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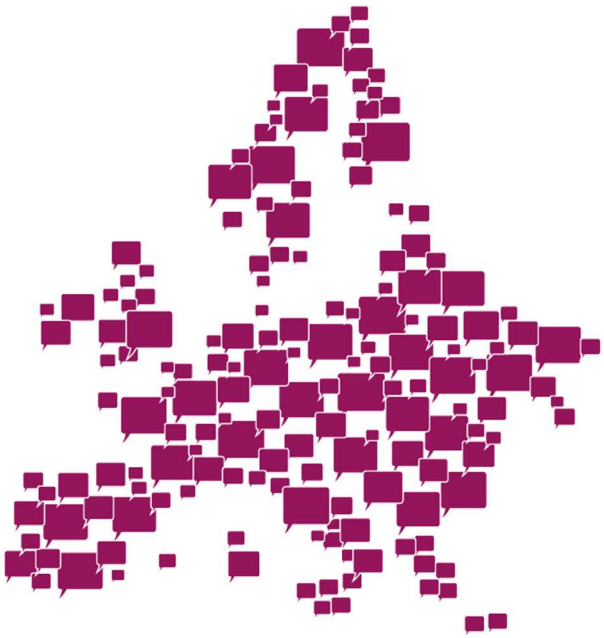
SocialCar

Open social transport network for urban approach to carpooling

D5.1 – Test plan and KPIs definition



Deliverable D5.1
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1. Introduction

1.1 Scene setter

The WP5 will test the SocialCar system in a real environment using the existing modelling tools already in use in the different cities (test sites). The tests will be conducted in all the involved cities accordingly to their level of maturity. The WP5 will define and implement in the project sites a common evaluation framework based on relevant and measurable Key Performance Indicators (KPIs), through the involvement of the chain of stakeholders for local data collection and users testing. The SocialCar system testing will be performed at three different levels (based on the level of maturity of each respective site) as follows:

a) Technical and functional testing of the SocialCar system for the system rollout (Test A);
b) Site specific simulated experiments based on traffic macro-simulation models (Test B);
c) On site real experiments based on real life testing in at least 3 sites (Test C).

The deliverable D5.1 - Test plan and KPIs definition is needed for defining the test plan which will be implemented in each of the SocialCar sites. It is aimed at developing site-based full test plan and KPIs list.

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1.2 Executive summary

The deliverable D5.1 provides the background information and the test design plan on top of which the 10 project sites will implement the SocialCar system, describing as well the type of test (Test A, Test B, Test C) each site will implement. Furthermore, this deliverable defines, for each project site, the criteria and KPIs needed to evaluate tests' results. The deliverable D5.1 develops a site-based test plan, which will be designed and implemented in each of the selected project sites, according to the different maturity of the involved

cities. The objective is to define a set of structured information based on a standard framework following the 5W2H approach (What, Why, Where, When, Who, How, How much). The main data which will be collected is: transport and mobility needs (What), scope of testing (Why), demo area (Where), time plan of testing and evaluation activities (When), local stakeholders involved and roles in testing activities (Who), test running levels namely Test A, Test B as well as Test C (How), final results of impact and process evaluation (How much). To this extent, each site has provided information describing how the different level of testing (usability, data model, macro-simulation and user involvement) will be performed in the SocialCar project.

This deliverable develops a site-based full test plan and KPIs list needed to assess and evaluate tests' results. For each KPI which will be defined in synergy with the planned activities of Task 5.4, a minimum set of parameters has been defined namely indicator name, measurement unit as well as frequency of calculations.

Test A is not subject to impact evaluation because it will be focused on the technical and functional testing for the SocialCar prior to system rollout. This specific test is, in fact, aimed at testing the data interfaces, component functionality, robustness and usability of the SocialCar system in all the project sites.

Test B and Test C provide the basis for the impact evaluation to be conducted in Task 5.4. Test B involves the use of macro simulation models at 5 sites (Edinburgh, Brussels, Canton Ticino, Zagreb and Turin) to estimate the potential city wide benefits from the SocialCar system. Test C implements on site real experiments of the SocialCar system at 3 "lightning" sites (Edinburgh, Brussels and Canton Ticino), testing the SocialCar App on-the-ground by the involvement of a number of users including citizens as well as public transport users.

The 10 test sites are as follows: Edinburgh (UK), Canton Ticino (CH), Brussels (BE), Lazio Region (IT), Zagreb (HR), Ljubljana (SLO), Luxembourg (LU), Brescia (IT), Turin (IT) and Skopje (MC).

In each sites the respective project partner(s), relevant subcontractors as well as other "external" participants / organisations are involved in order to effectively plan and implement the SocialCar components and services.

1.3 Scope of the document

The deliverable D5.1 Test planning and KPIs definition is the first deliverable of Wp5. It is aimed at developing site-based full test plan and KPIs list needed to assess tests' results. D5.1 is aimed at defining overall test plan which will guide by a structured approach in effective planning and implementation of the SocialCar tests and evaluation. D5.1 describes the inception of the planned test within each city/region, including among others, type and location of the experiment, the kind of test which will be implemented in each site, data and stakeholders involved into the experiment and KPIs that will be used to assess experiment's performance.

1.4 Glossary

SC:	SocialCar
PT:	Public Transport
PTO:	Public Transport Operator
GPS:	Global Positioning System
GNSS:	Global Navigation Satellite System.
TAM:	Technology Acceptance Model
KPI:	Key Performance Indicators
SUMP:	Sustainable Urban Mobility Plan

2. Test sites snapshot

The chapter provides a brief presentation of the SocialCar sites by the description of the respective transport and mobility issues (e.g. modal split, traffic jams, etc.), sustainable transport modes in operation (e.g. car sharing, bike sharing, etc.), car-pooling services in operation, public transport organization and ownerships (including buses, tram, metro, light train, etc.), traffic simulation tool used in each city / region, real-time traffic data collection and , finally, site-based mobility needs which will be addressed by the SocialCar project.

These background information will be used for further design and implementation of tests in the respective SocialCar sites through a structured site-based transport data collection and stakeholders engagement.

2.1 Edinburgh (UK)

Transport issues

According to 2011 census data:

- Continued car ownership growth and reduction in use of trains, buses, cycling and walking,
- Cycling to work has increased by >50% in Edinburgh, 25% in East Lothian, and 12% in Midlothian,
- Increased public transport usage across Edinburgh and the Lothians, especially by train,
- Road traffic levels have declined by 2.5% since 2007. East Lothian has seen the biggest reduction (-7.2%) whilst Midlothian (+0.6%) and Clackmannanshire (4.5%) have seen a growth in road traffic.

The current modal share (%) is provided as follows:

- Car as driver: 31.6
- Car passenger: 8.1
- Bus: 20.8
- Train: 1.1
- Other Public Transport: 1.3
- Cycle: 4.2
- Walk: 32.9

The current modal share (commuter trips) is provided as follows:

- Car as driver: 35.3
- Car passenger: 1.9
- Bus: 28.0
- Train: 1.4
- Other Public Transport: 1.8
- Cycle: 11.8
- Walk: 19.9

Sustainable transport modes in operation

A bike share scheme exists. This is currently only at Haymarket station, provided by Train operator Abellio.

Car-pooling services in operation

TripshareSEStran.com (the TripshareSestran scheme is provided by Liftshare and managed by SEStran) is a region-wide journey sharing initiative, which features options for car drivers, walkers and cyclists to share journeys to either save money or to gain support and encouragement if in a new area. The scheme has been alive since 2006 and has seen its membership rise to over 7,660 in the South East of Scotland alone. SEStran

funds and supports the promotion of Car Pooling at regional level. Organisations can also bid for matched funding through SEStran to support their schemes: http://www.sestran.gov.uk/grant-applications/

Edinburgh City – Over 3,400 members. SEStran Region – Over 8,200 members. The main carpooling service provider for the city is Liftshare. Liftshare's myPTP product, a personal travel planning tool, includes carpooling matches with members of the SEStran scheme for those searching within the region as well as suggesting public transport, walking and cycling options.

Public transport organizational model and ownerships

The public transport services are managed by Public Enterprise and 2 private companies.

- Authorities active in PT service provision:
  - Edinburgh Council (Shareholder in Lothian buses and Edinburgh Trams)
- Operators active in PT service provision:
  - Lothian Buses, Public
  - Edinburgh Trams, Public
  - Abellio, Private (Train)
- Third parties relevant in the fields of:
  - Real time passenger information: At bus stops, website and via mobile apps (Lothian Buses). Real time information integrated across modes is currently being integrated into the Regional Bus Tracker information on Bus Tracker SEStran http://bustrackersestran.co.uk/

Traffic simulation tool and real-time traffic data collection

The SEStran area has its own Regional model. Real-time information on road congestion is being collected. Real Time traffic information is collected and published by Traffic Scotland https://trafficscotland.org/. On-line/mobile journey planning information service is provided by Traveline Scotland, http://www.travelinescotland.com/welcome.do

Site mobility needs

The principal key trend in transport in recent decades has been the increase in car traffic and use of the car. This has bought about a number of problems including traffic congestion, detrimental effects on the environment, safety for all road users, and the encouragement of more sedentary lifestyles (and hence public health). The continued spread of residential and employment areas away from Edinburgh city centre will increase the need for more public transport and car-pooling options. An integrated platform would give travellers the information and options they need to be able to choose more sustainable travel methods.

Key mobility issues to address with SocialCar are as follows: it will assist in providing door-to-door mobility options, including carpooling and other alternatives to single occupancy vehicle journeys.

2.2 Canton Ticino (CH)

Transport issues

Every morning the highway from Mendrisio to Lugano is highly congested due to the high number of vehicles travelling on it. Minor disruptions in the traffic flow can create dramatic stop-and-go oscillations, spanning tens of kilometres. The same effect takes place also in the evening, when people are driving home from their workplace, but in the opposite direction. The road infrastructure has reached its capacity.

Sustainable transport modes in operation

The car-sharing company Mobility (www.mobility.ch) operates throughout Switzerland and has a few stations also in Canton Ticino. Mobility offers traditional car-sharing, with fixed pick-up and return points located close

to the main railway stations. Due to the limited size of the car-sharing fleet, vehicles are in fact mainly considered as the integration to trains for long distance travels, to reach one's final destination.

The City of Lugano also offers the Publibike bike-sharing service (www.publibike.ch), which serves the City and its outskirts. Other bike-sharing services are being developed in other parts of the region. Use of both car and bike sharing is however still limited, mainly due to the small number of pick-up and return points, to perceived high renting costs and, for bike-sharing, to the lack of cycling lanes and safety problems.

Car-pooling services in operation

Until 2014, only one carpooling platform was operating in Canton Ticino. It was supported by the Swiss Radio Channel ReteTre and it was called Liberalauto ("free the car"). It was a web based platform allowing users to offer/request for rides, indicating their routes by means of open textual description.

In 2015, new carpooling services were launched in Ticino. The first one in order of appearance was Pool2Job (www.pool2job.ch), a web-based carpooling platform focusing on car-pooling for commuting purposes and directly targeting companies and their employees. Since 2015, also the MobAlt platform was launched (www.mobalt.ch): a smartphone-based service offering different mobility options for home-work routes (shuttle-buses, bicycles, car-pooling services, discounted public transport tickets), again addressing companies. In 2015 also the Bepooler platform was activated (www.bepooler.ch). Smartphone-based as well, it promotes carpooling mainly targeting commuters. Finally, in 2016 the Italian Jojob company (www.jojobswiss.ch) started offering carpooling services in Switzerland and Canton Ticino, always targeting commuters. All these platforms exploit trans-national commuting traffic from Italy. Since they were all activated very recently, they are still building their core group of customers. Their popularity is fast growing and is expected to increase due to the approval of a cantonal tax on companies' parking areas, which will induce companies to reduce their parking lots and to introduce higher parking fees for their employees going to work with their own car.

Public transport organizational model and ownerships

Several public transport operators are active in Canton Ticino:

- Autolinee Bleniesi (ABL) - www.autolinee.ch
- Autolinea Mendrisiense (AMSA) -www.amsa.ch
- Autolinee Regionali Luganesi (ARL) - www.arlsa.ch
- AutoPostale Svizzera SA - Regione Ticino - www.autopostale.ch
- Ferrovie Autolinee Regionali Ticinesi (FART), ferrovia Centovalli www.centovalli.ch
- Ferrovie Federali Svizzere (FFS/TILO) - www.ffs.ch, www.tilo.ch
- Ferrovie Luganesi (FLP) - www.flpsa.ch
- Trasporti Pubblici Luganesi (TPL) - www.tplsa.ch
- Società Navigazione del Lago di Lugano, - www.lakelugano.ch

Traffic simulation tool and real-time traffic data collection

A macro-simulation model of the transportation flows in the Ticino region is available and it is modelled using VISUM. Canton Ticino is the data owner, and the model is operated by an Engineering firm based in the German-speaking part of Switzerland.

Site mobility needs

The local stakeholders are requesting an integrated mobility management system which integrates public and private transport, thus helping to reduce the number of vehicles that are daily circulating on the roads and minimise the impacts of cross-border car flows from Italy.

2.3 Brussels (BE)

Transport issues

Brussels attracts 350.000 commuters every day. Because of widespread suburbanisation, many Belgians are car-dependent. Those who do have other transport options will often prefer to use their car, because the alternatives are not well designed. There is a lack of park-and-ride facilities, for example, and inner-city parking is relatively cheap and abundant, encouraging people to drive all the way into the city centre.

The current modal share is provided as follows:

- Car as driver: 63.7%
- Car passenger: -
- Bus: 31.7% (all public transport)
- Train: -
- Other Public Transport: -
- Cycle: 0,4%
- Walk: 1,9%

The current modal share (commuter trips) is provided as follows:

- Car as driver: 40,9 %
- Car passenger: 2,1 %
- Bus: 17,5 % (tram & metro)
- Train: 33.3 %
- Other Public Transport: -
- Cycle: 1,9%
- Walk: 2,7%

Sustainable transport modes in operation

- Villo!: Bike sharing system with over 250 stations and over 2600 bikes.
- Collecto Nighttaxi: Brussels collective taxiservice that operates between 11pm and 6am, each day of the week. It has 200 stations (all nearby an MIVB/STIB station), and operates only in the Brussels region (no destinations in Flanders or Wallonia). Not expensive, with reduction rates for MIVB/STIB costumers.
- Cambio (initiated by Taxistop): car sharing service with 100 stations in Brussels and 353 vehicles of all kinds. This car sharing service exists in the whole of Belgium.
- Zen Car: car sharing system with electrical cars, only available in Brussels.

Car-pooling services in operation

Taxistop organizes carpooling commute in Belgium since 2001 via its database www.carpool.be. The carpool database counts 70.000 users and 2.500 carpooling offers each day. Taxistop is active in the three regions of Belgium. There are 170 companies affiliated to carpool.be and thus organizing carpooling for their employees (in all Belgium 655 companies are affiliated). Taxistop (carpool.be) uses Dijkstra matching algorithms.

Public transport organizational model and ownerships

- MIVB/STIB: Brussels public transport company
- De Lijn: Flemish public transport company
- TEC: Walloon public transport company
- NMBS/SNCB: Belgian Railroad Company

The public transport services are managed by Public Enterprise and private companies.

- Authorities active in PT service provision:
  - Belgian federal government, Belgian railways
  - Brussels regional government, Bus, tram metro
- Operators active in PT service provision:
  - STIB/MIV, semi-public, Bus-tram-metro in Brussels, www.stib.be
  - SNCB, semi-public, Belgian railway operator, www.sncb.be

Traffic simulation tool and real-time traffic data collection

In Belgium, every public transport company has its own transport tool. These transport tools allow journey creation with every public transport, for example, the MIVB/STIB transport tool (Brussels) proposes also to its clients to use TEC (Wallonia) or De Lijn (Flanders).

Real-time information on road congestion is being Via Brussels Region: Mobiris

JSon : http://www.bruxellesmobilite.irisnet.be/static/mobiris_files/nl/alerts.json

JSon : http://www.bruxellesmobilite.irisnet.be/static/mobiris_files/nl/levels_of_service.json

Congestion information is made available to the public through any real-time information services, Via website mobility Brussels: http://www.mobielbrussel.irisnet.be/, Via BeMobile: http://www.be-mobile-international.com/, Google-maps. Route information by public transport operators is already multimodal.

Site mobility needs

An integrated platform will help organising and promoting what is called "networked mobility". It will make it possible for commuters to easily transfer from carpooling to public transport and back. This will have a huge effect when Park&Ride, carpool parking and public transportation hubs will be integrated in the platform. Key mobility issues to address with SocialCar are a multimodal app for different modes with a hierarchy of modes.

2.4 Lazio Region (IT)

Transport issues

The current modal share (home-work trips) is provided as follows:

- Car as driver: 65,2 %
- Car passenger: 4,8 %
- Bus (and tram): 11%
- Train: 6%
- Other Public Transport: 18,1 %
- Cycle: 0,8 %
- Walk: 8,7 %

Rome Municipality Area Traffic Congestion Index is the fifth in Europe (TomTom Congestion Index 2012).

The preponderance for private car transport modality is due to many different reasons such as:

- low level of residential density in Rome suburban areas; the residents of the first 30 municipalities of Rome Province increased by 35% between 2001 and 2011, while Rome residents increased only by 2.8%;
- 85% of employees work in Rome Province, 6% in Latina Province, 5% in Frosinone Province, 3% in Viterbo Province and 1% in Rieti Province;

- the regional productive structure is concentrated in Rome Municipality, where 60% of employees work and in 12 economic areas, where 32% of workers is active.

Sustainable transport modes in operation

Rome Service for Mobility manages Bike Sharing Service since 2010. In this period the service is not operating as the call for tender for the extension of the service to the whole urban territory has not closed yet.

Car-pooling services in operation

Lazio Region has two applications of carpooling: one internal to employees of the Headquarters and one that concerns the entire Province of Rome. The first has been exhausted a few years ago because only a few employees were able to benefit from it. The second experience is ongoing and is having good success. It's called "Carpool Rome" and is an initiative promoted by the Province of Rome and managed by Autostrade per l'Italia SpA. Rome Province has signed in 2012 an Agreement with Italian Public Highway Company in order to set up Carpooling Service for Rome Province employees and citizens. A website (http://roma.autostradecarpooling.it/) has been created where employees and citizens can organize their carpooling trips. This Agreement is part of 2009 Strategic Plan "Kyoto Rome Province" that has allocated 400 milion euros for environmental sustainability, alternative energy development, waste separate collection, sustainable mobility and biodiversity safeguard.

Public transport organizational model and ownerships

The public transport services are managed by Public Enterprise and private companies.

- Authorities active in PT service provision:
  - Local Public Transport Observatory, Public ownership: Ministry of Transport, Ministry of Economy, Regions. The Observatory is in charge for the supervision of the sector and for the management of Local Public Transport State Fund. Observatory meets twice a year and recount yearly to the Parliament about the general condition of Local Public Transport.
  - Lazio Region Territory, Urban Planning, Mobility and Waste Directorate: It manages the programming of regional road and rail transport; coordinates programmes for traffic and mobility and the planning of transport and logistic infrastructures.
  - Transport Regulation Authority: it is financed through grants paid by Transport Infrastructure and Service Managing Authorities. Guarantees fair infrastructure access conditions; defines criteria for setting tariffs, fees and tolls; sets the minimum quality standards of national and local transport services; defines the rights of users towards Transport Infrastructure and Service Managing Authorities; establishes call for tender structure and content.
- Operators active in PT service provision:
  - Co.Tra.L S.p.A.: it manages the regional road extra-urban public transport lines. Lazio Region is the sole shareholder of the company.
  - ATAC S.p.A manages every kind of public transport network in Rome Municipality: bus, tram, metrò, trains, and exchange parkings.
  - Trenitalia S.p.A. is a company controlled 100% by Italian State Railways. It is the most important Italian company for the management of passenger and freight railway transport.
- Third parties relevant in the fields of:
  - Vehicle management & maintenance: Co.Tra.L S.p.A., ATAC S.p.A.-Roma TPL Scarl, Trenitalia S.p.A.
  - Pricing: Lazio Region Territory, Urban Planning, Mobility and Waste Directorate

- Planning (e.g. routes, frequency, vehicles, drivers, etc.): Regione Lazio, Co.Tra.L, Atac S.p.A, Roma Servizi per la Mobilità Srl, Trenitalia S.p.A.
- Journey planning: Regione Lazio, Co.Tra.L Atac S.p.A., Roma Servizi per la Mobilità Srl, Trenitalia S.p.A.

Traffic simulation tool and real-time traffic data collection

Lazio Region does not possess macro-simulation tool for what concerning Rome urban routes.

Real-time information on road congestion is being collected (http://regionelazio.luceverde.it/chiSiamo.php)

The range of public transport information services which operate in the region includes as follows: Bus, Train, Tram, Metro / Light Rail. Real time information is integrated across the above modes.

All Journey Planning Information Platforms existing in Rome Municipality and in Lazio.

- Region is multi-modal and provide real-time information updates.
- Luceverde S.p.A., Cotral S.p.A. and Agenziamobilità Roma Platforms provide information only and don't allow booking.
- Atac Roma provides also the possibility to buy tickets by tablet and by mobile-phone.
- "Muoversi a Roma" datas and services, also in real-time, are accessible as Open Data.
- Rome Mobility Agency's Open Data: http://www.agenziamobilita.roma.it/en/open-data.html

Site mobility needs

The project aims to validate a solution of a modern carpooling system for Lazio Region employees who work in EUR district head offices. The territorial area of the project is EUROPA district, better known as EUR. It is located in the south of the city, inside the GRA ring road. In the district there are 5 Regional Head Offices. The solution of carpooling with an integrated platform for the management of the service is the ideal one to meet the needs of Lazio Region employees of EUR district head offices. Key mobility issues to address with SocialCar are as follows: SocialCar project could be the opportunity to try to create a unique regional platform networking all these tools that at present time operate separately. The project aims at validating a solution of a modern carpooling system for Lazio Region employees who work in EUR District head offices. A survey among 100 employees working in these 5 Regional Head Offices was carried out with the following results:

- 62 employees arrive from the Municipality Of Rome (average travel time with public transport: 50m);
- 17 employees arrive from the suburbs of Rome, within 30 km (average travel time with public transport: 1h 40m);
- 21 employees arrive from other cities of Lazio Region (average travel time with public transport: 2h 25m);
- 35 take their own car traveling alone;
- 15 take the train, the subway and the bus;
- 14 take two bus lines;
- 14 take the scooter;
- 13 take metro and bus;
- 5 take one only bus line;
- 4 take their own car with other colleagues.

The demonstration will be implemented across the entire Region as Lazio Region employees working in those five employment sites live across the whole regional territory.

2.5 Zagreb (HR)

Transport issues

Road traffic congestion is a common problem in Zagreb and has a medium-to-high impact on the city's inhabitants, businesses, environment and public transport system. Traffic is at its highest in peak hours in the morning and afternoon. High congestion levels in Zagreb are a consequence of a variety of reasons. The Zagreb County areas are not well connected to each other resulting in increased traffic through Zagreb's urban area. The main street network of the city is characterized by insufficient capacity in peak hours, insufficient number of bridges crossing the Sava River as well as the lack of an overall traffic light coordination system. Due to the lack of public transport priority lanes and traffic lane separation, public transport vehicles share the street space with all other transport modes including private car transport leading to high traffic volumes and priority conflicts. This clearly affects public transport reliability and public transport vehicles' traffic flow. The City of Zagreb suffers from traffic noise emissions. Noise levels are highest along the main roads, key intersections as well as tramway and railway tracks. Zagreb is currently preparing a strategic noise map as well. The City of Zagreb has 790 017 inhabitants (census 2011) and has marked a sudden increase in the level of motorization. The modal split is constantly shifting in favour of personal cars and thus the city centre is faced with traffic network congestion, which produces negative effects such as longer journey time, increased pollution and noise, increased number of traffic accidents and illegal parking.

The current modal share - according to the CIVITAS ELAN study 2012 - is provided as follows:

- Car as driver: 49.31
- Car passenger: 7.78
- Bus: 2.64
- Train: 0.28
- Other Public Transport: 10.5
- Cycle: 10.14
- Walk: 19.03

Sustainable transport modes in operation

The City of Zagreb has introduced a public bicycle sharing system (Netxbike system).

Car-pooling services in operation

All carpooling portals initiated by individuals, groups or organizations and their data aren't available. Carpooling development will depend on the evolution of information and communication technologies. Three segments are especially important: interoperability and integration of the databases, development of advanced systems for connection of users, openness of users towards carpooling mobile applications.

Public transport organizational model and ownerships

The public transport services are managed by Public Enterprise and private companies.

- Authorities active in PT service provision:
    - ZET, in charge of bus and tram transport throughout the City and certain neighbouring towns and municipalities. In addition, ZET used to be in charge of the gondola lift connecting Zagreb.
    - Taxi services: there are currently 4 taxi operators in the City. An operator closed its taxi service, but is planning to reintroduce it in the future. Therefore, Zagreb might have 5 operators in the (near) future.
- Operators active in PT service provision:

- ZET, public, buses (covers Zagreb Urban region and surrounding areas; 303 buses in July 2015), trams (covers mainly the downtown; 187 motor vehicles and 41 wagons in July 2015);
- Radiotaxi and ther taxi operators (e.g. Taxi Cammeo, Eko Taxi and Zebra Taxi).

Traffic simulation tool and real-time traffic data collection

Faculty of Transport and Traffic, University of Zagreb, has tested the capabilities of the programming / simulation tools CUBE (Citilabs), as well as software tools VISUM / VISSIM (PTV). Real-time information on road congestion is not being collected. There is no systematic data collection, so the real incidents are unknown. The real-time congestion information is available publicly through the radio streaming, social networks and application for mobile terminal devices.

Site mobility needs

The city's strategic mobility projects and programs focus on: the modernization of public transport, prioritizing public transport in intersection management, energy-efficiency and car use rationalization measures, integration of public transport systems into a single tariff union (bus and tram network, regional train), better use of existing railway infrastructure by providing improved service and building new stops, introduction of a light rail system and the completion of the bicycle network within the city and in the region.

Key mobility issues to address with SocialCar are as follows: the SocialCar system is expected to provides a platform for travellers to share information directly or through social media channels: to fill gaps in current available information on service status or for travellers to seek out others to potentially share part of the journey with, thereby opening up more travel options and allowing sharing of travel costs.

2.6 Ljubljana (SLO)

Transport issues

The Ljubljana municipality receives daily around 130,000 commuters to work or school from other municipalities in the wider area. Within the city 38 % of all passenger travels are made by cars, 37 % by walk and only 13 % with public transport (mainly bus and train), the share travels with bicycle is 11 %.

There are a lot of daily commuters travelling to Ljubljana by car (85 % of all from outside of the Ljubljana Municipality are coming to Ljubljana by car) which causes high congestion in the city, especially during the peak hours. The congestion is in peak-hours (7-9 AM and 15-17 PM) and mostly on the main routes to the city centre and on the motorway ring around the city. The average car occupancy in Slovenia is 1.4 passengers per car which is very poor result. In the field of transport and mobility the main problems are: low travel speed of city buses (<18km/h), relatively expensive regional bus transport (infrequent service outside main corridors), daily commuters from other municipalities causing problems with parking (lack of parking places).

Sustainable transport modes in operation

Ljubljana City Bicycle: BICIKELJ (http://en.bicikelj.si/). 32 share points, 360 bicycles, 63.000 users, 680.000 users's hour per year.

Car-pooling services in operation

There is no car-pooling/car sharing running project Ljubljana being initiated by the City. There is only one, private carpooling initiative: prevoz.org (http://prevoz.org/). For its use, users have to register first. The list of available trips is visible in the website to everyone (time, destination, type of vehicle, costs of travel) but only registered users can read telephone numbers of available trips and contact the persons offering transport.

Public transport organizational model and ownerships

The public transport services are managed by Public Enterprise and private companies.

- Authorities active in PT service provision:
  - City (municipality) of Ljubljana, provides urban bus services (operated by LPP - public bus operator in own of the City of Ljubljana)
  - Ministry of Infrastructure of the Republic of Slovenia, provides railway public passenger services for Slovenian Railways (the only railway operator), provides long distance bus transport services (concessions granted to different bus operators).
- Operators active in PT service provision:
  - Javno podjetje Ljubljanski potniški promet d.o.o. (LPP), public bus operator in city's own: the most important task of the public company LPP is to provide safe, reliable and smooth-running public transport in the area of the entire City Municipality of Ljubljana and sixteen suburban municipalities.
  - Slovenian Railways, Passenger transport company, Public, provides railway passenger services.
- Third parties relevant in the fields of:
  - Vehicle management & maintenance: City bus
  - Pricing: City Council
  - Operations: Margento B.V. provides integral City Payment System
  - Real time passenger information: Telargo d.o.o., private company, Real time system and displays with info on city bus arrivals. Info available also on internet and mobile phone apps.

Traffic simulation tool and real-time traffic data collection

Prometni institut Ljubljana owns PTV VISUM simulation tool which is the leading software program for traffic and transport analyses and allows for GIS-based data management in the field of private and public transport. Real-time information on road congestion is not being collected. Timetables for public transport are introduced into googlemaps, where it is possible to plan an intermodal journey. No real-time data available.

Site mobility needs

Because of 130.000 daily commuters coming to Ljubljana and the majority are travelling by car, a car-pooling system would be a very good solution to decrease congestion, parking problems and consequently to contribute in lower emissions and better quality of life in the city. Moreover, the middle- and long term goal of the City of Ljubljana is to improve and change the modal split in transport in favour of more sustainable transport and decreased in car use in the city.

Key mobility issues to address with SocialCar are as follows: there are a lot of daily commuters travelling to Ljubljana by car (85 % of all from outside of the Ljubljana Municipality are by car) which causes the congestion in the city, especially during the peak hours. A car-pooling system would be a very good solution to decrease congestion, parking problems and consequently to contribute to lower emission and better quality of life.

2.7 Luxembourg (LU)

Transport issues

Public transport uptake in Luxembourg grew by 50 percent over a 12-year period, with journey numbers doubling in the capital. According to the latest report by the International Association of Public Transport, nearly 92.5 million journeys were made on Luxembourg's public transport system in 2012, a substantial rise from 61.5 million in 2000. Luxembourg is the country with the second highest number of cross-border in-commuters re-corded in the European Economic Area (EEA), second only to Switzerland (see for example MKW and Empirica, 2009). Exceeding 40% (2012) of domestic employment cross-border commuters are extremely important to Luxembourg's economy and labour market in general.

The average and median commuting distance are 46.7 and 43.0 kilometres, with German commuters having a slightly longer median commute (47 km) than commuters from Belgium and France (40 km for both). Cross-border commuters predominantly arrive by car. For an estimated 80% of cross-border commuters, it represents the sole mode of transport. The respective share for commuters from Belgium, France, and Germany are 82%, 76% and 87%. 16% are estimated to use both car and public transport and a low 4% use public transport only. The employment status of the partner varies across countries of residence. The mode for commuter households from Belgium is that even the partner is a cross-border commuter (43%). In France and Germany, the mode is that one partner is a cross-border commuter, while the other is in employment in the country of residence. Still, in both countries a relevant fraction of partners are cross-border commuters, too. In France and Germany, 35% and 26% of partners commute to Luxembourg.

The current modal share (commuter trips) is provided as follows:

- Car as driver: 86% (year 2010)
- Car passenger: -
- Bus: 5% (year 2010)
- Train: 9% (year 2010)
- Other Public Transport: -
- Cycle: -
- Walk: -

Sustainable transport modes in operation

Since 2009, Luxembourg has welcomed an innovative and sustainable concept CITY MOV', which is responsible of improving mobility by offering the possibility to rent an electric car or bike. Since 2013, a car-sharing service has been set up in order to improve mobility. In Luxembourg, there 5 big free parking lot around Luxembourg City. After parking there, it is possible to take the buses or to use the car-sharing service.

A new map layer on geoportail.lu shows the entire existing bicycle sharing system (BSS) stations (layer properties EN) for the different systems. The map layer currently shows five BSS centered in the following cities: @ Luxembourg City (vél'oh!), @ Esch-sur-Alzette (Vëlok), @ Bertrange (BE Bike), @ Mamer (Mamer Vélo), @ Ettelbruck (Nordstad eMovin). Luxembourg City's vél'oh! bicycle sharing system (BSS), the largest by far with about 73 stations, was deployed in March 2008. Developed and maintained by JCDecaux, advertisements covered the majority of the infrastructure investment and day-to-day service costs.

Car-pooling services in operation

In Luxembourg, "car-pooling" is not an established concept. Today, it is only a foreseen space for cross border workers, allowing theoretically a group of people to park their cars at the border and continue driving with one car into town. Carsharing SA, presentation of that initiative will be in autumn 2015.

Public transport organizational model and ownerships

In Luxembourg, the public transport is clearly divided into missions shared between:

- the State, which has the organization authority upon the public transport
- the Community of Transports, which is a cooperation agency gathering representatives from the government, the municipalities and the passengers
- the operators, responsible of the public transportation exploitation

The public transport services are provided by:

- Autobus de la Ville de Luxembourg (AVL)
- Société Nationale des Chemins de Fer Luxembourgeois (CFL)
- Syndicat des Tramways Intercommunaux du Canton d'Esch (TICE)

- Régime Général des Transport Routiers (RGTR).

The public transport services are managed by Public Enterprise and private companies.

- Authorities active in PT service provision:
  - Ministry of Sustainable Development and Infrastructure is a ministry of the Government of Luxembourg. Its head office is in the City of Luxembourg. As of 4 December 2013, François Bausch is the Minister. It was created on 23 July 2009 as the product of a merger between the positions of Ministry for the Environment, Ministry for Public Works, and Ministry for Transport.
- Operators active in PT service provision:
  - AVL, public, Autobus (http://www.vdl.lu/Mobilit%C3%A9/Autobus.html), autobus@vdl.lu
  - Société Nationale des Chemins de Fer Luxembourgeois (CFL), public http://www.cfl.lu/enav.luxembourg@cfl.lu
  - TICE / RGTR, public/private (http://www.tice.lu/).
- Third parties relevant in the fields of:
  - Vehicle management & maintenance: Operators
  - Pricing: Ministère du Développement durable et des Infrastructures
  - Ticketing: Ministère du Développement durable et des Infrastructures
  - Planning (e.g. routes, frequency, vehicles, drivers, etc.): Verkéiersverbond
  - Journey planning: Verkéiersverbond
  - Operations: Verkéiersverbond
  - Real time passenger information: Verkéiersverbond.

Traffic simulation tool and real-time traffic data collection

Real-time information on road congestion is being collected.

'"Mobiliteit.lu" is a web site and app (https://play.google.com/store/apps/details?id=de.hafas.android.cdt) that offers detailed information before and during the journey with the public transport in the Grand-Duchy of Luxembourg. All relevant information and services for journey by bus and train can be searched as follows: Timetable information with door-to-door journey-planner, Connection details with intermediate stops, Departure and arrival tables for individual stops, Indication of the nearest stops based on your actual location, Search for stops and addresses, Display of local area maps and pedestrian routes in the application, Live timetable information for all buses of the City of Luxembourg. The service is provided by Verkéiersverbond.

Site mobility needs

In 2012, Luxembourg's then government set itself a target of reducing motorised traffic on the Grand Duchy's roads so that a quarter of all transport is sustainable by 2020. Sustainable transport was defined as public transport, along with walking, cycling, car-pooling and car-sharing and electric mobility.

In order to improve the traffic flow, to reduce the noises and to reduce CO_2 emissions, the city of Luxembourg should develop a new "smart city" solution. The innovative, sustainable mobility concept should be based around strategically-placed 'Hubs', which will provide a number of complementary services such as parking, electric car charging, new train stations and bus stops, etc.

Key mobility issues to address with SocialCar are as follows: key mobility issues that are envisaged in Luxembourg, is to reduce traffic in and around the city of Luxembourg. Around 150.000 people are coming into Luxembourg each day. These people are using their car instead of public transport, car sharing, etc. The main highroad from the south of the country experiences the highest number of commuters with around 80.000 persons (80% are car drivers) P&R are not used as expected and people are driving with car in the city.

2.8 Brescia (IT)

Transport issues

The current modal share is provided as follows:

	All trips (% mode share) 2014	Commuter trips (% mode share) 2014	Other trips (% mode share) 2014
Car as driver	60,9	57,8	61,4
Car passenger	11,4	12,6	11,1
Bus & Train	13,5	15,1	13,4
Motorcycle	1,9	2	1,9
Bicycle	3,3	3,4	3,2
Walk	8,7	8,7	8,7
Other	0,3	0,3	0,3

Data for the Province: font: Regione Lombardia 2014

Sustainable transport modes in operation

The start-up of Brescia metro line in year 2013 allowed the integration of innovative systems: bike-sharing network, automated-metro line, train and bus services. The main goal is the reorganization of LPT network, in order to enlarge the positive effects of the new metro line. In Brescia, there is a bike sharing system called BICIMIA as follows:

- Active stations 69;
- 16.000 subscribers;
- 534 total number of bike;
- service is free under 45 minutes of use.

BICIMIA APP and BSMOVE APP, Brescia Mobilità manages the bike share.

Car-pooling services in operation

Before the beginning of the EU CIVITAS plus MODERN project, no experimentation of the Car-pooling service was ever made in Brescia. At the most "Car-pooling" was spontaneously practiced by citizens. Thanks to the participation to the CIVITAS project for the first time it was possible to experiment a car-pooling service managed by an external company, which provided the data logger and the software to automatically calculate the car-pooling crews and the fares.

Public transport organizational model and ownerships

The public transport services are managed by Public Enterprise and private companies.

- Authorities active in PT service provision:
  - Municipality of Brescia, local public transport in the city of Brescia,
  - Province of Brescia, local public transport in the Province
  - Agenzia per il Trasporto Pubblico Locale, not yet operational
- Operators active in PT service provision:
  - Brescia Trasporti, public, BST currently operates in the Urban Area of Brescia Municipality,
  - ARRIVA, public, operates in three areas as follows: CONSORZIO TRASPORTI BRESCIA NORD Province of Brescia - about 8.250.000 bus/km equal to 85% of the service; CONSORZIO TRASPORTI BRESCIA SUD Province of Brescia - about 1.850.000 bus/km or

22% of the service; Urban Area of the Municipality of Brescia - about 1.550.000 bus/km equal to 15% of the service.

- APAM, public, operates in four areas as follows: CONSORZIO TRASPORTI BRESCIA NORD Province of Brescia - about 138.000 bus/km equal to 2% of the service; CONSORZIO TRASPORTI BRESCIA SUD Province of Brescia - about 570.000 bus/km or 7% of the service; Urban Area of the Municipality of Mantova - about 2.079.000 bus/km equal to 27% of the service; Province of Mantova - about 4.854.000 bus/km equal to 64% of the service.

- Third parties relevant in the fields of:
  - Vehicle management & maintenance: BST, ARRIVA, APAM
  - Pricing: Municipality of Brescia
  - Ticketing: Municipality of Brescia
  - Planning (e.g. routes, frequency, vehicles, drivers, etc.): Municipality of Brescia, Province of Brescia, Agenzia per il Trasporto Pubblico Locale
  - Journey planning: Municipality of Brescia, Province of Brescia, Agenzia per il Trasporto Pubblico Locale
  - Operations: Municipality of Brescia, Province of Brescia, Agenzia per il Trasporto Pubblico Locale
  - Real time passenger information: BST, APAM

Traffic simulation tool and real-time traffic data collection

The Brescia Mobilità Group has available the CUBE-VOYAGER macro simulation tool, which provides traffic data for the whole road network. Models can count on the availability of traffic data (which are taken from the traffic counters spread all over the city), on the origin/destination matrix on the road network model. Traffic simulation concerns not only the private traffic flows, but also the LPT ones. This allows developing and studying mobility scenarios characterized by a different levels of integration between individual/collective transport networks. Several providers give the online/mobile journey planning information services: Google transit, Nokia, Bing, Moovit. BST already makes available information on LPT to the various providers which supplement them into their journey planning information services. The range of public transport information services which operate in the area is 80 electronic display boards at bus stops (providing real-time information) as well as 34 display devices in metro with audio messages in stations and wagons.

Site mobility needs

Carpooling service should be introduced in Brescia in order to enlarge the offer of alternative sustainable transport services. Carpooling service should be strongly integrated with the other transport services (especially public transport) in order to promote intermodality; through communication channels, with real-time information coming from travellers' web communities (crowdsourcing), Brescia aims at achieving a better understanding of the needs of citizens in terms of mobility.

Key mobility issues to address with SocialCar are as follows:

- extensive use of private vehicles, as drivers;
- low average car occupancy rate;
- disruptions or critical situations (change in direction or similar events) could been regulated through SocialCar, which could give a solution in all those cases; this would be very important because at the moment the management of disruptions is the most difficult situation for public transport company.

2.9 Turin (IT)

Transport issues

Relevant transport statistical data are provided for the territory of Turin as follows:

- Motorization rate: about 63%.
- Average trips (weekday): about 3,43 million. 2,46 million motorized.
- Trips per day per person: 2,44 (1,75 motorized).
- Modal split: 53% private car, 19% public transport, 28% other modalities
- 79% travel for study and/or work.
- Peak hours: 7-9 am; 5-7 pm.
- Peak hour: 7:30 to 8:30.

The current modal share is provided as follows:

- Car as driver: 43%
- Car passenger: -
- Bus: -
- Train: -
- Other Public Transport: 23%
- Cycle: 4%
- Walk: 29%

Sustainable transport modes in operation

There is a bike sharing system in the city, there are 100 station and about 700 bikes. The users are about 40.000 customers. The name company name is TOBIKE (http://www.tobike.it).

Car-pooling services in operation

There is an active car-pooling system in the city of Turin so-called "Bringme Carpooling & Autostop" which is the largest Italian community of car-pooling. The web portal of "Bringme Carpooling & Autostop" (www.bring-me.it/carpooling) was launched in September 2011. An innovative App ("Carpooling Certificate") was active at December 2012 able to certificate car-pooling trips. This App allows to certificating carpooling and assessing its benefits. The web platform allows users to register own profile to be shared with other registered users (carpoolers) within a community covering the Italian territory. Another carpooling system which is active in Turin is "BlaBlaCar" which is a European wide online platform with a community of more than 8 million of registered carpoolers. This service is not real time and it is mostly used for long journey

A novel Car-pooling experience will be launched by the Move+ project. The project is aimed at designing and implementing a web-based platform (including dedicated App) for dynamic ride sharing in the metropolitan area of Turin. This platform will be able to supply travellers the following services: navigation and routing system, network of geo-referenced pick-up points, service for mobility credits exchange among the car-pooling users and a social network.

Public transport organizational model and ownerships

GTT (Gruppo Torinese Trasporti) manages the public transport networks.

The public transport services are managed by Public Enterprise and private companies.

- Authorities active in PT service provision:
  - City of Turin
  - Piedmont Region

  - Agenzia della mobilità metropolitana
- Operators active in PT service provision: GTT e Trenitalia
- Third parties relevant in the fields of:
  - Vehicle management & maintenance: Iveco
  - Pricing: City of Turin
  - Ticketing: 5T - GTT
  - Planning (e.g. routes, frequency, vehicles, drivers, etc.): 5T - GTT
  - Journey planning: 5T - GTT
  - Operations: -
  - Real time passenger information: 5T - GTT

Traffic simulation tool and real-time traffic data collection

The macro-simulation tool used is based on the traffic model, so-called the MT Model. The traffic supervisor of the metropolitan area of Turin is based on the MT Model. Real-time information on road congestion is being collected. This information is collected by the public company 5T (www.5t.torino.it).

Congestion information is made available in real time on 5T website or in Google Maps.

Site mobility needs

In the short-term, the project represent an opportunity to develop innovation and sustainable mobility initiative as supporting action within the defined SUMP of Turin. In the long-term, the innovation which will be brought by SOCIALCAR will boost a new economic and social mobility model able to properly face the actual low connection of the public transport network with the suburban conurbations of Turin by a more integrated multimodal transport system. The combination of an integrated car-pooling system and a future polycentric public transport network will allow to properly face the most relevant arisen mobility problems by reducing vehicles circulation in peak hours, crossing trips, congestion and pollutant emissions. Key mobility issue to address with SocialCar is a new sharing services to replace the PT where demand is weak.

2.10 Skopje (MC)

Transport issues

Total approximatively of 240.000 travelers in Skopje daily including the commuters.

The current modal share is provided as follows:

- Car as driver: 110.000 (2009) per day 24,3 % (private transport)
- Car passenger: 9.3 % car passengers
- Bus: 77.000 passengers per day 30 % (public transport)
- Train: -
- Other Public Transport: -
- Cycle: 1.4 % use bicycle
- Walk: 35% from daily commuters

Most trips in the city are carried out to return home (47.2%) and going to work (22.3%) – Study on Traffic 2000. According to the same study, the preferred means of transportation is the public transportation (34%), walking (33.5%) and passenger vehicles (28.4%). It is determined by the Traffic Study that average daily mobility of the residents of the City of Skopje is 2.11 trips per capita, which consist of: 0.71 trips by walking, and 1.40 trips by other means of transport. Today, through the center of the City passes a significant portion of traffic, disrupting the main walkway and causing safety hazards, noise and air pollution. With the expansion and the suburbanization of the city, and given its economic role in the region, the city has seen a continuous

rise of people who commute in from outside. In 2009, a staggering 94,000 people, or around 18% of Skopje's population, commuted in and out of the city. The large majority of those (55,442) used private cars.

Sustainable transport modes in operation

There is a rent bike system in the territory of the City of Skopje. 5 parking lots on 5 different locations. 325 renting bikes.

Car-pooling services in operation

City of Skopje has not any Car-pooling experience.

Public transport organizational model and ownerships

The public transport services are managed by Public Enterprise and private companies.

- Authorities active in PT service provision: PE for Public transport Skopje (JSP Skopje),
- Operators active in PT service provision:
  - PE for For Publuc Transport Skopje (JSP SKOPJE), Public, 460 busses
  - JV Mak Ekspres, Private, 30 busses, Ivan Agovski bb
  - Jv Sloboda Prevoz, Private, 180 busses, Kacanicki pa bb
- Third parties relevant in the fields of:
  - Vehicle management & maintenance: City of Skopje, Council of the City of Skopje
  - Pricing: City of Skopje, Council of the City of Skopje
  - Ticketing: City of Skopje, Council of the City of Skopje
  - Planning (e.g. routes, frequency, vehicles, drivers, etc.): City of Skopje, Council of the City of Skopje
  - Journey planning: City of Skopje, Council of the City of Skopje
  - Operations: City of Skopje, Council of the City of Skopje
  - Real time passenger information: City of Skopje, Council of the City of Skopje (eb site (www.jsp.com.mk)

Traffic simulation tool and real-time traffic data collection

City of Skopje use VISUM traffic macro-simulation tool. Real-time information on road congestion are collected. Skopje has developed a CUKS (traffic management control center), which collects this data on daily basis. City of Skopje placed 6 electrical boards across the city area which provide real-time information for the congestion or closed roads. There is an app for route planning called Skopje Green route. It was developed with USAID grant for the City of Skopje.

Site mobility needs

Skopje has a vision that by 2020 it will be a viable, energy-neutral and attractive town existing in harmony with its inhabitant and in balance with nature. Skopje has adopted a strategy for the development of a sustainable urban transport system with a particular focus on the development of public transport. The quality of the service is improved through real-time passenger information, and smart ticketing solutions based on an integrated fare system for all PT services.

Key mobility issues to address with SocialCar are as follows: lowering the number of private owned vehicles pick time periods as well as lowering the emission and congestion.

3. Test planning

This section is aimed at defining the overall test plan, which will guide the relevant partners in an effective planning and implementation of the SocialCar system tests, stakeholders' involvement as well as evaluation in the respective territories.

The objective is to define a set of structured information based on a standard framework following the 5W2H approach (What, Why, Where, When, Who, How, How much).

The main data which will be collected are: transport and mobility needs (What), scope of testing (Why), demo area (Where), time plan of testing (When), local stakeholders involved and roles in the testing activities (Who), test running levels namely Test A, Test B and Test C (How), final results of impact and process evaluation (How much). Table 1 summarizes combinations between project sites and test levels.

Site name	Test A	Test B	Test C
Canton Ticino (CH)	X	X	X
Edinburgh (UK)	X	X	X
Lazio Region (IT)	X		
Zagreb (HR)	X	X	
Ljubljana (SLO)	X		
Luxembourg (LU)	X		
Brussels (BE)	X	X	X
Brescia (IT)	X		
Turin (IT)	X	X	
Skopje (MC)	X		

Table 1 - Matrix of site/test level combinations

3.1 Test A: Technical and functional testing of SocialCar for the system rollout

Objective of the Test A is to:

- test the usability and friendliness of the different SocialCar system's components and services by involving local stakeholders (project's partners and subcontractors only) in all the test sites;
- provide technical and functional debugging to the system (including its usability, accessibility, ease of use, robustness as well as functionality) before the real testing, by interactions with the system's developers.

Key data input is to clearly define the SocialCar components and services as a whole which will be developed in the previous WPs (WP3 designs the system and WP4 implements the system). This information will enable to properly plan needed resources (skilled persons) and working days for testing the different components and services of the SocialCar platform. The entire SocialCar app is a highly integrated client-server application. The test will be mostly focused on the client functionality ("front-end" applications).

A preliminary overview of the SocialCar system's components and services - which will be updated and finalized according with WP2, WP3 and WP4 results - is provided in the below table.

	Back-end architecture	Front-end application
SocialCar components and services	Service module for users' registration Data collection module (crowdsourcing transport data, open PT data) Users' data collection module (behaviours, preferences, etc.) Module for integration of crowd and behavioural data Dispatching module GIS infrastructure module (transport supply, graph model) Interface with all data (collection and elaboration) Trip planning (trip calculation algorithms) Ride matching and route planning algorithms Traffic modelling Tariff and payment module Reporting module	Multi-platform user interface (web, app) User registration User profiling Trip request (options, acceptance) User data (behaviours, preferences, etc.) Notification system module (traffic, accidents, etc.) Registration, login, authentication, profile editing and deletion Seeking a ride, selecting/reviewing trips Offering a ride, or other service Ride management (remainders, messaging, review, monitor, notifications, rating) Payment.

Table 2 - The SocialCar components and services

Test A will start with the setup of the system:

- uploading the site related data to the server, solving the data availability and accuracy problems,
- setting up the server (one server for all 10 sites or local server for each site).

Data collection method to test the usability and friendliness of the SocialCar system will be mainly based upon standard questionnaires which will ask for qualitative feedbacks by involving local stakeholders (project's partners and subcontractors) on usability, acceptability, easiness, robustness as well as functionality of the system's components and services. The method for the data collection will be **questionnaires** and **group meetings** with the identified experts which will perform the envisaged test.

The Test A will have strong linkages and synergies with the Task 4.6 Service roll-out, led by CERTH.

This task is aimed at carrying out tests of the technological system and all its components in order to calibrate services and verify any flaws in any component of the system. Effective synergies between Test A (WP5) and sub-task 4.6.1 (WP4) will be set up, in order to cooperate and exchange findings.

The Test A is expected to run by different steps which will include:

- test design (step 1),
- technical and functional test implementation (step 2),
- developers implementation of testers' feedbacks and results (step 3),
- final validation by expert users (involved in test implementation) of technical and functional improvements implemented by the SocialCar developers (step 4).

Figure 1 – The steps of Test A

The first step is characterized by preliminary activities necessary to design test workflow, standard questionnaires as well as communication process between a sample of site-based testers (skilled personnel within the respective organisation and/or external experts) and the SocialCar system's developers. In this respect, a preliminary stakeholder's engagement action will be implemented during the first and second site Consultation Group Meeting (WP8) planned respectively in September 2016 and December/January 2016.

A detailed, easy to follow test workflow will be developed. The questionnaire can be the part of this workflow document. It can be an online interface to speed up the testing, feedback, bug fixing process.

CERTH will centralise the process as the lead partner of Test A. The developers will translate testers' feedbacks into suggested improvements and further system's calibrations.

The second step is aimed at setting up technical and functional test implementation by the engagement of identified site-based testers which should be internal and/or external experts in the field of transport planning, mobility management, PT planning and management, ICT-based experts, etc., to enable covering the different SocialCar components and services to be tested.

The third step is aimed at collecting site testers' feedbacks – using standardised questionnaires – to enable forwarding these feedbacks and requests directly to the competent developers of SocialCar. Use of standardised questionnaires will allow getting insight on Advantages (reliable and valid findings) as well as Disadvantages (rigid and not tailored to pilot needs and requirements). This will allow establishing baseline to capture current experiences and practices. The developers will be in charge of fine-tuning and improving the SocialCar platform's performances based on bottom-up approaches through received feedbacks as well.

The last step (step 4) is the final validation by aforementioned testers of the SocialCar system which will be updated and improved by respective developers according to the feedback received during the testing phase.

Involved partners are as follows:

- **CERTH (lead partner),**
- UWH,
- SUPSI,
- Canton Ticino (Planidea, SUPSI), Skopje, Edinburgh (SEStran and Liftshare), Lazio Region, Zagreb, Ljubljana, Luxembourg, Brussels (Taxistop), Brescia, Turin.

Timing of Test A: 1st December 2016 (M19) – 31st May 2017 (M24)

The set of structured information about Test A is described below based on 5W2H approach (What, Why, Where, When, Who, How, How much). Main data which will be collected are as follows:

- what Test A is (What),
- objective of Test A (Why),
- on site testing (Where),
- time plan of testing and evaluation (When),
- involved stakeholders - both users and developers - and roles (Who),
- how Test A will run and needed facilities (How),
- final results and validation of by relevant KPIs (How much).

Subject matter**: WHAT?**

Test A is intended to identify all technical and functional bugs of the system. During the test A, the system usability (e.g. more efficient to use, easier to learn, more satisfying to use), friendliness, robustness (e.g. to cope with errors during execution), accessibility and functionality (e.g. the sum or any aspect of what a product can do for a user) of different system components will be examined. Based on the availability per mode and per site, the results are depicted on the public transport (as example).

Public Transport - 1) Only if SocialCar delivers a format that needs to be used and filled by the sites

Public transport data needed for journey planning structured per stop-stop-relation		**Brescia**	**Brussels**	**Canton Ticino**	**Edinburgh**	**Lazio Region**	**Ljubljana**	**Luxembourg**	**Skopje**	**Torino**	**Zagreb**
CompanyID	ID of the PT operator	X	X	X	X	X	X	X	X	X	X
CompanyName	Name of the PT operator	X	X	X	X	X	X	X	X	X	X
StopID	ID of the stop origin	X	X	X	X	X	X	X	X	X	X
StopName	Name of stop origin	X	X	X	X	X	X	X	X	X	X
StopGPS	GPS coordinators per stop	X	X	X	X	X	X	X	X	X	X
NextStopID	ID of stop destination	X	X	X	X	X	X	X	X	X	X
NextStopName	Name of stop destination	X	X	X	X	X	X	X	X	X	X
Modality	Bus, tram, metro or train	X	X	X	X	X	X	X	X	X	X
LineID	Public line number	X	X	X	X	X	X	X	X	X	X
TripID	To connect stop-stop relations	X	X	X	X	X	X	X	X	X	X
Timetable-1	Scheduled departure times	X	X	X	X	X	X	X	X	X	X
Timetable-2	Real time departure times					X		X	X	X	
Timetable-3	Scheduled trip name	X	X	X	X	X	X	X	X	X	X
Pricing	Structured data on tariffs	1)	1)	1)	1)	1)	1)	X	1)	1)	1)
Service info	structured data on service	1)	1)	1)	1)	1)	1)	1)	1)	1)	1)

Purpose: WHY?

The Test A is performed in order to identify all technical and functional bugs of the system and provide feedback to T4.6 (System Rollout). Functional bugs are related to functionality of application whereas technical bugs are associated with technical issues in application.

Location: WHERE?

Canton Ticino (CH), Edinburgh (UK), Lazio Region (IT), Zagreb (HR), Ljubljana (SLO), Luxembourg (LU), Brussels (BE), Turin (IT), Skopje (MC), Brescia (IT)

Timing: WHEN?

- Test design (step 1): 1st December 2016 – 31st January 2017
- Technical and functional test implementation (step 2): 1st February 2017 – 31st March 2017
- Collect and implementation of testers' feedbacks (step 3): 1st March 2017 – 30th April 2017
- Users' final validation of implemented improvements (step 4): 1st May 2017 - 31st May 2017

	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05
Technical and functional testing for the system rollout																	
Step 1: Test design																	
Step 2: Technical and functional test implementation																	
Step 3: Collect and implement of testers' feedbacks																	
Step 4: Final validation																	

Involved partners and stakeholders: WHO?

All SocialCar test site leaders and SocialCar developers are involved, in particular:

- test planning (step 1): CERTH, Movenda, UWH, SUPSI
- technical and functional test implementation (step 2): Canton Ticino (CH), Skopje (MC), Edinburgh (UK), Lazio (IT), Zagreb (HR), Ljubljana (SLO), Luxembourg (LU), Brussels (BE), Brescia (IT), Turin (IT)
- collect and implementation of users' feedbacks (step 3): CERTH, Movenda, UWH, SUPSI
- users' final validation of implemented improvements (step 4): Canton Ticino (Planidea, SUPSI) (CH), Skopje (MC), Edinburgh (UK), Lazio (IT), Zagreb (HR), Ljubljana (SLO), Luxembourg (LU), Brussels (BE), Brescia (IT), Turin (IT)

Depending on the needs that will be identified by the test site partners at each site, relevant developers will be invited to participate in the Test A process (considering as well the functions that will be developed).

Method: HOW?

Standard questionnaires and group meetings will be used to collect data and perform the envisaged test. In order to examine the functional and technical bugs and increase system performance a list of indicators will be tested and fixed upon needs. These indicators are linked with the clarity of alerts schedules, itineraries, updates, the sufficiency of the description of the information provided by the system, the sufficiency of alerts and notifications, the user friendliness on requests, notifications, alerts, interaction with the system, the time of response of the system, the total time for information provision etc. Test A will have strong linkages and synergies with the Task 4.6 led by CERTH. This task is aimed at carrying out tests of the technological system and all its components in order to calibrate services and verify any flaws in any component of the system.

Impacts: HOW MUCH?

The test will be working till the system will be fully functional and accepted and attractive by potential users.

3.2 Test B: Site specific simulated experiments based on traffic macro-simulation models

Objective of the Test B is to:

- implement SocialCar site-based simulated experiments based on traffic macro-simulation models in the five selected sites equipped with appropriate simulation models as well as a car-pooling system in operation;
- feed macro-simulation models in the five selected sites with multimodal public transport data, time traffic data as well as car-pooling data to evaluate the impact of using SocialCar into their territories.

Impact assessment of using the SocialCar system will be performed in Test B in simulated environments by running macro-simulation models which will be adapted by the involved sites (including possible support of subcontractor if needed according with allocated budget).

Final outcome is the estimation of potential impacts of the SocialCar system adoption in simulated scenarios in terms of mobility performance according with the defined KPIs. Commuting trips will be the core traffic category which will be considered for the simulation of mobility performance in a future time according with potential SocialCar uptake scenarios. Final outcome is the estimation of potential impacts of the SocialCar system, based on a range of adoption (usage) scenarios, in terms of both transport and mobility performances for evaluation areas namely environment, energy, society as well as economy. Generally, transport modelling software packages are classified in three major categories micro, meso and macro simulation respectively. The definitive factor that differentiates each category is the level of detail of actual representation of reality.

Macro simulation models allow analyses of mobility at a city or metropolitan level in an aggregate way. Macro simulation models are based on powerful software packages that allow for simulation of complex transport networks and their characteristics. The tools simulate the transport system's operation as well as people's choices and behaviour at present or in a future time, according to the envisioned scenarios. They take account of previous survey data as to origin and destination. Traffic survey data are used to build a representative model of current traffic patterns.

The macro-simulation models which will be used by the SocialCar site partners are indicated below.

SocialCar Site	Name of macro-simulation model	Ownership/Management
Brussels (BE)	MUSTI	Brussels Mobility (regional administration)
Canton Ticino (CH)	VISUM	External (TransOptima GmbH)
Edinburgh (UK)	CUBE	External
Turin (IT)	VISUM	External
Zagreb (HR)	VISUM	External

Table 3 - The site-based macro-simulation models and ownership/management

Notwithstanding specific differences between the models, common key data inputs are listed as follows:

- road transport graph (arcs and nodes),
- public transport network and supply data (i.e. PT route, timetable and capacity data),
- transport supply data by most common standard formats (text file, excel file, shapefile, GTFS-General Transit Feed Service/Google Transit),

- origin-destination demand matrices for public transport,
- origin-destination demand matrices for private traffic (individual motorized traffic),
- traffic data used to update the a-priori estimates of travel demand matrices and build a representative model of current traffic patterns,
- carpooling service data (only for some models).

A key issue is represented by the need of feeding macro-simulation models with estimates of the level of change of individual mobility patterns as direct effect of the introduction of the SocialCar system. Potential level of use of the SocialCar system will be hypothesized for different journey/trip purposes such as work (commuters), education (commuters), business (not systematic travellers), etc.

In this respect, local stakeholder involvement is needed in order to allow the engagement of a sample of car drivers, carpoolers as well as PT users (around 100 travellers at each site) to estimate the level of acceptance of the SocialCar system on a wide group of users.

Technology Acceptance Model (TAM) questionnaire will be designed and administered to carpooling users and citizens (car driver, PT users) to quantify the potential mobility behaviour change, by way of estimating the modal shift from the private car driver mode towards making connected journeys that include both carpooling services and public transport. When available, such estimates will also be updated with results of previous studies and surveys undertaken at the local level.

The basic concept behind TAM is represented by different assessment steps which include individual reactions to using information technology, intention to use information technology as well as actual use of information technology. The choice of using TAM is based on the following main criteria:

- TAM questionnaires are standard and validated,
- TAM questionnaires are concise and easy to administer,
- TAM questionnaires can be used to assess attitude and motivation before implementing pilot activities,
- TAM questionnaires can be repeated to assess evolution of the relationship with the SocialCar system,
- TAM questionnaires can be adapted to different users' groups as well.

The results of behavioural change analysis will feed macro-simulation models, allowing a quantitative assessment of the impact of the SocialCar solution. Data will be collected through **survey** using the aforementioned TAM questionnaire.

Focus groups with a selection of users involved in the surveys will allow to start gathering qualitative indications on the opportunities and barriers to the diffusion of the SocialCar system (process evaluation).

The Test B is expected to run by different steps which will include as follows:

- test design (step 1),
- input data collection (step 2),
- running traffic macro-simulation model (step 3),
- setting simulated scenarios and assessing relevant KPIs (step 4).

Figure 2 – The envisage steps of Test B

The first step is characterized by preliminary activities necessary to define workflow as well as to timely engage macro-simulation models experts (owners or managers) for the site partners who will implement Test B. This first step finally includes the adaptation of the selected models (see Table 3) to capture effects of SocialCar needs to be done prior to running the model (step 3).This activity will be led by **LuxMobility**.

The second step (step 2) is aimed at collecting all input data needed to feed the macro-simulation models which will be used for running traffic simulations. Once the macro-simulation model to be used for each site is defined, each site partner will be in charge of providing a complete list of data input necessary for running macro-simulations as well as the information of relevant data availability.

To integrate the model-based transport supply and demand data (including carpooling data provided by existing carpooling service providers) with SocialCar potential user-based data, specific survey and focus groups - led by **ZIGHT** - will be implemented using TAM questionnaire before launching step 3.

The third step (step 3) is aimed at implementing site-based simulated experiments based on macro-simulation models identified in step 2 in the respective project sites equipped with these models and a carpooling system already in operation. These simulation experiments will both help to identify potential traffic and transport scenarios at macroscopic level and estimate impacts of the SocialCar system adoption in each respective project site by defined KPIs. Mobility scenarios will be characterized by different levels of integration between individual/collective transport journeys as well as car-pooling use.

The last step (step 4) is the final elaboration of the impact assessment based on the defined set of evaluation criteria and indicators identified in chapter 4 of this deliverable. The outcome of Test B will enable to estimate potential quantitative/quantitative impacts (transport, environment, energy, society and economy) as cause-effect relationships resulting from the behavioural change analyses undertaken in the respective territories and uptake scenarios. Elements arising from the TAM surveys will also highlight perceived potentials and barriers to the diffusion of the SocialCar system.

The activities covering step 1, step 2, and step 3 will be coordinated by **Luxmobility**, as the lead partner of Test B, with the support of VECTOS. The last step (step 4) will be led by **UNIABDN**, based upon its key role of the "SocialCar Evaluation Manager" to elaborate test evaluation results based on defined criteria and model-based KPIs. Involved partners are as follows:

- **Luxmobility (lead partner),**
- ZIGHT,
- ABACUS,
- UNIABDN,

- VECTOS,
- Canton Ticino (Planidea, SUPSI), Edinburgh (SEStran, Liftshare), Brussels (Taxistop), Turin, Zagreb.

Timing of Test B: 1st September 2016 (M16) – 30th November 2017 (M30)

The set of structured information about Test B is described below based on 5W2H approach (What, Why, Where, When, Who, How, How much). Main data to be collected is as follows:

- what Test B is (What),
- objective of Test B (Why),
- demo areas of testing (Where),
- time plan of testing and evaluation (When),
- involved stakeholders and roles (Who),
- how Test B will run and needed software / model (How),
- final results and assessment by relevant KPIs (How much).

It will be essential that the macro-simulation models will be able to point out multimodal mobility scenarios including private cars, different type of public transport (schedules and capacities), car sharing as well as carpooling services. SocialCar will provide multimodal trips planning: macro-simulation models should be able to reflect connections between mean of transport. An essential requirement is represented by the use (as data input of macro-simulations) of origin-destination matrices related to different type of travellers using private car as well as PT services.

The **site-based plan** is below described with the contribution of the respective Site Partner involved in Test B.

Key needs, which are addressed in the test B planning and design phase, are listed as follows:

1) need to be able to assign demands to appropriate modes, including multiple modes for connected journeys where appropriate (need to know how the models at each site currently represent these different modes);
2) need to be able to capture perceived benefits that better information provides (need to know what components are included in the generalised costs used in models at each site and what weightings and penalties are applied);
3) need to modify networks in assignment model to create adequate combined network to reflect connected trips;
4) need to make suitable adjustment to parameter values and coefficients used in the assignment model to reflect the SocialCar system's benefits;
5) need to answer (once the assignment models are set-up correctly to capture SocialCar impacts) to the questions:
    - What proportion of each user segment /traveller type is likely to use SocialCar app (through TAM survey enabling to build set of Low / Medium / High uptake assumption)?
    - What changes in behaviour can be expected from the different user segment / traveller types for different trip purposes?
    - What are the impacts of different SocialCar uptake scenarios?

3.2.1 Brussels (BE)

Subject matter: WHAT?

Impact assessment of using the SocialCar system will be performed in simulated environments by running MUSTI macro-simulation model used by Regional mobility administration of Brussels. Commuting trips will be the core traffic category which will be considered for the simulation of mobility performance.

The Brussels-Capital Region faces significant traffic congestion issues during its peak travel hours. This congestion is the result of two primary groups of commuters. The first involves the 52% of the commuter population traveling daily from Belgium's two other regions, Flanders and Wallonia, to the Brussels-Capital Region for work. This generates 350,000 daily commuters into the Brussels-Capital Region, of which 225,000 are using private vehicles to travel. The second group comprises commuters who live in the Brussels-Capital Region and travel within the Region. Approximately 175,000 out of 400,000 cars traveling every day in the Brussels-Capital Region are from the Region. Traffic congestion in the Brussels-Capital Region can be addressed only as a metropolitan-area issue given that the flow of traffic spans the regions of Flanders and Wallonia, as well as the municipalities comprising the Brussels-Capital Region.

Purpose: WHY?

Macro-simulation model is expected to generate mobility and traffic scenarios for different timeframes including baseline scenario (base case - current traffic patterns), future scenarios without the SocialCar solution (do nothing) as well as future scenarios with the usage of SocialCar system (uptake scenarios).

Macro-simulations will enable to define:

1) Baseline transport and mobility scenario (base case – current situation)
2) Future envisaged scenarios with SocialCar system
3) Future envisaged scenarios without SocialCar system

Location: WHERE?

The demo area will be the Brussels Capital Region (19 municipalities).

Both inbound and outbound trips will be considered as well. In the SocialCar app carpool trips will be integrated towards, through or from Brussels with a maximum distance of 60 kms.

Timing: WHEN?

- test design (step 1): 1st September 2016 – 30th November 2016
- input data collection (step 2): 1st December 2016 – 31st March 2017
- running traffic macro-simulation model (step 3): 1st April 2017 – 31st July 2017
- setting simulated scenarios and KPIs assessment (step 4): 1st August 2017 – 30th November 2017

	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31
	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
Site specific simulated experiments																	
Step 1: Test design																	
Step 2: Input data collection																	
Step 3: Running macro-simulation model																	
Step 4: Setting scenarios and KPIs assessment																	

Involved partners and stakeholders: WHO?

- test design (step 1): Luxmobility, VECTOS, ABACUS, UNIABDN
- input data collection (step 2): ZIGHT, ABACUS, Taxistop, UNIABDN, PT service planners / providers (authorities / operators), third parties, citizens (car drivers, carpoolers), PT users
- running traffic macro-simulation model (step 3): Taxistop, Luxmobility, VECTOS, UNIABDN
- setting simulated scenarios and KPIs assessment (step 4): Taxistop, UNIABDN

Method: HOW?

Taxistop is in contact with the Regional mobility administration of Brussels. They are using the MUSTI tool, and they confirmed already the willingness to support us. In September 2016 there will be a first meeting, to define the collaboration within the SocialCar project. The contact person was suggested by STIB, the public transport operator who works together with the capital region to use MUSTI as macro-modelling tool.

Once the assignment model is set-up to capture SocialCar impacts, different SocialCar uptake scenarios will be defined based on survey (by TAM questionnaires) and focus groups' results as planned in the second step.

Necessary data input for feeding the macro-simulation model is as follows:

- road transport graph (arcs and nodes): *to be analysed in September 2016*
- public transport network and supply data: Data from trains (SNC), local public transport STIB, and inbound buses are already available in GTFS format.
    - PT schedule data: Actual data
    - PT infrastructural data: Actual data
    - PT tariff data: Actual data
- origin-destination demand matrices for public transport: *to be analysed in September 2016*
- origin-destination demand matrices for private traffic (individual motorized traffic): *September 2016*
- traffic survey data used to build a representative model of current traffic patterns: *September 2016*
- Existing carpooling data: Carpool data from Taxistop, actual real-time data is available and connectable.

3.2.2 Canton Ticino (CH)

Subject matter: WHAT?

Impact assessment of using the SocialCar system will be performed in simulated environments by running VISUM macro-simulation model. Cross border (with Italy) commuting trips will be the core traffic category which will be considered for the simulation of mobility performance.

According to the 2010 Swiss Mobility and Transport Microcensus (FSO/ARE, 2012), the average daily distance travelled in Ticino is equal to 29,1 kilometers. On average, people travel for 75 minutes per day.

Car is the dominant means of transport: on average, people use cars for 77% of the daily kilometers they travel: 57% of the kilometers (16.6 kilometers per day) as drivers and 20% of the kilometers (5.9 kilometers per day) as passengers. On average, public transport is only used for 3% of the kilometers (3.1 kilometers per day) and the same holds for slow mobility (2% of the kilometers, equal to 2.1 kilometers per day).

Specific insights are available for car-based mobility: in 2014 a survey by the Cantonal authorities for the transport sector estimated that on average every day 130'000 cars circulate in Ticino for commuting purposes; 50'000 of them are trans-national commuters, coming from Italy (Source: "Traffico transfrontaliero: rilevamento presso i valichi di confine", Sezione della mobilità, August 2015).

According to interviews performed at the borders with Italy in Autumn 2014 within the same survey, the average car occupancy rate was estimated to 1.28. In more detail: for commuting routes, the occupancy rate lowers to 1.14; for leisure time routes, instead, occupancy rate was estimated equal to 1.53. Interviews also indicated that 19% of the commuters for working purposes already carpools with other persons; 62% of the commuters declared they would be willing to carpool in the future, while 19% of them declared they would not carpool.

Purpose: WHY?

Macro-simulation model is expected to generate mobility and traffic scenarios for different timeframes including baseline scenario (base case), future scenarios without the SocialCar solution (do nothing) as well as future scenarios with the usage of SocialCar system (uptake scenarios).

Macro-simulations will enable to define:

1) Baseline transport and mobility scenario (base case based on year 2013)
2) Future envisaged scenarios with SocialCar system
3) Future envisaged scenarios without SocialCar system

Location: WHERE?

Simulations will be performed for the whole Canton Ticino region. Since Ticino lies at the border with Italy and it is characterized by heavy trans-national traffic flows, the model also simulates traffic generated by and directed to Italian regions close to the Swiss borders.

Timing: WHEN?

- Test design (step 1): 1st September 2016 – 30th November 2016
- input data collection (step 2): 1st December 2016 – 31st March 2017
- running traffic macro-simulation model (step 3): 1st April 2017 – 31st July 2017
- setting simulated scenarios and KPIs assessment (step 4): 1st August 2017 – 30th November 2017

	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31
	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
Site specific simulated experiments																	
Step 1: Test design																	
Step 2: Input data collection																	
Step 3: Running macro-simulation model																	
Step 4: Setting scenarios and KPIs assessment																	

Involved partners and stakeholders: WHO?

- test design (step 1): Luxmobility, VECTOS, ABACUS, UNIABDN
- input data collection (step 2): ZIGHT, ABACUS, SUPSI, Planidea, UNIABDN, PT service planners / providers (authorities / operators), citizens (car drivers, carpoolers), PT users
- running traffic macro-simulation model (step 3): Planidea, SUPSI, Luxmobility, VECTOS, UNIABDN
- setting simulated scenarios and KPIs assessment (step 4): Planidea, SUPSI, UNIABDN

Method: HOW?
PTV VISUM is a macro modelling software, using the digital model of a given area, in a scale of a city, or a district. VISUM is able to create convincing analyses, statistics and reports. VISUM allows the following examinations: scenario comparison, matrix histograms, flow bundle calculation, interactive shortest path search, isochrones, environmental analyses (noise, emissions) as well as analysis of accident data.

Once the assignment model is set-up to capture SocialCar impacts, different SocialCar uptake scenarios will be defined based on survey (by TAM) and focus groups' results as planned in the second step (step 2).

Necessary data input for feeding macro-simulation model is as follows:

- road transport graph (arcs and nodes): Tom Tom data (2013 update);
- public transport network and supply data (e.g. text file, excel file, shapefile, GTFS format, etc.)
    - PT schedule data: year 2013, updated every 5 years
    - PT infrastructural data: year 2013, updated every 5 years
    - PT tariff data: not directly included in the model; public transport cost is one of the parameters used to estimate level of use of public transport, but no direct tariffs are used
- origin-destination demand matrices for public transport: year 2013, updated every 5 years;
- origin-destination demand matrices for private traffic (individual motorized traffic): year 2013, updated every 5 years;
- traffic survey data used to build a representative model of current traffic patterns: year 2013, updated every 5 years;
- Existing carpooling data: no such data are used by the model.

3.2.3 Edinburgh (UK)

Subject matter: WHAT?
Impact assessment of using the SocialCar system will be performed in simulated environments by running CUBE macro-simulation model. Commuting trips will be the core traffic category which will be considered for the simulation of mobility performance in a future time according with potential SocialCar uptake scenarios.

Forecasts suggest that AM (07:00-09:00) peak traffic levels in the South East of Scotland in 2024 will be 26% higher than in 2007. This is the result of increases in forecast population, households and employment in the area, development in new locations leading to changes in travel patterns, and continuing trends in car ownership and usage. It should be noted that although general growth trends have slowed down in recent years and even reversed within Edinburgh, forecasts suggest that growth pressures, albeit at a lower rate, will resume with economic revival. It is notable that the most obvious network capacity problems are associated with the Forth Crossing, city bypass and its various junctions. Commuter traffic from the M8, M9, A1 and Fife to Edinburgh Corridors will be the focus of the SocialCar Trial. Our target group will be single occupancy car driving commuters from age 18-66 travelling on these congested corridors.

Purpose: WHY?
Macro-simulation model is expected to generate mobility and traffic scenarios for different timeframes including baseline scenario (base case), future scenarios without the SocialCar solution (do nothing) as well as future scenarios with the usage of SocialCar system (uptake scenarios).

Macro-simulations will enable to define:

1) Baseline scenario (base case)
2) Future envisaged scenarios with SocialCar system
3) Future envisaged scenarios without SocialCar system

Location: WHERE?
Regional wide level addressing commuters (mostly for work and education purpose of travelling).

Timing: WHEN?

- test design (step 1): 1st September 2016 – 30th November 2016
- input data collection (step 2): 1st December 2016 – 31st March 2017
- running traffic macro-simulation model (step 3): 1st April 2017 – 31st July 2017
- setting simulated scenarios and KPIs assessment (step 4): 1st August 2017 – 30th November 2017

	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31
	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
Site specific simulated experiments																	
Step 1: Test design																	
Step 2: Input data collection																	
Step 3: Running macro-simulation model																	
Step 4: Setting scenarios and KPIs assessment																	

Involved partners and stakeholders: WHO?

- test design (step 1): Luxmobility, VECTOS, ABACUS, UNIABDN
- input data collection (step 2): ZIGHT, ABACUS, SESTRAN, Liftshare, UNIABDN, PT service planners / providers (authorities / operators), citizens (car drivers, carpoolers), PT users
- running traffic macro-simulation model (step 3): SESTRAN, Liftshare, Luxmobility, VECTOS, UNIABDN
- setting simulated scenarios and KPIs assessment (step 4): SESTRAN, Liftshare, UNIABDN

Method: HOW?
Once the assignment model is set-up to capture SocialCar impacts, different SocialCar uptake scenarios will be defined based on survey (by TAM questionnaires) and focus groups' results as planned in the second step.

Necessary data input for feeding macro-simulation model is as follows:

- road transport graph (arcs and nodes): OpenStreetMaps, etc.
- public transport network and supply data (e.g. text file, excel file, shapefile, GTFS format, etc.)
  - PT schedule data: 2016
  - PT infrastructural data:2016
  - PT tariff data:2016
- origin-destination demand matrices for public transport: Scottish Household Survey 2009
- origin-destination demand matrices for private traffic (individual motorized traffic): Scottish Household Survey 2009
- traffic survey data used to build a representative model of current traffic patterns: 2010-2015, http://www.dft.gov.uk/traffic-counts/area.php?region=Scotland

- Existing carpooling data: the Sestrans Liftshare scheme has over 8800 members. Just over half of these members are part of private schemes within the Sestrans umbrella (so their journeys are only available for sharing with colleagues) so about 4,100 of these members are members of the public looking to share with other members of the public in Edinburgh. Over 1250 out of the 8800 total members share regularly or have ever shared with someone.

3.2.4 Turin (IT)

Subject matter: WHAT?
Impact assessment of using the SocialCar system will be performed in simulated environments by running the VISUM macro-simulation model which will be used in the experiment. Commuting trips will be the core traffic category which will be considered for the simulation. Transport demand data will be based on national ISTAT data which will analyze main traffic demand generators such as most important working places exploiting relevant Mobility Managers' data and analysis about commuters' trips of the different organizations.

Purpose: WHY?
Macro-simulation model is expected to generate mobility and traffic scenarios for different timeframes including baseline scenario (base case), future scenarios without the SocialCar solution (do nothing) as well as future scenarios with the usage of SocialCar system (uptake scenarios).

The city of Turin has elaborated own Sustainable Urbana Mobility Plan (SUMP) with the strategic objectives to reach modal shift based on 50% public transport use and 50% private transport also through the construction of new transport infrastructures, including the second metro line as well as an additional train line of the existing Metropolitan Railway System.

Macro-simulations will enable to define:

1) Baseline scenario (base case)
2) Future envisaged scenarios with SocialCar system
3) Future envisaged scenarios without SocialCar system

Location: WHERE?
Simulations will be performed in the Turin's area covering a specific peri-urban area where the Metropolitan Railway System is active. The System is built by 8 different train lines linking city of Turin with surrounding peri-urban areas where most of commuting trips (e.g. workers, students, etc.) take place as well.

Timing: WHEN?
- test design (step 1): 1st September 2016 – 30th November 2016
- input data collection (step 2): 1st December 2016 – 31st March 2017
- running traffic macro-simulation model (step 3): 1st April 2017 – 31st July 2017
- setting simulated scenarios and KPIs assessment (step 4): 1st August 2017 – 30th November 2017

	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31
	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
Site specific simulated experiments																	
Step 1: Test design																	
Step 2: Input data collection																	
Step 3: Running macro-simulation model																	
Step 4: Setting scenarios and KPIs assessment																	

Involved partners and stakeholders: WHO?

- test design (step 1): Luxmobility, VECTOS, ABACUS, UNIABDN
- input data collection (step 2): ZIGHT, ABACUS, Turin (City of Turin), UNIABDN, PT service planners / providers (authorities / operators), third parties, citizens (car drivers, carpoolers), PT users
- running traffic macro-simulation model (step 3): City of Turin, Luxmobility, VECTOS, UNIABDN
- setting simulated scenarios and KPIs assessment (step 4): City of Turin, UNIABDN

Method: HOW?

PTV VISUM is able to create convincing analyses, statistics and reports. In detail, VISUM allows the following examinations: scenario comparison, matrix histograms, flow bundle calculation, interactive shortest path search, isochrones, environmental analyses (e.g. emissions) as well as analysis of accident data.

Necessary data input for feeding macro-simulation model is as follows:

- road transport graph (arcs and nodes): OpenStreetMaps; existing road network graphs, used by other transportation models.
- public transport network and supply data (e.g. text file, excel file, shapefile, GTFS format, etc.)
    - PT schedule data: GTFS 2016, updated at every change of the scheduled service (indicatively every 1-3 months)
    - PT infrastructural data: GTFS 2016, updated at every change of the scheduled service (indicatively every 1-3 months)
    - PT tariff data: GTFS 2016, updated at every change of the scheduled service (indicatively every 1-3 months)
- origin-destination demand matrices for public transport: 2013 data (by Regional Mobility Agency)
- origin-destination demand matrices for private traffic (individual motorized traffic): 2014 data (2016 updates will be provided when will be available) by Piedmont Region under specific request
- traffic survey data used to build a representative model of current traffic patterns: 2013 "IMQ Survey" data (by Regional Mobility Agency)
- Existing carpooling data: Zego: +10.000 users, Easymoove +1000 users, Jobjo +1000 users

3.2.5 Zagreb (HR)

Subject matter: WHAT?

Impact assessment of using the SocialCar system will be performed in simulated environments by running the VISUM macro-simulation model which will be used in the experiment. Commuting trips will be the core traffic category which will be considered for the simulation. The City of Zagreb has never made a traffic model and there is a complete lack of information about origin and destination trips of their residents. Therefore, it was decided to develop traffic model of trips between suburban town and the city of Zagreb.

After considering the suburb towns near the city of Zagreb it was decided to model city of Samobor.

Samobor is a city in Zagreb County, located around 20 km west of Zagreb. 41,2% of Samobor workforce commutes every day to Zagreb. Except working trips, there is also a large amount of educational (universities, high schools) and leisure trips to Zagreb. Travelling from Samobor to Zagreb has only two options of transportation – public bus (operator is not the same as in the City of Zagreb) or private car.

Purpose: WHY?

Macro-simulation model is expected to generate mobility and traffic scenarios for different timeframes including baseline scenario (base case), future scenarios without the SocialCar solution (do nothing) as well as future scenarios with the usage of SocialCar system (uptake scenarios).

The transport model in PTV VISUM will be carried out after collecting input data for the City of Samobor and will represent the current situation. Based on the surveys, several scenarios will be developed for the time horizons: 2020, 2040, with the usage of Social-Car system and without usage of Social-Car System.

Macro-simulations will enable to define:

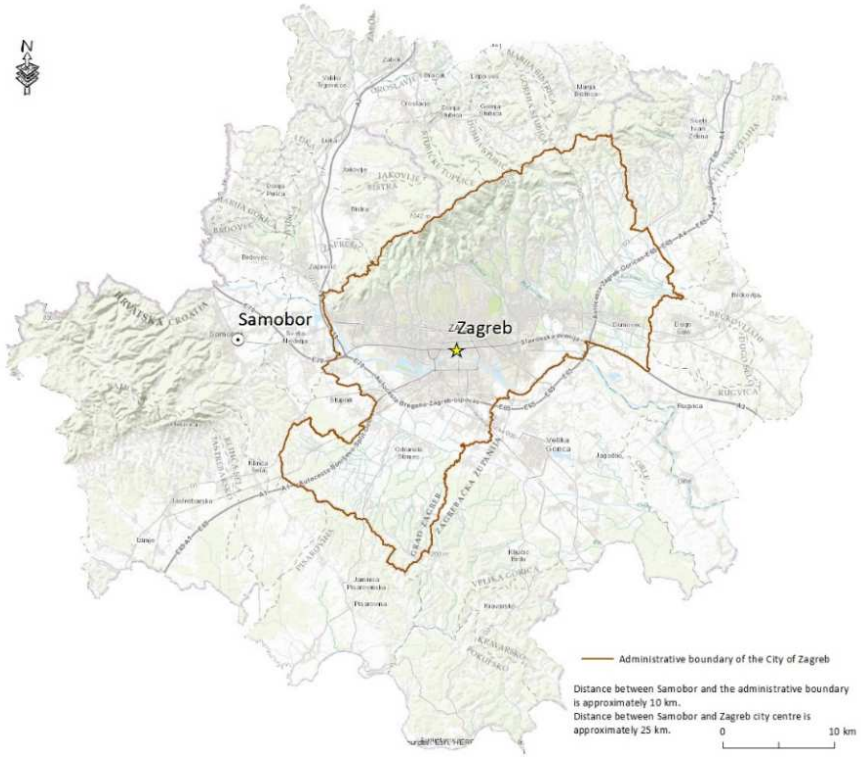
1) Baseline transport and mobility scenario (base case)
2) Future envisaged scenarios with SocialCar system
3) Future envisaged scenarios without SocialCar system

The City of Samobor, with distance of 20 km to Zagreb, has very limited and expensive PT and it is optimal choice for implementation of SocialCar system. Most of the citizens are using private cars to travel to Zagreb.

Location: WHERE?

Demo area for macro simulation would include commuters on routes from Samobor to Zagreb. Samobor is a city in Zagreb County, Croatia, located around 20 km west of Zagreb. Samobor is a part of the Zagreb metropolitan area, and most of the citizens gravitate to Zagreb. By 2011 census, the total population of the administrative territory of Samobor was 37,633. 41,2% of Samobor workforce commutes every day to Zagreb. The city of Samobor is connected with Zagreb by public transport (in peak hour, bus frequency is 15-20 min) and with motorway (free of charge), state road and county road (AADT in 2015: 19 395 veh/day).

Zagreb and Samobor in Zagreb Urban Agglomeration



Timing: WHEN?

- test design (step 1): 1st September 2016 – 30th November 2016
- input data collection (step 2): 1st December 2016 – 31st March 2017
- running traffic macro-simulation model (step 3): 1st April 2017 – 31st July 2017
- setting simulated scenarios and KPIs assessment (step 4): 1st August 2017 – 30th November 2017

	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31
	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
Site specific simulated experiments																	
Step 1: Test design																	
Step 2: Input data collection																	
Step 3: Running macro-simulation model																	
Step 4: Setting scenarios and KPIs assessment																	

Involved partners and stakeholders: WHO?

- test design (step 1): Luxmobility, VECTOS, ABACUS, UNIABDN
- input data collection (step 2): ZIGHT, ABACUS, Zagreb (City of Zagreb), UNIABDN, PT service planners / providers (authorities / operators), third parties, citizens (car drivers, carpoolers), PT users
- running traffic macro-simulation model (step 3): City of Zagreb, Luxmobility, VECTOS, UNIABDN
- setting simulated scenarios and KPIs assessment step 4): City of Zagreb, UNIABDN

Method: HOW?

Firstly, it was planned to use the CUBE tool. Finally, PTV VISUM is confirmed to be used within the SocialCar project. Macro simulation model as well as necessary "expertise" will be "External" to the organization.

The envisage subcontractor is the Faculty of Traffic and Transportation.

Necessary data input for feeding macro-simulation model is as follows:

- road transport graph (arcs and nodes): OpenStreetMaps, etc.
- public transport network and supply data (e.g. text file, excel file, shapefile, GTFS format, etc.)
    - PT schedule data: 2016.
    - PT infrastructural data: 2016.
    - PT tariff data: 2016.
- origin-destination demand matrices for public transport: 2016/2017
- origin-destination demand matrices for private traffic (individual motorized traffic): 2016/2017
- traffic survey data used to build a representative model of current traffic patterns: 2016/2017
- Existing carpooling data: no data, it will be collected in 2016/2017 by surveys.

3.3 Test C: On site real experiments based on real life testing in the three "lightning" sites

Objective of the Test C is:

- implementing on site real experiments of the SocialCar system in three "lightning" sites (Brussels, Edinburgh, Canton Ticino);
- use of the SocialCar App by a significant number of users (including car drivers, carpoolers as well as PT users), which will use it during on-the-ground testing.

Group meetings with a sample of users will be held to elicit the opinion of real travellers on the usability and friendliness of the SocialCar system. A significant number of users including citizens (car drivers, carpoolers) and PT users will be engaged in each respective site covering different journey purposes namely work (commuters), education (commuters), etc. The method of data collection will be the so-called "group of practice". It means that a group of users (citizens and public transport users) will test the SocialCar App on-the-ground in urban and peri-urban areas where they will move for performing their multi-modal trips as well.

Key issues to be addressed in Test C are listed as follows:

- local stakeholder involvement: car drivers, carpoolers (Drivers and Passengers) as well as PT users engagement to use the SocialCar system (the App) during the real life experiments;
- integrating automatic monitoring via the SocialCar App (as data input) to enable assessing impacts in terms of mobility behaviours in the transport network;
- integrating real-time data of public transport, carpooling as well as local traffic information;
- estimating potential change of mobility behaviour in predictable scenarios with the App users.

The Test C is expected to run by different steps which will include as follows:

- test design (step 1),
- stakeholder engagement and training (step 2),
- on-the-ground testing (step 3),
- data collection and users' feedbacks (step 4),
- results elaboration (step5).

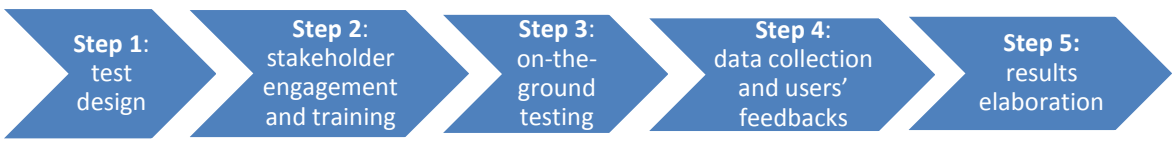


Figure 3 – The envisage steps of Test C

The first step is characterized by preliminary activities necessary to define workflow as well as the timely engagement of project's partners which will be involved in Test C (both the system's developers and site partners). This first step will include sharing and agreements on the most representative Use Case(s) which

the SocialCar platform will offer and test in each lightning site well-fitting local needs, constraints as well as other local-based issues. In addition, at least one technical meeting should be organized between the respective SocialCar site partner and local PT provider(s) as well as traffic information provider(s) in order to share data format, communication protocols and other key issues enabling to provide real-time information.

Each lightning site will be requested to identify and select most promising Use Case(s) among the SocialCar portfolio of nine (9) possible Use Cases as defined and described in the D1.1 – The SocialCar Arena namely:

- Use Case 1: Managing unexpected events
- Use Case 2: Holidays planning
- Use Case 3: Travelling with special needs
- Use Case 4: Overcoming disruptions in commuting
- Use Case 5: Flexible commuting
- Use Case 6: Participation to a public event
- Use Case 7: Group travelling
- Use Case 8: Integrating several travelling options
- Use Case9: Unique payment

The second step (step 2) is aimed at achieving a significant number of users (car drivers, carpoolers, PT users) in each lightning site which will use the SocialCar App during on-the-ground testing timeframe.

To this purpose, public events and marketing campaigns should be set-up, coupled with direct interaction with the mobility sector stakeholders in order to access to their customer base. This second step will include preliminary information and training activities to explain engaged participants how to use the App for the different functionalities namely registration, trip setting, trip planning, ride matching, monitoring, etc.

The third step (step 3) is aimed at implementing on-the-ground testing of the SocialCar solution by the involvement of both real-time data providers (PT providers, traffic information providers, crowdsourcing) and final users of the SocialCar App (car drivers, carpoolers and PT users). They will use the SocialCar App for a representative time period (averagely 1-3 months) during their daily or not systematic journeys within and crossing the respective city for different purposes of travelling (e.g. home-work, education, etc.).

The fourth step (step 4) is all about data collection and users' feedback based upon on-the-ground testing.

The SocialCar system will be able to automatically collect some specific data such as frequency of using the App, most used functions, time taken to ride matching, tracking pathways and modes of transport used, etc.

It will be collected not only indicators related to user experience and effectiveness of the SocialCar system as well as KPIs reflecting the different evaluation areas. On the other hand, ad-hoc questionnaire will be designed and used to collect qualitative data for process evaluation purposes. These **focus groups** will be aimed at assessing the user experience in the "before" and "after" situation: focus group 1 prior to on-the-ground testing and focus group 2 after on-the-ground testing (see chapter 4.2 – Test C Impact Evaluation).

The last step (step 5) is the final elaboration of impact and process evaluation by UNIABDN (the SocialCar Evaluation manager) based on the defined set of evaluation criteria and the results obtained from the on-the-ground real-life testing.

The outcomes from Test C will enable the user assessment of the SocialCar App in a real-life environment. It will also offer validation of the impact assessment conducted in Test B based on actual user experiences.

Involved partners are as follows:

- **FIT (led partner),**
- Movenda,
- ABACUS,
- UWH,
- UNIABDN,
- Canton Ticino (Planidea, SUPSI), Edinburgh (SEStran, Liftshare), Brussels (Taxistop).

Timing of Test C: 1st December 2016 (M19) – 30th November 2017 (M30)

The set of structured information about Test C is described below based on 5W2H approach (What, Why, Where, When, Who, How, How much). Main data which will be collected will be as follows:

- what Test C is (What),
- objective of Test C (Why),
- demo areas of testing (Where),
- time plan of testing and evaluation (When),
- involved stakeholders and roles (Who),
- how Test C will run and needed supporting tools (How),
- final results and assessment by relevant KPIs (How much).

The **site-based plan** is below described with the contribution of the respective Site Partner involved in Test B

3.3.1 Brussels (BE)

Subject matter: WHAT?

Impact and process evaluation of using the SocialCar system will be performed in real experiments (on-the-ground test). User acceptance evaluation with real travellers ("user experience") will be addressed in Test C, assessing how likely individuals are to use the App and how likely it is to change their mobility behaviour.

Purpose: WHY?

Assessing impacts of the use of SocialCar system in real urban and peri-urban areas. It is planned that a number of users (including a combination of car drivers, carpoolers and PT users) will use of the SocialCar App during on-the-ground testing. The resulting monitoring data (automatically by the SocialCar back-end system) as well as users' feedback (by focus groups) will be used to validate and update the TAM forecasts (used in Test B) to provide more accurate quantitative impact assessment. This will allow to understand the cause and effect of change of mobility behaviour produced by using the App, enabling the identification of the actual drivers and barriers for change.

Location: WHERE?

The demo area will be the Brussels Capital Region (19 municipalities), including inbound and outbound trips.

Timing: WHEN?

- test design (step 1): 1st December 2016 – 28th February 2017
- stakeholder engagement and training (step 2): 1st March 2017 – 31st May 2017
- on-the-ground testing (step 3): 1st June 2017 – 30th September 2017
- data collection and users' feedbacks (step 4): 1st June 2017 – 30th September 2017
- results elaboration (step5): 1st October 2017 – 30th November 2017

	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31
	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
On site real experiments																	
Step 1: Test design																	
Step 2:Stakeholder engagement and training																	
Step 3: On-the-ground testing																	
Step 4: Data collection and users' feedbacks																	
Step 5: Results elaboration																	

Involved partners and stakeholders: WHO?

- test design (step 1): FIT, UWH, Movenda, UNIABDN
- stakeholder engagement and training (step 2): FIT, ABACUS, Taxistop, citizens (car drivers, carpoolers), PT users
- on-the-ground testing (step 3): Taxistop, PT service planners / providers (authorities / operators), third parties, real-time traffic information providers, citizens (car drivers, carpoolers), PT users
- data collection and users' feedbacks (step 4): FIT, Movenda, Taxistop, UNIABDN, citizens (car drivers, carpoolers), PT users
- results elaboration (step5): UNIABDN

Method: HOW?

The potential / expected number of users (car drivers, carpoolers, PT users) to involve in the Test C providing them the SocialCar App for an extended period of time (within the timeframe of June-September 2017):

- car drivers: 20 potential users (testers)
- carpoolers: 20 potential users (testers)
- PT users: 20 potential users (testers)

Brussels is expected to involve in total 60 SocialCar users testing the App's functionalities and services.

Real-time data will be requested for feeding the SocialCar system during the on-the-ground testing (step 3):

- PT real-time feeds (Actual expected time of arrival, Incidents, Accidents, Disruptions/Deviations, Detours)
- Dynamic road data (Schedule roadworks, Events, Emergency roadworks, Road incidents/accidents)
- Real-time traffic data (by Traffic Management Control Centres – TMCC, etc.)

Availability / accessibility to the above categories of real-time data is indicated as follows:

PT real-time feeds:

- Actual expected time of arrival: depends on the operator (by the end of 2016 data may be real-time)
- Incidents: Yes
- Accidents: Yes
- Disruptions/Deviations: Yes
- Detours: Yes

Dynamic road data**:**

- Schedule roadworks: Yes
- Events: still to be analyzed
- Emergency roadworks: No
- Road incidents/accidents: still to be analyzed

Real-time traffic data**:** Yes, but not yet investigated.

Impacts: HOW MUCH?
Test C will validate and update TAM forecasts (used in Test B) to provide more accurate quantitative impact assessment based upon the resulting monitoring data (by the SocialCar App) as well as user feedback data.

3.3.2 Canton Ticino (CH)

Subject matter: WHAT?
Impact and process evaluation of using the SocialCar system will be performed in real experiments (on-the-ground test). User acceptance evaluation with real travelers ("user experience") will be addressed in Test C, assessing how likely individuals are to use the App and how likely it is to change their mobility behavior.

Purpose: WHY?
Assessing impacts of the use of SocialCar system in real urban and peri-urban areas. It is planned that a number of users (including a combination of car drivers, carpoolers and PT users) will use of the SocialCar App during on-the-ground testing. The resulting monitoring data (automatically by the SocialCar back-end system) as well as users' feedback (by surveys) will be used to validate and update the TAM forecasts to provide more accurate quantitative impact assessment. This will allow to understand the cause and effect of change of mobility behavour produced by using the SocialCar App as well.

Location: WHERE?
Real-life testing will be performed involving a core sample of users either working for or studying at SUPSI institution (university students) in the Municipality of Manno. Their homes are spread throughout Canton Ticino (and many of them also live in Italy) and their mobility needs span over the whole Canton. Further testers might also be recruited among users of the MobAlt system of the "Vedeggio" area and of the "Bepooler" carpooling system (see "HOW" below). Also in this case, they live throughout Ticino and the borders with Italy. Finally, testers might be recruited by advertising and communication activities exploiting regional media, which cover the whole Canton Ticino area. Therefore, the experiment will be regional-based.

Timing: WHEN?

- test design (step 1): 1st December 2016 – 31st January 2017
- stakeholder engagement and training (step 2): 1st February 2016 – 30th April 2017
- on-the-ground testing (step 3): 1st June 2017 – 30th September 2017 (*1st April – 30th June 2017*)
- data collection and users' feedbacks (step 4): 1st June 2017 – 30th September 2017
- results elaboration (step5): 1st October 2017 – 30th November 2017 (*1st July – 30th November 2017*)

	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31
	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
On site real experiments																	
Step 1: Test design																	
Step 2:Stakeholder engagement and training																	
Step 3: On-the-ground testing																	
Step 4: Data collection and users' feedbacks																	
Step 5: Results elaboration																	

Involved partners and stakeholders: WHO?

- test design (step 1): FIT, UWH, Movenda, UNIABDN
- stakeholder engagement and training (step 2): FIT, ABACUS, SUPSI, Planidea, citizens (car drivers, carpoolers), PT users

- on-the-ground testing (step 3): Planidea, SUPSI, PT service planners / providers (authorities / operators), real-time traffic information providers, citizens (car drivers, carpoolers), PT users
- data collection and users' feedbacks (step 4): FIT, Movenda, Planidea, SUPSI, UNIABDN, citizens (car drivers, carpoolers), PT users
- results elaboration (step5): UNIABDN

Method: HOW?

Real-life testing will be performed involving a core sample of users working for SUPSI institution in the Municipality of Manno. Further testers might also be recruited among the present users of the MobAlt system in case of success of ongoing preliminary activities aimed at integrating the SocialCar algorithms and functionalities with the carpooling functionalities at present offered by the MobAlt app. An integration between SocialCar and the Bepooler system might be envisaged, enlarging the number of potential testers.

Finally, other testers will be directly involved by word-of-mouth by the SUPSI, MobAlt and Bepooler testers themselves and by advertising and communication activities towards the general public, by means of local media (radio, press, television, social networks) advertising and communication activities towards the general public. Some testers will therefore directly test the SocialCar App, while some other will test the SocialCar algorithms and functionalities being integrated in the MobAlt and/or Bepooler apps.

Considering the number of employees (and students) working in SUPSI and in the companies who subscribed to the MobAlt platform for the "Vedeggio" region, the total number of potential participants to Test C is equal to 4'000 employees and 1'000 students. This number refers to the total number of employees and students to which we will mainly address recruitment activities. The number of the Bepooler users is not available at the moment, since the company has been launched very recently. However, they are fast increasing.

If we manage to actively involve around 5% of the SUPSI and mobAlt users in the "Vedeggio" region, which is a relatively optimistic prevision, we could gather around 200 users overall testing SocialCar functionalities and services for an extended period of time. We expect that they will mainly be car drivers; a limited number of them will already be using public transport, and a very small percentage of them will already be using car-pooling services. As mentioned above, in fact, the carpooling companies were recently activated in Canton Ticino; however, they are still very young and the number of their users is still limited.

Real-time data will be requested for feeding the SocialCar system during the on-the-ground testing (step 3):

- PT real-time feeds (Actual expected time of arrival, Incidents, Accidents, Disruptions/Deviations, Detours).
- Dynamic road data (Schedule roadworks, Events, Emergency roadworks, Road incidents/accidents)
- Real-time traffic data (by Traffic Management Control Centres – TMCC, etc.)

Availability / accessibility to the above categories of real-time data is indicated as follows:

<u>PT real-time feeds:</u>

- Actual expected time of arrival: it might be available by means of an API published by SBB; a definitive answer will be given once the technical requirements by the SocialCar app will be available.
- Incidents: probably not directly available – expressed however by means of delays.
- Accidents: probably not directly available – expressed however by means of delays.
- Disruptions/Deviations: it might be available by means of an API published by SBB; a definitive answer will be given once the technical requirements by the SocialCar app will be available.

- Detours: it might be available by means of an API published by SBB (Swiss Federal Railways). A definitive answer, however, will be given once the technical requirements by the Social car app will be available.

These data are available for SBB trains and a few other public transport companies throughout Switzerland. For Canton Ticino, they are only available for SBB trains (https://transport.opendata.ch/)

Dynamic road data:

- Schedule roadworks: No
- Events: No
- Emergency roadworks: No
- Road incidents/accidents: No

Real-time traffic data:

Real time traffic data are collected for highways and some cantonal routes (critical points for risk of accidents). However, they seem not to be made automatically available by an API.

Impacts: HOW MUCH?
Test C will validate and update TAM forecasts (used in Test B) to provide more accurate quantitative impact assessment based upon the resulting monitoring data (by the App) as well as user feedback data.

3.3.3 Edinburgh (UK)

Subject matter: WHAT?
Impact and process evaluation of using the SocialCar system will be performed in real experiments. User acceptance evaluation with real travellers ("user experience") will be addressed in Test C, assessing how likely individuals are to use the SocialCar App as well as how likely it is to change their mobility behavior.

Purpose: WHY?

Assessing impacts of the use of SocialCar system in real urban and peri-urban areas. It is planned that a number of users (including a combination of car drivers, carpoolers and PT users) will use of the SocialCar App during on-the-ground testing. The resulting monitoring data (automatically by the SocialCar back-end system) as well as users' feedback (by surveys) will be used to validate and update the TAM forecasts to provide more accurate quantitative impact assessment. This will allow to understand the cause and effect of change of mobility behavour produced by using the SocialCar App as well.

Location: WHERE?

The selected "demo area" is Region wide.

Timing: WHEN?

- test design (step 1): 1st December 2016 – 28th February 2017
- stakeholder engagement and training (step 2): 1st March 2017 – 31st May 2017
- on-the-ground testing (step 3): 1st June 2017 – 30th September 2017
- data collection and users' feedbacks (step 4): 1st June 2017 – 30th September 2017
- results elaboration (step5): 1st October 2017 – 30th November 2017

	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31
	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
On site real experiments																	
Step 1: Test design																	
Step 2:Stakeholder engagement and training																	
Step 3: On-the-ground testing																	
Step 4: Data collection and users' feedbacks																	
Step 5: Results elaboration																	

Involved partners and stakeholders: WHO?

- test design (step 1): FIT, UWH, Movenda, UNIABDN
- stakeholder engagement and training (step 2): FIT, ABACUS, SESTRAN, Liftshare, citizens (car drivers, carpoolers), PT users
- on-the-ground testing (step 3): SESTRAN, Liftshare, PT service planners / providers (authorities / operators), real-time traffic information providers, citizens (car drivers, carpoolers), PT users
- data collection and users' feedbacks (step 4): FIT, Movenda, SESTRAN, Liftshare, citizens (car drivers, carpoolers), PT users
- results elaboration (step5): UNIABDN

Method: HOW?

The potential / expected number of users (car drivers, carpoolers, PT users) to involve in the Test C providing them the SocialCar App for an extended period of time (within the timeframe of June-September 2017):

- car drivers: 40 potential users (testers)
- carpoolers: 20 potential users (testers)
- PT users: 40 potential users (testers)

Edinburgh is expected to involve in total 100 SocialCar users testing the App's functionalities and services.

Real-time data will be requested for feeding the SocialCar system during the on-the-ground testing (step 3):

- PT real-time feeds (Actual expected time of arrival, Incidents, Accidents, Disruptions/Deviations, Detours)
- Dynamic road data (Schedule roadworks, Events, Emergency roadworks, Road incidents/accidents)
- Real-time traffic data (by Traffic Management Control Centres – TMCC, etc.)

Availability / accessibility to the above categories of real-time data is indicated as follows:

<u>PT real-time feeds:</u>

- Actual expected time of arrival: Initially we have scheduled data. However, we are aiming to include real-time data feeds if the format GTFS format should become available
- Incidents: No
- Accidents: No
- Disruptions/Deviations: Yes, but still to be confirmed with Traveline Scotland/Traffic Scotland
- Detours: No

<u>Dynamic road data:</u>

- Schedule roadworks: Yes, but still to be confirmed by Edinburgh Council

- Events: No
- Emergency roadworks: Yes, but still to be confirmed by Edinburgh Council
- Road incidents/accidents: No

Real-time traffic data: Yes, but still to be confirmed by Edinburgh Council

Impacts: HOW MUCH?
Test C will validate and update TAM forecasts (used in Test B) to provide more accurate quantitative impact assessment based upon the resulting monitoring data (by the App) as well as user feedback data.

4. Evaluation framework and Key Performance Indicators definition

This section is aimed at describing the evaluation approach and defining relevant, effective and measurable Key Performance Indicators (KPIs) which should enable reflection of the SocialCar project's specific objectives, expected results and impacts in the evaluation areas of:

- Transport (e.g. commuting trips reduction, changes in travel time for travellers, cars kilometres-travelled reduction, etc.),
- Environment (e.g. CO_2 emission reduction, etc.),
- Economy (e.g. cost to city of delays during peak hours, changes in journey costs for individual travellers, etc.),
- Energy (e.g. fuel consumption decreasing, etc.),
- Society (e.g. increasing social inclusion of person with reduced mobility, etc.).

As previously described, the SocialCar project will run three different tests as follows:

- Test A: Technical testing of App functions and interfaces, done in the laboratory by developers and by expert users at all sites (checking the development works as it should);
- Test B: City wide impact assessment of benefits from the SocialCar App based on different uptake scenarios, done using assignment models available at 5 sites (evaluating how effective the developed App could be);
- Test C: Testing by actual travellers who utilise the developed SocialCar App, with evaluation done using user acceptance surveys and monitoring observed behaviour at 3 sites (evaluating how individuals use the App and how likely it is to change their behaviour).

Test A is not subject to impact evaluation because it will be focused on the technical and functional testing for the SocialCar prior to system rollout. This specific test is, in fact, aimed at testing the data interfaces, component functionality, robustness and usability of the SocialCar system. It provides the final checks to ensure a fully working prototype is ready for use by end users (travellers).

Tests B and C provide the basis for the **impact evaluation** to be conducted in Task 5.4.

Section 4.1 details the evaluation process including the Key Performance Indicators (KPIs) which will be used to measure the impacts for Test B, while Section 4.2 presents the process and KPI's for Test C.

An overview of the full testing (Test A, Test B, and Test C) and impact evaluation process is presented in Figure 5. This gives an illustration of the main tasks and when and how it all fits together.

Both tests B and C involve participation by end users (travellers) at each site; in completing surveys in Test B, and in completing surveys and utilising the SocialCar App before and during travel in Test C. The sites therefore need to identify who will be targeted for completion of surveys and who will be selected/approached to test the use of the SocialCar App. This is considered further in Section 4.1 and 4.2.

Section 4.3, finally, gives an overview of the **process evaluation** which will be conducted with other, non-traveller, stakeholders.

4.1 Test B impact evaluation

Test B involves the use of macro assignment models at 5 sites (Edinburgh, Brussels, Canton Ticino, Zagreb and Turin) to estimate the potential city wide benefits from the SocialCar App. The testing process, tools to be utilised at each site and schedule for running Test B is described in Section 3.2.

In order that the modelling outputs from the macro assignment tools can capture the potential impacts of the SocialCar App, the transport network representations used in these tools must adequately reflect all the modes which the SocialCar App facilitates, as well as being able to model multi-modal journeys involving any possible combination of modes. As such the mode choice model and highway / public transport assignment models (within the macro assignment tools) need to be adapted in a number of ways.

Macro assignment models are conventionally used to assess the impacts of a major piece of new infrastructure (e.g. building a new motorway, building a new tram etc.) or to assess physical changes in the existing network(s). However, SocialCar is changing the travel environment in more subtle ways by providing enhanced information on travel options. It has a particular focus on providing information on carpooling options and connected journeys to and from PT services involving carpooling for the first and last miles of the journey. Other alternative mobility options such as ride sourcing are also considered where available.

It will be essential that the macro assignment models utilised at the sites will include a mode choice model which is able to distinguish between the following modes of travel:

1. Drive alone
2. Carpool
3. Public transport
4. Park & ride
5. Carpool & ride
6. Cycle & ride
7. Cycle
8. Walk

The next task in ensuring the SocialCar impacts can be captured by macro assignment models is, therefore, to ensure that the different modes providing access to the PT network are represented in the assignment networks and that the parameters associated with these modes (capacities and generalised costs including wait times, average speeds, interchange penalties etc.) are calibrated appropriately to reflect the use of such modes and the value of the enhanced information which SocialCar can provide when using these modes; their outputs also need to be capable of representation as common KPIs for use in the evaluation.

This enhanced information that SocialCar provides reduces the disutility of making connected journeys – for instance we can adjust penalties associated with interchange; can adjust weightings associated with waiting for PT; can adjust weightings associated with finding car parking etc.

A pre-requisite to running the macro assignment models is the need to conduct a detailed assessment of the current capabilities of the mode choice models in capturing the different modes of travel which SocialCar provides information on, and their ability to adapt the public transport and highway networks to enable assignment of the mode specific demands to the appropriate network links.

UNIABDN, with the support of Luxmobility and VECTOS, will undertake a review of existing literature and good practice in valuation of information provision and techniques to represent the value of information in assignment models. With detailed information on the status and capabilities of the mode choice and

assignment models at each site, this will lead to recommendations on what/how to adapt the assignment models (mode choice model and transport network representations) in order that they can be used to capture SocialCar impacts. This information and recommendations will provide the necessary knowledge to allow the sites to prepare tender specifications for subcontracting the assignment modelling tasks (set-up and running the models) to local expert organisations.

Once the tools have been set up appropriately, the Test B impact evaluation will use the tools to **estimate the potential impacts of different SocialCar uptake scenarios at each site**. Low, medium and high uptake scenarios will be developed based on the results from Technology Acceptance Model (TAM) surveys with end users (travellers) conducted at each site. A relatively large sample of around 100 travellers at each site will be required to complete this one-off TAM survey - respondents should reflect a mix of traveller types from those who drive alone, PT users, carpoolers and those already making connected journeys. It is likely that these surveys can be conducted via an on-line survey with candidates being contacted via e-mail.

These Technology Acceptance Model surveys will be used to identify the factors which influence traveller's intention to use the SocialCar App and to identify if there are any differences in factors influencing traveller's intention to use SocialCar by gender, age, mode of travel, purpose of trip etc. The Technology Acceptance Model (TAM) is the first and most cited model, aiming to predict user acceptance and use of innovative Information Technologies (IT) (Davis, 1989). It was founded on the base of Theory of Reasoned Action (TRA), introduced by Fishbein and Azjen's (1975), which aimed to predict and explain human behaviour in general.

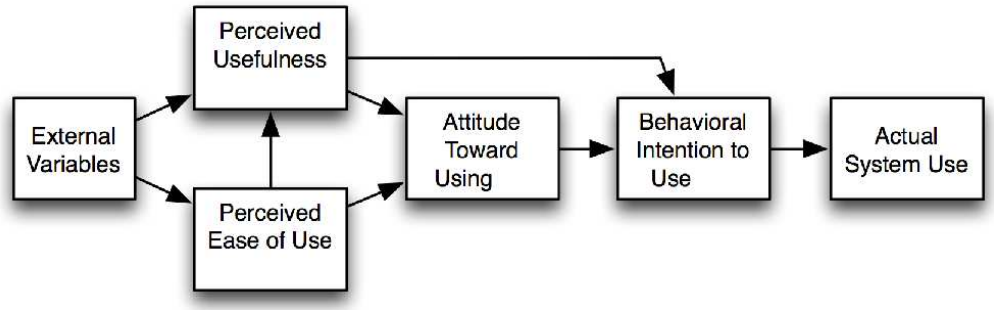


Figure 4 – Technology Acceptance Model (TAM) (Davis, Bagozzi & Warshaw 1989, 985)

UNIABDN will conduct a review of available literature on application of TAM to the use of mobile technologies by travellers, in order to adapt the model with suitable additional external variables such as previous ICT usage and Trip experience. A set of hypothesis will then be developed which need to be tested using the TAM methodology. At this point the TAM questionnaire surveys will be developed to enable testing of the hypothesis. The surveys may need to also include suitable mock-ups of the SocialCar App, illustrating a small number of use cases to give respondents a better understanding of what is provided. The surveys will be designed by UNIABDN in partnership with ABACUS. The mock-ups will be prepared by ABACUS as well.

The main outcomes from the TAM surveys will be assessment of the perceived ease of use of the tool and the perceived usefulness of the tool. Additional questions will be considered in the survey design relating to enjoyment and perceived risk of using the tool. The TAM is then applied to estimate traveller's attitudes towards using the SocialCar App and to gauge their intention to use the App.

The results from the TAM surveys will be subjected to reliability testing, correlation analysis , and finally linear regression analysis (UNIABDN) in order to test the hypothesis constructed previously and to identify the impact of each factor on intention to use the SocialCar app. This results in estimates of the proportion of travellers for each mode of travel and purpose of trip likely to use the SocialCar App. Usually, at least three different trip purposes are defined, often **home-based work trips (HBW), home-based other (or non-work) trips (HBO)**, and **non-home-based trips (NHB)**. The majority of trips are typically home-based, having their

origin or destination at home. This information will then be used to derive a matrix of uptake which gives values of low; medium and high uptake by travel mode and by trip purpose as illustrated in Table 4.

	Trip Purpose								
	HBW			HBO			NHB		
Travel Mode	Low	Medium	High	Low	Medium	High	Low	Medium	High
Drive alone									
Carpool									
Public transport									
Park and ride									
Carpool and Ride									
Cycle and ride									
Cycle									
Walk									

Values to be derived from TAM surveys

Table 4 - Matrix of uptake for low, medium and high use scenarios

The following test runs will be required using the macro assignment models at each site:

1. **Base case**: Current demand run through current networks with existing parameter values;
2. **Do nothing**: Future year demand run through current networks with existing parameter values;
3. **Low uptake scenario**: 100% of transport demand as a whole composed by:
   - Low uptake % of future year demand run through network **with existing parameter values;**
   - Low uptake % of future year demand run through **network adapted to capture SC impacts;**
4. **Medium uptake scenario**: 100% of transport demand as a whole composed by:
   - Medium uptake % of future year demand run through network **with existing parameter values;**
   - Medium uptake % of future year demand run through network **adapted to capture SC impacts;**
5. **High uptake scenario**: 100% of transport demand as a whole composed by:
   - High uptake % of future year demand run through network **with existing parameter values;**
   - High uptake % of future year demand run through network **adapted to capture SC impacts.**

So, for example, if 10% of commuters utilise the SocialCar App in the medium uptake scenario then 90% of the demand will be assigned to the networks without any adaptation while the remaining 10% will be assigned to the network with parameter values adapted to capture SC impacts. A full testing schedule will be developed by UNIABDN including specification of the set of input demand matrices for each test scenario. It is likely that at least three periods of the day will need to be modelled as follows: morning peak; interpeak; afternoon peak and evening. For each of these periods three demand matrices based on trip purpose will be established: Home based work, Home based other and Non-home based trips. For each test run the demand matrices need to be run through the mode choice model. This then gives a large set of 24 matrices for each time period (trip purpose x 3 and mode choice x 8). At this point the demand in each matrice is split according to the scenario being tested based on the values calculated from the TAM assessment and listed in Table 4.

Each matrix is then required to be assigned to the appropriate transport network. The models will be run by the subcontracted organisations who have access to and are experts in applying the assignment models at each site. The resulting link flows from the assignments of different demand matrices within each test run

need to be aggregated appropriately, the links costs updated and the iterative process of reassigning the demand matrices is repeated until convergence is reached. The mode choice modelling should then be repeated using updated skimmed cost matrices and the assignment process repeated. This whole process should be repeated until there is little variation between iterations in the mode choice as well as between iterations on the nested assignment stages. The final outputs from each of the test runs provide the data required to complete the impact assessment. The outputs will provide estimates, for different SocialCar uptake scenarios, of the level of use of different modes of travel and of the use of different modes to connect with public transport. This will be disaggregated by trip purpose and by time of day. Detailed link information will be available for every mode on travel time, cost, distance, and congestion levels (where relevant).

The list of KPI's which will be derived from the modelling outputs are listed in Table 5. These will be obtained for each trip purpose within each time period at each of the 5 test sites. All of these KPI's in Table 5 can be output directly from the macro assignment models, or may be derived/estimated from the data which the models provide. For instance, change in average vehicle occupancy, is not a standard output of the models, however, it can be estimated from the total number of trips output from the mode choice model for the drive alone mode; carpool mode; park and ride and carpool and ride modes. Another useful indicator for verifying this will be the respective total vehicle-km output from the assignment for each of these modes.

These extensive datasets will be analysed by UNIABDN for each site to identify, for example, the trip purposes and times of day where SocialCar is likely to have the biggest impact, and whether there are significant differences between sites. Annualised values will be produced where appropriate for benchmarking purposes (e.g. CO_2 reduction, fuel consumpions savings, accident reductions savings, etc.).

	KPI	UNITS
Nº	**Transport**:	
1	reduction in car trips	total number of car trips
2	reductions in car-km	total vehicle-km by car
3	change in average vehicle occupancy	persons /vehicle
4	increase in PT users	total number of PT trips
5	increases in PT pass-km	total passenger-km by PT
6	change in average travel time	average OD travel time
7	change of average v/c ratio	∑ [link volume (veh/hour)/link capacity (veh/hour) x link length] / total network link length
	Environment:	
8	CO_2 reduction based on car km reduction	kg CO_2e
	Energy:	
9	Fuel consumption reduction based on car km reduction	Toe
	Economy:	
10	City-wide reduction in Veh-hrs delayed	Veh-hours
11	Individual journey costs reduction, based on car-km reduction and parking charges PT fares	EUROS
12	Increased revenue for PT operators	EUROS
	Society:	
13	Reduction in accident costs based on car-km reduction	EUROS

Table 5 - List of Key Performance Indicators for Test B

4.2 Test C impact evaluation

Test C comprises of the use of the SocialCar App by actual travellers in their real travel environment at the three lightning sites (Brussels, Edinburgh and Canton Ticino). The impact assessment involves the evaluation of the use of the App through a combination of monitoring observed behaviour during real life testing and conducting user acceptance surveys both before and after the real life testing.

Test C requires a greater commitment from candidates, as it involves considerable time commitment during the different phases of the evaluation. Firstly candidates would be required to attend a focus group where they complete a Technology Acceptance Model (TAM) survey prior to using the SocialCar App. At this focus group they will also be provided with instructions and training in the use of the SocialCar App. They are then expected to make use of the App for a set period of time (between 1 month and 3 months). Finally, they are required to attend a second focus group after they have used the App – during this focus group they will be required to complete the TAM survey again and system usability survey as well as user esxperience feedback.

It is required that a group of 25 testers, prepared to particpate throughout the testing (pre-test focus group, test period use of SocialCar App, and post-test focus group) should be sought at each site. There will inevitably be some drop-off in participation and so a target of at least 20 testers retained throughout the whole process is desirable. The benefits of a retaining a small but consistent group of testers is that shifting opinion based on the effects of using the SocialCar App are well recorded. This is more accurate compared with different people that are contacted a number of times. Of course any additional users of the SocialCar App during the test period will also have their usage recorded by the system and system usability survey.

Focus Group 1

This focus group will be arranged locally and held at each site with support from FIT, Movenda and CERTH. Survey materials will be prepared by UNIABDN and ABACUS. Attendees will complete a TAM survey prior to using the SocialCar App. Information on the TAM surveys is provided in section 4.1.

The same survey is to be used with the Test C participants, but will be delivered during the focus group where participants will also be given instructions and training on how to use the SocialCar App. It is expected that these focus groups will be held between **April 1st and 31st May 2017**.

Test Period (on-the-ground testing)

The selected testers will then be expected to utilise the SocialCar App during their daily travel activities for an extended period of at least 1 month duration. Trial will be active between **1st June and 30th September 2017**.

During this time, the use of the App by the testers is monitored by the SocialCar system. This allows the capture of observed behaviour in use of the App. The data which will be collected is detailed in Table 6.

Note that this list is not exhaustive and will be refined and updated through consultation with the developers (UWH, CERTH, SUPSI, MOVENDA), and in light of the final set of functions to be delivered.

Id	Data
1	Type of traveller (driver / passenger)
2	% of users importing profiles from existing social media platforms
3	Frequency of use of the app (to include frequency of use of each app function)
4	Number of drivers offering carpooling
5	Time of day for travel searches (departure or arrival time) Carpool matching rate for passenger search (% of queries where a carpool option is included)

6	Carpool matching rate for driver offer (% of offers which are included in passenger queries)
7	Log of all selected + saved pre-planned trips
8	Number of remind rider messages sent
9	Number of remind driver messages sent
10	Number of notify carpool driver messages sent
11	Number of instances where 'send messages' function used
12	Number of confirm trip responses from drivers / Number of decline trip responses from drivers
13	% of users agreeing to real time tracking
14	Number of instances where 'view current trip' function is used
15	Number of instances where send travel experience function is used (and log of content of message)
16	Number of confirm payment messages sent
17	Number and content of ratings messages sent.
18	Log of null responses and instances of error messages to function use.
19	Log of failed communication with user. (e.g. real time tracking reliability)

Table 6 - List of observed data to be captured by SocialCar system during Test C trial period

Focus Group 2

Following completion of the trial period when testers will have had extended experience of using the SocialCar App, the testers will be required to attend a second focus group. This will be organised by site partners and supported by FIT. During this focus group they will be required to compete the TAM survey again and will be required to complete a system usability survey as well as give general feedback on their experinces using the App. Results from the TAM survey will be analysed by UNIABDN to enable validation of uptake scenarios used in Test B and provide more accurate impact assessment findings.

The system usability survey allows an in depth assessment of the ease of use of the SocialCar App and allows comparison with other established travel information tools (e.g. with Google Maps or other leading local travel information Apps). The basic survey consists of a 10 item questionnaire with 5 response options where participants are asked to provide their level of agreement on a 5 point scale (1=strongly disagree and 5 = strongly agree). Table 7 provides example of the questions which are asked relating to ease of use (usability).

The system usability survey responses will be analyzed by UNIABDN and will be scored according to the system usability scale (SUS) using the following response format (Brooke, 1996; Brooke, 2013):

- For odd items: subtract one from the user response.
- For even-numbered items: subtract the user responses from 5
- This scales all values from 0 to 4 (with four being the most positive response).
- Add up the converted responses for each user and multiply that total by 2.5. This converts the range of possible values from 0 to 100 instead of from 0 to 40.

This scoring system provides a means of comparing responses between different Apps and allows benchmarking with other new technology implementations. For instance, the average SUS score from over 500 studies is a 68 and so an SUS score above a 68 would be considered above average and anything below 68 is below average.

Question	Ease of use (usability)
1	I think that I would like to use the SocialCar App frequently.
2	I found the SocialCar App unnecessarily complex.
3	I thought the SocialCar App was easy to use.
4	I think that I would need the support of a technical person to be able to use the SocialCar App.
5	I found the various functions in the SocialCar App were well integrated
6	I thought there was too much inconsistency in the SocialCar App results.
7	I would imagine that most people would learn to use the SocialCar App very quickly.
8	I found the SocialCar App very cumbersome to use.
9	I felt very confident using the SocialCar App.
10	I needed to learn a lot of things before I could get going with the SocialCar App.

Table 7 - Example questions used in the System Usability Survey

Other questions for open discussion, which will be addressed to focus group participants, will be relating to:

- relevance/suitability/accuracy of results, clarity of results and user interface
- questions on future intention to use / willingness to pay
- questions on what SC features are most useful and most likely to affect their travel behaviour
- questions to elicit whether the user is more likely to use SC ahead of other Journey Planners or Mobility Apps

This second focus group will be held between the **1st September and 31st October 2017**.

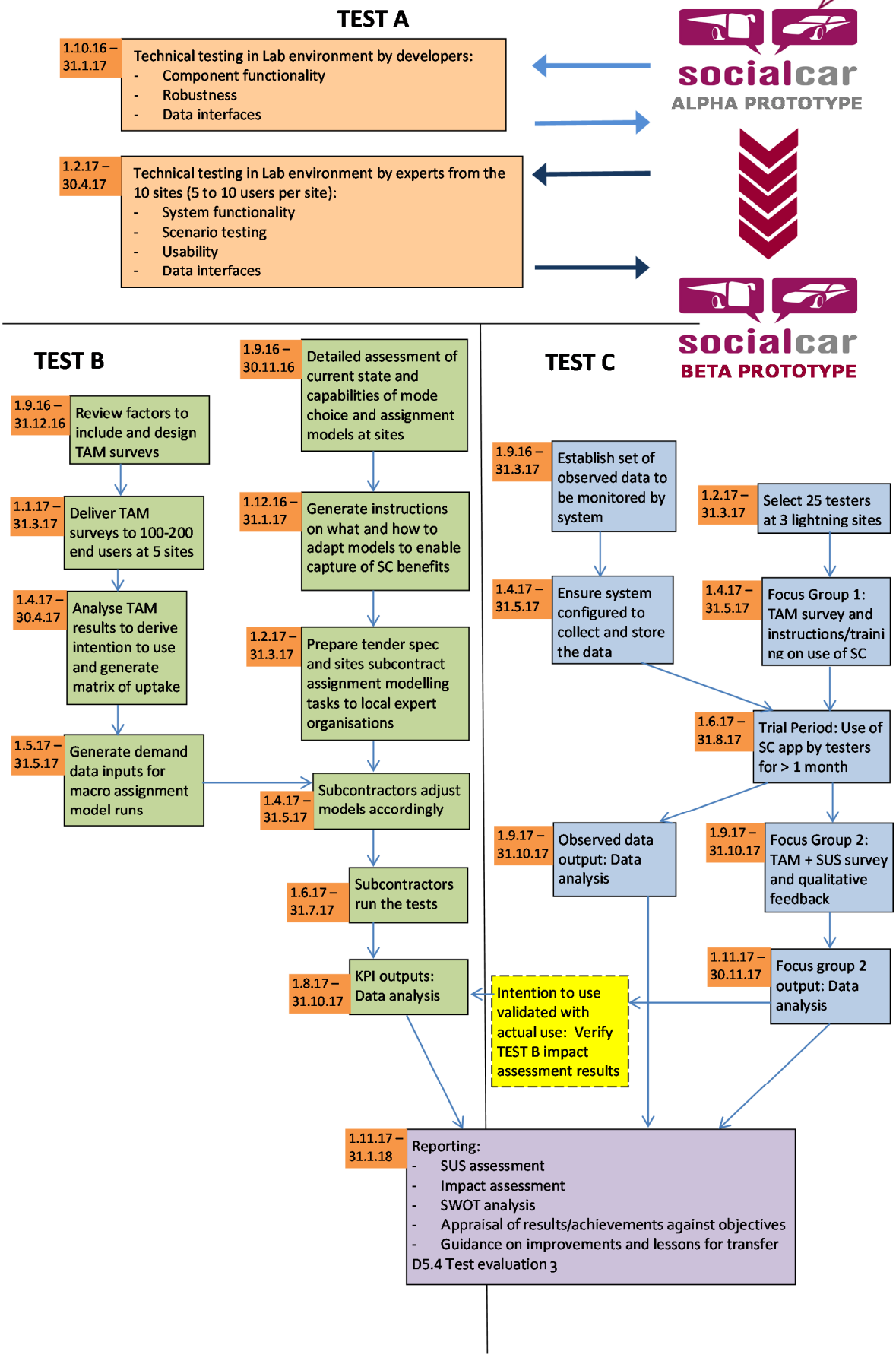


Figure 5 – Overview of the testing and impact evaluation process

4.3 Process evaluation

The process evaluation will be conducted with two main types of stakeholder organisations.

a. The suppliers to SocialCar
b. The exploiters of SocialCar

The suppliers to SocialCar

Initial identification of drivers for, and barriers to, the development and implementation of SocialCar have been investigated in Work package 6 and are reported on in MS8 which provides a pre-development assessment of the suitability and readiness of each site for the implementation of SocialCar. The process evaluation with 'suppliers' will use the drivers and barriers identified in WP6 as the basis for evaluating the real life site-specific ease of preparing, implementing and operating the SocialCar back-end system and front-end app. This will involve engagement with local stakeholders involved in the supply of data and/or the provision of responsive transport services.

Supplier specific questions will be designed using information contained in MS8 on Drivers and Barriers as well as information contained in D4.4 SocialCar Risk Assessment. As well as examining the ease with which these stakeholders can interface their data and services with the SocialCar platform, it will also investigate the motivation for these organisations to engage with SocialCar.

The exploiters of SocialCar

The process evaluation will also examine the ease with which third party services can exploit SocialCar by evaluating the benefits to organisations which will look to utilise the common data interfaces and/or routing and matching algorithms which SocialCar will develop. This will be tied in to the Business Model Development work in WP7, which will define in T7.3 the business plans for deployment at each site, identifying the organisations with potential to exploit SocialCar. This will establish the exploiters' stakeholder group. Exploiter specific questions will be designed using information contained in MS9 which details the SocialCar investment and deployment strategy in Europe, as well as relevant information contained in D4.4 SocialCar Risk Assessment and D6.1 The SocialCar Roadmap v1.

Common to both stakeholder groups will be questions related to local political and governance issues that may create barriers, and ideas and solutions to over-come them will be sought. Techniques and suggestions for improvement and for enhanced engagement/transferability beyond the project timeframe will also be investigated. Finally, questions, appropriate to the stakeholder group, which elicit the extent to which the SocialCar general objectives and specific objectives have been realised, will also be incorporated.

Questionnaires will be delivered to stakeholders by e-mail and through local consultation group meetings which will also provide a forum for capturing additional implementation and utilisation issues.

Taking the results from the impact evaluation with end users (travellers) together with the results from the process evaluation surveys and feedback from consultation group meetings for both suppliers and exploiters of SocialCar, we will undertake an appraisal of results/achievements against objectives as well as conducting a SWOT analysis. Lessons learnt, suggestions for improvement and good practice for enhanced engagement/transferability beyond the project timeframe will form the outputs from this analysis.

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