



HARMONY

SMARTPHONE- BASED TRAVEL SURVEY IN TURIN

A NEW DATA-DRIVEN APPROACH TO
ASSESS URBAN MOBILITY PATTERNS

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Context: HARMONY project



H2020 funded project



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 815269



VISION

- Develop a new generation of **harmonised spatial and multimodal transport planning tools**, to enable metropolitan area authorities to lead the **transition to a low carbon new mobility** era in a sustainable manner



OUTCOMES

- **Model Suite (MS):** multi-scale, software-agnostic, integrated activity-based model system
- **Recommendations for SUMP's update** (transport modelling)



APPLICATIONS

- Analyze regional and urban interventions for both **passenger** and **freight** mobility
- **Six EU metropolitan areas:** Rotterdam(NL), Oxfordshire(UK), Turin(IT), Athens(GR), Trikala(GR), Upper Silesian-Zaglebie Metropolis(PL)

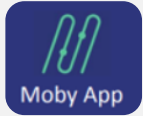


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Passenger travel survey with MobyApp



Model Suite (MS): including **passenger activity-based model**, requiring advanced methods to collect disaggregated data for households and individuals

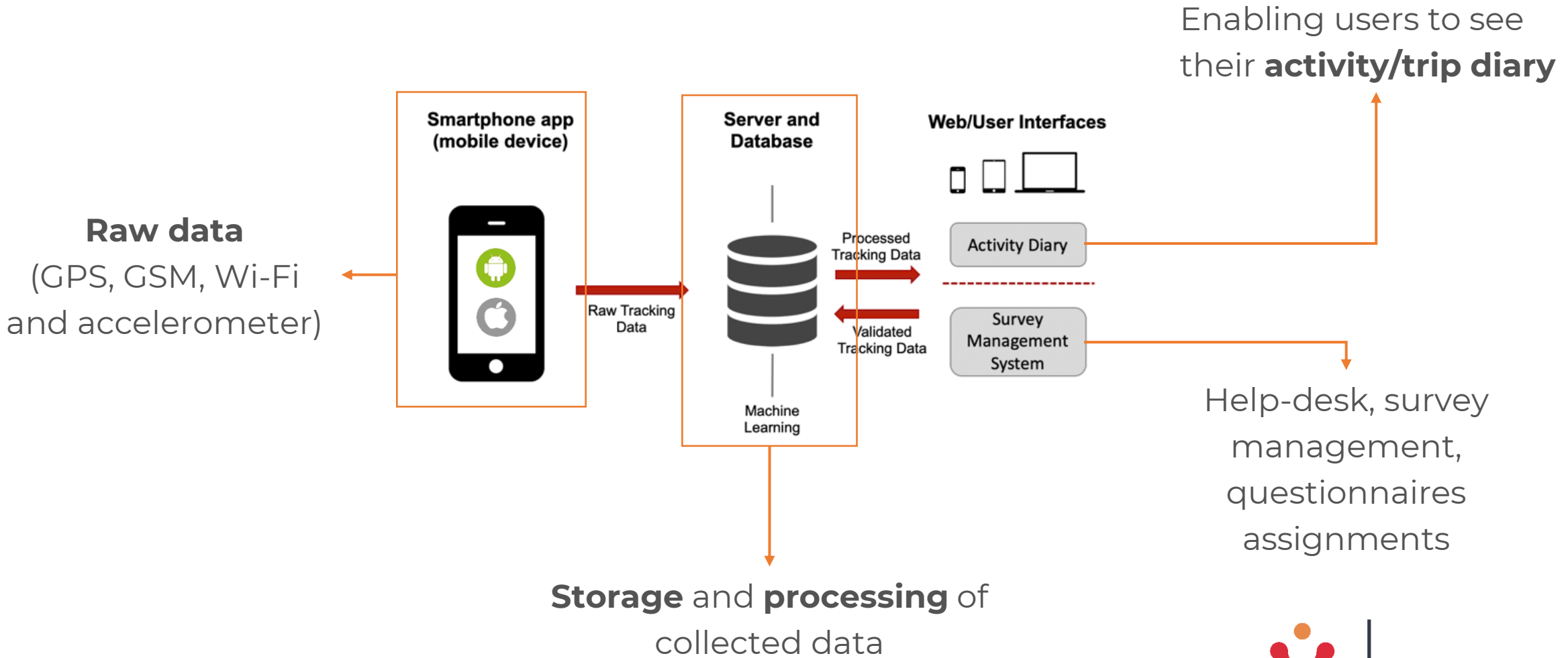


MobyApp developed to collect passenger mobility data to support the modelling application

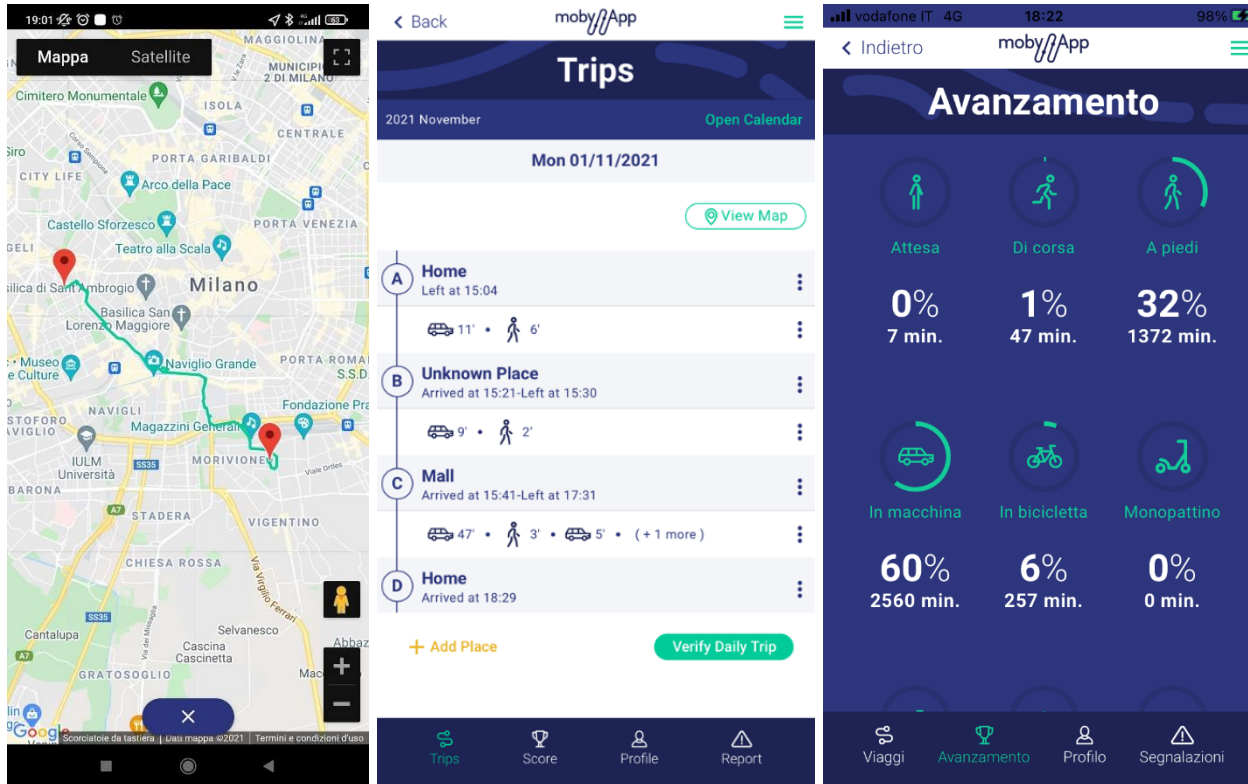


Passenger travel survey carried out in **Turin Urban Functional Area (Italy)**

Survey Integrated Platform



Moby App



- **Real data** tracked and collected
- Automatic detection of **places**
- Automatic detection of **trips** and **modes** used
- **Manual validation** needed
- **Additional information** asked (e.g.: if the vehicle is shared, parking information, etc.)

The sample in Turin

- **Representative sample** of individuals for the Turin FUA (Functional Urban Area) → 88 municipalities involved
- **Survey company** (IPSOS) engaged for recruitment of individuals



55%
From Turin
municipality

33%
From Turin
neighbouring
municipalities

12%
From outlying FUA
municipalities

More than
500



40%
18 - 34
Years old

60%
35 - 64

Participants



60%
Employed

10%
Retired

30%
Students



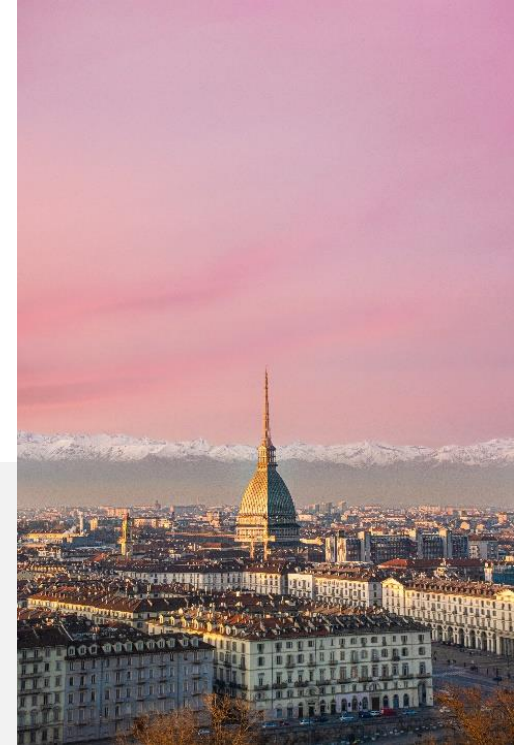
25%
No cars

50%
One car

25%
Two or more cars



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Fieldwork

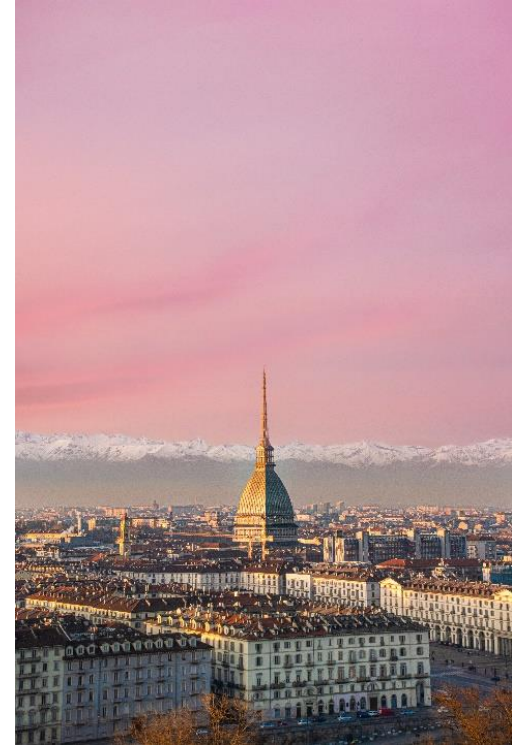
30 Individuals for testing the app in November 2021

257 Individuals in the first half of February 2022

297 Individuals in the second half of February 2022

What is asked:

- To fill the **introductory questionnaire**
- To track and validate at least **4 days** of activities
- To fill 2 out of 4 **Stated Preference** questionnaires (Mobility Tool Ownership, Remote Work, Mode Choice, Dynamic Travel Behavior)



10,200 hours of travel data

19,000 trips recorded

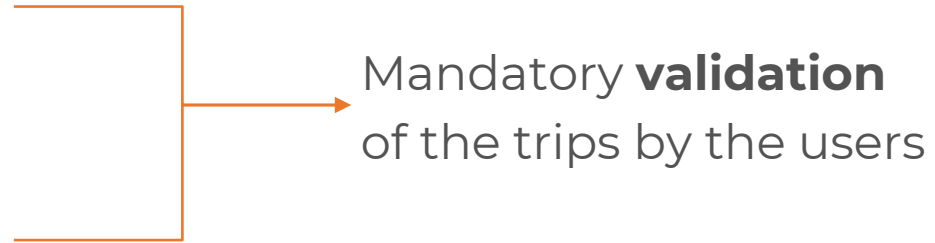
Preliminary cleaning procedure



MobyApp automatically recognizes transport modes



Not all the transport modes are recognizable (e.g.: car vs taxi vs public transport)



Mandatory **validation** of the trips by the users

Data analysis:

- Only **validated trip** were considered
- **Data correction** linking trip data and **introductory questionnaire** answers on mobility habits (cars and PT especially)



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RESULTS



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Number of trips



3.1
Trips/day
(2022)

- **Different trips** if there is a stop of more than 6 minutes
- **Whole week** considered



2.4
Trips/day
(2019)

- Short walking trips are **excluded** (less than 5 minutes)
- Only **working day** are considered



The size of the data is comparable



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Duration of trips



23.5

Minutes/trip

29 minute/trip in **2021**

*(New Mobility Patterns –
Forthcoming EU publication)*

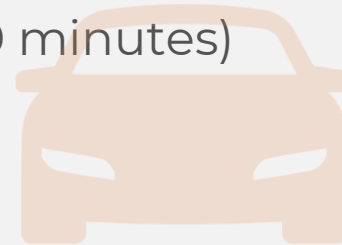
19 minutes/trip in **2019**

*(Mobilitaria 2022 - ISFORT
AUDIMOB)*

- About **half** of the trips lasts **less than 15 minutes**
- **35%** of the trips last **less than 10 minutes**

Almost one third

(24%) of the **car** trips
are very **short** (less
than 10 minutes)



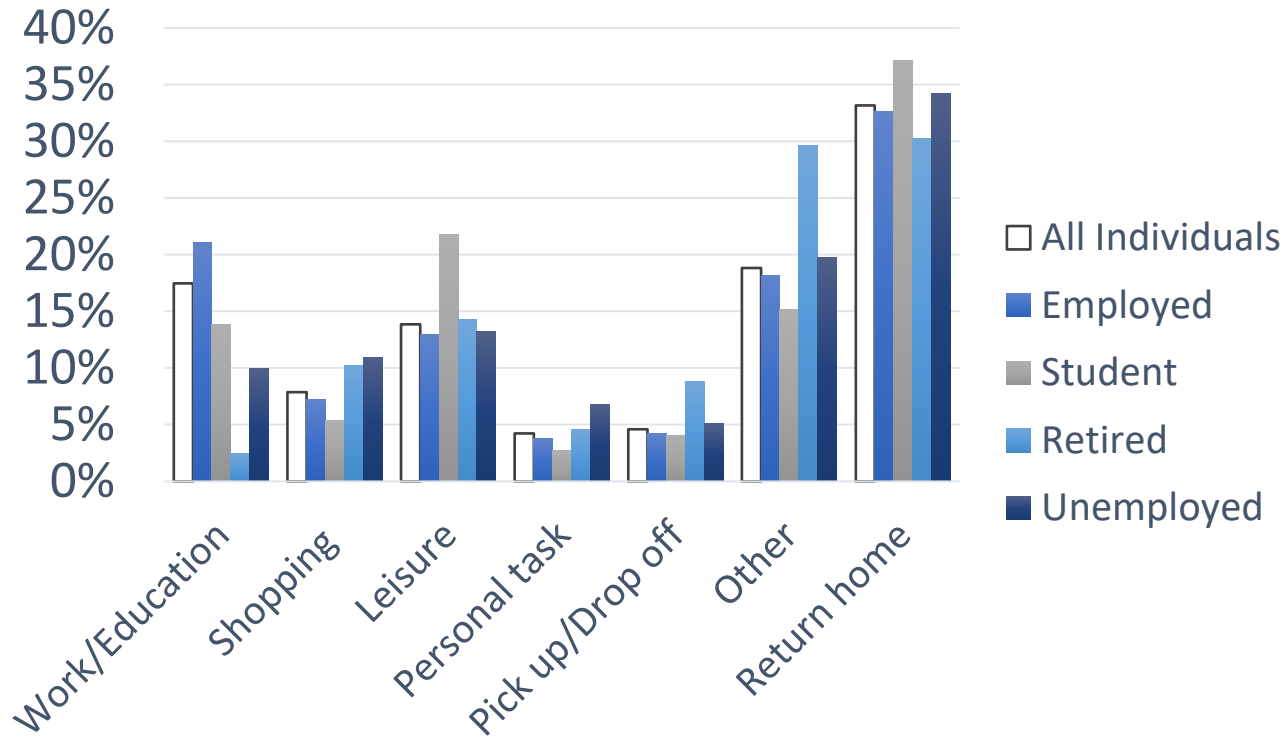
Car is used for trips
in which **active
modes** could be
competitive



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Origin and destination activities

Destination Activities



Comparison with **IMQ 2013** travel survey in Turin metropolitan area (home-based excluded):

MobyApp	IMQ 2013	Activity
6.9%	7.5%	Pick-up / drop-off
26.2%	36.7%	Work / education

33% Return to home

31% Home-based trips

Work / education:

- 33% in 2017/19 (Mobilitaria 2022)
- Large diffusion of **remote** working/studying

Modal shares

Multi-modal trips:

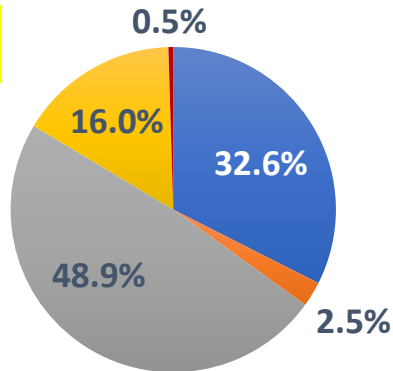
- MobyApp can collect combinations of **5 modes**
- **Post-processing** to exclude walking and still combinations (e.g.: walk + car)

1.3% Multi-modal trips

Result reasonable for an urban / suburban context (2.5% in IMQ 2013)

Modal shares of trips

sostituire



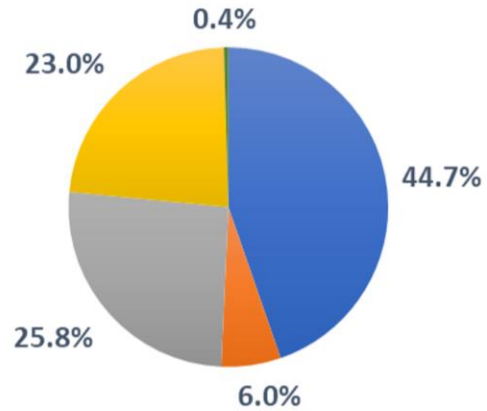
- Walk
- Car
- Scooter/Motorcycle
- Bike
- Public transport

Excluding multi-modal trips:

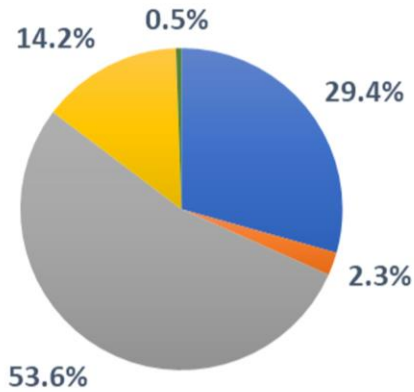
- **Car** is the most used mode (**49%**)
- **Bikes** are used for a minority of trips (less than **3%**)
- **Public transport** (bus, metro, tram, train) trips represent **16%** of the mobility

Modal shares

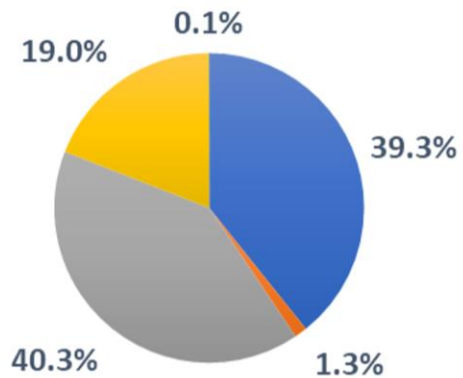
Students



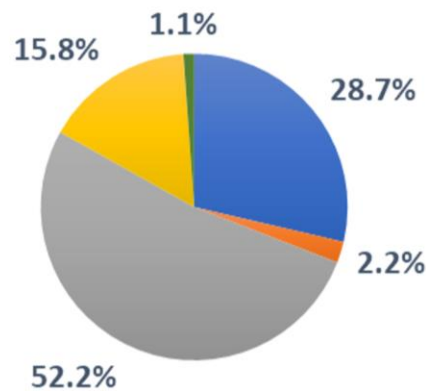
Employed



Unemployed



Retired



- **Students** use car only for 25.8% of the trips, they use **Public Transport** (44.7%) and **Bike** (6%) instead
- **Employed** and **retired** show a large use of **cars** (more than 50%)
- **Unemployed walk** and use **Public Transport** more than the average

Sharing mobility

During the validation process it is asked to specify if a vehicle is **private or shared**



5.2%

(of the total trips)

Car-sharing

1.4%

(of the total trips)

**Long-term rented
cars**

11%

(of the car trips)

Car-sharing

Car-sharing in Turin:

- 3 free-floating services
 - 900 vehicles
 - 280,000 subscriptions
 - High rotation rate
- (source: Italian Sharing Mobility Report)

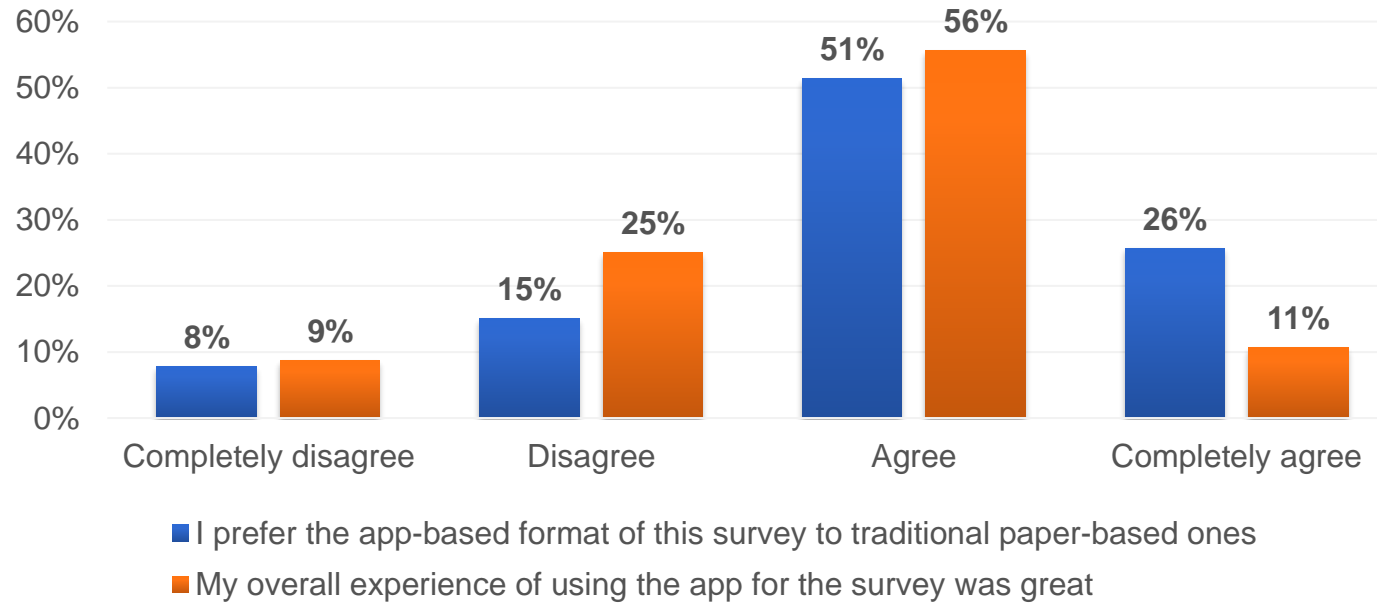
- 25% of the sample **does not own a private car**
- Checks to be performed on intro questionnaire (to exclude **misinterpretation** of the question)



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Users' Feedback

Feedback from the MobyX App users



CONCLUSIONS



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Conclusions



MobyApp allows to collect

- number of **trips, modes** used, duration, trip path, etc.
- **Additional information** managed through the application (e.g.: if a vehicle is shared, parking information, etc.)



This **approach** for collecting mobility data works



Reasonable overall picture of the personal mobility



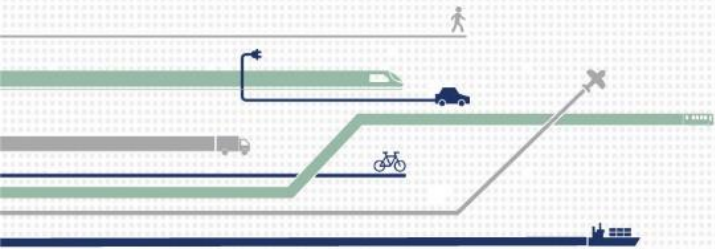
Further analysis needed to explain some results



MobyApp could be **improved** with reference to several features (e.g.: detection of Public Transport)



30 years shaping a better future | 1992-2022



Thank you!



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