The Woorti App
In search of “worthwhile time” in travel

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H2020 MoTiV project, Woorti app

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How did *you* get here today?

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Mentimeter Quick Survey: go to www.menti.com

and use the code 412427

Psssst on 2nd screen press SKIP for transport modes you did not use …

Survey results

https://www.mentimeter.com/s/24ea3d5523960cbf66e7a99825966812/de2c2153dbf9

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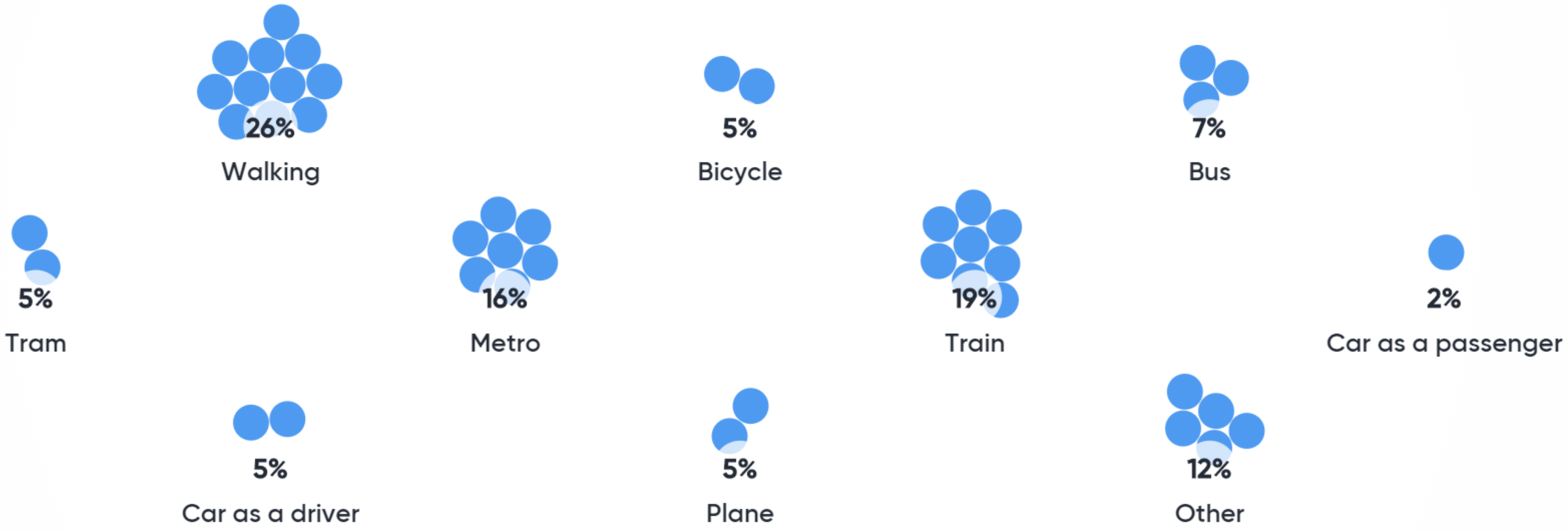
Mentimeter

Hola Barcelona! Which transport did you use to arrive here today?



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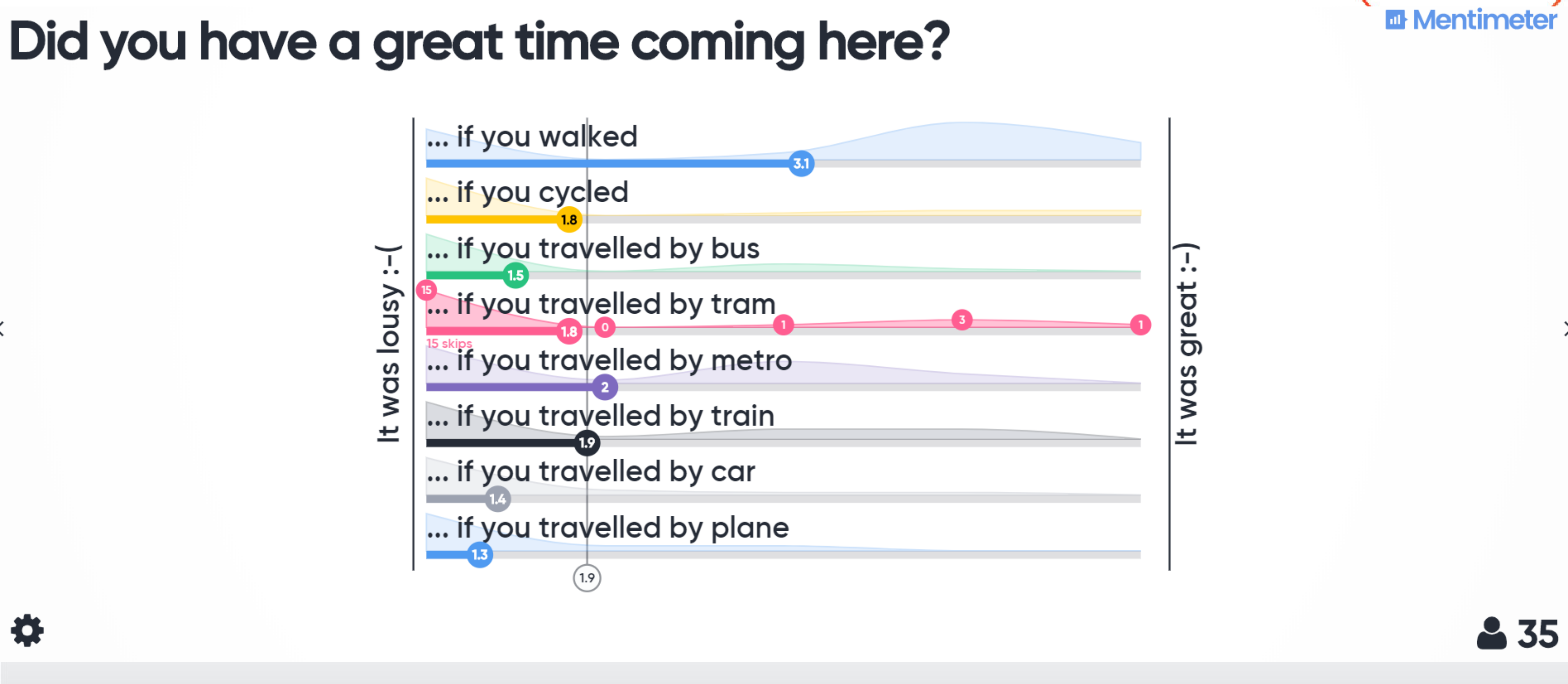
Survey results

https://www.mentimeter.com/s/24ea3d5523960cbf66e7a99825966812/de2c2153dbf9



Survey results

https://www.mentimeter.com/s/24ea3d5523960cbf66e7a99825966812/de2c2153dbf9

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Presentation Woorti app

- Concept
- Implementation
- Results

Valuable urban travel experiences?

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- Paradigm shift: from focus on motorized flow .. to quality-of-life

Transition towards sustainable mobility systems

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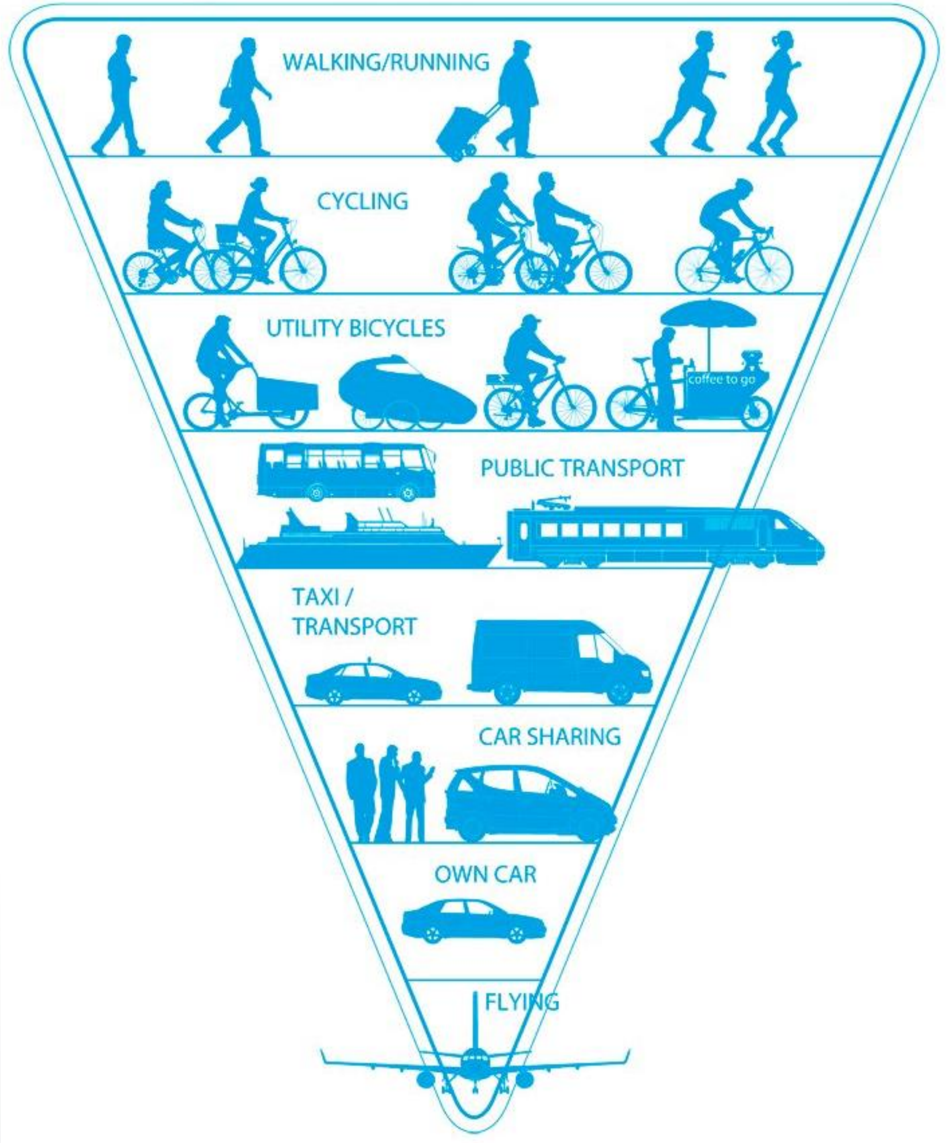
- Environmental
- Low-carbon
- Low space footprint



- Better experience?
- Better quality-of-life?

Smart Cities .. for people

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- Gap: no systematic attempt to collect data on travellers' **satisfaction** while in transport

Kitchin, Rob. 2013. "The Real-Time City ? Big Data and Smart Urbanism," no. November 2013: 1–14. https://doi.org/10.1007/s10708-013-9516-8

Worthwhile Travel Time

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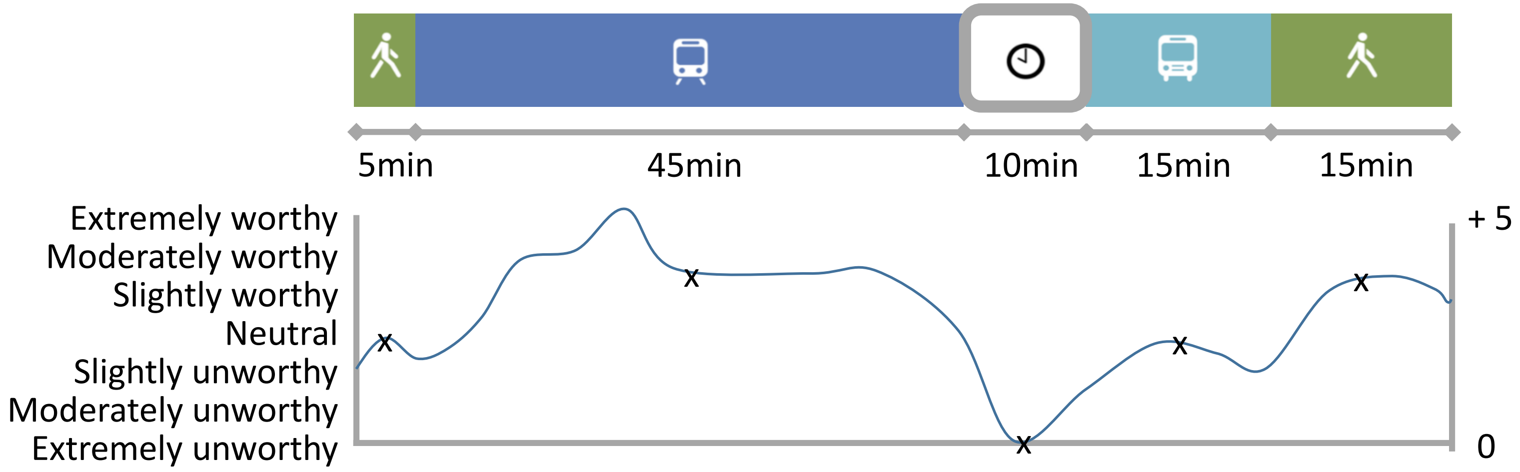
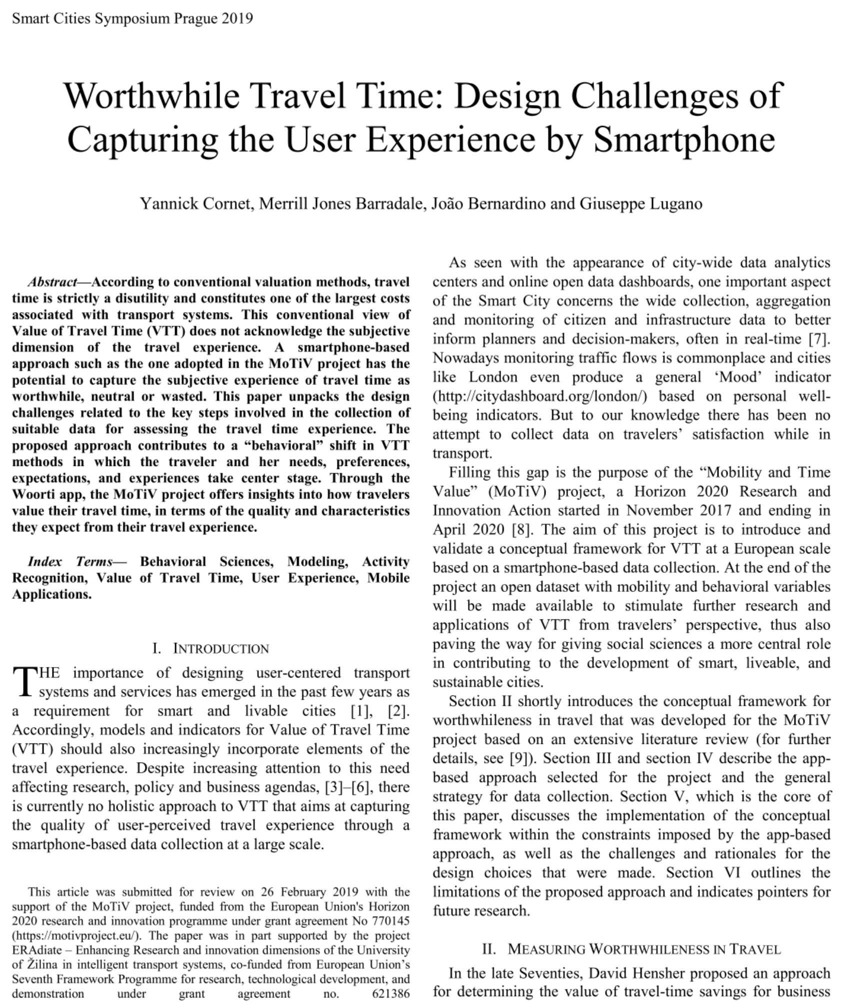
How to capture the traveller experience by smartphone?





Smart Cities Symposium Prague 2019

Worthwhile Travel Time: Design Challenges of Capturing the User Experience by Smartphone

Yannick Cornet, Merrill Jones Barradale, João Bernardino and Giuseppe Lugano

Abstract—**According to conventional valuation methods, travel time is strictly a disutility and constitutes one of the largest costs associated with transport systems. This conventional view of Value of Travel Time (VTT) does not acknowledge the subjective dimension of the travel experience. A smartphone-based approach such as the one adopted in the MoTiV project has the potential to capture the subjective experience of travel time as worthwhile, neutral or wasted. This paper unpacks the design challenges related to the key steps involved in the collection of suitable data for assessing the travel time experience. The proposed approach contributes to a "behavioral" shift in VTT methods in which the traveler and her needs, preferences, expectations, and experiences take center stage. Through the Woorti app, the MoTiV project offers insights into how travelers value their travel time, in terms of the quality and characteristics they expect from their travel experience.**

Index Terms— **Behavioral Sciences, Modeling, Activity Recognition, Value of Travel Time, User Experience, Mobile Applications.**

I. INTRODUCTION

THE importance of designing user-centered transport systems and services has emerged in the past few years as a requirement for smart and livable cities [1], [2]. Accordingly, models and indicators for Value of Travel Time (VTT) should also increasingly incorporate elements of the travel experience. Despite increasing attention to this need affecting research, policy and business agendas, [3]–[6], there is currently no holistic approach to VTT that aims at capturing the quality of user-perceived travel experience through a smartphone-based data collection at a large scale.

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As seen with the appearance of city-wide data analytics centers and online open data dashboards, one important aspect of the Smart City concerns the wide collection, aggregation and monitoring of citizen and infrastructure data to better inform planners and decision-makers, often in real-time [7]. Nowadays monitoring traffic flows is commonplace and cities like London even produce a general 'Mood' indicator (http://citydashboard.org/london/) based on personal well-being indicators. But to our knowledge there has been no attempt to collect data on travelers' satisfaction while in transport.

Filling this gap is the purpose of the "Mobility and Time Value" (MoTiV) project, a Horizon 2020 Research and Innovation Action started in November 2017 and ending in April 2020 [8]. The aim of this project is to introduce and validate a conceptual framework for VTT at a European scale based on a smartphone-based data collection. At the end of the project an open dataset with mobility and behavioral variables will be made available to stimulate further research and applications of VTT from travelers' perspective, thus also paving the way for giving social sciences a more central role in contributing to the development of smart, liveable, and sustainable cities.

Section II shortly introduces the conceptual framework for worthwhileness in travel that was developed for the MoTiV project based on an extensive literature review (for further details, see [9]). Section III and section IV describe the app-based approach selected for the project and the general strategy for data collection. Section V, which is the core of this paper, discusses the implementation of the conceptual framework within the constraints imposed by the app-based approach, as well as the challenges and rationales for the design choices that were made. Section VI outlines the limitations of the proposed approach and indicates pointers for future research.

II. MEASURING WORTHWHILENESS IN TRAVEL

In the late Seventies, David Hensher proposed an approach for determining the value of travel-time savings for business

Cornet, Yannick, Merrill Jones Barradale, João Bernardino, and Giuseppe Lugano. 2019. "Worthwhile Travel Time : Design Challenges of Capturing the User Experience by Smartphone." In IEEE Smart Cities Symposium Prague 2019, 1–9. IEEE. https://ieeexplore.ieee.org/document/8805706

Measuring travel time “productivity”

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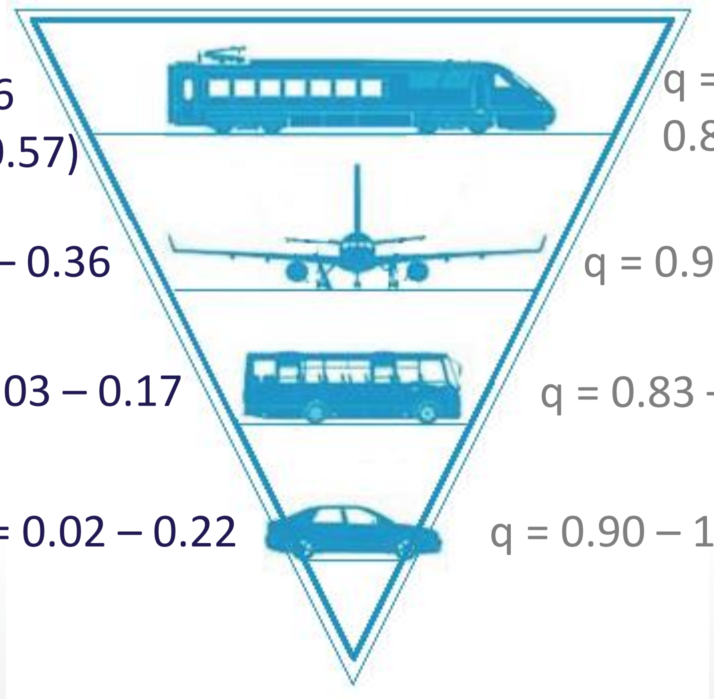
Hensher formula

- p = average amount of time spent working while travelling
- q = relative productivity of work done while travelling compared with in the office



p = 0.11 – 0.46
(new: 0.30 – 0.57)

q =
0.89 – 1.15

p = 0.07 – 0.36

q = 0.99 – 1.02

p = 0.03 – 0.17

q = 0.83 – 1.26

p = 0.02 – 0.22

q = 0.90 – 1.20

Wardman, Mark, and Glenn Lyons. 2016. “The Digital Revolution and Worthwhile Use of Travel Time: Implications for Appraisal and Forecasting.” Transportation 43 (3): 507–30. https://doi.org/10.1007/s11116-015-9587-0

Conceptual framework

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The Woorti App

Comfort factors & travel services

Importance weight

Satisfaction level

Satisfiers, enablers to a worthwhile experience

Trip worthwhileness

Productivity

Enjoyment

Fitness

Onboard Activities

Relevance weight

Duration

Ability to engage in a worthwhile activity

The "good"

The "bad"

Wasted time

Unwanted Efforts

Physical

Cognitive

Emotional

Time 'stolen' by the act of travelling

Make your journey worthwhile:

Productivity

Using travel time to get things done, not only for work or study, but also personal things like managing home or family stuff…

woorti

Make your journey worthwhile:

Enjoyment

Relaxing or having fun; taking time to listen to music, rest or meditate; engaging in social media; observing the surroundings…

woorti

Make your journey worthwhile:

Fitness

When you walk, cycle or even run on your travels, you’re getting exercise and keeping in shape.

woorti

Presentation Woorti app

- Concept
- **Implementation**
- Results

General approach

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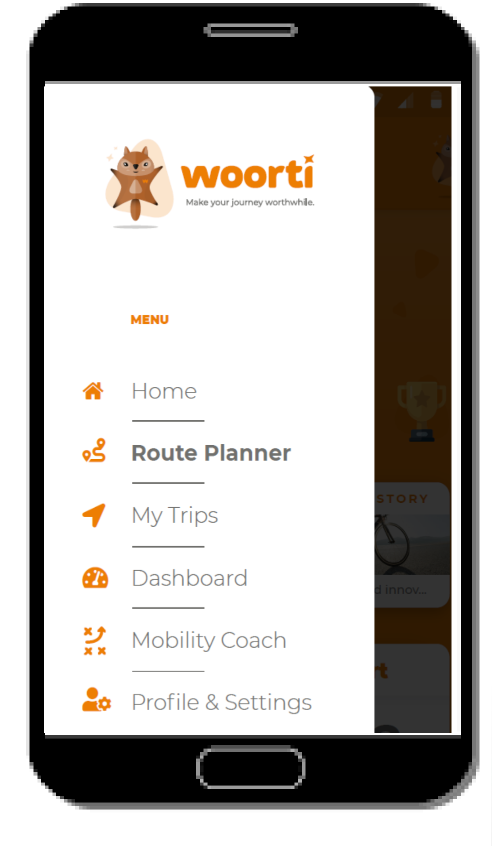
- **Smartphone-based data collection via the Woorti app**
  - Focus on the multimodal individual travel experience
- **Target**
  - Minimum 5.000 active users in 10 EU countries
  - App use for ~1 week
  - Answer travel survey for ~2 trip / day

  → 70000 trips (so far: 22000 since May 1st)
- **Release of Open Dataset** at the end of the project



The Woorti App – Onboarding

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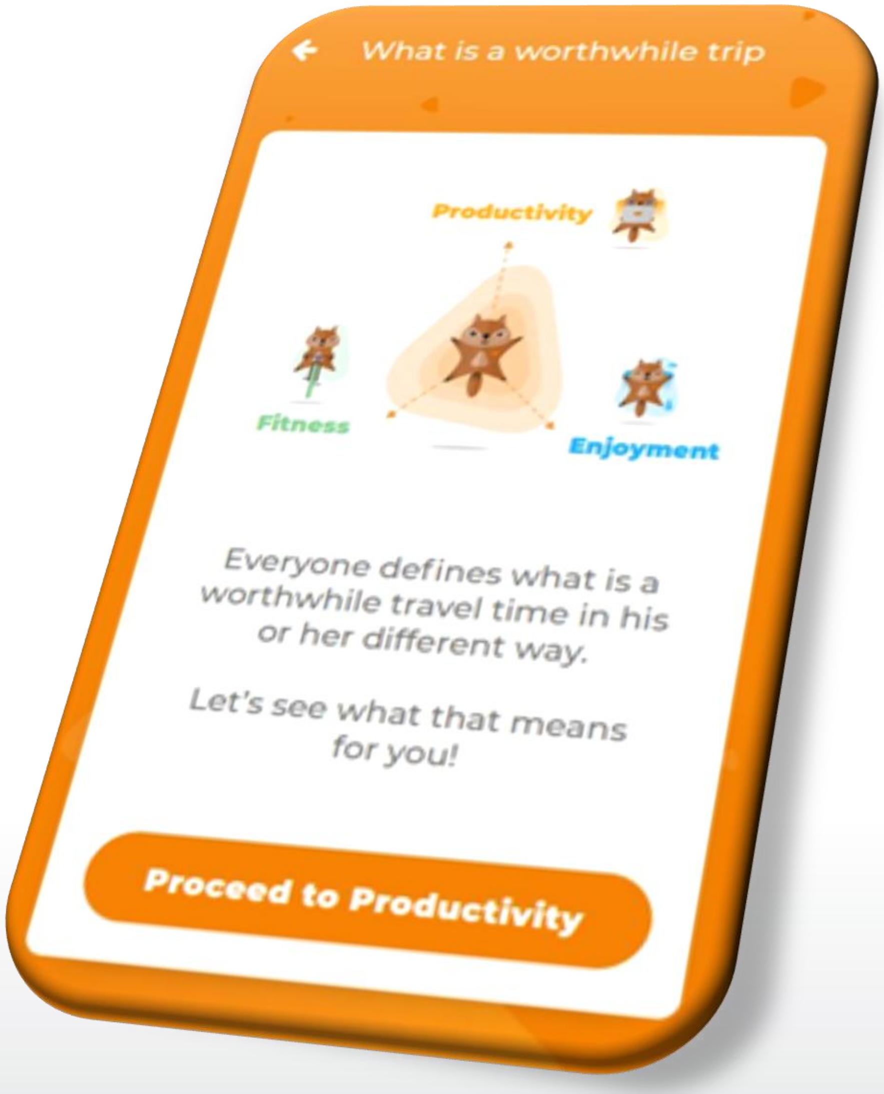
- Introduction of “worthwhileness”
- Basic socio-geo-demographics
- Transport preferences

- The design aims to appeal to a wide range of travelers



The Woorti App – Mobility layer

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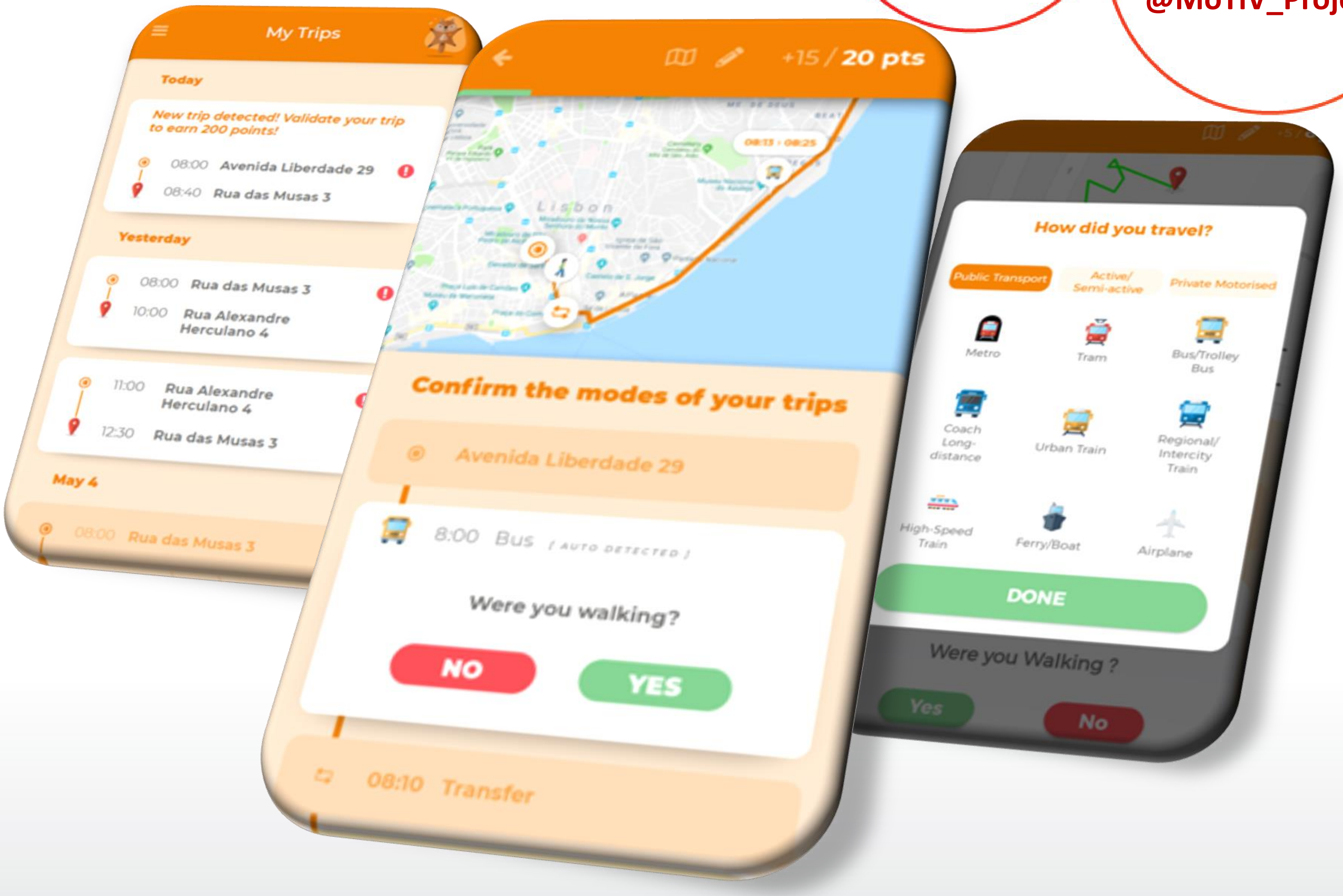
- Trips and transport modes are **automatically detected**
- Users are asked to **validate** their trips
- 3 categories of modes:
  - public transport,
  - active/semi-active, and
  - private motorised



The Woorti App – Experience survey

Comfort factors & travel services

Satisfiers, enablers to a worthwhile experience

Trip worthwhileness

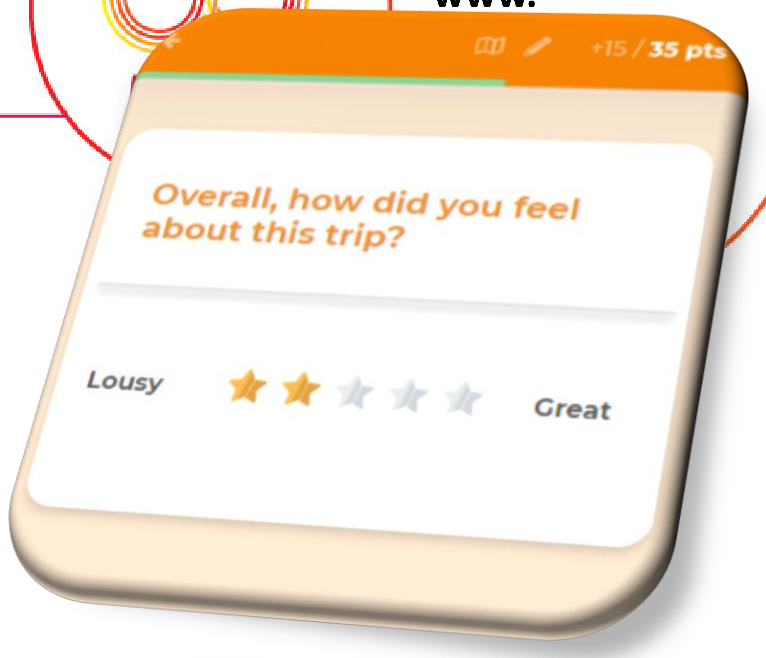
Productivity

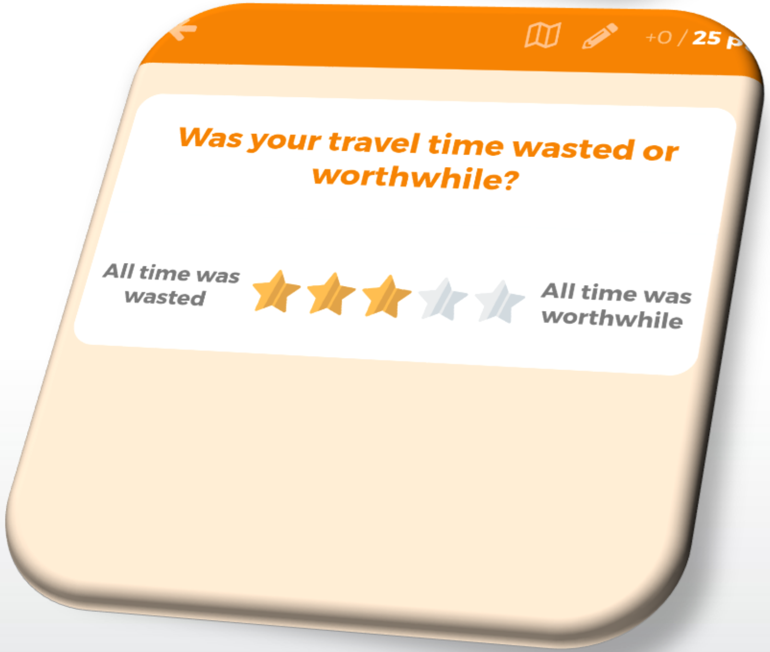
Enjoyment

Fitness

Onboard Activities

Ability to engage in a worthwhile activity





1. Capture “feeling” of <u>trip as a whole</u> (must collect soon after trip is completed)
2. Capture Wasted vs Worthwhile assessment <u>for a specific trip leg</u>

The Woorti App – Experience survey

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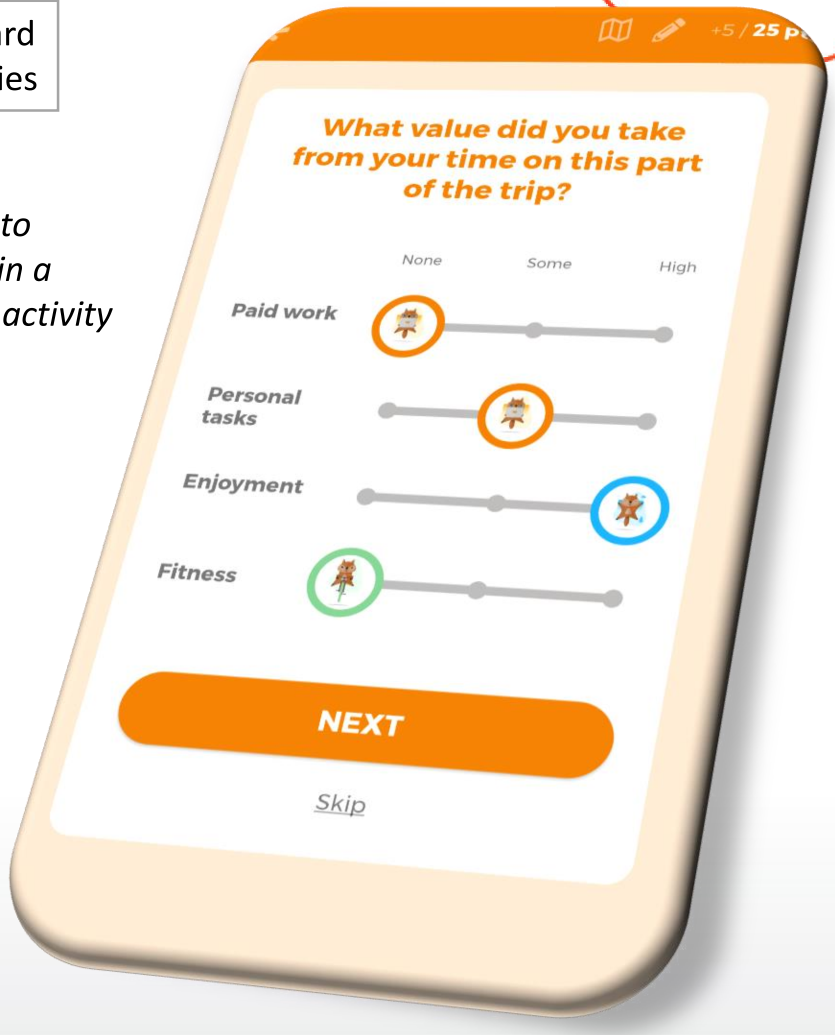

- Separate user value from actual activity
- Productivity: paid vs unpaid work

The Woorti App – Experience survey

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Comfort factors
& travel services

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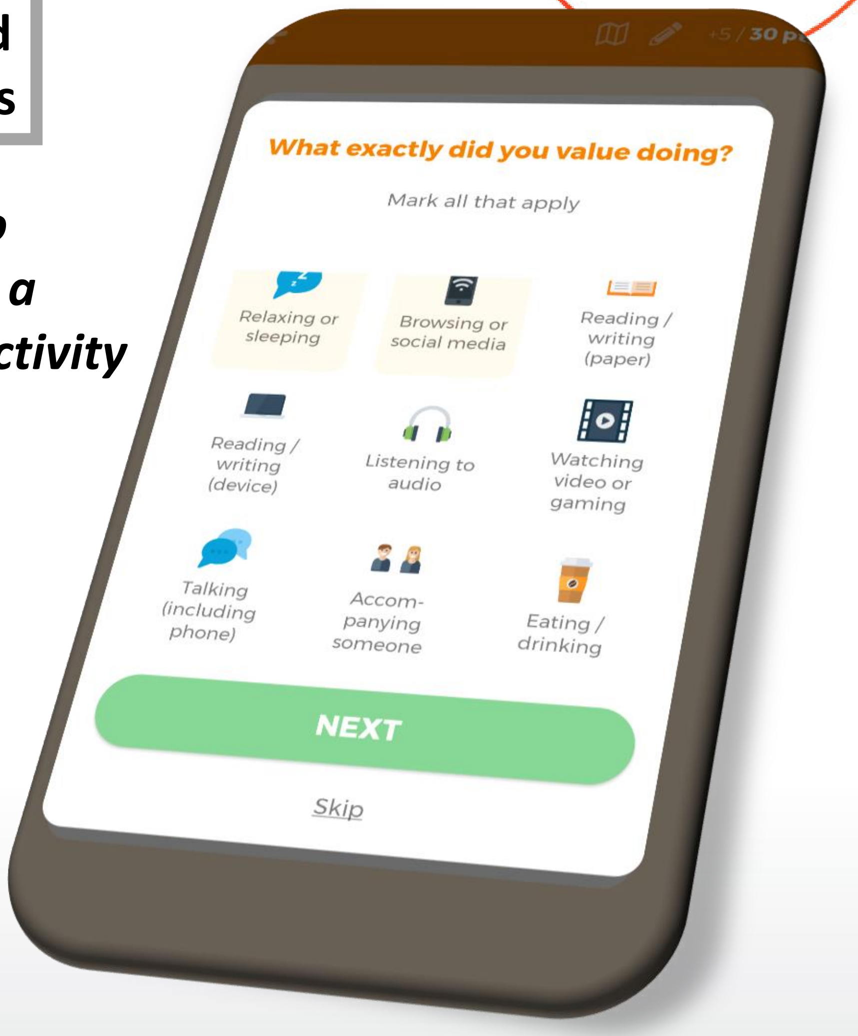

- Built-in vs add-on activities

The Woorti App – Experience survey

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Comfort factors & travel services

Satisfiers, enablers to a worthwhile experience

Trip worthwhileness

Productivity

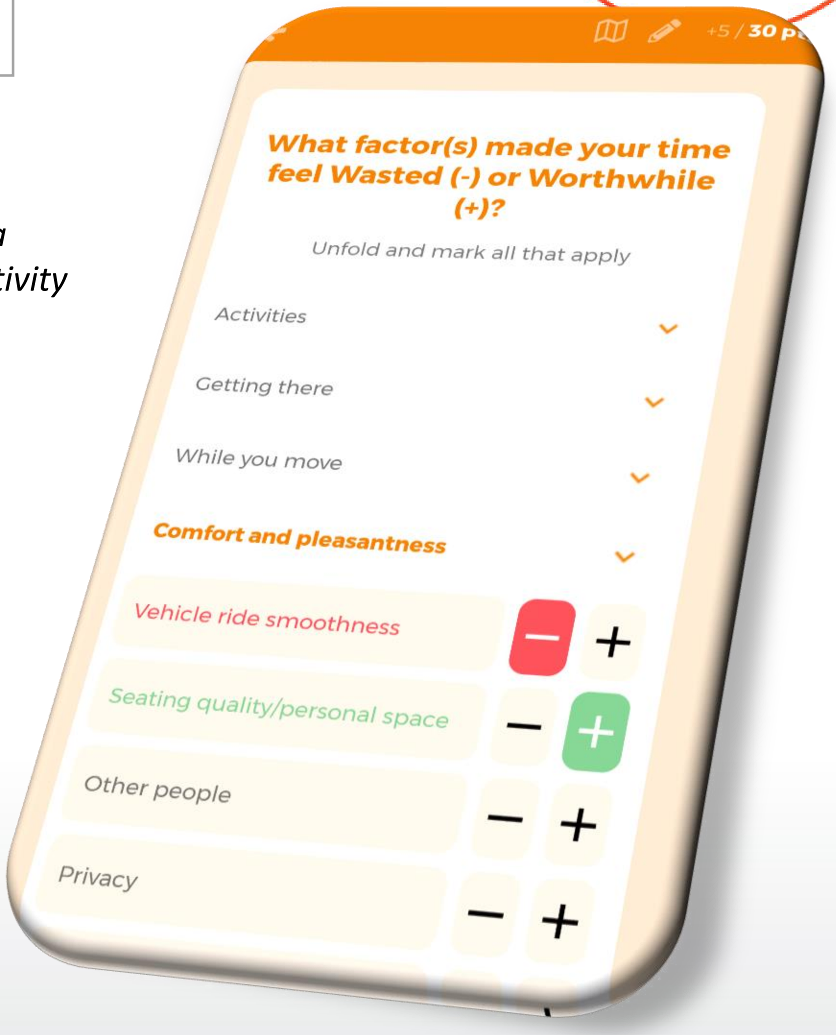
Enjoyment

Fitness

Onboard Activities

Ability to engage in a worthwhile activity

- Long list of possibilities ..
- Getting there
  - Everything about (cognitive, physical or emotional) efforts in figuring out how to get there
- Comfort and pleasantness
  - Factors helping to get things done or enjoy the ride

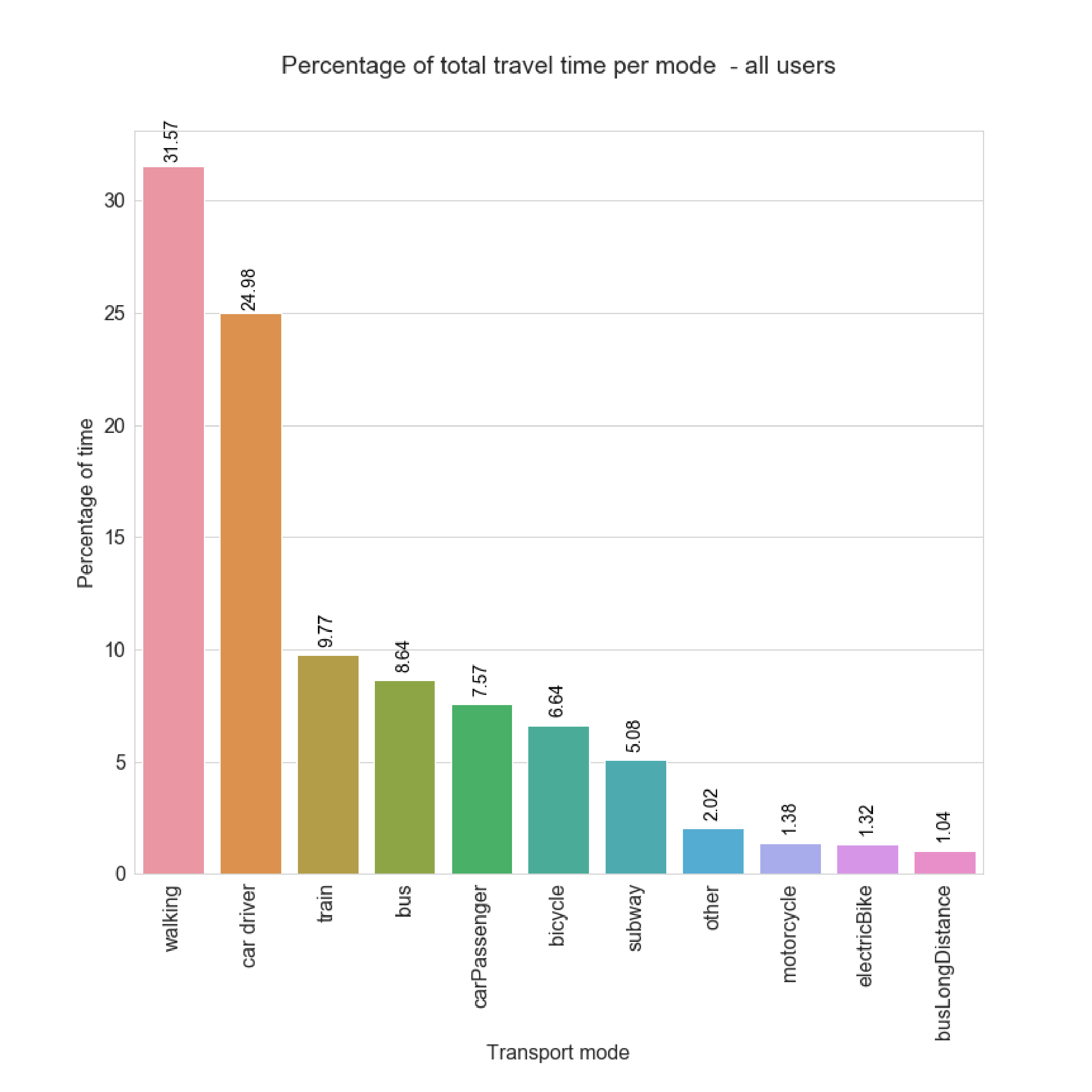


Presentation Woorti app

- Concept
- Implementation
- **Results**
  - Spanish data so far:
    106 users, 2662 trips, 4884 trip legs

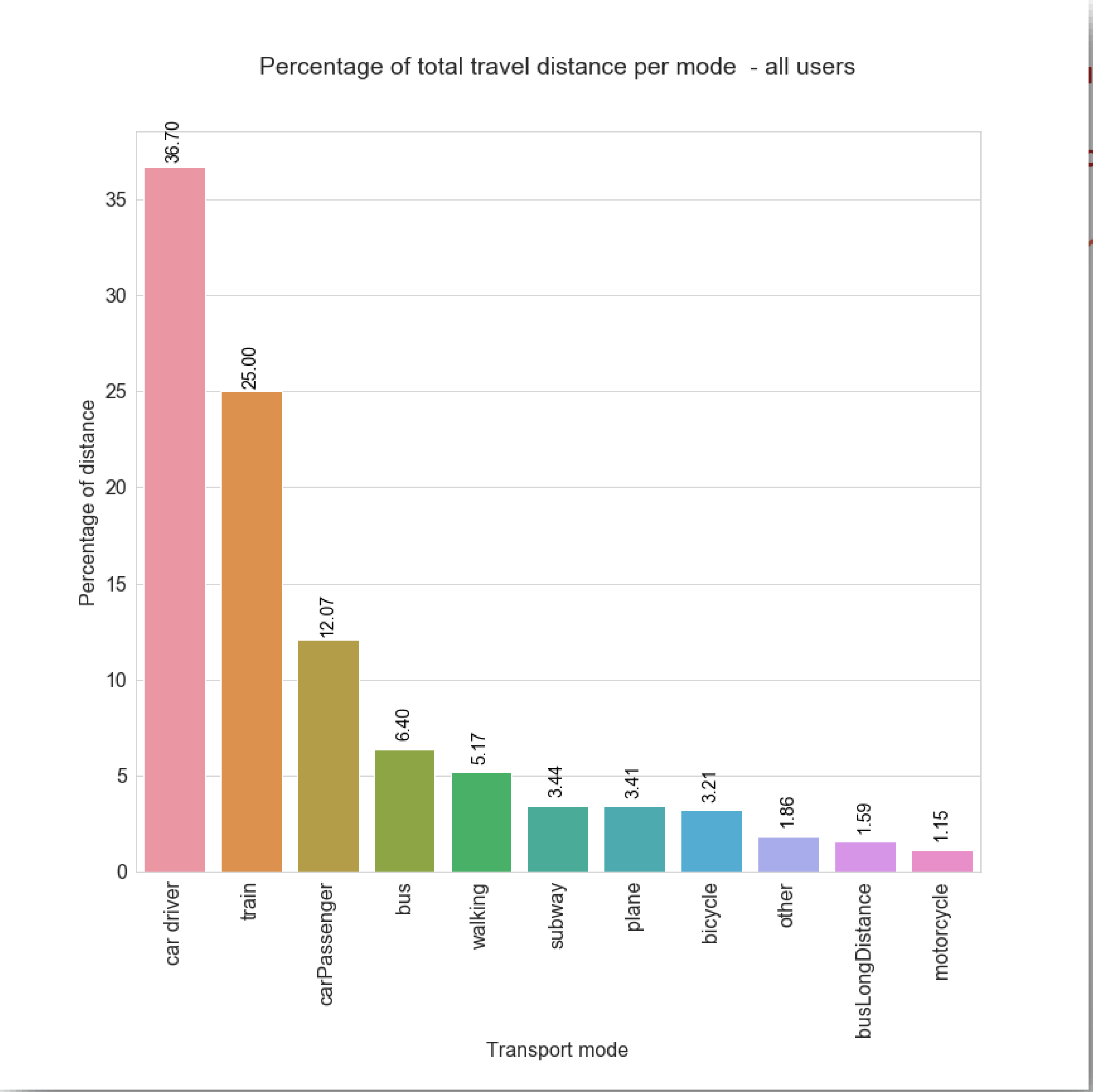
Mode share - time

- **Walking is highest**, because share is calculated by time, and walking is both a common ‘last mile’ mode as well as a main mode
- Public transport higher than EU average (25% vs 17%)
- Car still dominates with 40% (50% if removing walking)



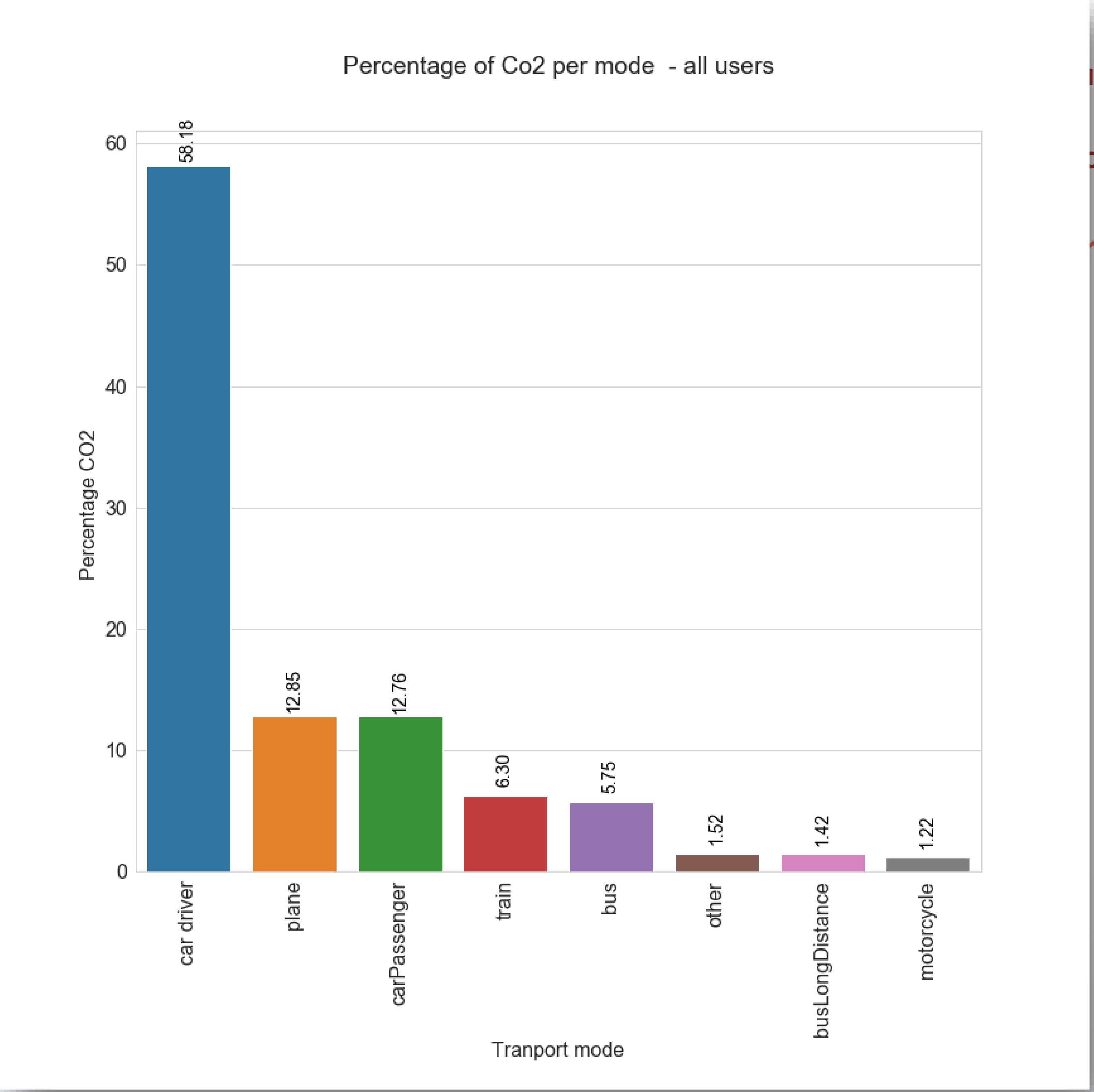
Mode share - distance

- Almost 50% of kilometres travelled are by car
- 25% by train

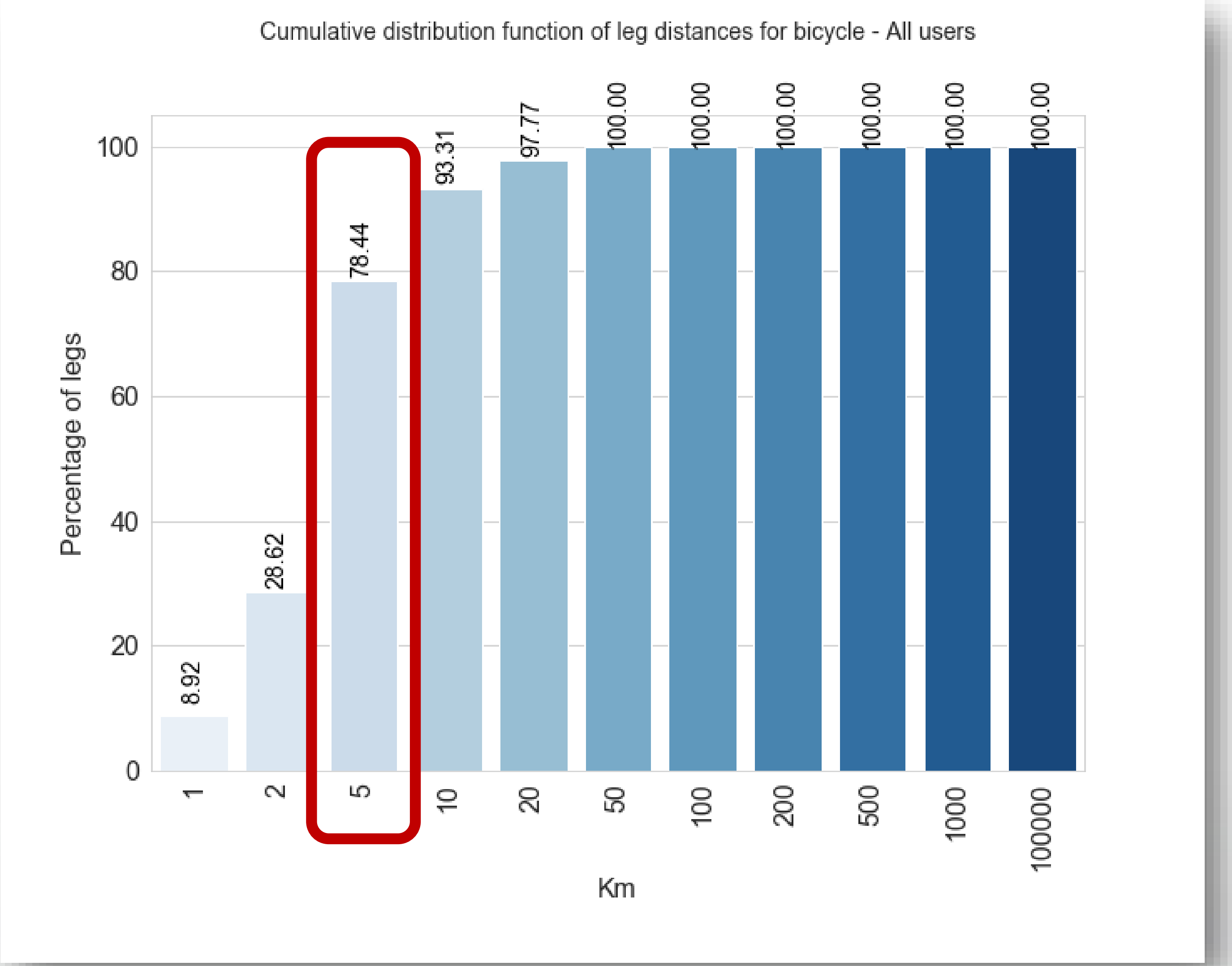


Mode share – CO_2

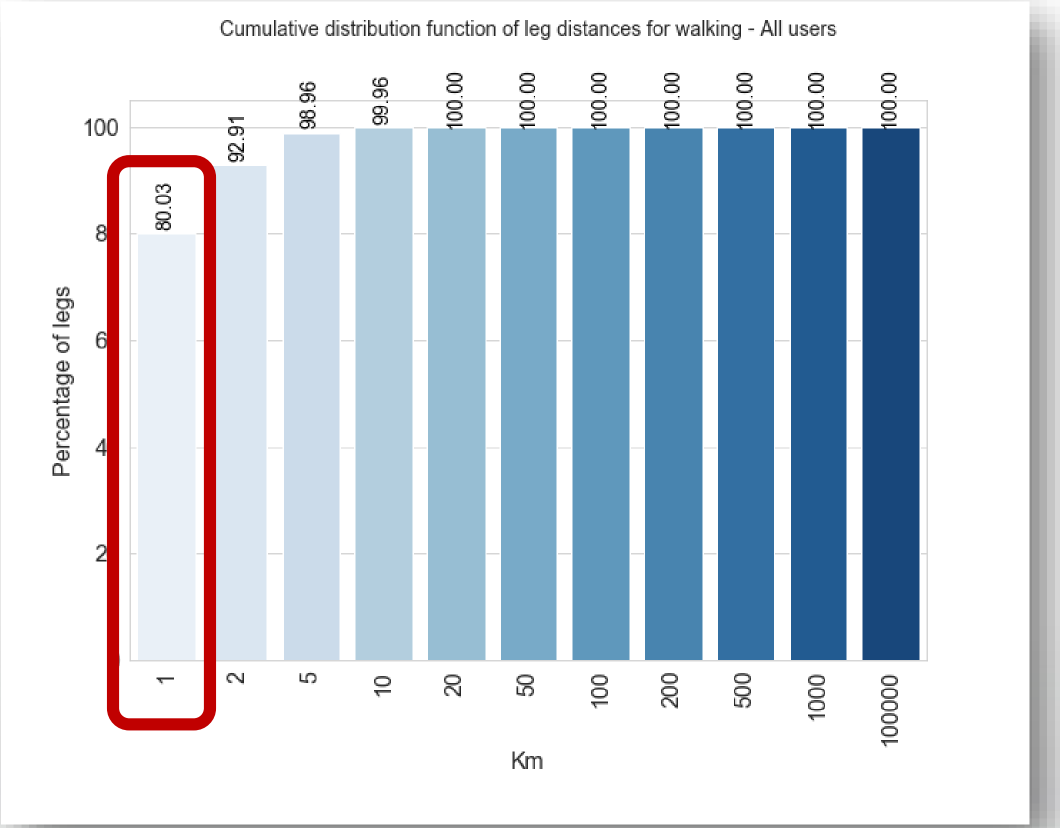
- Car and plane form the bulk of carbon emissions across modes (84%, on par with the rest of EU)



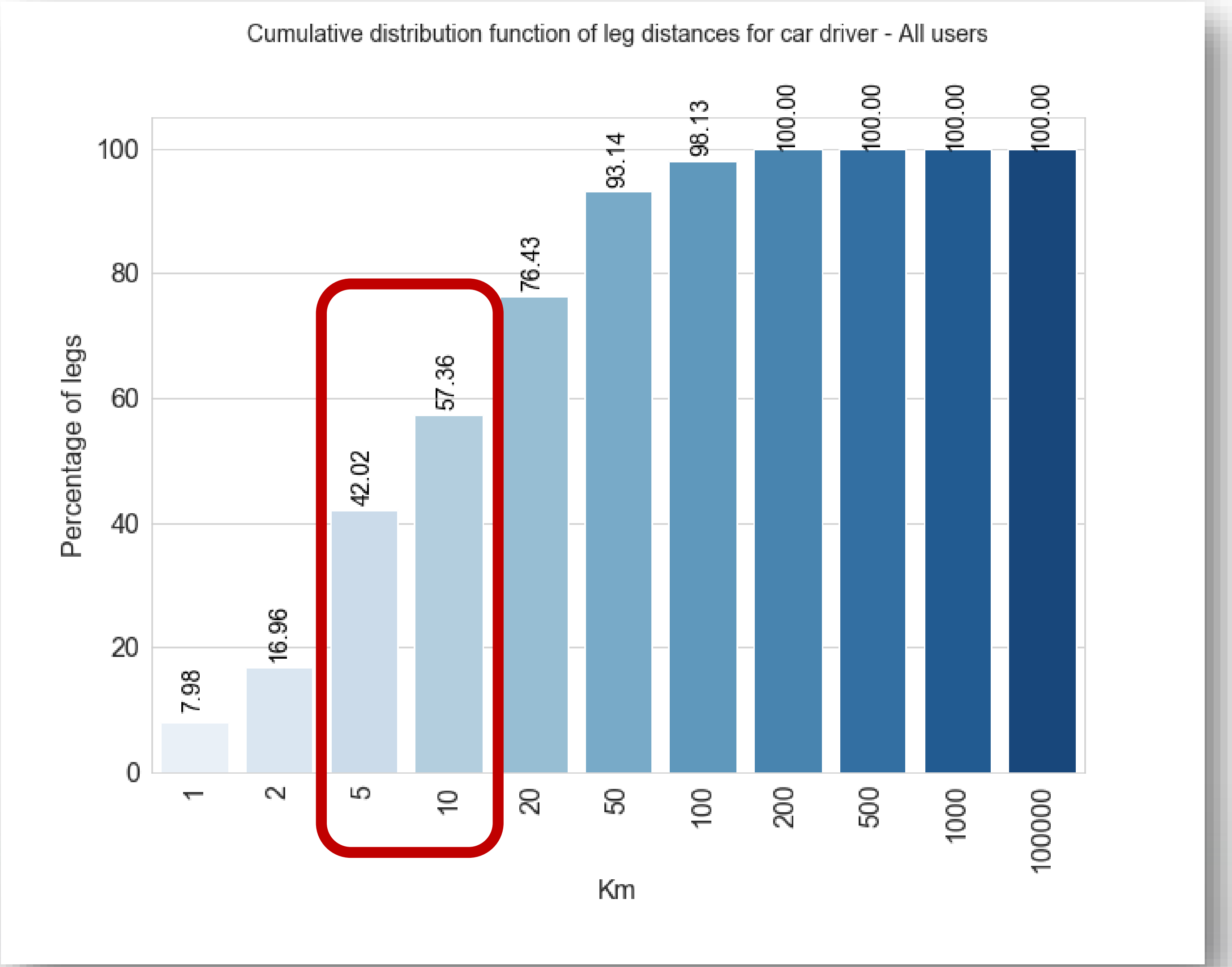
Cumulative distances – bike



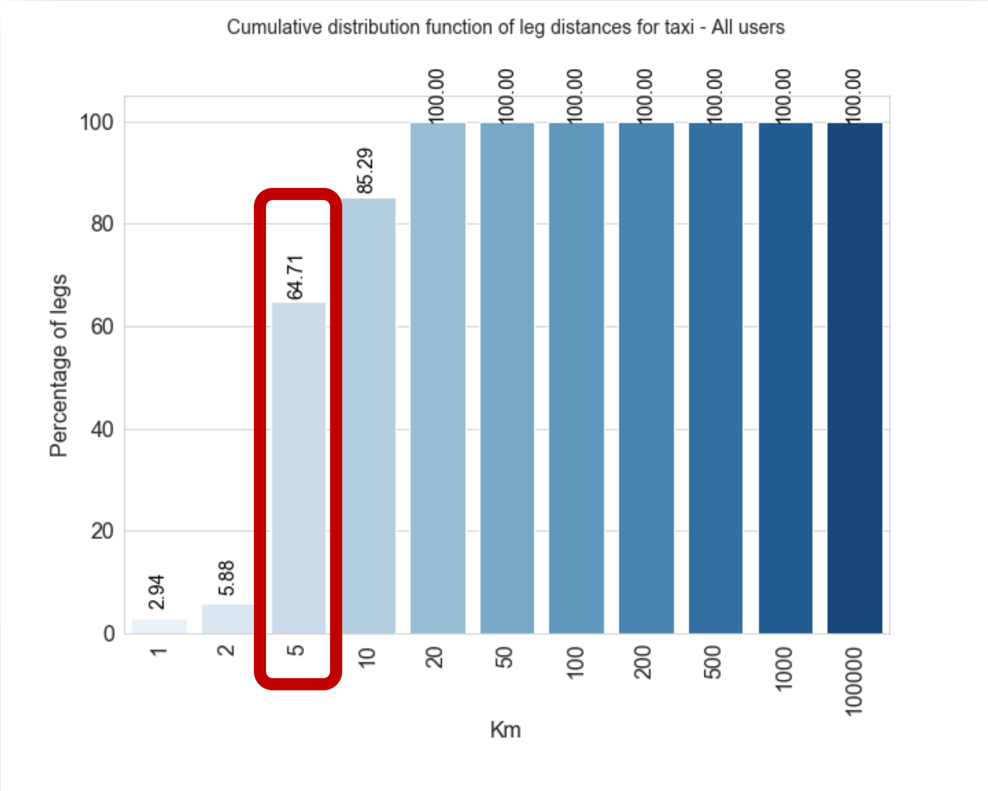
- ~80% of trip legs by bike are <5km and <1km by walking



Cumultative distances - car

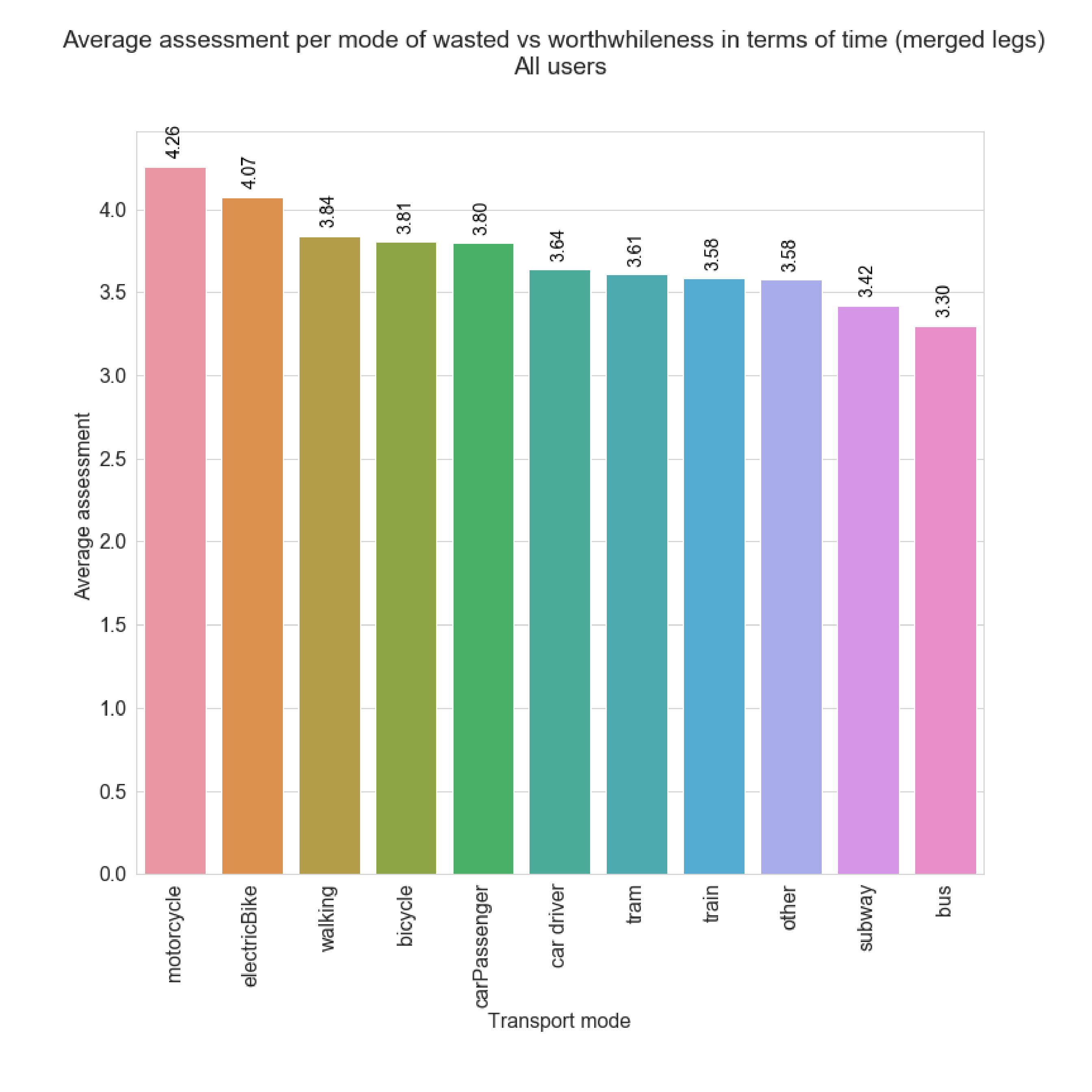


- A majority of trip legs are short distance



Worthwhile travel time

- Ordered list of 'preferred' transport modes
- Motorcycle and eBike rate highest (followed by walking, cycling and car passenger)
- Car driver on par with train or tram experience
- Bus rates significantly lower than other modes



Value of travel time

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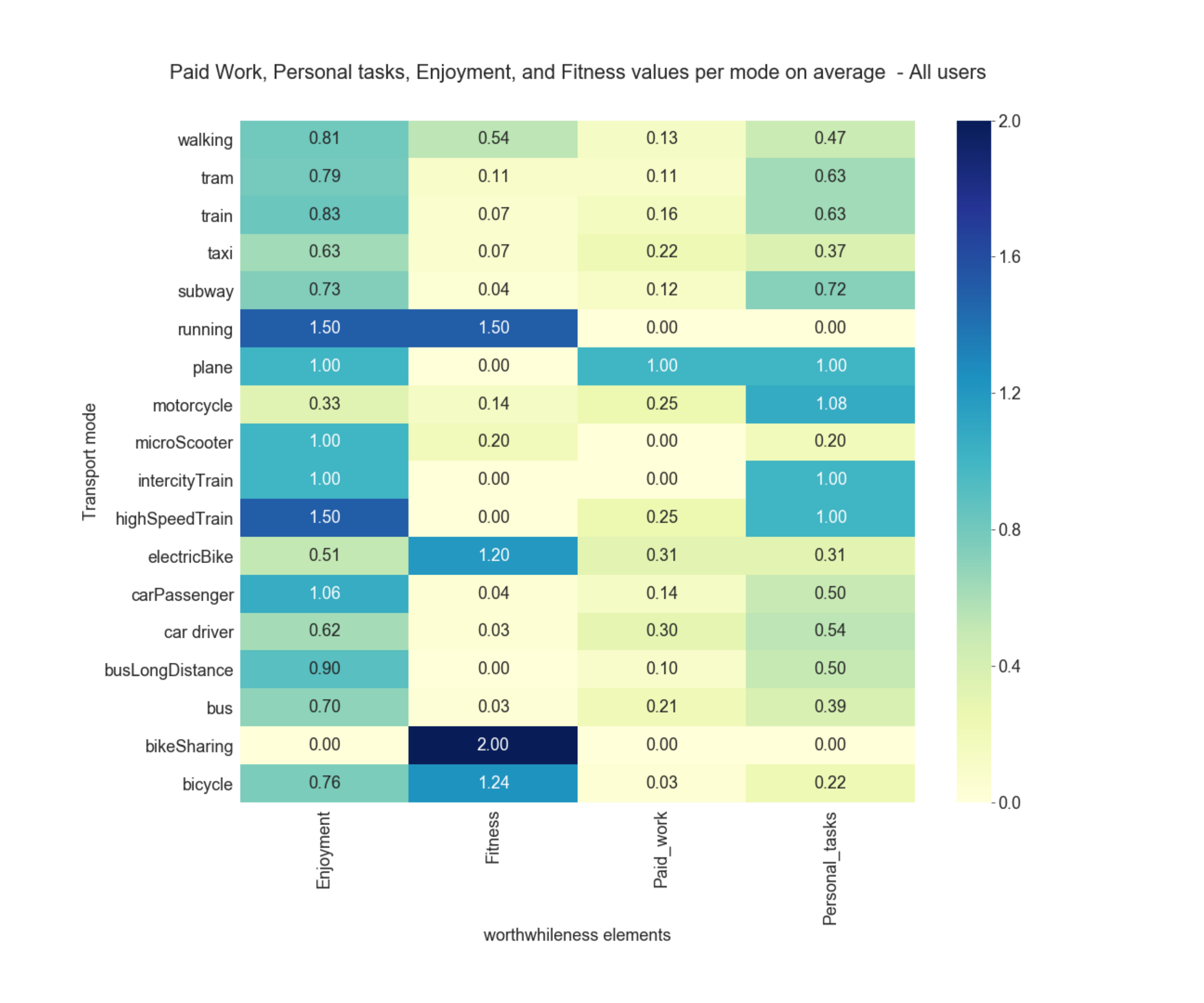
- The scale is
  - 0 – no value
  - 1 – some value
  - 2 - a lot of value
- Top fitness:
  - Bike sharing, running, bike, ebike
- Top fun:
  - Running, trains, car passenger, scooter
- Top productive:
  - Trains and plane



Implications for transport planners

In summary

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- Understand better the *type of value* travellers can gain
    - Fitness, enjoyment, personal or work productivity
- Understand better the *causes for* a better travel experience
    - Comfort and other factors
- Understand better the *effects* of a better travel experience
    - Worthwhile activities, including the trip itself

→ And therefore, provide transport planners with empirical evidence on how to *improve transport services*

Productivity

Enjoyment

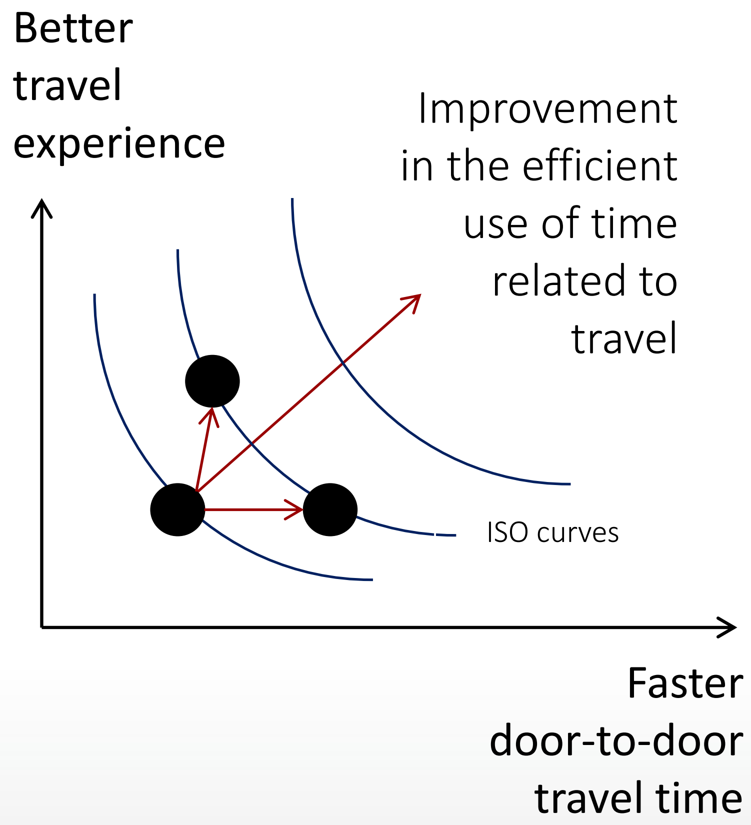
Fitness

Implications for policy-makers

In summary

- Challenge the conventional cost & benefit analysis assumption that all *travel time is wasted*
- Provide empirical evidence on the importance of the *travel experience* for travellers

→And therefore, open up the possibility for future transport investment to *balance between increasing travel speeds* or *increasing the quality of travel*



Questions

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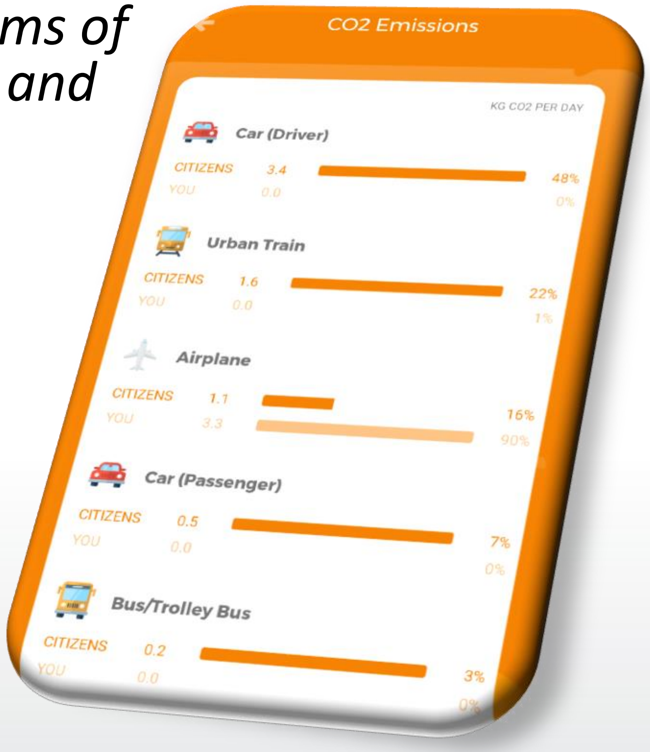
- With the dataset be shared?
  - *Yes, the full Woorti dataset will be made open for public use at the end of the project (July 2020), following proper anonymisation as per GDPR guidelines*
  - *We are also planning to release the app code as open source (UI+server)*
  - *We are currently investigating the most appropriate licenses and terms of use to allow researchers and practionners to benefit from both data and code*
- How do we attract users to use the app?
  - *We have campaign managers responsible for data collection in each country, with campaign prizes based on meeting targets in terms of number of days, number of trips and/or points*
  - *E.g. Slovakia has two Xiami e-scooters*
  - *The app also features a dashboard which presents the user statistics and compares with other users*



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Any Questions?

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