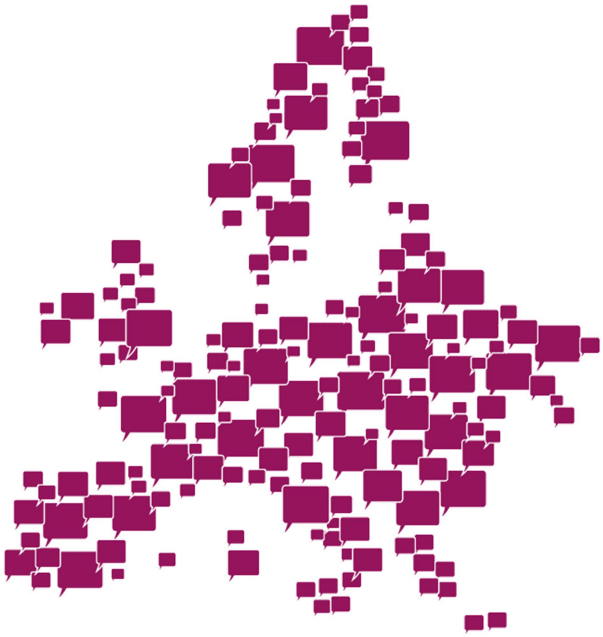
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 636427.

www.socialcar-project.eu

SocialCar

Open social transport network for urban approach to carpooling

Roadmap for future Research



Deliverable 8.8
Dissemination level: public
Work Package: 8
Version: 1.0
Date of preparation: 28.05.2018

Table of contents

1. Introduction

1.1 Scene setter

This Deliverable completes the research process of SocialCar, by reporting the advancements reached by the project and the key open questions emerged during implementation phases that should be addressed in future initiatives.

SocialCar carried out a 3-year research effort moving from the H2020 call *MG.7.1-2014. Connectivity and information sharing for intelligent mobility*, whose main challenge was:

"to come up with new, efficient, affordable, safe, secure and accessible solutions taking advantage of the ever growing connectivity of people and objects, the availability of European GNSS based location, the advances in cloud computing, big, linked and open data and the propagation of Internet and social media, that will help solve the mobility problems European citizens and businesses are facing today. Indeed, 'Big Data' management (availability, collection, storage, distribution and use) will progressively become a major challenge in intelligent transport communications as will the wider issues related to data ownership, user acceptance and privacy concerns."

And expected impacts:

- *Unlocking the potential of vast amounts of transport data and solving problems related to transmission, interoperability, storage, processing and security.*
- *Provision of new environmentally-friendly mobility solutions for European citizens, reducing the commuting times and improving transport system's quality and accessibility and utilisation.*
- *Alleviating congestion, reducing pollution levels and emergency-response times.*

The project accomplished an intense research activity in several domains (ICT, transport, business, socio-economics) and advanced the state-of-the-art with concrete outcomes reported in a successful scientific publication story.

The process, represented in figure 1, have its achievement in the identification of new key questions to be addressed by future research.

This document develops therefore a Roadmap for future research by setting priorities and looking for suitable objectives and targets to be achieved in a 10-years horizon.

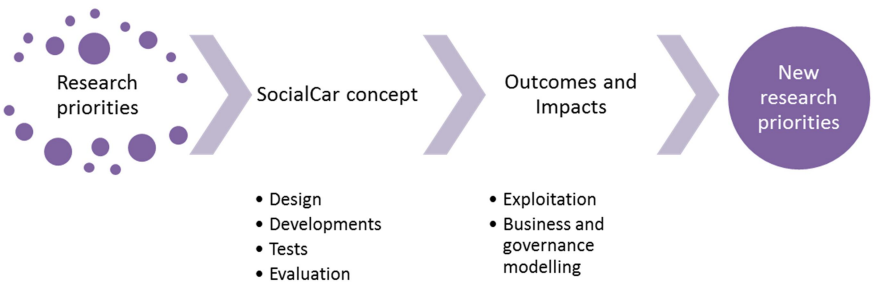


Figure 1 - The SocialCar research prcess

Project	SocialCar: Open social transport network for urban approach to carpooling
Grant agreement number	636427
Document title	Social media campaign report 2
Deliverable number	D 8.8
Type of deliverable	Report
Dissemination level	public
Work Package	8
Version	1.0
Date of preparation	28 May 2018
Language	English
Author(s) (Beneficiary)	FIT
Contributor(s) (Beneficiary)	All project beneficiaries
Peer reviewer(s) (Beneficiary)	Bermag
History	Version 1.0: 28.05.2018
Keywords	Travel assistance services, open data, sharing mobility, MaaS

1.2 Executive summary and scope of the document

The Deliverable is one of the final steps of SocialCar project and serves for EC purposes, supporting the identification of key research questions emerged by the results achieved by the project.

In section 2 the report analyses the main research topics addressed by the project and emerged during its Innovation management process and other investigations aimed at monitoring technical and operational evolutions in the market of travel assistance services. The following section 3 identifies the key challenges and proposes topics for future research.

1.3 Glossary

IM: Innovation Management

ICB: Impact Creation Board

PB: Policy Board

MaaS: Mobility as a Service

WP: Work Package

CCAM: Cooperative, Connected and Automated Mobility

2. Summary of main research problems addressed by SocialCar

2.1 SocialCar Innovation Management outcomes

During its lifetime, SocialCar addressed the key research topics not only by assessing internal advancements deriving from scheduled tasks but also exploiting external influences brought by the innovation management approach: a set of tasks accomplished and external key professionals recruited for identifying and monitoring key innovative solutions able to influence and impact the project. The Innovation Management (IM) was structured as below:

- The **Policy Board** (composed by policy makers coming from project test-sites);
- The **Impact Creation Board** (two external experts on business issues, two external experts on technology issues).

The process of the IM consisted in initiating an individual thread dedicated to monitoring current technological innovation and ensuring that the project evolved in compliance to existing practices and trends. Additionally, IM took all appropriate actions in order to make sure that the produced innovation was properly disseminated to external audiences and to the EC, thus expanding its impacts.

The Innovation Management deployed its action by holding dedicated meetings where all attendees discussed with project representatives and suggested guidelines, adjustments, ideas both technological and business-related.

Detailed reports of such meetings were provided in deliverables D3.4, D3.5, D3.6, D3.7 and are hereafter summarised:

- The 1st meeting was devoted to activate IM and related boards, to report the initial project achievements and trace the strategic guidelines for this knowledge-exchange flow.
- The 2nd meeting was dedicated to various aspects related to data management in the domain of transport, both from technical and business points of view.
- The 3rd meeting was dedicated to various aspects related to payments and tariffs that could provide application paradigms in the scope of the commercial exploitation of the SocialCar project.
- The 4th meeting was dedicated to monitor the latest technical (and organisational) innovations in the sector mainly related to Public Transport policies, data formats and gamification approaches ensuring high user adoptions of mobile apps dedicated to transport services.

Overall the Innovation management activities resulted in significant inputs for project activities that helped to re-focus some tasks finally leading to better understanding of problems and more effective solutions. Research activity benefitted too from this process and outcomes were reported in publications presented during the TRA conference (April 2018). These results may be summarised as follows:

- **Positioning of SocialCar in the Travel Assistance Service market**: during the project lifetime several technical advancements were discovered in the market of journey planners and related applications that increasingly evolved from mere information commodities to planning tools for both users and providers. SocialCar considered these advancements when designing its features and defining exploitation models as well as for identifying key open issues to be addressed in future researches.

- **The Data challenge**: as reported in technical and operational documents (D4.5 and D5.4 among others) the quality of transport data was discovered to be a key issue, potentially hampering the take-up of products like SocialCar but also affecting the overall mobility system in a city. Key data issues were discussed in D7.3, in an in-depth analysis proposing new governance models for managing data and their impacts in the organisation of transports in a public-private framework. The continuous evolution of technologies and models needs to be carefully studied for tackling potential negative externalities and promoting positive approaches for sustainable mobility.
- **Understanding the complexity of payment services within the emerging MaaS context:** the initial ambition of SocialCar project to deploy effective payment services besides planning and booking features was limited to the commercial environment in the transport domain, where public and private providers are adapting their strategies, considering new competitive scenarios where data aggregators could become the dominant part and lead demand/supply dynamics. SocialCar in this scenario should remain a step behind, focusing on its role of powerful and intelligent journey planner and leaving to new business initiative based e.g. on the Mobility-as-a-Service model the more complex commercial interactions, often played on global rather than at urban scale.
- **Considering the relevance of gamification or other user adoption practices** for raising interest and therefore critical mass of users: SocialCar became aware that a strong dependency for the success of multi-modal journey planners based on flexible services is the user adoption and related behavioural change. Supplement of research is needed in order to investigate all human factors influencing user decisions in mobility and therefore for promoting more sustainability in a less-individualised lifestyle.

2.2 Overview of future mobility scenarios

Since the beginning of the SocialCar project, in June 2015, the Intelligent Mobility topic has evolved and many open questions became clear, paving the way for future scenarios in urban mobility. In relation to the topics addressed by SocialCar, three aspects have been considered particularly relevant and during this timeframe outlined a better picture of their impacts in everyday transport habits, coming out from a niche condition and becoming mainstream in public debate as well as in business and technological implications. These aspects are analysed in the following subsections.

2.2.1 Sharing mobility

Sharing mobility is a socio-economic phenomenon that during the recent period invested the transport domain both on supply and demand sides. On the supply side the sharing mobility consisted in the uptake of varied models impacting traditional modes of transports (taxi, car, bike) and using digital technologies for facilitating the sharing of assets and journeys, creating flexible and scalable services, enabling interactions and data sharing among users/operators/platforms, finally making more efficient the use of existing resources in a determined environment. On the demand side, the sharing mobility impacted in the behaviour of individuals who progressively tend to accept the temporary access to mobility services rather than using the ownership and therefore joining new lifestyles that promote efficiency and sustainability.

According to the International Transport Forum (ITF)[1] in a shared mobility model, the transport demand could be met by just 3% of current car fleet in cities as each vehicle would be used more intensively, with greater

[1] https://www.itf-oecd.org/shared-mobility-innovation-liveable-cities

efficiency and at lower costs. Jose Viegas, ITF's secretary-general, noted in a statement[2:] "Using transport capacity more efficiency has the potential to build fairer, more inclusive societies by providing broad access to opportunities for everyone."

However some of the sharing mobility models (i.e. car sharing and other on-demand services somehow classifiable as shared mobility) work with highly profitable customer segments and according to some public authorities or public transport operators could draw away shares of users, bringing detrimental effects in economic sustainability of public services with consequences also in the social inclusion.

Concrete effects of a large uptake of such services are unknown and there are different points of view about their impacts in the overall transport system in cities.

2.2.2 Connected, Cooperative and Automated Mobility (CCAM)

The transport sector is in the middle of a revolutionary process boosted by Intelligent Transport Systems that are becoming more and more Cooperative and Connected (C-ITS) thanks to new technologies (mobile telco, Internet of Things, Big Data, Artificial Intelligence among others) and enable distributed computational processes. The emergence of Autonomous cars adds another relevant hint to this evolving framework, increasing the relevance of a deep interaction among infrastructure, vehicles, users; C-ITS have therefore been declined in more specific terms referring to the digital transformation of infrastructures (Smart Infrastructure, C-Road) and vehicles (driverless cars, automated vehicles). The C-ITS wording itself has been extended in Cooperative, Connected and Automated Mobility (CCAM), emphasizing the relevance of recent innovative features.

This technological progresses stimulates an evolution from the "traditional" ITS and a number of issues related to legal, economic, operational and transport aspects have been identified challenging both public and private subjects in defining a common framework.

Recently Polis published a positioning paper[3] expressing concerns about excessive enthusiasm around Connected and Automated Vehicles and the risk to overestimate the indubitable benefits (especially for transport safety) with insufficient consideration to negative impacts of unmanaged uptake of technologies in the market of urban transport. In particular the risks outlined consist in reinforcing the market position of individual transport that could become more attractive and affordable at the expenses of collective transport that could experience disruptions in its sustainability.

According to Polis, negative impacts could occur for:

- spatial aspects (automated transport would lead to higher urban sprawl);
- socio-economic aspects (increasing inequality, impacting the value of time spent in travelling);
- traffic efficiency (increasing congestion).

Similar positions expressed other subjects such as Civitas network, UITP and other institutional organisations which are traditionally more inclined to promote sustainable mobility showing a certain degree of cautiousness and even fear for a potential unmanaged uptake of commodities of individual transport and in the future of driverless cars that, by changing the way people will "consume their travel experience" may have dramatic negative effects in multiplying individual transports and at the expenses of public transport.

[2] http://www.eco-business.com/news/car-sharing-can-reduce-social-inequality-in-cities-report/

[3] https://www.polisnetwork.eu/topics/13/38/Automated-Vehicles/

On the other hand, industrial players (automotive, telco, infrastructure managers, telematics service providers) are strongly engaged in advancing the development of C-ITS and steering the public agenda in favour of services enabling the cooperative, connected and automated mobility, especially focusing on individual transport as key asset in respective markets. Their strategy is to reach and demonstrate effectiveness of new services in terms of traffic fluidity, safety, comfort and they aim to be well positioned in the future large take-up of driverless cars.

It is therefore evident that there are divergences between the two categories above presented both trying to influence the position of Member States and therefore the EU agenda. The new initiatives related to research and regulations will have to transpose different positions and tackle future challenges brought by technological innovations.

2.2.3 Global competitiveness

The global competiveness is affecting the market of urban transport, traditionally led by more local dynamics. Several technical and operational innovations brought new actors and models in this domain and cross-disciplinary aspects may enable new disruptive services in the future.

Main innovations relate to on-demand services, transport (Big) data management, MaaS schemes. These innovations could likely be proposed by global competitors with high investment capacities and able to address several markets at a time: this could be a strong enabler toward more efficiency in transport but there is also a risk of distortions, monopolies or other threats related to economic sustainability, social inclusion and urban accessibility. More specifically the risk could affect transport operators carrying-out subsidised services that could lose market shares with negative effects to the quality of services and the coverage of their operations.

According to Mckinsey[4], the transport sector in 2030 will look radically different than today and yew scenarios should be steered in a joint public-private effort. This trend is confirmed by a clear non-public fund raising tendency for mobility companies; investments are also provided by software companies that are forecasting strong relationships with their current core-business.

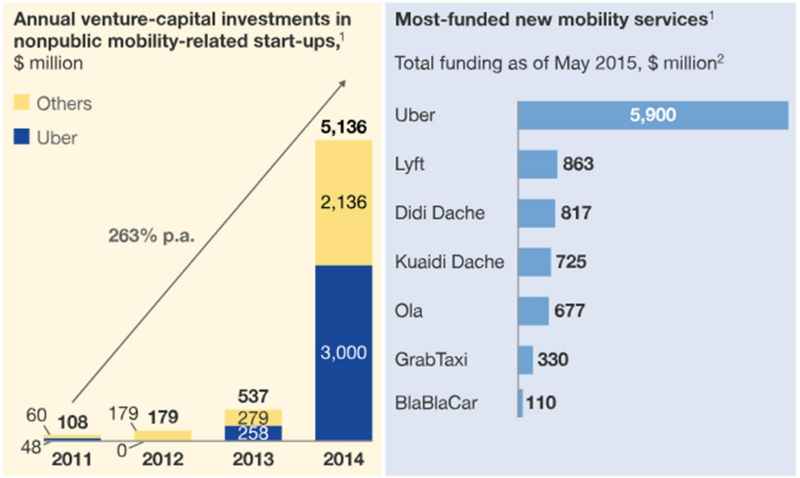


Figure 2 – Mobility-service copanies fund raising trends

[4] https://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/urban-mobility-at-a-tipping-point

3 Future research key objectives

Based on the inputs elaborated by the project and summarised in the previous section, the new research objectives have been identified to affect three main areas: 1) ICT for transport, 2) Policies and Regulation and 3) Leadership and competitiveness and are hereafter outlined.

3.1 ICT for transports

3.1.1 New digital technologies supporting virtuous mobility behaviours

This topics addresses the risk that increasingly more tailored travel assistance services deriving from powerful recommendation systems could shift citizens towards individual mobility behaviours. Connected and Automated vehicles combined with Artificial Intelligence and other data elaboration techniques are a formidable opportunity but should be deployed prioritising sustainable mobility principles.

Research should challenge this topic by:

- developing ecosystems where data acquisition/elaboration techniques and automated vehicles evolve in balanced way limiting negative externalities;
- simulating large uptake scenarios of above mentioned technologies by assessing the potential of shared mobility models and impacts in traffic congestion, user behaviour, environmental effects;
- designing open and innovative software architectures enabling collaborative models among diverse players (including ICT companies, transport providers, public authorities).

3.2 Policies and regulations for transports

3.2.1 Transport data policy

This topic addresses the emergence of aggregators and processing systems, producing and elaborating transport data (related to service descriptions and performances but also user habits and attitudes). These systems, thanks to their powerful capacity to generate, hold and process large amounts of data tend to produce dominant positions in the market and may influence (or even distort) the whole transport system by favouring segregations for disadvantaged areas or people.

Research should challenge this topic by

- Identifying how to regulate transport data-harvesting and defining viable models that balance private interests and the need to make relevant information assets available to everyone;
- Defining regulatory schemes, both at local and global scales, able to enforce quality and accuracy of open data for transport;
- Identifying suitable data sharing approaches among operators in order to reduce entrance barriers in the travel assistance service market.

3.2.2 Governance models for future mobility

New forms of mobility, supported by advanced technologies, intermediation services and innovative business models, have the capacity to disrupt actual schemes bringing new actors in the market and potentially generating positive impacts. However regulations are often fragmented, inadequate and not adaptive enough to such changes. This situation results in conflicts and difficult deployment of new services.

Research should challenge this topic by

- Scouting current good practices of local regulations and governance models concerning public and private transport services as well as travel assistance services;
- Identifying comprehensive and flexible models for travel assistance services having suitable characteristics that compromise progress and innovation with the protection of quality of service for the entire transport system;
- Analysing geographical, social, transport, economic and technical variables affecting the process of establishing suitable governance models for urban areas.

3.3 Global leadership and competitiveness

3.3.1 Promoting new business ideas

Urban transport sector is probably one of the last to be affected by the global revolution. As reported in section 2.2.3, investments are concentrating in new global services based on exploitation of large amount of data, shared mobility models and new technologies for vehicles. There is plenty of opportunities for new business ideas and the research should focus on how to take advantage from this wave and create competitiveness for EU.

Research should challenge this topic by

- Identifying drivers enabling new business opportunities in the market of travel assistance services and related MaaS models;
- Identifying key aspects (including open data, tariff schemes, ticketing integration) where public institutions can support the uptake of new business ideas by lowering regulatory barriers;
- Defining collaborative models among Education, Research and Business, in order to empower new entrepreneurship generations in the urban transport sector.