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## **Social inequalities in urban access: better ways of assessing transport improvements**

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### **Abstract**

In the field of transport studies, research on urban access generally deals with this notion in a narrow sense. Most of the time the issue of access is analyzed in terms of transportation network performance, using economic models that were designed to assess infrastructure efficiency. In this paper we argue that the social characteristics of space and of individuals, along with the provision of urban amenities in a given urban environment, are also essential elements in the complex notion of urban access. Therefore, urban access should be analyzed not only in terms of transportation networks but also from the perspective of spaces and individuals. We begin with a review of studies measuring urban access through *accessibility* in the field of transport studies, without restricting our analysis to transportation networks and transport policies. By rejecting a narrow definition of urban access, we seek to broaden thinking on measuring social access inequalities and their implications for public policy. We will then examine policies implemented to improve accessibility, focusing on those policies that emphasize the social dimension of urban access, and offering a critical review of the models and indicators used to assess transportation investments and policies. Finally, we will suggest some possible explanations for the lack of emphasis on social accessibility and offer suggestions to help overcome current difficulties.

### **Introduction**

Since the 1990s, the existence of a link between transport and social exclusion has been recognized (Gaffron, Hine and Mitchell, 2001) and has featured prominently in several countries<sup>1</sup>. This connection has been the subject of growing interest in research and policy. In the United Kingdom, for example, the creation of the Social Exclusion Unit in 1997 was a starting point for the development of many studies analyzing the various factors behind social exclusion. Lack of access to facilities and services has been cited among the components of social isolation (SEU, 2003). As a result, the notion of accessibility has received renewed attention in studies aiming to understand the transportation or more generally speaking spatial dimension of social exclusion. Similarly, in the US and in France the implementation of welfare-to-work policies has placed new emphasis on the necessity for job seekers to access employment. At the same time, the transportation field has also changed its focus from policies addressing a wide range of destinations to strategies targeting deprived areas (Harzo, 1998; Sanchez, 2008). However, despite this growing interest in accessibility and its relationship with social exclusion processes, there has been more recognition of this issue than progress in evaluating its components, effects, and applications to public policy.

Accessibility is indeed a complex notion, “a multifaceted concept” according to (Curtis and Scheurer, 2010). It is related to the spatial dimension of social exclusion and raises the issue of the role of place and location in poverty (Farrington, 2007). However, the role of space in social

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<sup>1</sup>The role of transportation in social exclusion processes was recognized quite recently, compared to other services like health or education.

exclusion is unclear and still the subject of debate (Hodgson and Turner, 2003). While most studies emphasize the fact that spatial segregation reinforces social exclusion, some authors argue that other factors like race play a more important role than space in social exclusion processes (Elwood, 1986).

Another difficulty in dealing with the notion of accessibility is its proximity to that of mobility. The two terms are often used interchangeably without clear distinction. According to Handy (2002), there is a strong relationship between the two ideas, which probably explains the confusion: mobility refers to a potential for movement while accessibility can be defined as a potential for interaction (Hansen, 1959). Moseley (1979, quoted by Farrington and Farrington, 2005) insists that accessibility must be focused on “opportunities, not behavior”, which expresses the distinction between accessibility and mobility. Farrington (2007) underlines that “there should be no simple conceptualization which sees mobility deriving from person characteristics, with accessibility being solely an attribute of place. Accessibility is at least as much about people as places”. As mobility reflects the ability to reach a destination, policies to increase mobility will generally increase accessibility (Handy, 2002). However, this is not always the case. In the US, the focus on mobility in transportation planning has contributed to a decrease in accessibility by encouraging sprawl and a scattered pattern of urban development.

“To plan for accessibility, in contrast, is to focus on the ends rather than the means and to focus on the traveler rather than the system”. For Handy (2002), accessibility planning includes a much broader range of strategies, which do not necessarily imply increasing travel. For Curtis and Scheurer (2010), “while mobility is concerned with the performance of transport systems in their own right, accessibility adds the interplay of transport systems and land use patterns as a further layer of analysis”. As a result, mobility planning has traditionally been concerned with the movement of motor vehicles, people and goods, while accessibility planning includes the land use and transport connection (Litman, 2003). However, as Farrington (2007) states, “a mobilities discourse does not conflict with an accessibility concept, which recognises the significant role that mobility plays, and will continue to play, in achieving the spectrum of people’s needs for reaching and participating in activities, services and opportunities”. Thus, current reflections on accessibility converge with those of authors like Urry (2003) or Cass et al. (2005), which are more focused on mobility issues. The two concepts should be seen as complementary (Farrington, 2007).

Another point to bear in mind when dealing with accessibility issues is the fact that “accessibility is only one aspect of social exclusion, and the existence of a high level of accessibility does not necessarily imply that people are able to benefit from it” (Church, Frost and Sullivan, 2000). In addition, to understand the various components of accessibility, it is necessary to distinguish between direct and indirect accessibility. According to Hine and Grieco (2003) individuals with low levels of direct accessibility can gain actual access through their social networks. It is therefore important to take interpersonal interactions and involvement with the local community into account, since exclusion from mainstream society does not necessarily mean exclusion from local networks (Stanley and Vella-Broderick, 2009). At the same time, certain individuals' social isolation is likely to worsen their accessibility situation (Hine and Grieco, 2003). Social interaction is thus an important dimension of access, as underlined by Cass et al. (2005): “appreciating the networked nature of social life makes the notion of access more complex and less locally focused”.

Certain groups are more likely to experience accessibility-related disadvantages: low-income, women, the elderly, the disabled, and (more generally) carless individuals are the most affected by the lack of access (Hine and Mitchell, 2001; Social Exclusion Unit, 2003; Hine and Grieco,

2003). Unfortunately most of the accessibility measures currently used are area- and space-based (Hine and Grieco, 2003). Additionally, current accessibility planning is not very sensitive to issues such as gender, age, disability and ethnicity (Preston and Rajé, 2007).

Finally it is important to recognize that accessibility is a component of social justice. As Farrington (2007) pointed out, constrained access is “making more difficult the achievement of social justice”. Accessibility is thus “a pre-condition for social inclusion, itself a pre-condition for social justice”. The accessibility discourse should take the relationship between accessibility needs and accessibility rights into account (Farrington and Farrington, 2005). It necessarily engages reflections on equity (Young, 1994) and spatial justice (Soja, 2010). An accessibility perspective is part of “the project of inserting explicitly the notion of space into the understanding of social justice” (Farrington and Farrington, 2005). This cannot happen without integrating the various dimensions of accessibility planning. While transport policies are of course critical to achieve better accessibility, they can be viewed as a “fire-fighting” rather than permanent solution (Farrington and Farrington, 2005).

Within the current framework of accessibility planning, the integration of land-use and transport has become a key policy objective (Hine and Grieco, 2003) and has led to the development of new approaches to measuring accessibility. However, accessibility-enhancing policies are difficult to introduce and there are many barriers to their implementation. Some are technical in nature but most involve political choices and the way in which priorities are defined. In this paper, we first review the various definitions of the notion of accessibility, as well as measurement techniques that have been proposed in the literature. The second section examines policies intended to improve accessibility, focusing on those that emphasize the social dimension of urban access. A critical review of models and indicators used to assess transportation investments and policies is then provided. Finally, based on our conclusion that the social dimension of accessibility is not sufficiently accounted for in either evaluations or policies, the last section of this paper will suggest possible explanations for this situation and propose new ways of overcoming these difficulties.

## **1. Accessibility: definitions, measures, and observations**

Though accessibility is a major topic in geography, urban planning, and transport engineering, it is also “a slippery notion (...) one of those common terms that everyone uses until faced with the problem of defining and measuring it” (Gould, 1969). As noted by Dalvi and Martin (1976), the “conceptual nature” of accessibility makes it difficult to propose a satisfactory measure, and complicates its use as a variable in travel demand or urban interaction models. Examining the state of the art in the fields of transportation and urban planning studies, our paper will first review different perspectives on measuring accessibility. Then, focusing on the relationship between accessibility and social inequality, we will evaluate the usefulness and limitations of accessibility indicators as social indicators. Finally, we will discuss a number of empirical results concerning the social dimension of accessibility.

### **1.1. Definitions of accessibility**

Since the end of the 1950s, accessibility has been defined in various ways for different purposes. According to Vandenbulcke, Steenberghen, and Thomas (2009) there is no consensus on the definition and formulation of accessibility. Hansen (1959) defines it as “the potential of opportunities for interaction”. Most of the early definitions of accessibility refer to the “get-at-ability” of a destination (Hillman, Henderson and Whalley, 1973, quoted by Hine and Grieco, 2003). Burns and Golob (1976) thus refer to “the ease with which any land-use activity can be

reached from a location using a particular transport system”. According to Burns (1979), accessibility represents “the freedom of individuals to decide whether to participate or not in different activities”. For Ben-Akiva and Lerman (1979), it could be defined as “the benefits provided by a transportation/land-use system”.

These different definitions concur on one point: in its simplest sense, accessibility is related to the interaction between land use and transport systems. Accessibility therefore is not only a question of transport. Indeed, accessibility is determined “by the spatial distribution of potential destinations, the ease of reaching each destination, as well as the magnitude, quality and character of the activities found there” (Vandenbulcke et al., 2009). Accessibility is “a function of the mobility of the individual, of the spatial location of activity opportunities relative to the starting point of the individual and of the times at which the activities are available (...). Accessibility therefore depends on the transportation available to individuals, the temporal and spatial distribution of activities and the social and economic roles of individuals that determine when, where and how long they must pursue various activities” (Okodi, Kerali and Santorini, 2001). Bhat, Handy, Kockelman, Mahmassani, Chen and Weston (2000) define accessibility as “a measure of the ease of an individual to pursue an activity of a desired type, at a desired location, by a desired mode, and at a desired time”. According to a recent definition, “accessibility refers to the ability of individuals to easily reach desired goods, services, activities and destinations at appropriate times using an integrated transport system without being restricted by physical, financial or safety concerns” (Wixey, Jones, Lucas and Aldridge, 2005). This definition points to the various components of accessibility. Finally, most definitions agree on four main determinants of accessibility: land-use, transport, time and individual components (Vandenbulcke et al., 2009).

According to Geurs and Van Wee (2004), the *land-use component* of accessibility not only reflects the amount, quality, and spatial distribution of opportunities, but also the demand for these opportunities and the tension between supply and demand. The *transportation component* refers to the transport system, expressed as the disutility for an individual to cover the distance between an origin and a destination using a specific transport mode (which depends on the tension between infrastructure and transport service supply and demand). Since accessibility is related to the role of land use and transport systems in society, which “gives individuals the opportunity to participate in activities in different locations” (Geurs and Van Wee, 2004), we must consider the influence of two other components: the *temporal* and *individual* components. The former refers to the availability of opportunities at different times of the day and the time available to participate in activities in different locations. The latter relates to the needs, abilities and opportunities of individuals, which depend on several characteristics such as age, income, household situation, physical condition and availability of travel modes.

To summarize, an accessibility measure should ideally take into account these four components. It should be sensitive to changes in the transport and land-use systems, to temporal constraints or opportunities such as changes in the schedules of public services and account for individual characteristics such as income, sex, age, or qualifications that could influence access to travel modes, jobs, or housing. These four components are not independent. For instance, the distribution of activities influences travel demand and may also introduce time constraints, influencing people's opportunities. The individual component interacts with the three other components: a person's sex or age determines his or her time constraints, needs, access to travel modes, and relevant activity types. As stated by Farrington (2007), *accessibility is at least as much about people as places*: “A place is not just ‘more’ or ‘less’ accessible, but accessible relative to people in all their different circumstances: people experience more, or less, access to

places”. Accessibility is also related to social groups, which vary in their needs and ability to access different goods and services (Wixey et al., 2005). In practice, accessibility measures generally focus on one or more of the four components, depending on the perspective employed (Geurs and Van Wee, 2004).

## 1.2. Practical measures of accessibility

As underlined by Weber (2006), the history of accessibility is “the history of particular measures, such as topological, cumulative opportunity, population potential or space-time”. From a literature review in the field of transport and urban planning (see for instance Handy and Nimeier, 1997; Geurs and Ritsema van Eck, 2001; Kwan and Weber, 2003; Vandembulcke et al., 2009), we have identified three basic perspectives<sup>2</sup> on measuring accessibility:

(i) *Location-based measures* analyze accessibility at locations. The measures describe the level of accessibility from one place to spatially distributed opportunities around that place and are typically used in urban planning and geographical studies. This category includes several types of indicators, which have been improved over time, such as (Geurs and Ritsema van Eck, 2001):

- Distance measures, which are the simplest ones. For instance Ingram (1971) defines “relative accessibility” as the degree to which two places on the same surface are connected, and “integral accessibility” as the degree of interconnection for a given point with all other points on the same surface. This type of measure assumes that space is undifferentiated with respect to the distribution of opportunities, and mainly estimates the connectivity of locations derived from the transport network.

- Contour measures, also known as isochrone measures or cumulative opportunities, evaluate the number of opportunities from a particular point within a certain time distance or travel-cost range (Wachs and Kumagai, 1973; Dalvi and Martin, 1976). Elements of land use and transport components are taken into account, but their combined effects are not evaluated.

- Potential accessibility measures or gravity measures have been designed to differentiate the attractiveness of opportunities by considering their distance from the origin point. In these measures accessibility decreases gradually as the travel time to destinations increases. Hansen (1959) was the first author to use the “potential concept”, derived from the social physics school, to describe accessibility. Several adjustments to Hansen’s formulation have been proposed, using alternative decay functions of distance or cost and weighting the potential accessibility measure according to the total number of opportunities in the zone of origin (see for instance Dalvi and Martin, 1976).

- Competition factors and inverse balancing factors, derived from gravity models, have been developed to take into account competition effects that result from the interaction between the demand and supply of opportunities when measuring access to opportunities. Competition factors only account for the competition for available opportunities, for instance the competition between job seekers (Shen, 1998). Inverse balancing factors also take into account the impact of other opportunities in other places, which may influence the level of accessibility to opportunities in a given place. Based on the doubly constrained spatial interaction model of Wilson (1971), inverse balancing factors are calculated by using an iterative process ensuring the number of trips to and from each zone is equal to the number of opportunities (Geurs and Ritsema van Eck, 2003).

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<sup>2</sup> Unlike Geurs and Van Wee (2004), we do not consider simple infrastructure-based measures (evaluating the performance of the transport system, such as congestion level or the average speed on the road network) as reflecting accessibility. In our opinion, accessibility is a transversal notion, resulting from interaction between at least the land-use and the transport systems.

(ii) *Individual-based measures* analyzing accessibility at the individual level were first developed in the time-space geography of Hägerstrand (1970). They evaluate the activities that an individual can participate in at any given time, considering constraints such as the location and duration of activities, the time budget for activities, and the travel speed allowed by the transport system (see for instance Dijst and Vidakovic, 1997).

(iii) *Utility-based measures* analyze the utility (benefits) that people derive from access to spatially distributed activities. The primary assumptions of this approach are found in Koenig (1974, 1980). Accessibility is measured at the individual level and takes into account user characteristics (income, demographic variables), in addition to modal or link characteristics (speed and travel costs) (see for instance Banister and Berechman, 2000).

### **1.3. Methodological problems of accessibility as a social indicator**

While our literature review reveals the existence of a wide range of accessibility definitions and measures, most studies pay little attention to the social dimension of accessibility. Moreover, since accessibility has been defined primarily in terms of public transport access to key destinations, its measurement is mostly based on aggregate and unimodal approaches “when a more disaggregated, multimodal approach is required” (Preston, 2009). We will now review practical measures of accessibility, questioning (from a methodological point of view) their ability to be used as social indicators.

(i) Location-based measures represent accessibility from one location to all other destinations, and do not account for individual characteristics that influence access. This drawback can probably be overcome by disaggregating measures among different population groups (see for instance Handy and Niemeier, 1997). Nevertheless, these measures exhibit several shortcomings in accounting for individual disparities. First, neither distance, contour nor potential measures include competition effects, i.e. they do not account for the tension between opportunity supply and demand. Inverse balancing factors, which have been designed to overcome this problem, are rarely used because they are complex to interpret and to estimate, as they result from an iterative process (Geurs and Van Wee, 2004). Furthermore, location-based measures do not account for temporal constraints.

(ii) Individual-based measures seem to be more appropriate when evaluating social access disparities, as they analyze accessibility from the viewpoint of individuals. The main purpose of the space-time geography founded by Hägerstrand (1970) was to re-introduce the individual and time components into spatial models, examining how individuals' or households' activity programs could be carried out given time restrictions. Prisms were used to describe patterns in space and time, identifying the potential areas within which opportunities could be reached given predetermined time constraints. Individual-based measures have great theoretical advantages: in particular, they allow more sensitive assessment of variations in accessibility, such as gender or ethnic differences, and account for the “lived experience of individuals” (Kwan and Weber, 2003). Highlighting the need for new concepts and methods in accessibility research, Kwan and Weber state that “the effect of distance on the spatial structure of contemporary cities and human spatial behavior has become much more complicated than what has been conceived in conventional urban models and concepts of accessibility”. However, these measures have several shortcomings for the evaluation of land use and transport investment. First, they do not account for competition effects. Second, current activity-based measures focus on short-term behavioral responses, and do not include the effect of long-term land-use changes on daily household activities and travel patterns. Third, these measures are difficult to operationalize. Recent developments in space-time measures have been made using network-based GIS (Geographic

Information Systems) (see for instance Kwan, 1998). Despite advances in GIS and spatial modeling, many difficulties remain, including the detailed individual activity-travel data required and the lack of operational algorithms (Kwan, 1998). Furthermore, as data on individuals' time budgets are not available in standard travel surveys, applications are often restricted to relatively small areas and subsets of the population, resulting in difficulties in extrapolating the analysis to larger population groups.

### (iii) Utility-based measures

Under the utility-based approach accessibility should be measured at the individual level and computed by including individual characteristics (Banister and Berechman, 2000). Utility-based measures interpret accessibility as the outcome of a set of transport choices. The computation of individual utility takes user characteristics (income, residential location and demographic variables) into account in addition to the number of opportunities at the destination (measuring each person's freedom of choice) and transport characteristics (speed, travel costs) (Koenig, 1974, 1980; Banister and Berechman, 2000). Two main types of measures are cited in the literature (Geurs and Ritsema van Eck, 2001). The first is based on random utility theory (the logsum model) and its main advantage is that it can be integrated with microeconomic theory, allowing consumer surplus calculations. The second is based on a doubly constrained entropy model including competition effects, but this measure cannot be interpreted in terms of consumer surplus or welfare without strong restrictions. To summarize, utility-based measures satisfy most of the theoretical requirements for accessibility measurement except for temporal and schedule constraints. Furthermore, because they capture the non-linear relationships between accessibility improvements and changes in utility, they can show the existence of diminishing returns. As a result, a utility-based measure may indicate that it is more desirable to improve accessibility for individuals at locations with low accessibility than at locations already benefiting from higher levels (Koenig, 1980; Geurs and Ritsema van Eck, 2001). This is clearly relevant when undertaking social or economic evaluations of transport and land use projects. The major disadvantage of these measures is the difficulty of interpreting and disseminating them, due to their roots in complex economic theory (Koenig, 1980).

## **1.4. Incorporating the social dimension in accessibility measures: empirical results**

According to many authors (Church and Frost, 1999; Gaffron et al., 2001), few studies have produced useful indicators for analyzing the link between social exclusion and transport. In the field of social exclusion analysis, "there are relatively few studies which directly attempt to assess levels of transport or accessibility as part of their indicators" (Church and Frost, 1999). By the same token, in the transportation field there is a paucity of empirical data to analyze the link between transport and social exclusion.

However, the social dimension of accessibility has been extensively studied and documented since the end of the 1990s due to increasing concern over social exclusion and its determinants. Since then, lack of mobility and insufficient access to urban services and resources have been included among factors that can prevent particular social or ethnic groups from fully participating in society. These studies can be roughly divided into three categories:

(i) A significant number of studies have been dedicated to illustrating social disparities in mobility, based on individual indicators. Most of these studies analyze the relationship between individual characteristics (household income, race, gender, age, etc.) and various indicators, such as travel patterns (number of trips, distance travelled and travel modes), car ownership, or the possession of a driver's licence. These studies show that in the US (Murakami & Young, 1997; Pucher and Renne, 2003), in Great Britain (SEU, 2003) as well as in France (Mignot and



Rosales-Montano, 2006; Orfeuill, 2004; Paulo, 2006), low-income households travel less and make shorter trips than their richer counterparts. Similarly, in these three countries, the rate of car ownership is much lower among low-income households, which are therefore more dependent on public transit and walking. As Pucher and Renne (2003) pointed out, this might be interpreted as fundamental inequity in the transportation system. Many low-income households experience restrictions on individual accessibility because they cannot reach parts of metropolitan areas that are only accessible by car. This brings us to a second category of studies that goes beyond mobility to address the notion of accessibility.

(ii) Many studies have focused on the unequal access to job opportunities among different social or ethnic groups<sup>3</sup>. The extensive research on this topic generally combines various accessibility components and indicators: land-use (location of residence and job opportunities), transportation (availability of transportation modes) and individual (income, social or ethnic group, and gender). A growing number of studies have shown that the uneven residential distribution of social and ethnic groups combined with the spatial distribution of employment opportunities creates large scale accessibility inequalities between groups. First developed in the US after the seminal work of John Kain (1968), the “spatial mismatch” literature has grown in importance since the 1996 Welfare Reform. Four types of approaches can be distinguished (Ihlanfeldt and Sjoquist, 1998) in the literature: comparisons of commuting time or distances between different ethnic or social groups; attempts to measure the impact of job accessibility on obtaining and maintaining a job and on wages; comparisons of the integration of inner-city and suburban residents in the job market; and examinations of the differences between inner city and suburban job markets. While most authors conclude that the suburbanization process has reinforced residential segregation and job access inequality, there is no consensus on the weight of the spatial mismatch factor in explaining certain social or ethnic groups' employment difficulties. Taylor and Ong (1995) show that barriers to employment opportunities for ethnic minorities are related less to spatial mismatch than to the use of slow forms of transportation: individual members of ethnic minorities have longer commute times because they use public transit more frequently and not because their jobs are further away. They conclude that the problem is one of ‘automobile mismatch’ rather than ‘spatial mismatch’. A body of related research has shown that car use tends to be positively correlated with a wider range of destinations, higher employment rates and salaries, and reduced disparities in inter-ethnic levels of unemployment (Ong, 1996; Blumenberg, 2002). According to Raphael and Stoll (2002), low-income people with access to a car have a better chance of finding and retaining a job than their carless counterparts.

The spatial mismatch debate has raised questions related to the role of space and access in the exclusion of certain individuals and groups from the job market. However, the conclusions are still controversial and several studies have shown that other factors like racial discrimination (Elwood, 1986), lack of qualifications (O’Regan and Quigley, 1999), or time constraints can also play a major role in the employment difficulties of certain groups. As a consequence “decades of empirical tests have resulted in widely divergent results, with contradictory evidence that both supports and refutes the existence of spatial mismatch” (Grengs, 2010). These conflicting results can be explained not only by the use of oversimplified measures of job access but also by the fact that the concept of spatial mismatch is “ill-defined” (Grengs, 2010). Therefore, the enormous amount of research on the topic contrasts with a lack of consensus on the relevant variables to take into account and the limited policy response to the issue of job access. Actually “because

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<sup>3</sup> In the context of the Workfare policies implemented in many industrialised countries, recent analyses have stressed the importance of access to employment opportunities for poor households. The ability to get around is presented as an important factor in maximizing the employability of poorer people.

scholars have been vague in defining the relevant independent variables in spatial mismatch studies, policy makers have interpreted the primary problem as geographic distance. But a person's prospects depend on the land-use arrangements of housing and jobs, the location of competing workers in filling a job, the availability of a car, and the effectiveness of transportation infrastructures and services. In other words, the problem is one of accessibility rather than distance itself" (Grenns, 2010). Another problem with the spatial mismatch debate is the fact that it tends to reduce the problem of accessibility to the sole issue of job access, and the solution to social inclusion as integration in the job market<sup>4</sup>. However, there has been a recent movement toward a "wider 'access to services' understanding" of social exclusion (Hodgson and Turner, 2003), leading to a broader understanding of accessibility.

(iii) Several recent studies have attempted to measure lack of access to a wide range of services as a component of social exclusion. Studies in this category use a larger set of indicators than those in the previous one, especially regarding the land-use component (location of various urban resources and opportunities). As low-income households are often concentrated in locations with sparse facilities and poor public transit service, the question of accessibility for residents living in deprived neighborhoods has been given emphasis.

In Great Britain, the appearance of the Social Exclusion Unit in 1997 created opportunities to analyze the various dimensions of social exclusion, as well as the relationship between mobility and social exclusion (Church et al., 1999, 2000; Hine & Mitchell, 2001; SEU 2003; Grieco, 2003; Lyons, 2003; Lucas, 2004). Church et al., (2000) list seven types of transport-related exclusion: physical, geographic, , economic, time-based, fear-based, space and exclusion from facilities. Wixey et al. (2005) list six main types of transport exclusion: spatial, temporal, personal, financial, environmental, infrastructural and institutional. Although these typologies help us better understand transportation-related social exclusion processes, they must develop empirical measures in order to be operationally useful.

Among the indices of local deprivation used by the Social Exclusion Unit is a measure of accessibility. However, as Grieco (2003) points out, the Index of Multiple Deprivation introduced by the SEU has a very limited accessibility component as it considers only four items: access to a food store, primary health care, a primary school, and a post office. Moreover, this kind of measure is restricted to "identifying outcomes without identifying the processes which produce them" (Grieco, 2003). Another weak point is the paucity of data on the cost of transportation and its effects on accessibility (Preston and Rajé, 2007).

Several studies have suggested that indicators using GIS databases should be developed. For example, Church et al. (1999, 2000) proposed a method of local access mapping based on the location of facilities (post offices and shops) and transport infrastructure. Their approach involves identifying areas with high levels of deprivation based on the Index of Local Deprivation devised by the Social Exclusion Unit. By calculating the average time needed to travel to specific destinations from a given area (using a mapping tool called CAPITAL), a cumulative indicator identifies the time needed to access a range of facilities and services. While this type of area-

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<sup>4</sup>It is indeed problematic to reduce social integration to the sole issue of access to the job market, and to reduce employability to a question of mobility and transportation. While the lack of adequate transportation is a significant barrier to employment, there are other obstacles that probably have a stronger impact on the employment outcomes of disadvantaged individuals: racial discrimination (Elwood, 1986; Massey & Denton, 1993) or individual characteristics like education and qualification (O'Regan & Quigley, 1999) are among the key barriers to employment. Policies aiming at improving physical access to job opportunities would probably be more efficient if they were complemented by strategies tending to improve access to health, childcare, education and training facilities.

based accessibility indicator is interesting, it does not take into account the individual dimension of accessibility. As Hine and Grieco (2003) point out, the fact that people have access to opportunities does not necessarily mean that they will be able to take advantage of them. In addition, while the mapping technique is very useful for identifying and measuring a lack of accessibility within clusters of individuals affected by social exclusion, it does not help detect more scattered individuals or groups (Hine and Grieco, 2003; Preston and Rajé, 2007). Consequently the focus on area-based measures rather than individual measures may be considered problematic.

As a result of the complexity of these measures, “examples of the actual use of accessibility measures in planning are relatively scarce” according to Handy and Clifton (2001). Traditional measures do not take some characteristics of the local environment into account, though they might have a major impact on transportation mode choice. In fact, accessibility assessment would require data that is very difficult to collect. There is a gap between the data required to obtain a satisfactory measure of accessibility and the data available to planning departments. In addition, “the more complex the measure the more data and analysis skill required, limiting the ability of most planning departments to develop such measures” (Handy and Clifton, 2001). It is thus a major methodological challenge “to make the bridge from theory to practice” (Preston, 2009) and to find “the right balance between a measure that is theoretically and empirically sound and one that is sufficiently plain to be usefully employed in interactive, creative plan-making processes where participants typically have different degrees of expertise” (Bertolini et al., 2005). According to Bertolini et al. (2005, cited by Curtis and Scheurer, 2010), “in order to be useful for practical planning purposes, an accessibility measure must meet two basic requirements: it must be consistent with the uses and perceptions of the residents, workers and visitors of an area, and it must be understandable to those taking part in the plan-making process”. This emphasizes the need to build a common language between the different participants in the planning process, be it policy-makers, technicians or citizens.

## **2. Transport policy and social inequalities**

Studies show that the way in which social inequalities have been addressed as a subject for public policy in general (Castel, 1995; Paugam, 1996) and for transport policy in particular (Gallez, 2011) has changed over time. In the 1960s, transport policies in most European countries focused on the development of road infrastructure, in order to meet expected growth in demand and individual mobility. In France at the beginning of the 1970s, the priority given to the development of urban public transport networks was a response to different concerns: preventing a loss of attractiveness in urban centers, ensuring access to the city center (in the context of rapidly increasing car traffic) and providing access to urban amenities for the many (especially those without a car). During this period, prior to the growth in suburbanization, transport studies paid little attention to the problem of socio-spatial inequalities. Many authors have pointed out that, similarly, much literature on social exclusion (or inclusion) had long neglected its spatial or mobility-related aspects (Kenyon, Rafferty and Lyons 2003, cited by Farrington, 2007; Church et alii, 2000).

Over the past four decades, the policy discourse on social issues gradually evolved from the fight against social inequalities to the problem of social exclusion (Jones and Smyth, 1999; Levitas, 2000). At the same time, the dimension of transportation and accessibility has slowly found its place among factors cited as contributing to social exclusion. As a result, instead of aiming to provide extensive access, transportation policies have been increasingly focused on specific territories, targeting the needs of the most deprived neighborhoods which are seen as being

particularly vulnerable to social exclusion. Since the 1990s, improving urban access for disadvantaged groups has become a component of strategies put in place to tackle social exclusion, partly through Workfare-type policies<sup>5</sup>.

Similarly, the question of social inequalities in access has been reformulated since the 1960s, influencing the design and application of models and indicators used in the assessment of transport and land-use investments. Despite growing concern over social exclusion and recognition that a lack of accessibility can prevent people from taking part in social activities, equity considerations are still poorly integrated in the *ex-ante* assessment of transport investment projects. On the other hand, an analysis of recent transport-specific policies in different countries shows their limited success in the fight against social exclusion, emphasizing the need for cross-sector policies.

In this section, we review policies intended to improve urban access, focusing on policies that have been implemented since the 1990s to tackle social exclusion through improved accessibility. Then we examine the various tools used to assess transport policies and their limitations. Finally we discuss social access as a policy priority.

## **2.1 Tackling social exclusion through accessibility policies**

Over the past twenty years, the perceived link between low accessibility to urban resources and the risk of social exclusion resulted in specific policies in most countries. In France since the 1990s, policies have been implemented to promote improved access to public transit in disadvantaged areas (Harzo, 1998). In the UK, after the creation of the Social Exclusion Unit, lack of access to various services was identified as a factor behind social exclusion. Many studies have set out the various dimensions of social exclusion that limit “access to basic necessities of life” (Strategy Action Team, 1999, quoted by Gaffron et al., 2001). The 2003 Report of the Social Exclusion Unit states that “recent years have seen a growing recognition that transport problems can be a significant barrier to social inclusion” (SEU, 2003). As a result, the UK has introduced policies to improve access to public transit in socially deprived areas. However, the main innovation is the introduction of “accessibility planning” (SEU, 2003). In 2004, the Department for Transport published a guidance note which required accessibility strategies to be included in Local Transport Plans. A five-step approach was recommended: strategic accessibility assessment, local accessibility assessment, option appraisal, accessibility plan preparation, performance monitoring plus evaluation (Preston and Rajé, 2007). As a result, while developing their 2006-2010 Local Transport Plans, local transport planners had to work with land-use planners, service providers and agencies, the private sector and major employers: “the key aims for accessibility planning are to ensure that local decision-makers have improved information on the areas where accessibility is poorest and the barriers to accessibility from the perspective of the people who are living there. It is also designed to create a more transparent, integrated and equitable process for transport and land-use decisions. Transport planners are encouraged to ‘think out of the box’ and work more collaboratively with their partner agencies, so that a wider range of solutions to accessibility problems can be identified and greater value for money achieved through their combined and synchronized efforts” (Lucas, 2006).

In the US, transportation policy started addressing social justice goals in the 1990s, in a break with what has been called the “Interstate era” of highway-building (Jakowitsch, Ernst, 2004). A landmark measure, the Intermodal Surface Transportation Efficiency Act (ISTEA) was passed in

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<sup>5</sup> In Workfare policies, the emphasis is put on the objective to get people back to work. As a result, unemployed people are given incentives to seek and maintain a job. Recipients have to meet certain requirements to continue to receive their Welfare benefits.

1991, and helped balance investment between roads and public transport infrastructure (Goldman, Deakin, 2000). Improved access for disadvantaged groups and individuals was to be achieved “through intermodal connections between people and jobs, goods and markets, and neighborhoods” (Bullard, 1996, cited by Sanchez, 2008). It also made cooperation with citizens and transportation bodies compulsory. The Transportation Equity Act for the 21st Century (TEA-21), which followed ISTEA in 1998, continued in the same vein making the travel needs of the poor and ethnic minorities a priority. The role of citizens and users in decision-making was strengthened. Meanwhile, the welfare system reform passed in 1996 emphasized the mobility needs of welfare recipients. Some of the “welfare-to-work” funds provided by the Federal Government were dedicated to improving transportation services. They were used to adapt public transit routes and schedules to the needs of welfare recipients, but also to create specific programs intended to improve access to employment.

Recently, due to the rising importance of “Workfare” policies in several industrialized countries, the ability to get around is presented as an important factor in maximizing the employability of poorer people. Therefore, accessibility and transportation are now seen as key in getting people back to work (Gobillon, Selod and Zenou, 2007; Patacchini & Zénou, 2003). At the same time, mobility is increasingly considered to be a personal asset and resource. In this context, public policies increasingly target individuals through dedicated tools like car ownership programs (Wachs and Taylor, 1998; Blumenberg & Waller, 2003) or targeted fare policies (Mignot and Rosales-Montano, 2006).

## **2.2. Social disparities, equity, and the appraisal of transport investments**

Since the 1990s, the spread of sustainable development ideas has raised the issue of environmental and social assessment of transport projects as well as their economic impact. While substantial efforts have been made to include environmental impacts in the appraisal of transport projects, the social dimension has received far less attention. Recent studies examine the evaluation of transport's social impacts (Geurs, Boon and Van Wee, 2009) or equity considerations in transport infrastructure appraisal<sup>6</sup> (see for instance Van Wee, 2012; Litman, 2011; Thomopoulos, Grant-Muller and Tight, 2009). Based on this review of current practices, we will first identify the limitations and advantages of the two main approaches to transport project evaluation, particularly their ability to take distributional impacts into account. Then, we will show that valuing mobility rather than accessibility in transport project appraisal may prevent better inclusion of the social dimension in transport and urban planning.

### *(i) Cost-Benefit Analysis*

Despite the fact that Cost Benefit Analysis the methodology has been criticized for several reasons (Thomopoulos et al., 2009; Grant-Muller, Mackie, Nellthorp and Pearman, 2001), some ethical and others technical. Here, we will focus on criticism of measuring social impacts and disparities, and the ethical basis of these methods.

CBA is criticized for *ignoring distribution effects*. The underlying theory of CBA, utilitarianism, does not distinguish between the different beneficiaries of a project – the aim is to maximize the total amount of welfare in society as a whole. Focusing on total welfare does not account for lost

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<sup>6</sup>The evaluation of social impacts and the question of equity are closely linked, although some authors recommend making a distinction between the measure (objective) and the interpretation (subjective) of social disparities. Questioning the social impacts of transport is related to estimating changes in a transport system that may (positively or negatively) affect the preferences, well-being, behaviour, or perceptions of individuals or groups (Geurs et alii, 2009). On the other hand, equity refers to the distribution of a project's impacts (benefits or costs) and whether that distribution is considered appropriate (Litman, 2002).

welfare among certain regions or population groups. CBA is based on the underlying assumption of an optimal distribution of income, neglecting the fact that, in practice, the marginal utility of one monetary unit decreases with wealth.

To be included in CBA, the effects of transport must be expressed in monetary terms, which is difficult for environmental effects and almost impossible for social effects. In practice, only a very limited number of social impacts are included in CBA as monetary values. This is generally done through the estimation of compensation, after a willingness to pay (WTP) or a willingness to accept compensations (WTA) survey has been conducted. However, this type of *a posteriori* compensation does not take into account other potentially damaging effects, such as the relative loss of access for certain regions or population groups resulting from the choice of one option over another. In other cases, social impacts are either omitted or assessed using a qualitative appraisal (see for instance Geurs et al., 2009). Moreover, the overall benefit of a particular project is highly sensitive to the chosen discount rate and the time horizon of benefits. Furthermore, these choices may have intergenerational equity implications.

Another limitation is that in most transport project evaluation methods, direct effects are estimated in terms of travel time savings<sup>7</sup> (Metz, 2008; Geurs et al., 2009; CGPC, 2005; Grant-Muller et al., 2001). Several authors have criticized this methodological approach to benefits (see for instance Neuberger, 1971; Poulit, 1974; Koenig, 1974; Metz, 2008), emphasizing the fact that short-term improvements in transport conditions may not result in a long-term reduction in travel time, but rather an increase in mean or total travel time. The additional travel time resulting from new transport infrastructure has long been recognized as a result of “induced traffic”, which arises from increasing the capacity of the system (Goodwin, 1996). Since the seminal comparative study of Zahavi and Talvitie (1980) on travel time budgets, several studies based on travel surveys have shown that over the long term, the average time an individual spends on daily travel has remained almost constant, while daily travel distance has increased. This hypothesis of a near-constant time budget for daily mobility is known as the “Zahavi conjecture”. It suggests that individuals and firms use the increase in travel speed resulting from improved transport conditions to increase their access (by choosing new locations, or reaching new opportunities) and not to gain time<sup>8</sup>. Based on these observations, some authors have highlighted the link between the improvement of transport conditions (which can be summarized as an increase in average speed) and urban sprawl (see for instance Bieber, Massot and Orfeuill, 1993; Wiel, 1999). From a social justice perspective, the main criticism of this approach is that it assumes a positive correlation between the total number of trips and the benefits generated: “the more trips are forecasted for a specific link for a certain year in the future, the more travel time savings can be earned by improving that link and the higher the total benefits related to that improvement” (Martens, 2006). As underlined by several authors (Martens, 2006; Litman, 2007), such a principle works to the advantage of well-off social groups with high levels of car ownership.

#### *(ii) Multi-Criteria Analysis*

Multi-Criteria Analysis (MCA) is a multi-objective decision making process that was developed following criticism of the single-criterion CBA approach. Here, multiple criteria are taken into account simultaneously, and the goal is to optimize with respect to a set of socially-based objectives defined by the decision makers, e.g. maximize accessibility for certain population groups. Unlike with CBA, the achievement of given objectives can be assessed using both

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<sup>7</sup> In Great Britain, for instance, travel-time savings have accounted for around 80 per cent of the monetized benefits of major road scheme CBAs (Metz, 2008).

<sup>8</sup> Of course this conjecture does not hold at a disaggregate level, but results from a combination of different individual situations.

quantitative and qualitative measures (Grant-Muller et al., 2001). A project's various impacts are ranked on an intensity scale, and the comparative desirability of each project can be evaluated via an overall project score, the weighted sum of all impacts.

MCA techniques have several advantages in estimating the indirect impacts of transport, especially social and environmental impacts which cannot easily be translated into monetary calculations. The participation of decision makers in the appraisal process (rather than only technicians) is central to this approach, and can be viewed as a significant advantage when assessing equity considerations (Thomopoulos et al., 2009). MCA has seen new developments recently in Great Britain, where monetized effects are used as inputs to a partial CBA estimating cost benefit ratios, which in turn are inputs to a MCA (Geurs et al., 2009). More generally, MCA has been used to assess projects' environmental impacts. According to Thomopoulos et al. (2009), MCA “has the potential to be an appropriate evaluation methodology to accommodate the equity considerations of large transport infrastructure projects”.

A large number of MCA methodologies have been developed, according to the different needs of each context and discipline (Thomopoulos et al., 2009; Grant-Muller et al., 2001). Among the most commonly used is the Analytical Hierarchy Process (AHP), which was developed by Saaty (1980). The key input to this method is decision makers' choices in relation to a series of pairs of various alternatives. These responses, which may be either verbal or numeric, are coded on a nine-point intensity scale and used to derive weights for criteria and performance scores for various options. This method has faced criticism over the use of a nine-point scale, which may not be compatible with all relevant pairs of comparisons, and the fact that the relative weight of criteria may be established by decision-makers before the measurement scale is set. Several improvements have been made to overcome these drawbacks, including breaking down the process into individual steps. The basic steps can be summarized as: (1) Establishing a hierarchy of objectives, where sub-objectives are linked to main objectives, (2) Eliciting responses to sets of pairs of comparisons from the decision-makers, (3) Deriving weights for each element using mathematical analysis of the pairs in the decision matrix (Thomopoulos et al., 2009).

Criticism of MCA methods concentrates on their subjectivity and lack of robustness (Crozet, 2004; Olson, 1995). According to Grant-Muller et al. (2001), as “the choice and use of weights in a MCA may be somewhat arbitrary (...) there may be a sense that the MCA is *making the decision* rather than *supporting the decision-maker*”. One way to overcome or lessen these potential problems is to contrast the results of the pairs of comparison with the project's objectives. Additionally, a decrease in total welfare is not necessarily reflected in MCA outputs. For Thomopoulos et al. (2009) this may be considered an acceptable risk “as regards equity concerns as they are principally based on value judgments of decision and policy makers”.

### *(iii) Shortcomings of the confusion between mobility and accessibility in transport plans*

Current planning practices tend to use the terms ‘accessibility’ and ‘mobility’ together without clear distinction (Handy, 2002) and to assess the benefits of transport projects in terms of mobility rather than accessibility. A review of recent urban studies literature shows that mobility variables are used more frequently than accessibility indicators to measure social disparities and risk of social exclusion. The focus probably falls on mobility because it is easier to measure than accessibility. However, it has major shortcomings.

It is rather difficult and ambiguous to interpret differences in mobility patterns in terms of social inequalities. In fact, a high level of mobility may correspond with a large number of constraints, especially for certain job categories such as cleaning personnel (who are most often women) or precarious workers (Jouffe, 2007). On the other hand, low levels of daily mobility are often

observed for high-income people who can afford central residential locations or who reduce their travel time to work to preserve their quality of life. More generally, travel time budgets are not a direct function of social status. Disadvantaged social groups sometimes have longer travel times but on the other hand many studies have shown that low-income individuals tend to travel less and make shorter trips than well-off individuals (Pucher and Renne, 2003; SEU, 2003; Orfeuil, 2004). Therefore, it is not a relevant objective to reduce daily travel time, especially where poor people are concerned, because this could mean reduced access to jobs or other urban opportunities. There is a contradiction between the short-term view (how to travel more easily or rapidly from one location to another) and the medium or long-term view (how to access better jobs and opportunities within a daily time constraint). Consequently, accessibility is a better indicator of social disparities in the sense that it accounts for land use patterns as well as social and individual characteristics including time availability.

In transport modelling, forecasts of future travel demand are based on current travel patterns. By doing so, transport models reproduce current imbalances in transport provision between population groups: “The models use the high trip rates among car owners in the present to predict high trip rates among car owners in the future. These predictions favor policies that cater to this growth through improved services for car owners (e.g. road building or investment in costly rapid rail)” (Martens, 2006). This inherent feedback loop was highlighted early by Dupuy (1978), who showed that by incorporating increasing motorization rates in the generation step, four-step models inevitably predicted an increase in transport infrastructure needs. As far as distributional impacts are concerned, such an analysis suggests that classic transport models tend to generate transport improvement plans that benefit highly mobile population groups at the expense of the mobility-poor (Litman, 2003).

Furthermore, the improvement of transport conditions does not systematically result in an improvement of accessibility. This relation depends on the considered spatial and temporal scales. For instance high-speed transport infrastructures give priority to long rather than medium or short distance access. Accessibility depends on the connectivity properties of the transport network (highly performant versus highly connected). High-speed transport infrastructures generally produce cut-off effects for people living in close proximity. Moreover, the improvement of access changes over time and differs between the short term and the long term. Experience shows that in the medium or long term, improvements to transport systems lead to changes in residential or activity locations, resulting either in induced traffic (and possibly in infrastructure congestion) and urban sprawl (resulting in residential areas with poor access).

As suggested by Wachs and Kumagai (1973), one reason that accessibility analyses have frequently not been included in social reports is “the common notion that the demand for movement is a ‘derived’ demand: movement is rarely considered an end in itself, but rather a cost which is normally born in order to achieve these objectives”. Because transport and physical accessibility systems were considered means to reach spatially distributed opportunities, accessibility has not been singled out in city or regional social reports. This probably explains why accessibility is still seen in terms of reducing distances, and addressed by transport policy rather than other fields of public policy.



### **2.3 Are current accessibility policies effective in tackling social exclusion?**

Although social issues have appeared on transport policy agendas in most countries, the results are still disappointing or difficult to assess (Sanchez & Schweizer, 2008; Féré, 2011). Studies have attempted to measure the impact of public transit on the social integration of low-income individuals and have produced mixed or even contradictory results (Sanchez, 1999; Cervero, Sandoval and Landis, 2002; Holzer, Quigley and Raphael, 2003; Sanchez, Shen and Peng, 2004; Kawabata & Shen, 2007). Research findings on how car ownership affects employment opportunities are more conclusive but their implications for public policy are controversial (Ong, 1996; Raphael & Stoll, 2002; Ong, 2002; Blumenberg, 2002; Blumenberg & Waller, 2003). The first studies on alternative policies like car ownership programs show that while their cost is very high their results are uncertain and they often “miss their target” (Fol, Dupuy & Coutard, 2007; Féré, 2011). For example, demand responsive services are very expensive but do not offer the flexibility of alternative means of transportation like taxis (Gaffron et al., 2001). Overall, the cost-benefit ratio of such programs is often questionable (Sanchez and Schweizer, 2008). According to Sanchez (2008), there is very little evidence of these programs “creating opportunity or improving the well-being of families in the grip of poverty”. One explanation is the lack of resources to evaluate the effectiveness of programs with social implications. The scale and fragmentation of these programs, which are scattered among many private and public agencies, do not make comprehensive evaluations of their effects easy. In addition, most of them rely on fragile, non-guaranteed funding, which prevents a long-term view of their effectiveness (Fol, 2010; Féré, 2011).

The effects of the accessibility planning implemented in the United Kingdom are difficult to assess. According to Lucas (2006), “accessibility planning for social inclusion is still in its infancy in the UK and it will be some time before it will be possible to assess whether the aspirations for the method can be realized”. This lack of evidence raises the question of whether real political will exists to improve social access. It also reflects the lack of a common language shared by the different participants in the planning process.

### **2.4 Is social access really a priority?**

Although the literature on the social dimensions of urban access has become quite abundant in the past few years, policy makers seem hesitant to make this issue a priority. Unlike other aspects of urban provision, which have been the subject of innovative solutions to better serve poor households and deprived areas, the field of transport is still struggling with basic difficulties in dealing with this issue. This can be partly explained by the complexity of the accessibility concept itself and the problems posed by its measurement, especially where the social dimension is concerned. In addition there are some specific characteristics of both transportation networks and accessibility planning that make it difficult to implement better and more efficient policies. Another possible explanation may be found in the distinct “technical cultures” of the transportation and urban planning fields. Transportation planning has long been structured around two main disciplines, economics and traffic engineering. Both emphasize the functioning of transportation networks in relation to the short-term problem of organizing urban traffic flows. However, urban planners, who often come from a social science background, are more inclined to adopt a long-term perspective and address “soft” issues like urban form and social disparities.

Transportation networks hold a distinct place among urban provision, and accessibility issues have never been addressed in the same manner as in other sectors. The idea of “universal coverage” is common to most networks including transport, and based on continuous improvement of supply through technical and economic progress and political will (Coutard,

1999). However, access to transportation does not carry the same weight and is seen in the same light as access to water, for example, which has been defined as a basic human need internationally (Jaglin and Zérah, 2010)<sup>9</sup>. While some innovative experiments in water or sewage services have been designed to reach poor populations in the developing world, the transportation field seems reluctant to renounce the network concept. For example, in the water services sector, “pro-poor” solutions have been implemented, relying on the participation and work of the users themselves and not necessarily on a network connection (Jaglin and Zérah, 2010). Although these innovations are subject to strong criticism (Spronk, 2009), the emphasis placed on community participation and non-network solutions is interesting.

Another distinguishing characteristic of transportation networks is their high cost high compared with other networks, in terms of infrastructure investment as well as operation costs. When investment choices are to be made, social concerns must compete with transportation's other goals. As observed and demonstrated by several authors, as long as the principles of welfare economics are applied, there is a major contradiction between the objective of efficiency (optimum allocation of resources) and the objective of equity (see for instance Martens, 2006; Bonnafous and Masson, 2003). The case of a light rail line extension in Lyon (France) studied by Cécile Féré (2011) is very informative: instead of implementing a long-term extension project designed to serve one of the most deprived areas of Lyon's urban region (Vénissieux), local authorities decided to give priority to a new line serving a brand-new regeneration project (Lyon Confluence), despite the fact that the initial scheme was expected to well-patronised. Similarly, in the current discussion on Greater Paris the recent choice between the two public transportation options was the scheme that had less effect on job accessibility for carless residents (Beaucire, 2012). Improving urban access for low-income individuals might not be a priority for some local actors if it means allowing young people from deprived neighbourhoods to travel anywhere anytime.

Moreover, in recent years the rising importance of environmental issues has tended to reduce interest in social questions, though the social dimension of sustainable development and environmental justice should keep these issues alive. In some respects, there are even tensions and contradictions between social and environmental goals in the field of transportation (Féré, 2011). The ‘rail versus bus’ debate in Los Angeles is a good example of the potential contradictions between limiting car use by expanding public transit for middle-class suburban commuters (the rail option) and better serving low-income and minority inner city residents (the bus option). In many cases, policy makers tend to favor pro-environment choices that can be detrimental to disadvantaged groups (Taylor, Wachs, Luhrsen, Lem, Kim and Mauch, 1995; Garrett and Taylor, 1999; Bullard and Johnson, 1997; Benit-Gbaffou et al., 2007; Fol and Pflieger, 2010).

Certain global trends have also hindered the introduction of good practice on accessibility planning. Insufficient planning regulations have allowed residential, employment, retail and service sprawl to continue. In parallel, the “rationalization” of many public services such as hospitals, health services, and post offices has resulted in longer travel distances for most users. In rural areas the ongoing streamlining of public and private services as a result of globalisation has had a dramatic impact on accessibility (Nutley, 2003). This is also the case in urban locations. As Lucas (2006) points out, “many planning decisions are taken out of the hands of land-use planners by the private sector or other more powerful public sector agencies (...), which do not include transport and accessibility in their location assessments. Moreover, the deregulation of transport systems, particularly in the UK, has led to a reduction in bus services”

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<sup>9</sup> An obvious explanation lies in the fact that lack of access to water and sewage has direct implications on health.

(Gaffron et al., 2001). The current context of an “underfunded and fragmented public transport network” (Lucas, 2006) does not favor better integration of land use and transportation. Grieco (2003) underlines a policy paradox where the role that transport and land-use organization can play in reducing social exclusion has been recognized just when the means of intervention (municipal transport, social housing, public sector employment) “have been subject to radical erosion”.

However, we shall argue that these obstacles to a better understanding of accessibility and more efficient implementation of accessibility planning can be overcome.

### **3. How can the role of social indicators in accessibility assessment be improved? How can accessibility policies be improved?**

Many recent studies have proposed new accessibility assessment methods that better account for the social component. These changes are occurring in pre-decision accessibility measurement, as well as the evaluation of accessibility policies themselves. Some improvements have already been tried in the planning process, too. We will first suggest some practical ways to better account for social issues in the appraisal of transportation projects and policies. Then we will make some recommendations for improving the planning process.

#### **3.1 How can social criteria be given greater weight in the appraisal of transport projects and policies?**

As mentioned above, social issues are rarely included in transportation planning, despite the fact that transport decisions often have significant social and equity impacts. In this section, we suggest three ways to increase the weight of social criteria, all of which assume the improvement of social access as an explicit objective of the decision-making process. The first aims to clarify which type of equity is pursued, in order to choose adequate measurements of social or spatial inequality. The second emphasizes the importance of shifting from a demand-based transport planning approach to one based on needs. Finally, the third seeks to identify the losers and the winners in the implementation of transportation projects.

##### *(i) Defining equity objectives in a comprehensive and effective way*

Our first proposal is **to define clearly which equity objectives are being pursued in order to clarify the types of indicators that may be used**. As underlined by Litman (2011), “transportation equity analysis can be difficult because there are several types of equity, various ways to categorize people for equity analysis, numerous impacts to consider, and various ways of measuring these impacts”. Different measures of social disparity correspond to different conceptions of social equity. According to Young (1994), three fundamental approaches reflect the main theories of equity (cited in Thomopoulos et al., 2009):

- Egalitarian: everyone has equal rights or benefits for a particular service or scheme
- Utilitarian: the aim is to maximize the total welfare of the society as a whole
- Rawlsian: the aim is to retain the existing status quo between those better- and worse-off, improving the situation for the worse-off as much as possible after everyone's fundamental rights are secured.

The utilitarian approach has prevailed in transport infrastructure appraisal through references to welfare economics and the use of CBA. As mentioned above, this approach takes little or no direct account of equity and social exclusion. Litman (2002) notes that the egalitarian approach

has also been applied in various situations, but the Rawlsian approach has not yet been widely used. Talen (1998, cited by Apparicio and Seguin, 2006) defines four conceptions of equity that correspond to four types of accessibility: equity in terms of equality (everyone receives the same public benefit); equity in terms of needs (the distribution of public benefit is based on needs, which refers to a ‘compensatory equity’); equity in terms of demand (which would probably favour wealthy neighbourhoods, where the expressed demand is greater); and market-based equity (where cost is the key factor determining the willingness and ability of users to pay).

Following Litman (2011), **we suggest that these various views of equity be grouped into three main types:**

- **Horizontal equity:** requires that public resources be allocated equally to each individual or group unless a targeted subsidy is specifically justified. Furthermore, it requires that consumers pay costs incurred by their activities as much as possible. Horizontal equity relates to the egalitarian theory of equity.

- **Vertical equity with respect to income and social class:** requires that disadvantaged people (according to the level of income or social class) be identified and given special consideration (or protection) in planning. People should be burdened according to their ability to contribute. Vertical equity relates to the Rawlsian theory of equity.

- **Vertical equity with respect to need and ability:** same as previous, except that people’s disadvantages are not estimated in terms of income or social class, but in terms of needs and ability.

As Litman (2011) points out, equity evaluation is significantly affected by the chosen definition of equity (table 1), along with the categories used to measure social differences (demographics, income class, geographic locations and ability) the social impacts of transport project or policy (prices, tax burdens, transport service quality and external costs.) and the units used for these measurements (per capita, per vehicle-kilometre and per trip).

*Table 1 - Equity evaluation variables*

Types of equity	Categories	Impacts	Measurement units
Horizontal	Demographics (age, gender, race, ethnic group, family status,)	Price or fare structure	Per capita
Vertical with respect to income and social class	Income class	Tax burdens	Per vehicle-mile or kilometer
Vertical with respect to need and ability	Geographic location	Transportation service quality	Per passenger-mile or kilometer
	Ability (physical disabilities, licence driving)	External costs (crash risk, congestion, pollution)	Per trip
	Travel mode	Access	Per peak-period trip
	Vehicle type	Economic opportunity and development	Per dollar paid in fare or tax subsidy
	Industry (truckers, transit, taxis, vehicle manufactures)	Transport industry employment and business opportunities	
	Trip type and value		

*Source: Litman, 2011*

Note: in this table, we added “access” to the list of impacts in order to distinguish the accessibility improvements from “economic opportunity and development” and “business opportunities”.

Acknowledging the fact that “there is no single correct way to evaluate transportation equity” (Litman, 2001), **we recommend**, as suggested by Litman, **considering various perspectives, impacts and methods**.

*(ii) Combining qualitative and quantitative methods*

In practice, transportation planning processes involve trade-offs between different objectives including equity, cost efficiency, and environmental protection. As there is no single way to determine how much weight should be given to a particular objective, it should reflect community needs and values (Litman, 2011). To achieve this, we suggest that **quantitative and qualitative methods of assessment be combined**. While the use of quantitative data seems essential when measuring accessibility, qualitative approaches are necessary to understand the real experience of deprived groups or individuals, the way they perceive their personal accessibility and that of their neighborhood, and the barriers which matter most to them. To implement this kind of approach, **we suggest that focus groups be put in place**, with participants describing the types of activities they take part in, their location, the routes and transportation modes used, frequencies and costs. (McCray, 2009). This could result in **the establishment of a detailed accessibility database by disadvantaged residents** (Handy and Clifton, 2001). As Lyons (2003) pointed out, while levels of access are rather easy to measure through quantitative parameters, quality of access relates to the individual’s experience. Some barriers to access are not necessarily objective but can be subjective or cognitive (Beaucire, 2011) and it is important to find out about these barriers, which could undermine the efficiency of policies aiming to improve accessibility. As Bertolini et al state (2005, cited by Curtis and Scheurer, 2010), taking various kinds of expertise into account is critical “not just because of a generic democratic concern, but also because of the importance of mobilizing the (tacit) knowledge of different participants in the identification of problems and the search for solutions”.

*(iii) Basing transport planning on the principle of needs*

Following Martens (2006), we state that given the importance of mobility and accessibility, **transport-modeling approaches** – which are implicitly based on the distributive principle of demand – **should be based on the principle of need**.

Many authors have underlined the importance of a needs-based approach to transport planning, derived from the Rawlsian idea of equity. Rawls (1971, 1982) discussed optimizing primary social goods as an alternative to optimizing welfare<sup>10</sup>. Sen (2009) disagrees with Rawls, arguing that it is important to take people's actual capabilities into account. More generally, there is an ongoing debate concerning the measurement of vertical equity. As underlined by Litman (2011), “there is general agreement that everybody deserves ‘equity of opportunity’, meaning that disadvantaged people have adequate access to education and employment opportunities. There is less agreement concerning ‘equity of outcome’, meaning that society ensures that disadvantaged people actually succeed in these activities”. Considering that transport affects equity of opportunity, it therefore meets the most ‘conservative’ test of equity, according to Litman. Following this principle, transport projects can be evaluated and prioritized according to the degree to which they provide basic access (Litman, 2011).

There are some practical barriers to evaluating present and future collective needs. For instance, it is necessary to define which types of goods, services and activities are considered essential.

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<sup>10</sup> According to Rawls, primary social goods include: basic liberties (freedom of association, liberty, etc.), freedom of movement and choice of occupation, powers and positions of responsibilities, income and wealth, the social bases of self-respect (quoted by Van Wee, 2012).

Moreover, it may be difficult to define the level of access that is sufficient to avoid a reduction in life opportunities without making normative judgments (Martens, Golub and Robinson, 2012).

While we appreciate the difficulty of taking present and future collective needs into account, we suggest that the following methodological and empirical changes be made in transport planning:

- Following Martens (2006) and other authors who emphasize the shortcomings of time savings as a criterion in transport benefit assessment (see for instance Litman, 2003; Metz, 2008), **we propose that travel time savings be replaced with accessibility gains as the key benefits of a transport project in CBA analysis.** By doing so, “the monetary value of accessibility gains is not related to income group dependent wage levels, but in large part to the existing level of accessibility of a person”. **Using a utility-based measure of accessibility** that incorporates the principle of diminishing marginal utility (see Koenig, 1980 for empirical applications), “an individual with a large choice set of destinations may be expected to attach a lower value to the addition of an extra destination, than a person with a relatively small choice of destinations, all else being equal.” The use of “accessibility gains” as the primary benefit of transport improvements would have two major advantages in relation to equity principles: the first is to break the direct link between quantity of trips and benefits; the second is to direct attention in transport planning and cost-benefit analysis towards equity in terms of accessibility (Martens, 2006; Geurs and Ritsema van Eck, 2001)<sup>11</sup>. Martens (2006) observes that the challenge here is to develop a practically feasible method to assess accessibility gains in terms of monetary values.

- Among the various measures of accessibility, utility-based measures are probably the most satisfactory. However, their foundations are in complex theory (random utility theory or the doubly constrained entropy model) making them difficult to implement by non-specialists. Therefore, there is a need for measures that are usable by planners at the local level – relatively simple indicators that could be used alongside classical CBA assessment in a Multi-Criteria Analysis. **Place-based indicators are more readily accessible to local planners.** Compared to individual-based measures, which require comprehensive local surveys (whose results are difficult to generalize on a larger scale), this type of measurement is easy to conduct. However, it results in a rather rough measure of urban access based on assessing which places or resources are reachable from a given location in a given amount of time To overcome its obvious limitations, **we suggest that this measure be disaggregated according to the needs of specific groups.** This method requires locally available place-based data (location of urban resources, transportation provision) to be combined with individual census data (income, social position, possession of a car). This combined method has been used in several studies (Handy and Niemeier, 1997; Wenglenski, 2004; Preston and Rajé, 2007<sup>12</sup>) and appears promising.

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<sup>11</sup> In classical CBA analysis, the more trips are predicted for a given link, the more travel savings can be accrued to this specific link and the higher the total benefits related to that improvement. This principle works to the advantage of populations with high levels of car ownership, since they have higher trip rates than people with lower car ownership (Martens, 2006; Litman, 2001). On the other hand, as Martens (2006) points out “the identification of accessibility gains as the prime benefit of transport investments has profound consequences for cost-benefit analysis. The monetary value of accessibility gains is not related to income group dependent wage levels, but in large part to the existing level of accessibility of a person. More specifically, the value of an additional destination that comes within reach due to a transport improvement will depend on the choice set of destinations already within the reach of an individual. Following the principle of diminishing marginal utility, an individual with a large choice set of destinations may be expected to attach a lower value to the addition of an extra destination, than a person with a relatively small choice set of destinations, all else being equal”.

<sup>12</sup> In their case studies of Bristol, Nottingham and Oxfordshire, Preston and Rajé (2007) have identified three criteria to assess accessibility-related exclusion: the level of travel in the area as a whole (area mobility); the level of travel made by particular individuals or groups (individual mobility) and the overall accessibility of the area.

### *(iii) Identifying losers and winners*

Most transportation projects are based on the naïve assumption that they will benefit all users whatever their social position, income or location of residence. The reality is of course different.

To change the current situation where the social dimension of accessibility is a low priority, Farrington (2007) suggests that “accessibility rights” be defined and placed on the urban and transportation actors' policy agendas. This is particularly relevant in relation to sustainability. According to Farrington (2007), the accessibility concept “is capable of both making a significant contribution to the conceptual development of sustainability discourses, and also helping to articulate the social and economic dimension of sustainability and implementation”.

To take this into account, we suggest that **the principle that there are losers as well as winners when transportation projects are implemented should be accepted**. This recognition requires a significant amount of political vision and courage, and a willingness to submit the issue of cost/benefit distribution to public debate. The “rail versus bus” conflict in Los Angeles is an interesting example of what happens when this principle is not taken into account. The Bus Riders Union sued the Metropolitan Transportation Authority over its extension of the rail system, arguing that this extension would mostly benefit the “white suburban commuters”. The allocation of resources to the project would therefore be detrimental to users of the inner city bus system, most of whom are low-income people and minorities. Garrett and Taylor (1999) argued that for carless, transit-dependent people, bus services were vital for access to jobs, schools, medical care and other necessities. They suggested that by “accommodating the political interests and desires of a more mobile, dispersed, and largely white, suburban-based electorate”, investment in the rail system would not increase accessibility but rather draw resources away from bus services that were vital for low-income residents. By failing to take transit ridership patterns into account, subsidy policies reinforced existing segregation<sup>13</sup>.

### **3.2 Improving the planning process by escaping the limits of transport-based approaches**

As stated by Church et al, (2000), overcoming the access difficulties of some groups and individuals requires not only changes to the transport system, but also policies that tackle the factors behind this lack of access. In this last section we suggest that the planning process itself can be adapted, encouraging better integration of the various dimensions of accessibility planning, and promoting public and community participation.

#### *(i) Coordinating transport and land-use policies*

We suggest **promoting integrated transportation and land-use policies**. While this requires a multi-agency approach<sup>14</sup>, we are convinced that this goal cannot be attained by institutional procedures alone, as it requires better coordination of public transport services and various community transport operations (Hine and Mitchell, 2003). Overcoming the traditional divide between transportation providers and land-use planning agencies is indeed a challenge (Handy, 2002). As Lucas (2006) points out, “a great deal of political will is needed, both within central and local governments and across all the relevant sectors” to achieve accessibility planning. In addition to improving linkages between land use, service location, and transportation decisions, an integrated approach would “optimize scarce resource use” (Farrington, 2007).

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<sup>13</sup> The Bus Riders Union won the case and in the following years, the Metropolitan Transportation Authority had to dedicate more funds to bus services and less to suburban rail.

<sup>14</sup> According to Farrington (2007), this multi-agency approach “involves horizontal integration between the different sectors in which policy is made and delivered, as well as vertical integration between stakeholders and partners in community, governance and policy-making”.

Beyond the limitations of transport policies themselves, the necessity to coordinate different policy sectors better derives from the need to reduce undesired impacts resulting from the improvement of transport systems, especially urban sprawl. The current separation of housing and transport policies, for instance, increases the risk of conflicting policy goals. In France, the creation of a zero-rate loan intended to facilitate homeownership for low-income households has had major urban sprawl repercussions, as low-income households were encouraged to buy homes in suburban areas where housing is more affordable than in the city centre.

The notion that coordinated transport and land-use planning is a necessary condition for sustainable urban development has spread throughout academic and professional circles. During the last decade, considerable research has evaluated the links between land-use patterns and public transportation use, favoring compact cities, “transit cities” or “transit oriented development” (Cervero, 1998). Despite their focus on sustainability, these studies rarely take social inequalities into account (Jemelin et alii, 2007). In addition, key issues for coordination such as land policy, local taxation, or economic development are often neglected in the analysis (Gallez et alii, 2012). However, promising new planning tools have emerged that seem to allow for better coordination of transport and urban development. In France, these tools take the form of contracts between the State or regional authorities in charge of public transportation, and the local authorities responsible for land-use planning. In accordance with the 2010 law on Greater Paris development, “territorial development contracts” (*contrats de développement territorial*) are being signed between the State and municipalities that will accommodate future metro stations, in order to define quantitative residential and economic development objectives. The aim is to encourage increases in density around stations. **We suggest that these arrangements should include public housing objectives**, in order to allow as many people as possible to benefit from improved access to public transportation and urban opportunities.

*(ii) Introducing accessibility indicators in the design of regeneration policies*

We suggest a **stronger emphasis on the accessibility criterion in the design of regeneration policies**. In France, current policies in disadvantaged neighbourhoods mainly target transportation improvements based on the simple diagnosis of spatial isolation. While it is necessary to improve the mobility of disadvantaged residents through transportation, we recommend that **accessibility should also be understood in terms of proximity**. This means that regeneration policies should take into account the local provision of services, shops, and jobs. Similarly, social housing policies would benefit from coordination of residential location with urban resources.

*(iii) Encouraging community participation in the planning process*

We recommend **local or neighborhood-level transportation planning**, which would allow greater participation of the community and of the groups affected by accessibility issues (Hodgson and Turner, 2003). However, planning at the local level can “represent a challenge for a profession traditionally concerned at maintaining integrity of a transport network at as large a geographic scale as possible” (Hodgson and Turner, 2003). Some successful examples of this kind of planning practice already exist. In the US, the appearance of environmental justice in political debate and policy-making processes constituted a turning point (Fol and Pflieger, 2010). Not only does the issue of accessibility need to be explicitly addressed in transportation planning, it also must be discussed with the concerned groups. Beyond equal access to transportation networks and a fair distribution of transportation-related burdens, this means **the participation of communities in the planning process** (Cairns et al., 2003). The planning process can greatly benefit from hearing **the citizens’ point of view, which must be recognized as a real form of expertise**.



## Conclusion

The multidimensional and complex nature of the concept of accessibility explains both its capacity to enrich reflection on the social aspects of spatial exclusion, and the difficulties encountered when using it operationally. The notion of accessibility should be distinguished from that of mobility. Accessibility involves mobility as well as proximity, transportation as well as land-use planning. Accessibility is a component of social justice, and as a precondition for social inclusion it is part of the “right to the city”.

Approaching accessibility in relation to social disparities or social exclusion is work in progress. While some effort has been invested in building indicators, the measurement of accessibility is still a challenge for both academics and planners. In terms of public policies, although a link between low accessibility and the risk of social exclusion has been widely recognized, policy results still seem disappointing and their effectiveness is difficult to assess.

In the appraisal of transportation projects, the social dimension of accessibility is not taken into account and poses difficult challenges. Expressing the benefits of transport projects in terms of *potential access* seems the best way to assess transport projects and their distributive effects. Therefore, we suggest two possible ways to improve the appraisal of transport projects:

- (1) The first is to replace time-savings in traditional CBA with utility-based access indicators, as it was done for instance in the work of Koenig (1974; 1980). Additional investigation will be needed to identify adequate methods and indicators that can be implemented and discussed by a large number of people.
- (2) Our second proposal is to use location-based measures of access that can be disaggregated according to different population groups, in addition to CBA calculations in multi-criteria evaluations. The challenge here is to apply an appropriate set of weights to these different indicators, with the BCR derived from both the CBA and the access indicators. All concerned stakeholders should be consulted.

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