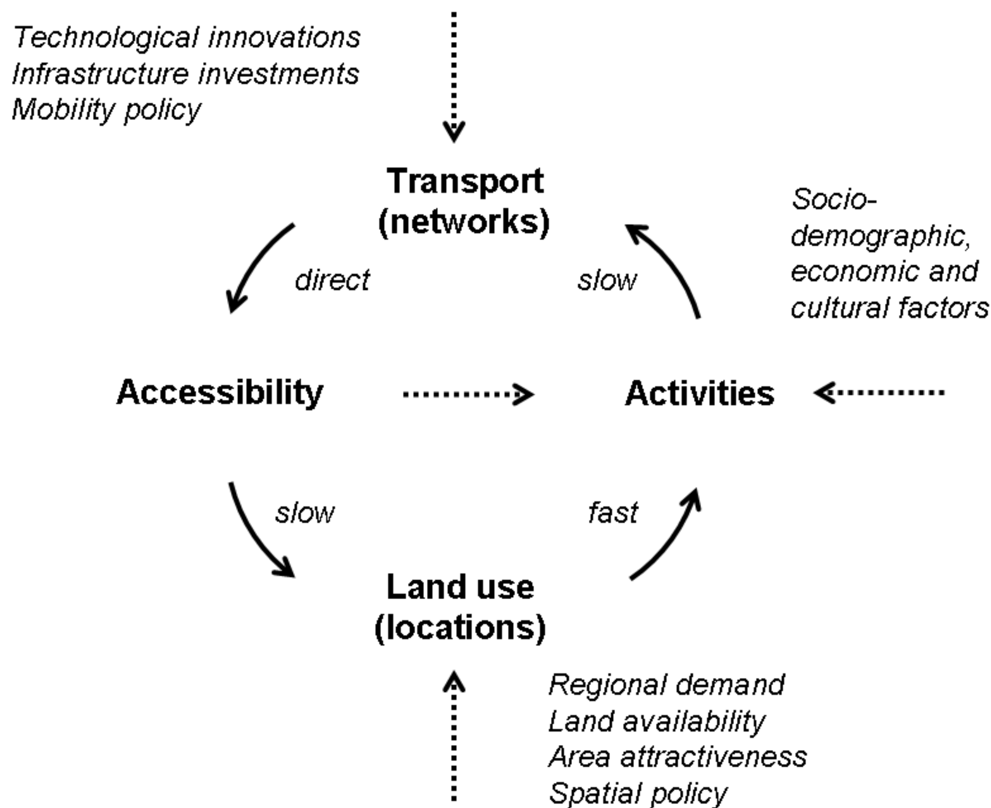
But even if a strong urban regional administration were to exist, and proved to be capable of completing the faulty regional networks, the question is whether this could be sufficient. The action spaces of households and firms have not only increased in size, they are also highly differentiated. For example, research shows that in the case of a large number of households in the Dutch city of Amsterdam, life is played out in the broader region. However, for some this means the entire *Randstad* (the urbanized West of the Netherlands), while for another notable group this still means the municipality itself (Ruimtelijk Planbureau, 2006; 2007). This variation is even greater among firms. Moreover, the dynamism of all those action spaces is considerable given that they are continuously being adapted based on changes in the attractiveness of destinations and of the costs of reaching these.

In the light of the increasing differentiation and dynamism of action spaces, the search for the right level of scale for urban and mobility policy appears to be a pointless exercise. It seems to be more important to increase the capacity for pursuing policy at a number of different levels of scale at the same time, and to form action-oriented coalitions of other parties according to the nature and scale of the problem. The term 'multi-level governance' has been coined to describe this idea. Fundamental research and policy experiments are ongoing as continued attempts to articulate this concept en strategy (see e.g. Salet and Thornley, 2007). From the perspective of a mobile urban society, the integration of urban and mobility policy must, in any case, be made easier. Planning must and can provide the building blocks for this integration and I now wish to turn my attention to a discussion of the three conceptual ones. After that, I will discuss some implications for planning education and research.

5. Building block I: the transport land use feed back cycle, and beyond

In order to tackle the previously outlined dilemmas, one first has to acquire an insight into the way in which the use of urban land, transport systems, and the activities of households and firms influence each other. There are clear connections between urban land use and transport systems. Striking examples are the close links between suburban environments and the car, or the much greater role of public transport in compact urban centers. A fundamental, recurring question concerns the direction of causality: do spatial developments determine the development of transport systems or does the reverse apply? Is mass car use the result of suburbanization or has the growth in car use caused suburbanization? And what is the link between the development of public transport and high density urbanization? The answer that transport planners and geographers have provided for a number of decades is that the influence is mutual. Suburbanization and the growth in car use have mutually reinforced each other, as have the development of public transport and compact urbanization. The essence of this relationship is caught in what is referred to as the transport land use feedback cycle (Wegener and Fürst, 1999; Meyer and Miller, 2001; Giuliano, 2004).

Figure 3 Transport land use feedback cycle (own interpretation)



The reasoning behind this is as follows (Figure 3). Patterns of land use partly determine the places at which people carry out activities, namely where they live, work, engage in leisure pursuits, etc. Movements between these different locations of activity have to be taken care of by the transport system and transport system developments are intended to be adapted accordingly. In turn, transport developments determine the accessibility of locations and, with that, their attractiveness as a location for certain activities.

The simplicity of the transport land use feed back cycle is both its strength and its weakness. Developments in the real world are determined by many more factors (Hanson and Giuliano, 2004). Furthermore, by focusing on a system view, there is a risk to overlook the role of individual agents (the people). The cycle should be thus seen as open and the development of the individual components as co-determined by other factors. For instance (see Figure 3), land use developments depend not only on accessibility conditions but also on the availability of land, characteristics of the local environment, land use policy, or the economic dynamism in a region. Individual characteristics of households and firms and the characteristics of the wider socio-economic context play a major role in the emergence and adaptation of patterns of activities, a greater role in fact than that played by spatial factors. The development of transport systems is not only determined by the demand for movements but also by relatively autonomous developments on the supply side, such as technological innovation or transport policy. The transport land use feedback cycle is also internally complex. Response times vary a great deal. While patterns of activities can be changed relatively quickly (within years, or even days, depending on the activity),

changes in land use and transport systems demand much greater amounts of time (in the order of decades). This leads to all manner of short circuits and contradictory movements. Variations in accessibility can, for example, lead to changes in patterns of activities without the land use changing first (Figure 3).

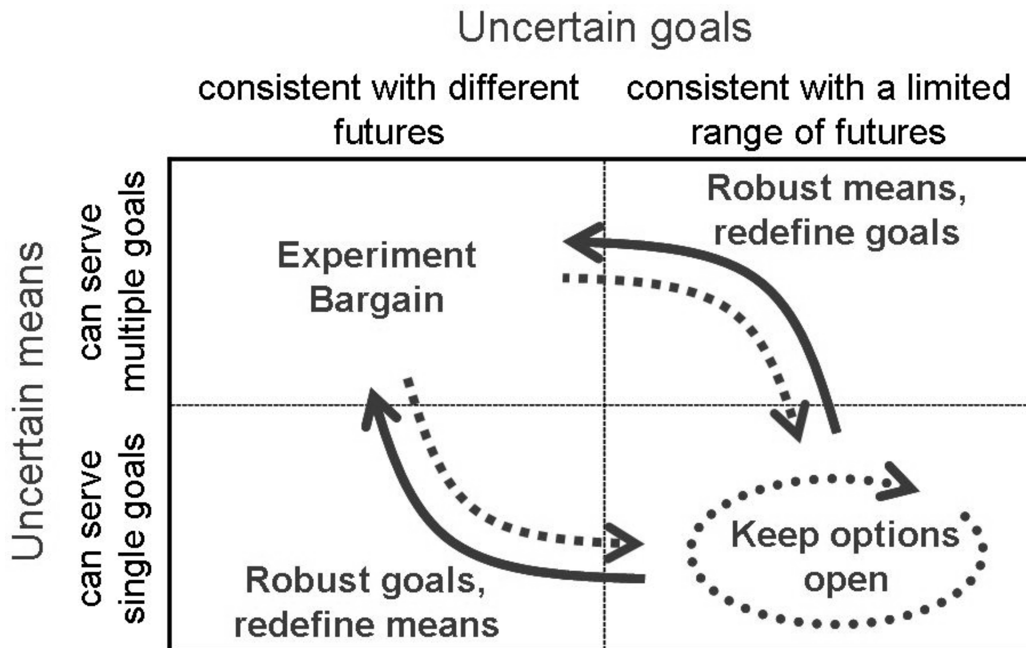
Despite these important nuances, the transport land use feedback cycle can provide a useful framework for exploring the relationship between developments in cities and mobility. It places the focus on the dynamic nature of the relationship, on the mutually strengthening or indeed weakening developments in both domains. It also reveals where the challenges are, for example in the need of reconciling the low level of flexibility of public transport with the increasing fickleness of metropolitan movement patterns (as addressed by regional light rail developments), or of reconciling the low level capacity of the car with the pressure in historic urban centers (as addressed by parking regimes or congestion pricing). Successful policy acknowledges these dependencies and dynamism and seeks ways of strengthening or indeed weakening them. For example, it is policy that combines the development of the public transport system with compact urbanization around that system's stops, and vice-versa, as in Transit Oriented Development (Dunphy et al., 2005). But it is also policy that acknowledges that, in the case of developments in low density areas, public transport can never play a leading role and that the use of cars should in fact be facilitated, as already stressed by Webber (1986) and more recently advocated by Bruegmann (2008). The inadequate spatial support for new public transport systems or, conversely, the lack of access to public transport in many new urban development locations show that things do not, by any means, go as they should in this respect. However, successful policy is also aware of the complexities of the transport land use relationship, and thus of the often decisive role of developments outside the cycle, and of the possibility of unexpected short circuits inside the cycle (Figure 3). It is policy, therefore, that acknowledges the existence of factors that fall outside the policy control and also takes account of the unpredictability of its own continued effects. This brings me to the second mobility planning building block, namely insight into how to deal with this deep-rooted uncertainties.

6. Building block II: coping with irreducible uncertainty

In essence, planning is about linking goals and means. Which goals should we be pursuing? Which means can we employ to achieve them? Traditional planning approaches assume that both a consensus on goals and an insight into the effectiveness of means are feasible, meaning that uncertainty can be reduced and a balanced choice can be made. This was most explicitly the case in the ideal, rational approach to planning (Simon, 1957) but it is still implicit in many current approaches, most notably in transport planning (Wilson, 2001). However, the debate on the dilemmas of the mobile society appears to be characterized by lasting, irreducible uncertainty regarding planning goals and means. For instance, although there is certain agreement on the necessity of sustainable mobility, each attempt to develop and apply it in practice reignites the discussion. Should we treat the economy or the environment as the priority? And how can we most effectively stimulate the economy or protect the environment? Will we ever really know the answer? Those who follow debates like the one relating to the expansion of airports, new motorway links, or other major infrastructure projects, or to parking regimes, road pricing and other limitations of car use, have to answer the latter question with a resounding 'no'.

Uncertainty about goals and means will persist. The situation is, therefore, such that planning approaches which focus only on reducing uncertainty will not come up to the mark, meaning that a much more adaptive approach is required. I call this an evolutionary approach, by analogy with adaptive processes in the natural domain and conceptualization in other social sciences.

Figure 4 Evolutionary planning



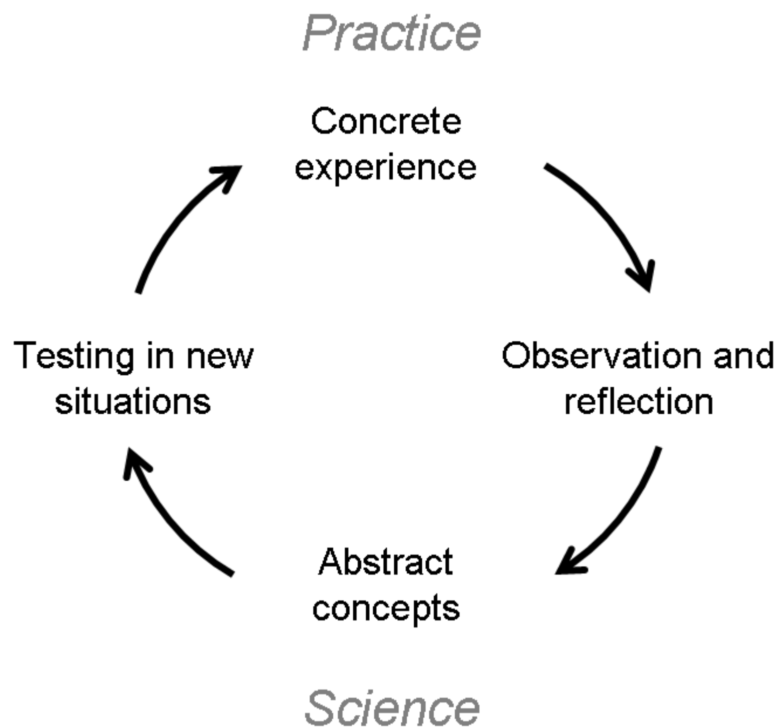
The most important point of departure is that, in a situation in which the uncertainty regarding goals and means cannot be reduced, the focus of planning has to shift from searching for certainty to searching for robustness and flexibility (Figure 4). Goals and means will continue to be uncertain but their robustness may vary, and this is a crucial difference. Robust goals are goals which are relevant in a number of possible future contexts. The maintenance of conditions for innovation of the urban economy is, for example, a more robust goal than assuming the long-term prevalence of a specific economic sector. Robust means are means which can serve a number of goals simultaneously. The maintenance of sufficient diversity as regards mobility options in cities is, for example, a more robust means than devoting everything to the development of one type of mobility. Goals and means which appear to be robust have to be experimented and bargained over in order to explore their potentials in more detail by implementing them in practice. After all, they will continue to be uncertain and only their application will reveal whether their potential is more than a hollow promise. Goals and means which are not robust, or turn out not to be robust after application, need to be reconsidered. Until then, options need to be kept open, and flexibility be preserved. It is a continual process which does not stop when policy is implemented and with regard to which it is important to keep involving various views on what should and can be done. The world, our understanding of it and our views on it will continue to change and in order to cope with this we should continually seek and not avoid refutations and contradictions.

Recent developments clearly reveal the dangers of goals and means which are insufficiently robust. North American cities which are very much car-oriented have on the whole functioned satisfactorily for decades but have turned out to be quite vulnerable when confronted with unexpected changes in the context. Unexpected and substantial increases in fuel prices caused entire lifestyles and industrial complexes to wobble. The turnover of hypermarkets plummeted, the real estate value of remote houses dropped, and the car industry was unconcerned with people who wanted to and had to drive more economically. Now fuel is cheaper again but it is very uncertain how the price is going to develop in the future. In any event, new and substantial price raises cannot be ruled out. The more varied mobility systems of European and prosperous Asian cities, where more economical cars, public transport and non-motorized means of transport also play a role seem to have proven to be more durable in this respect. However, the final word has by no means been spoken on this issue. Historically, North American society has shown itself to be very adaptable and whether the mobility systems of Europe and Asia will remain robust and flexible in the long term still remains to be seen. It is a challenging quest which also demands a change in the relationship between planning practice and planning science, as represented by the third and final mobility planning building block.

7. Building block III: experiential learning between science and practice

Understanding and managing the relationships between urban development and the development of transport systems is a major challenge, as is the identification and implementation of robust and flexible policy goals and means. Such challenges demand intellectual enquiries but also practical experiments, a science which can inspire a change in practice and a practice which is open to insights from science. The complex interactions sketched in Figure 3 can to a certain degree be mapped by researchers, but can never be entirely captured by them, and must therefore be also explored in actual, real world 'policy experiments' (Szejnwald Brown, 2004). The same applies to the search for robust and flexible combinations of planning goals and means evocated by Figure 4. More cross-pollination between planning science and practice is thus needed. This brings me to my third diagram (Figure 6). It elaborates on what is known as the 'experiential learning cycle' (Kolb and Fry, 1975) developed in the theory of education context during the Seventies and inspired in turn by the views of North American pragmatists.

Figure 6 Experiential learning cycle as a link between science and practice



The underlying idea is that learning is a process which closely combines action and thought, experience and conceptualization. Learning takes place by observing and reflecting on concrete experiences, by conceptualizing observations and reflections, experimenting with the acquired insights into new situations, and by applying the outcomes in concrete experiences. I believe that the experiential learning cycle provides a useful framework by which to structure the relationship between planning science and practice. The practice is the world of concrete experiences, the science that of abstract concepts. Learning takes place when the two domains are linked together. This occurs primarily in intermediary activities, that is, by observing and reflecting on practice, and by experimenting with the new insights from science. The inclusion of both practice and science is essential in order to maintain sufficient contact with developments in the world of experiences on the one hand and those of ideas on the other. At the same time, there has to be clarity regarding the differences in roles and activities in order to maintain a critical attitude on both sides.

The diagram provides a framework for the development of research programs in which to make optimal use of the unique potential of practice as a laboratory of new scientific insights. It also provides a framework to stimulate practice so that insights from science can be used immediately. Lastly it offers points of departure for educational programs aimed at producing, on the one hand, practitioners who are able to continue innovating and, on the other hand, scientists who are able to stimulate social innovation. The dilemmas discussed above can provide a focus and rationale for the exercise. Even more than that, they can only be coped with if such learning processes are in place (May and Marsden, 2010). However, I believe that, at the

moment, this cross fertilization is by no means being used to its full potential in the world of planning science, practice and education.

There are institutional barriers that need to be overcome. Indeed, institutional spaces need to be created and, where these are already present, consolidation needs to take place so that the critical interaction between planning practice and scientific research can be anchored. Research programs developed in recent years have reflected this change in direction, but the procedures have by no means been definitively formulated, let alone institutionally anchored. In education, possibilities need to be expanded to enable students to reflect systematically on practice and, conversely, to enable practice to benefit from students' fresh interpretations and perspectives.

Contradictory signals are being received from the wider context. On the one hand, the call for the social valorization of scientific knowledge is getting louder all the time (Nowotny et al, 2001); on the other hand, the dominant accountability mechanisms in both planning science and practice seem to be becoming increasingly inward looking (Balducci and Bertolini, 2007). In the present context academic research is geared increasingly at obtaining the recognition of peers (that is, other academics, and particularly academics abroad), rather than recognition of those who are supposed to use it (planners at home). A main reason for this is that funding, but also individual and organizational prestige, are increasingly linked to that recognition, as expressed in international publications, invitations to lecture at universities abroad, and research assessments by fellow scientists. At the other end of the research-practice spectrum, room for reflection by practitioners is becoming more difficult to find within increasingly short-term output-oriented professional planning practices. This represents a crucial challenge for planning. Due to the dual nature of science and practice the field is well positioned to perform on both interfaces but, relatively speaking, less well when it comes to performing on just one of the two fronts. If they stay in their separate worlds planning scientists and practitioners are doomed to substandard achievements. By contrast, progress can be made if the worlds are linked (Straatemeier et al. 2010).

8. Implications for planning education and research

In the above I have discussed how society has become an intrinsically mobile one and how this faces planners with two difficult but urgent dilemmas: how to balance our dependency on mobility with the lack of sustainability of present mobility patterns? How to reconcile the unboundedness of mobility with the boundedness of policy arenas and research agendas? Next, I have proposed some conceptual anchors to cope with these dilemmas: the transport land use feed back cycle (and beyond); an evolutionary approach to planning; and experiential learning between science and practice. As a way of concluding I will discuss below some implications for planning education and research.

Each of the conceptual building blocks introduced above has implications for planning education and research. As far as education is concerned, there is first of all a need to teach students to think at land use and transport issues, urban development and mobility issues as one and the same. Traditionally, urban and regional planners have focused on the former and transport planners on the latter. In many curricula courses are offered that provide a stepping stone towards the other side, but truly

integrated programs are rare (Kryzek and Levinson, 2005). The task is that of educating professionals and academics who are able to span and link both fields, and have at least a working comprehension of the dominant paradigms in each of them. Second, there is a need to train students in coping with irreducible uncertainty, recognizing that values and thus planning goals are contested and that the same applies to knowledge ant thus planning means. Both urban and transport planning have moved some way in this direction, even if in different ways. Urban planning seems more at ease with uncertainty about planning goals (and the ensuing need to intersubjectively define problems and thus mediate and negotiate), as in collaborative planning approaches (Healey, 1997, Innes and Booher, 1999). Transport planning seems to have been rather exploring uncertainty about means (or the need to incrementally identify solutions and thus experiment), as for instance in 'adaptive planning' approaches (Marchau et al., 2008). However, the task seems rather that of dealing with both uncertainties at the same time, to negotiate, mediate and experiment, identify problems and explore solutions simultaneously, as sketched above. Third, interaction between planning science and practice should be central to the education philosophy, and reflection in action be acknowledged as the main way professionals learn. Of course, this is something that has long been contended since Schön's seminal contribution (Schön, 1983). However, what we still often see is courses concentrating on *either* practical skills (planning practice) *or* on fundamental questions (planning theory). Recent developments in academia seem even to exacerbate the dichotomy (Balducci and Bertolini, 2007). The challenge seems rather to have *both* being developed, iteratively in the same curriculum and course. Interaction with real practice seems a prerequisite. A possible reference here could be the deliberately 'transdisciplinary' approach to education propagated by institutions as Harvard and ETH Zürich (Steiner and Laws, 2006).

The building blocks also point at implications for research. First, research should help us understanding transport and land use dynamics in its complex relationship with economic, social and cultural processes. Of course, there is already a strong tradition of studies focusing on questions such as the impact of urban form on mobility behavior, or - conversely – the impact of transport infrastructure on urban (and particularly economic) development (see e.g. Hanson and Giuliano, 2004). However the deep intertwining of mobility and contemporary urban life requires that the field is broadened and links are made with other perspectives, as for instance the emergent 'mobilities' paradigm in the social sciences (Sheller and Urry, 2006). Key to this emergent paradigm is the observation that social sciences have tended to ignore mobility, while transport planning and modeling has tended to ignore the social dimensions of travel. However, an integration of the two is essential if we are to understand contemporary 'mobile societies' (Larsen et al., 2006). From a planning perspective a crucial question is how to achieve change (e.g. towards more sustainable mobility) in the face of such a complex, 'locked-in' intertwining of the technical and the social, as captured by the notion of a 'system of automobility' (Urry, 2004). Inspiration can be sought in other fields facing similar challenges in 'long term transformative change' (Grin et al., 2010). Second, research should help identify and articulate planning approaches to deal with irreducible uncertainty. Two directions seem promising. The first is that of retrospectively analyzing and conceptualizing how in complex planning issues irreducible uncertainty has come to the fore and be dealt with. The second is to explore the potential of new approaches being proposed in planning or other fields to deal with irreducible uncertainty of goals and means (e.g.

Lempert et al., 2003) in mobility planning practice. The third and final implication is that if proposed approaches are to be more than promising concepts and are also to improve actual planning practice, they need to be tested and further developed in 'the context of their intended use', as is common in other sciences aiming at changing not just understanding the world (van Aken, 2004).

Literature

Anand, A. and G. Tiwari (2006) A Gendered Perspective of the Shelter-Transport-Livelihood Link: The Case of Poor Women in Delhi. In *Transport Reviews*, Vol. 26, No. 1, 63-80

Ascher, F. (1995) *Métapolis, ou l'avenir des villes*. Paris: Editions Odille Jacob

Ascher, F. (2003) Multi-Mobility, Multispeed Cities: a challenge for architects, town planners and politicians. Paper presented at the Rotterdam Architecture Biennale, Rotterdam, May 9

Balducci, A., and L. Bertolini (2007) Reflecting on Practice or Reflecting with Practice? In *Planning Theory and Practice*. Vol. 8, No. 4, 532-555

Banister, D. (2005) *Unsustainable Transport*. London, New York: Spon

Banister, D. (2008) The sustainable mobility paradigm. In *Transport Policy*, Vol. 15, No. 2, 73-80

Bertolini, L. and M. Dijst (2003) Mobility environments and network cities. In *Journal of Urban Design*, Vol. 8, No. 1, 27-43

Brenner, N. (2004) Urban governance and the production of new state spaces in western Europe, 1960-2000. In *Review of International Political Economy*, Vol. 11, No. 3, 447-488

Bruegmann, R. (2008) Point: Sprawl and accessibility. In *Journal of Transport and Land Use*, Vol. 1, No. 1, 5–11

Castells, M. (1989) *The Informational City*. Oxford: Blackwell

Castells, M. (1996) *The Rise of the Network Society*. Oxford: Blackwell

Centraal Bureau voor de Statistiek (2009) http://statline.cbs.nl/statweb/ [consulted on 18-05-2009]

Christensen, K.S. (1985) Coping with Uncertainty in Planning. In *APA Journal*, winter, 63-73

Coveney, J., en L.A. O' Dwyer (2009) Effects of mobility and location on food access. In *Health and Place*, Vol. 14, No. 1, 45-55.

Dematteis, G. (1988) The weak metropolis, in: L. Mazza (Red.) *World Cities and the Future of the Metropolis,* 121–133. Milano: Electa-XVII Triennale

Dijst, M.J. and L.L. Kapoen (1998) Ontwikkeling van steden vanuit vervoersplanologisch perspectief, in: M. J. Dijst and L. L. Kapoen (Red.) *Op weg naar steden van morgen*, 1–9. Assen: Van Gorcum

Dunphy R, Cervero R, Dock F, Mc Avey M, and D Porter (2005) *Development Around Transit*. Washington DC: Urban Land Institute

European Commission (2007) *Green Paper—Towards a New Culture for Urban Mobility*. Brussels: European Commission

Fishman R, (1987) *Bourgeois Utopias: The Rise and Fall of Suburbia*. New York: Basic Books

Garreau J, (1991) *Edge City: Life on the New Frontier*. New York: Doubleday

Giuliano, G. (2004) Land Use Impacts of Transportation Investments. In S.Hanson en G.Giuliano (Eds.) *The Geography of Urban Transportation*. New York en London, The Guilford Press, 237-273

Graham, S. (1997) Telecommunications and the future of cities: debunking the myths. In *Cities,* Vol. 14, No. 1, 21-29
Graham, S. and S. Marvin (1996) *Telecommunications and the City. Electronic Spaces, Urban Spaces*. London, New York: Routledge
Graham, S. and S. Marvin (2001) *Splintering Urbanism. Networked Infrastructures, Technological Mobilities and the Urban Condition*. London, New York: Routledge
Grin, J., J. Rotmans and Johan Schot, with F. Geels and D. Loorbach (2010) *Transitions to Sustainable Development. New Directions in the Study of Long Term Transformative Change*. New York and London: Routledge.
Grübler, A. (1990) *The rise and fall of infrastructures: dynamics of evolution and technological change in transport*. Heidelberg: Physica-Verlag
Hanson, S., and G.Giuliano, Eds. (2004) *The Geography of Urban Transportation*. New York en London: The Guilford Press
Healey, P. (1997) *Collaborative Planning - Shaping places in fragmented societies*. Houndmills and London: MacMillan Press
Healey, P. (2007) *Urban Complexity and Spatial Strategies. Towards a Relational Planning for our Times*. London, New York: Routledge
Innes, J.E. and D.E. Booher (1999) Consensus Building and Complex Adaptive Systems – A Framework for Evaluating Collaborative Planning. In *Journal of the American Planning Association*, Vol. 65, No. 4, 412-423.
Jacobs, J. (1961) *The death and life of great American cities*. New York: Random House
Jacobs, J. (1970) *The Economy of Cities*. New York: Vintage Books USA
Janelle, D.G. (2004) Impact of information technologies. In: Hanson, S. and G. Giuliano (Red.), *The Geography of Urban* Transportation, third edition, 59–85. New York, London: The Guilford Press
Jotin Khisty, C., and U. Zeitler (2001) Is Hypermobility a Challenge for Transport Ethics and Systemicity? In *Systemic Practice and Action Research*, Vol. 14, No. 5, 597-613
Kolb D.A. and Fry, R. (1975) Toward an applied theory of experiential learning. In C. Cooper (Red.) *Theories of Group Process*. London: John Wiley
Kryzek, K., and D. Levinson (2005) Teaching Integrated Land Use-Transportation Planning: Topics, Readings, and Strategies. In *Journal of Planning Education and Research*, Vol. 24, No.3, 304-316.
Larsen, J., J. Urry and K. Axhausen (2006) *Mobilities, networks, geographies*. Aldershot: Ashgate
Lempert, R.J., S.W. Popper, and S.C. Bankes (2003) *Shaping the Next One Hundred Years. New Methods for Quantitative, Long-Term Policy Analysis*. Santa Monica: RAND
Lynch, K. (1980) *Good City Form.* Cambridge, MA: MIT Press
Marchau, V., W.Walker and R.van Duin (2008) "An adaptive approach to implementing innovative transport solutions", *Transport Policy*, Vol. 15, No. 6, 405-412
Martin, J. (1978) *The Wired Society*. London: Prentice Hall
May, A., and G. Marsden (2010) Urban transport and mobility. Background paper for the 2010 International Transport Forum, on 26-28 May in Leipzig, Germany, [accessible on www.internationaltransportfoum.org]
Meyer, M.D. and E.J. Miller (2001) *Urban Transportation Planning. Second Edition* New York: Mc Graw Hill

Myers, D. (2001) Introduction. In *APA Journal*, Vol. 67, No. 4, 365-367.
Mokhtarian, P.L. (1998) A synthetic approach to estimating the impacts of telecommuting on travel. In *Urban Studies,* Vol. 35, No. 2, 215–241
Nowotny, H., P. Scott and M. Gibbons (2001) *Re-thinking Science. Knowledge and the Public in the Age of Uncertainty*. Oxford: Polity Press
O+S Amsterdam (2008) *Metropoolregio Amsterdam in beeld 2007*. Amsterdam: Gemeente Amsterdam. Dienst Onderzoek en Statistiek
Owens, S. (1995) From 'predict and provide' to 'predict and prevent'?: Pricing and planning in transport policy. In *Transport Policy*, Vol. 2, No. 1, 43-49
Ruimtelijk Planbureau [J. Ritsema van Eck, F. van Oort, O. Raspe, F. Daalhuizen, and J. van Brussel] (2006) *Vele steden maken nog geen randstad*. Rotterdam: NAi uitgevers
Ruimtelijk Planbureau [W. Hornis, J. Ritsema van Eck] (2007) *Achtergronden: Het nieuwe ommeland*. Rotterdam: NAi uitgevers
Salet, W., and A. Thornley (2007) Institutional influences on the integration of multilevel governance and spatial policy in European city-regions. In *Journal of Planning Education and Research*, Vol. 27, No. 2, 188-198
Schön, D.A (1983) *The Reflective Practitioner. How Professionals Think in Action*. New York: Basic Books
Schwanen, T., M. Dijst, and M. Kwan (2008) ICTs and the decoupling of everyday activities, space and time. In *TESG*, Vol. 99, No. 5, 519-527.
Sheller, M., and J. Urry (2000) The city and the car. In *International journal of urban and regional research*, Vol. 24, No. 4, 737-757
Sheller, M., and J. Urry (2006) The new mobilities paradigm. In *Environment and Planning A*, Vol. 38, No. 2, 207-226
Sieverts T, 1997 *Zwischenstadt: Zwischen Ort und Welt, Raum und Zeit, Stadt und Land* [published in 2003 as *Cities without Cities: An Interpretation of the Zwischenstadt*. London: Routledge] Braunschweig: Vieweg
Simon, H. (1957) A behavioral model of rational choice. In H.Simon (Ed.) *Models of Man*. New York; Wiley, 241-260
Steiner, G., and D. Laws (2006) How appropriate are two established concepts from higher education for solving complex real-world problems?: A comparison of the Harvard and the ETH case study approach. In *International Journal of Sustainability in Higher Education*, Vol. 7, No. 3, 322 - 340
Szejnwald Brown, H., P.J. Vergragt, K. Green and L. Bechicchi (2004) Bounded socio-technical experiments (BSTEs): higher order learning for transitions towards sustainable mobility, in B. Elzen, F.W. Geels and K. Green (Eds.) *System innovation and the transition to sustainability*. Cheltenham: Edward Elgar, 191-219
Straatemeier, T., L. Bertolini, M. te Brömmelstroet and P. Hoetjes (2010) An experiential approach to research in planning. In *Environment and Planning B*
Toffler, A. (1980) *The Third Wave*. New York: Bantam Books.
Urry, J. (2004) The ‘System’ of Automobility. In *Theory Culture Society*, Vol. 21, No. 4/5, 25-39
Van Aken, J. E. (2004) Management Research Based on the Paradigm of the Design Sciences: The Quest for Field-Tested and Grounded Technological Rules. In *Journal of Management Studies*, Vol. 42, No.2, 219-246
Venter, C., V. Vokolkova en J. Michalek (2007) Gender, residential location, and household travel: Empirical findings from low-income urban settlements in Durban, South Africa. In *Transport Reviews*, Vol. 27, No. 6, 653-677

Webber, M. (1986) Automobility for everyone, in *Urban Resources*, Vol. 4, No. 1, 47-50, 64

Wheeler, J. O., Aoyama, Y., Warf, B., Red. (2000) *Cities in the Telecommunication Age. The Fracturing of Geographies*. New York, London: Routledge

WBCSD, World Business Council for Sustainable Development (2001) *Mobility 2001—World Mobility at the end of the Twentieth Century and its Sustainability*. Geneva, Switz.: World Business Council for Sustainable Development

WBCSD, World Business Council for Sustainable Development (2004) *Mobility 2030: Meeting the Challenges to Sustainability*. Geneva, Switz.: World Business Council for Sustainable Development

Wegener, M., and F. Fürst (1999) *Land-Use Transport Interaction: State of the Art*. Dortmund: IRPUD

Wilson, R. (2001) "Assessing communicative rationality as a transportation planning paradigm", *Transportation*, Vol. 28, No. 1, 1-31