CO2GO

FINAL REPORT

USER CENTERED DESIGN

Group 10

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TÉCNICO LISBOA

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1. EXECUTIVE SUMMARY

Introduction

The task to improve transportation in some way in Lisbon was presented in the course User Centered Design within the computer science masters at Instituto Superior Tecnico. This was then executed by creating an application or a website, and then iteratively improving upon receiving user feedback through different methods such as surveys and user testing.

Motivation

Lisbon has just recently been voted the “Best destination city in Europe” at the world travel awards. This indicates how influential Lisbon is in an international sense being such a big tourist attraction. Thus, it is even more important to lie on the front end regarding environmental questions such as carbon emissions.

As the European Parliament has declared an official “climate emergency”, it further shows the urgent need to act now rather than later. Our solution for this project does this by raising awareness of everyday transportation emissions, so that the user can make a choice to change their behaviour and be mindful of the potential consequences.

Proposal

Our project, which has been developed as an application, is inspired by public transportation applications such as City Mapper and Google Maps but with the added feature of being able to see how much emission each way of transportation uses and to see collected points for saved emissions to promote more environmentally friendly modes of transport. This is aimed at mainly young european students within the age span of 18-25.

User Research

To find out about which features we wanted to implement in our project and the priority of these, we used a survey and sent it out to mainly people in our target group and gathered 45 responses. In the survey we collected information about daily travelling habits and asked questions of what would motivate the users to save CO_2 and how much time they would be willing to sacrifice for that. From these responses it was concluded that most people were primarily motivated to save emission through competitive features such as gamification rather than by gaining rewards such as coupons. Further it was concluded that the focus should be showing the routes for different types of transportation methods and the emissions for these.

App objectives

1. Find and display the routes from point A to point B and from these, calculate and show the emissions for different transportation methods such as biking, walking, public transportation (bus, metro, tram and more) and car.
2. Show how much emissions have been saved during a time period by picking a more environmentally friendly route or way of transport than the most emission costly way.
3. Show a scoreboard where the user can see their own carbon savings compared to friends to create competition and with that comes motivation.

2. BACKGROUND

Mina Tavakoli
Front-end

Thomas van Tussenbroek
Design

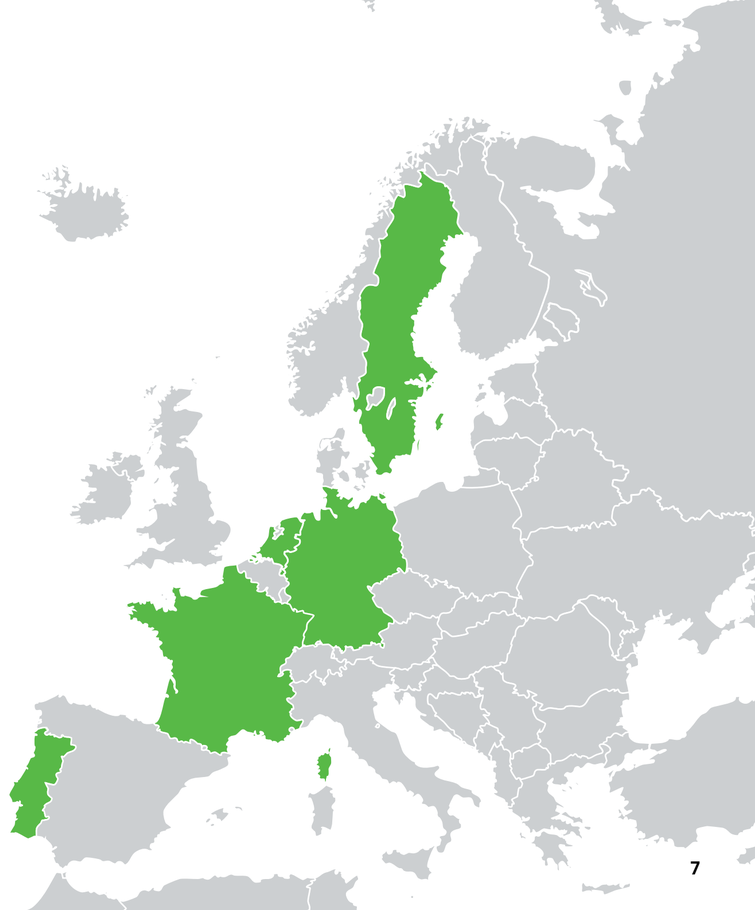
Hendrik Maier
User research

Bernardo Honrado
Back-end

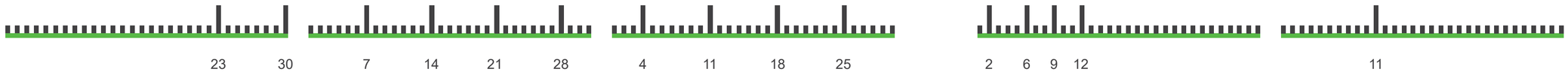
Oriane Bandou
Management

The team and the client

With our different and multicultural backgrounds rooted mainly in various parts of Europe such as Sweden, Germany, Portugal, France and the Netherlands, we all aim to tackle the same problem, the environmental crisis. There are mainly two ways to make an impact and change our future regarding environmental issues. One of which is to create something completely new, and the other to change our current habits and daily behaviours. We have chosen the second, which results in that every single user is an important client to CO_2GO. As a collective force these clients will be a part of a revolution of behaviour.



3. SCHEDULE



September

23. Value proposition canvas

30. Business model canvas

October

7. Project pitch and stakeholders

14. User research plan

21. User research synthesis

23. Prioritize Development

November

4. Low-Fidelity Prototyping

11. Formative User Study

18. Low-Functionality Prototype

25. Functional Prototype

December

2. Usability testing

6. Rehearsal final presentation

9. Fully Functional Prototype

12. Final presentation

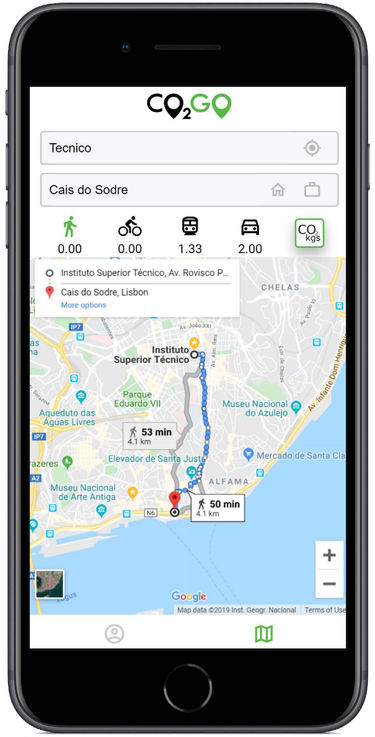
January

11. Report delivery

4. OVERVIEW

The App

CO_2GO is created to serve as an app for the purpose of raising awareness and helping users change their behaviour to reduce daily carbon dioxide emissions based on daily transportation methods. Our app allows the users to make conscious decisions regarding their routes and to see the effect of these over time.



Routes

Our main objective is to show the user the routes and emissions for four categories of transportation: walking, biking, public transportation and taking the car. The unit for the amount of emission can be changed from kilograms of carbon dioxide to the equivalent number of PET bottles which is more graspable.

Statistics

The profile page shows statistics over how much emissions the user has saved compared to the worst means of transport for each route per month in a bar chart. This gives the user an overview of their habits.

Leaderboard

The app encourages continued reduction of emissions by adding a competitive element, a leaderboard to show how the user compares to their friends regarding saved emissions.

5. PROCESS

> ***We want to*** *achieve emission awareness in daily life transport.*
>
> ***by looking at*** *different means of transport*
>
> ***in order to*** *create a service for young people between the age of 18-30 to compare CO2 emission.*

Overview

Before designing the app, we sketched a Canvas Business Model, which can be found after these pages.

For the design process we iteratively created prototypes with increasing amount of fidelity and complexity while gaining user feedback to know how we would further evolve the prototypes and which tasks and functionalities were most useful and attractive. Since we ourselves are within our focus group we had access to similar potential users and we were able to gain many important insights related to our project.

Initial survey

After sketching the Business Model Canvas, the first step was to create a prototype without any code to get user feedback on the main tasks, features and on the design of the application to be. That was afterwards developed into a low functionality prototype based on the feedback. Again we conducted user research through a formative study on the low functionality prototype to from the feedback create the final high fidelity prototype which included working main tasks and an improved user experience.

But even before we began creating these iterations, the main tasks were defined from a survey answered by 45 users. By creating our application this way with a constant focus on the users and their responses, we are more likely to have users which feel that our application caters to their needs and therefore more people will use CO2GO, in turn resulting in a greater environmental impact.

Ideation

After the survey was answered, the data collected from the users helped us develop the following features that we felt would satisfy their needs.

We also thought of implementing a Rewards System, where the user could spend tokens, gained after completing trips based on their emissions, on partnered eco-friendly stores. This idea was put aside for now due to the complexity of this feature.

Routes Information

A navigation page with routes according to different transportation methods, such as walking, bicycle, public transportation and car, from point A to point B, and their CO2 emissions, according to the different methods of transportation.

Profile Page

A page where the user can find relevant information about their carbon emission history, such as, total emissions saved when compared to a moree pollutant method of travel, which we set to be car, and a more detailed view divided by months.

Leaderboard

Where the user could compare their carbon savings with their friends (and world population/everyone who uses the app) in order to increase competition and motivation.

Canvas Business Model

This Canvas Business Model the means by which means we ty to solve the mission statement

Key activities

- App Maintenance
- Maintain contact with stores
- Marketing
- Handle customer data
- Keep environmental data updated

Key partners

- Transport Information Provider
- Eco-friendly Companies
- Advertisers

Customer relations

- Discounts at stores
- Subscribe and remove ads
- Share in social media the progress of $C0_2$ saving

Revenue streams

- With the CO2 points, receive discounts at CO2 friendly
- The companies pay us, and they will receive more customers.
- Relevant ads
- Freemium - pay to get rid of ads

Cost structure

- App Development/Maintenance
- Physical/Online ads
- Data Storage

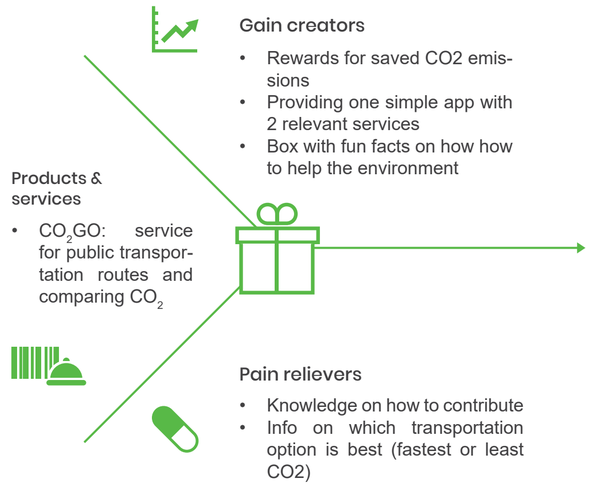
Key resources

- Public Transport Data
- Developers
- Partnerships with eco-friendly companies

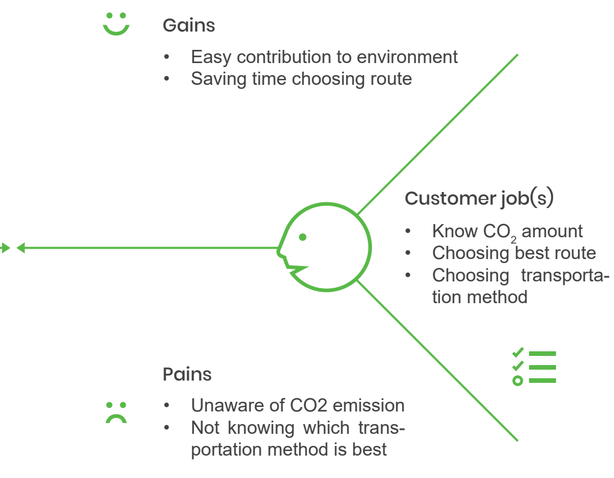
Channels

- Physical ads
- Advertising online - via social media
- Improvement section/customer support in the app
- Via subscription

Value propositions



Costumer segments



Low Fidelity Prototype

Our Low Fidelity Prototype was created in Powerpoint, as the (static) slides provides us with the tools to create high fidelity graphics such as, buttons and labels.

User feedback

For User Research, the method used was Uncovering the Mental Model, as it would be more helpful to get in-depth feedback of the elements of each screen.

Wizard of Oz and Think Aloud were not used because Mobility Apps are common for users and our first prototype was not built with interactivity in mind.

One insight we got from the feedback was how the Profile and Leaderboard tabs seemed empty. Another insight was that the measurement of CO2 in kilograms was abstract and ungraspable.

This is addressed in later iterations by combining both Profile and Leaderboard into one tab, and by adding a button, which lets the user convert the CO2 measurement from kilograms to the amount of plastic bottles that can be produced with that amount of CO2.

Functional Prototype

Based on the Low Fidelity Prototype and the User Feedback that we got from it, the second prototype aimed at adding interactivity for the user. It was developed using a series of HTML web pages, Javascript and CSS. A Google API was also used for the map.

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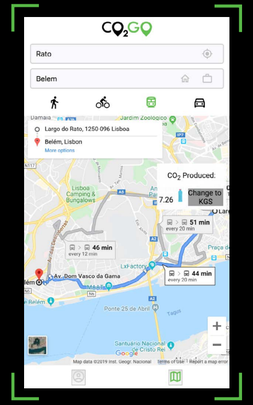
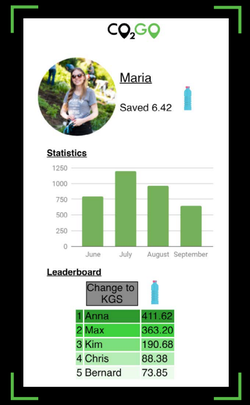


1. Route screen with filled in destination

2. Profile screen and leaderboard combined



This iteration

In this iteration of the project, users can find walking, cycling, public transport and car routes as well as their CO_2 emission, in kilograms or the number of plastic bottles, between to addresses in the city of Lisbon. Users can also check their profile and friend leaderboard, and change the units of measurement as well.

User feedback

Usability testing was done with 5 people. After a brief introduction to the app, users were given the task of finding how much CO_2 is emitted in plastic bottles from any 2 addresses in Lisbon of their liking.

The task was measured in terms of effectiveness (if the task was completed), efficiency (complete the task in less than 30 seconds, and number of clicks, excluding typing, fewer than 5), and satisfaction (Likert Scale from 1 to 5, from Not Intuitive to Really Intuitive).

All users completed the task within our expected time and number of clicks, and found the app intuitive. However, some design improvements were requested, such as, displaying CO_2 emissions for all transportation methods at once, to allow for faster comparisons.

Fully Functional Prototype

For this last iteration, we take in account user's advice and feedback gathered in usability tests in order to change the design.

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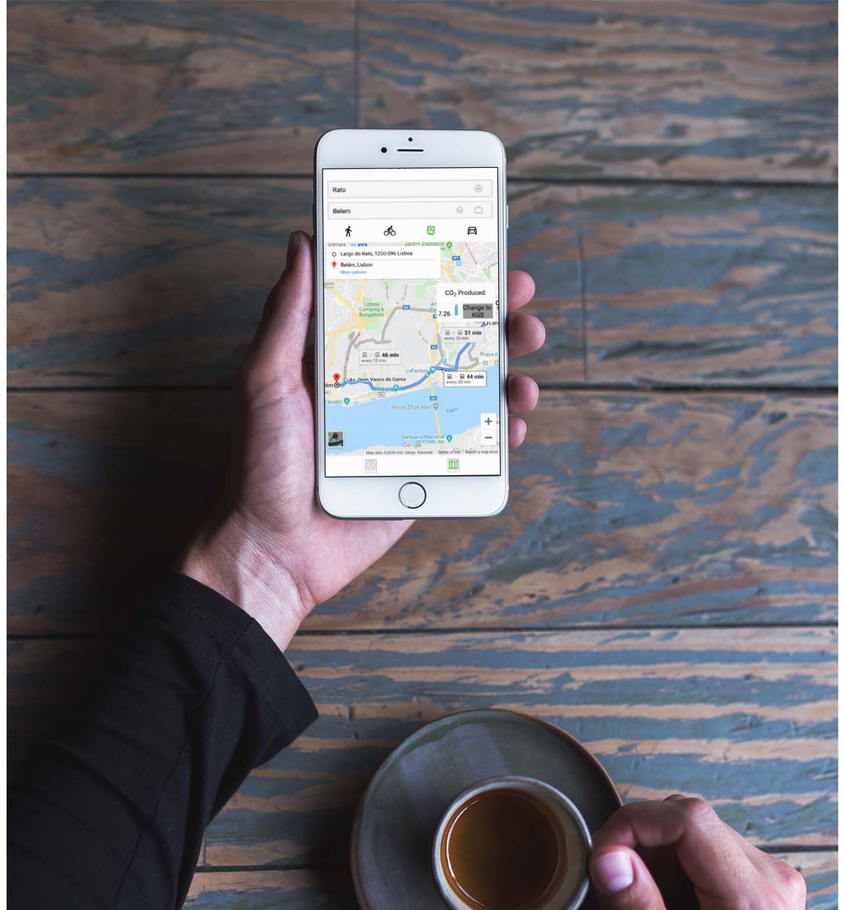


This iteration

In this iteration, we asked users to find the route by local transport to a destination and find out how much CO_2 is emitted.

The following points were observed:

1. Number of clicks
   We expect the user to perform this action in three clicks
2. Time to complete a task
   We expect the user to perform the action within 30 seconds
3. Task completion
   Did the user actually complete the task
4. Satisfaction of completing the task
   Giving the user a scale from 1-5 to choose from

User feedback

Our application was tested with a total of 10 people, 6 students from Instituto Superior Tecnico and 4 Erasmus student from Instituto Superior Tecnico. This analisys gives us more information on redesigning application.

To test the application we chose the Wizard of Oz method. Firstly, there was an introduction of the method, then a brief introduction to the application with the same script to all testers, following the description of the task mentioned previously, and giving the application to the user.

According to user result, we conclude that we need to:

- Move the CO2 indicator where it is more intuitive - for example to the transportation method bar
- Show comparison to worst method of transportation
- Work in general on the design to make it more visually appealing

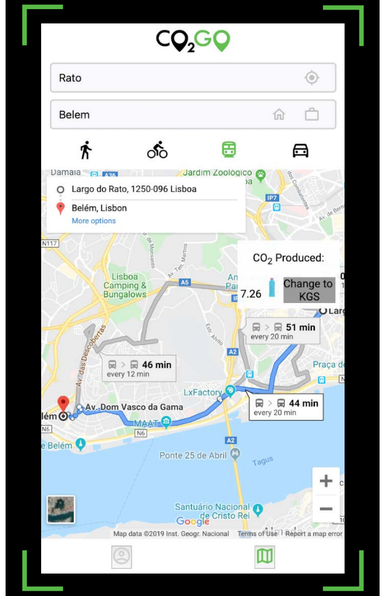
We also had to make some corrections according to the feed-back from the users' tests and design changes.

Route page

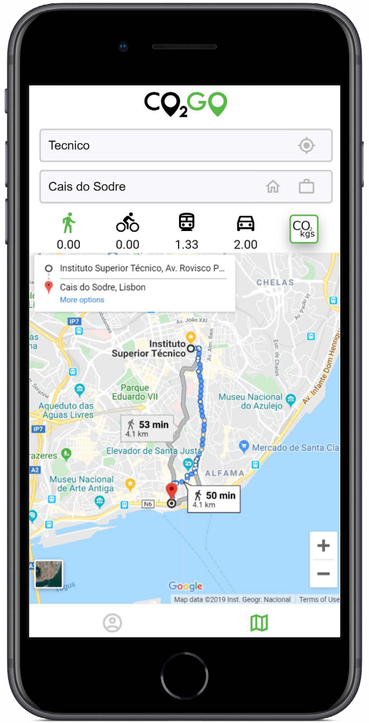
First of all, we change the design of the maps and the size of the internet site in order to seem like a real application for smartphone.

We put the CO_2 emission on the navigation bar to have a direct visualisation of how many CO_2 the user would consume for each transportation option.

Prototype



Final design



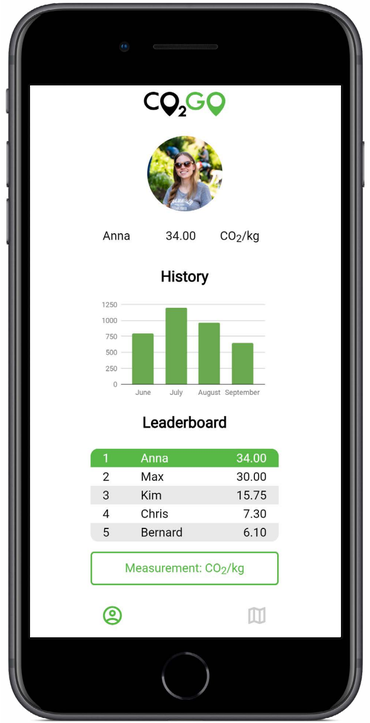
Profile page

We also improved the profile and leaderboard page so as to have a more consistent style.

And finally, for the changing of units, we made a button to convert the CO_2 emission to pet bottles because user can measure the impact of saving the CO_2 in one click.

Prototype

Final design



6. CONCLUSION

Final words

Mobility of our modern society on the one hand and the Climate Crisis crisis at the other are not working together intuitively. We believe, that our solution, right at the intersection of these two topics, is effective in raising awareness and helping people to reduce their carbon footprint by slightly changing their everyday behavior. Moreover, we are doing this without the need of huge investments or the invention of new technology. In summing up the past months, we are happy with what we achieved.

Potential Improvements

Due to the time constraint of only one semester, it is obviously not possible to integrate all features, that have come into mind at the beginning and throughout the project. However, we do want to suggest further features and improvements, that could be made if the project is to be continued.

Social Media Integration

The first improvement, that could be implemented is a the possibility to share your carbon savings and impact within your social media channels. Respective statistics, animations and links could be generated and shared via Facebook, Instagram and Twitter. This tackles members of the user group “Social competitive users”, who do not have a whole intrinsic motivation, but do need and want social rewards for their behavior.

Benefit and Reward System

In order to further motivate people to save CO2, a benefit and reward system would be helpful. One would need to partner up with (local) shops and companies, which are willing to give vouchers and discounts. What if you get a coffee for half the price at the café next to the university in exchange for some CO2-credit? In order to achieve that, the key action is to find respective partners. Possible arguments to convince them are: Firstly, more customers through and secondly, advertisement in the area of green branding.


CO2GO

Annex

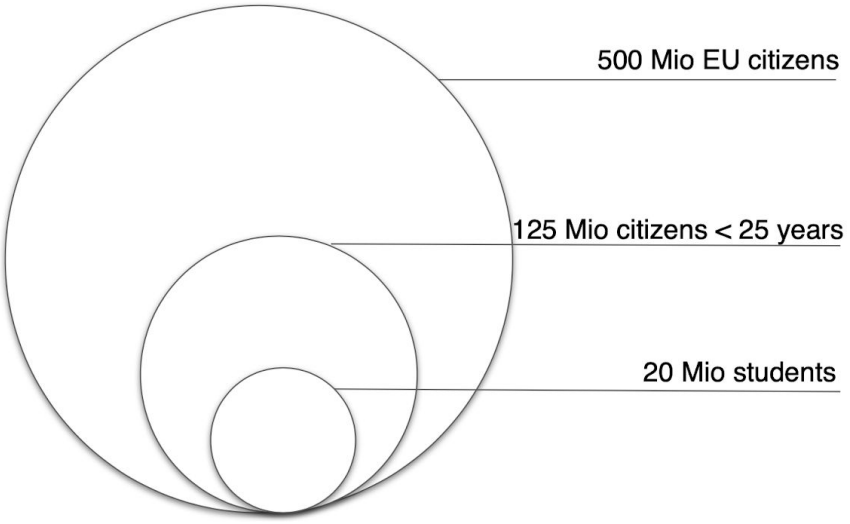
User Research reports

Target Group

Why European Union?
- Shared values
- Team experience

Why young people?
- Environmental conscious
- Technical affinity

Why students?
- easy to access user group



User Survey

In order to be able to assess the relevance and acceptance of an app, changing your route in order to safe CO2, we conducted a user survey. We tried to find out which features d need to be included in the app in order to catch users.

1. **Questions: sketching basic profile:**

What is your occupation? *

- ◯ Student
- ◯ Working
- ◯ Tourist
- ◯ Retired
- ◯ School pupil
- ◯ In between jobs

What is your gender? *

- ◯ Female
- ◯ Male
- ◯ Other/prefer not to say

What is your age range? *

- ◯ <18
- ◯ 18-25
- ◯ 26-35
- ◯ 36-50
- ◯ 51-65
- ◯ >65

2. Questions: daily transportation:

Which modes of transportation do you use on a day-to-day basis? *

- ☐ Walking
- ☐ Electric steps
- ☐ Train
- ☐ Car (including taxi, car sharing)
- ☐ Bicycle
- ☐ Subway
- ☐ Bus
- ☐ Ferry

If applicable, how long does it take for you to get to work/school every day?

- ◯ <5 min.
- ◯ 5-15 min.
- ◯ 16-30 min.
- ◯ 31-45 min.
- ◯ 46-60 min.
- ◯ >60 min.

3. Questions: preferences

Would you be willing to choose an alternative/slower route if less CO_2 would be emitted than during your current route? *

- ◯ Yes
- ◯ No
- ◯ Maybe

If answered with “Yes”

How much time would you be willing to add to your route in order to save CO_2? *

- ◯ <5 min.
- ◯ 5-10 min.
- ◯ 11-20 min.
- ◯ 21-30 min.
- ◯ >30 min.

Would you like the app to provide tips on how to contribute to saving the environment besides choosing an alternative mode of transportation? *

- ◯ Yes
- ◯ No
- ◯ Maybe

If answered with “No” or “Maybe”

Would you choose a more environment-friendly but slower route if you would be rewarded discounts at stores/cafés? *

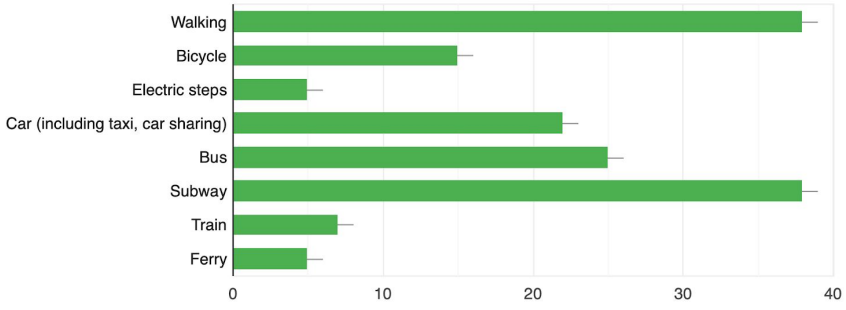
- ◯ Yes
- ◯ No
- ◯ Maybe

Would you choose more environment-friendly but slower route if you can challenge your friends to see who emits the least CO_2? *

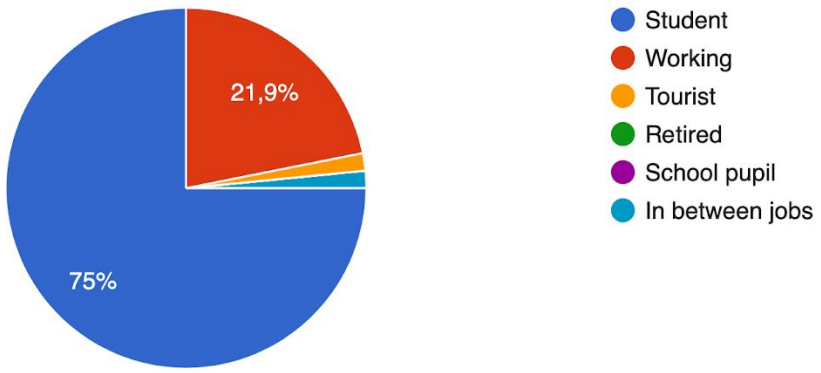
- ◯ Yes
- ◯ No
- ◯ Maybe

The following shows the results of the user research (64 respondents):

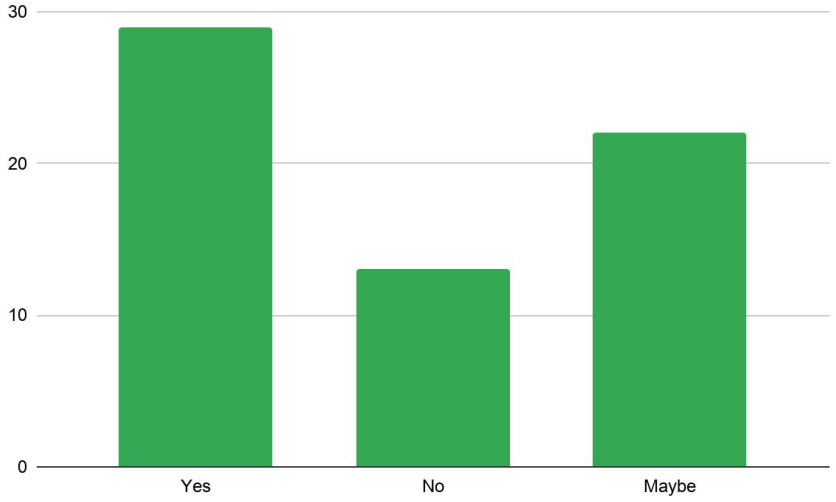
Means of transport used:



Occupation:

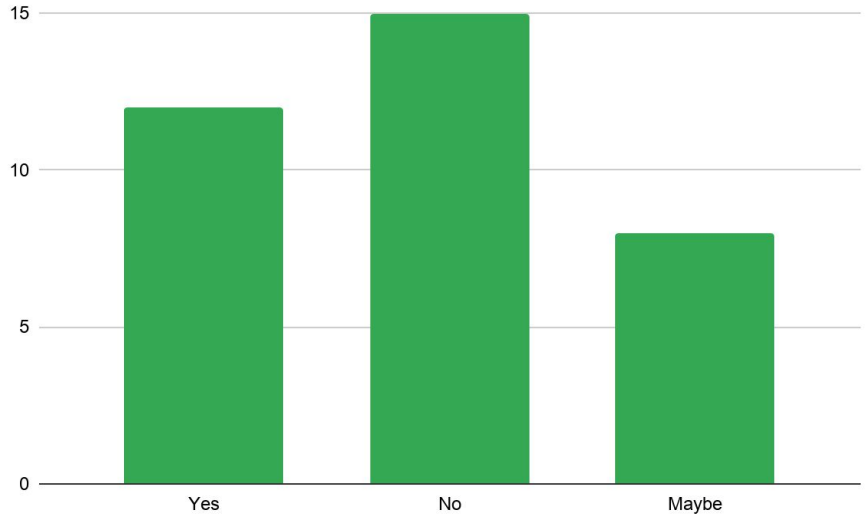


Motivated to change route without reward:



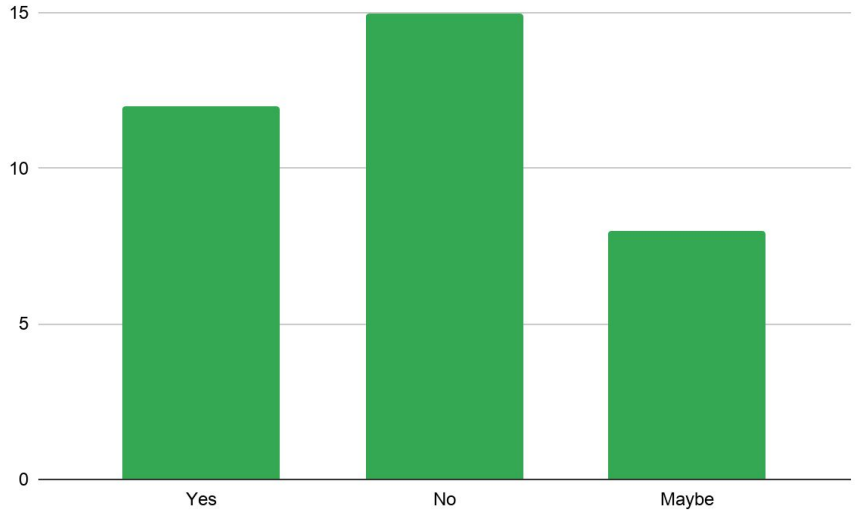
29% are motivated to change their mean of transportation to reduce carbon-emissions without getting any kind of reward.

Motivated to change route if challenged with friends:



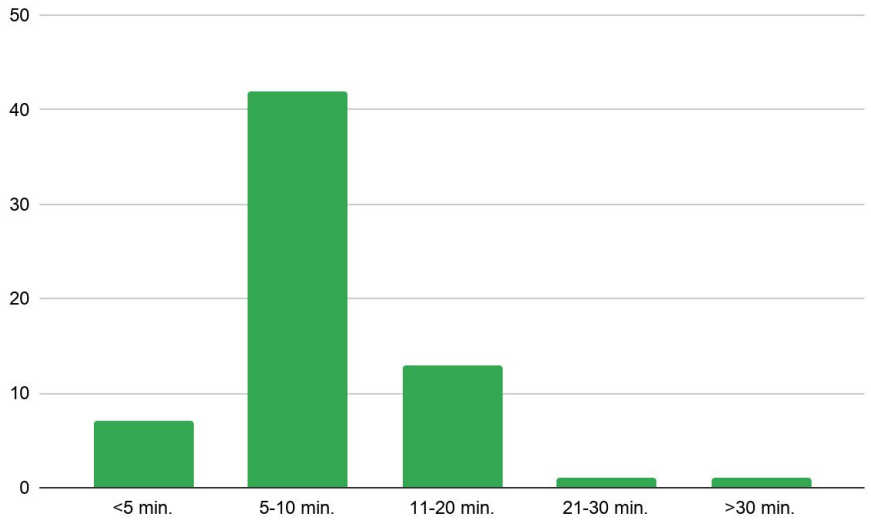
Out of the ones, who would not or would maybe change their route without reward, 20 % would change the route when challenged with friends.

Motivated to change route if rewarded:



Another 19% would change their transportation methods if they were rewarded somehow.

Amount of time willing to add:



42% would be willing to add around 5-10 minutes to their travel time. Another 15% would be willing to add more than that.

Identified User Groups

According to the user survey, we identified the following three different user groups.

Young urban enthusiasts

Social competitive user

Reward driven user

Architecture

From the Functional Prototype onward, the project was developed using HTML, JavaScript and CSS, as those were the tools the team felt most comfortable with. A Google Maps API was also used for the map.

The project is live on IST's web servers.

The project was intended to be a downloadable phone app, however, due to time needed to learn and program in a new language for the team, it wasn't feasible.

Our GitHub page can be found here: https://github.com/MinaTvkl/User-Centered-Design
Our project website can be found here: http://web.tecnico.ulisboa.pt/ist181023/ucd/