SUITS

Work Package 7

D7.3 Social Impact Assessment Report

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Abstract

The Social Impact Assessment detailed is a living, and therefore revisable, document for the SUITS project. As a RIA project, SUITS has a specific aim of enhancing capacity building in small to medium sized local authorities with regard to the development of sustainable integrated transport measures. The transport measures themselves have not been funded by the project, and their assessment falls outside of the scope of the project.

Social Impact Assessment is being considered in SUITS in three ways

1. As a means of recognising that SUITS has social responsibilities, above and beyond transport measures that it seeks to support. As part of the project evaluation these need to be understood and recognised. In this case, SIA is being explored as a means of widening our understanding of potential impact. The literature review and accompanying survey have been used to develop a set of factors which will be used to qualitatively check our outputs. CBA, MCA and more quantitative approaches used in full SIAs are not considered appropriate for this purpose.
2. To develop a common understanding of SIA across the project team. This has been provided by this document and through the completion of the survey.
3. Furthering debates around SIA and measurement approaches applied to sustainable transport, especially in terms of the breadth of the criteria used for assessment, the reliance on quantification and the role of citizen engagement. Of especial interest here is the relationship between transport innovation and new mobility paradigms, and how there has been a shift in thinking about the relationship between transport and quality of life. Transport can no longer be measured simply in terms of its performance but as an enabler or barrier to improved quality of life.

Project Partners

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Abbreviations

AHP	Analytic Hierarchy Process
CAV	Connected and autonomous vehicles
CBA	Cost Benefit Analysis
DI	Distributional Impact
EIA	Environmental Impact Assessment
HIA	Health Impact Assessment
MaaS	Mobility as a Service
MCA	Multi Criteria Analysis
DSIA	Distributed Social Impact
SIA	Social Impact Assessment
WebTAG	Web-based Transport Analysis Guidance

1 Executive Summary

This deliverable includes a review of approaches of Social Impact Assessments (including CBA, MCA and Web AG), and has used the work of Markovich and Lucas (2011) to summarise the factors that are most important to be included in an SIA. From these a survey was developed to understand the level of common understanding of SIA amongst the SUITS team and other related projects on the application of SIA to sustainable transport measures. 26 valid and usable surveys were completed. The survey is shown in the results documented and discussed in Section 6.

The final questions related to the ways in which SIA should be used in SUITS. It should be remembered that SUITS is not about the development and evaluation of transport measures per se, but about the impact that organisational and individual capability building can have on the development of sustainable transport measures, including those developed as part of SUMPs.

The role of SIA in the project is atypical. In the DoA, the stated intention of Task 7.3 was to use an SIA approach to evaluate the societal impact of the project on the quality of interventions and interactions being proposed or considered. The results from the survey, tempered by the answers to the final questions in the survey show that the main concept to be addressed is ‘quality of life’. This in itself is not surprising. However, as an overarching concept it is one which can be applicable to not only those effected by the new transport measures, but consultation processes and the extent to which the project is able to contribute to the quality of working life of those in organisations, i.e. small – medium authorities and other stakeholders.

Although all respondents answered the question, most value must be placed on the answers from those who had most knowledge of the project or similar R&I actions Although CBA and MCA approaches had their supporters, the weaknesses of CBA were recognised in evaluating social impacts, the impact of long term benefits and its delegation to technical people. MCA was considered more suitable as it was mode of a decision-making tool, and could uncover the association between socio-economic demographic and geographic factors. However, others felt that a more bespoke approach would serve the project better as it is about improving the conditions to implement sustainable transport projects, not just economic ones. Respondents went on to list a set of factors which should be measured and which map on to SIA factors. In this ‘quality of life’ featured most highly. The final section of the report details these factors and the approach SUITS will take to using SIA in conjunction with the rest of the evaluation processes we are using.

2 Introduction

SUITS aims to increase the capacity of small to medium cities to implement sustainable transport solutions. To do this, city authorities and others need to be able to measure the impact that their (proposed) measures will have on local people. The Social Impact Assessment tool developed in SUITS will provide guidelines and methods by which the social impact of transport measures may be considered. It will be incorporated into training material delivered by the SUITS project.

Additionally, the intention of the project was to explore whether 'social impact' as a concept, could add value to the evaluation of the impact of the project on wider stakeholders.

The relation between sustainable transportation and quality of life brings out the importance of impact assessment studies in transportation projects. The relationship between transportation and quality of life has been frequently emphasized in the literature, such as the function of integrating the economic and social structures of communities; preventing accessibility to education, health and social services, thus, constraining freedom of movement regarding deficiencies in the transportation system. The impacts of transportation projects have diverse effects on different groups.

This deliverable presents:

1. an introduction to SIA
2. the results from the survey used to measure perceptions of SIA in the SUITS project and other interested and knowledgeable parties such as transport consultants and Local authorities
3. the focus and manner in which SIA can be used in the evaluation of SUITS and similar R&I projects, together with a flow chart presenting how it will be used and the elements that it will focus on.

2.1 Definition

Since the Brundtland (1987) report was published, sustainability has been conceptualized as a problem of guaranteeing that any unit of work (project, city, region, building, organization, country, the planet) can exist without using the resources of future generations. A common understanding of sustainability as a social goal states that it has three aspects: economic, environmental and social (Martens, 2006).

The first two aspects of sustainability have been widely discussed and measured. However, it is only very recently that attention has come to the social justice aspect of sustainability. This is changing in relation to understanding how transportation projects can make cities more socially just.

Traditionally, the success of investments in urban infrastructure has been measured mainly in terms of economic performance. In other words, assessment of how well a piece of infrastructure performs refers only to established and measurable economic indicators such as time savings for the users of a given infrastructure unit. This narrow understanding of performance has been criticized in terms of sustainability because it does not account for environmental impacts and other externalities. In terms of social

justice, it often serves a policy of predict-and-provide. An added difficulty is that the mathematical models and design tools to support the development of infrastructure projects might have in-built properties that have a social justice bias, valuing more positively the time-savings of mobile-wealthy citizens at the cost of the poor (Martens, 2006).

During the 1990s in the United States, a strong environmental justice agenda developed. However, environmental justice is a narrower concept than equity; it refers only to the distribution of positive and negative impacts among populations defined in terms of demographic characteristics such as race or income. Environmental justice is also a policy mandate. In the United Kingdom, discussions have focused more on the promotion of accessibility in order to lessen social exclusion (Lucas, 2006). That is, rather than focusing on improving physical mobility, planners should aim to provide citizens with access to employment, health and other services, family and friends, and leisure activities.

More recently, there has been increasing interest in developing the discussion about how social justice can be considered when building infrastructure projects. There is no common agreement on what this means, or how to measure it. Many authors define equity in terms of three dimensions (Litman, 2010).

1. Horizontal equity refers to an egalitarian understanding and states that no one individual or social group should be favoured more than others.
2. Vertical equality with respect to social class and income refers to the idea of differentiating resources according to purchasing capacity. Thus an individual or social group, which is at a disadvantage, should receive more opportunities and resources in a progressive system, but will be overburdened in a regressive system.
3. A third dimension is to consider vertical equality with regards to transportation ability and need, which focuses more on individuals' physical ability and access to transportation modes, rather than on their socio-economic conditions.

SIA has conceptual, methodological and legislative dimensions as shown in Figure 1, along with some of the pressing concerns.

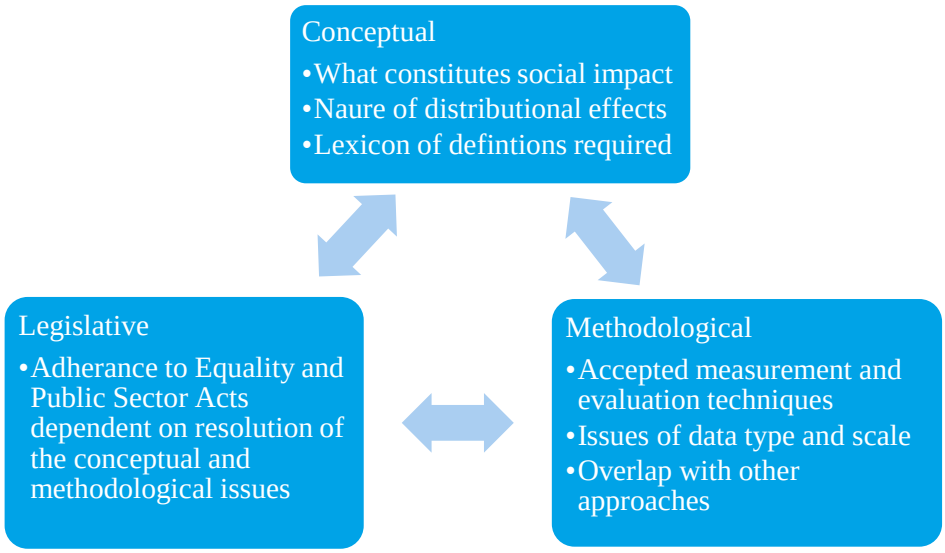


Figure 1 Dimensions of SIA

Geurs *et al.* (2009, p.71) provide what is, arguably, the most comprehensive definition and categorization of the social impacts of transport

> *"...changes in transport sources that (might) positively or negatively influence the preferences, well-being, behaviour or perception of individuals, groups, social categories and society in general (in the future). "*

With 'transport sources' described as: "*a movement and/or (potential) presence of vehicles using infrastructure or merely the presence of infrastructure itself*"

Guers et al (2009) provided an initial mapping of the elements to be considered in SIA, as shown in Table 1. A more detailed breakdown of this is provided in the following sections.

Table 1 Overview of social impacts by type, source and levels of human need Guers et al (2009, p75)

Source	Theme	Sub theme	Impact
Provider based	*Presence of infrastructure*	Structurally	Visual quality
			Historical /cultural resources
			Severance/social cohesion
		Temporarily (during construction)	Noise nuisance
			Barriers and diversions
			Uncertainty of construction
			Forced relocation
	Presence of parked cars		Visual quality
			Use of space
	Presence of transport facilities, services and activities (accessibility)	Transport facilities	Availability and physical access
	(inc cost and temporal dimension)		Level of service provided
			Transportation choice /option values

			Cultural diversity
		Land use/delivery/opportunity	Access to spatially distributed services and activities
User based	*Traffic (movement of vehicles)*	Safety	Accidents
			Averting behaviour
			Safety perceptions
		Environment	Public safety (dangerous cargo)
			Noise levels, nuisance
			Soil, air and water quality
	Travel (movement of people)		Intrinsic value, journey quality
			Physical fitness (active travel)
			Security

Sinha and Labi (2007, p. 427) pointed out that these effects can have a distance or geographical component, e.g. impacts such as noise can vary in severity as one moves away from the transport project area and a temporal component. Additionally, Geurs *et al.* (2009, p.85) observed that distributional effects can be cumulative, as in the combined effect of traffic noise and pollution levels on disadvantaged populations.

Distributional effects arise from *all* social impacts of transport, and yet the majority of the literature that focuses explicitly on this element of transport is generally concerned with road and congestion pricing schemes and carbon or environmental taxes. A smaller subset of this literature examines the distributional effects of public transport infrastructure or policies (see Bureau and Glachant, 2011; Nuwarsoo et al., 2009).

2.2 International Examples

Martens (*op cit*) proposes that in many countries, transportation should be a separate distributional sphere, like education and health. This means that transportation should not be considered as a normal economic activity, subject to free market regulation. On the contrary, direct intervention from the state should be promoted to guarantee that transportation is a sphere of activity where the worst off (the poor, the handicapped, the young, the elderly) are allocated more resources in order to level out their disadvantages in society, just as in many countries the education and the health systems have such a distributional role. More work, however, is needed to devise ways to measure how infrastructure and transportation projects could have a positive impact along these lines

2.2.1 LMIC countries

In parallel to conceptual development, there has been a growing interest in empirical measurement of the distributional impacts of transport across groups. In developing countries, some of this has been driven by the need to justify rail investments in terms of their positive impacts on the poor. For example, Barone and Rebelo (2003) examined how the construction of a 12,8 km long metro line in Sao Paulo promised to have a positive impact on 79% of the poor population in the city, by extending their access to jobs in the business areas of the city. Similar work has been undertaken in Mumbai (Baker et al., 2005), Karachi (Soheil et al., 2000), Bogotá (Cervero, 2005), and Kenya and Tanzania (Howe, 2000).

This work is typically a mixture of socio-economic analysis, travel demand analysis, and spatial-economic mapping. Ahmed et al. (2008) used data on demographic growth, land use, motorization, modal split development and investment in road development and public transport to trace how transportation projects and investment in infrastructure has impacted on the general socioeconomic indicators of a city over a period of time. Focusing on Karachi in Pakistan and Beijing in China, they show how the bulk of public investment has favoured infrastructure for private motorized users and has made public transportation less affordable for the poor, creating cities with less equity now than 30 years ago. Additionally, they suggest that the infrastructure development in these cities has worsened the poor's accessibility to job opportunities, public services and even their relatives.

Despite these attempts at putting equity on the transport agenda in developing countries, Keeling (2008) noted that 'there is little empirical evidence to demonstrate the relationship between the provision of public transport and social transport needs.' The relationships between transport, accessibility, and poverty outcomes remain poorly understood. One transport mode which has attempted this has Bus Rapid Transit systems, triggered by the worldwide interest in BRT. The following table summarizes the factors which have been considered for TransMilenio.

Table 2: Evaluation of TransMilenio BRT from Keeling (2018)

Factor	Examples
Travel time savings	BRT has the capacity to significantly reduce *average* passenger travel times through its combination of exclusive infrastructure and speed-enhancing technology (Deng and Nelson, 2013; Hidalgo and Gutiérrez, 2013). However, analysis needs to be undertaken *by user segment* to determine the equity distribution different transport modes and poor households.
Travel costs	Affordability is a key constraint to mobility among the urban poor, many of whom spend 20 to 30% of their household income on travel (Howe, 2000). BRT systems could bring public transport operating costs down and thus offer more affordable fares to users (Hook and Howe, 2005). There is evidence of lower fares offered on BRT
Accessibility changes	The A*ccessibility* provides is of fundamental importance to the extreme poor' (Howe, 2000:12). Studies have not demonstrated the *outcome* of enhanced accessibility for households. Can the poor actually make use of this enhanced access; Do *they* find better or higher paid jobs, or access better health care, education opportunities, orsocial networks? Need for further research using purposely designed before-after studies, to better understand these impacts.
Property impacts	The results show positive trends in land prices in areas within walking distance of stations. However this depends on socio economic class: impacts are positive for middle-class owners and renters, but negative for lower income and upper-class categories. Lower-income households might be priced out of accessible housing located close to BRT stations and routes.
Job creation	Job creation is more likely to be achieved where overt policies exist to that effect
Road user safety	88% reduction in traffic fatalities has been reported in the Transmilenio corridor (Hidalgo and Yepes, 2005; Hidalgo et al. 2012; Echeverry et al., 2005). This can be attributed to a decline in pedestrian deaths. Although no socioeconomic breakdown is offered, most pedestrian and cyclist victims of traffic accidents are poor.
Health impacts	BRT reduces the chaos associated with paratransit and is accompanied by the scrapping of old vehicles and replacement by modern low-emission ones. This improves air quality. Hidalgo et al. (2013) report savings in health costs due to

	reductions in emissions from TransMilenio's first two phases in the order of $114 million over a twenty-year period. No socio-economic analysis is provided. These is some evidence to suggest that congestion and air pollution has been displaced to lower socio-economic areas.
Ridership	Gilbert's (2008) assessment of the extent to which TransMilenio, brought benefits to the poor of Bogotá, concludes that '[w]hat is less certain is how much Transmilenio has so far helped the poor' (Gilbert, 2008:458). The reasons he gives for this are that, while the poor make up the bulk of passengers, it is used most intensively by middle income users, due to a combination of route coverage (Phase 1 missed most of the poor areas) and fares being more expensive than in the traditional system.
Overall socio economic benefits	TransMilenio Phase 1 study showed a negative net effect, and Phase an overall benefit/cost ratio of 2.5, and a social internal rate of return of 24.2%. The evaluation has been criticized due to methodological errors and faulty information sources (Hidalgo et al., 2013)

The evidence suggests that BRT systems offer significant benefits to lower-income users in many developing countries such as increased accessibility to opportunities, travel time and cost savings, health and safety benefits, and increased community satisfaction. However, these do not seem to go as widely as they might, and in many cases are concentrated among the higher strata of the poor (or the lower strata of the middle-income), bypassing the poorest who arguably suffer most from exclusion-based poverty. Two reasons emerge for this: lack of coverage, and pricing. However, the methodological issues of undertaking such an analysis were immense.

3 Methodological Issues

Figure 1 indicated the need for better methodologies for defining, conceptualising, measuring, and comparing equity in a consistent and transferable manner. Methodologies used in economics and the social sciences, such as properly designed before and after studies and the use of control group could be applied. The growing area of accessibility measurement offers a means of capturing the benefits of access-enhancing projects in terms of enlarging the spatial envelope within which poor households can pursue livelihoods. Yet, there appears to be little convergence of techniques and approaches.

Empirical work is needed on the linkages between theoretical accessibility measures that reflect 'opportunity', and the actual outcomes that households experience that improve the quality of their lives. For instance, health and traffic safety benefits are typically aggregated rather than reported by group. This implications for better data collection and analysis procedures.

Forkenbrock *et al.* (2001, p.81) observed that the assessment of economic effects has taken precedence and been easier to demonstrate than the social effects. Although tools are available e.g. Burdge, 1987; Forkenbrock *et al.*, 2001) the process is a 'relatively inexact science' (Sinha and Labi, 2007, p.427). The knowledge base is fragmented across numerous disciplines, including: spatial planning; human geography; social policy and sociology; public health; engineering; and of course, transportation; each with their own approaches and methodologies.

The transport sector is dominated by quantitative methods (Schiefelbusch, 2010), but is an issue with regards to evaluating social impacts in particular. Investigating the visual impacts of roads and traffic, Wright and Curtis (2002, p. 145) wrote that these are: "less tangible aspects that cannot be expressed in quantitative terms". Here, focus groups and in-depth interviews, along with integrating visual materials guide participant discussion (e.g. Bayley *et al.*, 2004). This contrasts with assessments of other social impacts, such as noise exposure and accidents, which use quantitative methods.

Neighbourhood surveys are being used more frequently in the evaluation of the social effects of transportation projects. For example, Forkenbrock *et al.* (2001, p.20) explained that these surveys enabled planners to understand that qualities or attributes of neighbourhoods that were residents; and then these could be considered during planning and ways of mitigating the negative impacts could be found. Such surveys are especially useful in terms of community cohesion and forced relocation. However, these have been criticised as only being useful in identifying a limited range of social impacts, such as trip diversion and delay, and road safety (e.g. James *et al.*, 2005).

This conceptual overlap (e.g. with environmental, health and economic (Parkhurst and Shergold, 2009)0 has led to further discussion about methodological approaches. The area of Health Impact Assessment (HIA), for example, has taken a different approach to looking at transport infrastructure, policies (e.g. Thomson *et al.*, 2008) and spatial planning more generally (Forsyth *et al.*, 2010). However, what is acceptable as evidence impact in different disciplines makes mergers difficult. Forsyth *et al.*, (2010)

comment on the overlap with social impacts and the inclusion of these and other forms of assessment in a 'health wrapping' (p.241).[1]

Other approaches to assessing the social impacts of transport schemes have focused on the monetary valuation (e.g. Monzón and Guerrero, 2004; Preston and Wall, 2008)[2]. Here, social impacts are considered a 'social cost', and assessed like other monetary costs.

Geurs *et al.*, (2009, p.71) drew attention to the overlooked temporal dimension of social impacts of transport. One example is the role of parental influence on children and their subsequent views on car-based travel (e.g. Kopnina, 2011). Forkenbrock *et al.*, (2001, p.20), recognise the opportunities that exist for developing methodologies to predict the social impacts of transport, rather than analyses that document existing or past impacts, which tend to dominate the literature.

3.1 Existing assessment techniques[3]

The concept of evidence-based decision-making is intended to help policy-makers to maximise the benefits from their investments, and to prevent investments in measures or projects that fail to address critical problems. Ideally, decisions should be based on ex-ante assessment of measures' potential effects, preferably from all relevant fields. However, there is a tendency in transport decision-making to assess measures more narrowly, focusing on direct economic effects, which favours traditional measures. Including a wider range of factors when assessing urban transport measures promote the implementation of soft measures or innovative projects, whose costs and benefits lie predominantly beyond direct economic effects. Road expansion, for instance, might promise short-term congestion relief and economic benefits, but wider sustainability concerns are typically not addressed well, if at all (Huging et al, 2014).

In many countries across the EU medium and large scale transport projects are only funded after some sort of assessment has been made. The two main techniques for assessing transport investments are Cost-Benefit Analysis (CBA) and Multicriteria Analysis (MCA) (Beria et al, 2012). These are briefly described below.

3.1.1 Cost Benefit Assessment (CBA)

CBA dates back to an 1848 article by Dupuit and was formalized in subsequent works by Alfred Marshall[4]. It simply states that benefits must exceed costs. In the 1950s and 1960s CBA was used by decision-makers in highway and motorway projects in the UK e.g. for London Victoria Line and the M1 (Williams, 2008).

Cost-Benefit Analysis is the process of quantifying costs and benefits of a decision, program, or project (over a certain period), and those of its alternatives (within the same period), in order to have a single scale of comparison for unbiased evaluation. Unlike the present value (PV) method of investment appraisal, CBA estimates the net present

[1] The combination of environmental and health impacts with social impact assessment was considered in the survey
[2] Also see the section on WebTAG
[3] https://ec.europa.eu/transport/sites/transport/files/themes/infrastructure/studies/doc/2010_10_ten-t_planning_methodology.pdf
[4] http://en.wikipedia.org/wiki/Cost-benefit_analysis

value (NPV) of the decision by discounting the investment and returns. Though employed mainly in financial analysis, a CBA has been extended to beyond monetary considerations, to include those environmental and social costs and benefits that can be reasonably quantified. CBA can potentially express a project's or measure's direct and indirect impacts, in monetary terms, allowing the economic viability of a project to be assessed and expressed by viability indicators such as benefit to cost ratio (BCR), internal rate of return (IRR) or net present value (NPV)

Although it has evolved over time, the basic assumption remains that the benefits should outweigh the costs. Additional refinements include the Kaldor-Hicks criterion (Zerbe, 2006) at its foundation states. that the gainers from an analyzed project could in principle compensate the losers. This means if the total gains exceed the total losses, then the project is viable. (Layard & Glaister, 1994).

As an applied social science, CBA is largely based on approximations, working hypotheses and shortcuts because of lack of data or constraints on resources. It needs intuition not just data crunching, and should be based on the right incentives for the evaluators to do their job in the most independent and honest environment. (European Commission, 2008). Additionally, the timing of the evaluation can be crucial in determining the result.

CBA focuses on direct user benefits because they are a good approximation to total benefits and easier to measure than ultimate benefits. This shortcoming of standard CBA has long been recognised. The inclusion of external costs (e.g. local pollution, accident risk reduction) is known to be important for good appraisal in a very wide range of situations[56] For other, broader impacts, there are strong indications that they are worth exploring in at least some circumstances, notably the agglomeration impacts of large urban projects (ITF, 2009 and 2011). Other known issues include:

- The communication of the results may be dominated by a few, easily monetizable indicators
- Failure to follow up with a risk assessment
- Failure to model the effects of other investments in the area
- Failure to account for budget uncertainty
- Optimism bias
- Dominance of travel time savings. Sceptics believe that there are no time savings in the long run, that higher travel speed just increases accessibility (Metz, 2008) and that Value of Time is not a constant (Ben-Akiva, 2010). The side effects of the time savings is often ignored (e.g. making longer or more frequent trips)
- Modellng of reliability (which can add 8-10% of the benefits).
- Comparison with ex-post evaluations show that the investment may have been ill conceived (Mátrai and Juhász, 2012)
- Doubt about whether all impacts can be successful and accurately monetarised (Bickel et al, 2006)

[5] See also WP4 deliverables on changes to public procurement and innovative financing
[6] Distributed social Impact Assessment considers some of these issues. They may also be regarded in some quantified approaches such as WebTAG.

- Extensive data requirements resulting from the need to monetize all effects (Browne and Ryan, 2011)

Cost benefit analysis (CBA) as a tool that determines if a new transport project is a sound economic investment has often applied to evaluate urban consolidation centres (van Duin et al., 2007). A variation to the CBA is social cost benefit analysis (SCBA) which also looks at the monetized costs and benefits to society (Gonzalez-Feliu, 2014). It compares costs and benefits of an alternative and uses monetary values to measure all the effects. It appears to be more objective than MCA, but omits effects which cannot be monetized. As environmental and social effects are difficult to monetarise, CBA is not suitable as a means of looking at Social Impact Analysis. The conclusions of the roundtable discussion of the ITF (2016) were that.

> *CBA theory and practice need to be gradually expanded to incorporate more impacts in the rigorous valuation and forecasting framework; and CBA results need to be more effectively linked to other criteria in the broader decision-making framework, including by bringing in a more diverse evidence base.*

3.1.2 Multi Criteria Analysis

In MCA firstly, a set of criteria is developed by which the measures should be assessed. The criteria are weighted to reflect their relative importance (Browne and Ryan, 2011). Then the performance of the measure and its alternatives are qualitatively or quantitatively analyzed. There are various approaches to assign the criteria weights and combine the scores (Beria et al., 2012), a common approach being the Analytic Hierarchy Process (AHP), developed by Saaty (1977). Multicriteria analysis enables the simultaneous quantitative and qualitative impact of the achievement of some objectives, not necessarily in monetary terms. Its main advantage is that it can allow for more holistic evaluations through a more participatory approach. However, the weightings have a level of subjectivity, which can lead to bias if not well managed.

Table 3 shows a comparison between the methodologies used in EU Countries[1].

Table 3: Assessment methodologies in EU countries

Country	Assessment methodology	Comments	Suitability
NL	CBA	Categorisation of direct, indirect and external impacts	No measurement of non-monetizable effects
UK	CBA+EIA	AST and supporting analyses	Schemes involving more than one mode
G	CBA+ qualitative assessment	Evaluation divided into topics	Regional and national level
A	CBA+ cost effectiveness + open discussion	3 groups of criteria	No environmental impacts
Sp	CBA+MCA	Complementary	Theoretical approach

3.1.3 Critique of MCA and CBA approaches

From this table and the review by Hueging et al (2014) it is apparent that although impact assessments are conducted there is little standardisation across the EU or for different types of the transport measures. Hueging et al concluded that CBA is mainly applied to infrastructure projects – including infrastructure for non-motorised modes – and to projects intended to generate revenue, such as city tolls. However, the exact design and the impact criteria included in the assessment vary between measures as well as between studies of the same measure, greatly limiting the comparability of the results. Communicating only overall results, summarized for instance into a BCR, carries the risk of non-assessed impacts being neglected in the decision making process, and that of BCRs of different studies being compared despite them resulting from assessments with different assumptions and criteria

Cascajo (2010) concluded that there was a preference for- ex-ante approaches and a tradition for the use of CBA for the appraisal of public transport infrastructure projects; normally, a global assessment is complemented with a MCA or some kind of qualitative procedure[7]. There is a lack of uniformity in assessment methodologies across the EU, with a variable number of impacts being considered, and assessments are focusses at regional and national level, not urban level. None of the methodologies reviewed allowed quantification of all the effects (economic, social and environmental) produced by transport projects in urban areas, so there is necessary to define a new methodology. Whilst the economic benefits and environmental improvements are measured quantitatively, the social benefits of social equity and urban regeneration are measured qualitatively. Increase in the use of PT trips per is measured quantitatively but does not include user segment information. Hueging et al (2014) conclude by calling for a need for a simplified impact assessment based on MCA be adopted for small and innovative transport measures which may have considerable sustainability effects.

3.1.4 WebTAG (Web-based Transport Analysis Guidance)[8] and Social Impact Assessment

In the UK, WebTAG provides information, guidelines, data sheets and proforma for transport modelling and appraisal. This is basically a CBA approach, but has been extended to allow qualitative assessment in certain cases e.g. customer journey. It consists of software tools and guidance on transport modelling and appraisal methods that are applicable for highways and public transport interventions. These facilitate the appraisal and development of transport interventions, enabling analysts to build evidence to support business case development, to inform investment funding decisions. Projects or studies that require government approval are expected to use this guidance in a manner appropriate for that project or study. For projects or studies that do not require government approval, TAG provides a best practice guide. Given its

[7] The results fromt his survey showed a split between adherents to CBA and MCE and mixed approaches.
[8] As many of the principles used in Webtag have been adopted by other schemes, a detailed overview has been provided

extensive use in the UK and its systematic approach to impact assessment, a detailed overview has been provided, especially in relation to SIA.

3.1.4.1 TAG Unit A4.1: Social Impact Appraisal and Distributional Impact Assessment (A4.2)

WebTag was extended in 2015, to include the distributional impacts caused by transport. The impacts include user benefits, noise, air quality, accidences, severance, security, accessibility and personal affordability. These are analysed for their effects on individual social groups, e.g, people aged 70+. Distributional Impacts (DIs) consider the variance of the impacts of transport intervention across different social groups. This has become a mandatory part of the appraisal process and is a constituent of the Appraisal Summary Table (AST) (see Table 9). Both beneficial and /or adverse DIs of transport interventions arre considered, along with the identification of social groups likely to be affected. These are considered in Tag Unit A4.2

WebTAG provides a comprehensive coverage of all impacts. Social impacts, the focus of this Deliverable, cover the human experience of the transport system and its impact on social factors, not considered as part of economic or environmental impacts. Each social impact is assessed individually and entered into the Appraisal Summary Table (AST). Eight social impacts are considered and quantified [9]:

1. Accidents. The estimated difference in the numbers of accidents and numbers of casualties (between the with-scheme and without-scheme case) form the key quantitative measures for the appraisal of transport interventions. Combining these estimates with values for the prevention of casualties and accidents yields a monetary estimate of the accident-related costs or benefits of proposed transport interventions. Accident impacts considered include: for casualties (pain, grief and suffering; loss of economic output; medical and health care costs) for number of accidents (material damage, police costs, insurance administration, legal and court costs).
2. Physical Activity. TAG Unit A4.1 states that "**physical inactivity** is a primary contributor to a broad range of chronic diseases such as coronary heart disease, stroke, diabetes and some cancers". It is recognised that transport and the physical environment of cities play a major role in the amount of physical activity that people do on a day-to-day basis.
3. Security. Transport interventions can impact upon the **personal security of transport users or other persons.** The principal security impacts on road users relate to situations where they are required to leave their vehicle (e.g. car parks) or where they are forced to stop or travel at low speeds. For freight users, security impacts relate to both the security of drivers and goods carried. Security indicators include site perimeters, entrances and exits; formal and informal surveillance; landscaping; lighting and visibility; emergency call. Each indicator is rated poor moderate or high. For example for landscaping

[9] The reader is referred to the Webtag documents for details on how each of the factors is monetized at https://www.gov.uk/guidance/transport-analysis-guidance-webtag

Table 4: WEBTAG assessment of landscaping

Security indicator	Poor	Moderate	High
Landscaping	Landscaping features (design, plants etc) inhibit visibility and encourage intruders	Evidence of some positive use of landscaping features (design, plants etc) but more measured needed to contribute to visibility and deter intruders	Positive use of landscaping features (design, plants etc) to contribute to visibility and deter intruders

4. Severance. **Community severance** is defined in TAG unit 4.1 as "*the separation of residents from facilities and services they use within their community caused by substantial changes in transport infrastructure or by changes in traffic flows*." Severance is caused where vehicle flows "*significantly impede pedestrian movement or where infrastructure presents a physical barrier to movement."*

The TAG A4.1 definition of severe severance is where "*people are likely to be deterred from making pedestrian journeys to an extent sufficient to induce a reorganisation of their activities. In some cases, this could lead to a change in the location of centres of activity or to a permanent loss of access to certain facilities for a particular community. Those who do make journeys on foot will experience considerable hindrance.*" This is rated in 4 broad levels:

None - Little or no hindrance to pedestrian movement.

Slight - All people wishing to make pedestrian movements will be able to do so, but there will probably be some hindrance to movement.

Moderate - Pedestrian journeys will be longer or less attractive; some people are likely to be dissuaded from making some journeys on foot.

Severe - People are likely to be deterred from making pedestrian journeys to an extent sufficient to induce a reorganisation of their activities. In some cases, this could lead to a change in the location of centres of activity or to a permanent loss of access to certain facilities for a community. Those who do make journeys on foot will experience considerable hindrance.

Assessments should be made at different points across the network and the overall outcome pooled across the area being measured. The transport measurs is rated beneficial if severance is reduced; or adverse if severance is increased). A 7-point scale is used: None, slight negative/positive, moderate negative/positive, large negative/positive. Special notes should be made regarding cyclists.

5. Journey Quality in TAG Unit A4.1 is defined "*a measure of the real and perceived physical and social environment experienced while travelling*". This is broken down into 3 elements:

1. Traveller care (cleanliness, facilities, information)
2. Traveller's views
3. Traveller stress (frustration, fear of accidents and route uncertainty)

If a qualitative approach is deemed suitable, the analysis should assess whether the difference between the without-scheme and with-scheme cases will be better, worse or neutral, overall and for each sub-factor in Table 5. More details are provided for different transport modes and the factors which are likely to affect them, some of these have been monetized, although it is acknowledged that these figures need to be treated with caution

To arrive at an overall impact score for quality of a journey uses the following guidelines:

- the assessment is likely to be neutral, if the assessment is neutral for all or most of the sub-factors, or improvements on some sub-factors are generally balanced by deterioration on others;
- if the change in impact across the sub-factors is, on balance, for the better, the assessment is likely to be beneficial, and, conversely, it is likely to be adverse if there is an overall change for the worse;
- the assessment is likely to be slight (beneficial or adverse) where the numbers of travellers affected is low (less than 500 a day, say);
- the assessment is likely to be large (beneficial or adverse) where the numbers of travellers affected is high (more than 10,000, say);
- the assessment is likely to be moderate (beneficial or adverse) in all other cases.

Table 5: Shows the classification and examples of journey quality factors

Factor	Sub-factor	Description
Traveller Care	Cleanliness	Internal and external cleanliness and graffiti; the condition of the seats; tables; brightness of internal lighting.
	Facilities	Types of seats, handles, luggage racks and storage, toilets, buffet/restaurant facilities and level of staff customer service, presence of service stations and facilities for motorists.
	Information	Audibility, frequency and usefulness of on-board PA announcements; the provision of general travel information and customer magazines; and the condition of advertising posters.
	Environment	Extent of overcrowding, ventilation; temperature; noise; overall condition and smoothness of ride, motor vehicle condition and driver capability.
Travellers' Views	-	Depth of cuttings or natural/ artificial barriers, the presence of which may block views of the surrounding countryside or townscape.
Traveller Stress	Frustration	Road layout and geometry; condition of the road network; ability to make good progress along a route.
	Fear of potential accidents	Presence of other vehicles, inadequate sight distances, possibility of pedestrians stepping into the road, presence of central reservation or safety barriers (or not); inadequate lighting; the width of the road/ carriageway/lane; presence of roadworks; the absence of lane markings, cats eyes, and hard shoulders.
	Route uncertainty	Timetables and network maps (e.g. available in public places, or on the Internet), provision of in-vehicle route signs. (NB actual time savings through better information should be assessed as a TEE benefit).

6. Option and Non-Use Values. An option value is the willingness-to-pay to preserve the option of using a transport service for trips not yet anticipated or currently undertaken by other modes, over and above the expected value of any such future use. Non-use values are the values that are placed on the continued existence of a service (i.e. transport facility), regardless of any possibility of future use by the individual in question.

7. Accessibility WebTag also references to five key barriers cited in from 'Making the Connections' (Social Exclusion Unit, 2003), which can form the basis of the accessibility impact assessment. These are:

- The **availability and physical accessibility of transport**: For some people in isolated urban and rural areas there are limited or no public transport services or the services are unreliable, or do not go to the right places or at the right times;
- **Cost of transport**: Some people find the costs of personal or public transport very high or unaffordable;
- **Services and activities located in inaccessible places**: Developments including housing, hospitals, business and retail are often located in areas not easily accessible to people without a car;
- **Safety and security**: Some people will not use public transport or walk to key services because of the fear of crime or anti-social behaviour; and

- **Travel horizons**: Some people are unwilling to travel long journey times or distances, or may not know about or trust transport services.

8. Personal Affordability

Web tag is highly regarded and well used (in UK) economic measurement tool, concentrating on quantitative assessment. It enables all except the last three factors to be monetised. The above has presented a highly simplified account of some of the elements most critical to this document.

Where specific social impacts are considered to be an important element of a scheme proposal, the methods allow the analyst to attempt to quantify and monetise most of these impacts in order to appreciate the scale of these impacts relative to other outcomes and to allow robust values to be presented in the appraisal. Where individual impacts are considered to be of lesser importance or where sufficient data or valuations are unavailable to undertake a quantitative approach, it may often be more useful to appraise it in a qualitative manner, presenting a seven-point scale of beneficial, neutral or adverse (as shown in the items above). The process of conducting an approval is outlined below (adapted from the Webtag site)

3.1.4.2 WebTAG approach

The following section provides a bief overview of the process of conducting a SIA. At all stages, data sets and proforma are available to guide the assessment, and the reader is referred to the extensive on-line documentation available.

Step 1; Screening process in which the likely impacts for each of the indicators (see above) are identified. The transport intervention might have negative or positive impacts on specific social groups. These may include: children, older people, people with a disability, Black and Minority Ethnic (BME) communities, people without access to a car and people on low incomes. Some/all of the expected negative impacts can be eliminated through some form of amendment/redesign of the initial intervention. Where impacts are either significant or concentrated, a full appraisal of the impacts should be undertaken. The output is the screening proforma.

Step 2; Assessment in which the area likely to be affected by the transport intervention is identified, along with the social groups and the amenities likely to be affects. The output here is the social groups statistics and amenities affected. Step 1, screening process identifies the likely broad impact areas of the transport intervention.

Step 2a investigates these spatial impacts in more detail. It is necessary to confirm the overall geographical area experiencing impacts and consider which specific areas are relevant to the DI appraisal. Robust evidence is required to support the defined impact area or areas for each indicator. The impact area will vary for each indicator. The largest area will normally be that covered by a transport model or will be the relevant travel to work area (TTWA). The latter is likely to be an important consideration in levels of accessibility to employment. For example**:** In the case of a new quality bus corridor, the road safety impacts might be limited to the road corridor itself, whilst accessibility impacts could cover a wider area comprising the end to end routes of bus services

operating along the corridor. Some impacts tend to be more localised and noise and air quality impacts only affect areas where there are human receptors eg housing. The process of identifying the impact area should be documented to inform the appraisal audit trail for the intervention

Step 2b requires analysis of the socio-economic, social and demographic characteristics of:

• The **transport users** that will experience changes in travel generalised costs resulting from the intervention; and

• The **people living in areas** who may experience impacts of the intervention even if they are not users; and

• The **people travelling in areas** identified as likely to be affected by the intervention.

Table 6: Scope of Socio Demographic Analyses for DIs from Tag Unit 4.2

Dataset / social group (Ticks indicate analysis required for each impact)	User Benefits	Noise	Air quality	Accidents	Security	Severance	Accessibility	Affordability
Income Distribution (see below)	✓	✓	✓				✓	✓
Children: proportion of population aged <16		✓	✓	✓	✓	✓	✓	
Young adults: proportion of population aged 16-25				✓			✓	
Older people: proportion of population aged 70+		✓		✓	✓	✓	✓	
Proportion of population with a disability					✓	✓	✓	
Proportion of population of Black and Minority Ethnic (BME) origin					✓		✓	
Proportion of households without access to a car						✓	✓	
Carers: proportion of households with dependent children							✓	

National and local data sets are available which enable the socio-demographic characteristics of a particular area to be estimated. For example, in relation to age, gender, disability, ethnicity, faith, household income, economic activity, car ownership, deprivation, households with dependent children, educational qualifications, benefit claimant.

Geographic Information Systems are essential in providing detailed information on the characteristics of people travelling or living in the impact area. For example, an intervention in a coastal area may have a higher proportion of older people compared with the regional average than a large city which may have higher proportions of BME communities.

Step 2c identifies the amenities in the impact area, eg schools, leisure and retail facilities.

Table 7: An example of an output of impacts in step 3.

Social group and amenities indicators			User Benefits	Noise	Air quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	England
Resident population in the impact area	Income distribution quintiles	0-20%	26%	15%	18%					26%	23%	20%
		20-40%	14%	32%	32%					14%	12%	20%
		40-60%	35%	21%	18%					35%	20%	20%
		60-80%	17%	19%	11%					17%	16%	20%
		80-100%	8%	13%	21%					8%	29%	20%
	Children (<16)			6%	12%	10%	24%	9%	16%		18%	21%
	Young people				16%	9%			13%		16%	12%
	Older people			14%		16%	14%	15%	19%		19%	14%
	People with a disability					4%	5%	3%	4%		6%	4%
	Black Minority Ethnic								8%		8%	8%
	No car households							21%	16%		29%	25%
	Households with dependent children								19%		31%	28%
	Indicator population in the impact area		10,000	1,000	3,000	5,000	500	750	15,000	10,000	2,700,000	60,000,000
Amenities present within the impact area	Schools / nurseries			✓	✓	✓	✓	✓	✓	✓	-	-
	Playgrounds			✓	✓	✓	✓	✓	✓	✓	-	-
	Parks and open spaces			✓	✓	✓	-	-	✓	✓	-	-
	Hospitals			-	-	✓	-	-	✓	-	-	-
	Care homes / day centres			-	-	✓	✓	-	✓	✓	-	-
	Community centre			-	-	✓	-	-	✓	✓	-	-

Step 3: Appraisal of impacts. this step provides an assessment of the impact of the intervention on each indicators social groups for input into the AST. The general grading system is shown in Figure x below. This is needed for each type of impact for each identified social group. The distribution of impacts on all social groups needs to be considered as averaging may mask the differential effects. A qualitative assessment could also be made for each indicator to describe the key impacts

Table 8: general grading system for DI for each of the identified social groups

Impact	Assessment
Beneficial and the population impacted is significantly greater than the proportion of the group in the total population	Large Beneficial ✓✓✓
Beneficial and the population impacted is broadly in line with the proportion of the group in the total population	Moderate Beneficial ✓✓
Beneficial and the population impacted is smaller than the proportion of the group in the total population	Slight Beneficial ✓
There are no significant benefits or disbenefits experienced by the group for the specified impact	Neutral
Adverse and the population impacted is smaller than the proportion of the population of the group in the total population	Slight Adverse ×
Adverse and the population impacted is broadly in line with the proportion of the population of the group in the total population	Moderate Adverse ××
Adverse and the population impacted is significantly greater than the proportion of the group in the total population	Large Adverse ×××

in the final stage the analysis is completed for each group leading to a DI appraisal matrix as shown below. Further analysis using the Tag proforma enable more refined analysis and the monetization of the effects of each impact, on each group in the impact area

Table 9: Specimen DI appraisal matrix

	Distributional impact of income deprivation					Are the impacts distributed evenly?	Key impacts - Qualitative statements (example below)
	0-20%	20-40%	40-60%	60-80%	80-100%		
User benefits	✓	✓✓	✓✓	✓✓	✓✓✓	No	Although benefits are felt by all income quintiles, the benefits favour those in the least deprived income quintiles. Those in the least deprived income quintile (income quintile 5) experience a considerably higher than expected proportion of benefits, whereas those in the most deprived areas (quintile 1) experience a smaller than expected proportion of benefits.
Noise	×××	✓	✓✓✓	✓✓	✓✓✓	No	Noise impacts favour those in the least deprived income quintiles. Those in the most deprived income quintile experience noise disbenefits, whereas all other income quintiles experience benefits of the intervention.
Air quality	✓✓✓	✓✓	✓	××	✓	No	Air quality impacts favour residents in the most deprived income quintiles. Those in the most deprived income quintile (quintile 1) that may be considered to be the most vulnerable experience a considerably higher proportion of air quality benefits than may be expected from an even distribution. Residents living in income quintile 4 experience air quality disbenefits.
Affordability	××	×	××	✓	✓✓	No	Personal affordability benefits favour those in the least deprived income quintiles. Those in income quintiles 4 and 5 experience benefits in terms of affordability, whereas those in the least deprived income quintiles (who may are the most vulnerable) experience disbenefits as a result of the intervention.
Accessibility	×	×	×	×	×	Yes	Accessibility impacts are appraised as slight adverse for all of the income deprivation quintiles and therefore although the impact is adverse the impact is distributed evenly.

	AST entry										
	Social groups						User groups				Qualitative statement (including any impact on residential population AND identified amenities)
Impact	Children & young people	Older people	Carers	Women	Disabled	BME	Pedestrians	Cyclists	Motor-cyclists	Young male drivers	
Noise	××										
Air Quality	✓✓										
Accidents	✓	✓✓✓					✓	✓	✓	✓	
Security	✓✓	✓		✓✓							
Severance	×	×	×		×						
Accessibility	✓	×	×	✓	✓	✓					

3.1.4.3 Critical review of Web TAG approach

It is beyond the scope of this document to provide more detailed information on WebTAG and the range of tools which support the measurement and monetisation of social impacts. What has been useful from this discussion is the considered and well validated approach to identifying

- the impact areas;
- the socio-demographic criteria which need to be considered
- the inclusion of amenities
- the social impacts, and the distributional impacts which are currently considered
- the use of standardised templates and proformas (some of which have been included here) for the collection of data.
- the use of 7-point rating scale
- the commitment to measuring differential impact in a number of areas for different socio economic groups

- the use of such a system at different stages of the design and implementation of transport plans so that modifications can be made to the plans (ex-ante and ex-post)
- the need to consider the local context
- adaptation of the system to reflect new thinking
- adherence to principles of monetisation, even when the value of so doing is dubious
- widespread use and acceptance in UK
- grounding of factors measured in the literature (presented in the following sections).

However, questions remain as to whether the weightings are correct and whether monetisation is the right/only way to do this. For example,

- can all factors be adequately and fairly represented using this approach e.g. customer journey factors, community severance?
- is the weighting fair for all sectors of society, e.g. the waged and unwaged?
- have all the social impacts been considered?

SUSTRANS (2014) conducted a critical review of WebTAG that revealed significant gaps in the value placed on cycling and walking in optimising transport and economic performance, in terms of

- job creation,
- business growth (start-ups and increasing turnover, productivity gains),
- economic diversification,
- place competitiveness (including place branding, employment land, infrastructure, property, visitor economy, tourism offer),
- skills and employability (notably helping the unemployed and those at risk of unemployment, helping individuals access employment),
- economic resilience (local economy's ability to withstand shocks, risk mitigation, economic diversification, energy and resource efficiency and security, climate change).

Additionally, there were gaps in relation to children, wellbeing, social inclusion, and leisure and tourism. The benefits of active forms of transport are not captured by WebTAG. They suggest a better approach would be to use an input-output framework assessment, complemented by components from the existing WebTAG model. This wider assessment should seek to take account of the direct impact of the investment, the demand-led impact of increased take-up of cycling and/or walking, the supply chain effects and the induced effects from additional employment. None of these are currently addressed through WebTAG.

4 Legislative considerations

In many EU countries, the national appraisal framework for transport infrastructure projects mandates a CBA and/or MCA, while in some countries the appraisals are mandatory only for major infrastructural investments in order to receive public funding. Examples of the latter include the WebTAG tool in the UK and the OEI in the Netherlands, neither of which cover the full range of potential social impacts arising from a transport measure (Guers et al, 2009). In addition to being a requirement for funding, the UK WebTAG guidelines are also intended to serve as best-practice for the assessment of other transport projects (which is why they have been discussed at length in this document). As they were primarily developed for nationally-relevant projects, the appraisal guidelines pay little attention to local effects (Geurs et al., 2009), and thus may not properly reflect a city's objectives

The EC Directorate-General Regional Policy has developed a common guideline for cost-benefit analyses (required to be eligible for funding), including a specific section on transport projects. However, this primarily focuses on larger transport projects: depending on the fund, a CBA is required only for projects with a volume of €10m or more. MCA is recommended as a complementary tool where monetization is difficult or impossible (EC DG Regional Policy, 2008).

Hueging et al (2014) included a survey of 14 EU cities which attempted to understand assessment practice. Where not mandated to use a specific assessment tool e.g. for large scale infrastructure projects the cities adopted those which could be assessed in a simpler way, and which were relevant to their city. In many cases CBA was challenging, where criteria were difficult or impossible to monetise they were often neglected.

For the UK, the legislative implications associated with the social impacts of transport as a consequence of the Equality Act (2010) and the Public-Sector Equality Duty (2011) are important. These new forms of equality legislation reflect a growing awareness of the ethical dimensions related to transport policy as it relates to social exclusion (see, Lucas; 2009 and various). Public transport should provide a minimum level of opportunity to participate in activities (e.g. work, education, health services, etc.) for all persons, regardless of whether or not they have access to cars or hold driver's licences, and irrespective of such factors as household income, gender, age, ethnicity or disability (e.g. Social Exclusion Unit, 2003). An important element of social exclusion is that excluded people cannot reduce or eliminate barriers to inclusion, so policies are needed which reduce these barriers. This can be viewed as further indication of the aim of public policy more broadly, namely to improve citizens' welfare and protect the most vulnerable individuals within society (e.g. Hill, 1996).

The deliverable has so far outlined the case for SIA and ways in which it can be approached. The next section looks at the factors which have been put forward to be included in SIAs. These are included here, as it is from this list that the factors to be included in the SIA survey were drawn.

5 Factors to be included in Social and Distributional Impacts of Transport

Using Geurs et al's 2009 framework, Markovich and Lucas (2011) conducted a detailed, critical review of the literature, highlighting the most frequent types of impact. Most of this section is based around their review. The social impacts they are identified are presented in order of importance

5.1 Casualties and injuries

The World Health Organization recognises road traffic injury as part of the global burden of disease, and predicts that by 2020 it will rank third amongst leading causes of disability adjusted life years. The distribution of transport related accidents reflects the relative power of a vehicle-dominated as opposed to a pedestrian-dominated culture (Short and Pinet-Peralta, 2010, p. 56).

In terms of those most at risk, Factor *et al*. (2010, pp.1412-1413) identified five main social groups *men; young people (esp. 15-29-year olds); visible minority groups; people with lower levels of educational attainment; and people from lower socio-economic backgrounds.*

5.2 Noise and nuisance levels

Noise is often regarded as a nuisance associated in contemporary urban living (Schade, 2003). It becomes a health burden when it associated with sleep deprivation, cognitive impairment (in children), high blood pressure, cardiovascular disease, and fatal heart. It is also correlated with lower health-related quality of life (HrQoL) (Dratva *et al.*, 2010). Many of the studies have concentrated on car-based travel, but work is also being conducted on other modes of transport, and elements of the urban soundscape. Despite the evidence of the impact of traffic noise on residents, Adams *et al.* (2006, p.2386) observed that visual aesthetics rather than acoustic properties dominate urban planning policy and guidance. Those found to be most at risk, include

- *school-age children, elderly people and people of low-income* to from **long-term noise exposure from rapid transit** Dinno *et al.*, (2011, p. 11)
- *women* reported significantly higher levels of noise annoyance from **road traffic-related noise** and thus lower health-related quality (Dratva *et al.,*2010)
- *children* are vulnerable to the negative health effects associated with **traffic noise** (**especially aircraft noise**), with exposure associated with cognitive impairment and reading comprehension (e.g. Matheson et al., 2010)

5.3 Air Pollution/Air Quality

Transport has been shown to contribute to asthma, cardiovascular and respiratory diseases, and reduced life expectancy (BMA, 2009, p.14).In terms of those at risk:

- Schweitzer and Zhou (2010) in US analysed of *ozone and particulate matter exposure* in 80 metropolitan areas in America finding higher exposure rates in **Asian and African American households**
- **Poverty** was also found to be a strong *predictor of exposure to ozone and fine particulates* for those individuals **aged 65 and older**

5.4 Accessibility

Accessibility can be broadly defined as*: [T]he extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s)*. (Geurs and van Wee, 2004, p. 128). 4 components have been identified related to availability and physical access to transport facilities, level of service, transportation choice/option values

Availability and physical access to transport facilities is the most influential factor cited in the literature (e.g. Farrington, 2007; Preston and Rajé, 2007; SEU, 2003). In terms of those at risk the SEU identified: **teenagers, the elderly, job seekers, and people living in rural areas** as being most at risk. Dobbs (2005 and 2007) revealed *how poor access to public transport* in north east England has posed problems for **women** in accessing employment opportunities. This is followed by level of service (time, cost, comfort), operating hours and the cost of public transport (e.g. concessionary bus fares for the elderly and people with mobility issues) adversely affect the ability of socially disadvantaged groups to access important services (Rye and Mykura, 2009).

5.5 Personal Safety and Security

The presence and fear of crime affects the decision to use public transport (Cozens *et al.,* 2004). The construction of a new public transport link can also heighten fears that crime will be increased in station neighbourhoods.

In terms of those most at risk, Loukaitou-Sideris and Fink (2009) identified gender differences to the *perception of fear and personal safety on public transport stations*, with **women** more likely to limit or alter their travel behaviour based on their fears and concerns as passengers. Yavuz and Welch (2010) outline five key issues in this regard: adequate lighting and visibility at transport stops and stations; the appearance of trains and stations (e.g. cleanliness); reliability of service; the presence of CCTV cameras versus police officers (with women preferring the latter). Other groups who are **fearful of crime in stations** include *elders; people with disabilities; people of low income; and visible minority groups.*

Certain social groups modifying their own or others travel behaviours due to such concerns as personal safety (e.g. 'stranger danger') or risk of traffic accidents (Geurs *et al.,* 2009). In terms of those at risk:

- unwillingness to let **children** play outside or to walk and cycle, particularly for the journey to school
- **children in low-income families**, who are still more likely to play outside near busy roads and walk to school and so are more *vulnerable to accidents*

In terms of those at risk of exposure to **hazardous materials spills** Schweitzer (2006) found that *people of colour and low-income individuals* are more at risk due to their greater likelihood of **residing near a hazmat route;** and/or **near industrial land uses**, including the shipment's origin or destination. Sonak *et al.*, (2008) looked at the inequity in the export of end of life vehicles to developing countries

5.6 Community Severance

James *et al.*, (2005, p. 24) defined severance as: [T]he existence of a real or perceived barrier to people's movement through an area that is created by the transport infrastructure (such as roads or railways) or traffic. They distinguished between *primary severance* (e.g. caused by the initial barrier itself), and *secondary severance*; an additional barrier derived from the lack of adequate, accessible and operational mitigation measures.

In terms of those at risk:

- Rajé (2004a) looked at the *health dimensions of severance* such as *reduced access to facilities and services* for **disabled people**, and *reduced social services for disabled people*, and *reduced social support derived from lack of interaction*.
- James *et al.* (2005) *severance* may affect fears of accidents and feelings of intimidation associated with busy roads, which may ultimately **prevent people from accessing certain facilities**
- SEU, 2003 found a *lower quality of life* associated with the loss of social interaction amongst neighbours (particularly *children*), resulting from concerns about **busy roads**

Those effected by *secondary severance* (such as *poorly designed mitigation measures* (such as crossings); *poor maintenance leading to such physical barriers as those formed by flooding or icy areas*; and the *neglect or lack of maintenance of an area leading to such problems as graffiti or rubbish,* ultimately deterring **pedestrians** through fear of crime) include

- individuals without cars;
- those with restricted mobility (e.g. wheelchair users, older people, people pushing prams and buggies);
- school children;
- individuals who are not reached through the usual methods of consultation, such as elderly people and carers of young children).

Rajé (2004) also highlighted **students and women of low-income** as more affected by *community severance* as *derived from increases in bus fares*

5.7 Forced Relocation

This may be associated with the construction phase of a permanent move. This may affect relocated **residents** (Hwang *et al*. 2011) who are unable to socially adapt to a new place e.g. dealing with the *act of moving*, *finding employment*, and having *reduced social networks and support systems*.

5.8 Uncertainty of Construction

Marx's (2002) study of the impact of port facility expansion on local village residents in Doel, Belgium revealed that elderly residents living in single-person households were most likely to remain in the community, whilst younger residents and those in larger families were more likely to relocate

5.9 Visual Quality

Taylor (2003) observed the relative lack of attention to this area of study is remarkable, given the significance of the experience of motor vehicle traffic in modern urban life, and

the ways in which urban form and the aesthetic character of cities have been radically transformed to accommodate car based travel. He looked at the following:

- Vehicle aesthetics and impact on the pedestrian environment where a more positive aesthetic environment for pedestrians could be achieved by removing vehicular traffic from heavily pedestrian areas; reducing the size of street furniture and integrating it into the existing fabric; and more creative design of pedestrian environments (Wright and Curtis, 2002)
    - Bayley *et al.* (2004) found that the size of the car could an adverse impact, with large vehicles with high roof-lines (such as SUVs), being notable in this regard. Agglomerations of vehicles, such as lines of stationary/parked vehicles and lines of moving traffic, were 'visually claustrophobic' to research participants
    - Wright and Curtis (2002) found that the size and design of vehicles in the contribution to a positive aesthetic environment for pedestrians, but also that transport related features contribute to 'aesthetic degradation' such as wide junctions that create 'no-go' areas for pedestrians, road markings (e.g. hatchings and coloured surfaces) and street furniture, such as street lamps and signage.
    - Mullan's (2003) research with 11-16 year olds in Wales found that high levels of traffic and car parking negatively affected young people's views of their local area
      as a good place to grow up
- Roadside landscaping has not been studied extensively. However, all studies point to the restaorative and calming effects of roadside landscaping.
    - Fathi and Masnavi (2014) studied vegetation and scenic beauty in Canada. in relation to public safety via driving behaviour and accident rates but there have been few studies looking at the aesthetics of other types of transport infrastructure or the distributional effects of the visual impact.
    - Wilde (2010) noted the restorative and calming effect of roadside trees
    - This was also confirmed in a more urban study by Naderi et al (2008)

5.10 Physical Fitness

This is an area of expanding interest with the recognition of the association of obesogenic environments and non-active forms of transport to ill health. The introduction of new transport infrastructure (e.g. Olgivie *et al.*, 2010) and other changes to the built environment (Coulson *et al.*, 2011) may both impact on physical fitness levels, but the relationship between these is not straightforward. For example, Biddulph's (2010) monitoring of 14 recently completed home zone pilot projects in the UK reveals that residents did not spend more time in their streets following the remodelling, despite overwhelmingly citing aesthetic improvements to their neighbourhoods. In terms of Impact groups:

Bostock (2001) in her research with *single-mothers* in the Midlands, recognises the disadvantages associated with **compulsory walking** which can lead to both physical fatigue and psycho-social stress. These included psycho-social pressures associated with managing the demands of children whilst walking; physical fatigue as a result of

long journeys; limited access to health care and retail services, including hospitals and food shops.

5.11 New mobilities and quality of life

The potential role of transport in wider social processes has started to be recognised in the 'new mobilities' literature (Kaufmann *et al.*, 2004; Sheller and Urry, 2006; Urry, 2007; Ohnmacht *et al.,* 2009). Of interest here is the role of transport in terms of social interactions and the creation of social networks and social capital. (e.g. Currie and Stanley, 2008; Carrasco *et al.*, 2008; Frei *et al.*, 2009). Urry (2002) for example, argues that full, active, and engaged members of society require social capital within localities, and that their participation involves transportation and mobility. In a similar vein, Currie and Stanley (2008) argue that the role of transport in social capital has been overlooked, with a need for better understanding how transport acts to address social disadvantage through the provision of mobility/

Stanley and Vella-Brodick (2009) recognize that "little theoretical work has been undertaken on social capital and transport, apart from the recognition that it does play a role" (p.90), calling for more explicit measures around social capital and community, especially since social interaction in this context tends to be viewed "narrowly and specifically".

Schwanen and Ziegler (2011, p. 720) assert, mobility, wellbeing, and independence are: 'intricately connected with each another in many ways, especially in later life'. Mobility allows older people to engage in everyday activities outside the home that are meaningful and enhance wellbeing, whilst independent living gives older people control over the times and places in which activities are carried out.

Mobility is a multidimensional concept that includes not only movement in physical space, but psychological space (Zeigler and Schwanen, 2011). Thus, driving cessation, which commonly results in fewer out-of-home activities for many elderly people, will not only compromise physical mobility, but adversely affect such fundamental psychological elements as life-satisfaction, happiness, and sense of self.

Where Markovich and Lucas distinguished between provider based impacts (infrastructure, parked vehicles; transport facilities, services and activities) and user based impacts (traffic and travel) Varlıer and Özçevik in their study of the Istanbul's Third Bridge Project considered levels of citizen engagement and social science analysis methods to study liveability and quality of life, using ethnographic interviews and phenomenological observations. This approach led them to ask questions about the neighbourhood – its resources and values- the utilization of public services, their expectations and knowledge of what was happening heir study, amongst other things revealed the poor level of community engagement and consultation in the development process.

Marko (2002) reviewed factors that affect transportation and factors affected by transportation, and formed a classification system for the effects of transportation. Of interest here are the factors related to livability and quality of life; time use, income, freedom and privacy, community cohesion, equity value, historical sites, gender, air pollution health effects, access to people, goods and services, fitness levels, collisions,

noise levels, emergency vehicle access, communicable diseases and stress level. An environment meeting quality of life standards should be accessible, clean, comfortable, secure, safe, appealing, busy and lively. VanZerr and Seskin (2011) listed quality of life and liveability factors such as:

- affordability/disposable income;
- property values;
- noise impacts;
- air quality;
- community cohesion/severance;
- landscape;
- heritage/historic resources;
- physical activity;
- safety;
- transportation choice/option value;
- security;
- accessibility;
- travel time;
- streetscape/journey ambiance;
- distribution of impacts/amenities among vulnerable populations.

The review has highlighted the growing awareness of the role and impact of transportation, its social and distributional impacts of transport. There has been an underrepresentation of social factors e.g. through the problems of cross disciplinary research, difficulties in quantifying effects, low priority and lack of will and understanding attend to these. This is now changing. One key to this is the use of integrated and long-term planning (e.g. through SUMPs) and innovative financing and procurement which requires wider issues to be considered in calculating costs. Trends have also been noted with regard to the negative social impacts of transport schemes, the unequal distribution of impact across different social classes, the interrelationship between negative impacts and multiple levels of deprivation associated with transport poverty (e.g. Lucas et al, 2016). Markovich and Lucas (2011) conclude by commenting that a focus on the social and distributional impacts of transport presents an opportunity to ‘ensure a more socially just system of transport spending and delivery’ (p. 807) in this decade and beyond’.

6 Social Impact Assessment Survey

The previous sections have introduced the concept of Social Impact Assessment and provided a review of the major concepts. Undoubtedly there is strong legislative, ethical, moral and economic case for recognising the impact of new transport measures. The SIA survey conducted as part of SUITS aimed to assess what was happening in practice and whether there was agreement n terms of the methods and the underlying factors which could be used in a SIA in this project. The survey was chiefly conducted amongst the project partners in SUITS and others interested in the development of new transport measures.

6.1 Construction of the survey

The survey was compiled based on the literature review, using BOS[10]. It was piloted on 4 members of SUITS team in autumn 2017. Following substantial revisions based on their feedback it was passed for approval to Coventry Ethics Committee. Following this it was redistributed to the SUITS and sister project members and distributed through social media to other interested groups. The completion period was extended twice to get more responses. The exclusion criteria (those who are working on SIA), the length of the survey, and the willingness of overworked LAs and transport consultants to participate in these studies contributed to the low response rate. The final number of usable responses was 26.

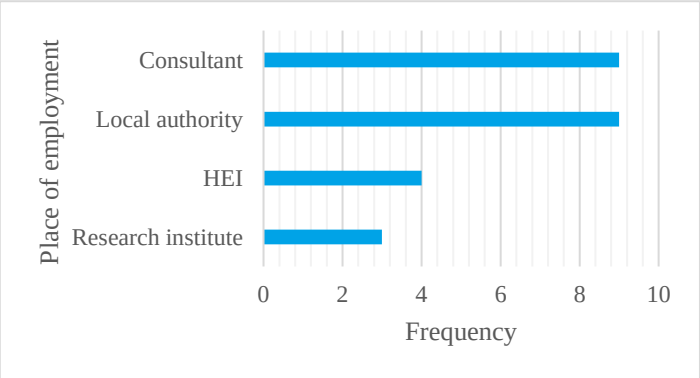
6.2 Results

6.2.1 Respondent backgrounds

The respondents were drawn from across the EU. 9 worked on SUITS (3 had only worked on SUITS in the capacity of EU projects). Other projects the participants had engaged in included METPEX, BESTFACT, CO3, FREVUE, PROEBIKE, EVIDENCE, FLOW, REACT, PORTIS,The Airport 2050+, NSB Core, BESTFACT, CLOSER, COFRE,T TRANSNEW, BESTUFS II, MOTOS, EAST WEST, INLOC, Baltic Gateway, INTRASEA, MODUM, HoPE, TIDE, SHAPE-IT, SOLUTIONS, EMPOWER, FLOW, OPTIMISM, ECOSTAND, TRIA, PROSPERITY, METAMORPHOSIS, PUSH&PULL, ACTIVE ACCESS, ELTIS, SCHOOLCHANCE, Ecorails, CIVITAS, DG MOVE, SUMPs-UP, PASTA. 3 participants had no experience of Eu transport projects. The distribution of the participants against places of employment is shown in Figure 1.

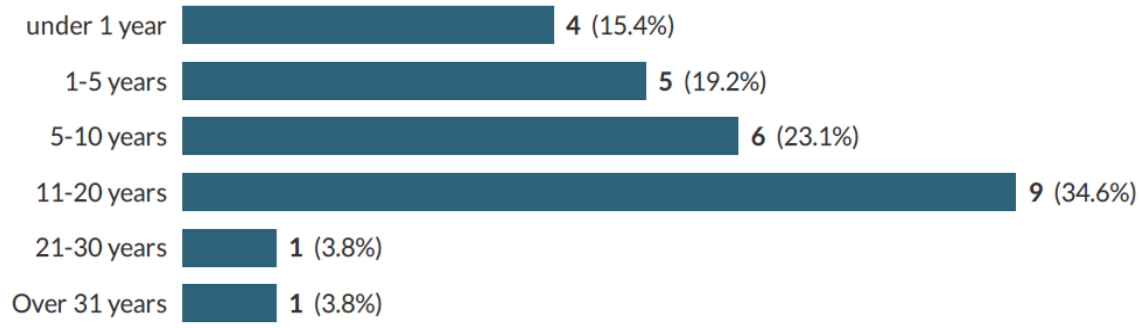
Figure 2: Participants place of employment

[10] https://www.onlinesurveys.ac.uk/



Participants were mostly from EU countries, including Italy, Greece, UK, Lithuania, Germany, Romania, Belgium, Spain. Once participant was from Malaysia. All were senior members of their organisation – from research associates to directors. They were all actively involved in transport, as project managers, co-ordinators or researchers. Their ages ranged from 21- 60 years, with a modal age between 31 and 40 years. Just under 35% of the respondents were female, 61% were male, the others did not declare their gender. Figure 3 shows their level of experience in transport, ranging from under 1 year to over 30 years.

Figure 3 Length of time in transport



6.2.2 Experience with conducting SIAs

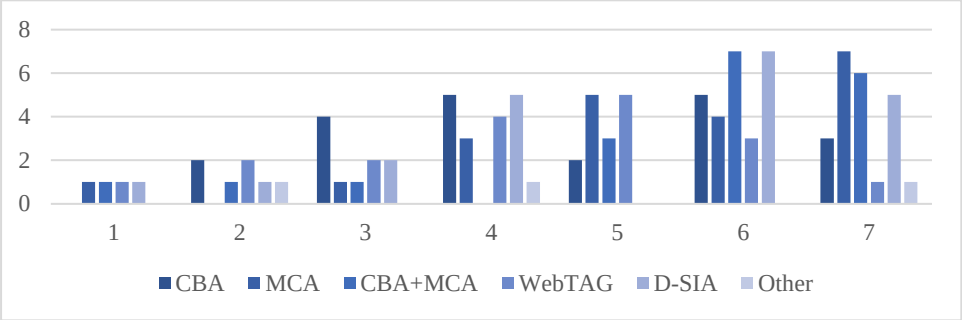
Figure 5 illustrates that approximately 2/3rd of the sample had some experience of conducting SIAs. This included research into CBA/MCA, SIAs in non-transport related fields, creation of guidelines on accessibility of transport services and tools combining CBA/MCA, and less formal approaches to understanding social impact of transport. Just over 40% of the SIAs which the sample had conducted were used ex-ante and ex-post. 30% had only been conducted before hand. The tendency to some only being used ex-ante is ambiguous. It may either that the project was not deemed to have any social impact, or had so great an effect that it was abandoned, or abandoned for other reasons. 80% of the respondents thought that both ex-ante and ex-post SIAs should be conducted. 20% considered ex-ante to be essential as there was a '*clear need to consider these in the planning stage, and then measure ex-post as well*'.

The most frequently used method, accounting for 30% of the sample was CBA+MCA. CBA or MCA on their own were used 23% of the time, and WebTAG only by UK participants. Other methods included multifactor surveys, and 'quantification of impacts through models without subsequent evaluation activities'.

The most appropriate methods for SIA are shown in Figure 3. This shows a clear preference for CBA +MCA and D-SIA (Distributed Social Impact Assessment). This

reflects the literature and the move towards more sophisticated assessment methods. Other methods included gender impact assessment and 'quality of life assessments for random selected groups of citizens' and stakeholder discussions.

Figure 4 Methods considered most appropriate for SIA



CBA+MCA were perceived to be complementary, for example.

> *The MCA could complement CBA by providing insights by using methods that are not limited to monetary valuations and could grasp aspects that are equally important for assessing social impacts*

Respondents acknowledged that the more comprehensive the approach the better, although the selection was dependent on the results needed. Others considered CBA to be the best, commenting,

> *CBA is the best as it is easy to understand and interpret the answers. MCA is also excellent. However, lack of data could be an issue*.

> *CBA is the most representative and reliable method of assessment*

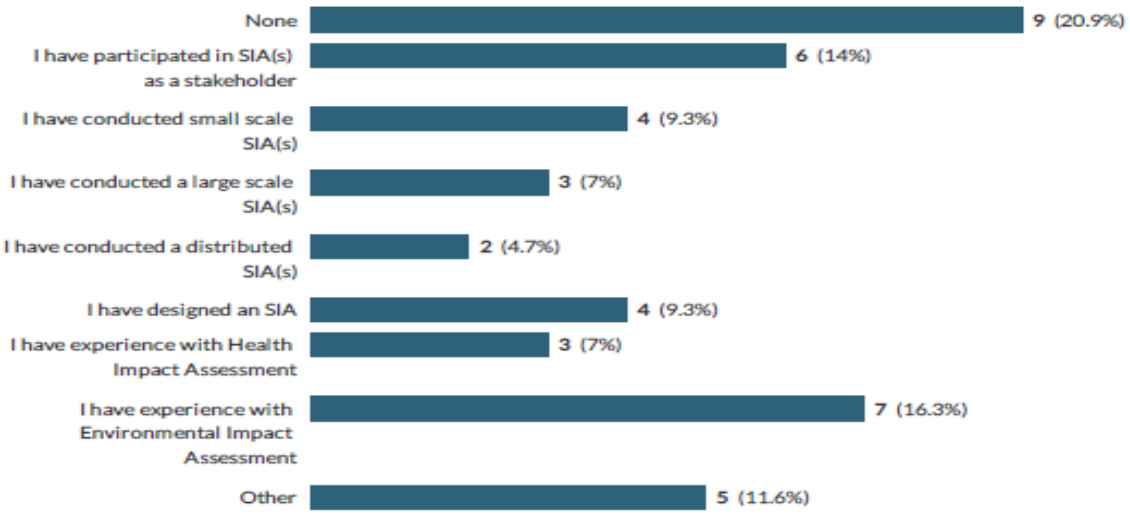
Distributed Social Impact Assessments were regarded as useful for understanding wider impact assessments.

> *Distributed SIA are useful for understanding which types of people are most affected by the scheme. CBA is good for an all-round economic assessment, and also generally considers different types of scheme users.*

> *in transportation, we include spatial impact as the movement of transport not only involves the area but also outside of the site, outer movement (out-out), in and out.*

Figure 5 confirms that most respondents had a working knowledge of SIAs and had experienced them in projects of different scales

Figure 5 Level of experience of conducting SIAs



Respondents were then asked about the level of impact the SIA had on the overall project. The answers are shown on Figure 5 below on a scale from 1 (none) to 7. Clearly this shows

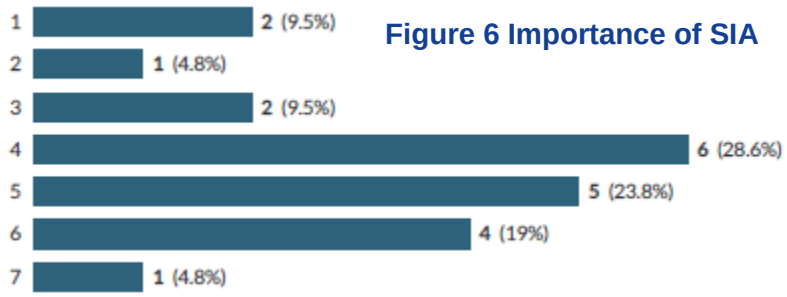


Figure 6 Importance of SIA

a positive skew towards SIAs having some influence on the implementation of the transport measure with one respondent commenting that '*social aspects are really important in transport decision making'*. However there was also a tendency in the comments show that this was a prerequisite which had to be undertaken, and that engagement of citizens was difficult because they were not interested in the assessments, or able to understand the technology. Time and resource pressures also influenced the quality and nature of the assessment,

The overall impact of the SIA is also influenced by economic and political considerations. In some cases it did inform the decision as to whether to go ahead with the scheme, was useful for comparative purposes and to inform future transport schemes.

The responses to the question about how SIA could be made more effective for the assessment of sustainable urban transport measures are shown in Table 10. These could be grouped into 2 main categories related to process /operational issues, and the depth of the SIA

Response	**Key themes**
Closer cooperation between technical staff running the analysis and stakeholders, especially local authorities	Process – Flow of information

Considering those seeking employment, young people and commuters would help make the assessment more effective with the desired outcome.	Process - Wider consultation
To ensure key decisions and evaluations are informed by the results of the survey(s) pre and post. Inform key stakeholder groups at each stage. Translate findings and impacts into laypersons language / different languages based on minority groups in the region. This will hopefully garner further interest and buy-in to the process whilst empowering at the citizen level.	Process – feed the results through to stakeholders – use appropriate language for the populations being consulted
By engaging a big number of citizens to be involved and empowered	Process – increasing size of sample
SIA can help in assessing the ways urban transport can be used as a tool for social inclusion of all groups in a society.	Process – integration with wider city plans
Make it simple and easy to use	Process – design of surveys
SIA is very important when assessing the importance of different routes and technologies to be used in urban transport as it should evaluate the way people have real access to services	More depth and broadening range of impacts considered
Focus on environmental impact and economic assessment (e.g. motives for buying electrical or hybrid cars)	
Include land use planning	
Much deeper and better well-funded ex-ante SIA's to get objective idea of the potential impacts	
Takes into consideration the views of all stakeholders including users and looks at aspects that are not the most obvious - direct for transport measures (e.g. education performance of pupils, effects of cleaner transport on health of citizens etc.)	
Incorporation of longer vision horizon, visioning not 5 but 15 years ahead	

Table 10 How SIA could be made more effective

Although only briefly mentioned in the literature, the respondents were asked about the level and quality of citizen engagement in this process. The answers were normally distributed, with engagement rated as being average, never excellent, and in one case poor. Engagement was not scored more highly owing to lack of information about

transport issues at the citizen level, lack of time and lack of faith for change. Figure 6 shows the level of engagement to be mainly at informing level, not at empowerment. Comments included

> *There was a willingness to get the feedback of stakeholders on the impacts but (a) not all of stakeholders had the capacity to get involved more deeply and (b) the project promoter was reluctant to engage on a higher level.*
>
> *In order to deepen the acceptance of the innovative projects that are proposed, the level of engagement should at least be "collaborating", otherwise it leads to failure*

Figure 7 Level of citizen engagement

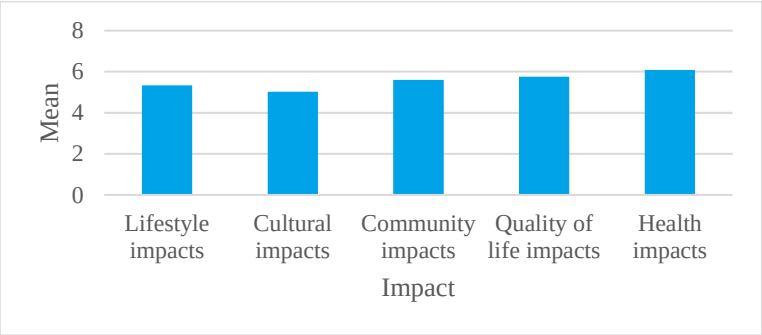
6.2.4 Definitions of Social Impact Assessment

Given the relatively high levels of experience with SIA and the composition of the sample it was interesting to note whether there was any agreement in the definitions of SIA. 22 respondents answered this to a varying degree. The most complete answers include the following. All answers showed a commonality and an understanding which meant that the respondents could comment on the following sections of the questionnaire.

> *Evaluation of the effects that changes in transport for stakeholders not directly involved in the decision-making process (society)*
>
> *socio-economic impacts, gender impacts,*
>
> *when your results relate to a better wellbeing of people in any way*
>
> *I understand it as the effects that certain activities and insights (scientific findings, technological innovations, etc.) have on society. It is about finding out which areas of society are affected and how things are affected. It is also about a possible interplay with other activities and social phenomena.*
>
> *Social Impact Assessment - processes of analysing and monitoring of the intended and unintended social consequences*
>
> *Social Impact Assessment includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment.*
>
> *To what degree to which a certain measure has an impact on the social welfare of the community*

In terms of factors which should be included in an SIA, Figure 8 shows the mean scores for each 'high level factor' that could be included in an SIA. From this it can be concluded that the respondents considered all impacts to be highly important, but that health and quality of life impacts were slightly more important. Cultural impacts scored slightly lower than the others.

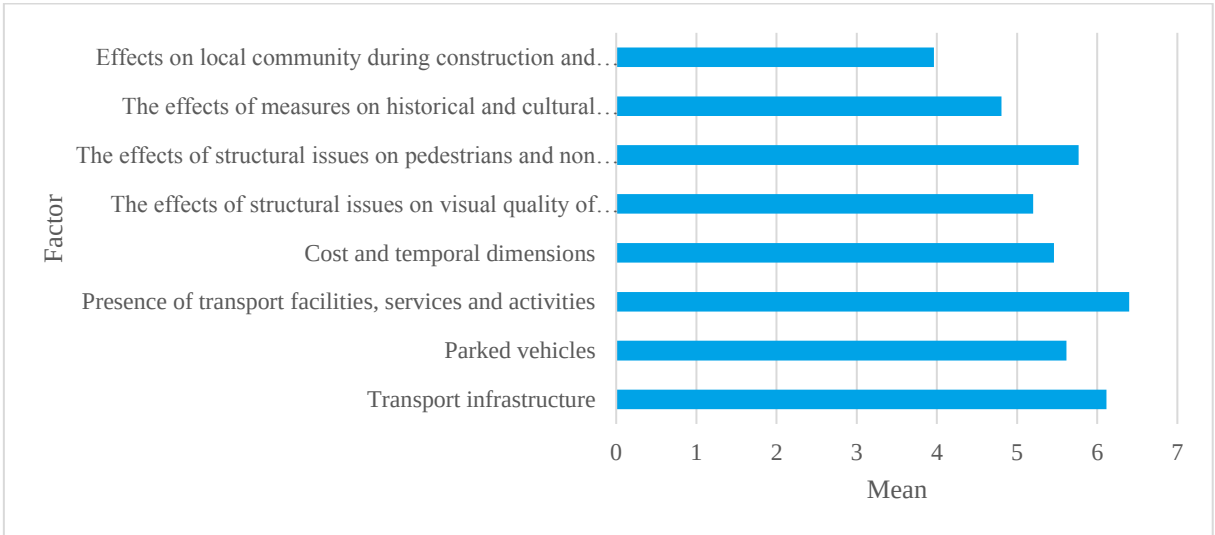
Figure 8 Factors to be included in SIA



6.2.5 Provider based issues

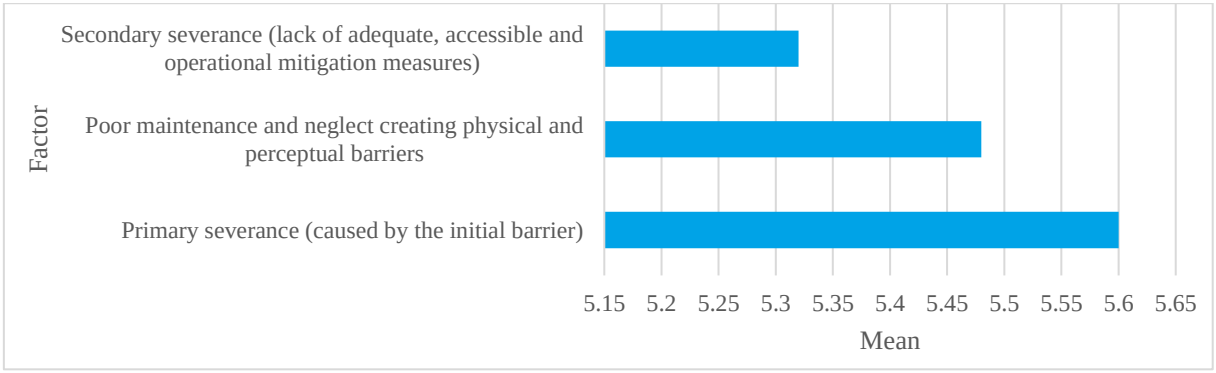
The respondents were asked to rate the importance of provider based issues typically considered in SIA, when this was applied to sustainable transport. Figure 9 shows that issues related to the presence of transport facilities, transport infrastructure and the effects of structural issues on the environment were most important.

Figure 9 Relative importance of provider based issues for SIA



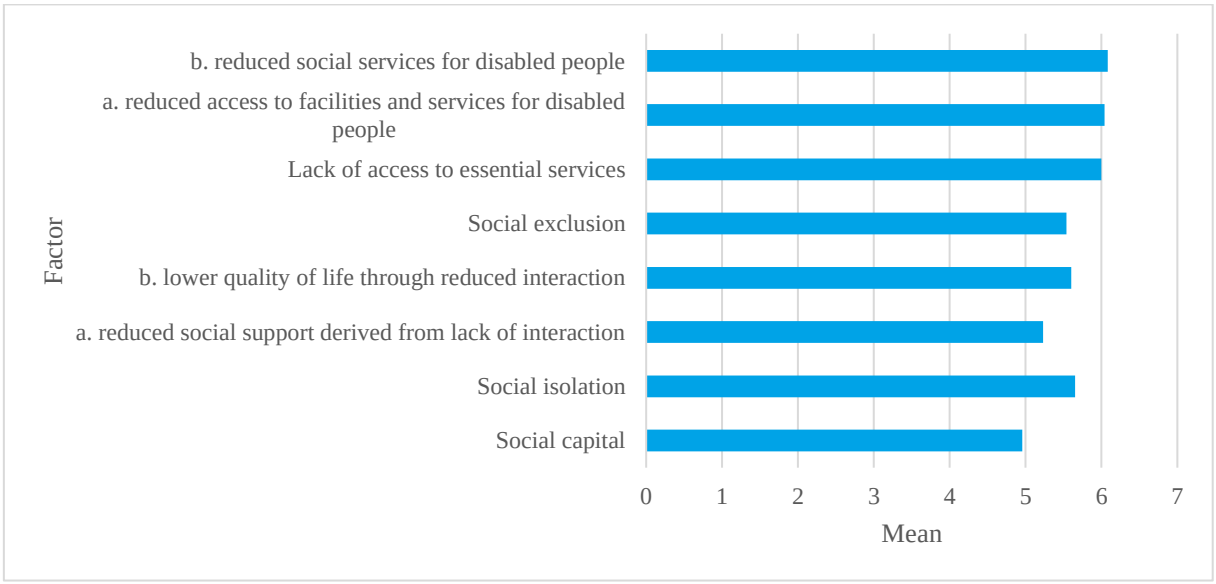
Again, looking at provider based issues, this time in relation to community severance, clearly primary severance (caused by the initial barrier) was the most important factor in this category

Figure 10 Relative importance of provider based issues on community severance



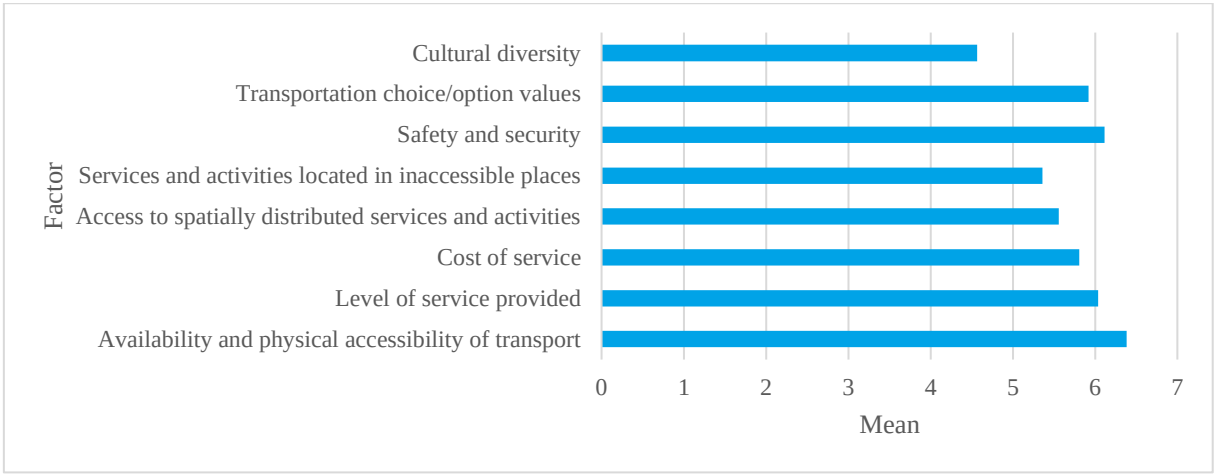
In terms of provider based issues associated with Social cohesion in SIAs. In terms of sustainable transport measures and SUMPs the most important factors were associated with a lack of access to essential services for disabled people

Figure 11 Relative importance of provider based issues on social cohesion



The following figure relates to provider based issues in terms of accessibility. The most important issues related to availability and physical accessibility of transport, safety and security and level of service provided.

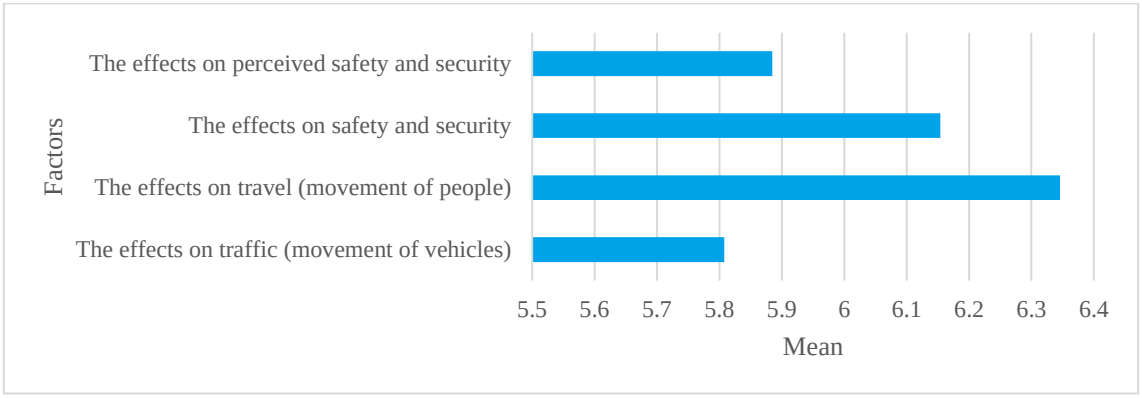
Figure 12 Relative importance of provider based issues on accessibility



6.2.6 User based issues

The respondents considered the most important issues as relating the effects of travel on movement of people and effects on safety and security.

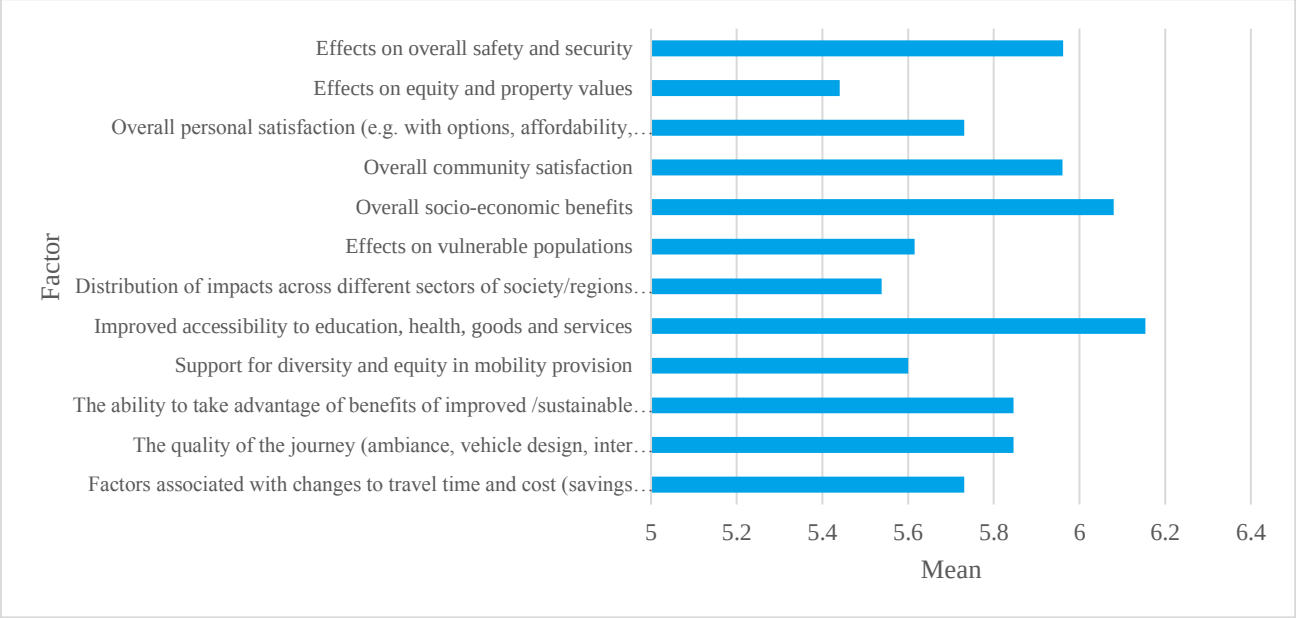
Figure 13 Relative importance of user based issues in SIA



6.2.7 Liveability and Quality of life issues

The answers here confirmed that improved accessibility to education, health, goods and services and overall socio - economic benefits were key. These were followed by effects on overall safety and security (a key issue already raised in Figure 13), along with overall community satisfaction. Surprisingly effects on equity and property values and distributional effects across were considered relatively unimportant.

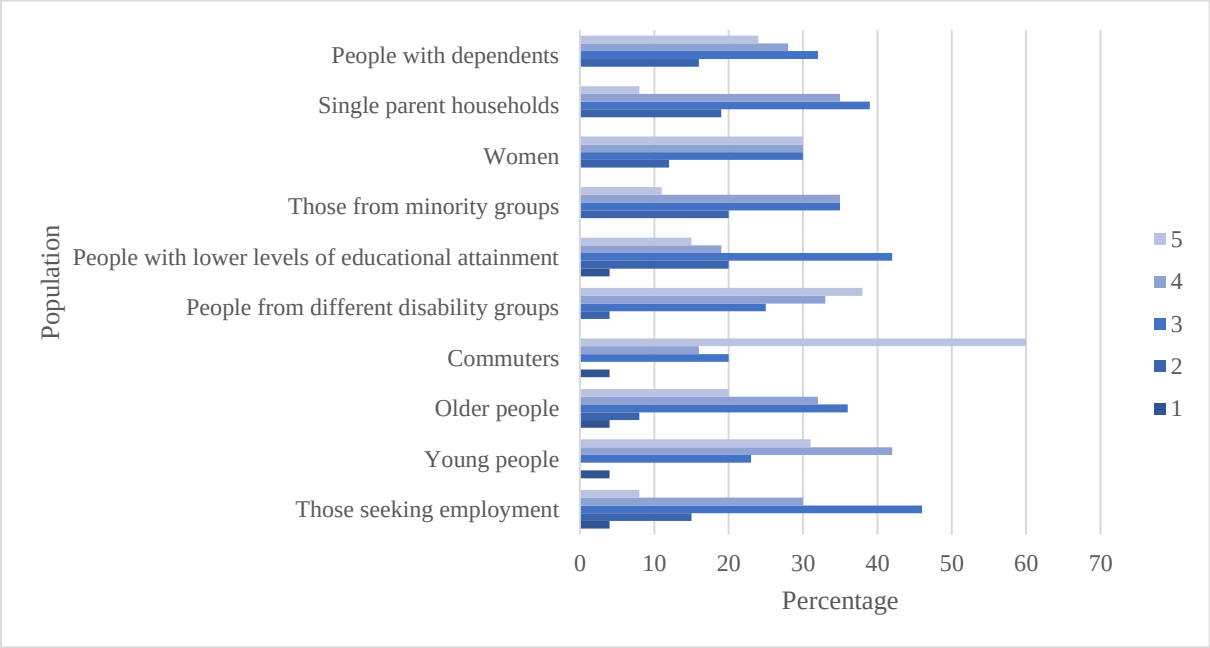
Figure 14 Relative importance of liveability and quality of life issues



6.2.8 Which citizens should be given priority in SIAs

The next set of questions related to who and what should be included in the SIAs. All items were ranked from low to high (1-5). Interestingly, Figure 15 shows that the population which was most important to be regarded in SIAs was the commuting population

Figure 15 Which populations are most important to be considered in SIA



The rationale for answers are shown in Table 10. Groups for which no answers were provided have been omitted. One respondent answered *'everyone counts to all'* questions and another similarly answered *'Neutral here - as a good proportion of the population should be consulted*'. Other populations which could be consulted include '*social activism groups and charities with an interest in sustainable/eco-friendly or low carbon transport'* and decision makers

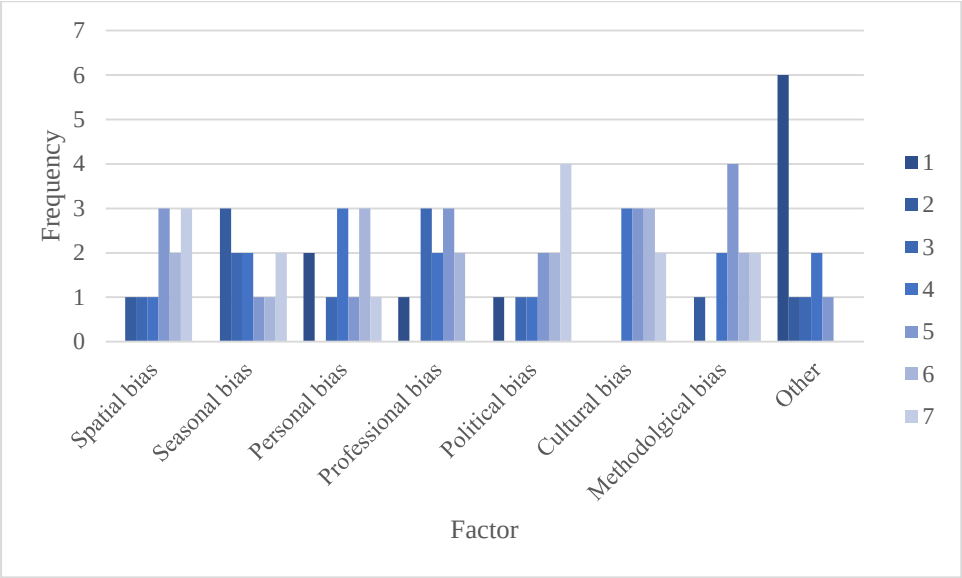
Population group	Responses
Those seeking employment	Will require high quality and reliable transport; to increase employment, we need better/more sustainable transport
Young people	Less likely to use private vehicles so need access to public transport; highly influencing group; changing mobility behaviour within the population
Older people	Social equity
Commuters	Higher value for money of their trips- they generate most problems in the system such as congestion etc; will require high quality and reliable transport; most important to encourage travel to work using sustainable transport measures, this is a large group of people so best way to reduce overall car travel; biggest group/most impact
People from different disability groups	Social equity; require safe and secure transport with accessibility considerations
People with lower levels of educational attainment	Hard to get involved
Women	I'm not sure how relevant this is – women shouldn't be given higher priority than men, but equally, men shouldn't be given higher priority than women; highly influencing group; should not be addressed specifically, but rather holistically
Single parent households	Depends on the composition of the target group

Table 10: Rationale for answers for groups to be included in SIA

6.2.8 Which factors limit the effectiveness of SIAs?

Each element was rated on a scale 1-7, from least to most important. As the response rate to these questions was poor, frequency has been used instead of percentages in Figure 16.

Figure 16: Factors which might limit the effectiveness of SIAs

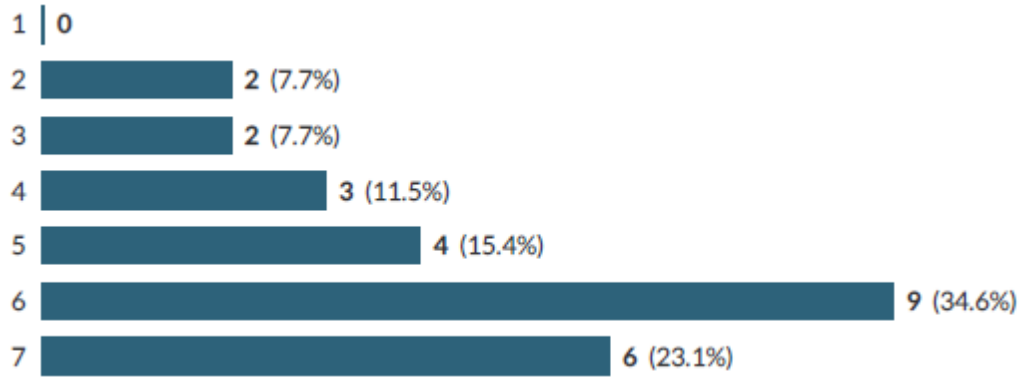


Comments here related to the extent to which citizens bought into the SIA process. Personal, social, political and cultural biases were regarded as influencing al SIAs. Additionally, political and cultural biases could distort the SIA so that it does not accurately reflect the social impact of the measure/project under investigation. A major issue may also be the role of the decision makers whose needs to take into account the results from the SIA.

6.2.9 Health, social, economic and environmental impact assessments

This part of the survey sought to understand whether it was viable or appropriate to merge different types of impact assessments. Figure 17 shows considerable level of support for this (on a 7-point scale from totally disagree to very much agree). Comments mainly related to the fact that these items were inter related. Table 11 shows the comments for and against this more integrated approach

Figure 17: Agreement for one combined assessment



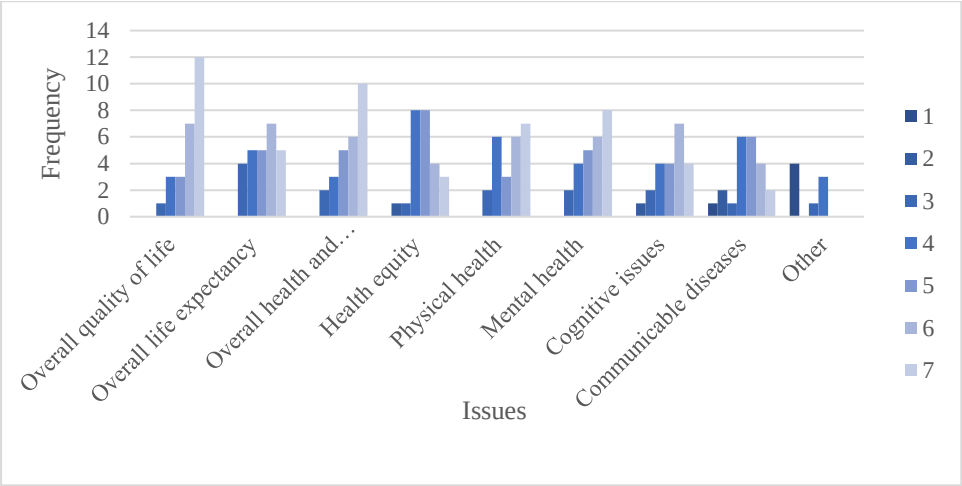
In broad agreement	More cautious
All of them are depend on each other	It really depends of what effects you want to achieve. If the overarching aim is to have zero transport accidents then this is what should

	be measured. Its a normative approach and we have to be clear about the norms.
I think all aspects should be analysed using the same framework	there's a risk of this becoming too complex. In addition, not all criteria for each type of measure certainly play a role.
Clear need to consider all aspects into the assessment	Combined assessment is a great ideal, but if aspects can't be assessed quantitatively, they shouldn't be crammed into a CBA at all cost
The less effort for partners, stakeholders etc. to get evidence of impact the better it is as they are anyway restricted in relation to time.	It depends on the scope of the assessment. Normally the Health and Environmental Impact Assessment is a totally separate task but in some cases it is necessary to integrate / combine the process and results into one study.
There is auto-correlation between health, social, economic and environmental conditions.	I think you can go into more detail by having separate assessments for each. Also, I don't think you can combine each of these impacts under one single assessment with one single answer; for example, you could have really good economic impacts but really bad environmental impacts. If they were to be combined into one assessment, there should be four separate outputs.
The would help meet some of our obligations we are committed too.	There are some measures which can be evaluated separately.
All interdependent and cyclical factors	Depends on the methodology and expected outcome
The different aspects regarding Health, Environmental and Economic Impacts have to be combined in wide view	As much as other impacts may affect each other, different impact assessment will be more in detail related to the field and specific issues
Social and economic factors influence the opinion of people	I think that the assessment of the different areas need a weight. Not all impacts have the same weight.
Without any of the above-mentioned impacts, the result of the SIA would be incomplete and it will not provide a holistic view of the situation.	

Table 11 Comments related to the one assessment

Given that respondents saw some potential in combining the assessments, the following questions asked them to consider which factors could be considered in a wider SIA. Questions were on a scale of 1-7 (from not important to very important). The numbers have been given in frequencies owing to a reduction in number of responses.

Figure 18 Health issues which could be included in a SIA



Most respondents were in agreement that health issues should be included in the SIA, with *'the quality of life, health and well-being the most important factors that a SIA should assess, as these are prime issues for citizens'*. One respondent commented on the need to consider road accidents and casualties here as well. Additionally, health impacts can increase the influence level of the assessment.

Figure 19 Environmental issues which could be included in a SIA

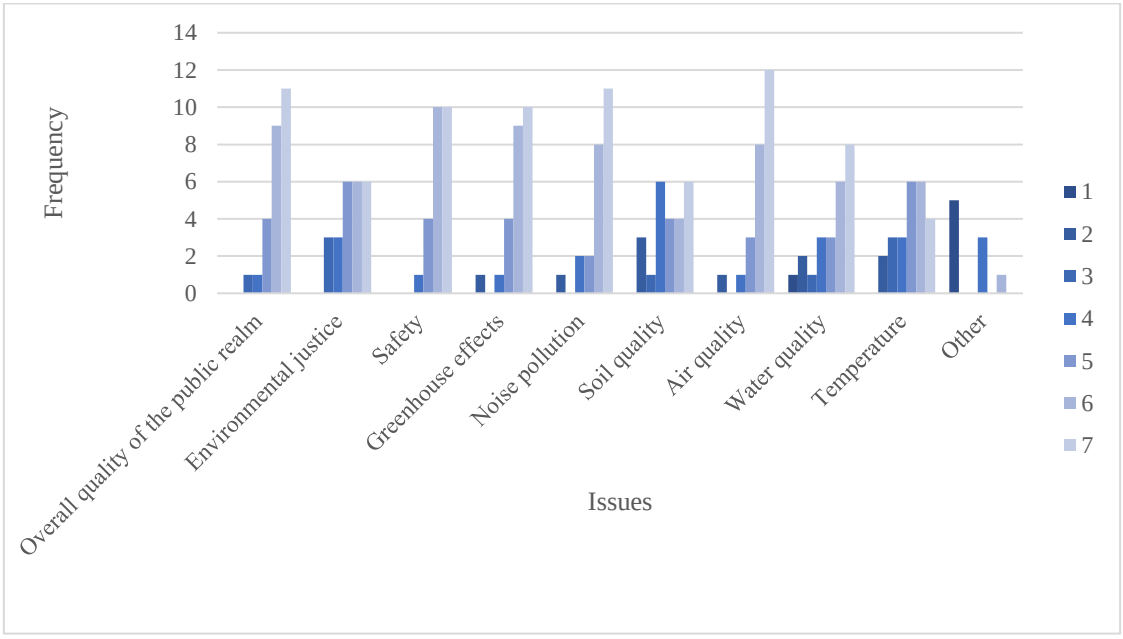
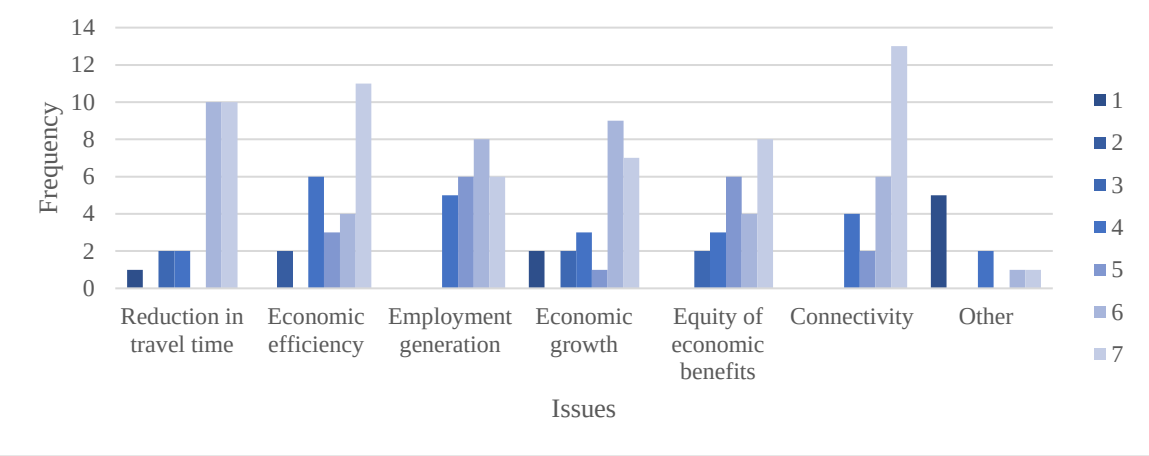


Figure 19 presents a similar breakdown in terms of environmental issues. Respondents saw a clear relationship between environmental aspects and social impacts, especially in relation to air quality for young people. Air, water and soil quality were seen as being important parameters of healthy living, so again the interrelationship between elements is being emphasized.

Clearly, most respondents also agreed that economic issues (Figure 20) should be included in the SIA, with some stating that these were the most important elements to include the assessment. Economic issues played an important role in determining the mode of transport used and the decisions about which transport measures to develop.

Attempts should be made to calculate vehicle travel time and see how much economic benefit derives from differences and whether these are noticeable.

Figure 20 Economic issues which could be included in a SIA



Privacy impact assessment is a relatively new concept, but with the use of big data and the move towards intelligent mobility it was interesting to understand whether respondents had considered these issues, or thought they might be important in SIA. 50% thought that they should be included, 23% thought they should not, with the rest being undecided. The comments reflected respondents' uncertainty, especially whether this should be included in a SIA or dealt with separately. For example,

> *not relevant, but should be done yes.*
>
> *this is an impact which can affect society*
>
> *there is no social impact in my opinion*
>
> *I think this should come under a project risk assessment, rather than SIA.*
>
> *Too specific issue, there is already enough to evaluate.*
>
> *Consumers are increasingly aware of the fragility of their personal data in a digital world. The public want assurance that their data is safe and secure and not vulnerable to leaks or hacks. In addition new GDPR regs will compliment / replace Data Protection Act*

6.2.10 Application of SIA to SUITS project

The DoA made reference to the fact that we would try to apply SIA to the project. The final section of the survey asked respondents for their views on this. This was difficult to answer for those who were not in the SUITS team, familiar with H2020CIVITAS projects or SUMP approaches. However, of the 20 responses over 50% favoured MCA, or approaches the combined MCA, 25% favoured CBA and the remaining 25% more bespoke approaches e.g. focus groups, stakeholder consultations and quality of life assessment.

In terms of comments, CBA was considered

- To give full and meaningful outcomes

- A reliable and precise method
- The impact on skills and capacities require longer time to be shown - CBA could not identify and assess accurately the long term benefits
- CBA too time consuming and tricky to use to evaluate SIA aspects, assuming data is even available

MCA on the other hand offered

- Decision making tool to find the best solution
- Confirmation of the association between socio-economic, demographic and geographic factors using advanced statistical techniques.
- Varied assessment criteria
- Means of studying holistic criteria
- A method that involves decision makers in the process, unlike CBA that is totally delegated to technical people.

More bespoke methods were considered relevant owing the nature of the project which is about improving the conditions to implement sustainable transport projects, and not just about economic impacts.

Respondents thought that relevant issues for an SIA for SUITS were[11]:

1. Environmental impacts
    a. way of human living in urban areas
    b. air quality
    c. Impact on environmental awareness and sustainability awareness
2. Economic impacts
    a. Employment generation
    b. Socio economic benefits to the city/region, measurement of skills and change
    c. Capacity/attitude/knowledge of people working in the city administration
    d. Travel time and cost reduction
    e. Connectivity (isolation etc)
    f. Increasing the attractiveness of transport services

3. Social impacts
    a. Accessibility and usability
    b. Quality of life,
    c. Safety and security,
    d. Socio-cultural aspects and mobility limitations
    e. Social acceptance and use of developed services
    f. Behavioural and attitudinal change
    g. Effects on the perceived quality of offers and implemented measures
    h. Accessibility of transport infrastructure
    i. Social capital

4. Health

[11] See section 7 for how these have influenced the final method

a. personal safety

6.3 Conclusions

Despite repeated reminders and attempts to push the survey through social media the response rate was disappointingly low. This may be a function of the number of people who actually conduct and are interested in this area of work, or workload.

The social impact of transport is a key and growing area of concern. Therefore, an immediate outcome of this survey must be how SIA can be transformed from a transport planning tool to one that engages people and can be used **as a tool to reduce transport poverty** in line with integrated master plans

Although not touched upon in this survey, the literature suggests a need and **trend to move away from highly quantitative approaches, to more direct community engagement** (e.g.Varlıer and Özçevik (2015). There was some support for using alternate methods. However, the feasibility of using limited resources on ex ante and ex post evaluations which are not recognised at national and EU level must be considered. Already the usefulness of the SIA is perceived as being influenced by time and the aspirations of the promoter, and ultimately by economic and political considerations. In terms of community engagement, SIA was not recognised as acting at the level of citizen empowerment (Arnstein, 1969), but did on occasion move towards collaboration.

Given the amount of investment in SIAs and cross disciplinary knowledge in mapping the effects of transport on the one hand, and a call for greater citizen engagement and awareness raising by Las, there is a **clear opportunity to use and design participatory activities around SIA**, and use this in the **wider context of urban transport planning** – linking transport through to environmental, health, social and economic master plans. This document could form a basis to design training material focussing on the elements which have been rated most highly by respondents.

Respondents raised many issues regarding how SIA could be more effective. These were grouped into 2 broad categories; **process based issues** (e.g. flow of information, extent of consultation, use of language, size of sample, survey design and integration with city plans) and issues around the **depth and content of the SIA** . WebTAG, for example, has attempted to look at some forms of quantification of less tangible elements, but acknowledges that these might be of limited accuracy. As an example of a CBA approach, this gives credence to the idea to use CBA+MCA approaches in SIA which was popular with at least half of the respondents.

Clearly the breadth of the items which could potentially fall under SIA is daunting, especially if it is merged with environmental, economic and health impacts. All of these have their own measurement criteria and an equally broad set of factors which need to be considered. The movement towards considering **liveability and quality of life as superordinate categories** accords well with **new procurement regulations** which need to consider wider implications than initial cost.

The responses to issues about the inclusion of **privacy impact assessment**, showed that the respondents were not too familiar with this. They answered the question in terms of the privacy afforded to people whose data is included in SIAs rather than thinking

about the social impacts that could arise when mobility data is not securely handled by new entrants in MaaS ecosystem, such as CAV and ride share providers.

The factor which was raised most spontaneously by all participants to be included in an SIA assessment related to quality of life. As an overall concept this could be used to measure not only the transport measures, but also the impact of the project in **improving the quality of life** for those associated at all levels with the planning, implementing and use of transport. Although **transport poverty** was not mentioned per se, this might be a factor which could be considered as many elements map on to this.

7 SIA in SUITS

7.1 Introduction

Social Impact Assessment is being considered in SUITS in three ways

1. As a means of recognising that SUITS has social responsibilities, above and beyond transport measures that it seeks to support. As part of the project evaluation these need to be understood and recognised. In this case, SIA is being explored as a means of widening our understanding of potential impact. The literature review and accompanying survey have been used to develop a set of factors which will be used to qualitatively check our outputs. CBA, MCA and more quantitative approaches used in full SIAs are not considered appropriate for this purpose.
2. To develop a common understanding of SIA across the project team. This has been provided by this document and through the completion of the survey.
3. Furthering debates around SIA and measurement approaches applied to sustainable transport, especially in terms of the breadth of the criteria used for assessment, the reliance on quantification and the role of citizen engagement. Of especial interest here is the relationship between transport innovation and new mobility paradigms, and how there has been a shift in thinking about the relationship between transport and quality of life. Transport can no longer be measured simply in terms of its performance but as an enabler or barrier to improved quality of life.

The aim of task 7.4 was to assess the societal impact of the project in relation to the quality of the interventions being proposed or considered.

This will be achieved by:

- The conduct of a SIA at critical stages of the project informed by interactions with various stakeholders
- Discovering through stakeholder engagement varying views on impact
- Documentation of the interventions and activities being proposed (by the LA).
    - Where an LA has not or will not perform a SIA for the projects occurring within the time frame of SUITS, we will conduct and iteratively develop our own SIA based on qualitative assessment of impact of the sustained transport measure on quality of life using key informant interviews
- Documentation of the interventions and activities being proposed (by the project).
    - The interventions proposed by the project relate to the development of training material, on-line materials and demonstrations in Torino, Kalamaria and Alba Iulia (public procurement decision support toolset)
        - For training material, part of the usability assessment and feedback from the events will include a sheet related to SIA
        - For Kalamaria and Torino, more extensive SIA will be conducted on expected and derived benefits with those who are running the trials

The SIA will be:

- mediated through computer based interactions,
- social media

- face to face meetings conducted amongst SUITS partner at 6 monthly meetings and training events
- updated on the SUITS website for feedback from relevant stakeholders

How this fits with the Evaluation workpackage:

The SIA will be woven into WP7 evaluation activities throughout the project. At the level of the project partners, we will evaluate their current understanding of the concept of SIA and how it applies to SUITS, measuring whether there is a common understanding and, if not, identifying the steps needed to create this common understanding, e.g. a session dedicated to SIA.

Key project partners such as Change Agents and Site Evaluation Assistants will be tasked with reflecting on key questions such as:

1. What social aspects of transport measures can be influenced by SUITS?
2. How can these be measured?
3. How can we create greater social impact of SUITS outputs?

This will be conducted at Change Agent workshops/SEA workshops in the middle of the project. At the end of the project they will be asked to reflect on questions such as:

4. What impact has the project made on the level of understanding of social impacts of transport?
5. What impact has the project made in ensuring that social impact of transport investment has been considered?

The Process Evaluation approach provides a means of gaining deeper insight into SIA at the city level during and at the end of the project. An exercise dedicated to SIA will focus on partner cities' attitudes to, acceptance of and use of SIA, barriers to its use and how these can be overcome.

The Social Impact Assessment tool developed in SUITS (to provide guidelines and methods to measure the social impact of transport initiatives) will itself be evaluated by city partners in terms of usefulness, applicability, and intention to use it. Training materials on SIA (and workshops on the topic if any) will also be evaluated by city partners/attendees/potential users of the material.

7.2 The role of the survey and the literature review

The literature review formed a scoping document for the survey. The survey has been used to make our intention known to other projects that we are addressing societal impacts, to gather data on the method and key concepts that we will be addressing and to reach a consensus on what SIA is amongst the team.

7.2.1 Methods appropriate to SIA in SUITS

Extensive, well documented approaches to measuring SIA have been developed. These are not considered to be applicable for the purposes of the SIA in SUITS. LAs conduct SIAs in line with national and EU protocols and preferred best practice. The role of this WP is not to re-evaluate transport measures, but we can assess the extent to which current SIAs have successfully dealt with SIA. In this we agree with Huegong, Glensor, and Lah (2014) that there is a need for a simpler approach to SIA especially for SM authorities, that more qualitative approaches and better citizen engagement is needed as discussed in Varlıer and Özçevik (2015) and that the focus of SIAs should be on quality of life (in line with other studies and the survey).

Pragmatic, qualitative research methods will best deliver the results we need from SIA, and in line with the DoW we will work with SEAs to deliver key informant interviews throughout the project in each city and partner institution.

7.2.2 Focus of SIA

The overarching concept for SIA is quality of life, in this project and sustainable transport measures. Although here is no common definition of quality of life, it is about meeting basic personal needs in an individual and societal context. VanZerr and Seskin (2011) define quality of life as the general welfare of individuals and communities, livability refers to the comfort and quality of the surrounding environment; quality of life as the impacts of the surrounding environment on human experience and health. Raphael et al. (2001) propose that ‘community quality of life’ is related to the community members’ perception of life and can be evaluated through observing the degree to which their basic personal requirements have been met. Transportation has significant effects on both individuals and the society due to the link it creates between production, storage and consumption and to its contributions to commerce.

The case for using quality of life as a KPI for transport in general and SIA in particular is clear. As a KPI in SUITS this can work in three ways:

- to consider the value of the project in supporting individual, organisational and institutional change,
- the extent to which the training materials can be applied In SM LAs c to improve quality of life,
- in relation to the transport measures themselves (if needed)

The application of quality of life indicators to organisational change has currency (e.g. Westley (1979), Fernandez et al (2007), Ahrens et al (2017)). It is consistent with the main aims of SUITS in terms of our aspirations to develop a model for organisational change within S-M LAs, and in the need to develop training material.

The LCs are being surveyed to further understand how they have used quality of life indicators in their current SIA of transport measures within SUITS

Using the results from the survey and literature review, the following items scored most highly and will be incorporated into a template for use in key informant interviews, focus groups and other qualitative measures.

- Quality of life/ liveability issues; improved accessibility to education, health, employment and other services, overall community satisfaction, overall personal satisfaction, ability to take advantage of opportunities, quality of the journey, visual quality of the public realm,
- Environmental features: overall quality of the public realm, air quality and noise pollution
- Economic issues: connectivity, reduction in travel time, equity of economic benefits
- Health issues; overall quality of life, overall health and well-being, health equity,
- Provider based issues; primary severance and poor maintenance and neglect
- Social cohesion: effects caused by reduced opportunities for interaction, social isolation, social exclusion, lack of access to essential services
- Accessibility: availability and physical accessibility of transport, safety and security, level of service provided, access to spatially distributed services, effects of structural issues on pedestrians.
- User based issues; effects on travel
- Process based issues; range and quality of engagement

7.2.3 Mapping of SIA on to transport measures

SIA should be undertaken at ex ante and ex post stages of the transport measure implementation. The SUITS project will work with city partners in the development of transport measures, of different scales relating to

- Mobility management
- Safety and security
- Information systems and services
- Clean fuels and low emission vehicles
- Collective passenger transport
- SUMP measures
- Freight

Taking a snap shot of projects which partners are completing within the period of SUITS it would seem that SIA is not considered routinely at either ex ante or ex post stages even when it might be assumed that there would be a social impact consideration. From the above list. The following provides some examples.

- Safety and security (Rome)
    - (Measurement of safety and security for vulnerable people, the quality of public transport experience, pedestrian facilities)
        - Vulnerable users evaluation in term of road safety, through yearly accidents analysis[12] considered social cost calculations for all victims involved in road accidents
        - Understanding of transport perceived quality. Over 6000 users gave their opinion of public transport and evaluated fares, emergency

[12] https://romamobilita.it/it/progetti/sicurezza-stradale

management during transport service; personal security (overcrowding on board, safety of the vehicle); public transport accessibility, tariff levels for each users category; dedicated service to disables students and students with families low income
        - For traffic calming measures, realization of pedestrian areas and pathways[13] consideration was given to improved urban liveability, safe spaces for social encounters, reduction of environmental pollution and promotion of active mobility
- Safety and security (Kalamaria)
    - Pedestrian facilities (for instance smart pedestrian crossings) used MCA after implementation
        - **Social Issues** Increased level of satisfaction for vulnerable road users, improved severance through installation of smart pedestrian crossings
        - **Environmental issues**: Pedestrian safety improvement
        - **Economic issues** related to economic benefits of promoting physical activity
        - **Health issues** considered decrease in number of accidents, injuries
- Safety and security (Coventry)
    - Various measures to improve safety at crossings: Nearside pedestrian indicators (flashing red man / green man) buttons rather than far-sided; Assisted crossing app in development audio and visual cues for vulnerable road users. Pre and post evaluation was conducted by road safety team
        - **Social Issues** Improved road safety and provide safe environment for all user groups and residents.
        - **Environmental issues;** Controlled movement of pedestrians and traffic by not having the traffic constantly stopping and starting.
        - **Economic issues;** Reduce incidents and accidents – and resulting costs
        - **Health issues:** Reduce carbon emissions by improving traffic flows by reducing congestion at key crossing points.

- SUMP measures (Kalamaria)
    - Data to support development pilot implementation of an integrated parking study and bike sharing scheme of 150 parking- slots system at 3 roads, campaigns during the European mobility week in Kalamaria. MCA was used after implementation.
        - **Social issues** considered looking at awareness of free space, and better us of free space, and awareness of sustainable urban mobility issues.

[13] https://romamobilita.it/it/progetti/piano-generale-traffico-urbano-pgtu

        - **Environmental issues** considered reduction of emission of CO2, reduction of pollutant emissions (tons / year of CO, NO,PM, lead), improved energy consumption:
        - **Economic issues** related to economic efficiency, reduction in travel time, economic growth, income that could further be used to install another parking area
        - **Health issues** considered decrease in number of accidents , injuries

- Freight (Kalamaria); Extension and improvement of routing for freight
    - Development of an on line tool
        - **Social issues** considered better accessibility, better journey quality
        - **Environmental issues**: Reduction of pollutant emissions (CO2, NO,lead, PM), greenhouse effect (reduction of emission of CO2)
        - **Economic issues** related to reduced congestion and traffic in the area will improve fuel economy for motorists who regularly travel through the improved routing
        - **Health issues** considered decrease in number of accidents, injuries due to reduced traffic

- Information system and services (Accessible information portal providing web based access to transport data, gamification etc) (Coventry) eg
    - iVMS – Intelligent Variable Messaging Systems / Dynamic Routing Project.
        - Pre-work report and focus groups to determine aspects of info required for an app and incentives through gamification and post project evaluation report conducted by the university
    - HoPE project included tourist maps alongside a transport planner for public transport.
    - VMS Signs across ringroad for example.
    - Wayfinding Totems across city centre e.g. tourist info
        - **Social issues** considered Totems with the help of large touchscreen displays, the computers will help pedestrians find useful information about the city, maps, activities and places to go.
        - **Environmental issues** VMS signs help divert traffic and improve flow, also advanced notification and communication of events or closures etc iVMS project aimed to promote ‘peak spreading’ or ‘load sharing’ principles whereby the strain of traffic was spread equally across the three test corridors using innovative technology and topologies linking various onstreet and digital infrastructure.
        - **Economic issues** City first in Europe to unveil Wayfinding touchscreens providing maps and information via an interactive 'cloud' or keyboard search.
        - **Health issues** Reduced congestion as a result of variable messaging based on live conditions should have an effect on numbers of accidents and incidents plus reduced emissions hopefully

- Clean fuels and low emission vehicles (Coventry): Greening of the greyfleet
    - Retroffiting of buses https://www.wmca.org.uk/news/birmingham-and-coventry-to-get-clean-and-green-buses-in-multi-million-pound-exhaust-kits-scheme/
    - Council initiatives include a switch to hybrid fleet of pool cars, car sharing, development of electric taxis in talks, investigating retrofitting viable housing estates with EV charging infrastructure, early measures project through

DEFRA to address government emissions targets and EU targets through identification of city hotspots, UK Autodrive project includes LSATS vehicles (Light Speed Autonomous Transit Systems) which aim to test and rollout a fleet of autonomous electric pods in pedestrianised environments (e.g. last mile / leg solution as part of a multi modal journey).

- **Social issues**; Accessibility, mobility, inclusion. Help mobilise vulnerable population (mobility impaired, communication impaired)
- **Environmental issues** Low carbon, air quality, DEFRA National air quality objectives; European Directive target values for the protection of human health.
- **Economic issues** Internet of things, connectivity, autonomy, living lab – attracting investors, funders, researchers and visitors. City of Culture presents economic opportunities for the region too.
- **Health issues** Reduced congestion as a result of variable messaging based on live conditions should have an effect on numbers of accidents and incidents plus reduced emissions hopefully

One of the ambitions of the SUITS project was to ensure that SUMPS and local measures delivered during the project are inclusive and deliver against sustainability, quality of life and value for money metrics (DoA, p23). This also relates to the proposed impact of the project regarding representation of women and disadvantaged users in transport planning. Although SIA was not mentioned at this level, it could clearly provide a mechanism to enable more equal representation. As such this document will be used inform the development of training material produced by WP5.

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