STARS

Shared mobility opporTunities And challenges foR European citieS

Car sharing at a glance in Europe

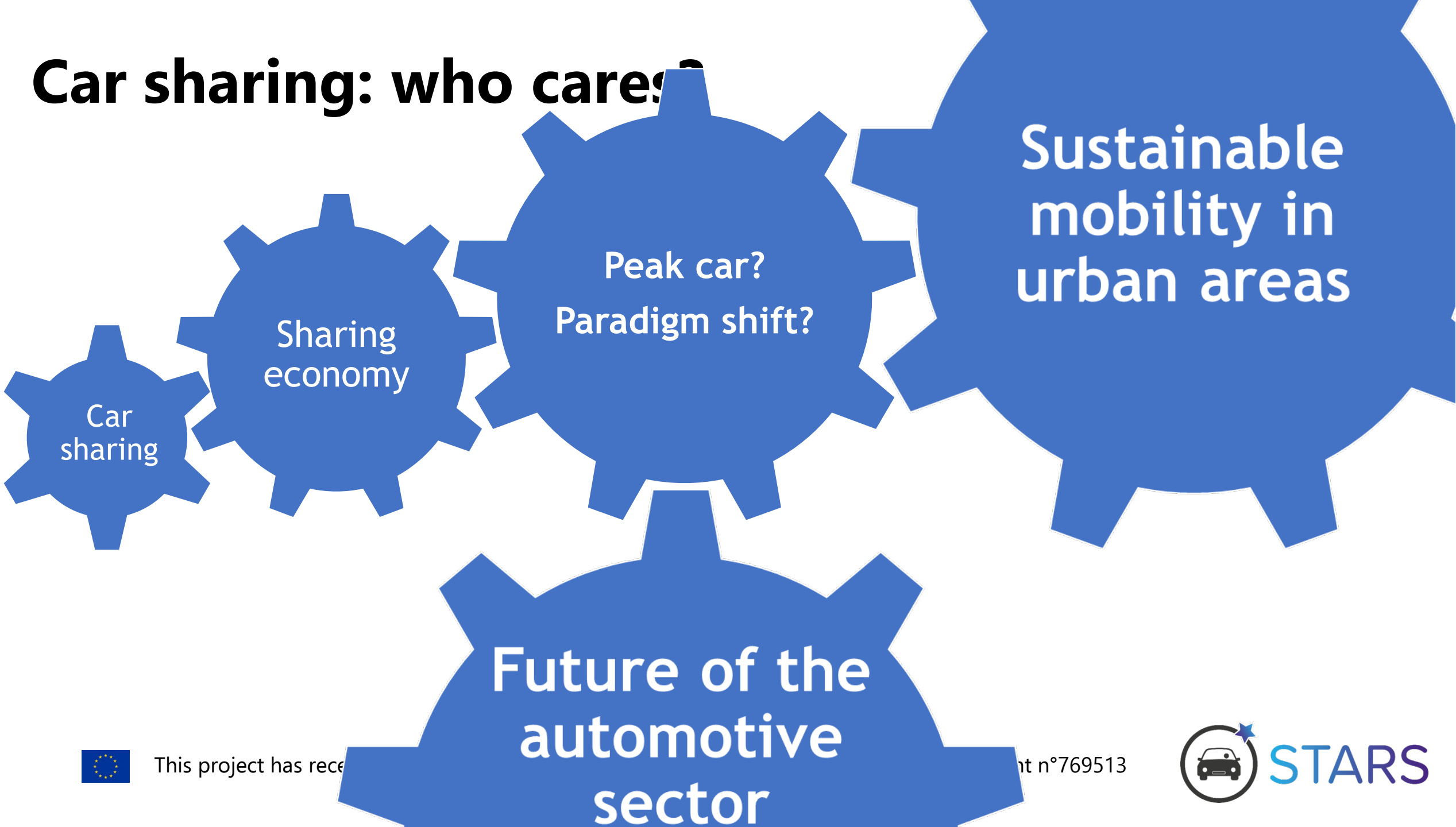
An international perspective from the STARS project

Marco Diana, Project Coordinator

STARS final event, 13th February 2020

This project has received funding from the Horizon 2020 programme under grant agreement n°769513

Car sharing: who cares?



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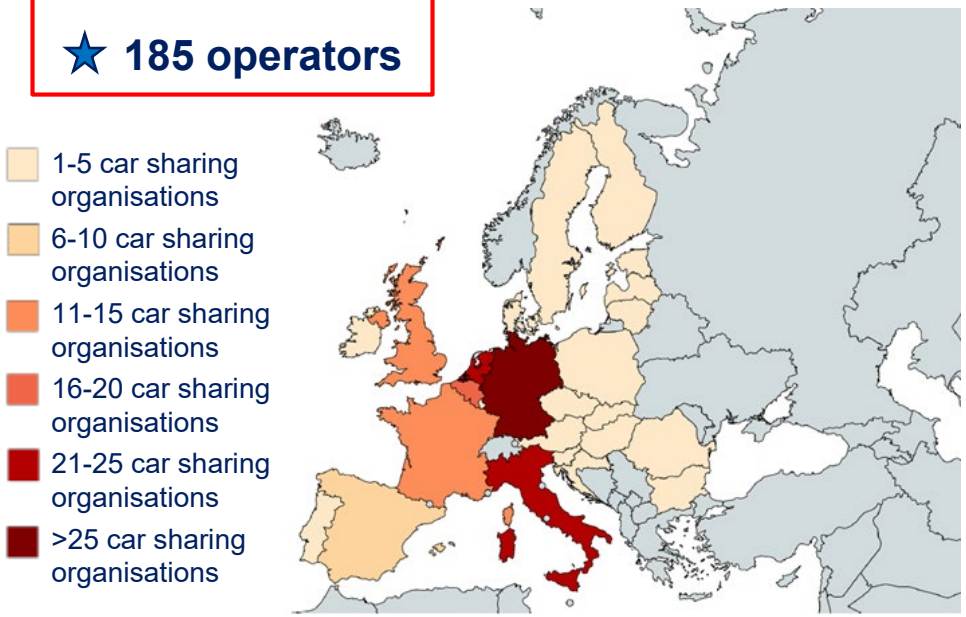
A two-level pan-European survey in 2017/18

Desktop research

Web research carried out by all partners

★ **25 countries**

★ **185 operators**



Seeking information such as operational characteristics, business model, shareholders, fleet consistency, pricing, reservation and opening technologies

In-depth research

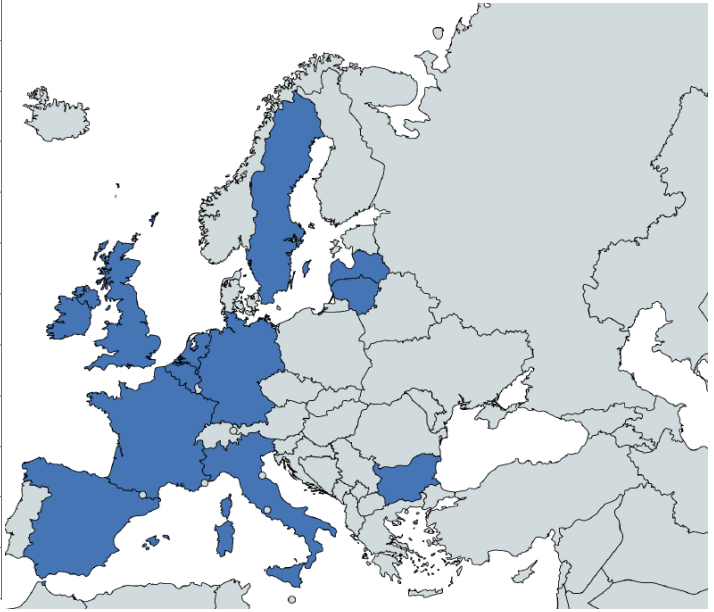
Web survey to all car sharing organisations operating in selected cities

★ **12 countries**

★ **20 cities**

★ **56 operators**

Country	City
Belgium	Antwerp, Brussels, Ghent
Bulgaria	Sofia
France	Paris
Germany	Berlin, Bremen, Cologne, Mannheim
Ireland	Dublin
Italy	Milan, Rome, Turin
Latvia	Riga
Lithuania	Vilnius
Netherlands	Amsterdam
United Kingdom	London
Spain	Barcelona, Madrid
Sweden	Göteborg



More specific information about each organisation, fleet composition, number of members, rental stats, future perspectives as well as other information collected in the desktop research

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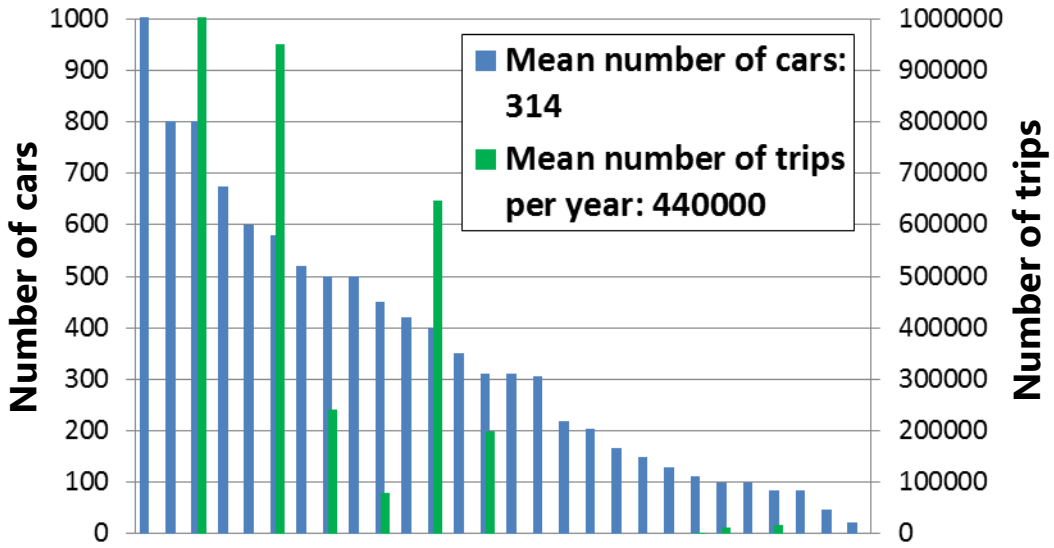
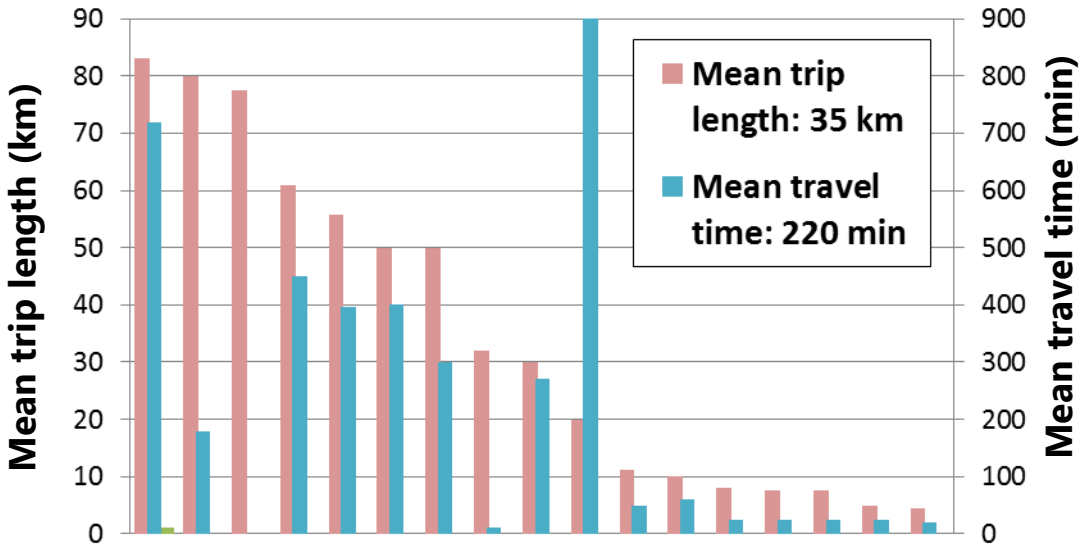
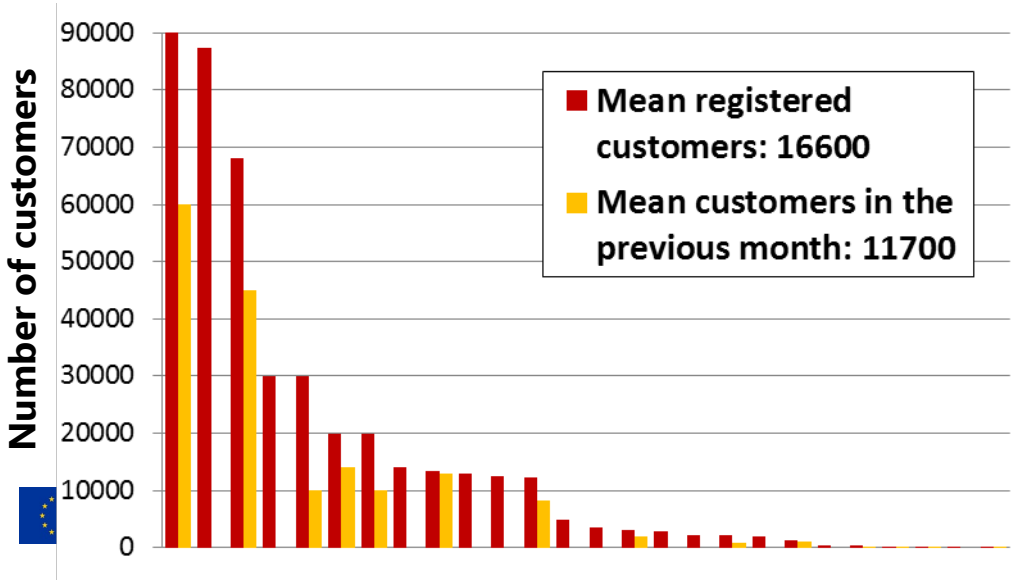
Car sharing at a glance: summary statistics







- Number of annual trips per car: **1400**
- Number of customers per car: **53**
- Number of annual trips per customer: **26.4**
- Ratio of active over registered customers: **70%**

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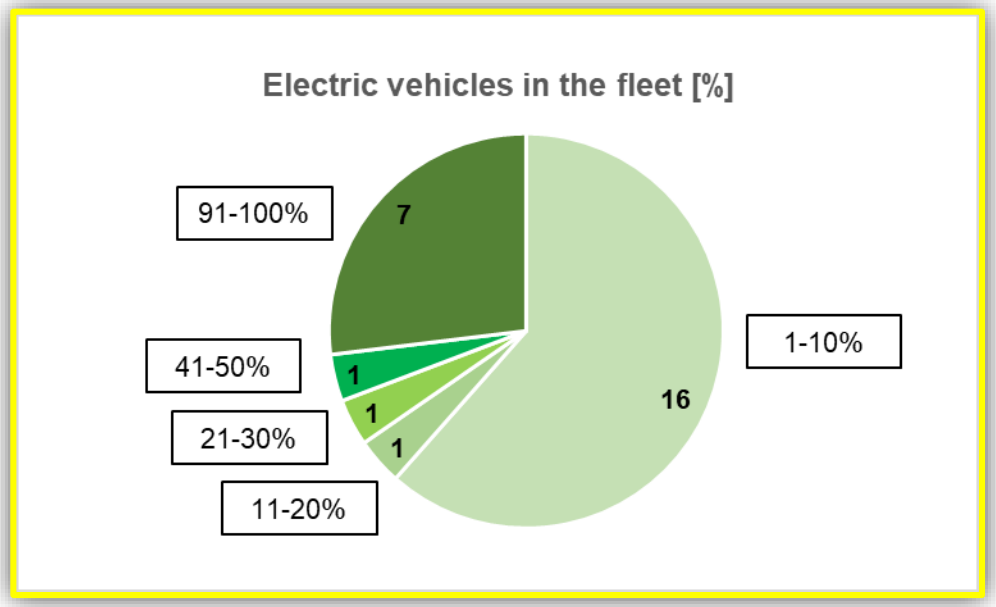
Car sharing at glance: fleet composition

Engine technology	Number of operators adopting the technology	Frequency over the total sample
Petrol / gasoline	34	81%
Diesel	22	52%
LPG	2	5%
Hydrogen	0	-
Electric	**26**	**62%**
Hybrid	9	21%
Total sample	**42**	



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What summary statistics are hiding to us?

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Car sharing is not a univocal concept

- **Operational characteristics:** roundtrip, free floating, stations, operational areas
- **Juridical scheme of the operator:** corporation, company, association, cooperative; ownership can be public, private or mixed
- **Business models:** for profit, no profit, fleet ownership scheme,m competition versus cooperation with other transport services
- **Dimensions:** fleet size and composition, number of registered customers, number of trips
- **Rules for service use:** subscription process, reservation policies, vehicle opening technologies
- **Pricing policies** for subscription and use of the service
- … and, last but not least, **local and environmental factors**: legal and regulatory framework, city policies, socioeconomic trends, cultural factors, performances of other transport modes…

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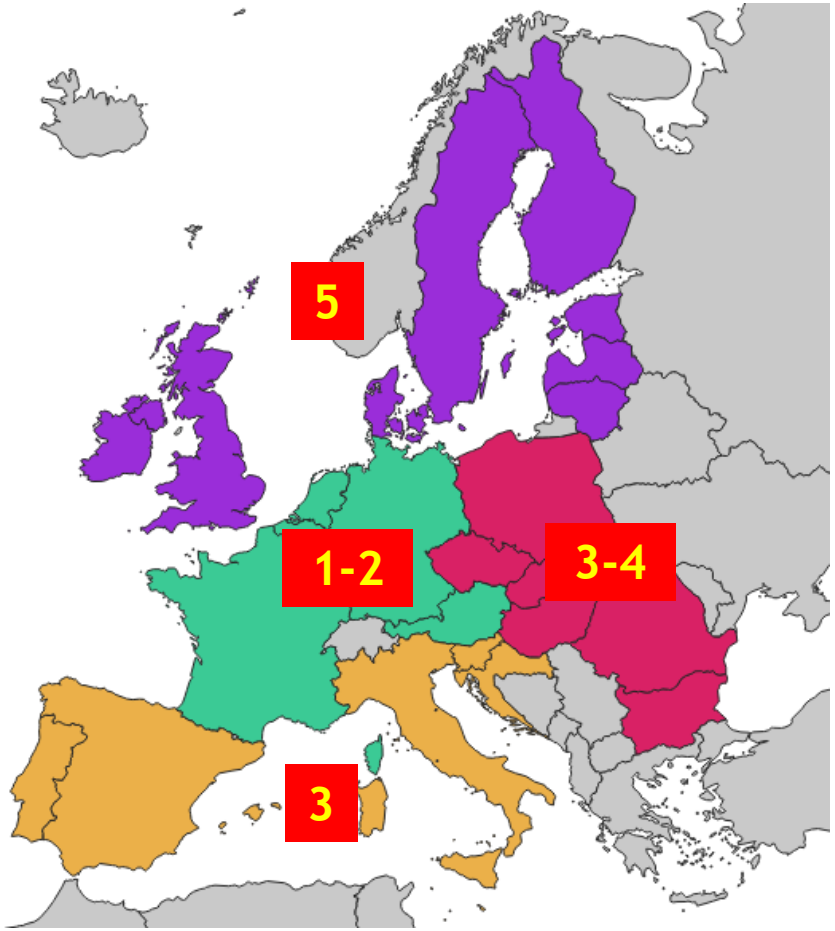
Five different car sharing schemes

Category of car sharing		Business model		
		Car sharing providers with an own fleet	Peer-to-Peer car sharing	Car sharing among neighbours
Operational characteristics	Roundtrip station-based	greenwhe 1 **Roundtrip station-based**		
	Roundtrip homezone-based	PARTAG 2 **Roundtrip homezone-based**	Getaround Déga 5 **Peer-to-Peer car sharing**	
	Free floating with an operational area	SHARENOW 3 **Free floating with operational area**		
	Free floating with pool stations	bluetorino 4 **Free floating with pool stations**		



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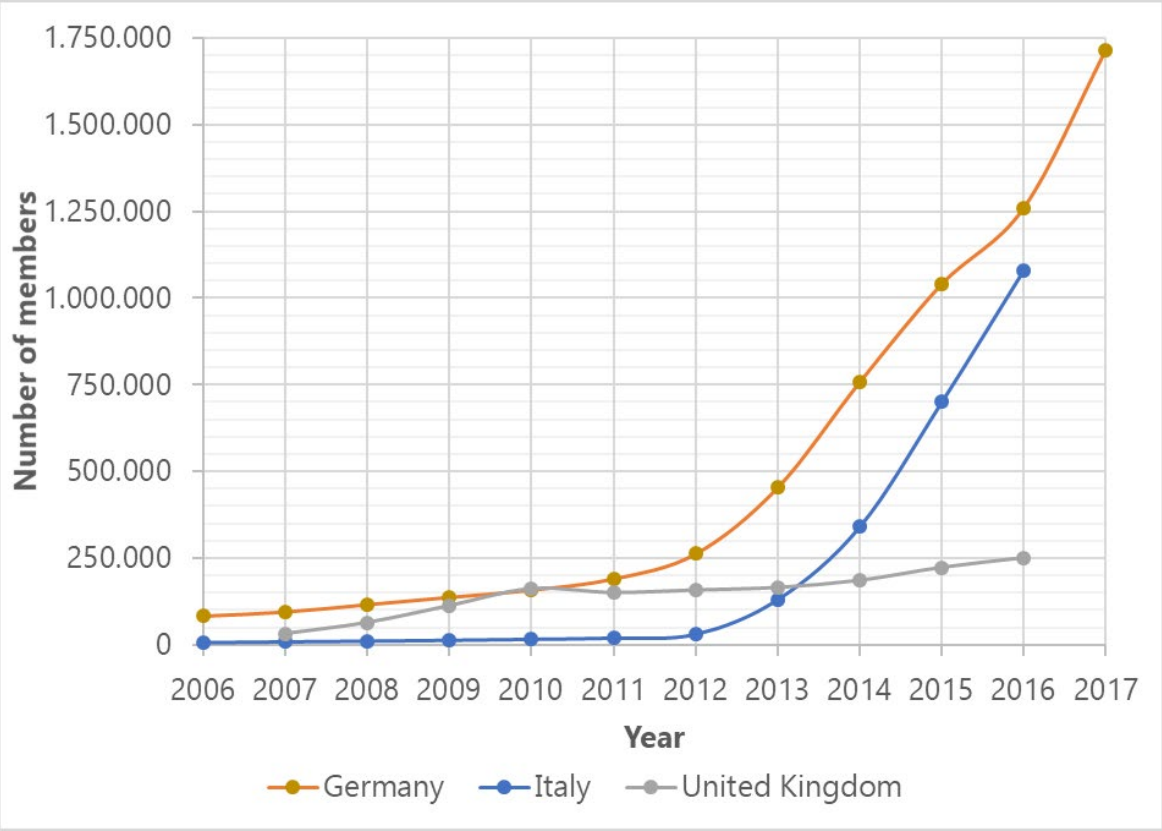
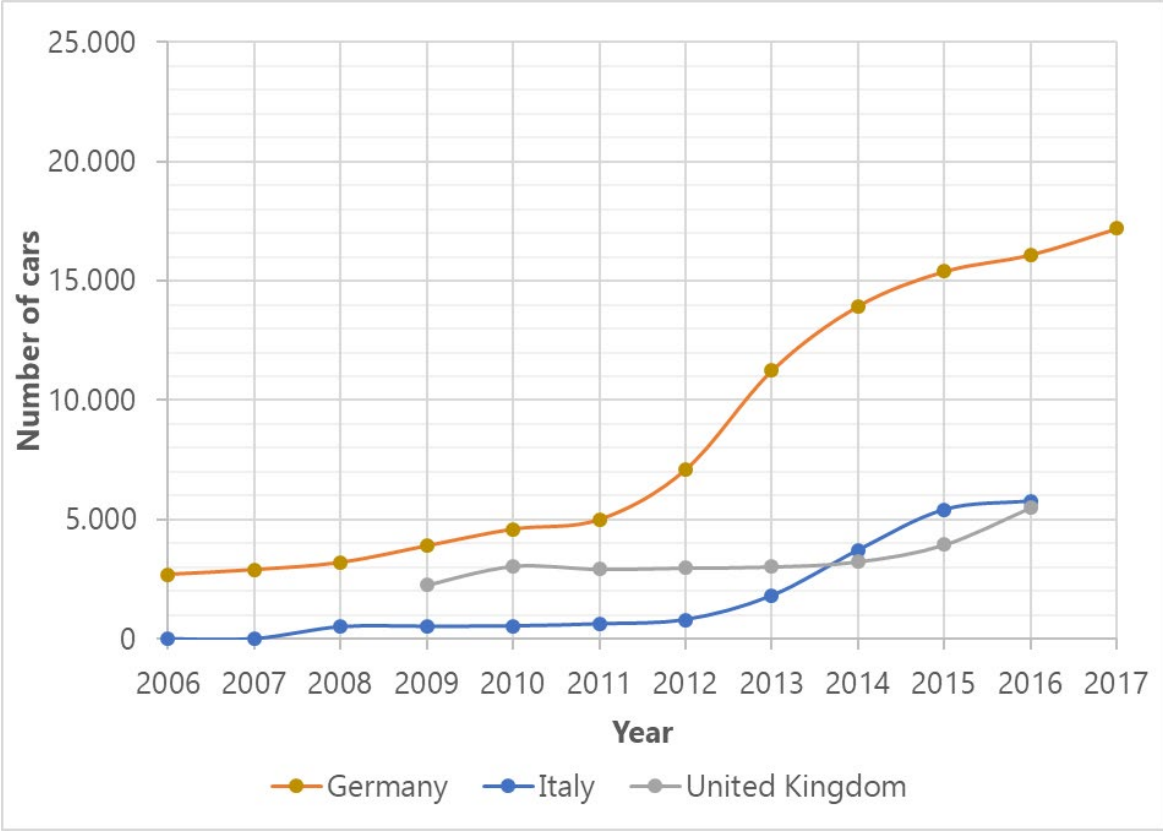
Differences among EU countries





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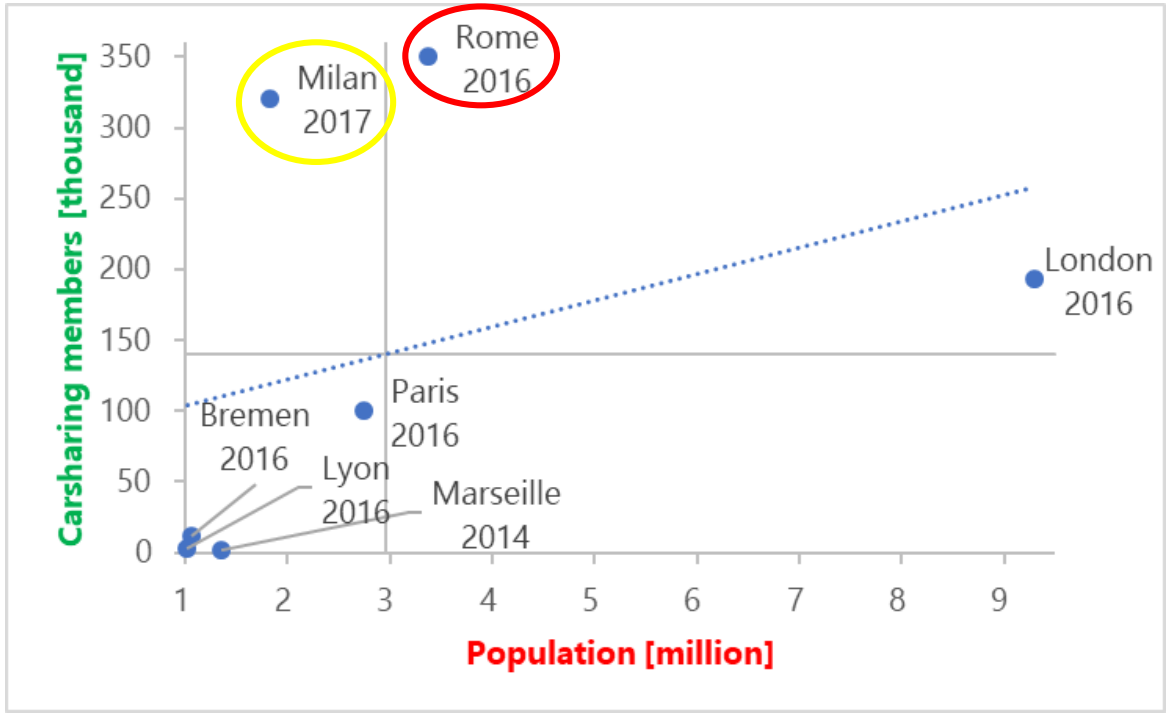
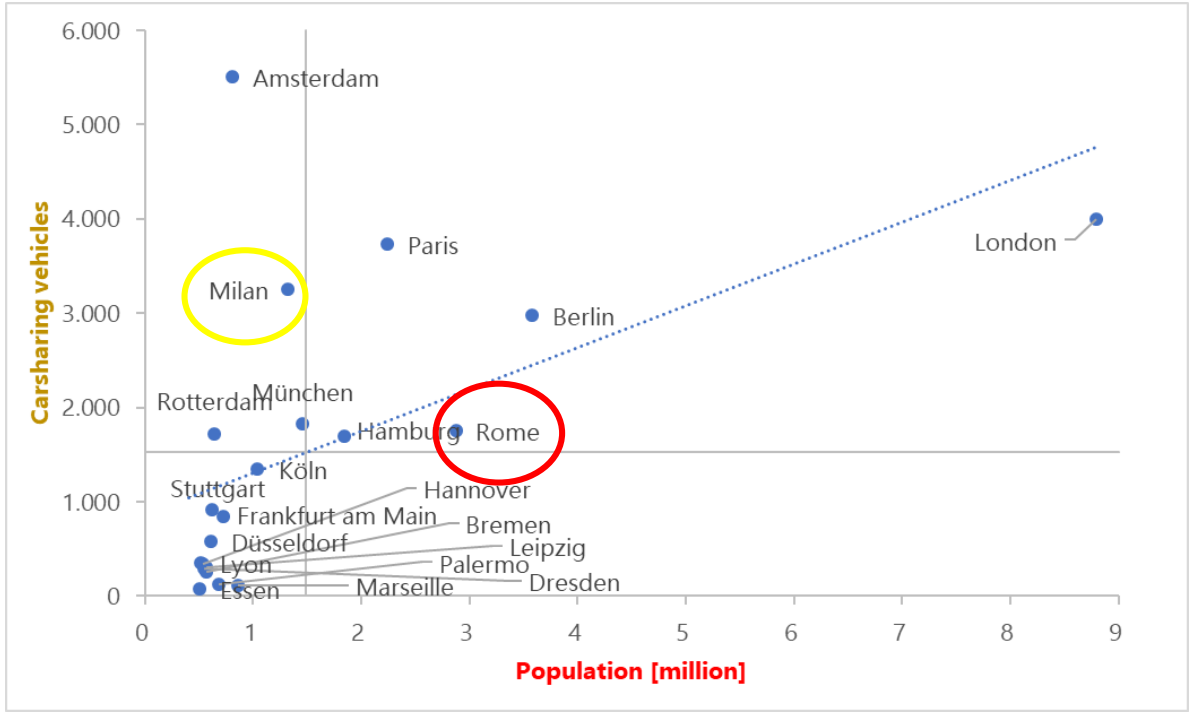
Differences among EU cities





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What are the impacts of car sharing?

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Long term and short term impacts

Long-term mobility choices → **Person-level analysis** →
- Car ownership levels
- Public transport passes
- Levels of use of different modes

Everyday travel choices → **Trip-level analysis** →
- Modal choices
- Impacts on emissions, congestion, parking demand…

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The future of car sharing from the operators' viewpoint

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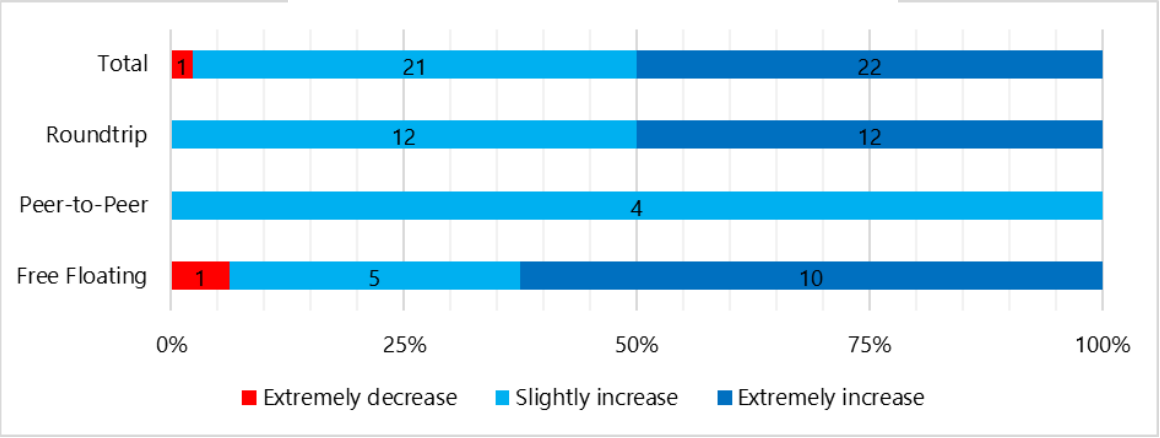
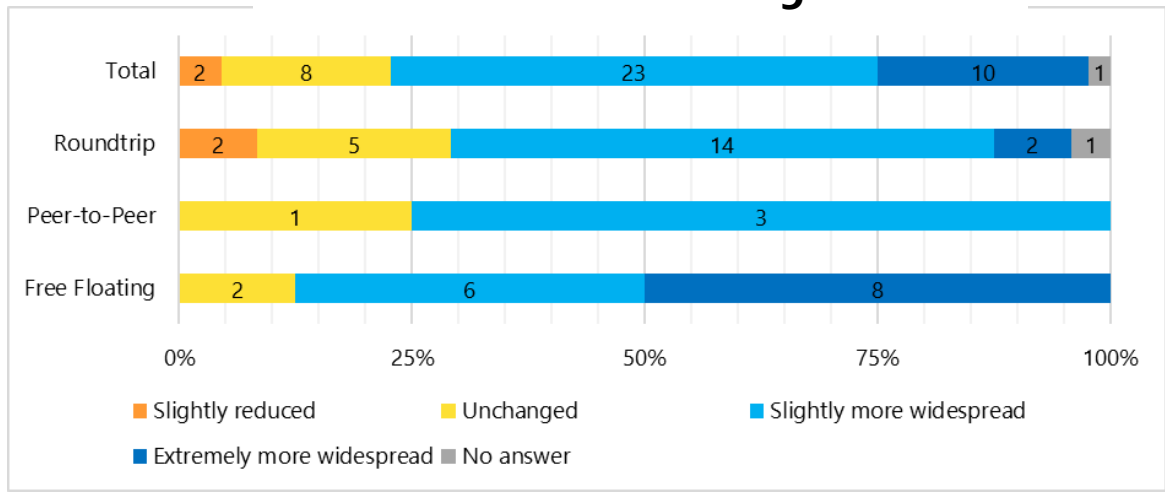
An outlook on the market trends

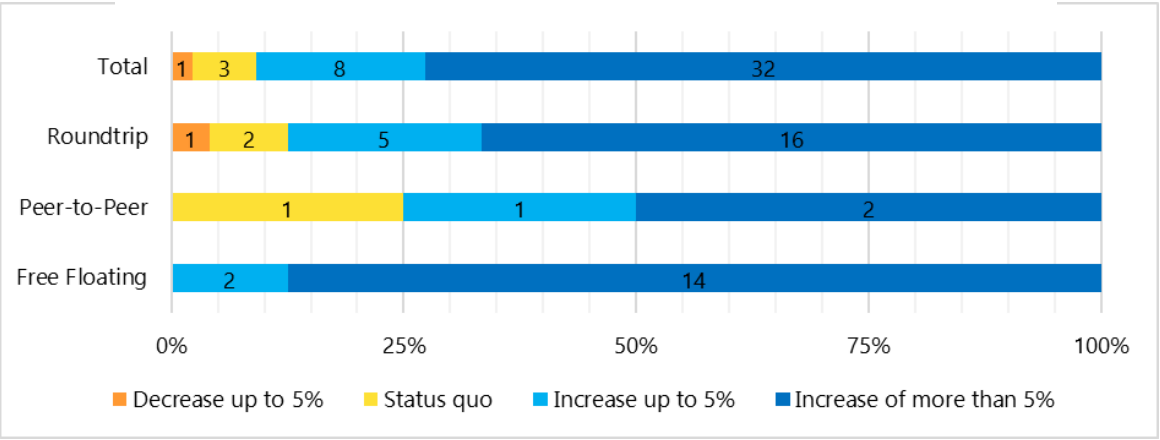
Number of customers



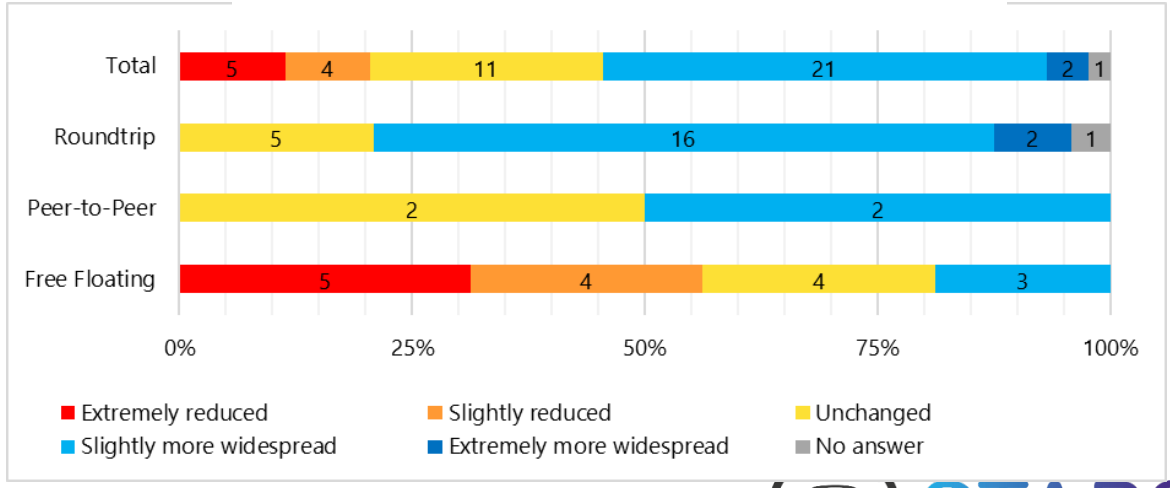
Diffusion of free floating services



Number of customers for their own business



Diffusion of station based services



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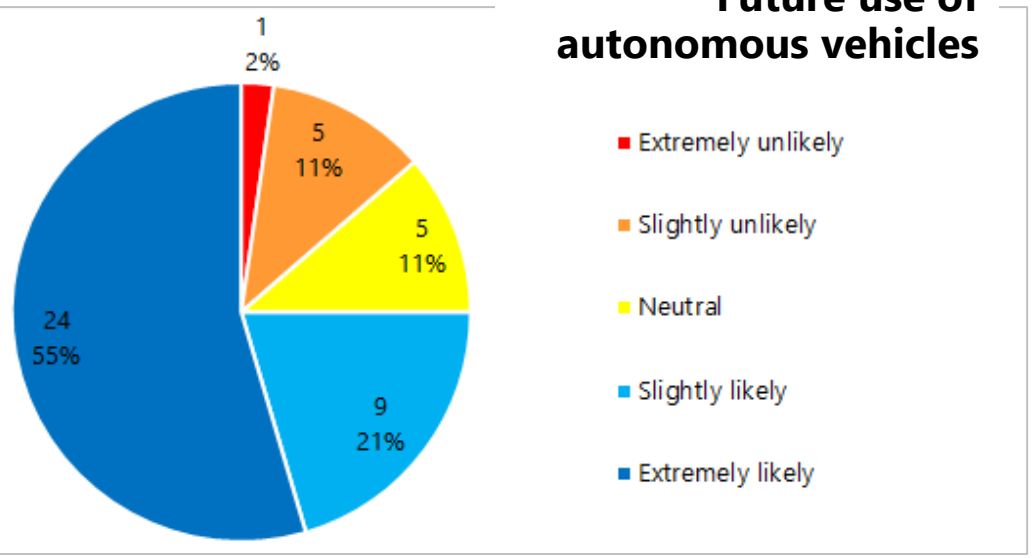
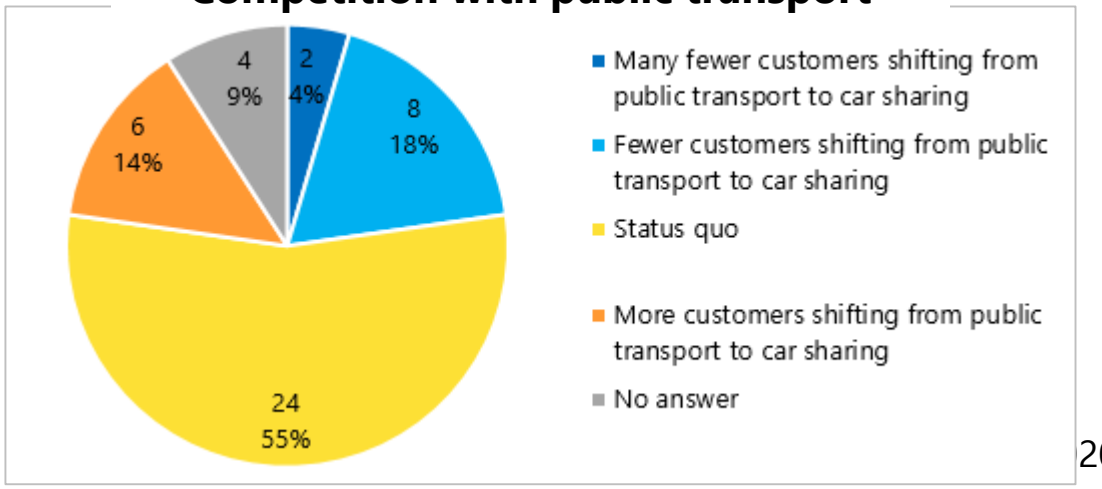
Tech innovation and competition with transit

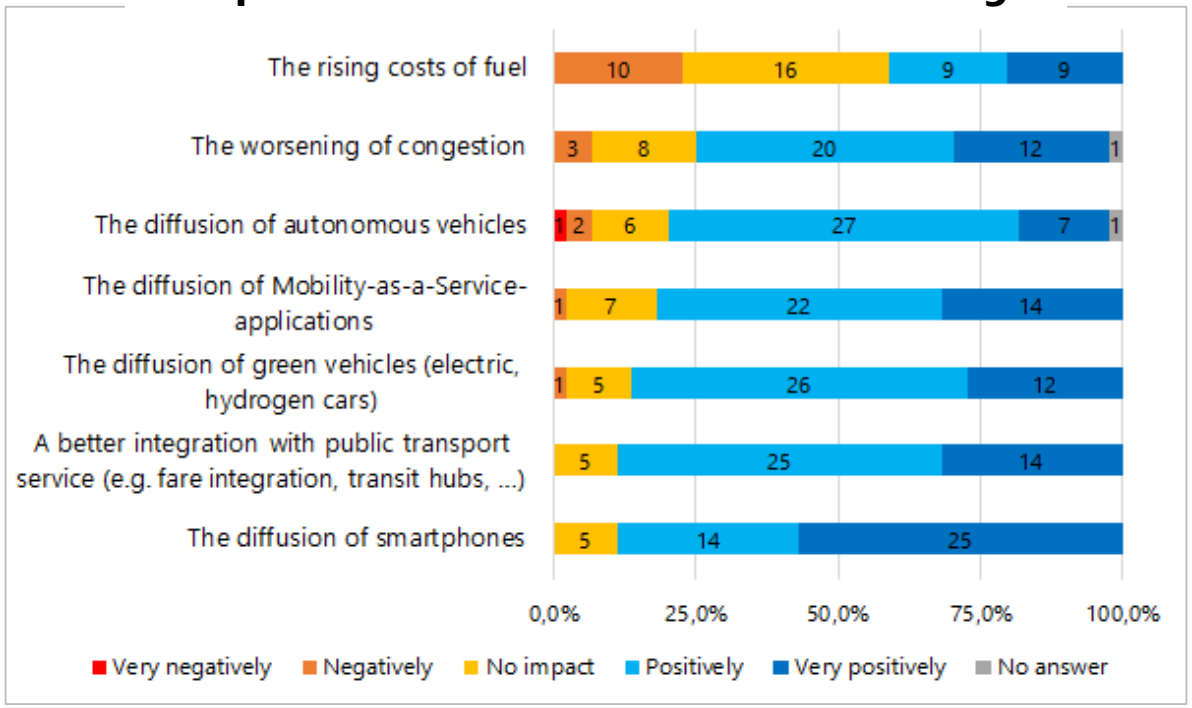
Future use of autonomous vehicles



Competition with public transport



Impact of different factors on car sharing



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So… what?

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Conclusions from this introduction

1. **Uneven diffusion** of car sharing among countries an cities: local conditions matter!

2. **Growth potential** still good but it is unlikely that car sharing will become a massively used mode in current conditions (*numbers from the Italian case study*)

3. **Positive benefits** mainly from replacing private cars, or are there also short term benefits related to daily mobility choices? (*stay tuned for an answer…*)

4. **Different car sharing** schemes may have an appeal to different social groups and a different impact on car ownership and mobility choices:

    a) ***Free floating*** is probably less beneficial regarding sharing impacts and modal substitution patterns BUT much more attractive to the «average driver» especially in car => *entry level in the car sharing world*

    b) ***Round trip*** is more a niche for «pro-social» individuals BUT higher benefits for cities => an easy car rental scheme for discretionary trips out of the city that makes the *final push to get rid of cars*

    c) ***Peer to peer*** even more emphasizing round trip characteristics

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Searching for the optimal “service mix”

Addiction to car ownership

Try out something new and in fashion “on the fly”, no obligation

Free floating services

Consolidate the use of shared cars for short trips

Engage with different means including public transport

Start planning to use car sharing for longer trips

Station based services

Realise that a personal car is not so needed after all

… ready for the **BIG JUMP?**

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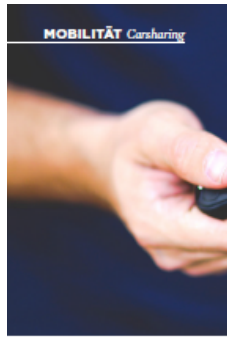
STARS output



Entlastun
Carsharin

Vergleichende Befr
Carsharing-Angebo

Stationsbasiertes Carsharing, Fre
Verkehrsverhalten

In den letzten Jahren sind einige
sharing-Angeboten mittels Kunde
dass sie entweder ausschließlich
Deutschland verbreiteten station
hat mit einheitlichem Design die
bestehenden Carsharing-Angebo
Nutzer unterschiedlicher Carshari
so zur Entlastungsleistung der Ar

Willi Loose, Gunnar Nehrke

Verschiedene Studien haben
den vergangenen Jahren Entlas
tungswirkungen von Carsha
ring-Angeboten meist Kunden
befragungen erforscht (z. B. EVA-CS
MobiP, share² und Bremen-Studie
Rahmen des EU-Projektes STARS
vom Bundesverband CarSharing e.V.
ersinnals Nutzerinnen und Nutzer unter
schiedlicher Carsharing-Variant
chend untersucht. Dazu wurden in den dre
Städten Frankfurt, Köln und Stuttgart jeweil
in innerstadtnahen, urban strukturierter

50 Internationales Verkehrswesen (70) 4 | 20

TRANSPORTATION LETTERS
https://doi.org/10.1080/19427867.2019.1707351

Taylor & Francis

Check for updates

A multimodal perspective in the study of car sharing switching intentions

Marco Diana and Riccardo Ceccato

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ABSTRACT

The introduction of innovative mobility services such as car sharing leads to changes in users' travel habits, inducing a shift of travel demand from existing travel modes. An analysis of such changes should be performed to promote car sharing, managing travel demand effectively. Policies should be developed to induce the switch only from private modes, avoiding the shift from public transport and active modes. In order to reach this aim, data from a mobility survey carried out in Turin (Italy) were used to study
choices. Decision Trees were adopted to complement the analyses following an econometric approac
decision trees was estimated for each mode used by respondents in a specific trip, to identify trip att
affecting the intention to switch to car sharing. Thus, threshold values of each variable that entice a
shift are mode-specific, thus better informing policies aimed at maximizing the benefits of car shar

KEYWORDS

Stated preferences; travel surveys; travel demand; car sharing; SMOTE technique

Introduction

After the introduction of car sharing, changes in travel habits of users are often reported (Clewlow 2016), both considering private and public transport modes. Potentially car sharing has several advantages, including the reduction of car ownership (Becker, Ciari, and Axhausen 2018) and vehicle miles traveled (Martin and Shaheen 2016), which contribute to decrease carbon emissions and energy consumption (Martin and Shaheen 2016, 2011), the diffusion of electric vehicles (Spezi et al. 2018) and an increase of the user's attitude to combine different travel means (Clewlow 2016). However, in order to take advantage of these positive aspects in a suitable and effective way, authorities have to carry out policies to promote car sharing, avoiding competition with existing sustainable modes (i.e. active modes and public transport) (Spezi et al. 2018), but complementing them. Hence, policies should be targeted in order to shift travel demand from private modes to car sharing (Ceccato and Diana 2018). In order to reach this aim, this paper analyses factors affecting the choice to switch to car sharing, developing separate models for each currently adopted mode. In this way, the use of car sharing can be promoted or avoided by varying mode-specific factors.

Several authors identified variables affecting the choice to use car sharing, even if their effects varied according to the specific area of analysis. Concerning socio-economic variables of travelers, car sharing adopters tend to be young (Becker, Ciari, and Axhausen 2017a), with higher employment rate (Carroll, Caulfield, and Ahern 2017), more educated (Burghard and Dütschke 2019), living in households with higher income (Clewlow 2016) and fewer cars (Martin, Shaheen, and Lidicker 2017). Other authors also considered household size (Efthymiou, Antoniou, and Waddell 2013) and composition (Kim, Rasouli, and Timmermans 2017), the number of owned bikes (Joachim et al. 2017), and spatial information, such as working location (Carroll, Caulfield, and Ahern 2017) and the presence of private parking near home (Ceccato and Diana 2018). Moreover, characteristics of a specific trip performed by car sharing were used: cost (Le Vine, Adamou, and Polak 2014), travel time and distance from the nearest vehicle (Becker, Ciari, and Axhausen 2017b), walking time to reach the car (Kim, Rasouli, and Timmermans 2017), parking co
pose (Le Vine et al. 2014), wea
Axhausen 2017b) and potentia
Diana 2018). Finally, several s
travel habits, such as usage fre
Timmermans 2017), public tr
modes (Clewlow 2016), and env
onmental awareness (Efthymio

In this paper, we aim at stud
conducive to a shift from a g
Therefore, compared to the abo
related to trip attributes were as
and cost of car sharing trips), s
manage them, in order to preven
particular, interventions to redu
example, by giving free access
Moreover, the walking time to
decreased by supplying a large
policymakers can also influen
financial support (subsidies o
Louvet 2019). The related res
which extent car sharing ma
induce a switch. On the oth
were not considered, since the
order to understand and simula
from the work of McFadden (
random utility maximization
(Tang, Xiong, and Zhang 201
2007), in particular, multinom
2016; Xie, Jinyang, and Parkan
2007; Hagenauer and Helbich
based on some statistical and
used to calibrate them (Yam
Cheng et al. 2018). For instanc
irrelevant alternatives (IIAs) (
Jinyang, and Parkany 2007; Ha
et al. 2018; Arabsolo, Pitombo,
of attributes are compensatory

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D 2.3

Car sharing in Europe

The growth of car sharing in a business as usual scenario

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Shared mobility opportunities And challenges foR European citieS

CAR SHARING IN EUROPE

FACTSHEET

How social, cultural and emotional factors influence users and non-users of car sharing

ONTEXT

day, there is **an urgent demand to reduce pollution in cities,** especially by limiting the
naging impacts of transportation on the environment (bad air quality, noise, reduced
en areas, traffic congestion...). **Car sharing appears as a sustainable solution** to tackle
nate change in urban areas.

nding for "Shared mobility opporTunities And challenges foR carsharing European citieS",
e **H2020 STARS project** aims to analyse the car sharing market, measure the benefits of
different services and compare their costs, as well as study user profiles and behaviour.

nched in October 2017, STARS brings together experts in the fields of transport engineering,
vironmental psychology, and industrial economics. Their work will serve as a basis to
sign and distribute a **policy toolkit** that will include guidelines and recommendations **to**
plement the best car sharing services in Europe, maximising environmental and social
efits while making cities better and more affordable places to live in.

s factsheet presents the results of two reports produced by the STARS project: D 4.1 -
e influence of socioeconomic factors in the diffusion of car sharing" and D 4.2 - "Mobility
tures and mobility styles", and addresses **"how social, cultural and emotional factors**
luence users and non-users of car sharing". The reports are based on studies conducted
6 countries (Belgium, France, Germany, Italy, Spain, Sweden) by Autodelen, BCS,
neral Motors, ICLEI, Politecnico di Torino, and the University of Gothenburg.

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10 Recommendations to Help Policymakers Implement Car Sharing in Europe

haring in Europe: a Multidimensional
ification & Inventory

the results of the STARS Deliverable 2.1, the following **five types**
aring have been identified in Europe:

itrip station-based: bringing back a shared vehicle to the same
ocation.

itrip homezone-based: bringing back a shared vehicle to the same
rhood.

loating with pool stations: a shared vehicle can be returned at
spots, but always in a dedicated car sharing hub/station.

loating with an operational area: a shared vehicle can be left at
ng place in an operational area.

o-peer car sharing: shared vehicles among private drivers, either
) community groups or peer-to-peer.

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Thank you

Get in touch for more information!

All of the reports of the project will be available for download on the STARS website: **www.stars-h2020.eu**

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