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Deliverable 1.1

Requirement Analysis

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1 Summary

The following document provides a summary of the activity carried out for the case study requirements analysis. The deliverable contains a description of each case study, the results of the analysis done and a summary of requirements that have emerged. The final section of the deliverable contains four use cases that have been identified as a merge of the case study use cases. For each case use case we present a description, summary table of features and a scenario.

2 Glossary of Terms

BCC	*Birmingham City Council*
CA	*Consortium Agreement*
Co2	*Carbon Dioxide*
DoW	*Description of Work*
HS2	*High Speed 2*
HS1	*High Speed 1*
IMD	*Indices of Multiple Deprivation*
iOS	*iPhone Operating System*
LUTI	*Land Use and Transport Interaction*
OD	*Origin Destination*
OLA	*Ordenanza Limitadora de Aparcamiento - Parking Metered Spaces*
PRM	*People with Reduced Mobility*
PRO	*Professionals (Decision-makers)*
PSCL	*Piano Spostamenti Casa Lavoro (*House-Work Trip Plan)
PUB	*Public (Citizens)*
SOC	*Associations*
SWOT	*(Strengths, Weakness, Opportunities and Threats)*
TUS	*Transportes Urbanos de Santander*
WP	*Work Package*
ZTL	*Limited Traffic Area (Zona a Traffico Limitato)*

3 Introduction

This deliverable summarises the activity carried out to implement a common methodology for the three SETA case studies, on which the specifications for the implementation of the case studies will be based. The methodologies behind the implementation has been devised as part of D7.1 and has been adopted in the different case studies, with a particular emphasis on establishing a common overarching approach. This will ensure both the generality of the scientific approach and the applicability to additional case studies.

The main objectives of the task 1.1 were:
present and discuss the methodologies that will be adopted for the use case analysis, design,

- development and evaluation
- implementation of the chosen methodologies to support stakeholder analysis and case study requirements analysis;
- contribution to the creation of a common vision and understanding of the case studies for the project consortium.

The deliverable describes how the methodology designed in T7.1 was implemented and presents preliminary findings.

The chosen methodology was user-centred, based on user questionnaires and focus groups, to help clarify:

- Who the users are
- What are the issues faced
- How decisions are made currently
- What the barriers are to effective action
- What are the available data
- What is the environment they work in
- Which are the main tasks they carry out
- Which are the information needs

4 Implementation of a common methodology

The aim of this deliverable is to implement the common methodology defined in D7.1 for studying, evaluating and refining the project case study as living labs. This methodology shall be used for carrying out all the work package tasks. Throughout the project there will be interaction, and some overlap, between the various Deliverables produced in WPs 1 and 7.

The methodology gives guidelines to:

- how the case study should be defined as a living lab
- how the user studies should be run
- what information should be collected
- what methodologies should be used for collecting information
- how to structure and present the information to the project consortium, to make it useful for the other work packages

4.1 Case study definition and Stakeholder identification

The term "case study" refers to the generic context in which the stakeholders interact to achieve their goals, i.e. in the SETA project mobility and transport management approach in Turin, Birmingham and Santander.
The stakeholder identification process, carried out in cooperation with WP7, focuses on identifying not only the involved stakeholders in the case study but also all other relevant stakeholders, closely related to the case studies.

The initial stakeholders analysis was carried out in the form of an exercise, by encouraging users to think about the mobility and transport management in their region and outline as many stakeholders as they can think of that are relevant for the issue, whether because they are active transport users or because they are involved in planning and/or actively managing the issue. Users were encouraged to:

- illustrate links, i.e. information flow between different stakeholders
- think how the goals of the case studies could be relevant for the stakeholders
- think of how the tools and technologies planned for the project could be related to the different stakeholders.

The stakeholder analysis was carried out following a template reported in D7.1.
Once the stakeholders had been identified and their importance to the issues and project established a strategy for engagement, including which stakeholders and when was

developed, dependent on the activities and relationships already established in each case locality which included taking account of local sensitivities.
To this extent a two stage opportunistic strategy was developed:

- involve those stakeholders most engaged in the issue in order to develop the observatory – in this first very experimental stage groups were kept small to enable quality engagement and management of expectations
- expansion of the stakeholders group in circles to extend the variety and range of stakeholders involved during the second phase of the project.

4.2 Requirements Analysis

A user-centred design approach often works by trying to answer typical questions like who are the users, what are the user tasks and goals, what information do the users need and so on. Therefore when starting a project aiming to adopt a user-centred design approach the first phase is to gather the necessary understanding of the users and their needs in order to formulate an initial list of requirements. All these activities need to be carried out to be able to translate the abstract requirements into concrete descriptions that feed directly into the prototype. The full methodology used is described in D7.1.

4.3 Methods for Requirements Analysis

In order to carry out the user requirements studies identified above, it is essential to adopt the appropriate methods, described in D7.1.

4.3.1 Questionnaires

The SETA questionnaires were kept relatively short in order to maintain engagement of the respondent and to make the best use of the time in the evaluation session.

The chosen questionnaires (D7.1) were adopted as the core method of analysis for the project for the following reasons:

- the questionnaires were designed to be self completion; this enabled all those attending meetings or group discussions to complete them at the time rather than wait to be interviewed individually; it also reduces the number of non-completions
- it allowed questionnaires to be distributed in a number of ways either at the time of a meeting, by email or via an electronic survey;
- on the most part samples were self selected interest or professional groups;
- it allowed the language barrier to be overcome with questionnaires translated into Spanish and Italian, as appropriate, and easily analysed by non speakers of any of the languages.

The chosen questionnaire was modified to create a professional and citizen version (in Appendix 1, Section 7). The results from the questionnaires were analysed, however at this early stage, sample sizes were not large enough to allow for statistical analysis and are reported as counts.

Using questionnaires we were also able to:

- ask individuals if they were interested in being involved in the project and obtaining permission for them to be recontacted by us
- keep a record of participants and baseline data to evaluate change in attitudes and behaviour.

4.3.2 Focus groups

Focus groups were adopted as means for carrying out structured discussions with the identified stakeholders.

In order to ensure coverage of all topics and uniformity between sessions, a pre-defined agenda for the session was drafted, covering topics belonging to 6 different categories (see Appendix 2 – Focus Group agenda).

4.3.3 Requirements template

A standard template was used to summarise the Technical Requirements, dividing them into functional and non-functional requirements.

Functional requirements are defined as outline of the functionalities of a system, in terms of behaviour, inputs and outputs. The functional requirements are divided into:

- information gathering, access and sharing requirements
- analysis requirements
- transport modelling requirements

Non-functional requirements define qualities of the system, as in how the system is supposed to be, i.e. accessibility, privacy, trust.

For every requirement identified we specify its priority and the stakeholder category:

- Citizens (PUB)
- Transport Managers/Professionals (PRO)
- Social Groups/ Citizens Associations (SOC)

5 Results

5.1 Birmingham

5.1.1 Case Study Description

In the following section we will summarise the outcome of the case study analysis for Birmingham, including the urban profile, data about journeys and modes of transport taken from previous work in the area, questionnaire and focus groups results and requirements.

5.1.1.1 Urban Profile and Demographic

Birmingham is the largest and most populated city in the UK outside London, with a population in 2014 of 1,101,360 (based on the 2014 mid-year population estimate[1]). Birmingham is a youthful city, with more people in the younger age groups compared to the England average (see Figure 1, based on 2013 mid-year population estimates[2]), in part due to students coming to study at the City's Universities. 45.7% of Birmingham residents are estimated to be under 30, compared with estimates of 39.4% for England. In contrast 13.1% of Birmingham residents are over 65, compared with 17.6% nationally.

[1] *"Population and Census". Birmingham City Council. 7 July 2014.* https://www.birmingham.gov.uk/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobheadername1=Content-Disposition&blobkey=id&blobtable=MungoBlobs&blobwhere=1223587719385&ssbinary=true&blobheadervalue1=attachment%3B+filename%3D349623BDB_04_2014_mid-year_population_estimate-Birmingham_final.pdf.

[2] *"Population and Census". Birmingham City Council. 7 July 2013* https://www.birmingham.gov.uk/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobheadername1=Content-Disposition&blobkey=id&blobtable=MungoBlobs&blobwhere=1223587769094&ssbinary=true&blobheadervalue1=attachment%3B+filename%3D991834BDB_2015_02_2013_mid-year_population_estimate-Birmingham_final.pdf.

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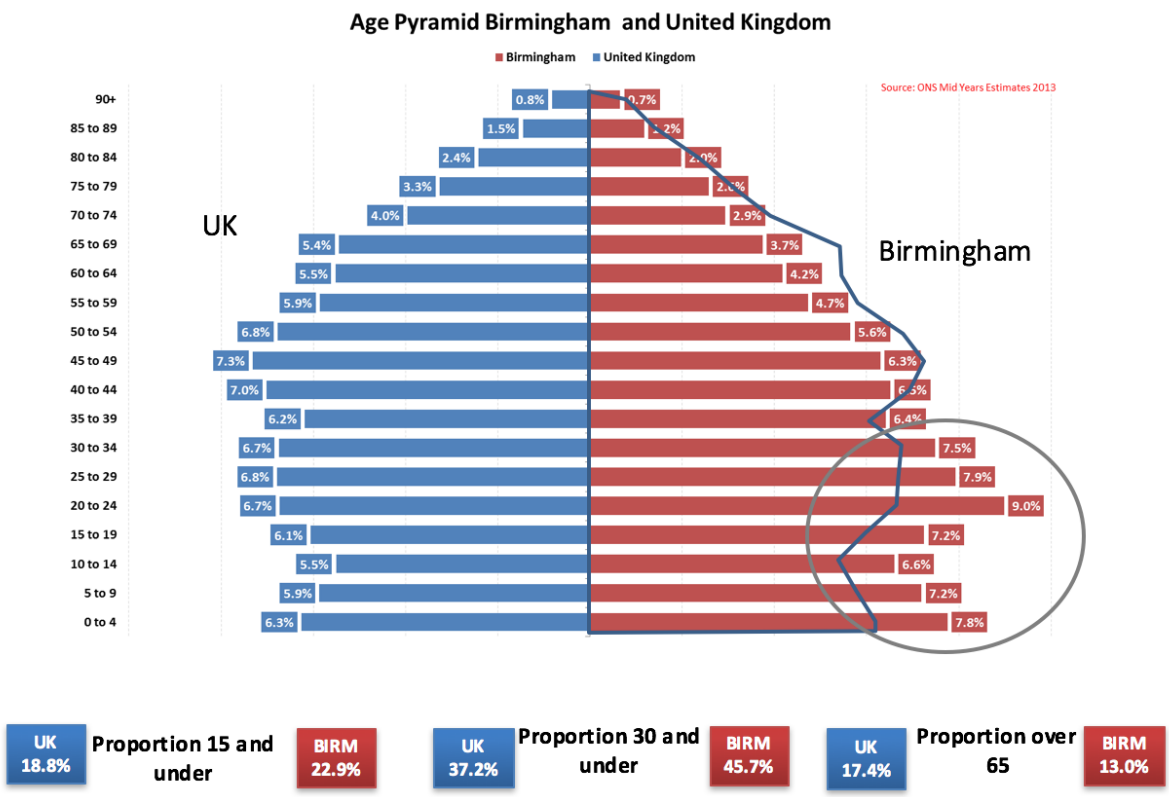


Figure 1 – Age pyramid Birmingham and England. Source: Mid-year Estimates 2013.

Birmingham is also growing at a very high rate: Since 2004 the population has increased by almost 100,000 (9.9%), with an average of 0.9% per year. The publication of the Office of National Statistics revised population projections show that Birmingham's population will grow by up to 150,000 between 2011 and 2031. The population increase over the last decade is associated with more births, fewer deaths and international migration. Linked to this is the high diversity found in Birmingham, where according to the 2011 Census around 42% of residents were from an ethnic group other than White; 46.1% of Birmingham residents said that they were Christian, 21.8% Muslim with 19.3% having no religion. Compared with 14% in England, 22% of Birmingham residents were born outside of the UK and 11% in the West Midlands region.

At the time of the 2011 Census there were 10 Districts in Birmingham (parliamentary constituencies) with an average population size of 107,300 (see Figure 2). By Mid-year 2013 the average Constituency size had increased to 109,230. Each district has responsibility for making decisions for the following local services:

- Sports and Leisure

- Community Libraries
- Neighbourhood Advice and Information Services
- Community Development and Play Services
- District Engineers
- School Crossing Patrols
- Local Car Parks
- Community Arts
- Local Housing Management
- Youth Services
- Adult Education
- Local Community Safety Teams

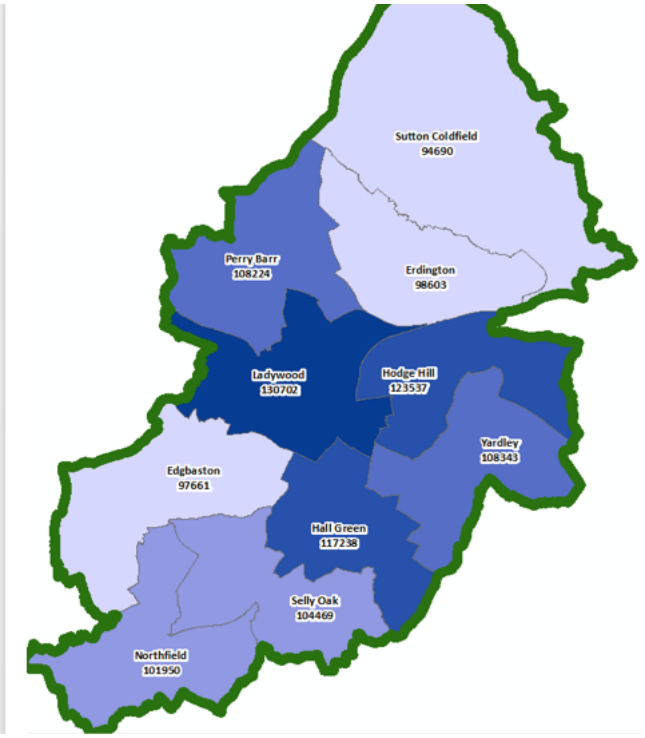


Figure 2 - Birmingham Districts and Population. Source: 2011 Census

Hall Green and Hodge Hill are the most densely populated, with 59 people per hectare, compared with 17 people per hectare in Sutton Coldfield. Hodge Hill and Hall Green are the only Districts that have a greater household size that the Birmingham average of 2.56 persons per household. Mid - 2013, 21% of people living in Sutton Coldfield are pensioners, compared with 7% in Ladywood. There were four Districts where the number of people who said they belonged to an ethnic group other than White was above the city average of 46.9% they were, Hall Green (69.5%), Hodge Hill (66.9%), Ladywood (78.7%) and Perry Barr (65.2%). Over half (52.1%) of residents living in Hodge Hill said they were Muslim.

Birmingham is one of the most deprived Local Authorities in England, with high variation between districts (see Figure 3).

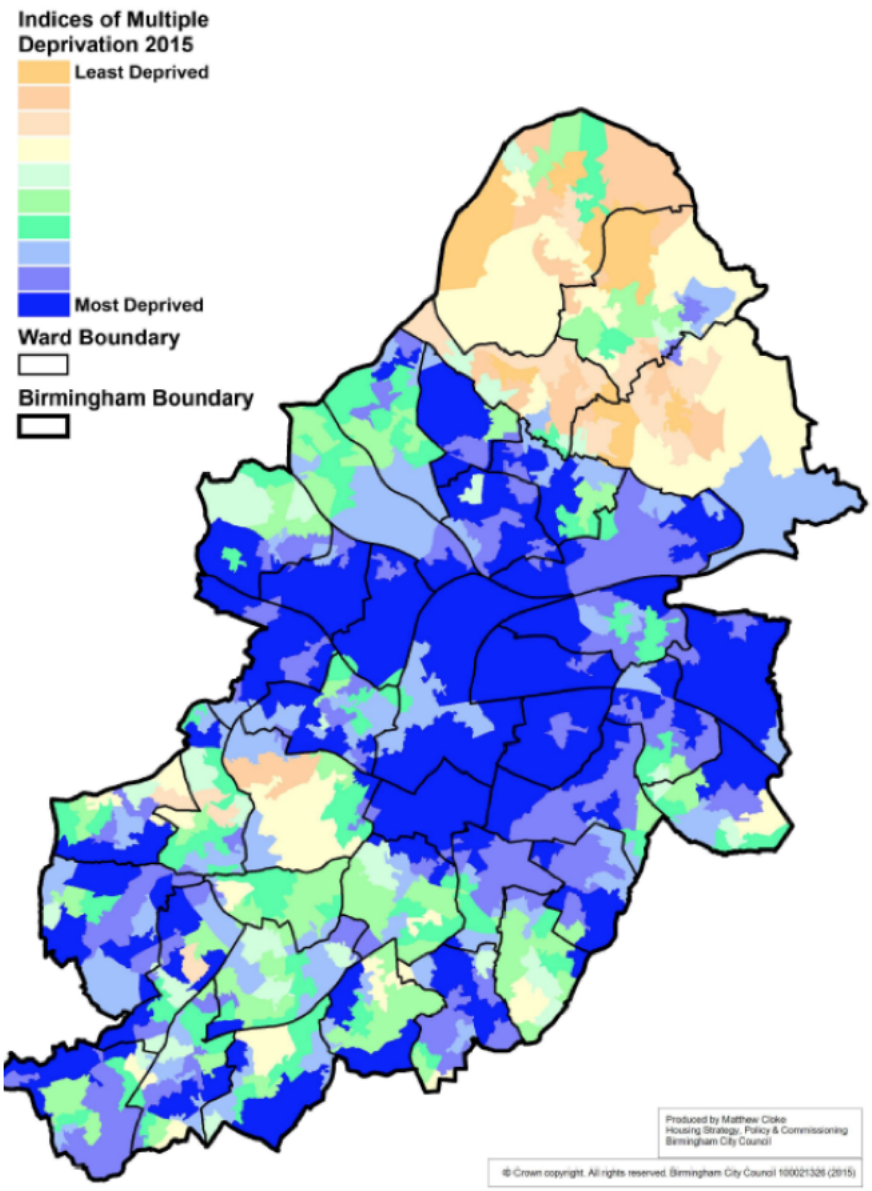


Figure 3 – Birmingham Deprivation map. Source: Birmingham City Council, Housing Strategy, Policy and Commissioning.

In such a growing city, transport is crucial as a means by which people engage in economic, social and recreational activities. It underpins the business life of the city. Transport connects the many separate strands of the life in the city - where people live, work, shop and take their leisure; where businesses of all sorts operate, obtain goods, services and the labour they need for successful and profitable operation.

5.1.1.2 *Area Transport Plan*

As many other cities in England, Birmingham has developed an Area Transport Plan to assist in the development of future projects and programmes, with the aim of providing a high quality and integrated transport network.

The Area Transport Plan analyses key issues such as road safety, congestion, public transport networks, non-motorised mobility networks combined with consultations with key stakeholders.

The Area Transport Plan frames mobility in the more general vision of the Birmingham City Council administration, as set out in the Council Business Plan & Budget 2014+: "The core mission for the city is to make Birmingham a 'fair city', a 'prosperous city' and a 'democratic city' and the priorities are:

- Protecting the most vulnerable citizens of the city from the impact of cuts
- Protecting the highest priority services and delivering them more efficiently
- Taking forward the policy development programmes most critical to our goals
- Continuing to work towards our objectives and getting the most from the significantly reduced resources available." [Council Business Plan & Budget 2014+]

The first step in devising the Area Transport Plan was to analyse the 2011 Census and the 2010 Indices of Multiple Deprivation (IMD) to derive information on car ownership and travel to work.

5.1.1.3 *Car Ownership and Mode of Transport to work*

The average car ownership in Birmingham is 33.8%, with higher percentages in some areas such as Kingstanding, Washwood Heath, and Shard End (42% each). In such areas, citizens tend to prefer the car as a means to travel to work, whilst public transport usage seems to be highly correlated with areas that have lower car ownership, higher population density and lower income. Where income is severely constrained, there is greater reliance on walking and cycling.

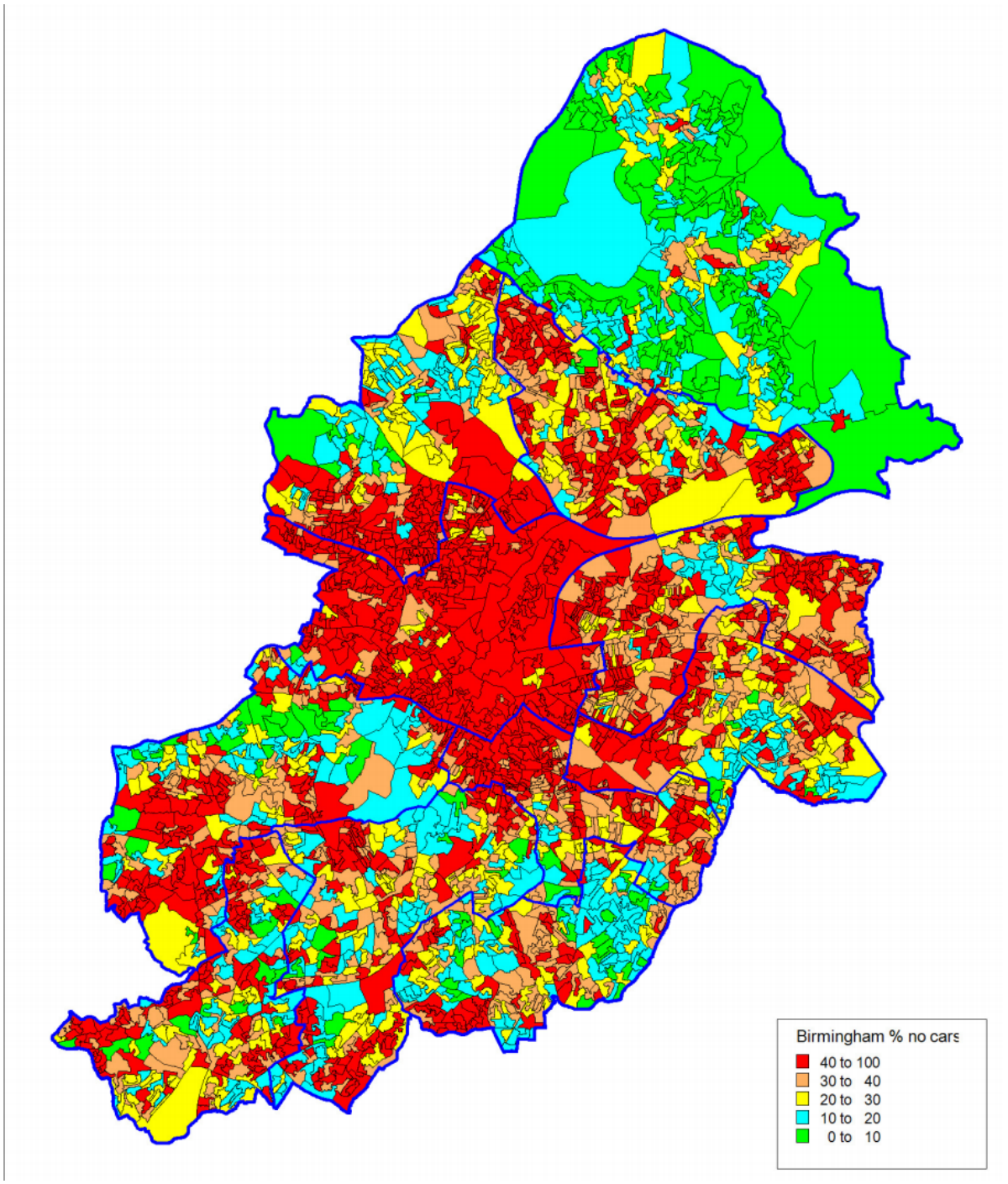


Figure 4 - Map of Birmingham region and car ownership. Source: Area Transport Plan

There are a few affluent areas where this correlation does not hold (e.g. Moseley & King's Heath), as car ownership is average but cycling to work is a more popular mode that the average in the city.

For public transport, rail usage is very popular in the more affluent areas which are located near to the frequent cross city line, or where there are rail stations located. For example, Sutton Coldfield has the highest percentage at 4.9%, with Northfield and Selly Oak both having 4% compared to the city average of 2.6%. Less affluent areas (e.g. the East Area) tend to choose bus as the form of public transport. In general, there has been a consistent growth of rail transport in recent years, though 2012-13 figures show the trend is levelling off.

Cycling as a mode of travel to work is low at 0.9%.

The table below, taken from the Area Transport Plan, outlines the main transport modes to work for each Birmingham area and compares them to the National and Regional Average.

2011 Census, Key Statistics: Method of travel to work (percent)

	People aged 16-74												
2011ward	All categories: Method of travel to work	Work mainly at or from home	Underground, metro, light rail, tram	Train	Bus, minibus or coach	Taxi	Motorcycle, scooter or moped	Driving a car or van	Passenger in a car or van	Bicycle	On foot	Other method of travel to work	Not in employment
England	38,881,374	3.5	2.6	3.5	4.9	0.3	0.5	36.9	3.3	1.9	6.9	0.4	35.3
West Midlands	4,067,119	3.0	0.2	1.6	4.8	0.3	0.4	40.6	3.8	1.2	6.2	0.3	37.6
West Midlands	1,958,674	1.9	0.3	2.1	7.6	0.3	0.3	35.6	3.6	1.0	5.5	0.3	41.5
Birmingham	760,252	1.9	0.2	2.6	9.6	0.4	0.3	31.0	3.0	0.9	5.6	0.3	44.3
Districts													
Birmingham, Edgbaston	72,392	2.3	0.2	1.9	11.1	0.3	0.2	32.0	2.6	1.2	5.9	0.2	42.1
Birmingham, Erdington	69,179	1.4	0.1	2.6	11.1	0.4	0.4	31.8	3.5	0.9	5.3	0.3	42.3
Birmingham, Hall Green	80,135	2.1	0.2	1.9	9.8	0.5	0.2	29.0	2.8	1.3	4.7	0.4	47.2
Birmingham, Hodge Hill	78,086	1.1	0.1	0.8	9.4	0.6	0.2	25.5	3.1	0.5	4.4	0.4	53.9
Birmingham, Ladywood	92,865	1.4	0.5	2.8	10.2	0.5	0.1	17.7	2.3	0.7	11.5	0.4	51.8
Birmingham, Northfield	71,953	1.7	0.1	4.0	8.9	0.3	0.4	35.6	3.3	0.7	4.6	0.3	40.1
Birmingham, Perry Barr	75,624	1.5	0.2	1.1	12.1	0.4	0.2	32.0	3.7	0.5	4.2	0.4	43.8
Birmingham, Selly Oak	78,098	1.9	0.1	4.0	8.4	0.3	0.3	31.1	2.7	1.4	5.5	0.3	43.9
Sutton Coldfield	68,137	4.2	0.1	4.9	4.1	0.2	0.3	47.1	2.8	0.6	3.8	0.3	31.5
Birmingham, Yardley	73,783	1.5	0.1	2.1	10.7	0.5	0.3	33.3	3.4	0.8	4.9	0.3	42.0

Table 1 - Birmingham - Methods of Travel to work - Source: Area Transport Plan

5.1.1.4 Rail Transport

The major stations in Birmingham are New Street, Moor Street and Snow Hill. These provide connections to the rest of the country on nine main railway lines (see Figure 5).

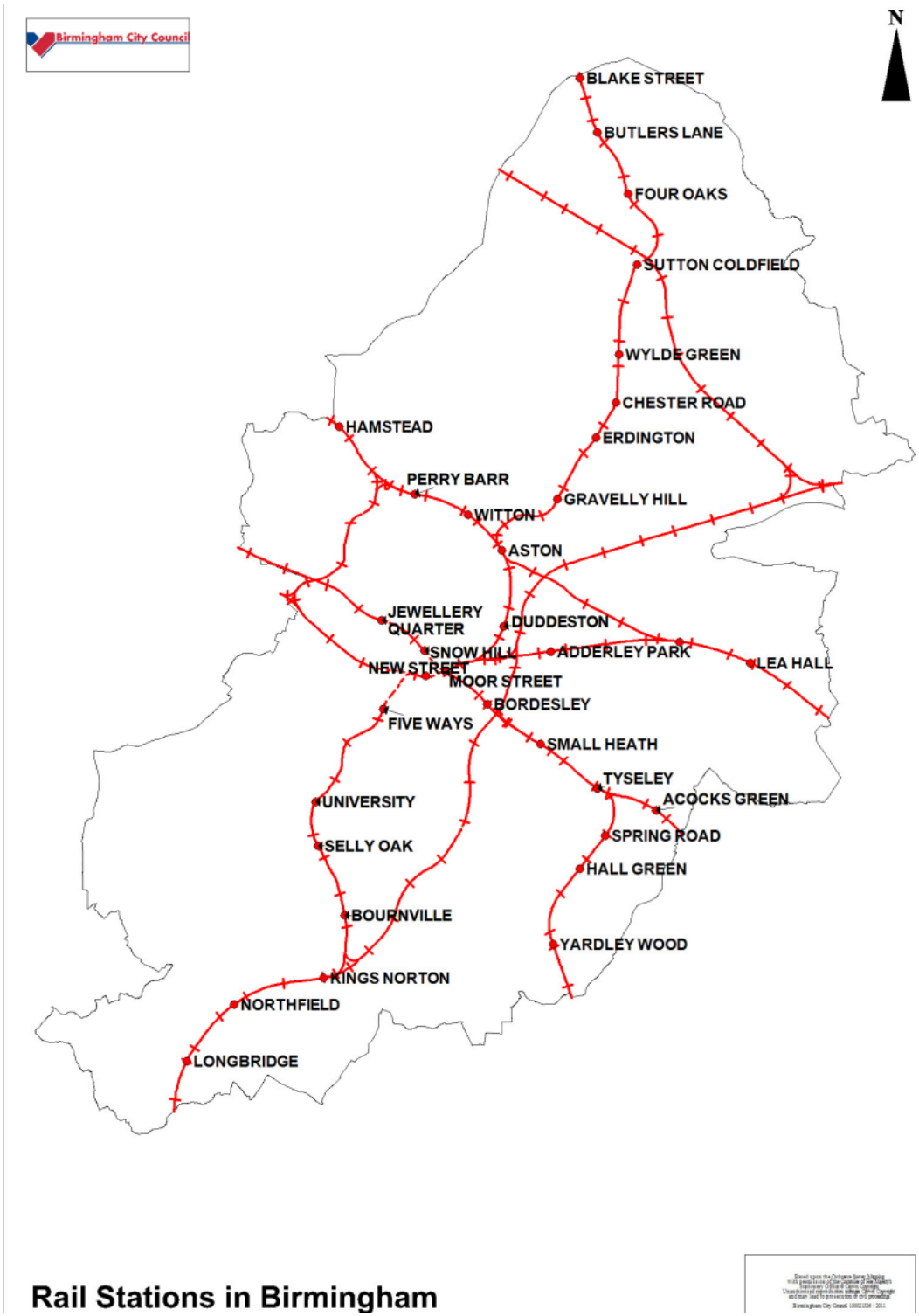


Figure 5 - Rail station in Birmingham. Source: Area Transport Plan

Table 2 provides usage information on all stations within Birmingham.

Rank	Area	Station Name	12-13 Entries & Exits	11-12 Entries & Exits	Percentage change	Parking facilities
1	CC	Birmingham New Street	32,090,346	31,235,638	2.66	40 spaces
2	CC	Birmingham Moor Street	6,101,444	5,865,922	3.86	None
3	CC	Birmingham Snow Hill	4,402,376	4,530,530	- 2.91	800 spaces
4	South	University	2,635,676	2,600,694	1.33	None
5	South	Selly Oak	2,277,504	2,274,142	0.15	378 spaces
6	NW	Sutton Coldfield	1,368,220	1,380,694	- 0.91	320 spaces
7	CC	Five Ways	1,350,282	1,346,254	0.30	None
8	South	King's Norton	1,091,626	1,103,610	- 1.10	212 spaces
9	South	Bournville	976,424	984,150	- 0.79	None
10	NW	Erdington	796,846	816,732	- 2.50	None
11	NW	Chester Road	763,286	750,114	1.73	155 spaces
12	South	Longbridge	743,184	752,652	- 1.27	None
13	South	Northfield	738,724	744,504	- 0.78	206 spaces
14	NW	Perry Barr	644,300	646,596	- 0.36	None
15	East	Gravelly Hill	630,990	636,562	- 0.88	None
16	NW	Four Oaks	585,186	581,454	0.64	105 spaces
17	NW	Wylde Green	492,798	488,640	0.84	52 spaces
18	East	Lea Hall	443,472	454,890	- 2.57	28 spaces
19	CC	Aston	437,680	445,164	- 1.71	None
20	East	Acocks Green	388,592	372,326	4.19	130 spaces
21	East	Stechford	367,518	361,698	1.58	None
22	East	Yardley Wood	363,012	352,172	2.99	100 spaces
23	CC	Jewellery Quarter	359,924	342,602	4.81	None
24	East	Hall Green	353,978	341,760	3.45	105 spaces
25	NW	Blake Street	306,770	313,772	- 2.28	155 spaces
26	CC	Witton	253,956	265,682	- 4.62	None
27	CC	Hamstead	241,154	239,034	0.88	None
28	East	Tyseley	193,212	181,510	6.06	None
29	NW	Butlers Lane	186,450	188,918	- 1.32	None
30	CC	Duddeston	181,674	180,104	0.86	None
31	East	Spring Road	156,988	154,398	1.65	None
32	East	Small Heath	103,534	100,126	3.29	None
33	East	Adderley Park	54,378	53,086	2.38	None
34	East	Bordesley	12,592	14,134	- 12.25	None

Table 2 - Usage information on all stations within Birmingham. Source: Area Transport Plan

5.1.1.5 Tram and Bus service

Birmingham has one tramline, Midland Metro Line 1, which was opened in 1999 connecting Wolverhampton and Birmingham, via West Bromwich and Wednesbury. This year the line has been extended and connects to Birmingham New Street and Snow Hill.
The bus network of Birmingham has been criticised for being too complex and relatively dense with a large number of low frequency routes. In response to this, Centro, in partnership with local bus operators and the West Midlands' local authorities, have been undertaking a series of Bus Network Reviews (Centro's Transforming Bus Travel Strategy). The aim of these reviews is to provide a better network of high quality services for the benefit of existing and prospective users, leading to increased bus patronage.
In general, an analysis carried out using Accession software shows that access to the city centre using public transport services is possible within 30 minutes during the peak periods for over 80% of the population. Access to a person's nearest local centre is within 30 minutes for 100% of population but those able to access within 15 minutes has declined in recent years.
Public transport journey times have been compared against car journey time data (calculated using TrafficMaster). This has shown that public transport journey times compare favourably against journey times by car. However, the public transport data is based on timetable journeys whereas the TrafficMaster data is based on actual journeys of fleet.

5.1.1.6 *Future Strategy*

Given the current trends in population growth, Birmingham is faced with transport issues such as: predicted 50% rise in traffic by 2020 if current trends continue; increasing congestion - more intense and for longer. As personal mobility has increased, the existing transport system has come under pressure. The rising demand for car travel reflects both increased prosperity and under investment in transport alternatives. There is a need to maintain capacity for the car and work to provide a genuine travel choice in order to avoid the environmental, social and economic consequences of increased congestion on our roads. This requires the City Council to provide alternatives so travellers can make sustainable choices.

As part of their future strategy, Birmingham City Council has identified some key investments that need to be made in the mobility sector:

- Improve non-motorised transport;
- work with the rail companies to improve freight and passenger carrying potential;
- continue the development of Birmingham International Airport;
- proposals for a new High Speed Rail Link (HS2) between the Channel Tunnel Rail Link (HS1) in London and the new New Street Station in Birmingham.

BCC successfully bid for £17m funding from government to help make cycling an everyday way to travel in Birmingham over the next 20 years. This funding will be used as part of

Birmingham Cycle Revolution to improve cycling facilities within a 20- minute cycling time of Birmingham city centre, with 95km of improvements to existing routes and 115km of new cycle routes.
The scheme aims are to:
• Improve cycling conditions on popular routes into the city centre;
• Provide quiet cycling routes and 20mph areas within residential areas;
• Upgrade towpaths on canals;
• Develop new cycling green routes through parks and open spaces;
• Improve local links to cycle routes;
• Provide new secure cycle parking hubs;
• Develop cycle loan and hire schemes to make it easier for people to start cycling.

In tandem with the cycling revolution project, BCC successfully bid for monies from the Department for Health and the Department for Transport, to encourage walking within the inner city areas. A range of measures will act as a catalyst to encourage more walking across the city, with its associated benefits in terms of reducing the adverse impacts of road congestion, improving health, and addressing social inclusion through improvements to low-cost transport options.

5.1.2 Case Study Analysis: Focus Groups

In order to obtain a comprehensive stakeholder requirements analysis an initial selection of stakeholders has been done in accordance with Birmingham City Council, following the template provided in D7.1.

The stakeholders identified have been invited for two structured focus groups carried out on the 21st and 23rd of June 2016 in Birmingham City Council, focused on mobility in Birmingham, issues and challenges.

In order to ensure coverage of all topics and uniformity between sessions, a pre-defined agenda for the session was drafted, covering topics belonging to 6 different categories. The full agenda is available in Appendix 2.

The focus groups had a total of 30 participants from the following organisations:

- Sustrans
- Birmingham City Council
- Birmingham Chamber
- West Midlands Combined Authority
- Marketing Birmingham
- Midlands Connect

- CCG / Public Health
- WMITA
- Motorcycle Action Group
- Enterprise Rent a Car
- DRC Disability Resource Centre
- Transport for West Midlands
- Community Transport
- ATOC (Association of Train Operating Companies)
- WalkIt
- University of Birmingham
- Veolia
- Birmingham City University

The sessions were held using a mixture of post-it writing and discussion capture by the facilitators on flip charts hanging to the walls (see Figure 6).

Figure 6 - Birmingham Professional Stakeholders Focus Group - 21/06/2016

Instead of discussion the participants that preferred writing down their thoughts on the guided questions used post-its that were collected and added to flip charts by the facilitators at the end of the meeting (see Figure 7).

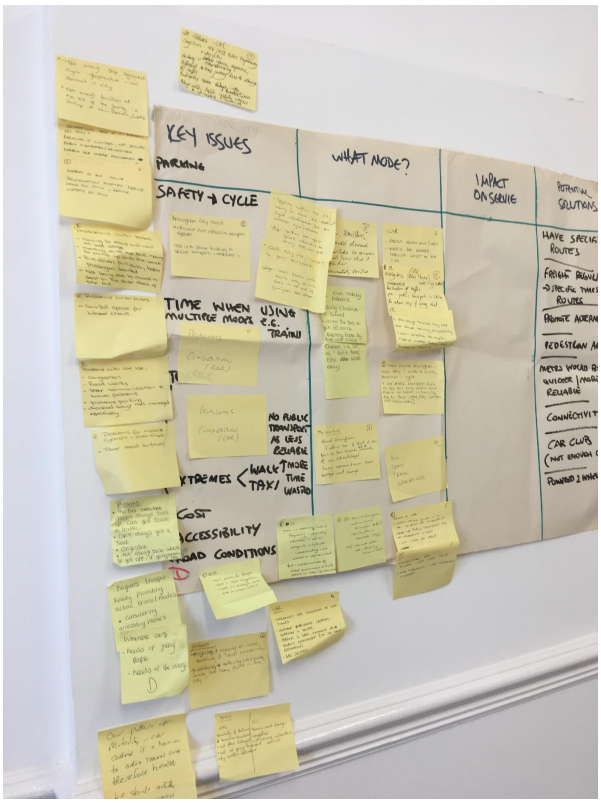


Figure 7 - Flip chart identifying mobility key issues in Birmingham

The outcome of the focus groups was to identify key issues, key data/information sources and define possible scenarios that SETA could support.

5.1.3 Case Study Analysis: Stakeholder Analysis

Stakeholder analysis in Appendix 1 – Stakeholders Analysis, Birmingham section.

5.1.4 Case Study Analysis: Questionnaires

were distributed in Birmingham using the official City Council channels and advertised their availability on Social Media.

The SETA Public Survey was made available through the Birmingham Be Heard platform, dedicated to citizens' engagement:

- https://www.birminghambeheard.org.uk/economy/seta-mobility-questionaire

The Stakeholders Survey was made available using Survey Monkey.

- https://www.surveymonkey.co.uk/r/SETA_Transport

Social Media has been used to raise the awareness of both these surveys.

There were 31 responses to the Public Survey and 25 responses to the Stakeholders Survey. Whilst these numbers limit the ability to draw specific statistical conclusions, we consider them a complement to the activity carried out during the focus groups and to previous activity carried out by Birmingham City Council with other mobility surveys.

5.1.4.1 *Public Questionnaires Results*

All the respondents own a smartphone (60% Android, 40% iPhone), tend to use Internet and Social Networks hourly whilst usage of public forums and Image sites is less frequent.

In average the respondents all spend a high amount of time per day travelling (see Figure 8): this could explain why they were particularly keen, more than other citizens, in filling in the survey.

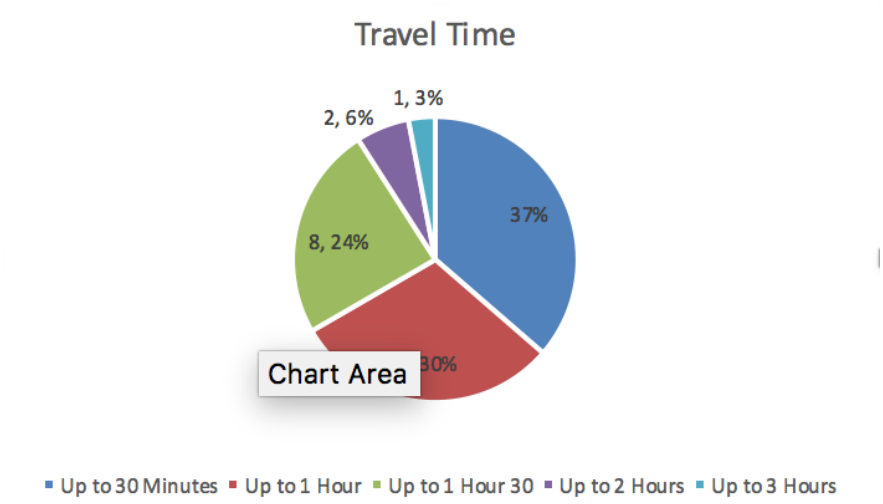


Figure 8 - Birmingham Public Questionnaire: Travel Time

The following figures summarises the preferred modes of transport (Figure 9) and the frequency of use and the main challenges the citizens perceive (Figure 10):

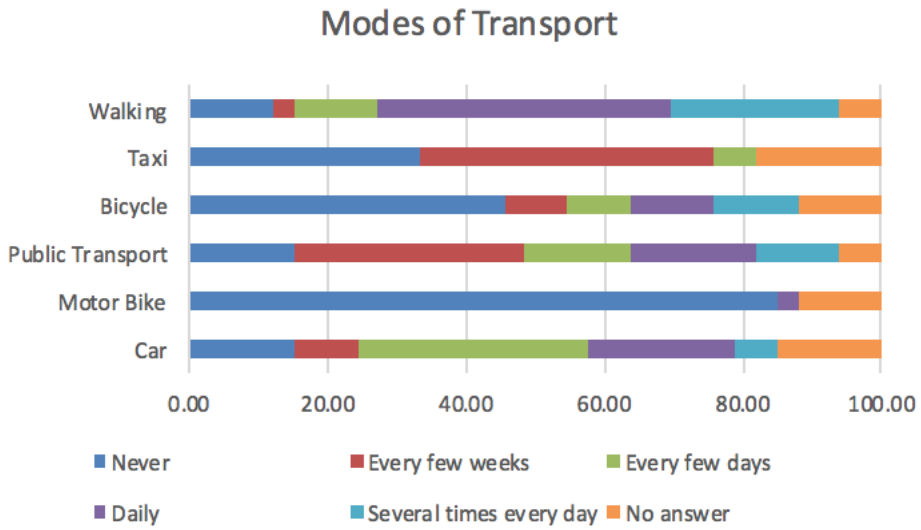


Figure 9 - Birmingham Public Questionnaire: Modes of Transport

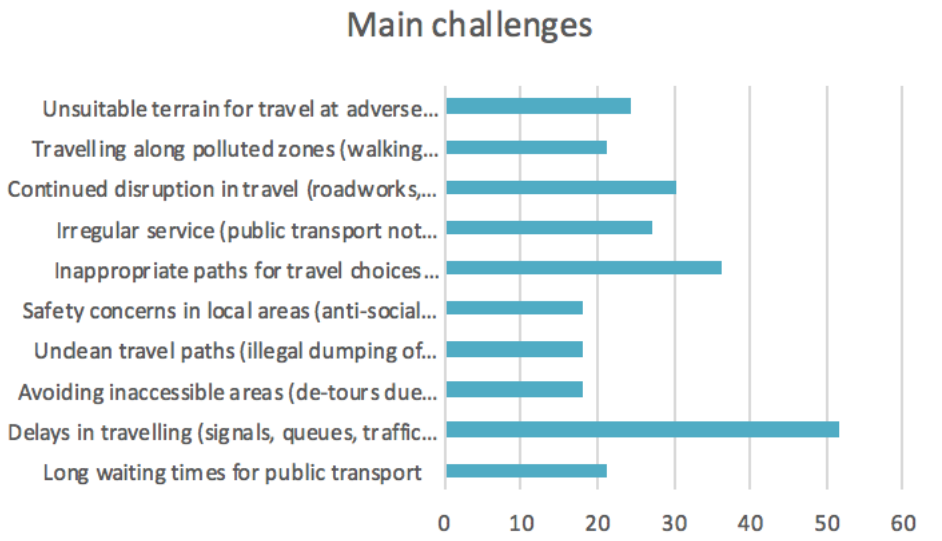


Figure 10 - Birmingham Public Questionnaire: Main challenges

In the survey, users were asked to identify the main sources of mobility information they currently use, in order for the project to be able to tap into those sources or consider similar interaction paradigms:

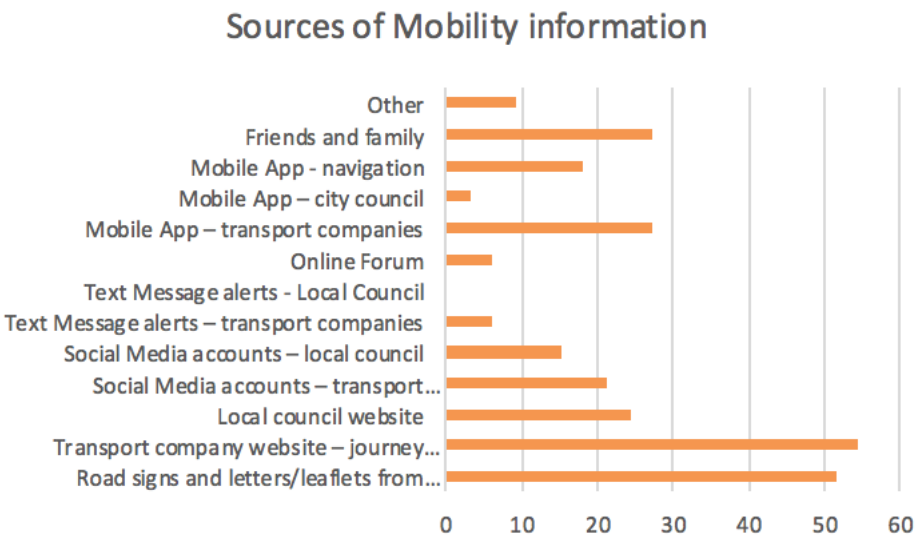


Figure 11 - Birmingham Public Questionnaire: Main information sources

The priorities that the users find more relevant for mobility in Birmingham all focus around improving travel time and conditions (see Figure 12):

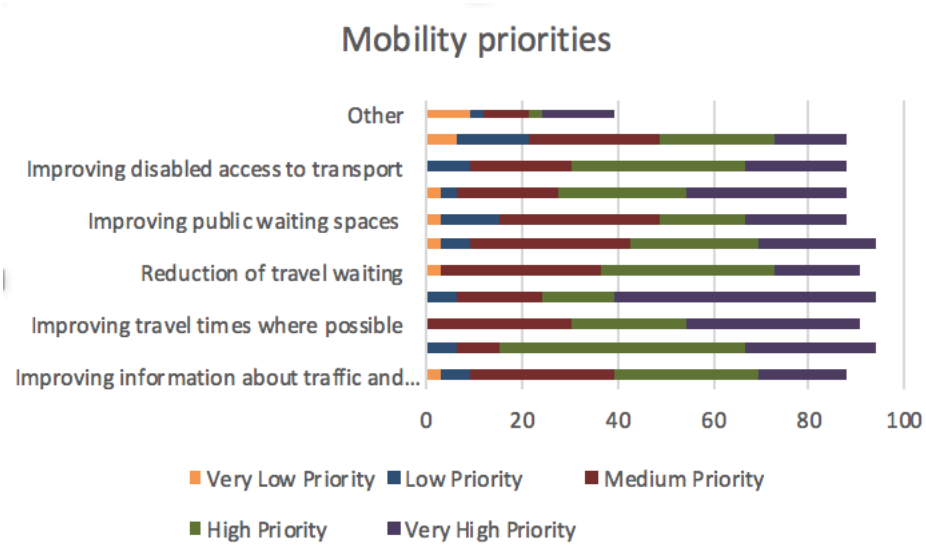


Figure 12 - Birmingham Public Questionnaire: Priorities

Users were also asked to judge their potential involvement in the project, by stating their willingness to carry out specific tasks (see Figure 13). This is so the project can judge which modes of interaction could be better implementing, at least in the first phase, to engage with our user base.

"I would use Social Media to report mobility information. "

	Response	%
Yes	15	45.45
No	7	21.21
Don't know	9	27.27
Not Answered	2	6.06

"I would carry a sensor in-person that automatically reports useful information."

	Response	%
Yes	11	33.33
No	9	27.27
Don't know	12	36.36
Not Answered	2	6.06

"I would carry a sensor in my vehicle (car, bike etc.) that automatically reports useful information."

	Response	%
Yes	15	45.45
No	10	30.30
Don't know	7	21.21
Not Answered	1	3.03

"I would download a mobile app to keep updated about mobility in the local area."

	Response	%
Yes	24	72.73
No	5	15.15
Don't know	4	12.12
Not Answered	0	0.00

"I would download a mobile app to report information about mobility in the local area."

	Response	%
Yes	12	36.36
No	4	12.12
Don't know	16	48.48
Not Answered	1	3.03

Figure 13 - Birmingham Public Questionnaire: Engagement Potential

5.1.4.1.1 Highlight comments:

- "If I ride to work I can be there in 20 minutes. Due to appalling bus connections it can take up to two hours coming home at night. People do shift work. Where are the regular bus services in a morning to get people to work for 7am and getting people home at 10pm"
- "It should be made easier to travel by bus. Bus stops should be numbered so passengers know where to catch and depart bus services. There should be information terminals that allow passengers to travel between two addresses using post code information. These terminals could also dispense tickets. Passengers could be informed which buses they need to take and which stops they need to pick up bus services"
- "The key issue in the city is huge congestion as soon as some event occurs, such as wet weather last week, a traffic accident, a delay or cancellation."
- "No joined up transport thinking."
- "Training for bus drivers in braking less suddenly.

5.1.4.2 *Stakeholder Questionnaires Results*

The stakeholders' questionnaire was filled by a balanced range of stakeholder sectors (see Figure 14).

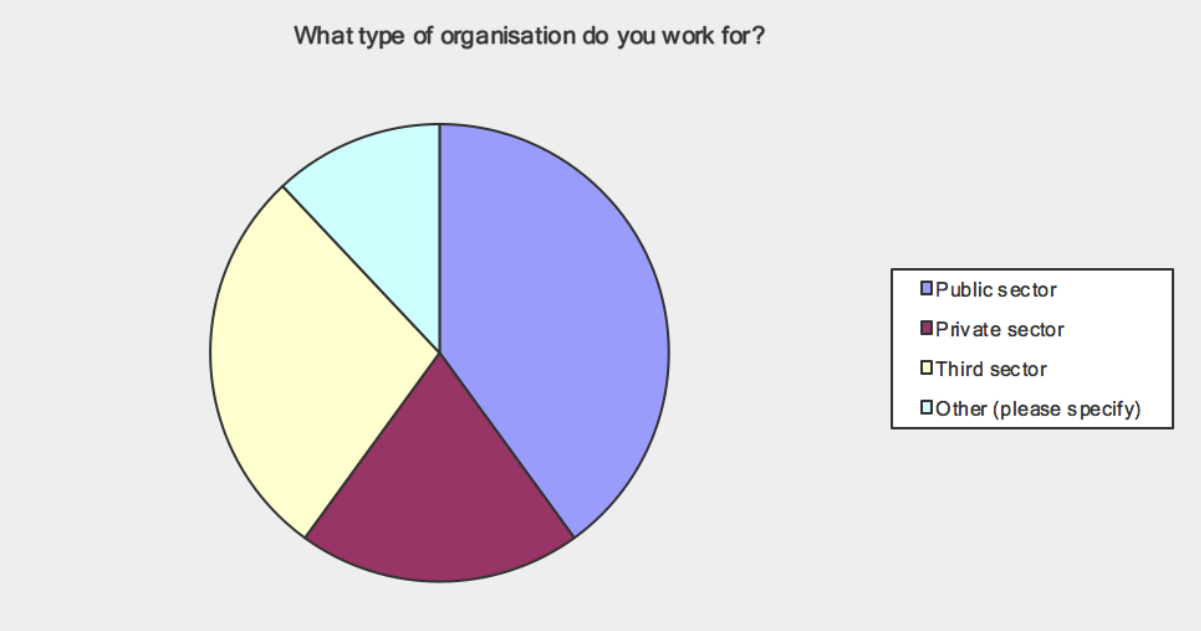


Figure 14 – Birmingham Stakeholders Questionnaire: activity sectors.

They were asked to highlight the priority of mobility issues in Birmingham, with a high number of responders considering delays in travelling and waiting times amongst the highest priority and a high majority reckoning users are not provided with sufficient information about mobility status and possible choices (see Figure 15).

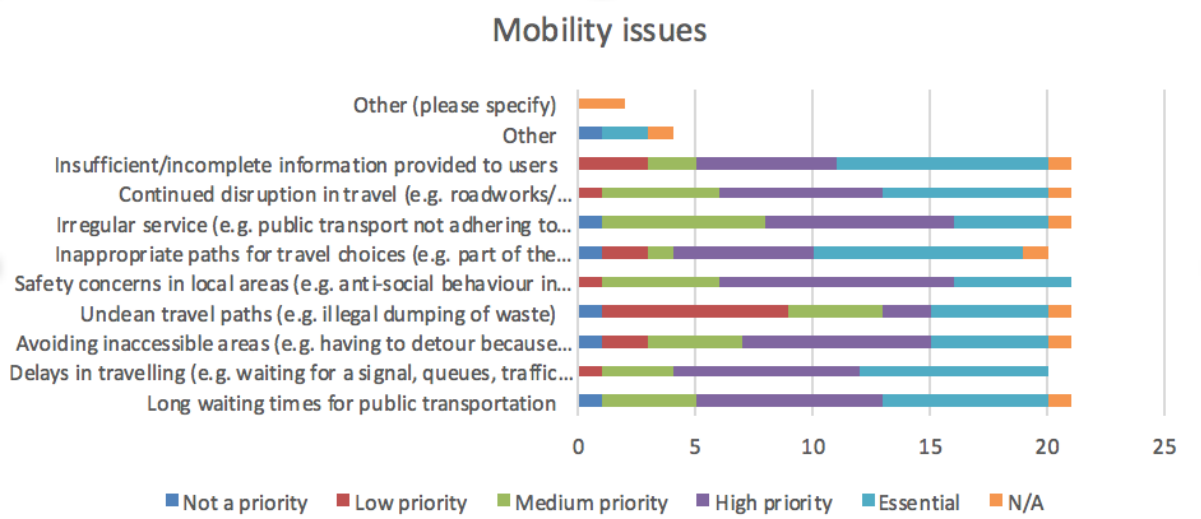


Figure 15 – Birmingham Stakeholders Questionnaire: mobility issues.

From a project perspective, we were particularly interested to understand what professional stakeholders lack of in terms of functionalities for understanding and managing mobility.

Figure 16 shows how must professional stakeholders reckon they lack the ability of combining data from various sources and the ability to visualize all this data. Real-time data availability is also considered a big challenge that the project will aim to address.

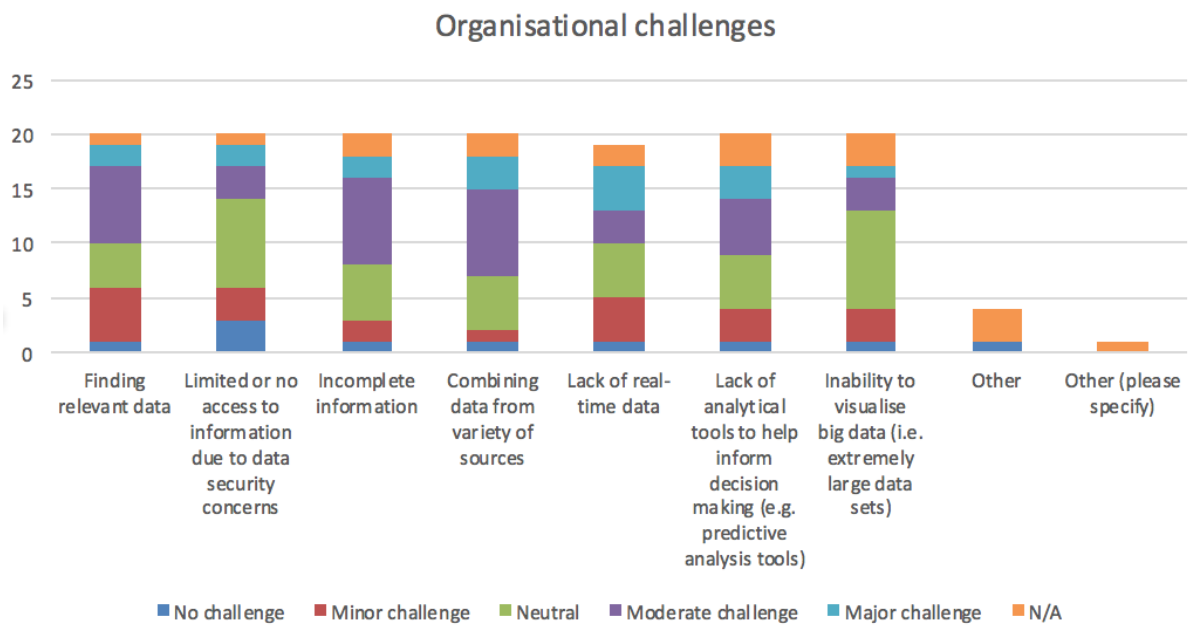


Figure 16 – Birmingham Stakeholders Questionnaire: Organisational challenges

These insights were mirrored in the replies to the question about solutions that could be helpful for their organisations to better manage mobility: in this case users reckon data fusion and analytical tools will have a high importance, followed by data acquisition from citizens.

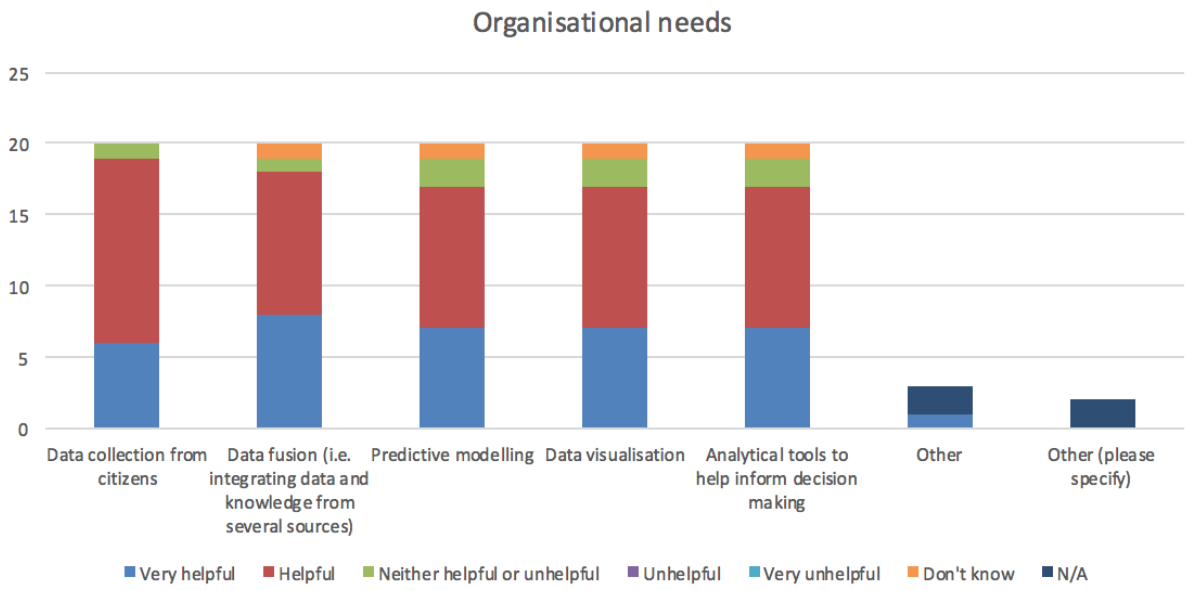


Figure 17 - Birmingham Stakeholders Questionnaire: Organisational needs

The last question regarded means currently use to share information with their users, so that the project could tap into those means or mirror the interaction paradigms. The answers to this question reflect the outcomes of the focus groups, where mobile apps were generally regarded as the most used and useful mean of communicating information (Figure 18).

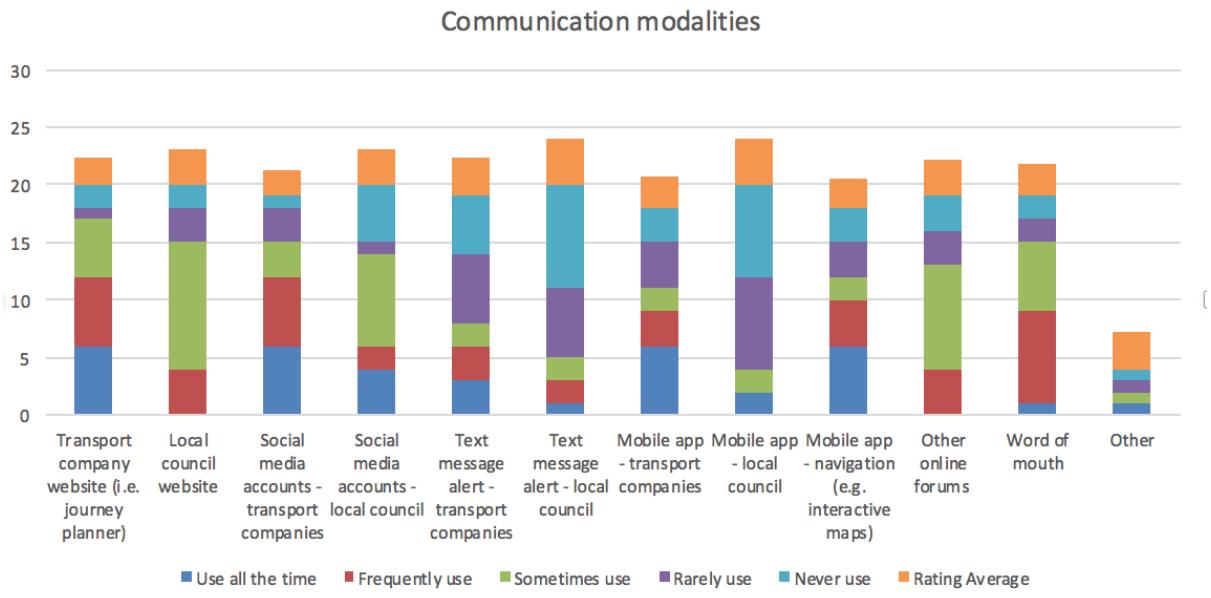


Figure 18 – Birmingham Stakeholders Questionnaire: Communication modalities

5.1.4.2.1 Highlight comments:

- "Have one generic high profile, useful accessible website with a strong brand that is well promoted and therefore well known."
- "More data released as open data"
- "More resource to make operators provide data and for analysis of data once captured"
- "The accurate real-time location of all buses would be a very good start. The current system is partial and unreliable."
- "Data capture and marketing of the data is essential to change travel behaviours and address conflicts between different modes"

5.1.5 Case Study Analysis: Use Cases

All the feedback gathered from the questionnaires and the focus groups was analysed and synthesised into two scenarios' categories:

	Categories	Categories Id
1	Personal Mobility Planning	P
2	Professional Mobility Planning and Monitoring	PM

Table 5-3 Birmingham Case Study Scenarios' Categories

5.1.5.1 Personal Mobility Planning

Id	Cat	Type	Data	Description
BS-P1	P	Personal Mobility Planning	Models Traffic Demand Data and Traffic Data Observations Bicycles and Pedestrians, Contextual Data	Multimodal journey planner that works by specifying Origin Destination and provide results based on contextual data/user needs (i.e. targeted for disabilities, environment consciousness etc.).
BS-P2	P	Multimodal Parking Planning	Parking data	Provide means to plan in advance multimodal parking by having real-

				time occupancy information.
BS-P3	P	Events Planning	Public Transport Parking Bicycles and Pedestrians Contextual Data	Awareness of planned/unplanned disruptions/big events and how they can impact personal mobility.
BS- P4	P	Predictive Planning	Models Parking Traffic Demand Data and Traffic Data Observations Bicycles and Pedestrians Contextual Data	Predictive engine that can notify a user of the probability of a specific outcome for a journey (i.e.,. journey time) using contextual data.

Table 5-4 Birmingham Personal Mobility Planning Category Scenarios

This category focuses around the idea of providing individuals with means to better plan their mobility, by providing awareness of alternatives and focus on different needs or lifestyle choices.

✓ ***Personal Mobility Planning (BS-P1)***

This use case aims to promote awareness of available transport choices and corresponding economic/societal/safety/lifestyle costs to ultimately improve mobility and the urban environment.

Basic requirements are:

- *Public transport*: individuals should have real-time information about all the modality of public transport available and one would best suit their profile: i.e. if a user is disabled, they should be recommended a mode that guarantees accessibility for their circumstances. This includes infrastructural and services changes.
- *Non-motorised transport*: individuals should be provided with real-time information to be able to consider alternative non-motorised transport choices. This includes infrastructural and services changes.
- *Inter-modality*: individuals should be provided with a unique interface to planning journey across modalities with particular attention to connecting journeys and last-mile support (i.e. a disabled user should not get recommended to get off the bus and walk for 2 miles).
- *Road transport*: individuals should be provided with real-time predictions of traffic, disruption alerts and viable alternatives. Care should be taken to not provide same alternative routes to everyone or this will re-create congestion in other areas.

✓ ***Multimodality Parking Planning (BS-P2)***

Multimodality parking planning refers to the needs of individuals to park their means of transport to either reach their destination or to connect to another modality of transport.

Parking convenience affects the ease of reaching destinations and therefore affects overall accessibility and journey modality choice (for example if there is no bicycle parking outside a destination a user may decide to take an alternative modality of transport).
In this scenario it is fundamental for a user to be able to know in real-time the availability of parking spaces.

✓ ***Events Planning (BS-P3)***

Events occurring in a location can be either planned (e.g. a football match) or unplanned (e.g. a car accident) but they will both have a high impact on mobility. Planned events can be on-off or recurring and they can be affecting just one area or they can have city-wide repercussions. Examples of events can be: festivals, football matches, marathons etc.
In such occasions it is particularly important for users to have real-time and up-to-date information on the situation and the possible evolution. Of particular importance in such occasions it would be having information on the best routes to avoid the congestion whether heading or not to the event, the best places to park if using a car and real-time availability.

5.1.5.2 Professional Mobility Planning and Monitoring

Id	Cat	Type	Data	Description
BS-PM1	PM	Real-time mobility dashboard	Models Traffic Demand Data and Traffic Data Observations Bicycles and Pedestrians Contextual Data	Dashboard for decision-makers to see real-time information about traffic, number of people moving/on the streets and public transport occupancy and status. Ability to use the dashboard to send contextual and personalized information to citizens about their journeys.
BS-PM2	PM	Real-time Parking Monitoring and Planning	Parking	Dashboard for decision-makers to see real-time information about parking. Ability to use the dashboard to send contextual and personalized information to citizens about their parking.
BS-PM3	PM	Real-time Events Monitoring and Planning	Public Transport Traffic Demand Data and Traffic Data Observations Parking Bicycles and Pedestrians Contextual Data	Dashboard for decision-makers to see information about disruptions/big events and how they can impact mobility. Ability to use the dashboard to send contextual and personalized information to citizens about transport/route alternatives.
BS-PM4	PM	Real-time incident detection	Traffic Control Plan Traffic Demand Data and Traffic	Real time traffic incident detection and planning in case of emergency

			Data Observations Public Transport Bicycles and Pedestrians	(accident...)
BS-PM5	PM	Planning	Public Transport Parking ITS Bicycles and Pedestrians Generic Contextual Data	Dashboard for decision-makers to use historic and current data to optimise mobility in the city.
BS-PM6	PM	Real-time environmental Monitoring and Planning	Public Transport Traffic Demand Data and Traffic Data Observations Bicycles and Pedestrians Generic Contextual Data	Dashboard for decision-makers to use historic and current data about people movements and environmental conditions (e.g. pollutions) to inform citizens about environmental status and to inform planning.

This category focuses around the idea of providing decision-makers in the mobility area with means to better plan the mobility of the town or of their fleet of vehicles, by providing awareness of real-time road conditions, transit times and predictions based on historic data and models.

✓ ***Real-time Mobility Dashboard (BS-PM1)***

This use case aims to provide decision makers with an overview of the up-to-date (real-time) situation of traffic and transport in an urban area.
Basic requirements are:

- *Public transport*: information should be provided on public transport status (e.g. where are the buses compared to where they should be), statistics (e.g. punctuality of the buses at a given time) and occupancy (e.g. how many buses are full).
- *Non-motorised transport:* information should be provided on number of people moving on the streets at a given time (e.g. walking), cycling, using shared cycle facilities.
- *Road transport*: information should be provided on real-time traffic and traffic statistics.
- *Real-time communication:* Ability to use the dashboard to send contextual and personalized information to citizens/staff about their journeys.

✓ ***Real-time Parking Monitoring and Planning (BS-PM2)***

This use case aims to provide decision makers with an overview of parking situation in an urban area.
Basic requirements are:

- *Parking locations:* information should be provided on location of parking spaces for all types of transport.

- *Parking availability:* information should be provided on real-time availability of parking spaces for all types of transport.
- *Parking predictions:* information should be provided on predicted availability of parking spaces.
- *Real-time communication:* Ability to use the dashboard to send contextual and personalized information to citizens/staff about parking.

✓ ***Real-time Events Monitoring and Planning (BS-PM3)***

This use case aims to provide decision makers with an overview of mobility in an urban area when an event is happening/about to happen.

Basic requirements are:

- *Disruption locations*: information should be provided on location of disruptions that may affect all types of transport/mobility.
- *Disruption status/duration*: information should be provided on the duration and, if available, on the real-time status of each disruption.
- *Public transport*: information should be provided on public transport status (e.g. where are the busses compared to where they should be), statistics (e.g. punctuality of the busses at a given time) and occupancy (e.g. how many busses are full).
- *Non-motorised transport*: information should be provided on number of people moving on the streets at a given time (e.g. walking), cycling, using shared cycle facilities.
- *Road transport*: information should be provided on real-time traffic and traffic statistics.
- *Parking locations*: information should be provided on location of parking spaces for all types of transport.
- *Parking availability*: information should be provided on real-time availability of parking spaces for all types of transport.
- *Parking predictions*: information should be provided on predicted availability of parking spaces.
- *Real-time communication*: Ability to use the dashboard to send contextual and personalized information to citizens/staff about transport/route alternatives.

✓ ***Real-time Incident Detection (BS-PM4)***

This use case aims to provide decision makers with detections of incident/emergencies.

Basic requirements are:

- *Emergency type/ locations*: information should be provided on the type and location of the incident/emergency.
- *Disruption status/duration*: information should be provided on the duration and, if available, on the real-time status of the incident/emergency.
- *Public transport*: information should be provided on the status of public transport around the incident/emergency location.
- *Non-motorised mobility*: information should be provided on the status of non-motorised mobility around the incident/emergency location.
- *Road transport*: information should be provided on the status of road traffic around the incident/emergency location.
- *Real-time communication*: Ability to use the dashboard to send contextual and personalized information to citizens/staff about the incident/emergency.

✓ ***Planning (BS-PM5)***

This use case aims to provide means for decision-makers to use historic and current data to plan and optimise mobility in the city.
Basic requirements are:

- *Public Transport Historic Data*: on public transport statistics (e.g. average punctuality of the busses) and occupancy (e.g. how many busses are full).
- *Non-motorised mobility historic data*: information should be provided on number of people moving on the streets at a given time (e.g. walking), cycling, using shared cycle facilities.
- *Road transport historic data*: information should be provided on traffic OD matrixes and traffic statistics.
- *Disruption status/duration*: information should be provided on planned disruptions and their durations.
- *Parking locations*: information should be provided on location of parking spaces for all types of transport.
- *Parking availability historic data*: information should be provided on availability of parking spaces for all types of transport.
- *Prediction Engine*: Ability to show the consequences of performing infrastructure/legislation changes.

✓ ***Real-time environmental Monitoring and Planning (BS-PM6)***

This use case aims to provide means for decision-makers to use historic and current data about people movements and environmental conditions (e.g. pollutions) to inform citizens about environment status and to inform planning.
Basic requirements are:

- *Public Transport Historic Data*: on public transport statistics (e.g. average punctuality of the busses) and occupancy (e.g. how many busses are full).
- *Non-motorised mobility historic data*: information should be provided on number of people moving on the streets at a given time (e.g. walking), cycling, using shared cycle facilities.
- *Road transport historic data*: information should be provided on traffic OD matrixes and traffic statistics.
- *Environmental historic data*: information should be provided on environment values such as pollution, Co2 emissions, allergens etc.
- *Public transport real-time data*: information should be provided on public transport status (e.g. where are the busses compared to where they should be), statistics (e.g. punctuality of the busses at a given time) and occupancy (e.g. how many busses are full).
- *Non-motorised transport real-time data*: information should be provided on number of people moving on the streets at a given time (e.g. walking), cycling, using shared cycle facilities.
- *Road transport real-time data*: information should be provided on real-time traffic and traffic statistics.
- *Environmental real-time data*: information should be provided on real-time environment values such as pollution, Co2 emissions, allergens etc.
- *Real-time communication*: Ability to use the dashboard to send contextual and personalized information to citizens/staff about their journeys.
- *Prediction Engine*: Ability to show the consequences on the environment of performing infrastructure/legislation changes.

5.1.6 Case study analysis: Requirements

In the following tables we will summarise the System Requirements for the Birmingham Case Study, dividing them into functional and non-functional requirements.

5.1.6.1 Functional user requirements – Information Gathering, Access and Sharing

Description	Stakeholders
Gather real-time mobility data from multiple modes of transport	PRO
Gather real-time occupancy from public transport	PRO

(bus, metro, train)	
Gather real-time occupancy from parking spaces (car, bicycles)	PRO
Share data as open data	PRO
Emergency real-time information sharing	PRO
Gather real-time environmental information (e.g. pollution, allergies)	PRO
Receive transport information/planning customized for different abilities	SOC
Receive transport information/planning customized for different lifestyle choices/needs (e.g. (pollution, allergies, hayfever)	SOC
Receive real-time alerts for disruptions affecting their route, departure time, arrival time and/or connection	PUB
Receive real-time alternative routes in case of disruptions customized for different abilities/lifestyle choices (pollution, allergies, hayfever) and different from the alternatives offered to other users	PUB
Use multiple means of communication (voice, text, etc.)	SOC
Have information available seamlessly on multiple devices, Appropriate to the context of interaction	PUB
When a disruption is notified, communicate the time the disruption occurred and the predicted end time	PUB
Have connecting journey information	PUB
Have contextual information on routes (i.e. safety at specific times of the day)	PUB
Have costing information for different routes/modes of transport	SOC
Have real-time special offers to encourage the use of a specifi transport mode	PRO

5.1.6.2 *Functional user requirements - Analysis*

Description	**Stakeholders**

Analysis of all the possible alternatives for a journey based on current and historic data	PRO
Compare time/cost/environmental sustainability of journey solutions	PRO
Parking availability prediction	PRO
Have predictive information based on historic and current data (i.e. based on personal journey patterns)	PUB

5.1.6.3 *Functional user requirements – Transport Modelling*

Description	Stakeholders
Modelling system should include the possibility to model events and their consequences (planned/unplanned)	PRO
Historic data should be used to model public and optimise public transport	PRO
Real Time Public Transport rerouting	PRO

5.1.6.4 *Non- Functional user requirements*

Description	Stakeholders
Promote non-motorised mobility	SOC
Ensure engagement and accessibility for different user groups	SOC
Guarantee scalability trough the possibility to easily integrate data from new domains and/or wider coverage.	PRO
Guarantee interoperability via the implementation of open access interfaces.	PRO
Guarantee usability of the system via the implementation of user-friendly multimodal interfaces	PUB
Preserve privacy by minimizing personal data storage and confirming to EU Regulations	PUB
Guarantee secure data access and storage	PRO

Provide feedback to the user on the system operations	PUB
Provide feedback to the user on the prediction confidence	PUB

5.2 Santander

5.2.1 Case Study Description

5.2.1.1 Urban Profile

Santander is the capital of the autonomous region of Cantabria. With nearly 180,000 inhabitants according to the National Institute of Statistics, trade and services provide employment for more than 70 percent of its active population. Santander has an Oceanic climate and its humidity is quite high throughout the year, with average temperatures ranging from 25 °C in summer to 10° C in winter.

Santander is a city that stretches along the sea. Its marine spirit and harbour nature have conditioned its urban appearance, lengthened in search of water. Built on hills, its steep slopes also had much to do in the configuration of the different neighbourhoods. Its fondness for the bay, the only one of the North that is oriented to the South, has shaped a unique personality full of contrasts, sometimes engrossed in itself but with a taste for the world.

5.2.1.1.1 Territory

The urban area of the bay of Santander is located in the centre of the region of Cantabria. It is 108 kilometres from the metropolitan area of Bilbao and 393 Kilometres from the metropolitan area of Madrid. Different urban experts have identified this area as an integrated urban system. However, there is no consensus about its limits and boundaries. The most detailed quantitative study conducted to date has differentiated the following subareas (Cos, 2005)[3]:

- The municipality and the city of Santander, the nucleus of the urban area.
- Municipalities in the northwest of the bay of Santander. These municipalities have very close relationships with the city of Santander: Santa Cruz de Bezana, Camargo and El Astillero.
- Municipalities with significant but less important relationships with Santander: Villaescusa, Medio Cudeyo, Marina de Cudeyo, Piélagos and Ribamontán al Mar.

[3] *Cos, O. (2005) Propuesta de delimitación del área metropolitana de Santander: realidad funcional, organización administrativa y gobernanza. Centro de Estudios de la Administración Pública Regional. Gobierno de Cantabria*

These nine municipalities could be included as part of the urban area of Santander. This area covers a surface of 300 square kilometres. Considering the nine municipalities, the total population of this area is around 280,000 inhabitants, nearly half of the population of the region of Cantabria. Sixty two percent of the population is located in the municipality of Santander whereas 22% live in the municipalities of Santa Cruz de Bezana, Camargo and El Astillero (see table below). The population in the municipality of Santander has declined by about 4% in recent years. In contrast, the populations in other nearby municipalities have increased suggesting the presence of a modest urban sprawl process as in other Spanish cities. The municipalities with the highest increases in population are Pielagos, El Astillero and Bezana, which have grown by around 25% in the period 2001 – 2015, according to ICANE, 2015[4].

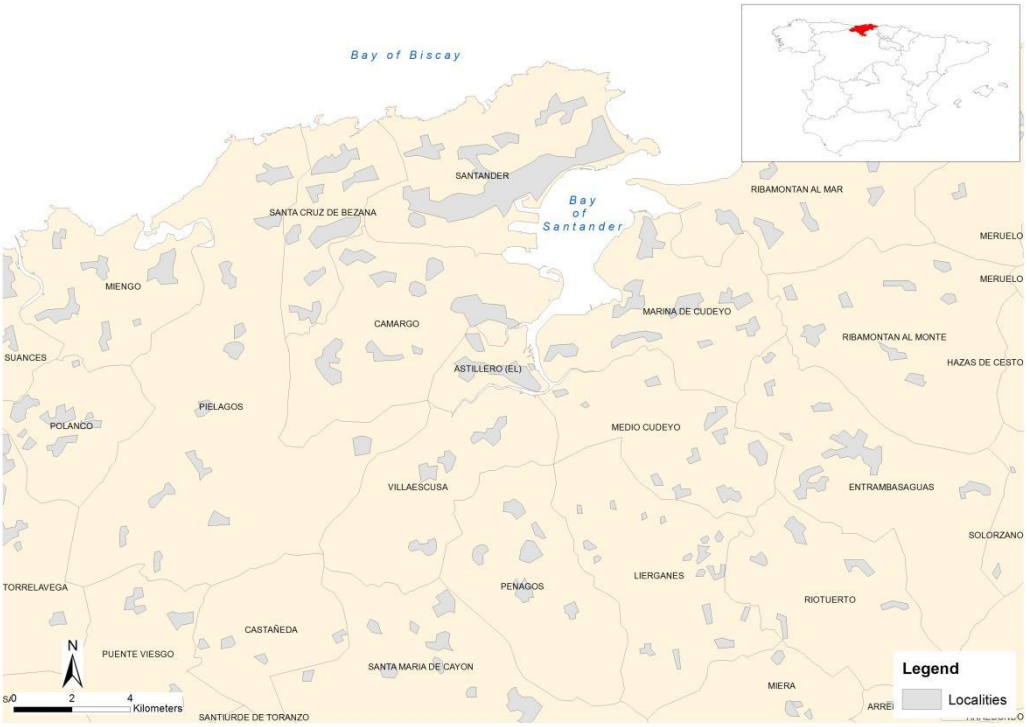


Figure 19 - Metropolitan area of Santander

MUNICIPALITY	Km²	Population 2001	Population 2015	Change 2001-2015 (%)	Density 2001 (inhab/km²)	Density 2015 (inhab/km²)
ASTILLERO (EL)	6.8	14353	18297	27.48	2111	2691

4 *Instituto Cántabro de Estadística (ICANE) (2015) Fichas municipales. Santander.*

CAMARGO	36.6	24498	30766	25.59	669	841
MARINA DE CUDEYO	28.4	5058	5203	2.87	178	183
MEDIO CUDEYO	26.8	6287	7530	19.77	235	281
PIELAGOS	88.6	13035	24360	86.88	147	275
RIBAMONTAN AL MAR	36.9	3688	4419	19.82	100	120
SANTA CRUZ DE BEZANA	17.3	9149	12560	37.28	529	726
SANTANDER	34.8	180717	173957	-3.74	5193	4999
VILLAESCUSA	28	3323	3826	15.14	119	137
TOTAL	304	260108	280918	8.00	856	924

Table 5- Characteristics of municipalities belonging to metropolitan area (ICANE, 2015)

In the housing sector, this population growth has been accompanied by a significant increase in the construction of both first and second homes. In the period 2001 – 2011, 25000 new dwellings were built, almost 30% in Santander and 25% in the municipality of Pielagos. The distribution of the urban space in the study area can be seen in the following figure, according to the data provided by the Corine Land Cover project.

The economic structure of the area is changing because of a growing tertiary sector. In the eighties, the primary sector employed around 10%, the secondary sector about 30% and the tertiary sector about 60% of all workers. This sectorial composition has changed slowly and in 2007, before the economic crisis, the distribution was 1% of the workers in the primary sector, 27% in the secondary sector and 72% in the tertiary sector. The most recent data (2015) shows that employment in the secondary sector has fallen to 17% because the destruction of jobs in the construction industry. Today the tertiary sector represents about 82% of all employment (ICANE, 2015). The average unemployment rate in the area is around 17%, slightly better that the regional (18%) and the national average (20%).

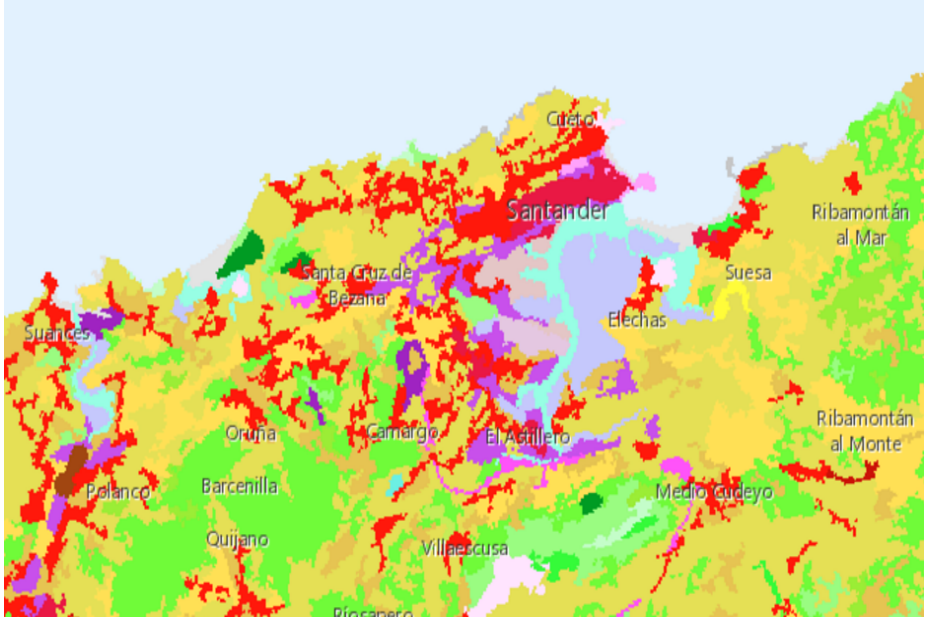


Figure 20 - Land use distribution in the study area. Red: Urban space. Purple: Industrial space. Yellow: Fodder and farming space. Source: Corine Land Cover 2012[5].

5.2.1.1.2 Journeys Analysis - Data

In the metropolitan area of Santander residents make (on an average working day), 890,000 motorised trips. We have no data about non motorised trips in this area, however, according to a mobility survey carried out in Santander in May 2012, there are up to 247 thousand non motorized trips made. On average the residents in the metropolitan area make 2.09 trips per-capita/ weekday.

5.2.1.1.3 Journeys Analysis – Modes of transport

According to the mobility survey cited above, overall mobility has decreased by 7% with respect to 2011, representing up to 30 thousand fewer trips per day in only one year.

The expanded data show that 50% of urban mobility is done by walking, nearly 41% by car (driving or passenger) and 7% by bus (TUS). The remaining 2% is done by taxi and cycling. Over the same period, the pubic transport proportion of the motorised trips has increased to 13%.

[5] *http://land.copernicus.eu/pan-european/corine-land-cover/clc-2012*

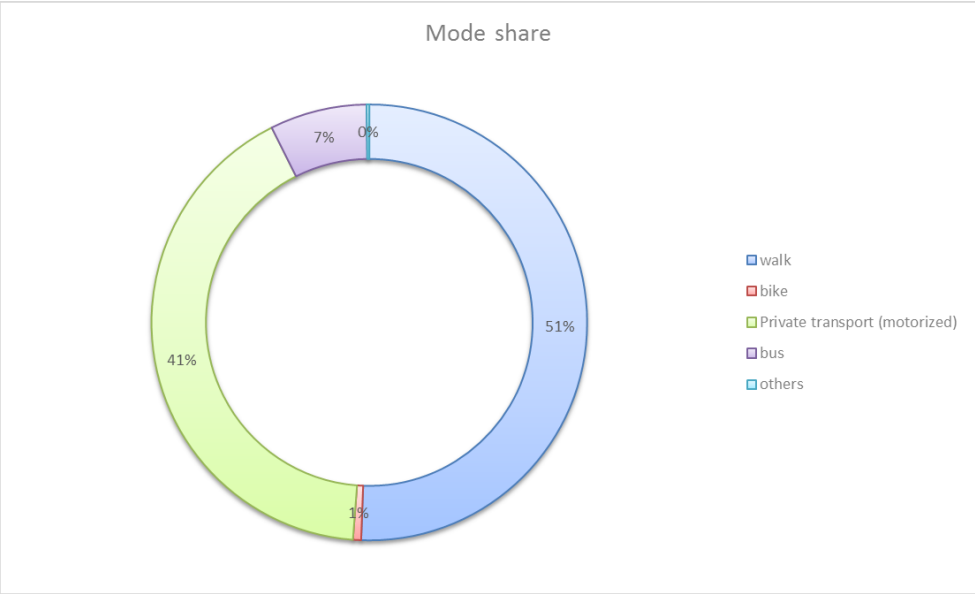


Figure 21 - Mode share of daily trips

This modal share change is shown in the following figure according to the purpose of the trip. It should be highlighted that public transport is more often used for study and health related trips.

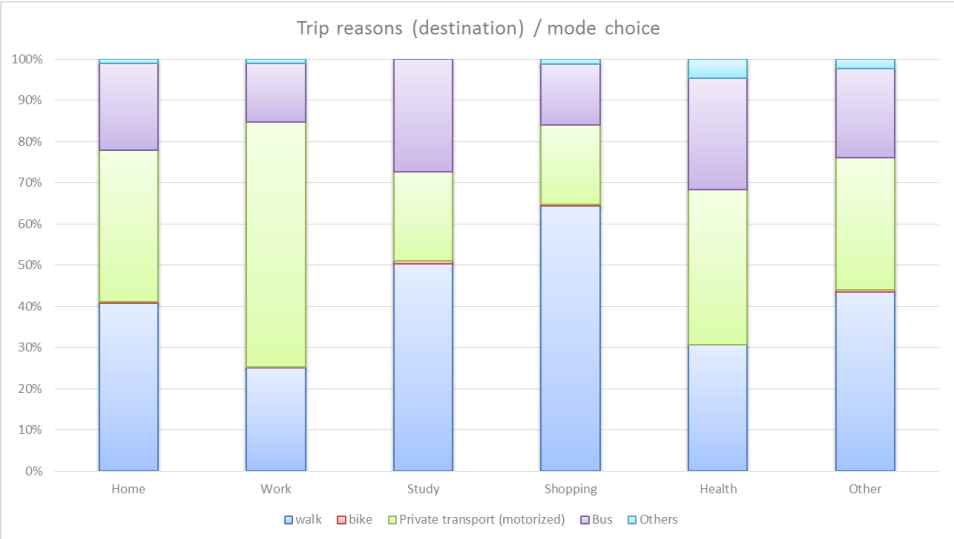


Figure 22 - Trip reason and mode choice relationship

Last but not least, is the analysis of modal share based on family income (as declared in the survey). The high income families tend to use the private car more than families with lower incomes, while public transport is mainly used by middle income families. Those families with the lowest incomes are the ones with high levels of walking.

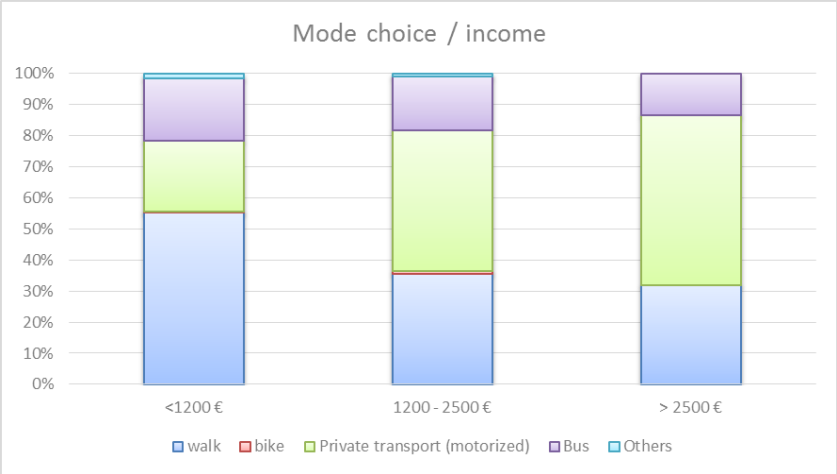


Figure 23 - Mode choice and income categories

5.2.1.1.4 Journey Analysis - Reason

Forty five percent of all trips made by residents in the city of Santander are for reasons of work or study. Shopping (including recreational and leisure trips) is the second reason reported by the users (34% of all trips).

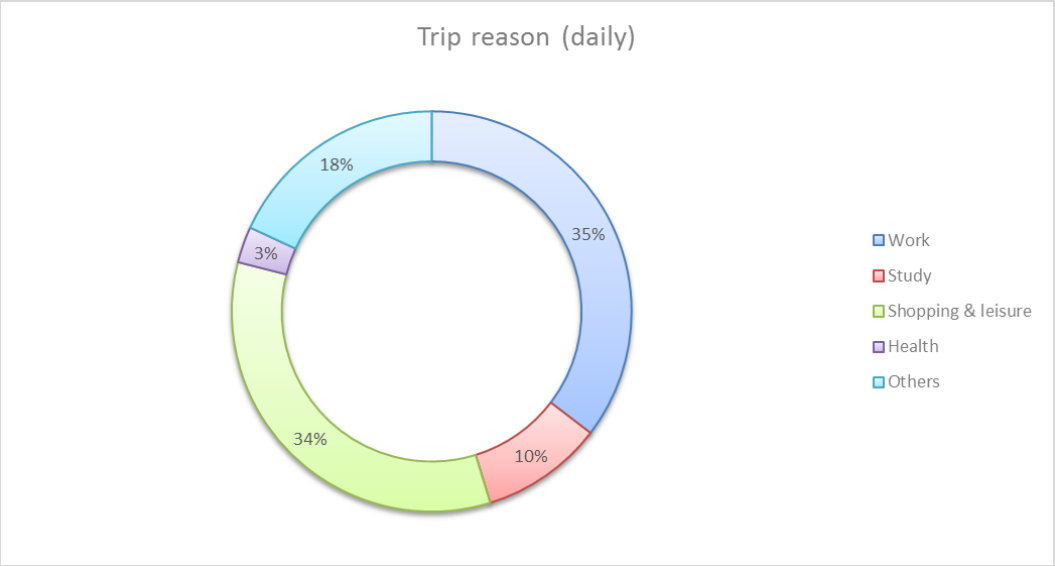


Figure 24 - Trip reason for daily trips

A more detailed analysis of trips (made inside the city) reported in the survey can be made by showing daily distributions represented according to motive and mode used. This technique provides the following figures, which show that first thing in the morning the main reasons for travelling are returning home and going to work. This is followed by the study motive, whereas at midday there are more diverse reasons for making trips. In the afternoon, leisure, shopping and returning home trips are the most common.

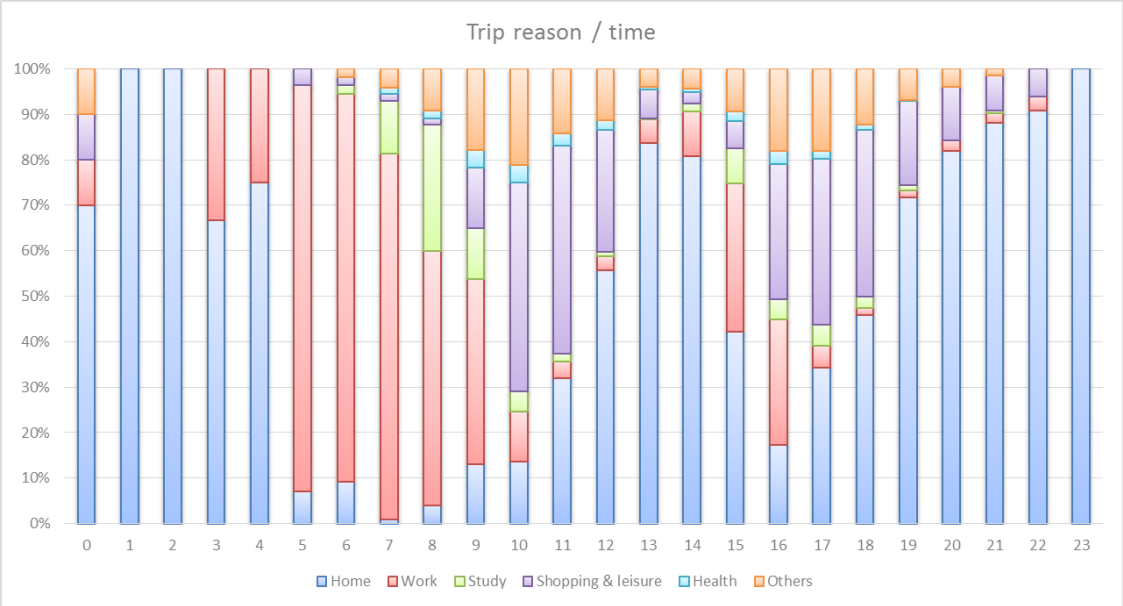


Figure 25 - Trip reason evolution on a working day

5.2.1.1.5 Journeys Analysis – Temporal Distribution

Finally, the following daily private and public transport profiles can be obtained. Peak hours and patterns can be seen to match for all modes throughout the day, with the exception of the afternoon peak hour, which is slightly longer for the private vehicle mode.

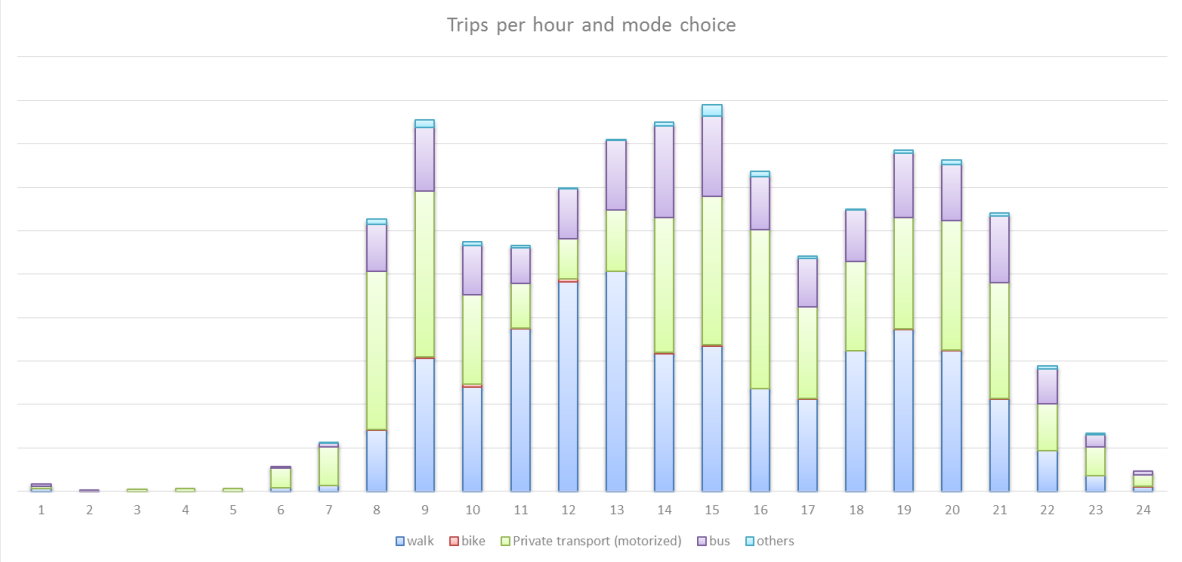


Figure 26 - Demand profile and mode choice evolution on a working day

5.2.1.1.6 OD Matrix

In 2010, the University of Cantabria developed a LUTI Model (Land Use and Transport Interaction Model) in which the city of Santander and its metropolitan area were modelled in terms of mobility. According to the estimated origin – destination matrices (OD Matrixes) the motorized trips made during the peak hour (13:00-14:00 pm) were as shown in the following tables:

PRIVATE

Origin/Dest	Santander	Suburb	Region	TOTAL
Santander	39921	4901	967	**45790**
Suburb	5224	4081	2916	**12222**
Region	1209	3067	2394	**6670**
TOTAL	**46354**	**12050**	**6278**	**64683**

Table 6- Private OD Santander area data (trips / peak hour)

PUBLIC

Origin/Dest	Santander	Suburb	Region	TOTAL
Santander	5898	314	13	**6225**
Suburb	356	161	24	**541**
Region	29	29	0,55	**59**
TOTAL	**6283**	**504**	**37**	**6826**

Table 7- Public OD Santander area data (trips / peak hour)

As regards the use of the roads, an interesting analysis can be carried out of the portion of the public transport in the total motorized mobility in relations to the macro-areas.

Origin/Dest	Santander	Suburb	Region	TOTAL
Santander	12,87%	6,03%	1,34%	**11,97%**
Suburb	6,39%	3,80%	0,81%	**4,24%**
Region	2,35%	0,95%	0,02%	**0.88%**
TOTAL	**11,94%**	**4,02%**	**0,59%**	**9,55%**

Table 8 OD Santander area trip distribution

5.2.1.1.7 Public Transport – Why

Evaluating the reasons for using of public transport, 59 % do not have a car available for that shift (forced choice) and 21% use it due to parking problems at their destination (both high occupancy rates and higher costs).

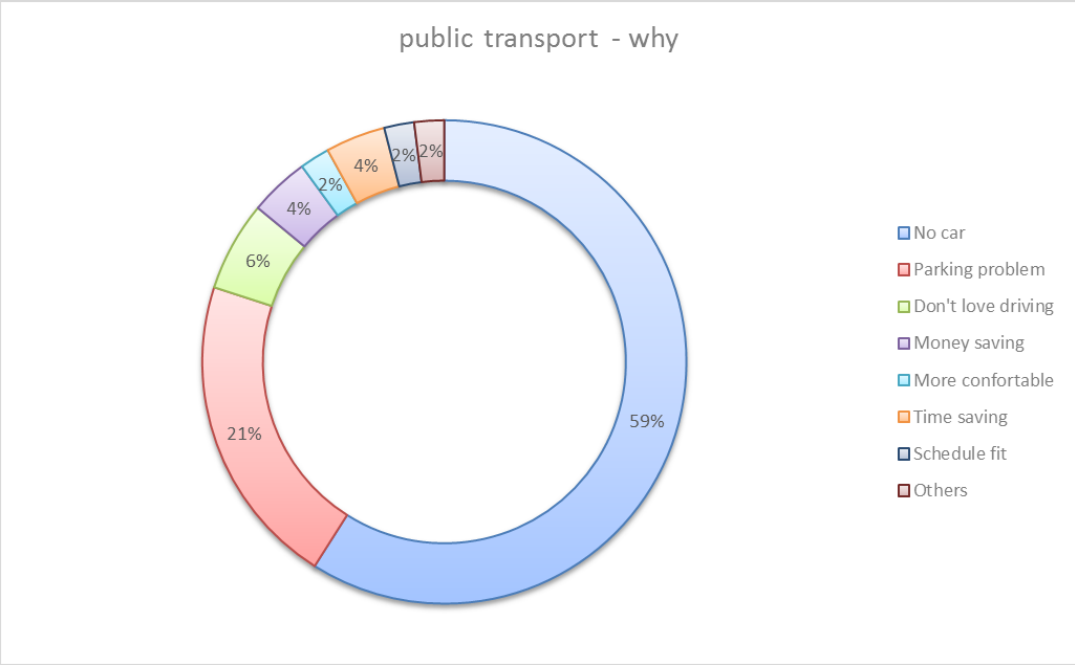


Figure 27 - Reasons for using public transport

5.2.1.1.8 Public Transport – Why not

The main reasons for not using public transport are:

- Useless line routes (27%)
- Excessive travel time (25%)
- Waiting time in stops (20%)
- Other factors such as: cost (8%), stop proximity to the final destination (6%) or making exercise (3%)

The fact that the buses have fixed and rigid routes is a meaningful reason why citizens do not currently use the public transport system in Santander. Most of the non users are not aware of the public transport routes available to them. That kind of lack of knowledge is one of the main problems that TUS has to deal with in order to attract potential users. An advertising campaign is required to deliver a variety of information about line routes, average travel times, waiting times, most frequent trips done on each line, etc.

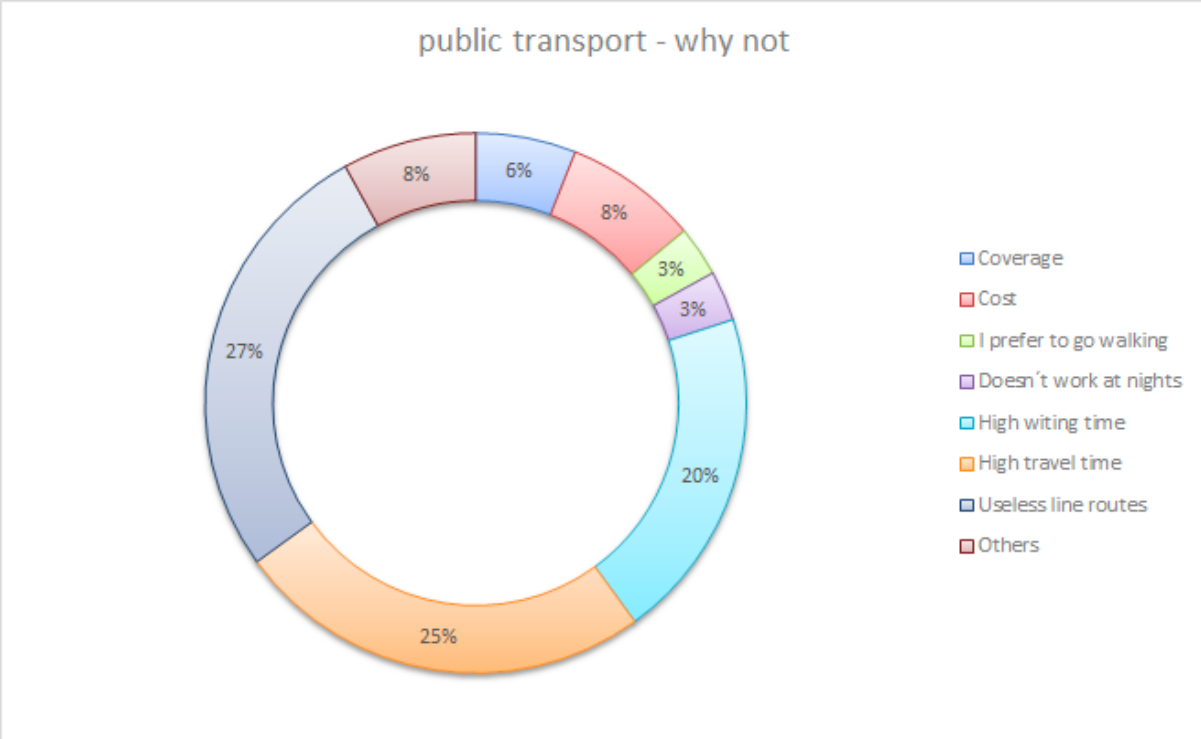


Figure 28 - Reasons for not using public transport

Most of the users (42%) make study related trips, 18% are for going to work and 14% for going home. As the vast majority of trips are daily trips with fixed times and frequencies made by potential TUS users (who are not currently users) an important objective of the city, more sustainable mobility, could be achieved by targeting these non-users.

The most common mode used by the non TUS users is the private car, either as a driver or as a passenger (36%+20%), followed by the walking mode (29%). Bicycle use needs to be highlighted at 8% along with motorcycles at 5%.

5.2.1.2 *Use Cases*

As will be explained in section 5.2.2 several focus groups have been held to obtain a comprehensive stakeholder requirements analysis. As a result of these meetings, we have been able to identify three use case categories:

	Categories	Categories Id
1	Mobility Information	I

2	Mobility Management	M
3	Fragile categories	FC

Table 9- Santander Case Study Use Case Categories

5.2.1.2.1 Mobility Information Use Cases

Id	Cat	Type	Data	Description
SUC-I1	I	Traffic information	Models Traffic Demand Data and Traffic Counts (5 years) Traffic Control Plan Transit vehicles GPS tracking data Traffic cameras (working on it)	Short term traffic prediction: Tool to predict and visualise (web/APP) the level of traffic in the city. Short term forecasting
SUC-I2	I	User Information System	Models Traffic Demand Data Transit vehicles GPS tracking data Traffic cameras (working on it) GTS (under development)	Route planner: define all possible transport modes to address a route by OD: Analyse all possible connections from an origin to destination point and give information to citizens
SUC-I3	I	Traffic information	Models Traffic Demand Data	Traffic information on Variable Message Signs (VMS)located at the entrances to the city
SUC-I4	I	Traversal mobility	Models Traffic Demand Data and Traffic Counts (5 years) Traffic Control Plan Transit vehicles GPS tracking data Mobile environmental sensing data Traffic cameras (working on it)	Information of pollution levels and occupancy of the tunnels in the city in real time and short term forecasting

Table 10- Mobility Information Category Use Cases

5.2.1.2.2 Mobility Management

Id	Cat	Type	Data	Description
SUC-M1	M	Traffic management	Models Traffic Demand Data and Traffic Counts (5 years) Traffic Control Plan Transit vehicles GPS tracking data Traffic cameras (working on it)	Real time traffic incident detection and planning in case of emergency (accident...)
SUC-M2	M	Public transport management	Models Traffic Demand Data and Passenger Counts (5 years) Transit vehicles GPS tracking data	Number of people who are in real time on a bus; calculation of bus occupancy in real time

Table 11- Mobility Management Category Use Cases

5.2.1.2.3 Fragile Categories

Id	Cat	Type	Data	Description
SUC-FC1	FC	Support to Fragile Categories		Define all possible routes compliant to disability problems solution.

Table 12- Fragile Categories Use Case

5.2.2 Stakeholder Analysis

5.2.2.1 Background

A methodology based on public participation is used to improve our knowledge about the problems, opinions and perceptions of mobility in the urban and metropolitan area around Santander, based on smartcities and new technologies. The aim is to support improvements in the way that mobility is organised, controlled and planned and to create decision-making support tools, a challenge which is covered by the SETA project.
To this end 3 focus groups were designed; the first brought together transport operators and administrators working in the urban and metropolitan area of Santander and the second and third focus groups were made up of citizens and social groups from the same area. The focus groups have allowed us to establish the problems, opinions and perceptions about mobility within the city's transport system. The focus groups were used in such a way that all the points of view of the implicated agents or those affected by transport issues are considered within the process, without any discrimination.

The focus groups established the uncertainties and problems around mobility in general and the problems associated with the availability and acquisition of data. They revealed the perception of the operators about the usage and utility of Intelligent Transport Systems using smartphones, the use and potential of social networks as additional elements of engagement and the enabling of mobility services and collaborative mobility systems.

5.2.2.2 Methodology

This was an exploratory study of a qualitative nature developed based on Focus Group techniques. As the perceptions and points of view of the operators, administration and technical staff working in the transport system were known to be different from those of the citizens and social groups that used it, three focus groups were organised:

- Focus Group #1: Operators, administration and technical staff in the transport field

- Focus Group #2: Social groups and people connected to mobility
- Focus Group #3: Citizens

Telephone, email and traditional postal contact were established with the participants in order to organise the date, time, place and reason for the meeting, as well as to confirm their attendance. The meetings were held in the Department of Transport of the Civil Engineering School at the University of Santander. Each session was recorded in video and/or in audio in order to collect all the required information without losing any details from the contributions made. The information was processed, analysed and researched to establish the problems, opinions and perceptions relating to mobility.

This formed the basis for the discussion and debate, through a process of social participation, to define the existing current problems around mobility in the defined urban and metropolitan area and to elaborate possible solutions based on the personal experiences of each individual.

The Focus Group began with a brief explanation about the SETA project and the reasons behind holding the session.
The participants then debated for 60 minutes about the most serious PROBLEMS they perceived with mobility in and around Santander: vehicle congestion, parking spaces.... Differentiating between the different modes of transport (bus, car, train, taxi…) and getting to know their general mobility patterns.

Figure 29 - Stakeholders Focus Group

During this part of the session the participants were given total freedom to express their opinions, the coordinators of the mega-focus group used a previously designed script (guide

lines) to direct the meeting and avoid getting held up on any particular point to allow all the relevant subjects to be addressed.

Figure 30 - Social groups focus group

In the final part of the session those present were asked to reflect on a personal level and provide a summary of 3 or 4 aspects which they considered to be important problems associated with mobility and 3 or 4 actions which they felt could be taken to improve these problems.

Figure 31 - Citizens focus group

Finally, they were thanked for their participation and they were reminded about how important their knowledge about mobility in and around Santander was for this type of research.

5.2.2.3 *Focus Group #1: Operators, Administration and technical staff in Transport*

5.2.2.3.1 Conclusions

The conclusions drawn from the focus group on mobility in the urban and metropolitan area of Santander are presented below.

The most significant conclusion drawn from this focus group is the lack of planning associated with public transport, as well as the lack of coordination between the agents involved, as these deficiencies lead to other problems. The problems and solutions detected are presented in the following table:

PROBLEMS/SOLUTIONS FOR MOBILITY	
PROBLEMS	**SOLUTIONS**
Problems in Parking Metered Spaces (OLA[6] zones)	**Changes in regulating Parking Metered Spaces**
Lack of encouragement and education of society	Personalised information for users to encourage use of public transport. One-off payment for using public transport
Bus stops not adapted for the disabled	Improve the accessibility of bus stops for the disabled
Lack of transport planning and its effects on other services	Plan by considering all the services and agents being affected
Lack of coordination between the agencies involved	Improved coordination between operators and administrators of urban and regional transport
Problems of communication between operators and/or administrators	Transmission of information between agents involved and/or affected
Low quality of information provided on social networks	A management office officially provides reliable information

[6] Parking Metered Spaces or Ordenanza Limitadora de Aparcamiento (OLA)

Inefficiency of the apps	Unique apps for all the services which take up little memory
Lack of information about one-off events	Information about one-off events affecting the network and road occupancy levels
Lack of information about occupancy of public transport	Inform about bus occupancy at the same time as providing information about waiting times.

Table 13 - Stakeholders focus group: Problems/solutions

5.2.2.3.2 SWOT Analysis (Strengths, Weakness, Opportunities and Threats)

Finally, a SWOT matrix summarises the strengths, weaknesses, opportunities and threats detected in the Focus Group held in the city of Santander.

This internal analysis consists of detecting the strengths and weaknesses found in the provision of mobility in the urban and metropolitan area of Santander.

All of them have a series of pros and contras, which have been classified in a SWOT matrix presented below.

The SWOT method is an analysis tool for strategic planning which supports decision making and problem solving. Within the present study it represents a key element in the classification of the ideas generated by the Focus Groups, serving to summarise and highlight the key points addressed in the meetings.

Over the years since it first appeared the SWOT analysis has proven to be very efficient in controlling the variables involved in company management, and has become a required technique for diagnostic situations (Bradford et al. 1999) in numerous modern day disciplines, among them the management of transport policies.

Strengths (internal system characteristics)
COORDINATION OF ACTIVITY
Coordination between periodic road closures with sporadic closures on nearby main roads.
COORDINATION AND COMMUNICATION BETWEEN OPERATORS AND/OR ADMINISTRATORS
Improved coordination of activities and communication of information between regional and local operators and/or administrators
INFORMATION
Inform the public about % bus occupancy, road occupancy or incidents/changes affecting networks in real time.
Personalised information for users to promote public transport use.

REGULATION OF THE OLA ZONE
Change the maximum allowed time for parking according to the time, the supply and the demand (park pressing)
BUS STOPS
Adapt the bus stops for disabled accessibility
PAYMENT SYSTEMS
Creation of offices to manage one-off payments for using public transport (with cards or mobile)

Weaknesses (internal to the system)
OLA ZONE
Parking and planning problems associated with the OLA service
PROMOTION OF PUBLIC TRANSPORT
Not enough encouragement to use public transport
COORDINATION AND COMMUNICATION BETWEEN OPERATORS AND/OR ADMINISTRATORS
Insufficient coordination and communication between regional and local operators, services and/or administrators about actions on the network
INFORMATION
Lack of information for operators and the public about incidents occurring on the network.
Lack of information about traffic levels and bus occupancy Out of date information
TRANSPORT PLANNING
The mobility projects do not consider other agents and services that are affected

Opportunities (external system characteristics)
TRANSPORT PLANNING
Overall planning about how changes in mobility affect other services in the town.
NEW TECHNOLOGIES
Install a quality wifi service on the buses.
Possibility of creating an official app for the city, unique, efficient and of quality
EDUCATION ABOUT PUBLIC TRANSPORT
Educate the public about using public transport.

Threats (external to the system)
COMMUNICATION AND COORDINATION
The general town plan does not coordinate with public transport when it creates new centres which attract high numbers of people
INFORMATION
Information about traffic condition on social networks is not up to date and/or is unreliable
EDUCATION ABOUT PUBLIC TRANSPORT

The existing culture about public transport (The public wants public transport to be a door to door service.)
Lack of knowledge about transport services and what they cost.
Information is available to the public but there is no education about using it.

5.2.2.4 *Focus group #2: People connected to mobility*

5.2.2.4.1 Conclusions

The most significant conclusion drawn from this focus group is the need to improve accessibility to transport and city infrastructure for people with disabilities, the lack of auditory information at bus stops and the need to offer more information. The problems and solutions detected are presented in the following table:

PROBLEMS/SOLUTIONS FOR MOBILITY	
PROBLEMS	**SOLUTIONS**
Difficulties of access, alighting and being on the buses for the disabled	Improve the adaptation of the bus for the disabled
Impossibility to alight the taxi to the sidewalk to people with reduced mobility (PRM)	Adapt taxi ranks to people with reduced mobility (PRM)
Misplaced dropped kerbs	Locate dropped kerbs where they are required (zebra crossings, taxi ranks...)
Train stops and escalators not adapted for PRM	Train stops and escalators aren´t adapted for PRM
Misplaced containers preventing good visibility	locate street furniture allowing good visibility for vehicles and good mobility for people with disabilities
Taxi ranks haven't for electric car charge point	provide electric car charge point at some taxi ranks
Some traffic lights aren´t aligned or synchronized.	traffic light synchronization (with green adequate time) to avoid crowds in traffic islands
Lack of delimitation between pedestrian areas and bicycle lanes	Mark and delimit bicycle lanes

short supply of public transport between villages and Santander	Provide quality intercity public transportation
Lack of information about intercity buses in bus shelters, the occupancy of tunnels and vertical transport…	Information about intercity buses in bus shelters, the occupancy of tunnels and vertical transport in app TUS and panels

Table 14- Social groups focus group: Problems/solutions

5.2.2.4.2 SWOT Analysis (Strengths, Weakness, Opportunities and Threats) of the Focus Groups

Strengths (internal system characteristics)
Adapted transport
Buses and taxis are adapted to PRM
Existence and correct operation of special lines for people with disabilities
Information
Usefulness of the new technologies applied to public transport (APP TUS) by young and middle-aged users.
Existence of visual information panels at bus stops
The existence of an application to report incidents in the street furniture.
Remote control available for PRM to activate auditory information on the bus and at the traffic lights
Information about the occupancy of parking
Urban structure
Existence of parking spaces for PRM
Existence of vertical transport (escalators and lifts) to facilitate mobility in the city
Dropped kerbs at zebra crossings

Weaknesses (internal to the system)
Adapted transport
Problems of boarding and alighting the bus for PRM due to malfunctioning of the platform

Increasing problems with turning for wheelchair users inside buses because of their size
Mobility and turning problems when wheelchair users alight due to reduced space between the alight platform and bus shelters, benches, litter bins ...
Impossibility to alight from the taxi to the sidewalk for PRM
Urban structure
Lack of delimitation between pedestrian areas and bicycle lanes (where there are bicycle lanes)
Location of parking spaces for PRM on the right of the street meaning the driver gets out onto the roadway
Train stops not adapted for PRM
Badly positioned dropped kerbs (where they exist)
Not all escalators are adapted to PRM
Misplaced containers preventing good visibility
Taxi ranks do not have electric car charging points
Too short time on green at some zebra crossings
Too narrow traffic island at some zebra crossings
Some traffic lights not aligned or synchronized.
Information
Low quality of the auditory information (line route, next stop...) on buses to inform people with hearing impairment
Lack of auditory information at bus stops
Low visual quality of the information panels at the bus stop due to light reflection
Lack of information about the occupancy of tunnels
Lack of information about intercity buses in Santander bus shelters
Lack of vertical transport information (escalators and lifts)

Opportunities (external system characteristics)

Education
Educate the public about using bicycle
Public transport mobility
Improve the adaptation of the bus to PRM (hearing information, mobility...)
Ability to improve information
Implement and/or improve auditory information at bus stops and in buses
Improve the current remote control for PRM, so that it is the remote itself or the device that activates and provides auditory information necessary at traffic lights, stops ...
Information panels placed on the short side of the bus shelters to improve their visual quality.
Information about the occupancy of tunnels
Information about intercity buses in Santander bus shelters
Information about breakdowns and stops in vertical transportation (elevators and escalators)
Report accessible walk routes taking into account dropped kerbs, slopes, sidewalk section …
Create a car share app for intercity journeys
Intercity transport
Increase the frequency of intercity transportation in order to reduce the need to access the city by private transport
Ability to improve urban structure
Adapt train stops for PRM
Improve the location and put new dropped kerbs in areas where needed (e.g. taxi ranks)
Place dropped kerbs in parking places for PRM and locate those parking places on the left
Enable electric car charge point at taxi ranks
Pedestrian areas with a special type of tile and don´t place the terraces of establishments in the middle of the street.
Allow taxis to enter the pedestrian areas when the user is a person with disabilities.
Place containers and parking space at a distance from zebra crossings to improve visibility.
Street furniture next to the facade
traffic light synchronization to avoid crowds in traffic islands

Threats (external to the system)
Education
Lack of education and knowledge about using bicycle
Lack of education about using park and ride
Dependence on private vehicle
Information about traffic density encourages car use (when it is low)
Intercity transport
Short supply of public transport between villages and Santander
Urban structure
Lack of bike routes due to the topography of Santander
Conflicts between pedestrian walkways and cafe or restaurant terraces
High confusion between cyclists and pedestrians when there is no bicycle lines

5.2.2.5 *Focus Group Citizens*

The most significant conclusion drawn from this focus group is the need to improve the information provided regarding traffic congestion and public transport. The problems and solutions detected are presented in the following table:

PROBLEMS/SOLUTIONS FOR MOBILITY	
PROBLEMS	**SOLUTIONS**
Journeys of Public Transport inadequate with lack of access to some areas of the city	Adjusting journeys to reach work areas in the suburban areas as *Fernando de los Rios* that are no man's land / Providing service on areas with larger population.
Deficiencies in the cross connection of the city	Reporting of congestion of transversal areas, especially in tunnels
Digital gap of many people whom not are able to use new technologies (elderly people)	Looking for different channels to communicate with elderly people
Low technology penetration	Improved of the apps already in service through the integration of new requirements and services
Queues in Santander's entrances (S-20)	Notice to drivers in case of queues or accidents

Knowledge of existence of jams	Driver information (Google traffic)
Coordination of the traffic lights	Notify how fast you should go
Few information and outdated	Warn about traffic conditions when you reach the destination
There is no knowledge of lines and alternatives routes	Journey Planner

Table 15- Citizens focus group: Problems/solutions

5.2.3 Questionnaire

The background information about the people surveyed is shown in the following figures. As can be seen, more than 80% of the people surveyed were men (Figure 32). Most of the people surveyed are male, middle aged, between 41 and 50 years old (Figure 33) and frequent mobile phone users, mostly android based devises (Figure 34). They use the internet on a daily basis and while social networks are often consulted, the use of forums can be neglected.

Gender distribution of the sample:

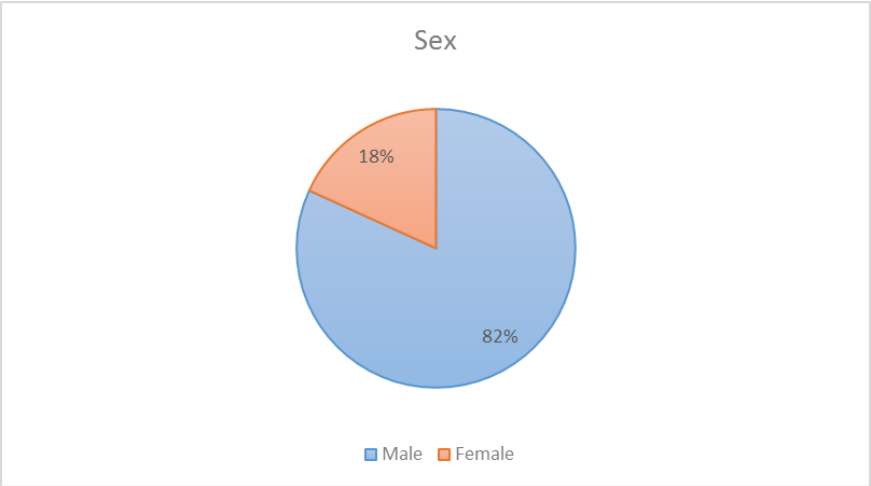


Figure 32 - Gender distribution

Age range:

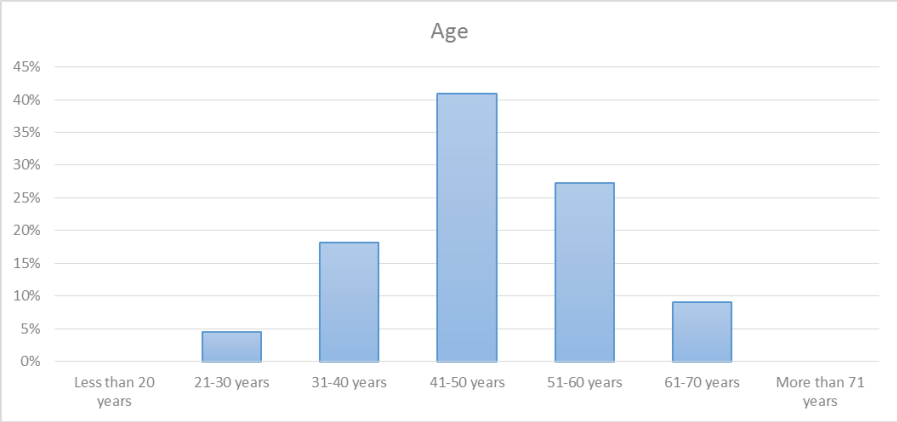


Figure 33 - Age range

The figure above shows the most common age range to be the middle one, 41 to 50 years old. The ages of the people surveyed show a clear normal distribution of ages with no teenagers and elderly people in the sample.

Mobile phone usage:

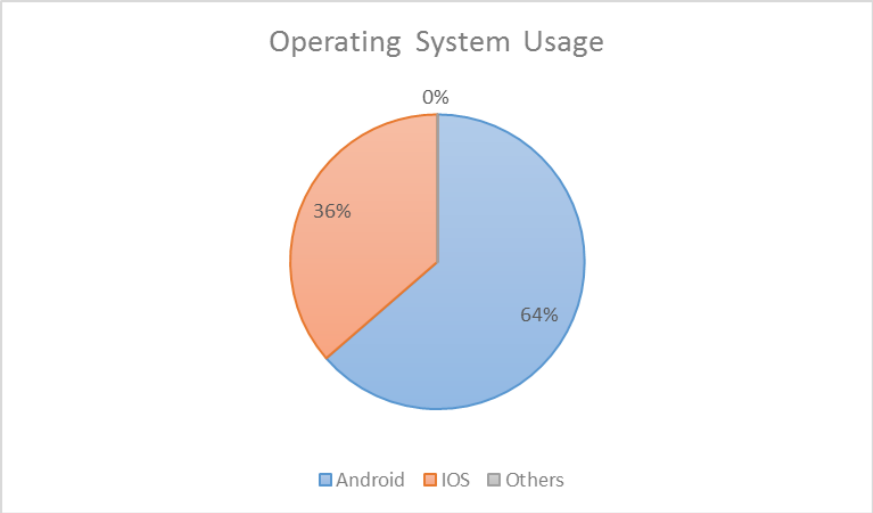


Figure 34 - Mobile phone operating system usage

As expected, everyone in the sample was the owner of a mobile device. The main users had phones using Android operating systems, but a large number (around a third of the total) use iPhones with IOS systems. No other operating systems were found as they are less common in the market.

Frequency of use of communication technologies:

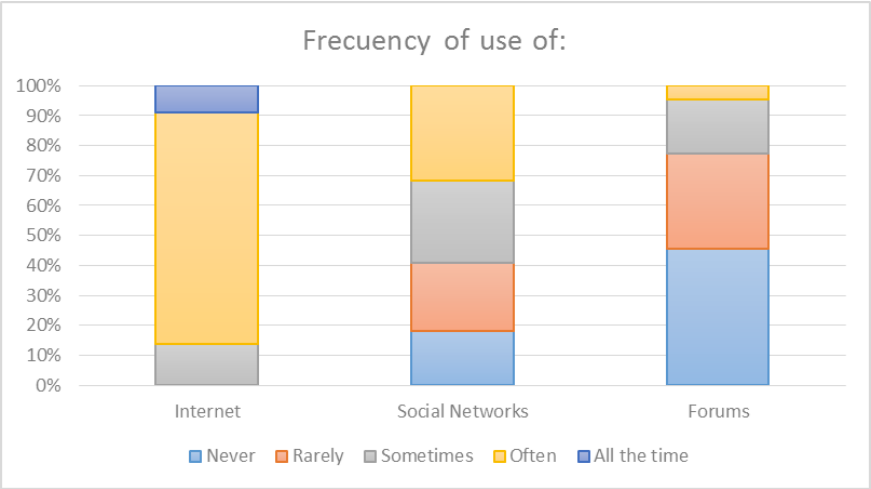


Figure 35 - Frequency of use of communication technologies

As expected, internet use is widely spread among those surveyed. Social networks are not often used but this fact can be a consequence of the analysed sample, based on middle – old aged people. The use of forums came out as an infrequent form of communication.

Results:

The results obtained in the questionnaire are presented below.

The following graph (Figure 36) shows that the most commonly used mode of transport for people of Santander is the private car. Walking is also a popular mode, which is logical considering the size of the city. The use of public transport is very different for each person, however, it is occasionally by almost every person. Other modes, such as Taxi, Bicycle and Motorcycle are much less used.

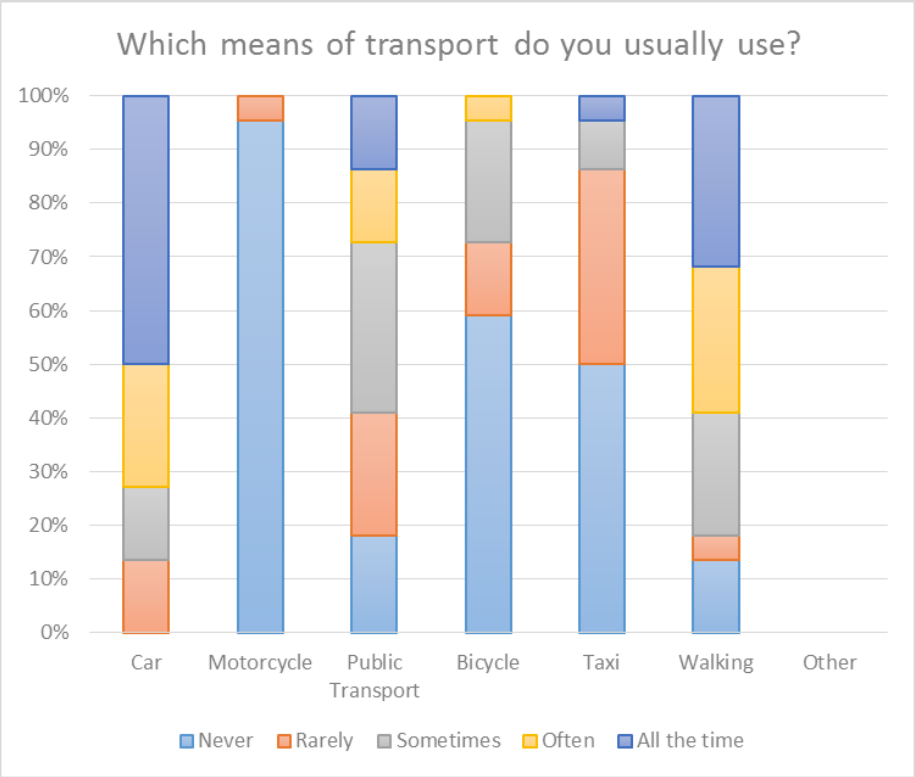


Figure 36 - Transport modes: frequency of use

The following figure shows the percentage distribution when each mode was chosen, where 100% is equal to having been chosen in every questionnaire. Few challenges are faced on a daily basis and the main problems are related to delays but even the most common problem only affects less than a third of the people.

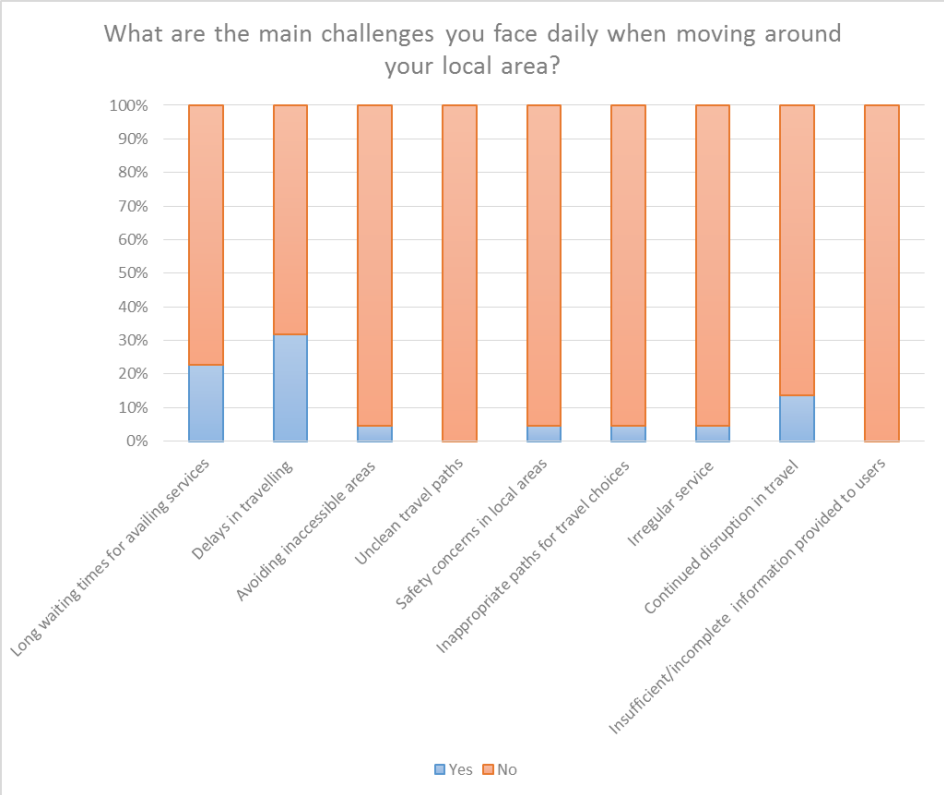


Figure 37 - Mobility: main challenges

How concerned are people about mobility; the following graph shows a high percentage of people very concerned with this matter (value 5), and very few not concerned at all.

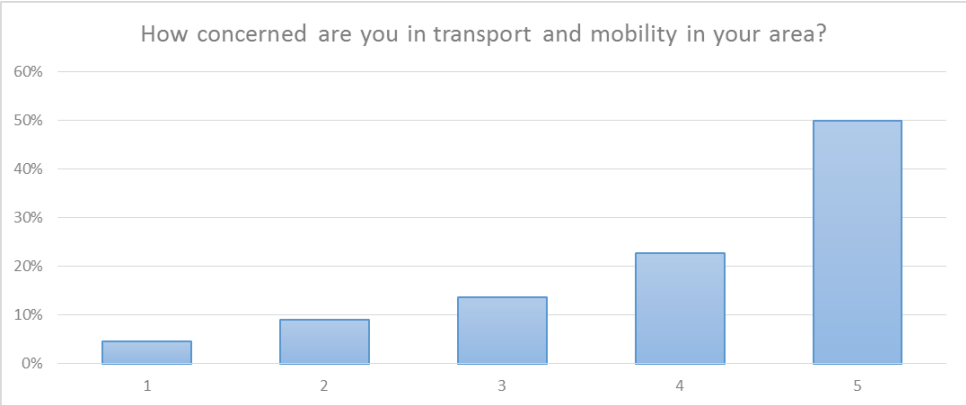


Figure 38 - How concerned are people about mobility

In the same question people were asked which are the main problems they are concerned about. The results are shown below:

- Lack of coordination between regional and urban transport.
- High waiting and travelling times.
- Congestion caused by private car.
- Pollution.
- Not enough urban space for pedestrians and cyclists

The survey asked people about planning trips, they were asked how useful and complete was the available information for their purposes and, as the graphic below (Figure 39) shows, most people replied that the information was quite useful and almost complete. Meaning that they have almost all the information they required. Nevertheless, there is still a need for a bit more information to completely fulfill the users' needs.

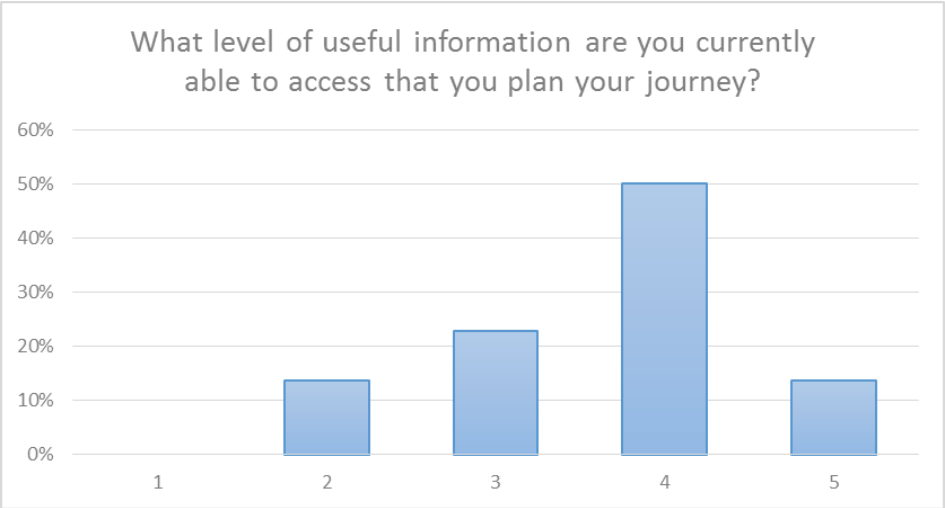


Figure 39 - Information usefulness

For most of those surveyed, their opinions do have some influence on mobility decision-making processes (more than 70%), but this opinion is widely dispersed, because quite a large proportion of the people surveyed do not feel that their opinions in these matters are taken into account at all (18%).

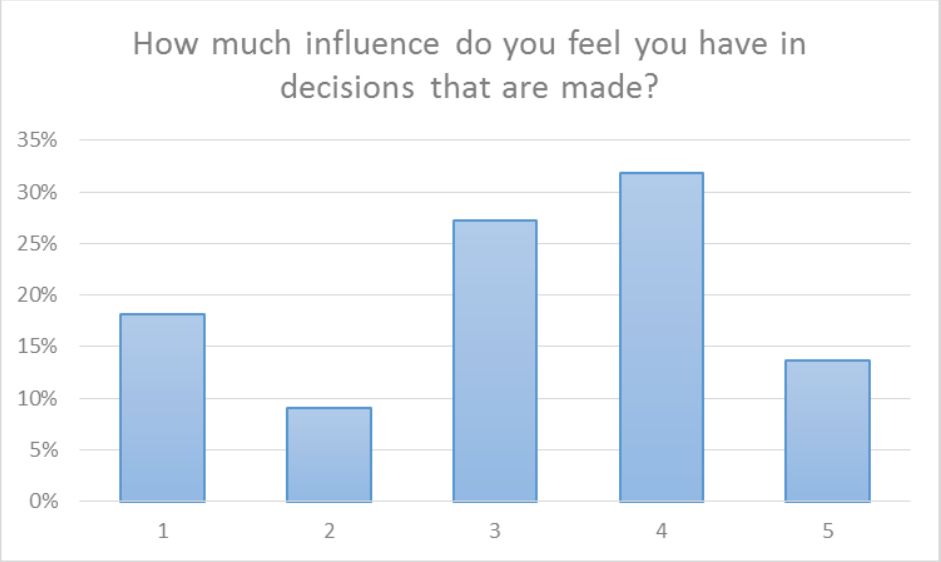


Figure 40 - user influence on mobility decisions

An analysis of the results about which source people use to obtain mobility information (Figure 41) shows that most of those surveyed place their trust in variable message signals and transport company websites. Mobile apps are also used, although in many cases the information available on websites and through mobile apps is most likely to be the same.

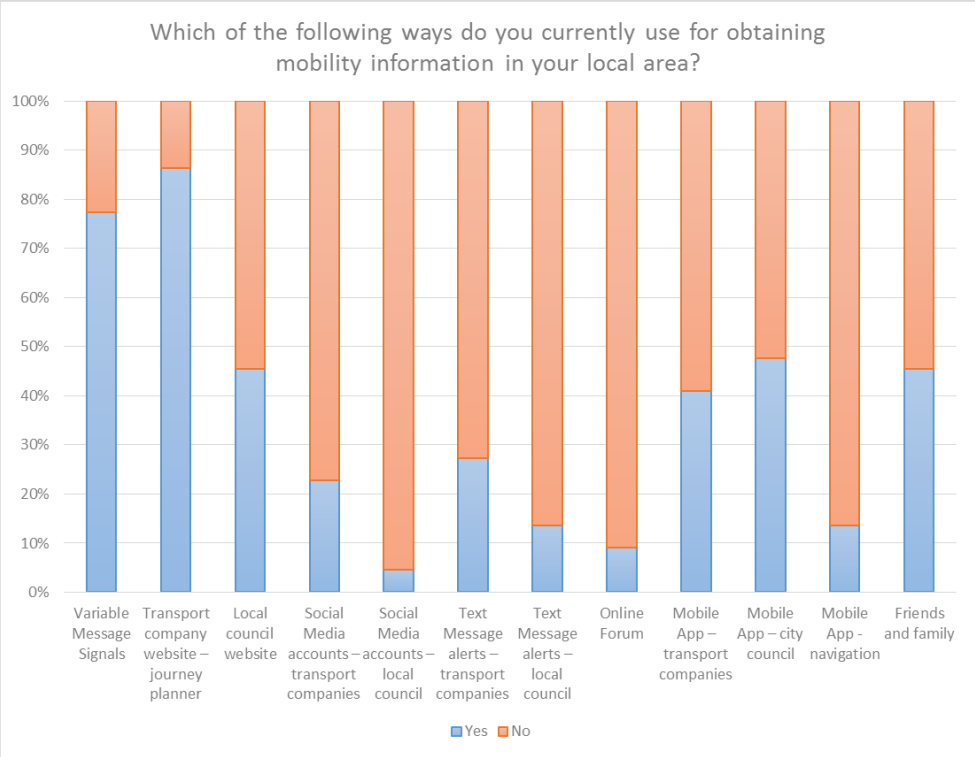


Figure 41 - Mobility information sources

When it comes to helping the system to obtain the necessary data from users, most people (more than 50% in all cases) are kind enough to contribute to the systems. Most people also state their intention to be informed and updated all the time. More detailed information can be found in Figure 42.

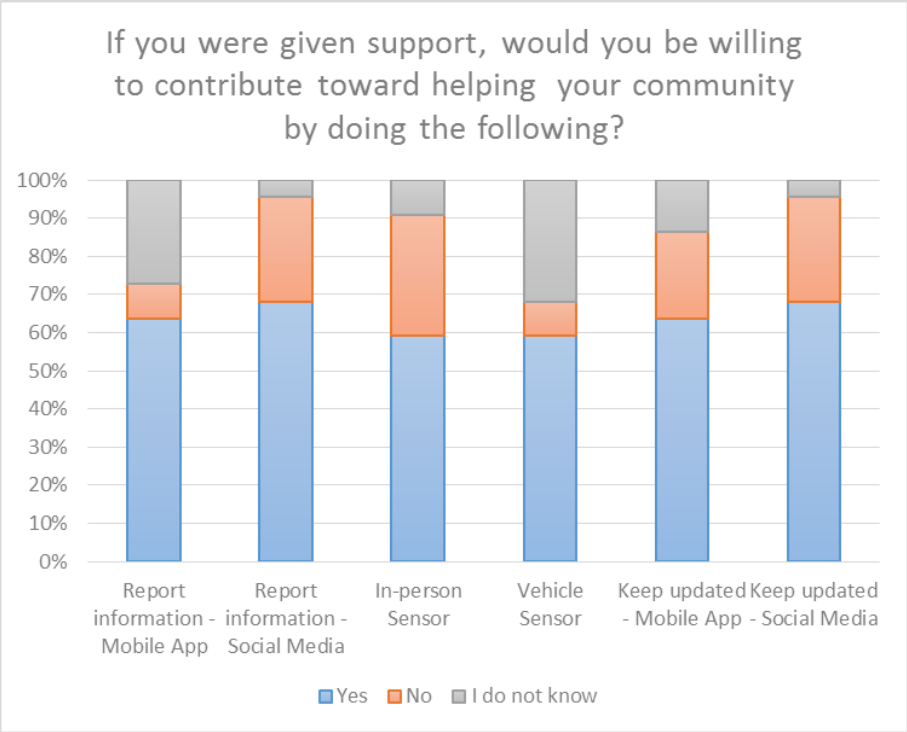


Figure 42 - Willingness to contribute

Considering previous answers, the most relevant platforms for interacting with potential users would be Facebook, Twitter and Whatsapp (Figure 43).

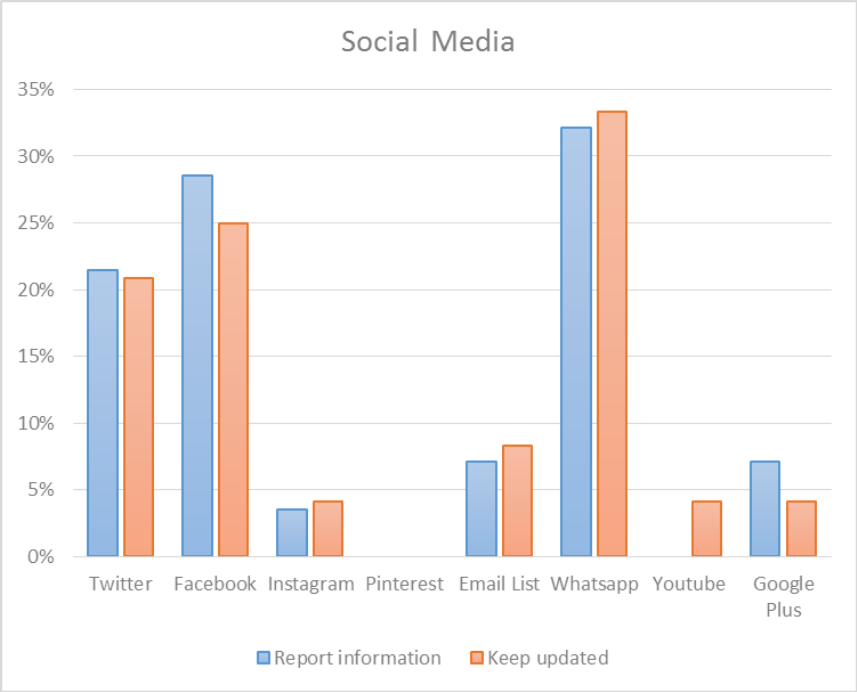


Figure 43 - Social media usage

When those surveyed were asked about the aspects that should be improved first, the most important aspect turned out to be the connectivity between different services. In spite of that, as Figure 44 shows, all the aspects obtained mainly medium to very high priority scoring, so it can be said that all aspects of mobility are of great importance to those surveyed.

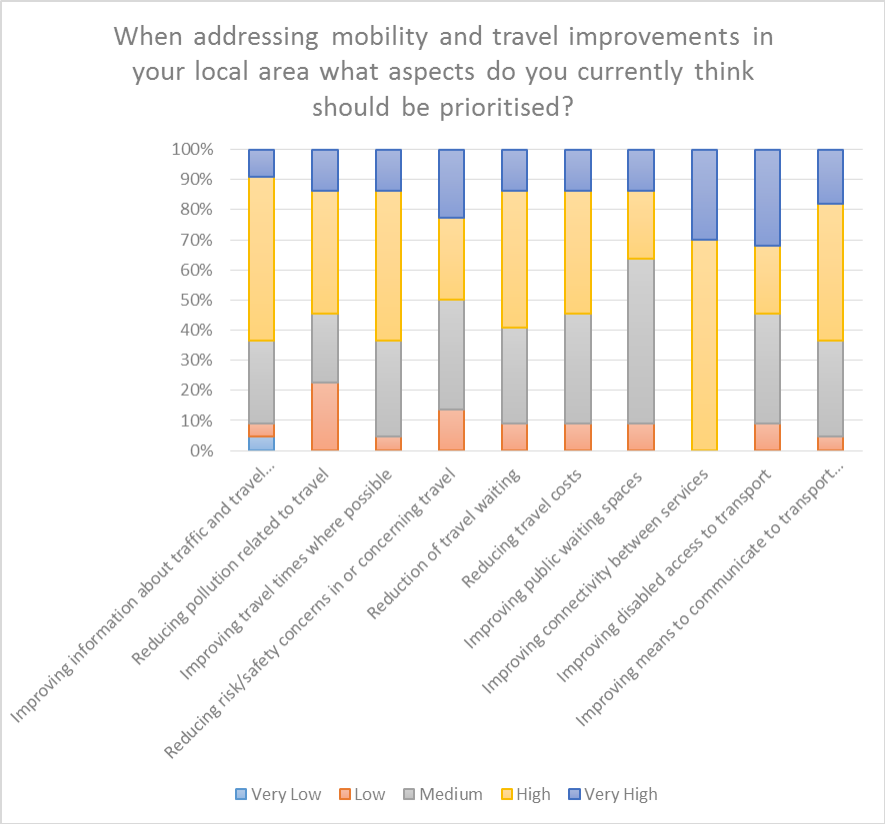


Figure 44 – Actions to be prioritised

Finally, regarding the willingness to participate in further activities of the project, the main part of the surveyed agreed to continue helping with the project SETA.

5.2.4 Requirements

In the following tables we will summarise the System Requirements for the Santander Case Study, dividing them into functional and non-functional requirements.

5.2.4.1 Functional user requirements – Information Gathering, Access and Sharing

Description	Stakeholders

Create an APP for high-class buses service users	PRO (ALSA)
Updated information about road conditions in social networks	PRO (ETRA)
Improve coordination and communication between operators and / or regional and local administrators on network performances	PRO (TUS)
Provide information about the occupancy of streets, tunnels and buses	PRO (RadioTaxi)
Improve auditory information (line route, next stop...) on buses and bus stop	SOC (ONCE; COCEMFE)
Improve visual quality of panels on the bus shelters	PUB
Provide information about incidents on network to operators and citizens.	PRO (SICE)
Provide information about intercity buses in Santander bus shelters	SOC (CEUC)
Provide information about breakdowns and stops in vertical transportation	SOC (CEUC)
Report accessible walk routes taking into account dropped kerbs, slopes, side	SOC (COCEMFE)
Create an app to share cars in intercity travels	SOC (CEUC)

5.2.4.2 Functional user requirements – Analysis

Description	Stakeholders
Traffic prediction	PRO (SICE; ETRA);
Personalised travel planner to optimize paths and travel times	PUB
Pollution in tunnels	PUB

5.2.4.3 Functional user requirements – Transport Modelling

Description	Stakeholders
Mobility planning tool (multimodal trip)	PUB
Real time traffic management support tool	PRO (SICE)
Merge historic data from different sources	PRO (ETRA)
Detect traffic incidents automatically	PRO (SICE; SDR)
Traversal mobility management: Traffic en-routing	PRO (UC; SICE)
Improve public transport operations	PRO (TUS; ALSA)

5.2.4.4 Non-Functional user requirements

Description	Stakeholders
Promote sustainable mobility	SOC (Cantabria ConBici)
Encourage use public transport to citizens	PRO (TUS)
Usability of the user information system	PUB
Preserve privacy of personal data	PUB

5.3 Turin

5.3.1 Case Study Description

5.3.1.1 Urban Profile

Turin is the fourth largest urban area of Italy.

The city has a 10 km radius, while the metropolitan area has a 20km radius. Turin has been the first capital of Italy, and has grown in the twentieth century as a centre of development of industry and innovation.

Today the city of Turin contains around 900.000 inhabitants, the maximum population was reached in the seventies, since then there has been a continuous decrease of population of the city. The metropolitan area itself has decreased from 1.7 million in 1979 to 1.5 million at present.

In 20 years there has been a decrease of about 25% of the city population, and the population of the surrounding area has increased from 30% to 40% of the metropolitan area[7].

[7] *"Indagine IMQ 2013 – Rapporto di sintesi sull'area metropolitana" shared by "AMP – Agenzia Mobilità Piemontese".*

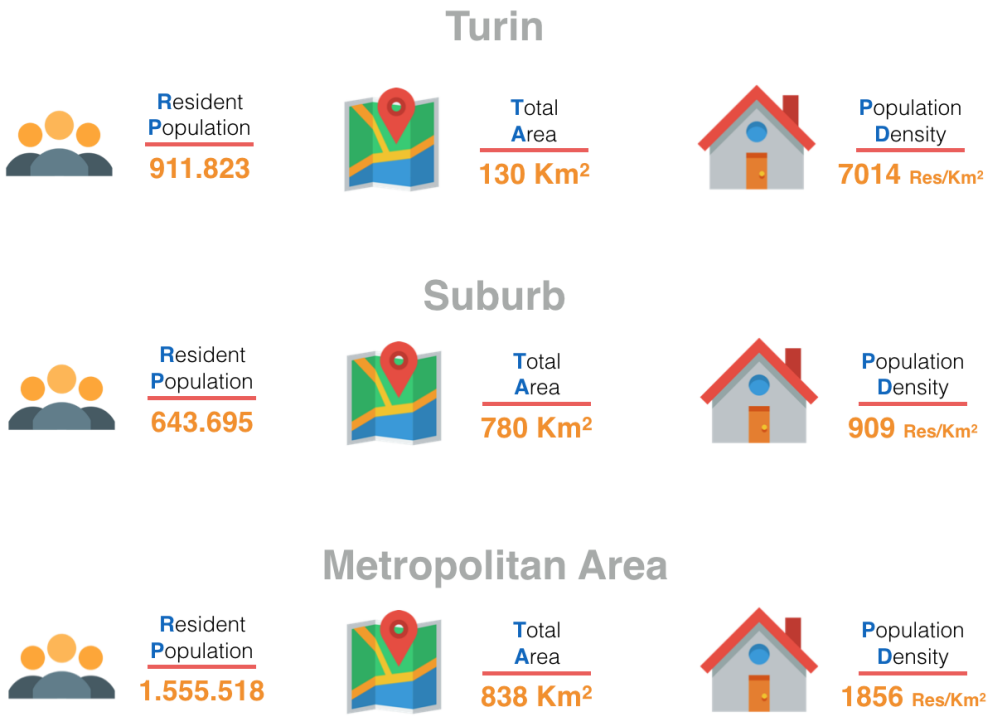


Figure 45 Turin population overview

5.3.1.1.1 Territory

The population of Turin tends to be very concentrated: 59% of Turin population is spread on only 16 % of the territory. The population of the suburb represents the remaining 41 %, but is spread over the remaining 84 % of the territory.

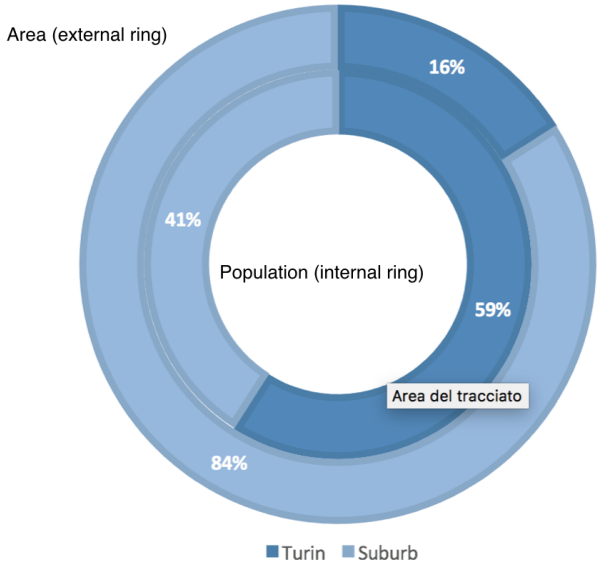


Figure 46 Turin population distribution

The Town Planning and Regional Planning of the Piedmont Region in April 2012 published a study called "Monitoring the land usage in Piedmont in 2008", in which they investigated the distribution between urban and suburban areas in Turin.
The urban area of Turin is 76 square kilometres or 59% of the municipal area while the suburban area is 151 square kilometres or 21% of the whole area.

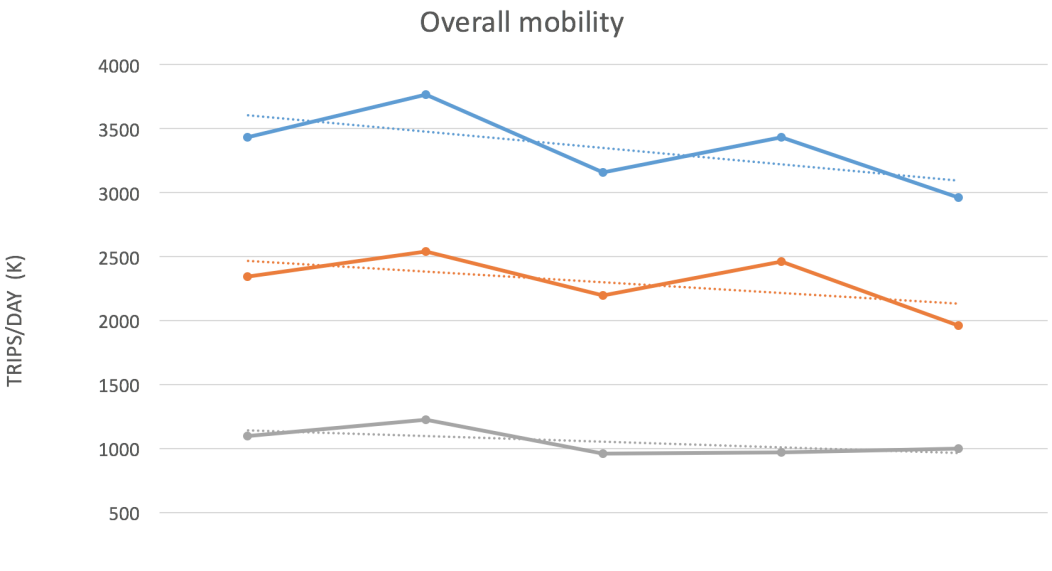
5.3.1.1.2 Journeys - Data

In this section we are reporting some information about overall mobility in Turin.

In the metropolitan area of Turin residents made (on an average working day in 2013), 2,000,962 trips of which 1,962,000 were motorised trips.
Compared to 2010, there was a decrease of 13.7 % of the total mobility, while the decrease (compared to 2008) is more modest (6.2%) (see Figure 47 Turin overall mobility).

Whilst motorized mobility decreased (-20 % compared to 2010), non-motorised mobility has increased.

The residents in the metropolitan area make on average 2.11 trips pro-capita in weekday, 1.40 of them are motorized [8].



	2004	2006	2008	2010	2013
All the ways	3434	3763	3158	3431	2962
Motorized	2340	2537	2199	2464	1962
Other	1094	1226	959	967	1000

Figure 47 Turin overall mobility

5.3.1.1.3 Journeys - Means of transport

In 2013 the most popular travel mode continues to be the car with the 48 % of journeys but, for the first time in a decade (in effect since 2000), its share drops below 50 % (it was 53 % in 2010).

The use of public transport averages at 18%, slightly decreasing compared to 19% in 2010.

The proportion of walking journeys increased from 24% in 2010 to 29% in 2013 and the journeys made using alternative modes (bicycle, motorcycle, taxi) rose from 3.9 % to 4.4%.

[8] *"Indagine IMQ 2013 – Rapporto di sintesi sull'area metropolitana" shared by "AMP – Agenzia Mobilità Piemontese".*

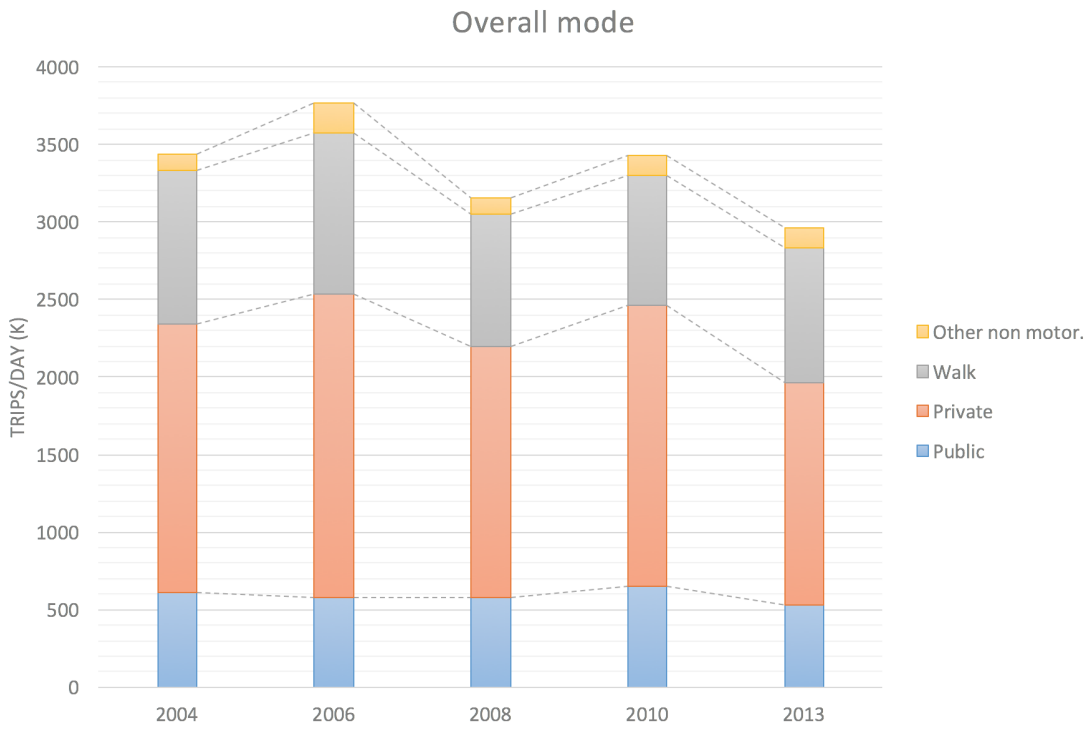


Figure 48 Turin overall mobility mode

5.3.1.1.4 Journeys - Reason

We define a journey as a shift from one point of origin to a destination point that is characterized by a purpose. Looking at the purposes of journeys carried out in the metropolitan area of Turin, just over half of all journeys are made to perform a task while the remainder is carried out to return home.

Focusing only on journeys made to carry out tasks, almost 37% of all journeys made by residents in the metropolitan area are carried out for work or study.
The main journey purpose is work, whilst the second in order of volume is shopping.

Other reasons (see Figure 49) are: driving someone, study and other purposes which include: sports / leisure, care / medical visits, visits to relatives / friends.

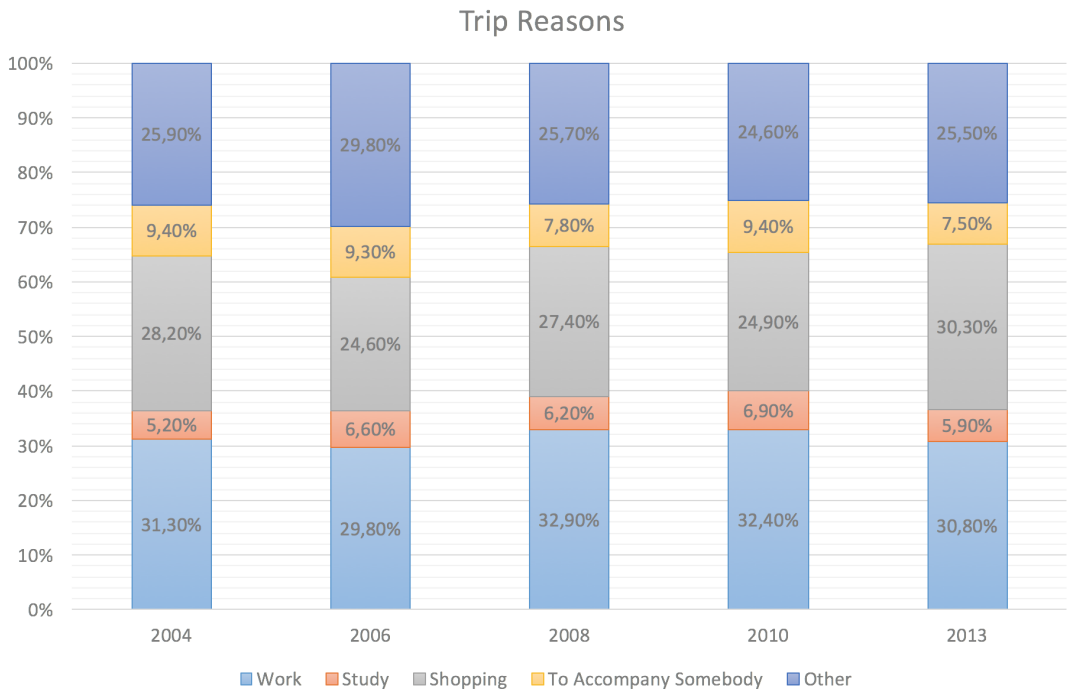


Figure 49 Journey reasons in Turin area

5.3.1.1.5 Journeys – Temporal distribution

Motorised mobility is distributed throughout the day depending on the commitments and the needs of people.
For what regards private car journeys, the peak of the morning traffic is between 8.00 and 9.00 while the evening rush hour is between 18.00 and 19.00.

As it can be seen in Figure 49 Journey reasons in Turin area, public transport usage varies in the different parts of the day and it represents between 25% and 30% during the day. The highest usage of public transport is 37 % between 13 and 14 (time in which school children leave school) and the lowest is in the evening hours, when the car transport reaches 90%.

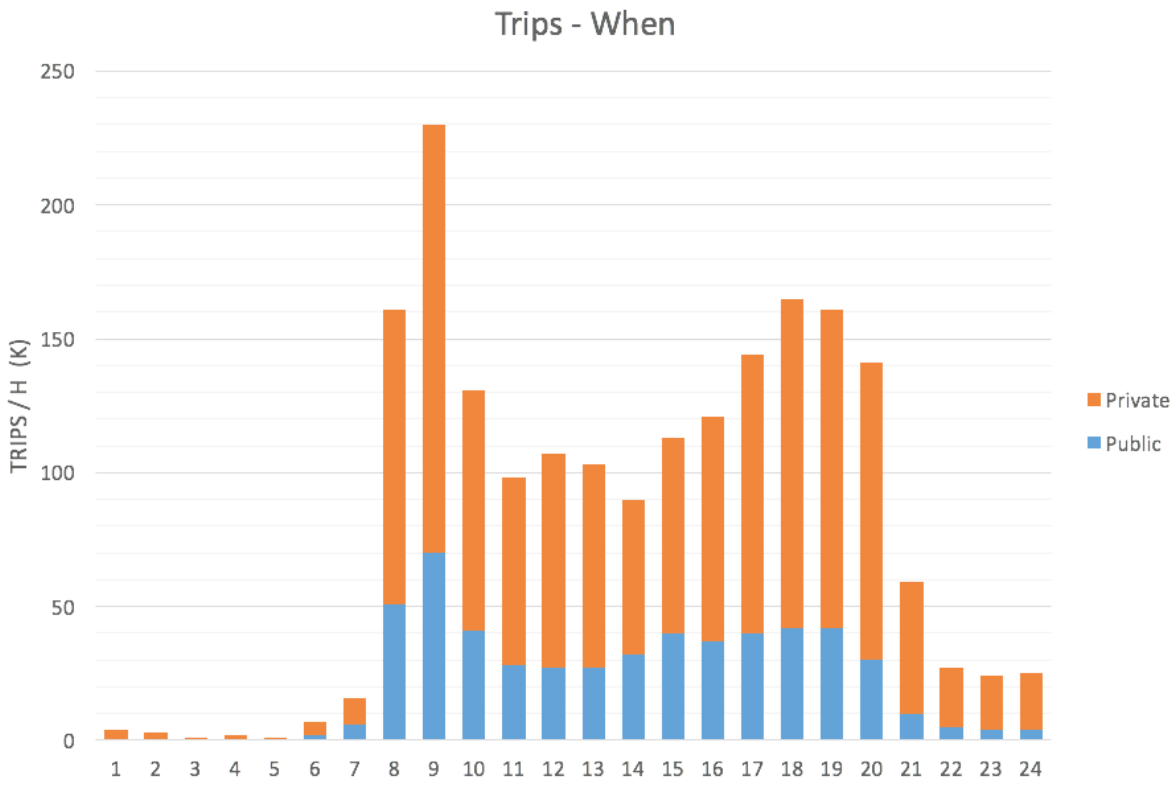


Figure 50 Turin mobility daily distribution

5.3.1.1.6 OD Matrix

The tables below summarise the Origin Destination of the journeys under consideration. For what regards motorised mobility in Piedmont Region, every day there are 1.85 million journeys within the metropolitan area and 500 journeys outside the metropolitan area.

About half of all journeys is carried out to return home: excluding those, highlighted below are the movements in the various macro areas (Turin, Suburb, Rest of Province, Rest of Region) .

Normally, a mainly residential areas have a great capacity to generate journeys, while productive areas and tertiary zones have a greater “attractiveness”. This means that typically users move ***from*** residential zones ***to*** productive areas.

To properly estimate the attractiveness of the various territories, the trips to return home should be excluded from counting.

PRIVATE

Origin/Dest	Turin	Suburb	Urban Area	Region	TOTAL
Turin	334,1	78,9	17,2	10,4	**440,6**
Suburb	96,6	197,4	20,8	6,2	**321,0**
Urban Area	51,8	47,9			**99,7**
Region	13,1	4,8			**17,9**
TOTAL	**495,6**	**329,0**	**38,0**	**16,6**	**879,2**

Table 5-16 Private OD Turin Data

PUBLIC

Origin/Dest	Turin	Suburb	Urban Area	Region	TOTAL
Turin	215,2	9,9	2,9	2,7	**230,7**
Suburb	36,9	13,1	1,8	0,6	**52,4**
Urban Area	31,0	3,9			**34,9**
Region	15,9	0,5			**16,4**
TOTAL	**299,0**	**27,4**	**4,7**	**3,3**	**334,4**

Table 5-17 Public OD Turin Data

In regards to modes of transport, it is interesting to carry out an analysis of public transport usage in relations to the macro-areas. 39,2% of the motorised transport within the metropolitan area is carried out by public transport. This quota decreases for the journeys from outside the metropolitan area.

Origin/Dest	Turin	Suburb	Urban Area	Region	TOTAL
Turin	39,2%	11,1%	14,6%	20,9%	**34,4%**
Suburb	27,6%	6,2%	8,0%	9,2%	**14,0%**
Urban Area	37,4%	7,6%			**25,9%**
Region	54,9%	9,5%			**47,9%**
TOTAL	**37,6%**	**7,7%**	**11,1%**	**16,9%**	**27,6%**

Table 5-18 OD Turin distribution

5.3.1.1.7 Public Transport – Why

Evaluating the reasons of the usage of public transport, 49.6% choose to use public transport when a car is not available. However, 25.8 % would still use public transport even when they have a car available, while only 24.6 % would use the car if they could.

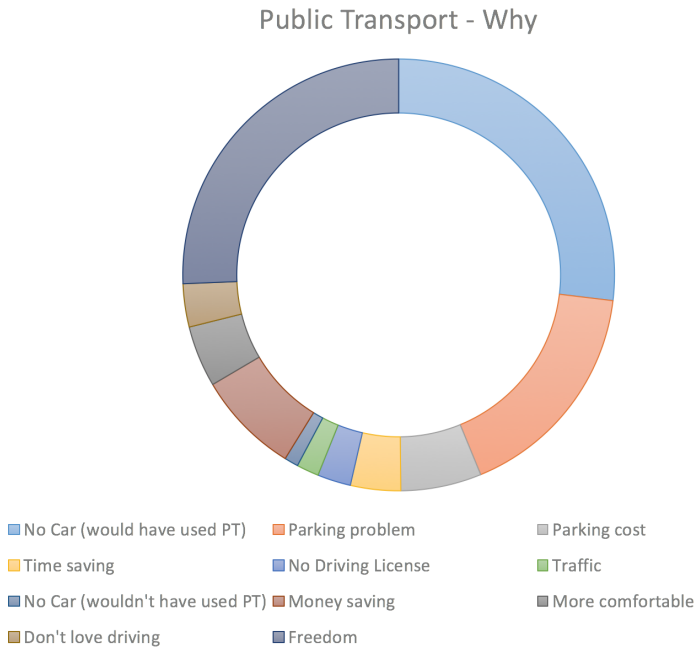


Figure 51 Public Transport – Reasons

5.3.1.2 Use Cases

In order to obtain a comprehensive stakeholder requirements analysis an initial selection of stakeholders has been done in accordance with Turin City Council. Stakeholders belonging to private and public sectors and from associations have been met to cover Seta target groups. Users have been asked to describe their everyday tasks, their information needs and their preferences.

As a results of these meetings we have been able to identified 5 use cases categories:

	Categories	Categories Id	Description
1	Mobility Planning	P	Support tools for mobility planning
2	Mobility Manager Portal	MM	Portal for mobility professionals
3	Fragile categories	FC	Support tools for disabled
4	Credit &Ticketing	CT	Platforms for credit and ticketing
5	Information portal	I	Mobility information convergence

Table 5-19 Turin Case Study Use Case Categories

5.3.1.2.1 Mobility Planning Use Case

Id	Cat	Type	Data	Description
TUC-P1	P	Sustainable Urban Mobility	Models Traffic Demand Data and Traffic Data Observations Bicycles and Pedestrians Contextual Data	Define less polluted route by specifying Origin Destination.
TUC-P2	P	Parking Planning	Parking	Maximise interchange park usage.
TUC-P3	P	Events Planning	Public Transport Parking Bicycles and Pedestrians Contextual Data	Support Tool to plan and manage mobility during big events.
TUC-P4	P	Off-Line Planning	Traffic Control Plan Public Transport Bicycles and Pedestrians	Optimise public transport (load / route / frequency)
TUC-P5	P	Real-Time Planning	Public Transport Parking ITS Bicycles and Pedestrians Generic Contextual Data	Redistribute traffic in case of accident or emergency.

Table 5-20 Planning Category Use Cases

Mobility planning is a decision making process oriented to create an operational transport system, aimed to develop a sustainable environment in the present and supporting social and economic developments of local territory in the future.
According to the specific outputs of the focus groups sessions it was possible to identify the following specific use case:

Sustainable Urban Mobility
This use case involves realizing a model of transportation system that minimizes the environmental impact, and maximizes efficiency, high quality and speed of movement. The main goal is to improve accessibility between urban area and hinterland. Main requirements for this use case are the ability to plan public transport, non-motorised transport and inter-modality.

Parking planning
Parking planning affects how easily is possible to reach a specific destination and therefore affects traffic in the surrounding areas.

This use case involves providing means to manage parking in Turin urban area, to make a more efficient use of parking resources, in particular with the optimization of parking spaces and area, with well-identified route of entrance and exit, and specific signage of collateral parking to be used in case of complete area. An appropriated parking management brings benefits in many areas, in particular environmental.

Events planning

This use case refers to the need of decision-makers to plan transport when there is an event happening in the area. It is dependent on the ability to manage the movement of people inside and outside the venues matching the attention to safety with the need to identify the services and the best and more sustainable routes, while minimizing environmental impacts.

Real Time planning

This use case refers to managing traffic with real time information. Information related to congestions detected on specific areas, due to unexpected events such as accident, in combination with aggregated information about the overall situation, are used to prevent jams and to minimise the negative effects of unforeseeable events

Offline Planning

This use case refers to plan mobility and traffic with off line information, such us big data for social transportation, which can help to approach traditional mobility problems with different traffic management strategies

5.3.1.2.2 Mobility Manager Portal

Id	Cat	Type	Data	Description
TUC-MM1	MM	Employee Welfare	Models Network Characteristics Traffic Demand Data Parking Traffic Control Plan Bicycle and Pedestrians Contextual Data	Find and Compare modes/time/cost of the routes used by employees.
TUC-MM2	MM	Employee Welfare	Models Network Characteristics Traffic Demand Data Parking Traffic Control Plan Bicycle and Pedestrians Contextual Data	Define all possible transport mode to address a route by OD.

The second use case that emerged from the Turin Stakeholder focus groups underlined the necessity to support mobility managers of private and public companies in their daily activity.

The **mobility manager of a private company** has the task of optimizing the systematic displacement of employees. He has the goal of reducing the use of private cars using also instruments like the "house-work trip plan" (Piano Spostamenti Casa-Lavoro / PSCL) with which alternative transport solutions can be offered with reduced environmental impact (car sharing, bike sharing, bus, car pooling...).

The **mobility manager of an area is a government entity and** usually coordinates the mobility managers of private companies. He works to improve mobility throughout the territory under its jurisdiction, working with all departments involved in the traffic and transportation, and works with local transport companies. He coordinates the execution of the PSCL of organizations and companies.

5.3.1.2.3 Fragile Categories

Id	Cat	Type	Data	Description
TUC-FC1	FC	Support to Fragile Categories	Models Network Characteristics Parking Public Transport Contextual Data	Auxiliary service reservation system.
TUC-FC2	FC	Support to Fragile Categories	Models Network Characteristics Traffic Demand Data Parking Public Transport Contextual Data	Define all possible routes compliant to disability problems solution.

The third use case that emerged from the Turin Stakeholder focus group underlined the necessity to identify and communicate to disabled people, or in general, to fragile categories, the possible door-to-door journeys options for their destination, ensuring safety.

We consider disability to be not only physical problems but also sight impairment and hearing impairment: in all cases it is fundamental that the information provided and the means of providing it are accessible and usable (i.e. visible signage for hearing impairments or noisy signals and alarms for sight impairments)

5.3.1.2.4 Credit & Ticketing

Id	Cat	Type	Data	Description
TUC-CT1	CT	Integrated payment and ticketing solutions	Parking Public Transport Bicycle and Pedestrians Contextual Data	Ticket purchasing integrated platform
TUC-CT2	CT	Integrated payment and ticketing solutions	Parking Public Transport Bicycle and Pedestrians	Payment integrated platform

The fourth use case that emerged from the Turin Stakeholder focus groups underlined the need of an integrated platform for intermodal, consistent and end-to-end mobility.

This would support users in selecting the best and more suitable transportation, the available fares and then to complete the payment through an integrated system . In order to achieve this, an integration of transport mode choices such as car sharing, bike sharing, taxi, train must be achieved.

5.3.1.2.5 Information Portal

Id	Cat	Type	Data	Description
TUC-I1	I	Information sharing	Parking Traffic Control Plan Public Transport ITS Bicycle and Pedestrians Contextual Data	Unique Information Portal to keep citizens informed about intermodal mobility and/or real-time news communication.

The fifth use case that emerged from the Turin Stakeholder focus groups underlined the need to make public transport more accessible with an adequate, reliable and up-to-date information. To plan any journey, even routine journeys, people need real time and easily accessible information about the possible choices.

From this emerged the need of a centralized platform to facilitate multimodal trip-planning with real time traffic situation.

5.3.2 Stakeholders Analysis

The Stakeholder analysis is presented in Appendix 1 – Stakeholders Analysis, Turin section.

5.3.3 Questionnaire

The Turin Public Questionnaire has been published online to grant a more agile distribution and data collection:

https://docs.google.com/forms/d/1IftaL9pmqLGYvOptXUQH7abCooF5XHIjJZ_qbS7U-58/edit

The questionnaire is anonymous, only users that are happy to be involved in future project initiatives can reach a link to another questionnaire where they can insert their contact details.

The Stakeholder Questionnaire is still being distributed via City Council and Torino Wireless at the time of writing this deliverable. We will collect and analyse the information and we will make it available.

User Demographic

43% of the respondents is in the age range between 31-40yrs and 73% of the respondents are men.

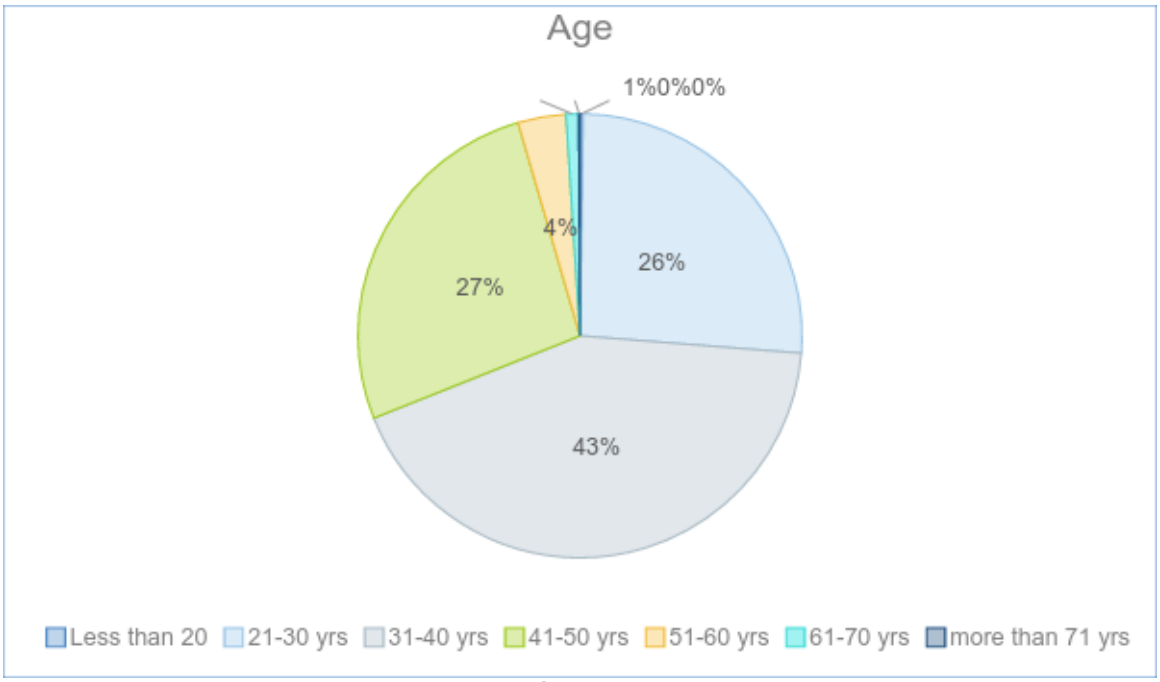


Figure 52 Turin Public Questionnaire - Age distribution

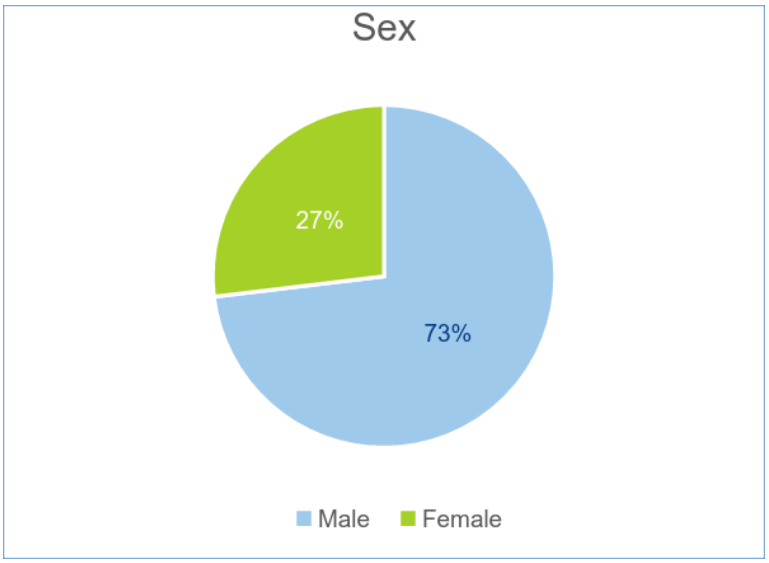


Figure 53 Turin Public Questionnaire - sex ratio

70,5% of the respondents is using an Android smartphone.

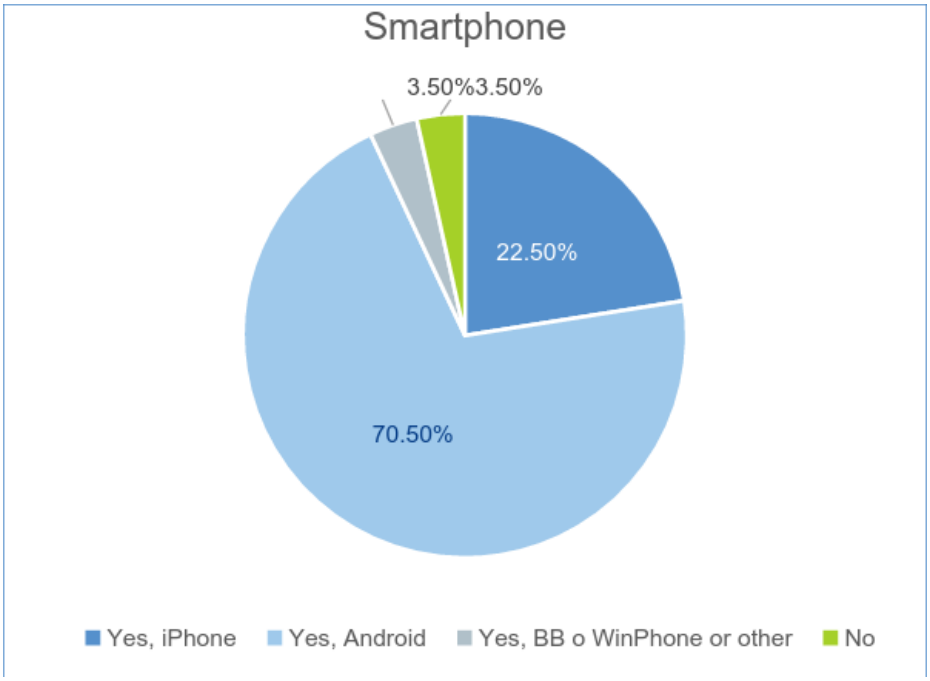


Figure 54 Turin Public Questionnaire - Smartphone Type

The majority of respondents **use internet regularly**, whilst Social Network and public forums./image sharing sites are less used (see Figure 55).

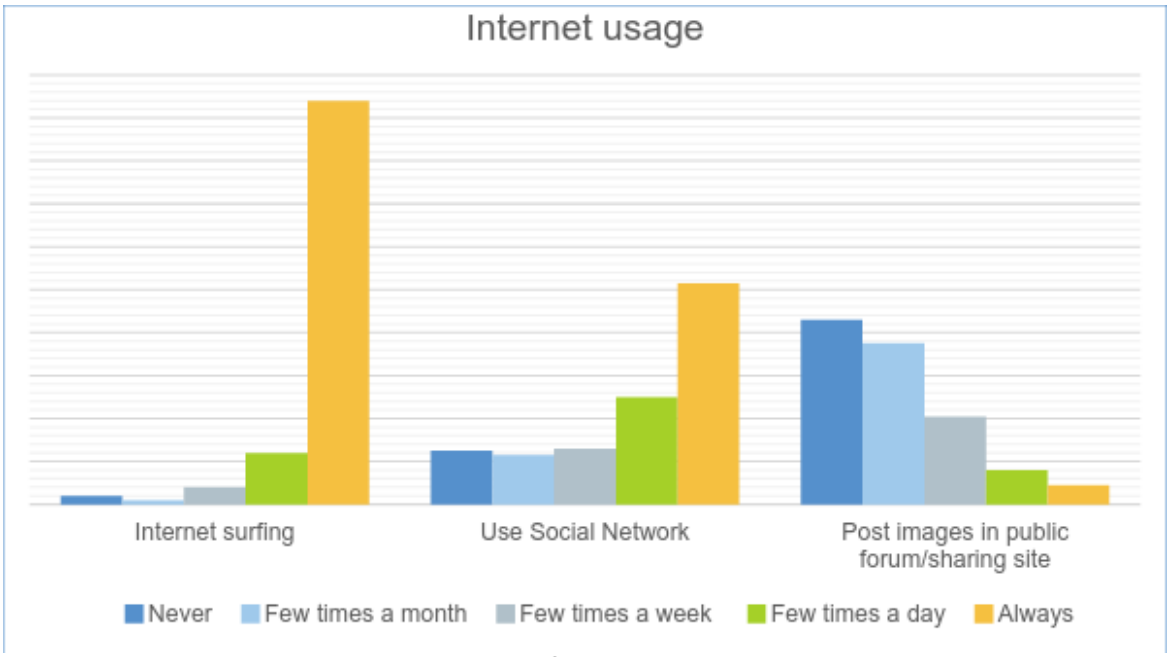


Figure 55 Turin Public Questionnaire - Internet usage

Mobility Patterns

In average the distance covered by the respondents during working days is about **35km (see** Figure 56**).**

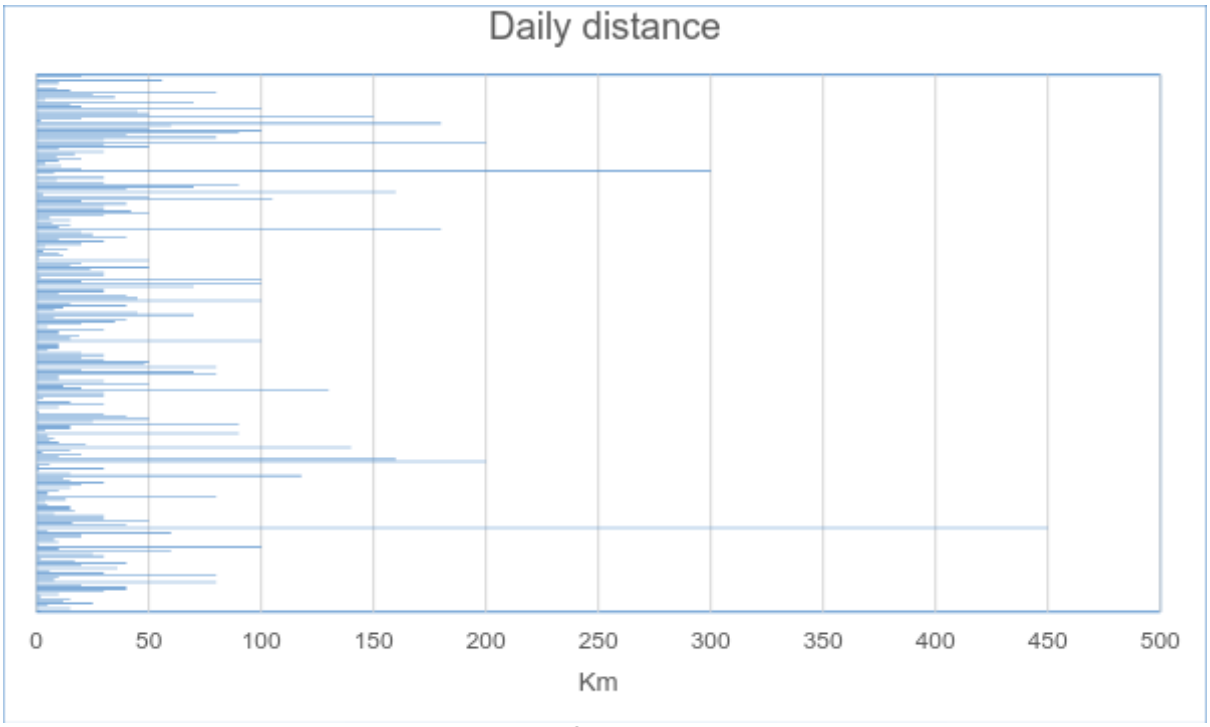


Figure 56 Turin Public Questionnaire - Daily distance

Almost the **40%** of the respondents declares to use the **car many times a day** for personal and professional trips. **90% never** use a motorcycle, **more than 50% never** use a bike (see Figure 57).

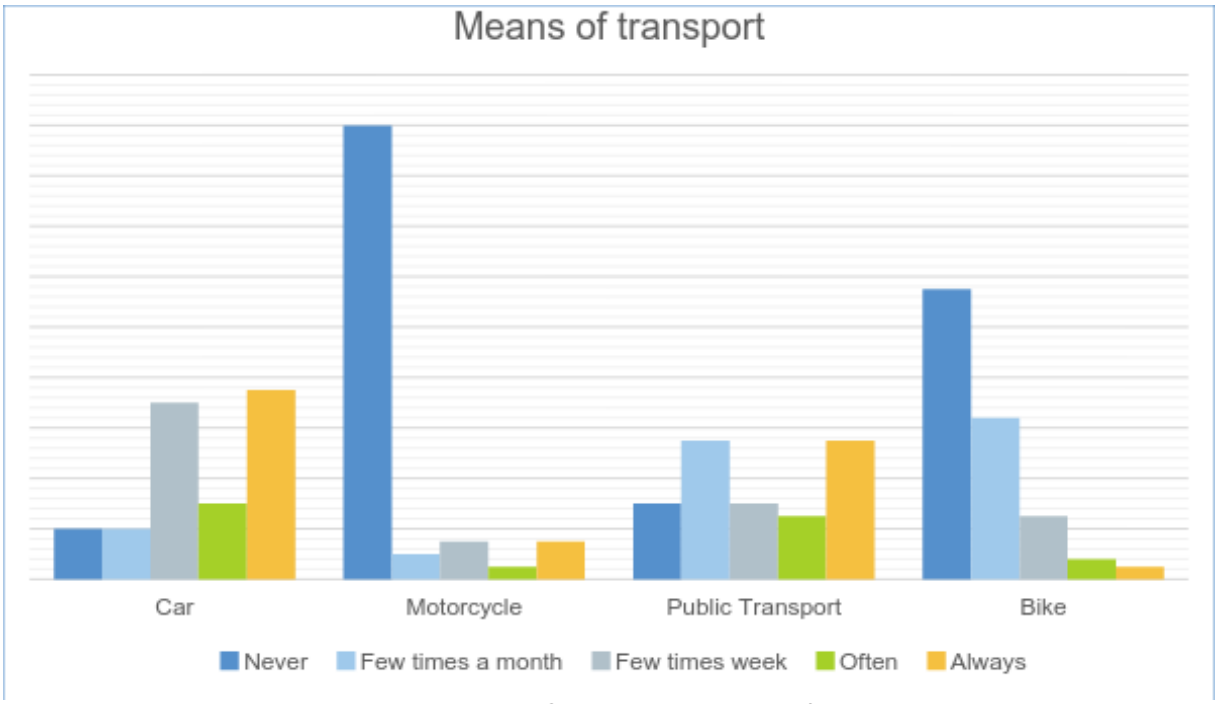


Figure 57 Turin Public Questionnaire - Means of transport

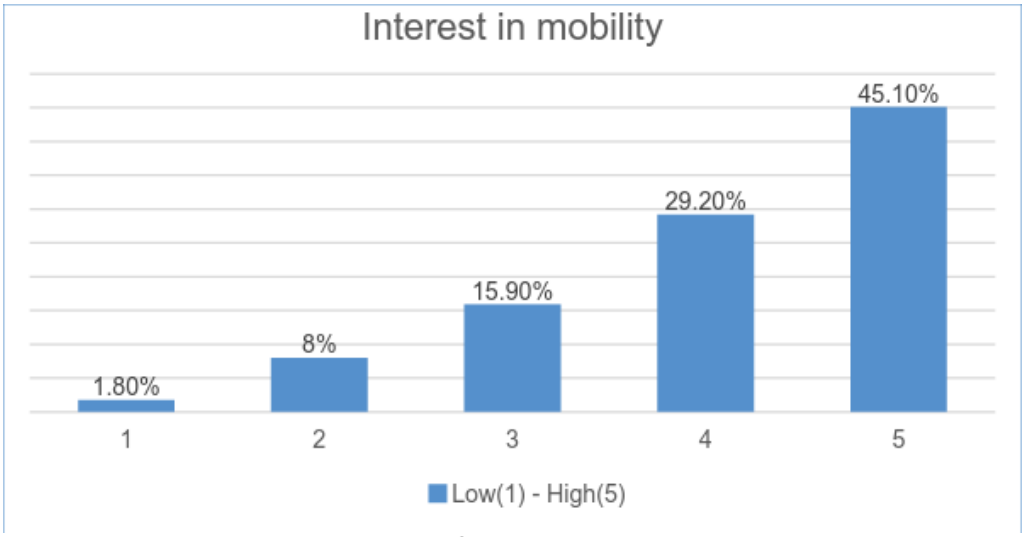


Figure 58 Turin Public Questionnaire - Interest in mobility

For what regards interest in mobility and access to information sources, 90% of the respondents are interested or very interested in mobility but only about 50% of the respondents think that all the necessary information to plan a journey are available, and about 50% declare that they do not have influence in mobility decision.

The most commonly used information sources are transport company websites (62.4%) followed by Travel Mobile apps (see Figure 59).

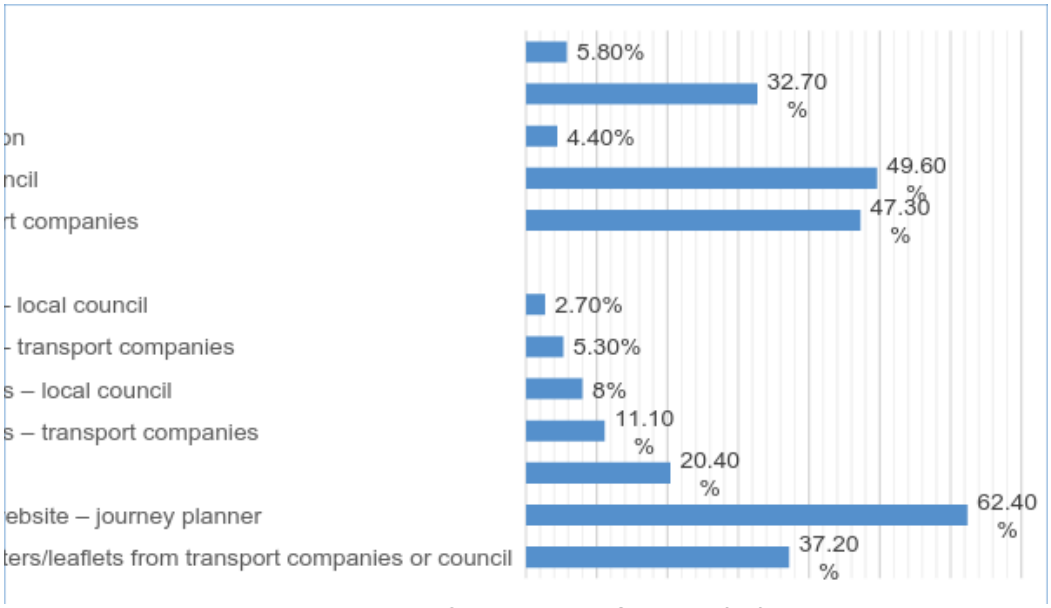


Figure 59 Turin Public Questionnaire - Sources of Information

38% of the respondent would not be happy to share their local mobility data, while 77% would share general mobility data if it helped them plan their journey (see Figure 60).

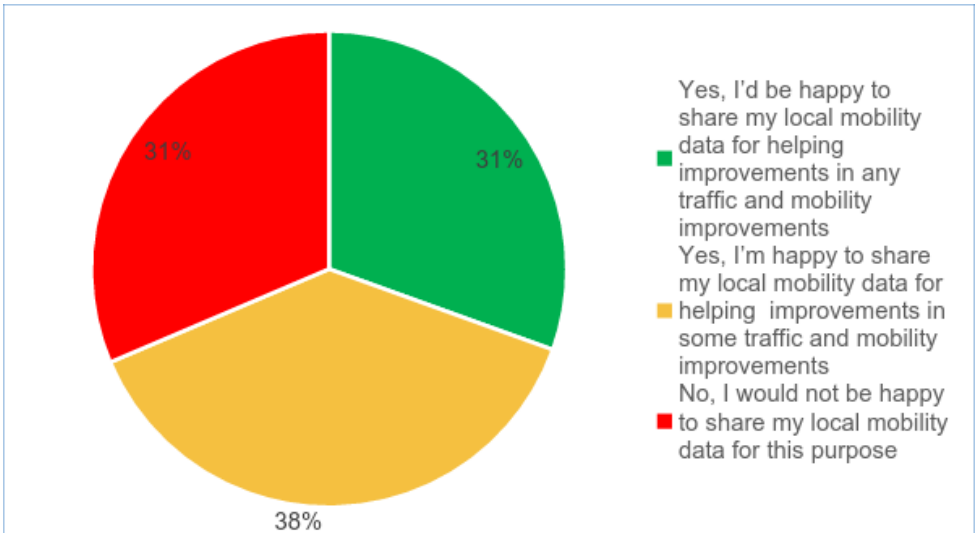


Figure 60 Turin Public Questionnaire - Willingness to share mobility data

5.3.4 Requirements

In the following tables we will summarise the requirements of the Turin Case Study stakeholders, dividing them into functional and non-functional. An additional table has been added to reports issues, challenges and needs referring to mobility that were expressed during the focus groups, even if they are out of scope for this project.

5.3.5 Functional user requirements – Information Gathering, Access and Sharing

Description	SH type	Stakeholders
Aggregate all urban mobility data, including information provided by citizens.	PRO	EXTRATO, CITTA' TORINO
Support citizens in providing mobility information	POR	CITTA' M. di TORINO
Provide a channel for emergency real-time information distribution	PRO	GTT
Provide means for all operators to share mobility information with citizens/other operators	PRO	EASY MOOVE
Infomobility platform for citizens with the possibility to choose the best multi modal solution for a trip.	PRO	EASY MOOVE, CNH,

		PRONTO TAXI
Link to live booking systems	PRO	SANPAOLO
Capability to share information between users respecting different roles/needs	PRO	TRENITALIA
On Demand location-based mobility services	PRO	POLITO
Provide a citizen feedback system on government initiatives about mobility	PRO	5T
Provide information about the sustainability of a journey: the time, cost and pollution	PRO	POLITO, EXTRATO
Provide tool to support smart traffic re-rerouting (suggesting different routes to users in case of congestion, road works, or when some main roads are underused).	PRO	GM
Create tools to provide live availability and location of parking spaces (e.g. parking spaces near offices)	PRO	GM, GTT PARK, TRENITALIA
Ability to use a shared authentication system for all the services provided by SETA	PRO	EXTRATO

5.3.6 Functional user requirements – Analysis

Description	SH type	Stakeholders
Analysis and visualization of all the possible alternatives for a journey	PRO	EXTRATO
Provide analytical tool to optimize mobility by taking into account transport modes, energy and environmental issues	PRO	POLITO

5.3.7 Functional user requirements – Transport Modelling

Description	SH type	Stakeholders
Provide support to decision makers for big events planning	PRO	RADIO TAXI, EXTRATO

Provide tool to plan the extension (area and time) of ZTL (Limited Traffic Area) areas.	PRO	EASY MOOVE
Real Time Public Transport rerouting	PRO	TRENITALIA
Providing tools to support mobility managers of big organisations in providing services for employees to improve their daily commute (e.g. suggesting cheaper journeys)	PRO	RAI, SANPAOLO
Provide city mobility planning capabilities taking into account all the different mobility options	PRO	TORINO, CSI

5.3.8 Non Functional user requirements

Description	SH type	Stakeholders
The solution should be implemented with a specific focus on improving communication with all stakeholders	PRO	TOBIKE
The solution should promote sustainable and environmentally friendly mobility	PRO	5T, GTT PARK
The solution should be accessible to all, with particular attention for disabled users.	SOC	ASS. DISAB. UDITIVA
Facilitated accessibility for people with disabilities	SOC, PRO	POLITO, ASS. DISAB. UDITIVA

5.3.9 Stakeholders needs, issues and challenges

In this table we report the outcomes of the focus groups conversations grouped in needs, issues and challenges. Despite being out of scope for the project, they highlight the stakeholders' worries and needs for what regards mobility in the territory.

Description	SH type	Stakeholders
CHALLENGE: increase access to private companies mobility data	PUB	REGIONE PIEMONTE
NEED: have a centralized and integrated booking, And payment system for transport that includes public transport, car sharing, bike sharing etc.	PRO	SANPAOLO, REGIONE PIEMONTE, 5T
NEED: More integration between cycle lanes, increase Cycle lanes coverage, improve connections between city centre and periphery	PRO	GTT
NEED: Interchange scheduling between operators	PRO	TRENITALIA
CHALLENGE: Encourage public and private companies to change their approach towards a more sustainable mobility	PRO	UNIPOL SAI
CHALLENGE: Improve public transport efficiency in interurban areas	PUB	CITTA' M. di TORINO, UNIPOL SAI
CHALLENGE: Improve train station connection with public transport	PUB	CITTA' M. di TORINO
NEED: Introduction of an auditory systems to provide information to users of transport modes.	SOC	ASS. DISAB. UDITIVA
NEED: Introduction of more comfortable transportation vehicles (e.g. Wifi)	PRO	5T
CHALLENGE: Introduction of a flexible pricing system linked to actual usage of different transport means (i.e. cheaper process for underused services) or to the sustainability of the chosen mode (i.e. cheaper prices for more environmentally friendly modes)	PRO	5T, POLITO
ISSUE: Communication problems and lack of cooperation between public transport and private transport companies.	PRO	CAR2GO

NEED: Inclusion of project results in the Public Administration operational process.	PRO	CSI
CHALLENGE: Incentivise the use of public transport	PRO	GTT
NEED: Provision of a dedicated transport booking services for users with disabilities, for example a video booking system for hearing impaired.	SOC	ASS. DISAB. UDITIVA
NEED: providing means to dynamically regulate ZTL (Limited Traffic Area).	PRO	RADIO TAXI
NEED: Integration with other mobility projects and effort	PRO	CSI, TORINO
NEED: Provision of door-to-door integrated transport for senior or disabled users	PRO	SANPAOLO
NEED: have a unique subscription service for all modes of transport in participating areas.	PRO	RAI
NEED: Better mobility planning that focuses on providing dedicated lanes and zones for public transport	PUB	TORINO
CHALLENGE: Boost underground parking lot usage	PRO	GTT PARK

6 Feasibility Matrix

Starting from the use cases and requirements collected during each case study analysis, we merged them into 4 project use cases, focused around different categories of users. Merging all the use cases, we defined two global use cases:

Use Case	Users
Personal Mobility Decision Support	Focus on citizen

For each project use case we have identified 2 sub use cases, that will be addressed in the two different phases of the project, so to guarantee that each main user group will have one case study developed by the end of Phase 1.

Use Case	*Sub Use Case*	*Description*	*Phase*
Personal Mobility Decision Support	SETA-UC1	Real Time Mobility Portal	1
	SETA-UC3	SETA Personal Journey Assistant	2
Decision Makers Dashboard	SETA-UC2	Real Time Mobility Dashboard	1
	SETA-UC-4	Decision Makers Planning Platform	2

For each case study we have written a scenario that is representative of the users, the tasks, the data and the interaction. The scenario has been written with particular attention to the project cooperation, inserting a column, called WP interaction, in which is detailed which work package is involved at every step and how; the version reported here does not have a "questions" column as that was used during the scenario development and evaluation but not relevant for the final version.

The example personas for the scenarios cover the variety of roles identified during the stakeholders analysis and the focus groups. Four main types of users should be considered, two belonging to the public/citizens group and two belonging to the decision-makers group.

Name	George	Joe	Barbara	Mark
Age	48	21	29	33
Location	Birmingham, UK	Birmingham, UK	Turin, Italy	Birmingham, UK
Home location	He lives in a Birmingham suburb.	He lives with three friends in a city centre student flat.	She lives in Turin City Centre.	He lives in a small house in the outskirts of Birmingham
Family and Social Life	He is married, has one children	Originally from Sheffield, Joe is	Barbara is married and	He lives with his girlfriend and a

	aged 8.	a student at Aston University. He has a girlfriend.	mum to two young children, 3 and 5.	dog.
Work Life	He is a Professor at Birmingham University.	Joe is a student in Computer Science at Aston University.	She is the manager of Turin Garbage Trucks.	Mark is responsible for mobility planning in Birmingham City Council.
Mobility preferences	He is a keen cyclist. Rarely drives.	Joe normally walks or cycles.	She prefers to drive.	Mark prefers to walk and use public transport when needed.
Internet Knowledge	His PC and internet knowledge is advanced and he uses the internet both during his work and at home.	Joe is a keen user of social media, Internet and in general of new technologies. He owns a smartwatch.	Barbara does not use PC or internet very frequently, apart for her job on occasions. She uses her mobile phone very often to take photos and videos.	Mark owns a mobile phone with a camera and Wi-Fi connection and it is a high user of Internet, email, social networks both at home and at work.

6.1 SETA-UC1 – Real Time Mobility Portal

This use case aims to provide citizens with an overview of the up-to-date (real-time) situation of traffic and transport in an urban area.

Basic requirements are:

- *Public transport*: information should be provided on public transport status (e.g. where are the busses compared to where they should be), statistics (e.g. punctuality of the busses at a given time) and occupancy (e.g. is your next bus full).
- *Non-motorised/motorised transport*: information should be provided how busy the streets are, how busy is the traffic and on traffic statistics
- *Parking locations*: information should be provided on location of parking spaces for all types of transport.
- *Parking availability*: information should be provided on real-time availability of parking spaces for all types of transport.
- *Parking predictions*: information should be provided on predicted availability of parking spaces.
- *Disruption locations*: information should be provided on location of disruptions that may affect all types of transport/mobility.
- *Disruption status/duration*: information should be provided on the duration and, if available, on the real-time status of each disruption.
- *Environmental historic and real-time data*: information should be provided on environment values such as pollution, Co2 emissions, allergens etc.
- *Personalisation:* Ability to customise the portal to receive contextual and personalized information.
- *Real-time communication:* Ability for citizens to submit issues, concerns and comments about mobility in an area.
- *Citizens Observatory:* Ability for citizens to view issues, concerns and comments about mobility in an area.
- *Live Data Streams:* ability for citizens to view live data streams from webcams for chosen areas.

In the following table we summarise the sub-use cases for each case study that were merged to create SETA-UC1, the main features of the use case and the data that is needed to support this.

Scenario	Personal Mobility Decision Support	
UC	Real Time Mobility Portal	SETA-UC1
Features		*Ref.*
	Traffic Info - Real Time	SUC-I3
	Pollution and tunnels occupancy	SUC-I4
	Unique portal for Real Time communications	TUC-I1
	Reporting Mobility Issues (comments, opinions)	
	Citizens observation - concerns	
	Live Web Cam Streams	
	Multimodal Parking Real Time Info (check data availability)	BS-P2

To better exemplify the use case, we have written a scenario that narrates the usage of the Real-time Mobility Portal by a citizen.

6.1.1 SETA-UC1 – Scenario

The following scenario is set in Birmingham in May 2016.

N	Narration	WP Interaction
1	Joe wakes up at 7:30 and eats breakfast with his housemates, whilst eating they catch up on Instagram on their tablet computers. Joe has to be at a lecture at 9, it is normally only 25 minutes' walk, or a 15 minute bike ride. Joe logs in to the Birmingham Real-Time Mobility Portal to check his journey before setting off.	WP6 Login Support WP5 - Login interface
2	Zooming-in on the city-centre Joe can see that there is an 85% chance of rain between 3 and 4 pm, the time he would be cycling home, so he decides to walk instead.	WP5 Zoomable Dashboards for different data sources. WP2 weather data collection
3	He selects one of his saved journeys, a walk between home and the University.	WP5 - Historic

		journeys WP2 - Non motorised transport data collection
4	Looking at the colour-coded pollution map for the route, he can see that pollution levels are quite high, the traffic overlay shows slow-moving traffic.	WP5 -Heatmaps and overlays WP2 - Environmental data collection WP3&4 traffic estimates WP2 - Motorised data collection
5	He clicks on a webcam icon and opens a live stream; he can see that a bus has broken down. Warning icons start appearing on the map, he clicks one which says 'number 52 bus has broken down on Church Street, nothing moving!'.	WP5 - Link to live-streams feeds. WP5 - Real-time alerts and notifications WP2 - Webcam data WP2 - Citizens observatory data WP5 - Citizens data collection and visualisation interface
6	Joe would rather avoid the pollution so he selects an alternative route via the park; there is one alert on this route dated 4 pm yesterday: 'watch-out for deep puddles on the path here'.	WP5 - Map-based routing WP5 - Real-time alerts and notifications WP2 - Citizens observatory data WP5 - Citizens data collection and visualisation interface
7	A member of the council parks department has marked the message 'resolved' and commented 47 minutes ago 'thank you for reporting it, we have cleared the drains and the puddles have drained'.	WP5 - Citizens observatory - commenting and feedback
8	Remembering his umbrella, Joe leaves the house at 8:25, giving himself plenty	WP2 - - Non

	of time to detour via the park. On the way, his smart-watch monitors his walking and congratulates him on achieving his 30 minute daily exercise target.	motorised data collection WP5 - Smartwatch app WP5 - feedback
9	Joe meets his girlfriend after lectures are finished, and along with some friends they visit a new bar that they have seen is offering a student promotion via Facebook. They decide to leave around 11:30 pm, and as it is now raining, Joe gets-out his smartphone and checks the night-bus schedule via the portal.	WP4 - Dashboard/mobile interface WP2 - Public transport data
10	There is one due at 11:50, the portal tells him that it is 2 minutes behind schedule.	WP2 - Real-time public transport data WP - alerts
11	Joe checks the webcam on the bus, the images of individuals are deliberately blurred so he can't recognise anyone, but he can see that there are several spare seats upstairs.	WP2 - live video data collection WP6 - privacy and ethics WP5 - live data streams display
12	Joe and his girlfriend share his umbrella and walk to the bus-stop. Unfortunately someone has vandalised the bus-stop and there is broken glass on the ground. Joe reports this via the portal, taking a photo as evidence. Avoiding the glass they wait for only a few minutes until the bus arrives on time.	WP5 - Citizens observatory app for reporting

6.2 SETA-UC2 – Real Time Mobility Dashboard

This use case aims to provide policy and decision makers with an overview of the up-to-date (real-time) situation of traffic and transport in an urban area. using historic and current data related to public transport, private transport, pedestrian and bike flows, to create different traffic management strategies.

Basic requirements are:

- *Real-time public transport:* information should be provided on public transport status (e.g. where are the busses compared to where they should be), statistics (e.g. punctuality of the busses at a given time) and occupancy (e.g. is your next bus full).
- *Real-time Non-motorised transport*: information should be provided on number of people moving on the streets at a given time (e.g. walking), cycling, using shared cycle facilities.
- *Real-time Motorised transport:* information should be provided on how busy is the traffic and on traffic statistics
- *Parking locations*: information should be provided on location of parking spaces for all types of transport.
- *Parking availability*: information should be provided on real-time availability of parking spaces for all types of transport.
- *Parking predictions*: information should be provided on predicted availability of parking spaces.
- *Disruption locations*: information should be provided on location of disruptions that may affect all types of transport/mobility.
- *Disruption status/duration*: information should be provided on the duration and, if available, on the real-time status of each disruption.
- *Environmental real-time data*: information should be provided on environment values such as pollution, Co2 emissions, allergens etc.
- *Support for transport management:* in case of jams and unexpected situations with real time traffic simulation and short term prediction scenario to reduce the effects of unforeseeable events and minimise travel times
- *Real-Time Parking Management Simulation:* to illustrate the real parking system for authority and operators, optimizing information displayed through variable message signs.
- *Event Planning:* means to continuously monitor the traffic on the event day and modify the plan for real-time situations, to resolve unexpected congestions or empower public transport according to demand of event customer.
- *Real-time communication:* ability to use the dashboard to send contextual and personalized information to citizens/staff about transport and about transport/route alternatives.

In the following table we summarise the sub-use cases for each case study that were merged to create SETA-UC2, the main features of the use case and the data that is needed to support this.

Scenario	Decision Makers Dashboard	

UC	Real Time Mobility Dashboard	SETA-UC2
Features		*Ref.*
	Dashboard for decision-makers to see real-time information about traffic, number of people moving/on the streets and public transport occupancy and status.	BS-PM1
	Real time parking monitoring management	BS-PM2
	Real time event monitoring management	BS-PM3 / BS-P3
	Real time incident detection	BS-PM4 / SUC-M1
	Dashboard for decision-makers to use historic and current data about people movements and environmental conditions (e.g. pollutions) to inform citizens about environmental status	BS-PM6 / SUC-I4
	Improve planning and management during big events (dedicated shuttle, road closed, diverted traffic, taxi drop off/load zone..)	TUC-P3
	Real Time Public Transport Management	TUC-P4 / SUC-M2
	Real Time Traffic management	TUC-P5 / SUM-M2
	Short Term Traffic Prediction	SUC-I1 / SUC-I3
	Information Sharing with citizens and staff	TUC-I1

6.2.1 SETA-UC2 – Scenario

The following scenario is set in Turin in June 2016.
Barbara is a manager of Turin Garbage Trucks and has just started her planning activity of garbage pick-up.

1	It's 8.30am. Barbara login to the SETA Dashboard for decision-makers and chooses the "traffic" layer from the side panel to see real time traffic information. She can see the traffic heat map layer understanding which is the real time traffic situation. Traffic situation is normal.	WP3&4 traffic estimates WP5 maps and overlay
2	Then she switches to event calendar section to check particular events in Turin.	WP5 event calendar
3	She notes an home game of Juventus at Juventus Stadium, in Turin.	
4	For this reason she plans some extra pickup in the stadium area with the Garbage Truck planner. Extra trucks are prepared.	WP5 planning interface (maybe)
5	It's 10.15 am. Barbara receives a notification from the "incident detection system". It seems that there has been a car accident near the city centre.	WP3 for incident detection. WP2 sensors (or social sensing) WP3 incident detection from cameras
6	She wants to know if that accident could be a problem for the trucks planned routes. So she selects the map and choose to show the truck routes layer. She recognizes that it could be a problem for truck #134.	WP5
7	Barbara sends a notification to the workforce mobile application.	
8	It's 11.30am. Barbara receives a notification from the Real Time Traffic Management System. Traffic in the area of the incident is back to normal. She choose to notify it to the truck drivers in order to let them pickup garbage also from that area.	WP2 new traffic sensors WP3/4 traffic estimation and

		prediction
9	It's 2pm, and Barbara receives a notification from the Real Time Parking Control System. The system notifies that the city centre biggest parking lot (near the train station) is full.	WP2 parking sensors WP3 parking from video
10	Barbara knows that the streets around the parking lot are congested when the parking is full. She chooses to reschedule the garbage picking in that area.	
11	Barbara sends a notification to the workforce mobile application.	WP5 app notification
12	It's 5pm. All the Juventus supporters are moving to the stadium. Barbara receives a notification from the Public Transport Real Time Monitoring System. There is an anomalous use of 3 bus lines on the way to the stadium (#77, #52, #4).	WP3 count people from cameras WP2 new sensors counting people on buses
13	She moves to the map section and chooses to show buses #77, #52, #4 route and the real time garbage trucks route layer. She notices that #4bus route overlaps to a truck route near the stadium. So she choses to divert the truck in order to avoid congestion and delays.	
14	Barbara sends a notification to the workforce mobile application.	
15	It's 5.30pm Barbara receives a notification from Real Time Traffic Management System. Traffic near the city centre park is back to normal. She checks the Real Time Parking Control System. Even if the park is still full she chooses to restore garbage collection.	
16	It's 8pm. The match has started. Barbara choose to restore the garbage collection near the stadium and schedule extra pick ups at 1am, after the match has finished and the area near the stadium is free from cars.	
17	She chooses to send a push notification to the Garbage Trucks Company App to notify that during the night there will be an extra nightly pick up, apologizing to the users for the inconvenience.	WP5 push notification

6.3 SETA-UC3 – SETA Personal Journey Assistant

This use case aims to provide citizens with a personalise journey assistant that helps them planning a journey taking into account personal preferences, constraints, contextual data, real-time traffic, public transport and environmental data.

Basic requirements are:

- *Origin-Destination Routing:* the user should be able to receive a set of alternative routes given an origin and a destination.
- *Alternative Routes Calculation:* The alternative routes should be calculated using
    - *Real-time public transport location*
    - *Real-time public transport occupancy*
    - *Real-time sharing services availability*
    - *Real-time traffic conditions*
    - *Real-time parking availability*
    - *Disruption location and length*
    - *Environmental data*
    - *Public transport predictions*
    - *Traffic predictions*
    - *Parking Predictions*
    - *User preferences*
    - *Constraints*

- *Feedback:* Ability for the user to provide feedback on the journey
- *Automatic alerting:* the user should be informed of disruptions/changes to a route and offered alternatives

In the following table we summarise the sub-use cases for each case study that were merged to create SETA-UC3, the main features of the use case and the data that is needed to support this.

Scenario	Personal Mobility Decision Support	
UC	SETA Personal Journey Assistant	SETA-UC3

Features		*Ref.*
	Define Less polluted route	TUC-P1
	Define route by personal pref/needs	SUC-FC1 / TUC-FC2
	Define route by cost	
	Define route by Contextual Data	
	Define route by time efficiency	
	Define best route	TUC-MM2
	Multimodal Parking Planner	BS-PM2
	Analyse all possible connections	SUC-I2

To better exemplify the use case, we have written a scenario that narrates the usage of the SETA Personal Journey Assistant by a citizen.

6.3.1 SETA-UC3 – Scenario

The following scenario is set in Birmingham in June 2016.
George has just woken up and he is planning his day. Looking at his calendar he can see today he has to go to a meeting in Milton Keynes University.

N	Narration	WP Interaction
1	It's 4pm. George, after looking at his calendar, starts thinking about the best possible way to be in Milton Keynes University at 11 tomorrow for a meeting. His meeting is 11- 1 and then he needs to come back to Birmingham by 3pm to pick up his child from school.	WP5 Journey Assistant Interface
2	George opens the SETA Personal Journey Assistant app, chooses the Journey Assistant functionality and inputs his home postcode and his destination postcode and time of departure and arrival.	WP5 Journey Assistant Interface - OD form

3	Before pressing "Search" George checks his personal preferences. George has set up his preference when he first used the app, choosing cycling and public transport as his favourite modes of transport. Happy that the system has remembered his preferences, George presses "Search".	WP5 Journey Assistant Interface - user preferences Setting WP6 - Storage of personal preferences
4	After waiting a few seconds George can see 3 different options for his journey: ● car travel, highlighted as fastest and therefore most efficient ● bus travel, highlighted as lowest cost ● bicycle + train travel, highlighted as the one best matching his preferences.	WP2 - collection of sensing data WP3 translating these sensor data in useful variables WP4 extrapolating these variables into the future (leaving now means we need predictions to know which path) WP4/5 Generation of best multimodal (?) path WP5 - Display of possible alternatives
5	George clicks on the car travel and views the directions on a map, including the potential traffic blocks, miles to destination, car emissions (NOx, greenhouse gasses) and cost of travelling by car (given by maintenance, insurance, parking etc.). George can choose to press a button to view different parking options and availability but chooses instead to go back to the results screen.	WP5 - Visualisation of route on a map
6	George now has a quick look at the bus journey, that includes connections from the bus stop at home to the interchange and then the bus to Milton Keynes and a bus from the Milton Keynes interchange to his final destination. Although George can see this travel is very cheap and easy to book (the app offers a link for ticketless booking) the time to reach his destination is over 3 hours and George would be late at his meeting.	WP5 - Visualisation of route on a map WP2 - bus info in real-time and from predictions
7	George goes back to the Results Page and presses the bicycle + train option. The Journey Assistant presents him the total cost of travelling, the amount of calories/activity he will be doing and the dynamic pollution levels of the route chosen and the weather forecast. George chooses this option.	WP5 - Visualisation of route on a map WP2 - train info in real-time and from predictions Wp2 - expected activity

		from journey
8	It's 8am in the morning and George is having breakfast and checking his plan for the day. Having decided yesterday to go to Milton Keynes by bicycle and bus George wants to check if it's sensible for him to cycle to the train station, take the bicycle on the train and then cycle in Milton Keynes or if it's better to leave the bicycle in the parking at the train station. The other alternative he considers is public transport to the station.	WP5 - Connection to booking API
9	George checks the availability of bicycle parking spaces at the train station. He knows there is plenty of space but they usually get full in the morning. The Journey Assistant tells him that in average, on a Wednesday morning at 9 there is 70% chance that he will find a free bicycle space, and that there are currently more free spaces than on typical Wednesday mornings. Given this and a lack of parking spaces in Milton Keynes University George decides to cycle to the station, take the train and then walk to his destination in Milton Keynes.	WP2 & WP3 - sensing for parking spaces availability WP4 - Short term predictions
10	It's now 8.30 and George's train leaves at 9.30. Given he has plenty of space, before setting off George wants to ensure he will cycle through a non-polluted route. George asks the Journey Assistant to check for alternatives routes based on pollution levels.	WP5 - Visualisation of possible cycling routes on a map
11	The Journey Assistant presents him with 3 alternative routes, highlighting the pollution levels, the time, the amount of ascent and the activity he would be doing if he chose that route.	WP2 - pollution sensing/activity estimate
12	George quickly looks at all the possible routes and then chooses route n.2 as it's the least polluted and still gives him plenty of time to arrive to the train station.	
13	As soon as he arrives at the Train Station, George is able to park the bicycle in the parking he planned to. The journey assistant at this point, recognising his location, asks for confirmation that he could indeed find a free place and asks for a quick estimate of the percentage of spaces left. George is happy to provide this feedback as he knows it will help improve the precision of the Journey Assistant.	WP5 - feedback
14	John boards his train to Milton Keynes. During the journey John realises the train is travelling very slowly. He checks the SETA app that indeed has alerted him his train is delayed and it's now due in Milton Keynes at 10.50.	WP2 - real-time train info WP5 - alerts
15	Given the delay, the app offers George the possibility of re-planning his journey. George presses "Re-Plan" and the app comes back with suggestions on	WP5 - - replanning

	how to reach Milton Keynes University as fast as possible. The Journey Assistant knows that George has left his bicycle in Birmingham therefore it recommends a few options to reach its final destination: ● an Uber Taxi, as this is the fastest option ● a city-bike to rent, as this is George's usual preferred means of transport For both options the app presents an estimate cost, pollution emissions and activity related to that choice.	WP5 - user history WP2 - taxi and city bikes sensing WP2 pollution/cost estimates
16	Given the delay, George choses to book an Uber taxi. The app connects to the Uber API and informs him there is a taxi available in 5 minutes. George then asks the app to alert him 10 mins before he arrives in Milton Keynes so he can finalise the taxi booking.	WP5 - connection to booking API WP5 - user history WP5 - alerts
17	At 10.40 the SETA Journey Assistant alerts George that it's time to book the taxi. George clicks on the Uber link but there are no taxis available to be booked at that moment in time. George goes back to the SETA Journey Planner and chooses the alternative option.	WP5 - alerts
18	The SETA Journey Planner asks for feedback on the reason of the different choice, George clicks "No taxi available" between the options.	WP5 - - feedback
19	George chooses to rent a bike in Milton Keynes. He clicks on the link provided to register his details and he receives immediate confirmation that a bicycle is available at the chosen location.	WP5 - booking WP2 - real-time info availability
20	Before getting off the train, George clicks on the possible routes for reaching Milton Keynes University, choosing in this case the shortest route. As he does not know Milton Keynes but he needs to cycle, George chooses to use voice directions.	WP5 - routes on a map WP5 - voice commands/smartwatch
21	As soon as he gets on the bicycle the SETA Journey Assistant, knowing he has a smartwatch linked to his mobile, turns on the smartwatch app and starts directing George to his destination with voice commands.	
22	George arrives at his destination – knowing he is late the SETA App does not ask him to provide feedback on this journey.	WP5 - feedback

6.4 SETA-UC4 – Decision Makers Planning Platform

The Seta Decision Makers Planning Platform provides support for decision-makers to use historic and current data to plan and optimise mobility in the city.

Basic requirements are:

- *Public Transport Historic Data:* on public transport statistics (e.g. average punctuality of the busses) and occupancy (e.g. how many busses are full).
- *Non-motorised mobility historic data*: information should be provided on number of people moving on the streets at a given time (e.g. walking), cycling, using shared cycle facilities.
- *Road transport historic data*: information should be provided on traffic OD matrixes and traffic statistics.
- *Disruption status/duration:* information should be provided on planned disruptions and their durations.
- *Parking locations:* information should be provided on location of parking spaces for all types of transport.
- *Parking availability historic data:* information should be provided on availability of parking spaces for all types of transport.
- *Prediction Engine:* ability to show the consequences of performing infrastructure/legislation changes.

In the following table we summarise the sub-use cases for each case study that were merged to create SETA-UC4, the main features of the use case and the data that is needed to support this.

Scenario	Decision Makers Dashboard	
UC	Decision Makers Planning Platform	SETA-UC4
Features		*Ref.*
	Event planning	BS-PM3 / TUC-P3
	Parking Planning and optimization	BS-PM2 / TUC-P2
	Static Environment Planning	BS-PM6
	Public transport optimization (planning)	TUC-P4
	Infrastructure Planning	
	Information Sharing	
	Mobility Manager Planner	
	Dynamic Environment Planning	BS-PM6

6.4.1 SETA-UC4 – Scenario

The following scenario is set in Birmingham in June 2016. Mark has just arrived into work at Birmingham City Council.

N	Narration	WP Interaction
1	It's 9am. Mark sits down at his desk to start the working day. On his work calendar he can see he has blocked today as a day to work on deciding where best to place new bicycles routes across the city and understanding the impact that a new roundabout will have on pollution around the city. Mark opens the SETA Decision Maker Planning Platform and opens the historic data dashboard.	WP5 Dashboard Interface
2	Mark looks at the map of historic data and decides to have a look at the movements of bicycles in the city over the past year.. Clicking on the right hand side of the screen he brings up a contextual menu that allows to choose which data needs to be shown on the map. Mark clicks on bicycle. The map updates showing only bicycles tracked over last year (Mark decided to not change the temporal horizon in the date slider).	WP5 Map Interface and Layers. WP2 bicycle journey data
3	Looking at the map, Mark can clearly see areas with higher bicycle traffic. Bringing up the layer menu again, Mark chooses to visualise the existing bicycle lanes.	WP5 - Map interface and layers
4	Mark uses this visualisation to understand where in the city there are areas of high bicycle traffic but no bicycle lanes. He zooms in on certain areas to better understand the distribution and uses the time slider to see how the traffic changes over the day/week/month/year.	WP5 - Zooming capabilities WP5 - Time sliders
5	Satisfied with his theory, Mark adds an annotation to the map for the areas where he would like to add bicycle lanes. Mark takes screenshots of these areas results to place them in his report.	WP5 - Annotations
6	He now decides to compare the areas with high bicycle traffic and no bicycle lanes with the other traffic. He brings up the menu and enables the public transport and private cars layers.	WP5 - Map visualisation and layers WP2 - traffic information
7	Looking at the comparison, Mark decides to focus on two main areas and checks the pollution levels of each. Seeing the pollution level, Mark estimates putting cycle lanes in those areas will improve both traffic and pollution in the city. To check his estimate, Mark opens the Modelling dashboard.	WP5 - Modelling dashboard WP4 - Modelling data

8	Opening the modelling dashboard Mark can focus on the 2 areas under analysis and add a cycle lane during the two main trajectories.	WP4 - Modelling
9	Mark runs the simulation and when the results are available he could see the traffic flowing more freely in those areas and the pollution level decreasing in a 10m radius. Satisfied with his decision Mark takes screenshots of the simulation results to place them in his report.	WP4 - Modelling
10	Moving on to the task of analysing the impact of a new roundabout in the city centre, leading to the shopping mall, Mark goes back to the platform home page. He clicks on the map of historic data and zooms in to the shopping centre. Using the contextual right menu he chooses to visualise public transport and private traffic converging to the area. Immediately he can see the location of the proposed roundabout being a hotspot for traffic and pollution. Looking at the origin destination trajectories he can see the hotspot is exactly where roads that connect Birmingham to nearby cities are merging and where there is lots of constant traffic between the cities.	WP5 - Zoomable maps and contextual menu WP2 - Historic data collections
11	He then decided to investigate the traffic using the graph dashboard, to compare traffic levels over time of the day. Looking at monthly, weekly and daily trends he can see there are higher values in rush hours (8-9 in the morning and 5-6 in the afternoon) but traffic is consistently high throughout the day. Mark saves the graphs to insert in his report.	WP5 - graph dashboard WP5 - historic traffic data
12	Going back to the map, Mark uses the contextual right menu to bring up the pollution layer. In this case he wants to see where the pollution sensors are placed and he notices they are all at least 10m away from the proposed roundabout. He decides, if the roundabout is built, to place a new pollution sensor on it to get better readings.	WP5 - - Zoomable maps, contextual menu and layers.
13	Again Mark needs to check his hypothesis using the modelling and simulation platform. He opens the modelling dashboard and he zooms in on the desired area.	WP4 - Modelling
14	After zooming in he chooses a new component from the menu and he adds a roundabout, making sure he connects it to all the incoming roads. He launch the simulation and he gets a warning that the simulation will take over an hour to perform therefore he chooses to receive an alert when it's done.	WP4 - alerts WP5 - alerts
15	After 45 mins Mark receives an alert from the SETA planning platform, both via email and text message. He logs back into the platform and clicks on the received message. This opens the modelling dashboard with the results of the simulation. Mark checks the results and takes a screenshot of the prediction.	WP4 - Modelling.

7 Appendix 1 – Stakeholders Analysis

7.1 Birmingham

Who?	Why are they a stakeholder?	Section of Community	name	Website	email address
Amey	Business		Ann Reilly		Ann.Reilly@amey.co.uk
Birmingham Gateway Project - Network Rail	Business		Chris Montgomery		Chris Montgomery chris.montgomery@networkrail.co.uk
Carillion	Business		Simon Dingle		Simmon.j.dingle@carillionplc.com
Chamber of Commerce	Business		Jerry Blackett (Chamber of Commerce)		V.Stolban@birmingham-chamber.com
City Centre Partnership	Business		Hilary Hall - Chair of City Centre Partnership		Hilaryhall@marche.org.uk
EON Energy	Business		Keith Budden		keith.budden@eonenergy.com
GBSLEP	Business		Bally Bhogal		Bally.bhogal@solihull.gov.uk
Hs2 skills & employment	Business		Scott-james eley		Scott-james.eley@hs2.org.uk
LEP	Business		Katie Trout (LEP)		katie.trout@birmingham.gov.uk
Willmott Dixon	Business		Richard Freeman		richard.freeman@willmottdixon.co.uk
Centro (Workwise provider)	Business		Alison Pickett		alisonpickett@centro.org.uk
Veolia	Business		Gavin Graveson		gavin.graveson@veolia.co.uk
Thomas Vale	Business		Ken Jones		ken.jones@thomasvale.com

Birmingham Chamber of Commerce	Business Organisation	Business	Jerry Blackett CEO 75 Harborne Road, Edgbaston, Birmingham B15 3DH 0121 454 6171	http://www.birmingham-chamber.com/	J.Blackett@birmingham-chamber.com
Business in the Community	Business Organisation	Business		http://www.bitc.org.uk/west_midlands/	westmidlands@bitc.org.uk
BID	Community Organisation	Disability - sensory	Mark Woodall	www.bid.org.uk	mark.woodall@bid.org.uk
Birmingham Disability Forum	Community Organisation	Disability		-	BDRC@Disability.co.uk lsimmons@disability.co.uk
Birmingham Disability Network Y	Community Organisation	Disability			admin@birminghamdisability.org.uk
Birmingham Disability Resource Centre Y	Community Organisation	Disability - learning difficulty		www.disability.co.uk	bdrc@disability.co.uk
Disability Support Group (DSG)	Community Organisation	Disability			pmillington@disability.co.uk
Disabled Action Group	Community Organisation	Disability - physical		-	disabledactiongroup@yahoo.co.uk
CCG/ NHS	Health		Amos Mallard (CCG)	-	a.mallard@nhs.net
CCG/ NHS	Health		DR Basil Andreou (CCG Chair)	-	basil.andreou@nhs.net
CCG/ NHS Y	Health		Gavin Ralston (CCG Chair)	-	gavin.ralston@nhs.net
Healthwatch Birmingham	Health		Andrew John- Acting CEO	-	AndrewJ@healthwatchbirmingham.co.uk
Healthwatch Birmingham	Health		Clenton Farquharson - Chair		clentonf@healthwatchbirmingham.co.uk;
Reading University, Lead Health	Health		Dr William Bird,	-	william.bird@intelligenthealth.co.uk

and Wellbeing with Be Active					
Sandwell & West Birmingham Hospitals NHS Trust	Health	-	Jim Pollitt		l.briscoe@nhs.net
West Midlands Police	Police		Diane Lloyd		d.lloyd@west-midlands.pnn.police.uk
Police(BRVG)	Police		Paul Street	-	Paul.street@birmingham.gov.uk
Birmingham Advisory Council of Older People "BACOP" Y	Third sector	Older People	Eva Tabora	-	BACOP@aston.ac.uk
Birmingham Citizens Advice Service Ltd	Third sector	low income		http://www.bcabs.org.uk/	bcabsemailadvice@bcabs.org.uk
Birmingham Disability Forum	Third Sector	Louise McKiernan (CEO of bham disability forum)	Louise McKiernan	-	lmckiernan@disability.co.uk
Birmingham Faith leaders group Y	Third Sector	Jonathan Gurling (Bham faith leaders group)	Jonathan Gurling	-	jonathangurling@yahoo.co.uk
Birmingham Leadership Foundation	Third sector	-	MashKura Begum		mashkura.begum@bleaf.co.uk
Birmingham Mind	Third sector	Disability - mental health	Jane Bird	http://www.birminghammind.org/	jane.bird@birminghammind.org
Community Safety Partnership	Third sector		Barry Toon	-	birmcomsafe@googlemail.com
Disability Resource Centre	Third Sector	Mark Macpearson mmacpearson@disabilit	Mark Macpearson		mmacpearson@disability.co.uk

		y.co.uk			
Aston University	University		Professor Dame Julia King Vice Chancellor Aston University Aston Triangle Birmingham B4 7ET 0121 204 4884	www1.aston.ac.uk	e.hindson@aston.ac.uk, a.offong@aston.ac.uk
Birmingham City University	University	Education			cliff.allan@bcu.ac.uk
Birmingham City University	University		Beverley Nielsen		Beverley.Nielsen@bcu.ac.uk
Birmingham City University	University		Paul Glennon		paul.glennon@bcu.ac.uk
Birmingham City University	University		Professor David Tidmarsh Vice Chancellor City North Campus Birmingham B42 2SU United Kingdom 0121 331 5000	http://www.bcu.ac.uk/	veronica.bartlett@bcu.ac.uk
Newman University	University		Kevin Griffiths		Kevin.Griffiths@staff.newman.ac.uk
University of Birmingham	University		Zena Wooldridge		z.j.wooldridge@bham.ac.uk
University of Birmingham	University		Dan Herbert (UOB)		d.herbert@bham.ac.uk
University of Birmingham	University		Dr Catherine Durose (UOB)		c.durose@bham.ac.uk
University of	University		Dr Peter Lee		p.w.lee@bham.ac.uk

Birmingham			(UOB)		
University of Birmingham	University		Prof Deborah Youdell (UOB)	-	d.youdell@bham.ac.uk
University of Birmingham	University		Liz Haydon	-	e.haydon@bham.ac.uk
University of Birmingham	University		Dr Peter Lee	-	l.wilden@bham.ac.uk
University of Birmingham	University		Dr John Gibney (UOB)	-	j.gibney@bham.ac.uk
BCC	Internal		Cllr Paulette Hamilton	-	
BCC	Internal		Anne Shaw	-	
BCC	Internal		Karen Creavin	-	
Combined Authorities	Business Organisation			-	
Sport England	Community Organisation			-	
Cyclist Groups				-	
Running clubs				-	
Walkers				-	
BCFC				-	
AVFC				-	
				-	

7.2 Turin

7.2.1 Mobility Main

	Stakeholder Name	Brief description of stakeholder main activities	Interest in mobility
Private Sector	011.5730 Radiotaxi.it	Taxi services	Public transport
	0115737 Pronto taxi.it	Taxi Services	Public transport
	Car2go	Car-sharing service	Sharing mobility
	Enjoy	Carsharing service	Sharing mobility

	CarcityClub	Carsharing service	Sharing mobility
	BlucarTorino	Electric Carsharing Service	Sharing mobility
	ITALO	High speed train service	Public transport
	SNFC	High speed train service (France)	Public transport
	TOBIKE	Bike sharing service	Sharing Mobility
	Sandro Pertini Airport	Airport Turin	Public Transport
	AMIAT	Waste Service	Freigt Transport
	APCOA	Parking service	Parking service
	Best in Parking	Parking service	
	ACI	Parking service	
	Viasat	Service provider	Insurance - ecall
	Alenia Aermacchi spa	Mobility Manager	Mobility
	Amiat	Mobility Manager	Mobility
	Città della Salute	Mobility Manager	Mobility
	Arpa Piemonte	Mobility Manager	Mobility
	ASLTO2	Mobility Manager	Mobility
	Ospedale Mauriziano	Mobility Manager	Mobility
	Enel Spa	Mobility Manager	Mobility
	FCA spa	Mobility Manager	Mobility
	General Motors powertrains	Mobility Manager	Mobility
	GTT Spa	Mobility Manager	Mobility
	FTP Industrial (IVECO)	Mobility Manager	Mobility
	Intesa Sanpaolo	Mobility Manager	Mobility
	RAI	Mobility Manager	Mobility
	Santander Consumer Bank	Mobility Manager	Mobility
	Reale Mutua Assicurazioni	Mobility Manager	Mobility
	Telecom Italia Spa	Mobility Manager	Mobility
	Trenitalia	Mobility Manager	Mobility
	Unipol Assicurazioni	Mobility Manager	Mobility
	ATIVA	Manage autoroute	
	Sadem	Public transport service (by bus)	
	Cavourese	Public transport service (by bus)	
	Seag (Bus Company)	Public transport service (by bus)	
	Autostradale	Public transport service (by bus)	
	ATAP	Public transport service (by bus)	

	Autolineee Martoglio	Public transport service (by bus)	
	VIGO	Public transport service (by bus)	
	Bellando Tours	Public transport service (by bus)	
	Ca.Nova	Public transport service (by bus)	
	Chiesa	Public transport service (by bus)	
	Staav	Public transport service (by bus)	
	Bouchard	Public transport service (by bus)	
	VIMU	Public transport service (by bus)	
	Menini	Public transport service (by bus)	
	Seren	Public transport service (by bus)	
	Furno	Public transport service (by bus)	
	Vita	Public transport service (by bus)	
	Autotrasporti Marino	Bus Transport service	
Public Sector	Agenzia Mobilità Piemontese	The main aims is to improve the sustainable mobility in Piedmont region, by optimising pubblic transportation SYstem	
	GTT		Public transport services (city +metropolitan area)
	GTT Parking		Parking service
	5T		
	Assessorato Mobilità COMUNE DI TORINO		
	EXTRATO		Public transport service (Metropolitan Area)
	TRENITALIA		Train transport service (National + regional + metropolitan area)
	LOCAL POLICE TORINO		security
	Piedmont Region		
	Metropolitan City	Metropolitan area Mobility Manager	
	ACI		
	Ministero dei Trasporti		
Voluntary	Legambiente		
Community	Federtaxi		
	Fita CNA		
	Aicai		

	Ania		
	Confesercenti		

7.2.2 Mobility Secondary

	Stakeholder Name	Brief description of stakeholder main activities
Gender defined	Bike pride	Bike no profit association
	Bimbibus	
Life-stage defined	Agenzia Sansalvario	No profit association
	Kyoto club	No profit association
	Bikeitalia	No profit association
	FIAB	No profit association
Ethnicity defined		
Wealth defined	Cus Torino	

7.2.3 Mobility Temporary

	Stakeholder Name	Brief description of stakeholder main activities
Temporarily Affected	SETUP	
	Torino Calcio	
	Juventus F.C.	
	Assesorato Turismo Città di Torino	
	Confesercenti	
	Cisalpina Tours	
	Federalberghi	
	Furno Viaggi	
Temporarily Affected but involved		

7.3 Santander

7.3.1 Mobility Main

	Stakeholder Name	Brief description of stakeholder main activities	Interest in mobility
Private Sector	ALSA	Belonging to National Express group. Urban and metropolitan public transport services (by bus)	Public transport
	ASCAN GEASER	Facility management; trash and solid waste management; street cleaning services	Mobility
	ETRA	Public transport ITS services	Public transport // Mobility
	Los Reginas	Ferry service through Santander bay	Public transport
	Radiotaxi	Taxi Services	Public transport
	SETEX	Parking service	Sharing mobility
	SICE	Mobility Management, Maintenance and Operation of the Traffic Control Centre; traffic signal management	Mobility
Public Sector	ADIF	National rail infrastructure management	Public Transport
	AYUNTAMIENTO DE SANTANDER (SDR)		Mobility
	CTL	Transport and Logistics facilities	Mobility
	DIRECCIÓN GENERAL DE TRANSPORTES	Regional public transport administrator (Regional Government)	Mobility
	FEVE	Commuter rail services	Public transport
	LOCAL POLICE SANTANDER		Traffic and security
	RENFE	Commuter and national rail services	Public Transport
	TUS	Santander public transport operator	Public transport
	TUSbic	Santander public bike sharing system	Mobility
	UNIVERSITY OF CANTABRIA		Mobility
Community	CANTABRIA CONBICI	Cycling association	Mobility
	CEUC	Students association of University of Cantabria	Mobility
	COCEMFE - CANTABRIA	Disabled people association	Mobility

	FECAV	Neighbours association federation	Mobility

7.3.2 Mobility Secondary

	Stakeholder Name	Brief description of stakeholder main activities
Gender defined	FAPA CANTABRIA	Bike no profit association
	ONCE	Blind people association

8 Appendix 2 – Focus Group agenda

Every focus group has been planned as follows.

Phase 1 : 10 mins
Introducing meeting agenda, focus on objectives

Phase 2 : 30 mins
SETA project overview, introduction to SETA project, focus on stakeholder early involvement. Potential applications.

Phase 3 : 15 mins
Needs, problems, expectations overview (individual session). We asked every user to write on a post-it their needs, problems and expectations.

Phase 4 : 60-90 mins
Plenary sharing. Every user shares his comments with the others. This session generates interaction between users and user requirements definition.

Phase 5 : during Phase 4
Content aggregation. During Phase 4 the moderator aggregates content, sticking and moving post-it to define scenarios.

Phase 6 : after meeting
Every scenario (and/or requirement) is rated following certain rules (i.e. depending on the number of the stakeholders involved).