Tper Application

Project Management Highlights

GRASSO; MORINI; SILVA

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An official *app* for public transport in E-R

At the moment, information related to the main public transportation company in the Metropolitan City of Bologna and other cities in Emilia-Romagna are located in a **complex and outdated website**, which do not replicate in its layout, structure or design any type of real life experiences related to the field of action.

This leak has not only prevented potential users from successfully using it, but has also allowed **other companies to take advange of this.**

The scope of this project is to overcome this situation by realizing an **official Tper application** that would more faithfully convey the company beliefs of reliability, autonomicity and accountability.

Why does Tper need an ***application***?

Reliability

The TPER company is a **reliable brand** recognised by the population of Emilia Romagna. An app can reinforce its brand image and identity.

Consistency

user expectation that is the same company that manages the public transportation infrastructure to provide them the informative service about their data

Marketing

Tper can respond to the market demand of users by minimising the use of third-party apps.

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1. Ethnographic Research

Discussion Flow

1.1 Segmentation of target audience
1.2 User resear

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Segmentation of target audience

How we built our target: the sources

- "**L'inquadramento della domanda di mobilità**", available on the Emilia-Romagna regional website, "Mobilità" section
- **ISTAT statistics,** relating in particular to the Emilia-Romagna region
- Data and statistics available on the **Tper website**

Segmentation of target audience

X	**Students aged between 18 and 27**	Use the monthly "Youth" season ticket to go to school or university: they could be users of the public transport but not regular users of the site, used only to renew their subscription;
X	**Workers between 27 and 65 years**	Presentations are communication tools that can be used as demonstrations, lectures, speeches, reports, and more. It is mostly presented before an audience. It serves a variety of purposes, making presentations powerful tools for convincing and teaching.
✓	**Occasional users between 35 and 55 years**	**Use the city pass or single journey ticket, visit the city and the metropolitan area only occasionally for events, tourism or certain periods of time; do not know the city well.**

User research

How we built our target

User research is the methodic study of target users, including their needs and weaknesses, so as to have the sharpest possible insights of the user exigencies to be satisfied by the design.

In order to conduct our user research, we used two methods:

Quantitative research

(Google Form questionnaire "Survey on the use of the Tper (Emilia-Romagna Passenger Transport) site for the urban and extra-urban area of Bologna')

Qualitative research

Interviews with the users

Quantitative results

25 partecipants to the Google Form questionnaire

User profiling

- **Ethnographic profiling**

  mostly people aged 21-30 years, but with a conspicuous portion of participants between 30- 60 years. The vast majority reside in Emilia-Romagna, with 28% divided between central Bologna and the metropolitan area of Bologna and 60% within E-R.

- **Aptitude for technology**

  the vast majority of users say they consider the Internet as indispensable for their everyday life, use their smartphone more than 4 hours a day and rely heavily on mobile applications for daily services.

- **Aptitude for public transport**

  they rarely use public transport, mostly for occasional events. A good portion of participants said to be afraid of getting the wrong line, direction or ticket price when using it: problems in the use of public transport persist in those who use it sporadically.

Quantitative results

25 partecipants to the Google Form questionnaire

Habits in planning a trip

In seeking information about public transport, the official website is rarely used. However, it is instead considered to be far more reliable and more up-to-date than the other modalities presented. The real discriminating factor in the user's choice is, as could be imagined, in the ease and comfort of use.
Furthermore, third-party applications such as Roger or Muver are proved to be few known.

Use of the Tper website

Most of the participants (52%) said they had never used the site, 12% used it once but were not happy, 32% use it sporadically and only one user (4%) always use. 22 of them are not registered in the personal area of the site, against 3 registered. The site was used by smartphones for 66% of users. The great majority of participants agreed with the need to develop an official app linked to the site, while none of them disagreed.

Qualitative results

Direct interviews to three partecipants:

Asia, 19 years old, student:	She doesn't know about the existence of the Tper website but would find a public transport app very handy.
Claudia, 50 years old, employee	Use the site to look up news and subscriptions for her child who use transport to go to school.
Michele, 60 years old, photographer	Travels by private transport because he is not familiar with the public transport system and would feel more comfortable using it if there was clear information.

Task analysis

We analyzed tasks our target user might employ when using the Tper website.

2 Lead-in tasks

A. Preliminary step (5 steps)
B. Registration process (10 steps)

A - Preliminary step	
Context	You are looking for transportation information and related tasks.
Goal	Accessing the Tper webpage.
Steps	1) Open the browser and make sure your Internet connection works; 2) Use a search engine and write the query "Trasporto Pubblico Emilia-Romagna" in the search bar; 3) Click on the link "TPER - Trasporto Passeggeri Emilia Romagna"; 4) Eventually, directly type the url of the website in the address bar; 5) Access the webpage.

5 Open services

C. Plan route (12 steps)
D. Check timetables (15 steps)
E. Buy a ticket (14 steps)
F. Talk with Tper (9 steps)
G. Hello Bus (9 steps)

G - Hello Bus	
Context	You are physically located or near a bus stop.
Goal	Check the real time of arrival of the bus at the bus stop.
Steps	0) Preliminary step; 1) From the homepage click “Consulta gli orari”; 2) Alternatively, you can reach the same page from the main menu by clicking “Percorsi e orari”; 3) Search for “Informazioni in tempo reale” in the left sidebar and select it; 4) Here, you can use “Chiamatreno” or “Hello Bus”. Select the latter; 5) Hello Bus is meant to be used on the phone. However, if you scroll down you can use the online version of the service; 6) Specify the name or number of the bus stop; 7) Specify the bus line; 8) Specify time of the day and click on “Vai”; 9) Read the textual information about the time of arrival.

3 Closed services

H. Plan an appointment (11 steps)
I. Buy a citypass (13 steps)
J. Other online services

I - Buy a citypass	
Context	You already explored and used the tasks on the Tper webpage.
Goal	Register and pay for a long-period citypass.
Steps	0) Preliminary step; 1) From the homepage click “Servizi online”; 2) Click on the human bust icon or from the slide down menu select “Account” and then “Accesso”; 3) Insert credentials if available, otherwise go back to the Registration process and follow the steps; 4) Click on the green square with the card icon; 5) Click on “Continua” and check if the personal information already stored are correct; 6) Select a shipping address; 7) Check contact info and upload a portrait photograph to be displayed on your citypass; 8) Choose the starting date of activation and then choose among the different typologies of long-period or short-term passes; 9) The subscription prize and additional costs will be shown. Confirm and go on; 10) Choose a payment option between: • Online Sofort transfer • Credit card 11) Look at the resume of information and give authorization to process personal data; 12) Complete the payment with Nexi; 13) Take a look at the resume of information and click on “Conferma” to confirm.

2. Assessment for existing resources

Discussion Flow

3.1 Expert usability review
3.2 User testing

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Expert Usability Rewiev

Guidelines

The 20 heuristics of Weinschenk and Barker (2000)

1. User Control 2. Human Limitations 3. Modal Integrity 4. Accommodation 5. Linguistic Clarity 6. Aesthetic Integrity 7. Simplicity 8. Predictability 9. Interpretation 10.Accuracy 11.Technical Clarity 12.Flexibility 13.Fulfillment 14.Cultural Propriety 15.Suitable Tempo 16.Consistency 17.User Support 18.Precision 19.Forgiveness 20.Responsiveness

First inspection

These are the main usability issues that can be identified at a first inspection:

- Information overload: too much information collapsed in huge textual units.
- Linguistic limitations: the website is available only in Italian.
- Lack of consistency: different paths and buttons lead to the same endpoints.
- Poor quality graphics: low quality images, low quality graphics, not homogeneous
- No customization available: the website has fixed parameters and the organization of
- information is the same for every user. Filtering is unclear.
- Bad navigation system: no breadcrumb navigation bars or other indications are used to
- help the navigation and overall understanding of the webpage.

Direct Analysis

Most violated guidelines vs. **Most problematic pages**

5. Linguistic Clarity (7)
6. Aesthetic Integrity (7)
1. User Control (6)
16. Consistency (6)
18. Precision (5)
7. Simplicity (4)
8. Predictability (4)
9. Interpretation (4)
11. Technical clarity (4)
2. Human Limitations (3)
13. Fulfillment (3)
10. Accuracy (2)
14. Cultural Propriety (2)
20. Responsiveness (2)

Timetables page (11)
Tickets page (9)
Planning page (9)
Home page (8)
Registration page (8)
Citypass page (8)
Chat page (6)

Reverse Analysis

5. Linguistic Clarity (7)
6. Aesthetic Integrity (7)
12. Flexibility (7)
17. User support (7)
1. User Control (6)
16. Consistency (6)
20. Responsiveness (6)

18. Precision (5)
15. Suitable tempo (5)
11. Technical clarity (5)
9. Interpretation (5)
4. Accommodation (4)
7. Simplicity (4)
8. Predictability (4)
13. Fulfillment (3)
2. Human Limitations (3)
3. Modal integrity (3)

10. Accuracy (2)
14. Cultural Propriety (2)
19. Forgiveness (2)

User testing

Discount usability tests on three different users

User 1 is a 26 year old girl who lives in Emilia-Romagna and works as a waitress. Italian is not her mother tongue but after many years she is able to speak it at a medium-high level. She has good technology skills, uses social media a lot and recently was asked by her boss to manage reservations via a digital platformt. She often accompanies her boyfriend to Bologna for medical visits, but never uses buses.

User 2 is a 23-year-old boy in his last year of university. He lives in Reggio Emilia, and is a commuter. He knows the city quite well, but does not use buses frequently. He loves to travel and has visited many European cities, always organizing his trips by himself. He is very familiar with travel planning sites and often uses means.

User 3 is a 40-year-old man who lives in Milan and moves around a lot for work; he is very used to travelling but uses mainly private means of transport. He has visited Bologna as a tourist and to visit some friends. He loves to travel, in Italy and abroad and has also visited many foreign countries. He is used to planning trips and often uses websites to book and buy tickets online.

User testing

Task completion rate: 77%

		User 1	User 2	User 3
Task 1	Travel calculation: understanding which bus line they have to take given an arrival and a departure point	V	X	V
Task 2	Timetable consultation: understand what time they have to take the bus to get to their destination within a certain time	X	V	V
Task 3	Ticket purchase: understand which fare to buy, how much it costs, and where to buy it	V	V	V

User testing

Error-free rate: 44%

		User 1	User 2	User 3
Task 1	Travel calculation: understanding which bus line they have to take given an arrival and a departure point	non-critical errors	critical errors	critical errors
Task 2	Timetable consultation: understand what time they have to take the bus to get to their destination within a certain time	critical errors	no errors	no errors
Task 3	Ticket purchase: understand which fare to buy, how much it costs, and where to buy it	no errors	no errors	critical errors

User testing

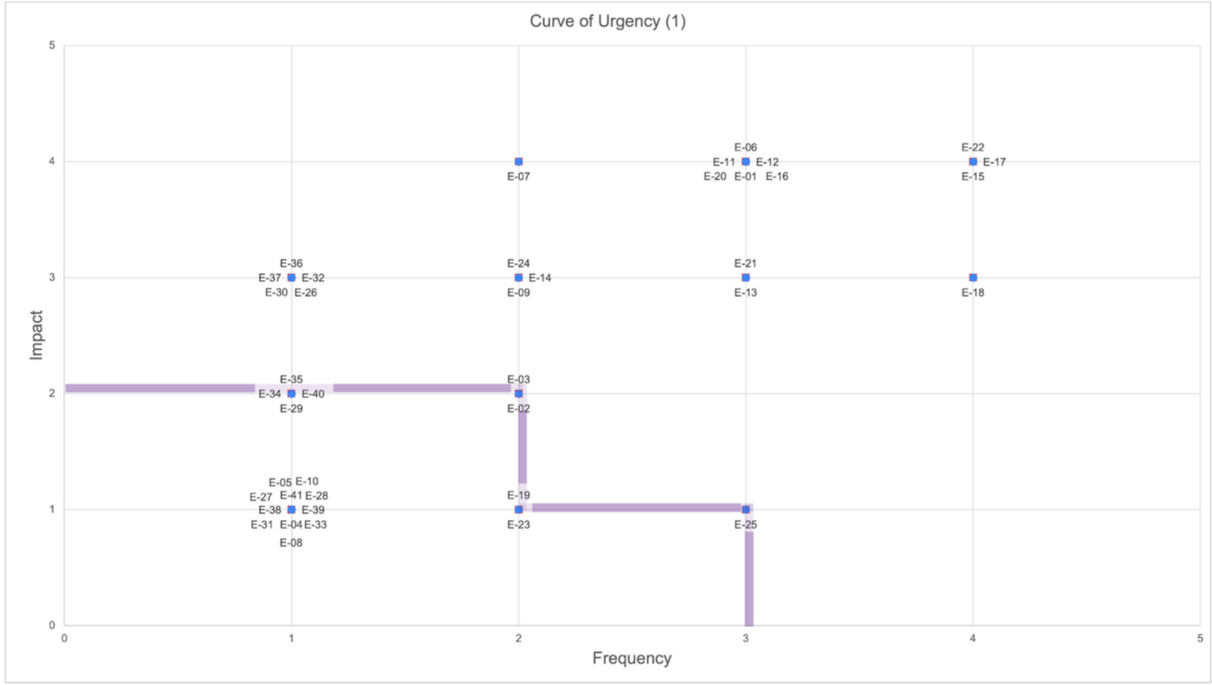
SUS Score: severely insufficient

39,16 / 68

for the sufficience

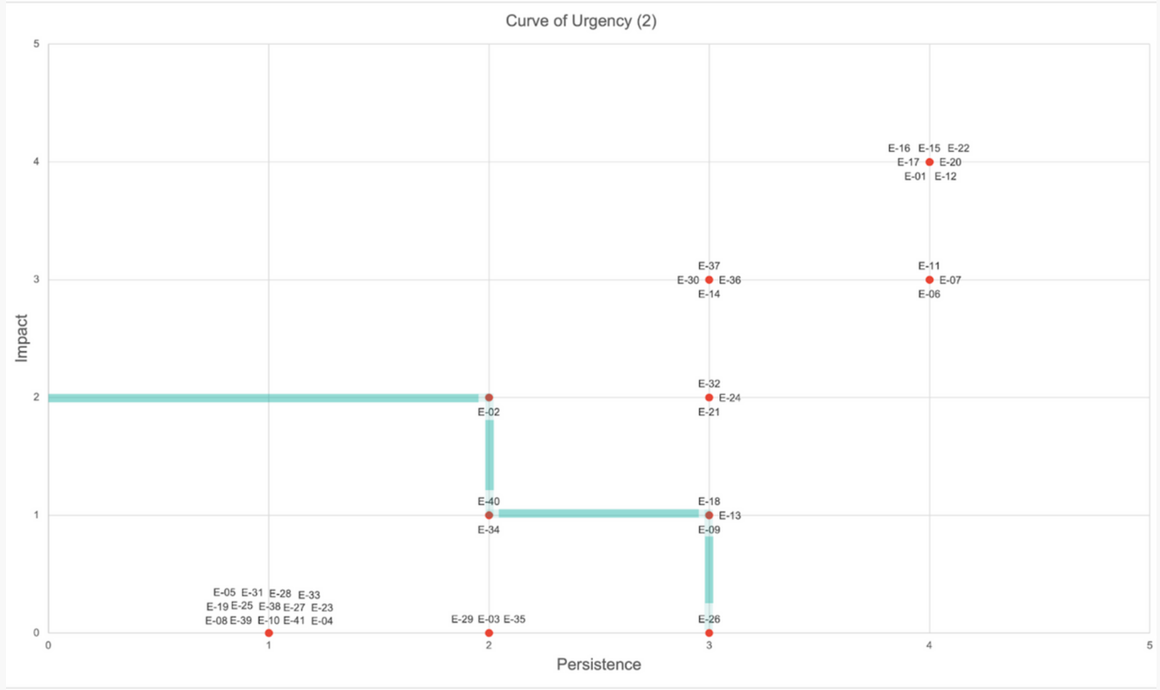
Curve of urgency 1

Impact vs frequency



Curve of urgency 2

Impact vs Persistence



3. Feasibility Study

Discussion Flow

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Context of use

Tasks

- Registration
- Plan a small route
- Plan a visit
- Check timetables
- Check information about bus lines
- Check information about bus stops
- Check real-time arrival timings
- Buy a ticket
- Buy a citypass
- Buy a subscription pass
- Renew subscription pass
- Ask for help/Chat

Technical constraints

- Smartphone
- Computer
- Internet
- App installed
- Credit card
- GPS

Cultural constraints

Users need to be acquaintanced with:

- Public transportations systems
- E-commerce systems
- Application usage
- Italian language or English
- NO legal constraints

Enviromental constraints

Environmental distractions can have a direct effect on mobile or website usability, so a calm and isolated environment should be ideal.

Different viewports and device screen sizes may also influence the usability.

Target user

Age	Adult people between 35 and 55 years of age
Gender	Male, female or identify as any gender
Provenance	They live outside the metropolitan city of Bologna
Level of instruction	The general level of instruction is very high, with a majority of users being graduates
Motivations	They usually do not use public transportation and when they do so, occasionally, they carry out an activity which deviates from the range of standard daytime duties
Tech	They use the Internet every day. They prefer using mobile applications over navigating the web with a computer, especially for carrying out daily tasks

Personas

01

Stefano Mangiagalli

Stefano is a 53 years old man, he is divorced and with 2 daughters. He lives in Bergamo and he is a cosmetics sales representative. He needs to drive every day to go to work and for daily activities. He is very environmentally aware and he loves apps for organising the day and improving his productivity.

02

Giorgia Morelli

Giorgia is a 38 years old woman, married and with a teenage son. She is a math teacher and likes to organise small trips to spend time with his family.
Giorgia uses the car as little as possible. She doesn't like to drive, especially in big cities or for long journeys.

03

Sofia Santiago Ramos

Sofia is a 33 years old woman, she is engaged and she's a vlogger. She speaks Spanish, Catalan, English, French and Italian. Because of her job, she does not own a car; she likes to plan her trips in advance in order to be able to move around quickly. She uses different technologies for her work and free time.

Scenarios

Work event

Who: Stefano
Where: on a train
With whom: with his colleagues
With device: personal tablet

After an initial moment of difficulty, he finds the informations about to go to Cosmoprof on the Tper website.

Medical checkup

Who: Giorgia
Where: in her home
With whom: alone
With device: personal computer

From a free internet search, Giorgia founds the available options to go to her appointment in the city centre on the Tper website.

Touristic visit

Who: Sofia
Where: Venice
With whom: with her partner
With device: personal smartphone

After an initial search on Google maps that did not give the desired results, Sofia looks for the official application for transport in Bologna. She consults the Tper website and finds the route to take for her visit.

4. Design Proposal

Discussion Flow

4.1 Design Model
4.2 Information architecture
4.3 Cao=S Model
4.4 Interaction design

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Information Architecture

Davenport and Prusak Information Ecology

Context

Public utility website providing information about public transport referring to huge variety of users with different needs and capabilities. Has to maintain a simple, linear and universally understandable language, adequate for the communication of a public body.

Content

- Very large volume
- Centralized control
- Textual, images and interactive format
- Deeply granular structure
- Combination of long-term and real-time data

User

The **users** the Tper app has to address are heterogeneous for background, domain knowledge, ethnographic profiles and technological attitude. However, all of them are united by the same information-seeking behaviour: they have the need to retrieve particular and punctual information through the app.

Information Architecture

A top-bottom redesign approach

Structuring

Tper website information are about:

- bus lines, terminals and stops
- timings and differences along the year
- ticket rates, selling points and rate zones
- subscriptions
- news and updates on the status of the lines, real-time information on the bus route

Organizing

That can be divided in 4 different categories:

- planning a route
- make or renew a subscription
- general information about lines and timings
- general information about a ticket rate they may be interested in buying

Classifying and labelling

And labelled as:

- *Calcola il tuo percorso*
- *Linee e orari*
- *Abbonamenti*
- *Promozioni e Tariffe*

+ Findability, Manageablity, Serendipity

CAO=S MODEL

Concept

The concept indicates the way in which the user perceives and understands information. In the app design process, we discussed and solved several problems (**standardisation**, **lexical**, **conceptual** and **polysemical**) that could interfere with the understanding of information.

Actors

Actors are the **categories of users** who act on the application interfaces to perform their tasks by manipulating the data structures that they perceive through the concepts. They are differentiated by the role they play within the application.

Operation

Operations are **actions available on the interface** that correspond to handling concepts. Operations coincide with the task, since the user believes he is manipulating concepts and not data structures. For each operation we may have to deal with several actions that manipulate data in the underlying structures.

Structure

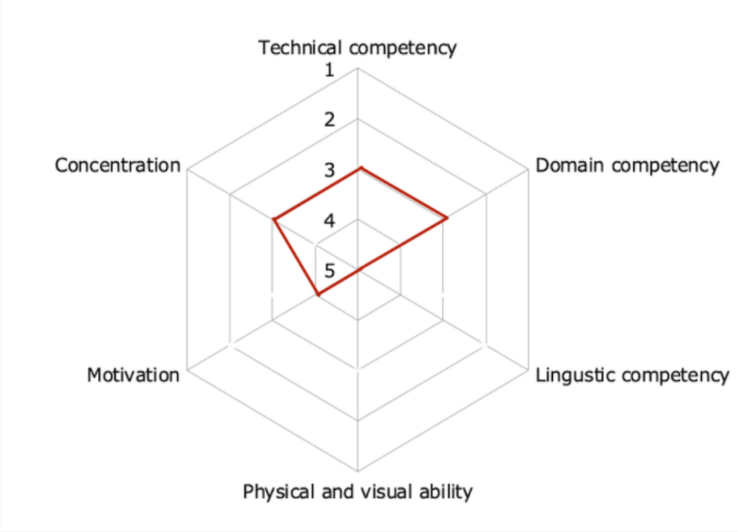
The structures provided by the CAO=S model are three: data structures, views and navigation. The CAO=S model is based on the creation of a **three-dimensional table**, having as axis concepts, actors and operations, and inside each cell all annotations of how actor A should be able to perform the operation O on the concept C.

NEXT →

Actors

Actors are described through the essential characteristics that have an impact on the interaction. They correspond to competences and abilities of exactly six basic characteristics specific to the user with a clear impact on the implementation. For each feature, a numerical score from 1 to 5 is assigned, where 1 corresponds to a very low value and 5 to a very high value.

Stefano Mangiagalli



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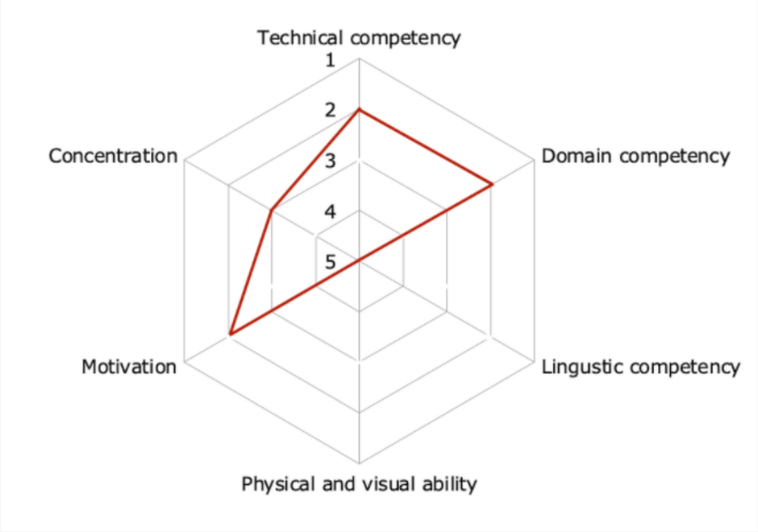

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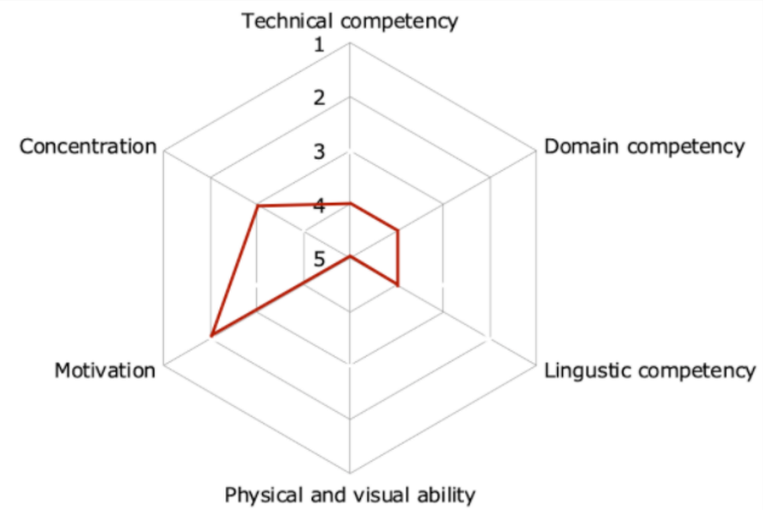

Operations

The operations according to CAO = S are of four types:

Creation	Status bus, route, favourite lines and stops, profile, subscription
View	Profile, status bus, route and timetable, subscription cards, promo and prices, news, realtime information
Update	Profile, favourite lines and stops, route and timetable, news, real time information and maps
Remove	Status bus, favourite lines and stops, profile, route calculation

Structures

The diagram shows views that collect several cells that are consistent with each other in purpose and boundary action and therefore allow the specified operations on the specified concepts by the specified actors. These are just some of the operations described, in order to display the type of table and the information collected.

USER	Promo and prices	News	Real time information	Maps
Creation	no	no	no	no
View	Promotions and prices for tickets and subscriptions can be viewed.	News about public transport can be consulted.	Real-time information on transport can be displayed.	Maps with location and bus route indications can be visualised.
Update	no	News about public transport can be updated.	Real-time information on transport can be updated.	Maps with location and bus route indications can be updated.
Remove	no	no	no	no

Interaction Design

Interaction device	Smartphone or tablet
Interaction type	Touch
Element appearance	Few components, task segmentation and completion traceback, input facilization, intuitive output, skeumorfism
Element format	Interactive, step-by-step guided
Feedback and manageability of errors	Information recap, choice confirmation, lock-in strategies
Customization	The homepage changes according to user needs and provides shortcuts to their interests, queriability of the info

5. Evaluation of Design

Discussion Flow

5.1 Inspection
5.2 User testing

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Inspection

Our competitive differentiators

Cognitive Walkthrough

2 TASKS
2 TEST USERS
2 HAPPY PATHS

Happy Path

1 - Filippo is using the browser application on his phone;
2 - Filippo downloads the application from link found in the website;
3- After the download, he accesses the application;
4- Now he is on the welcome page. He has three options: logging in, register or access as a guest without an account. He chooses the last option and clicks on “Accedi come ospite”;
5 - He clicks on a button in order to accept the terms and conditions ...

Action Analysis

Informal approach

Task vs. Timings

Log in	00:28,17
Log on	00:15,80
Sign in	01:42,49
Plan route	01:29,96
Check lines	00:30,32
Check stops.	00:28,15
Check prices	00:17,57
Follow Updates	00:05,12

Heuristic Analysis

The 10 heuristics of Jakob Nielsen (1996)

Violations found:
- Match between system and the real world
- Error prevention
- Flexibility and efficiency of use
- Help and documentation

User testing

Discount usability tests on three different users

User 1

A 24 year old girl who lived in Bologna for 5 years and is now resident in a different city within Emilia-Romagna. She is currently employed as art gallerist assistant, a work that requires a constant use of the Internet and the computer. When she lived in Bologna she used to take the bus, but she never used the Tper website.

User 2

A 28 year old woman who is finishing her graduation in Medical Science. She lives in Modena and loves to explore the nearings of the Emilian countryside. She is not an expert in using the computer, however she uses a lot of app in order to manage daily services and to keep in contact with friends.

User 3

A 25 year old boy who works as traineer in a Law study. He is from Rome and has to live in Bologna for few months in order to finish his internship. He does not love technology nor using public transport, however, he is curious about everything is new and useful for him.

User testing

Iterative process from the discount usability test

Individuation of problems
Classification of errors
Error description

User  Prototype

Suggestions
Corrections
Improvements

User testing

SUS Score: highly satisfactory

85,83 / 68

for the sufficience

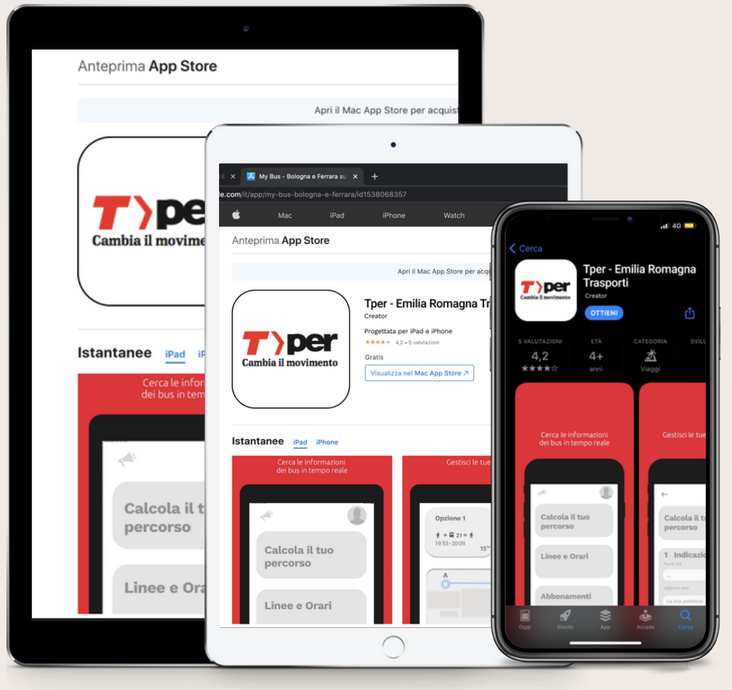
Final raccomendations

A reliable and trusted application for public transport in Bologna

The **goal** of the current project was to provide guidance and explanations for simplifying decision making strategies and navigation patterns of these tasks. The application does not simply contain a list of instructions or suggestions, but it makes things easier for the user by means of interaction, context dependency and sequenciality.

From our research, it emerged an interest towards the **possibility of using a single app** for getting reliable information about public transportation and at the same time, and most urgently, for buying tickets.

At last, we believe that both the application and the website could be further expanded with other tools, which would give a **significant competitive advantage** on the digital services market in question



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