



Politecnico di Torino

DIPARTIMENTO DI AUTOMATICA E INFORMATICA

Laurea Magistrale in Computer Engineering

Human Computer Interaction - Final Report

Candidates:

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Chapter 1

Project Overview

Group Name

I tarallucci

Group members

- Giuseppe Arbore
- Claudia Maggiulli
- Michele Pio Mucci
- Francesca Porcelli

Project Name

MEOW

Value proposition

Meet, observe, explore and wonder

1.1 Problem and Solution

Tourists who travel alone often find difficult to occupy their free time beyond just sightseeing, as they may miss the social aspect of exploring new places. The solution to this challenge is a platform that connects solo travellers in the same city, enabling them to meet up and share experiences. This service enhances their journey by offering companionship for exploring local attractions, dining, or participating in activities. Additionally, it provides the opportunity to connect with locals who have insider knowledge of lesser-known spots and off-the-beaten-path experiences.

Chapter 2

Needfinding

2.1 Domain of interest

Solo travel offers freedom and adventure, but when it comes to free time, many travelers find themselves unsure of how to make the most of it, especially when looking for engaging activities or a bit of company. Without the structure of group plans or travel companions, it can be challenging to discover the best local experiences or connect with like-minded people.

That's why we focus on helping solo travelers navigate their free time beyond basic sightseeing. Whether it's finding unique local events, social meetups, or interactive experiences like workshops and group activities, we ensure that traveling alone doesn't mean missing out. From discovering the best cafés to meet fellow travelers to joining guided experiences that encourage conversation and connection, we make it easier to turn free time into meaningful moments.

2.2 Interviews

2.2.1 Methodology

The interviews were conducted mostly in pairs to ensure effective engagement with participants while covering more ground. All interviews took place in person, as we moved around the city to meet individuals in settings that best suited their needs. We carefully selected interviewees based on how well they aligned with the profile of the identified domain of interest.

Materials used

Materials used in our process included a variety of tools to ensure smooth data collection and participant interaction. We used a camera to capture visual artifacts and document relevant materials for later analysis. The audio recorder was essential for ensuring clear, high-quality recordings of interviews and discussions. For taking notes, managing consent forms, and organizing informative materials, we relied on a tablet. Additionally, as a gesture of appreciation, we brought "taralli", a traditional snack, to offer as small thank-you gifts to our participants.

2.2.2 Users

To better understand these needs, we conducted interviews with different types of young adults who frequently travel:

- **Immediate Users:** Young adults who frequently travel and experience firsthand the struggles of making the most of their free time.

They provided valuable insights into the real-life difficulties of finding engaging activities and social opportunities while traveling.

- **Domain Experts:** Professionals in the travel and hospitality industry, such as tour guides, hostel managers, and event organizers. Their expertise helped us understand existing solutions, common solo traveler behaviors, and gaps in the current travel experience.
- **Lead Users:** Highly experienced solo travelers who have developed their own strategies to navigate free time effectively. They offered advanced insights and innovative approaches to making solo travel more enjoyable and socially fulfilling.
- **Extreme Users:** Individuals at the far ends of the solo travel spectrum, such as those who either thrive on social interactions or prefer complete solitude. Their experiences allowed us to examine unique perspectives and identify opportunities to cater to different types of solo travelers.

2.2.3 Participants

We conducted seven interviews, each corresponding to the user types defined earlier. Based on the identified domain of interest, the extreme user and the lead user were represented by the same individual. The participants were carefully selected to ensure a diverse range of perspectives, each aligning with a specific user type.

- **Immediate User 1:** A person who travels frequently

- **Immediate User 2:** A person who travels for work
- **Immediate User 3:** A person who frequently travels for work
- **Immediate User 4:** A person who loves to discover new authentic places
- **Immediate User 5:** A person who often travels alone
- **Domain Experts:** A person working in a hotel located in the city center.
- **Extreme/Lead User:** A person who frequently travels with organized groups, often consisting of strangers, for various trips and tours.

2.2.4 Interviews Immediate users

In this section, we provide a summarized overview of the answers from each interview with immediate users. For each question posed, we have distilled the responses to highlight the key points, capturing the most significant insights and patterns. These summaries aim to showcase the users' core perspectives, challenges, and preferences, offering a clear and concise understanding of their feedback.

- **How often do you travel?**
 - **User 1:** Quite often, about once a month.
 - **User 2:** On average, once a month.
 - **User 3:** Five times a year.

- **User 4:** Like probably twice or three times per year.
- **User 5:** I travel on average 2 or 3 times a year.

- **What do you mainly travel for?**

- **User 1:** For general culture, to discover new places.
- **User 2:** I mainly travel for work.
- **User 3:** I travel for leisure, fun, relaxation, but also for work.
- **User 4:** Just to tour around discovering new places, hang out with friends and family.
- **User 5:** I mainly travel for leisure.

- **What do you think about traveling alone and traveling in company?**

- **User 1:** Traveling alone is a great way to gain experience and meet people different from the lifestyle standards we are used to. Traveling with company is great if you surround yourself with people who travel similarly to you; otherwise, it can be problematic.
- **User 2:** Traveling alone gives me freedom and time for myself, while in company, I can share experiences. However, traveling with others can limit my autonomy.
- **User 3:** I have never traveled alone because I consider traveling an experience to be shared. I prefer to be with people I know or whom I can get to know better during the trip. I wouldn't feel

comfortable alone in an unfamiliar place. Traveling with someone helps psychologically and allows for mutual support.

- **User 4:** I have never traveled alone and don't think I would enjoy it. I prefer traveling with company because it's more fun, and I like spending time with others.
- **User 5:** I prefer traveling alone because it gives me total control over the itinerary. I don't have to adapt to other people's schedules and preferences, and I can follow my own pace.

- **Can you tell me 3 positive and 3 negative aspects of traveling in company?**

- **User 1:** Positives: Sharing an experience, companionship, sense of security. Negatives: Different needs, different interests, possible misunderstandings.
- **User 2:** Positives: Traveling at the company's expense, dedicating time to personal interests and growth. Negatives: Difficulty reconciling group desires, risk of feeling isolated, social pressure to follow colleagues.
- **User 3:** Positives: Being together, having fun, sharing memories for the future. Negatives: Coexistence issues, misunderstandings in organization, differing opinions that can create tensions, especially on work trips.
- **User 4:** Negatives: People think differently, which can cause problems, and some can be moody while traveling. Positives: It's

fun, tasks and planning are shared, and you don't have to do everything by yourself.

- **User 5:** Positives: Total independence, the ability to plan the trip as desired, more opportunities to meet new people. Negatives: Less security, difficulty participating in some group-oriented activities, moments of loneliness.

- **Tell me about your typical day while traveling.**

- **User 1:** I like waking up early but not too much, having a hearty breakfast, and dedicating my morning to culture and monuments. For lunch, I tend to adapt so as not to waste time, and in the afternoon, I enjoy exploring the city and local flea markets. For dinner, I like discovering local culinary habits and experiencing the nightlife in clubs and popular spots.
- **User 2:** I wake up early, have breakfast, and start my workday. After work, I explore the city a bit or relax before returning to the hotel.
- **User 3:** It depends on the plan for the day. If visits are scheduled, I take care of organizing them and choosing where to eat. If I don't feel like visiting, I stay home without doing much.
- **User 4:** I wake up early, have breakfast, plan the day, visit famous tourist attractions, then go home to relax. In the evening, I go out for dinner or spend time in a club or pub.

– **User 5:** I wake up early to make the most of the day, have breakfast, and start exploring the city by visiting museums, attractions, and strolling. In the evening, I look for a restaurant to try local cuisine.

- **When you are not busy sightseeing, what do you usually do?**

– **User 1:** Shopping, I also really like discovering the underground scene, especially through food and new friendships.

– **User 2:** I love using my free time to visit museums, walk, read, or do sports. I always look for new experiences to avoid wasting time.

– **User 3:** I'd say dining out is a must, so I book a place. I always try to find good restaurants and eat the local specialties.

– **User 4:** I just walk around and explore anything that looks interesting, like museums, restaurants, or streets.

– **User 5:** I look for local street food for lunch. In the evening, I like going to live music venues or cultural events to meet new people.

- **Do you prefer to plan your free time or leave room for spontaneity?**

– **User 1:** I like leaving room for spontaneity because when traveling in a city, you can discover hidden gems.

- **User 2:** I do a mix: I plan the main activities, but I leave room for improvisation and spontaneous discoveries.
 - **User 3:** Both. I don't organize everything down to the last detail, so traveling with company helps. However, having a plan is important to avoid wasting time. I also like improvisation because it leads to unexpected discoveries.
 - **User 4:** Both. Sometimes I plan everything in advance, but other times I just walk around and do spontaneous things. It's a balance.
 - **User 5:** I seek a balance between planning and spontaneity. Some activities require booking, but I also like deciding on the spot to fully enjoy the city's atmosphere.
- **What foreign languages have you learned or tried to speak during your travels?**
 - **User 1:** English and French.
 - **User 2:** Only English.
 - **User 3:** During my trips to Greece and Spain, I learned some words in Greek and Spanish. I also improved my English and French, the latter thanks to a trip to Brussels.
 - **User 4:** Italian and French, since I've traveled to those countries. I also speak Arabic and English. I like making an effort to speak the local language as a sign of respect for their culture, even if I make mistakes.

- **User 5:** Before every trip, I learn some basic phrases in the local language to interact better with people. I have focused more on German, as I often travel to Germany especially during Interrail.

2.2.5 Domain Expert

- Could you tell me three of the most common requests tourists make, especially regarding their free time?

- They ask about swimming pools, gyms, bike rentals, restaurants, and live music venues. Often, they look for pubs to watch sports matches and typical places to visit. I recommend locations based on their specific needs.

- Are there people who travel alone and want to go out?

- Many solo travelers, especially those traveling for work, look for venues with live music. They want to socialize and unwind after work. Music helps them meet new people in a pleasant setting.

2.2.6 Extreme/Lead User

- Interviewer: How often do you travel?

- I travel for work at least twice a month. Once a year, I take an intercontinental trip.

- **Interviewer: What do you mainly travel for?**
 - Mainly for work, about twice a month. I take leisure trips whenever possible.
- **Interviewer: What do you think about traveling alone versus traveling with others?**
 - Traveling with organized groups allows me to depart whenever I want, especially during low season, and visit distant places without logistical complications. I enjoy meeting new people, but not sharing experiences with close friends can be a downside.
- **Interviewer: Could you tell me three positive and three negative aspects of these experiences?**
 - **Positives:** Freedom to travel without depending on others, easier organization with guided tours, long-lasting new friendships.
 - **Negatives:** Lack of sharing experiences with loved ones, higher costs compared to self-organized trips.
- **Interviewer: Could you tell me about the friendships you've made?**
 - I have formed connections with people I met while traveling, and with some of them, I have planned other trips together. I keep in touch with many of them, and we meet again for short trips or events.

- Interviewer: When you're not busy sightseeing, what do you usually do?
 - In organized tours, I spend time with the group. When traveling alone, I like to experience the city as a local, avoiding the most obvious tourist attractions.
- Interviewer: Do you prefer to plan your free time or leave room for spontaneity?
 - I always plan my trips in advance, looking for deals and itineraries to optimize time and money. Unexpected events can happen, but I prefer to have everything under control.
- Interviewer: What do you like to do in your free time?
 - I like to alternate between classic tourism and more adventurous experiences. If I return to a place I've already visited, I focus on relaxation and the local lifestyle.
- Interviewer: What foreign languages have you learned or tried to speak during your travels?
 - I speak English and a bit of French and Spanish. I like trying the local language, but in some countries, it's very difficult to communicate.
- Interviewer: Could you name three apps that are most useful when traveling alone?

- I use Skyscanner for flights, Booking for hotels, and dating apps to meet people.

- **Interviewer: Is there something I should have asked but didn't?**

- Why travel? Traveling is not just about vacations but also a personal challenge and a way to discover new cultures. After the lockdown, many people have rediscovered their desire to explore the world.

2.2.7 Key Quotes

The following quotes hightlight the more relevant problems encountered:

- **When traveling alone, I like to experience the city as a local, avoiding the most obvious tourist attractions.** - Extreame user
- **Many solo travelers, especially those traveling for work, (...) want to socialize and unwind after work.** - Domain expert
- **I also really like discovering the underground scene, especially through food and new friendships** - Immediate user 1
- **I always try to find good restaurants and eat the local specialties** - Immediate user 3

2.2.8 Results

Artifacts



Figure 2.1:
Interview with
domain expert



Figure 2.2: Thank you gifts

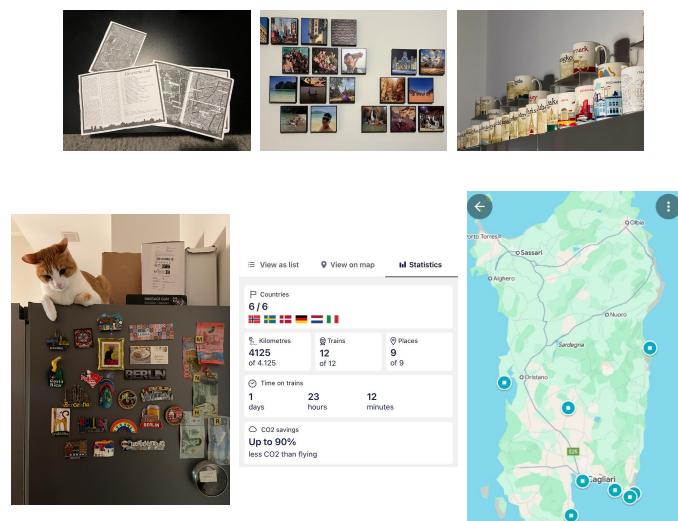


Figure 2.3: Artifacts

Consent forms

<p>POLITECNICO DI TORINO Human Computer Interaction (M.S. in Computer Engineering)</p> <p>Informativa privacy [ai sensi dell'art. 13 del Regolamento 2016/679/UE]</p> <p>Si fornisce la seguente informazione in relazione alle attività di ricerca realizzate nell'ambito dell'insegnamento di Human Computer Interaction (M.S. in Computer Engineering). La ricerca dati riguarda la sua collaborazione e disponibilità attraverso la compilazione di un questionario/intervista per la realizzazione di un'interazione individuale.</p> <p>La metodologia utilizzata comporta l'audio-registrazione dell'intervista, procedura che permetterà un maggiore livello di dettaglio delle informazioni raccolte ai fini dell'elaborazione dei dati.</p> <p>I suoi dati personali, in particolare quelli sensibili di carattere anagrafico, saranno trattati con un elevato livello di sicurezza. I risultati saranno utilizzati esclusivamente per motivi didattici e diffusi in forma rigorosamente anagrafica e in modo aggregato.</p> <p>Le riconosce che l'adesione alla ricerca è completamente volontaria. L'eventuale mancata adesione alla ricerca non porta in alcun modo arretrato al pregiudizio.</p> <p>In qualità di partecipante allo studio in oggetto, lei può esercitare i diritti sui dati di cui alla sezione 2, 3 e 4 del capo III del Regolamento UE 2016/679.</p> <p>Dopo aver preso visione di quanto sopra riportato in data 10/10/2024, il Sig/Sigra Lucia Onoghi dichiara di aver compreso la presente informativa privata e quanto spiegato/lo dal professionista e pertanto, con piena consapevolezza, decide di partecipare alla ricerca come sopra descritta.</p> <p>Data, Luogo e firma leggibile: Lucia Onoghi</p>	<p>POLITECNICO DI TORINO Human Computer Interaction (M.S. in Computer Engineering)</p> <p>Informativa privacy [ai sensi dell'art. 13 del Regolamento 2016/679/UE]</p> <p>Si fornisce la seguente informazione in relazione alle attività di ricerca realizzate nell'ambito dell'insegnamento di Human Computer Interaction (M.S. in Computer Engineering). 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Figure 2.4: Consent forms

2.3 User Needs

We started the process of identifying user needs by thoroughly reviewing the data gathered from the interviews. Using Miro as a collaborative digital workspace, we documented every possible user need on virtual sticky notes. Each note was traced back to the individual user whose feedback or behavior had highlighted that particular need. The identified user needs are:

- **Users need to explore new places to hangout** - domain expert
- **Users need a way to simplify planning** - immediate user, extreme user
- **Users need to live the city like a local** - immediate user, extream user
- **Users need to meet people to enjoy group activities** - immediate user
- **Users need to feel safer when travelling** - immediate user
- **Users need to taste local food** - immediate user, extreame user
- **Users need to find local festivals** - immediate user
- **Users need to reduce the cost while travelling** - extreame user, immediate user
- **Users need to feel less alone while travelling** - immediate user, domain expert

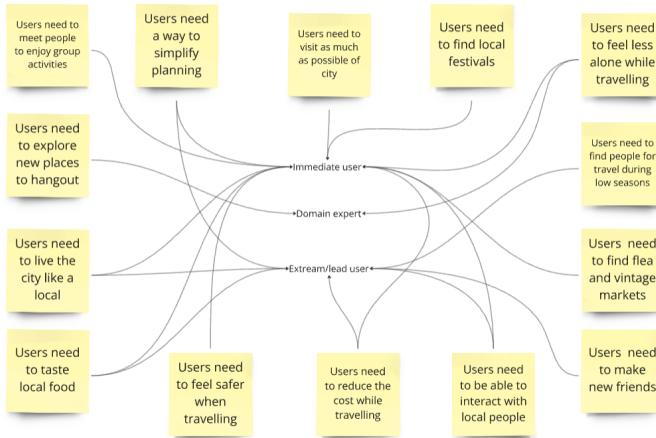


Figure 2.5: Brainstormed user needs

- **Users need to be able to interact with local people** - immediate user, extreme user
- **Users need to visit as much as possible of city** - immediate user
- **Users need to find people for travel during low seasons** - extreme user
- **Users need to find flea and vintage markets** - immediate user
- **Users need to make new friends** - extreme user

2.3.1 Deep User Needs

Based on our research and interviews, we have identified four key user needs that go beyond simple logistics and tap into the deeper desires and challenges of solo travelers. These needs represent fundamental aspects of the solo travel experience and can serve as the foundation for an interactive application.

- Users need to explore new places to hangout
- Users need to feel less alone while travelling
- Users need to live the city like a local
- Users need to meet people to enjoy group activities

2.4 Finding a solution

2.4.1 Finding some solutions to each deep user need

To develop potential solutions, we used a structured brainstorming approach. Each team member focused on one user need at a time, setting a five-minute timer to independently generate as many ideas as possible. Afterward, we came together as a group to share, organize, and discuss the ideas, identifying patterns and refining the most promising concepts. This process allowed us to explore a wide range of possibilities while ensuring a collaborative and well-rounded approach to addressing user needs.

Users need to explore new places to hangout

- **A curated list of hangout spots outside the city** – A collection of recommended places beyond the urban center where travelers can relax, explore nature, or experience a different side of the destination. This could include scenic viewpoints, quiet retreats, or unique cultural sites.

- **User-shared itineraries for fellow travelers** – A platform where travelers can create, share, and discover itineraries based on personal experiences. This would allow solo travelers to follow tried-and-tested routes tailored to different interests, such as food, adventure, or history.
- **Local guides with personalized recommendations for travelers**
 - A resource filled with insider tips from locals, providing authentic suggestions on the best places to eat, visit, and experience. These guides would help solo travelers immerse themselves in the culture and explore beyond typical tourist attractions.
- **A travel buddy system for discovering new places** – A feature that connects travelers with like-minded individuals or local hosts who can introduce them to hidden gems and must-visit spots, making exploration more social and enriching.
- **An interactive map with all possible places to visit in the city**
 - A comprehensive and dynamic city map that highlights various points of interest, from popular landmarks to lesser-known spots, helping solo travelers navigate and plan their explorations efficiently.

Users need to feel less alone while travelling

- **Users can join events with people in the same travel destination** – A system that allows solo travelers to discover and participate in events happening in their current location, helping them connect with others who share similar interests.

- **Locals organize group trips** – A platform where local residents can set up and host group trips, offering travelers an authentic experience while fostering cultural exchange and social interaction.
- **Bars and clubs organize events for meeting new people in town**
 - A network where nightlife venues create social gatherings specifically designed for travelers to meet each other and interact with locals in a relaxed and friendly setting.
- **Shared travel journals** – A collaborative space where travelers can document and share their experiences, providing insights, recommendations, and personal stories that help others navigate their own journeys.
- **Organized groups for traveling** – A feature that facilitates the formation of travel groups, allowing solo travelers to team up with others who have similar plans, making trips more social and cost-effective.

Users need to live the city like a local

- **Guides with local suggestions for travelers** – A curated resource offering insider tips from locals, helping travelers explore authentic, lesser-known spots in the city, and providing recommendations for food, activities, and experiences that are off the beaten path.
- **A map of nearby local spots and local festivals** – An interactive map that highlights nearby hidden gems, local hangouts, and seasonal festivals, helping travelers experience the city's culture and vibe in a more intimate way.

- **A local buddy** – A feature that connects travelers with locals who can show them around, share stories, and guide them to authentic experiences, offering a personal and immersive way to explore the city.
- **Group trips organized by locals** – A service where locals can organize small group trips to nearby attractions, nature spots, or cultural events, providing travelers with the opportunity to explore in a social setting while experiencing a more authentic view of the destination.
- **Invitation to have a meal in local people's homes** – A platform where locals can invite travelers to dine with them in their homes, allowing for unique cultural exchange, the enjoyment of homemade meals, and an authentic connection with the community.

Users need to meet people to enjoy group activities

- **Users can join events with people based on their location** – A feature that allows solo travelers to find and join local events, meet new people, and participate in activities happening around them, fostering social connections and shared experiences.
- **Group trips organized by locals** – A service where local residents organize group trips to various attractions or hidden gems, offering travelers a chance to explore with others in a guided, social setting.
- **Local people organize groups to participate in events** – A platform where locals can create and manage groups of travelers to attend

specific events together, providing a sense of community and shared purpose for solo adventurers.

- **More activities for solo travelers** – A curated list of activities tailored specifically for solo travelers, ensuring they have opportunities to engage in group experiences, discover new places, and socialize, all while enjoying independence.
- **Organized groups for traveling** – A service that helps solo travelers connect with others and form travel groups, making it easier to share experiences, reduce costs, and explore new destinations with fellow adventurers.

2.4.2 Top overall solution

We decided to use the Post-it voting method as a way to involve everyone in the decision-making process. Each participant was given three votes to allocate to the solutions they felt most drawn to, allowing them to express their preferences individually. The approach encouraged independent thinking while ensuring that everyone's voice was heard. After all participants had cast their votes, we gathered the results and reviewed the feedback.

The final decision, based on the voting, was that

- **People should have the opportunity to meet others in the place they are traveling to**

. This solution resonated strongly with the group, reflecting a shared desire to create a social, connected experience for travelers. It emphasizes the

importance of fostering interactions and building connections, which was a key theme throughout our research and discussions. This solution aligns with the needs of various user types, as it allows for both personal connections and the discovery of new relationships while traveling..

Chapter 3

Tasks and Storyboard

3.1 List of tasks

After analyzing the solution to meet the user's need, we identified the following tasks:

- **Simple task:** Discover an event attended by a “Local Legend” in the place you’re travelling to.
- **Moderate task:** Complete an ice breaker activity during the event you’re attending.
- **Complex task:** Become a “Local Legend” for a selected city.

Motivation of:

- **Simple task:**
 - People are often looking for new places in the city that align with their interests. Discovering events and locations that match their

hobbies and passions enhances their leisure time and makes their experience more fulfilling.

- People generally seek experts who can guide them in discovering and understanding a place. In our case, a Local Legend provides invaluable insights into the culture, history, and traditions of the destination. They offer personalized recommendations, help uncover hidden gems, and create opportunities for meaningful social exchanges that elevate the travel experience beyond conventional tourism.

- **Moderate task:** People often need a catalyst to break the ice and start conversations, especially in unfamiliar social settings. An ice breaker activity helps participants feel more comfortable, encourages interaction, and fosters connections that might not happen otherwise. This approach enhances engagement and ensures a more enjoyable and immersive event experience.

- **Complex task:** Many individuals aspire to become a Local Legend because it allows them to share their passion for their city, connect with people from diverse backgrounds, and contribute to the local community. By becoming a Local Legend, they gain a sense of belonging, develop valuable social connections, and enhance their personal growth by deepening their knowledge of their surroundings and becoming a trusted source of recommendations and experiences for others

As solo travel becomes increasingly popular, travelers are looking for easy

ways to find events, connect with others, and immerse themselves in local culture. Having access to events featuring a Local Legend offers a unique opportunity to engage with someone knowledgeable about the destination, providing insights and recommendations that enhance the experience.

In summary, offering the opportunity to meet new people and explore local places meets the need of solo travelers to feel less alone and to join group activity.

3.2 Storyboard

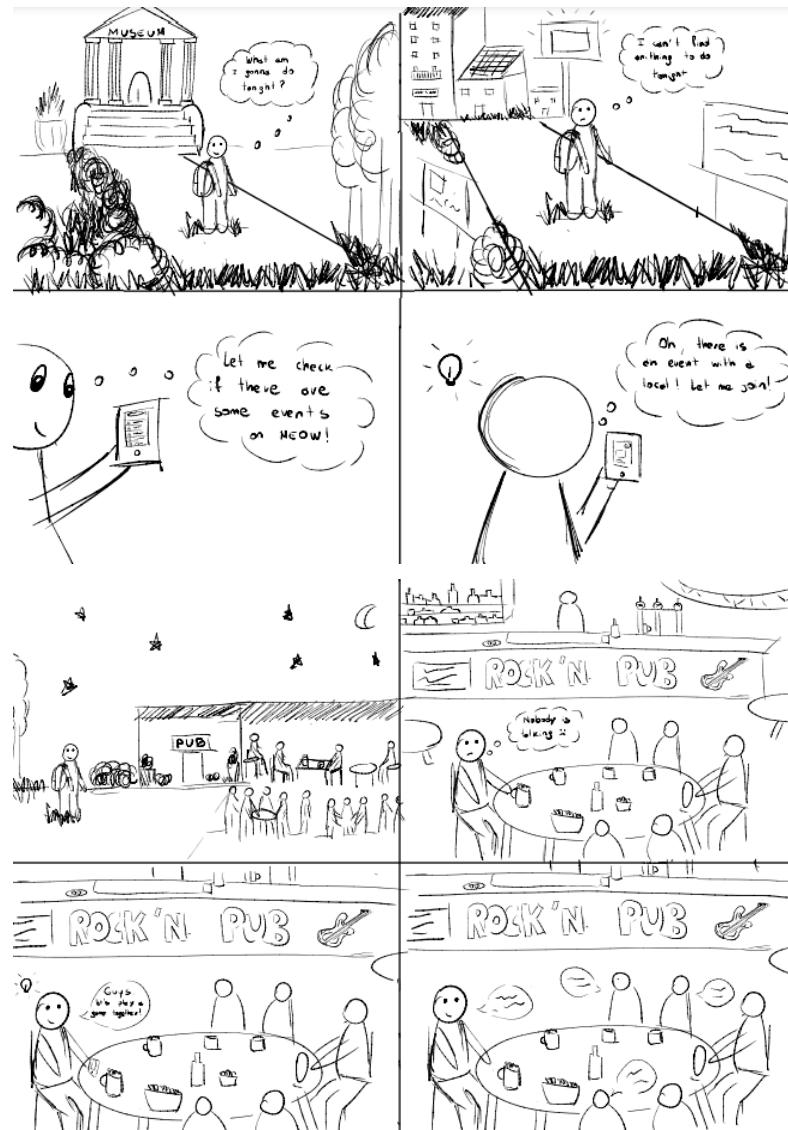


Figure 3.1: Storyboard

The storyboard follows the journey of a solo traveler who finds himself with some free time after visiting a museum in a new city. The core problem revolves around the protagonist's unsuccessful attempt to discover something interesting to do on his own. A dedicated app can help the protagonist to find

suitable event aligns with his interests. It represents simple and moderate tasks by fulfilling the traveler's need to find something to do in their free time while also satisfying their desire to socialize, start conversations, and meet new people through structured interactions, including an icebreaker game.

3.3 Why we chose it

We chose this approach because it effectively illustrates how the solution meets the protagonist's needs. The storyboard clearly shows a solo traveler struggling to find activities and connect with others, then successfully engaging in an event and an icebreaker activity. This highlights how the solution helps travelers make the most of their free time while meeting new people, making it a strong representation of the problem and its resolution.

3.4 Strengths

One of the key strengths of the storyboard is that it effectively represents both the simple and moderate tasks. It showcases the discovery of an event featuring a Local Legend, allowing solo travelers to engage with someone knowledgeable about the area. Additionally, it highlights how participants can interact through an icebreaker activity, making social connections easier and more natural. By covering these elements, the storyboard clearly demonstrates how the solution helps travelers find meaningful activities while fostering new social interactions.

3.5 Weaknesses

While the storyboard effectively represents the simple and moderate tasks, it has some weaknesses. One limitation is that it does not cover the complex task of becoming a Local Legend, which is an important aspect of the solution.

Chapter 4

Low fidelity prototype

4.1 Modalities exploration

To develop our solution, we explored various alternatives to determine the most suitable modality for our application. After evaluating different options, we selected the ones that best align with the needs of solo travelers while ensuring accessibility and ease of use.

Chosen Alternatives for Prototype:

- **Mobile:** Given its portability and widespread usage, mobile devices are the most convenient option for travelers. They allow users to easily access event information on the go and interact with the app effortlessly.
- **AR on Mobile:** Augmented Reality (AR) enhances user experience by providing an interactive way to engage with the city and people around them. This feature introduces an innovative layer to event discovery and social interaction.

Other Alternatives Not Chosen:

- **Smartwatch:** While smartwatches offer quick access to information, their small screen size makes it impractical for browsing and engaging with event details effectively.
- **Computer/Tablet:** Although these devices provide a larger screen and enhanced browsing experience, they are less practical for travelers who typically prefer lightweight and portable solutions.

Target Devices/Platforms:

- **Mobile:** Android and iOS platforms with a focus on native app integration.
- **AR on Mobile:** Augmented Reality (AR) features integrated into Android and iOS platforms, leveraging native capabilities to provide an interactive and immersive user experience.

4.2 Paper Prototypes

4.2.1 Prototype 1: Mobile

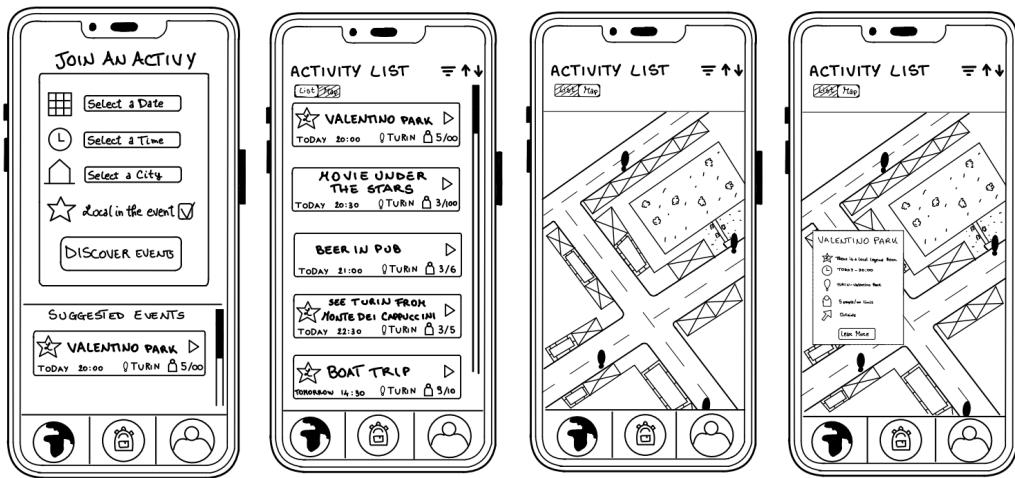


Figure 4.1: Discover events

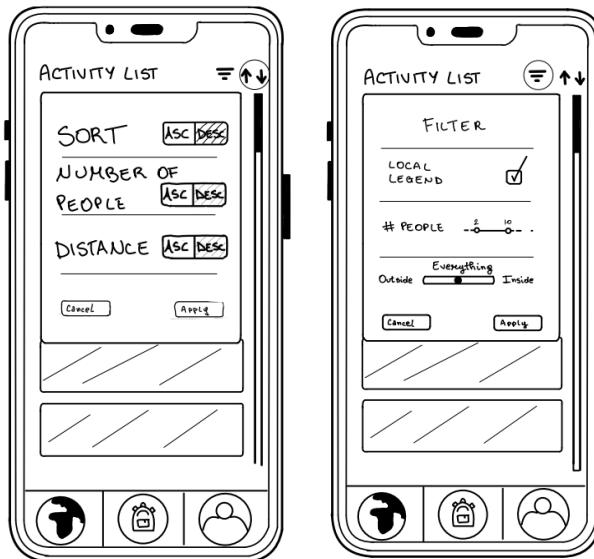


Figure 4.2: Filters

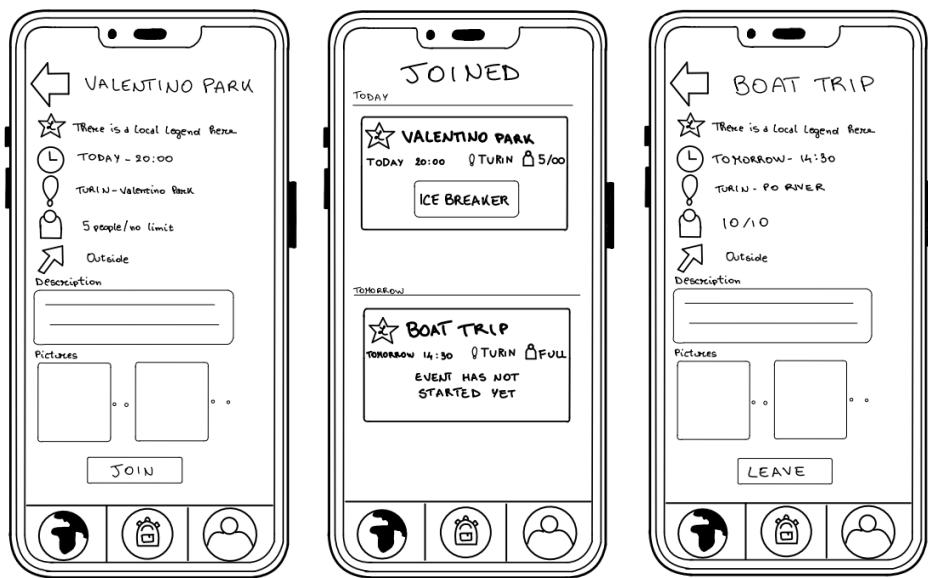


Figure 4.3: Joined Events



Figure 4.4: Icebreakers

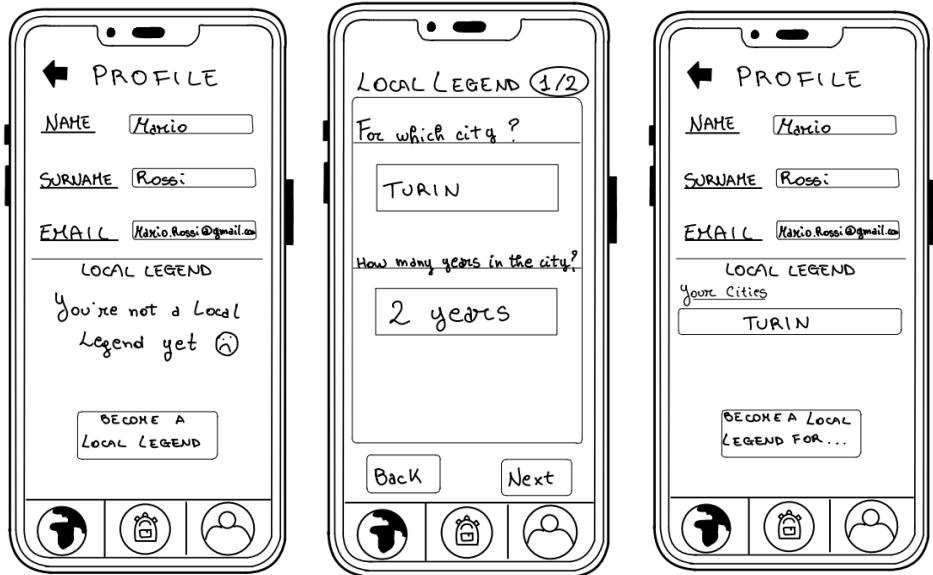


Figure 4.5: Profile and Local Legend



Figure 4.6: Become a Local Legend

Connection to Storyboard, Project Goal, and Tasks

This prototype directly connects to the storyboard and project goals by focusing on helping solo travelers discover and join local events to meet new people. It aims to provide an accessible and engaging platform where users can explore available activities, find events that match their interests, and connect with others through structured interactions. Additionally, the prototype introduces the concept of Local Legends—experienced individuals who facilitate social interactions and enhance the event experience—helping users feel more comfortable and engaged. **It supports the following tasks:**

- **Simple Task:** This is achieved by allowing users to easily browse also using an advanced filtering system and join suggested events within the app. The event list and map provide quick access to available activities, helping travelers find something to do effortlessly.
- **Moderate Task:** The app encourages social interaction by incorporating icebreaker activities within events. This feature helps users break initial social barriers, fostering conversations and connections among participants.
- **Complex Task:** The app allows users to become a Local Legend themselves. By completing a simple process, travelers can take on the role of a guide, facilitating social interactions for others while deepening their own engagement with the local culture.

By integrating these features, the prototype effectively supports solo travelers in overcoming social barriers and enhancing their overall experience through

structured activities and meaningful connections.

High-level flow



Figure 4.7: Flow diagram for the Mobile Prototype

4.2.2 Prototype 2: AR on Mobile

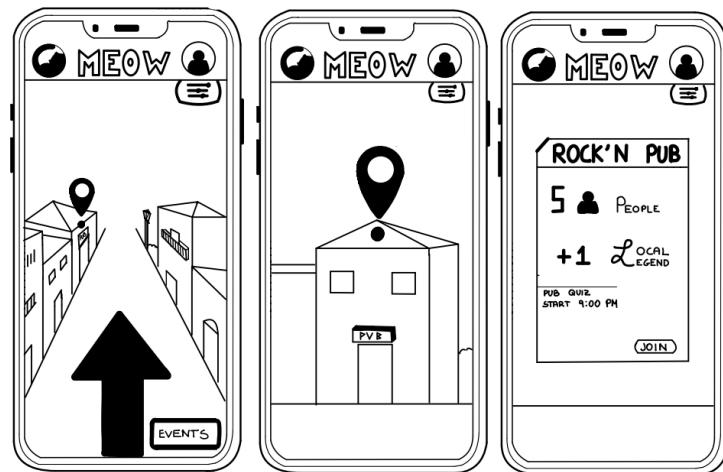


Figure 4.8: Discover events

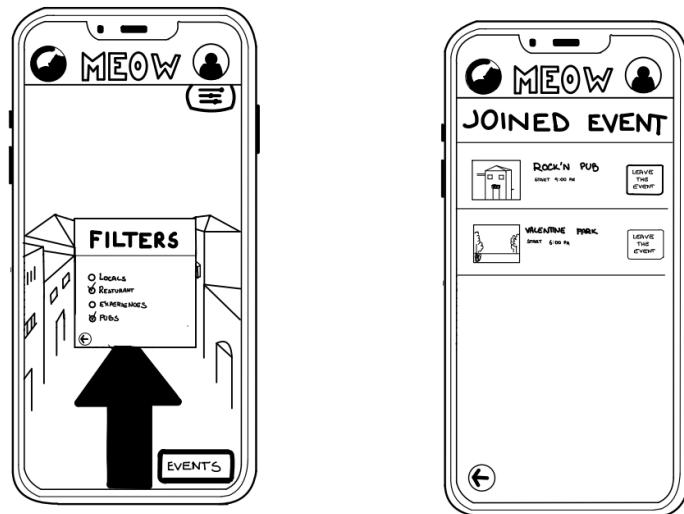


Figure 4.9: Joined events

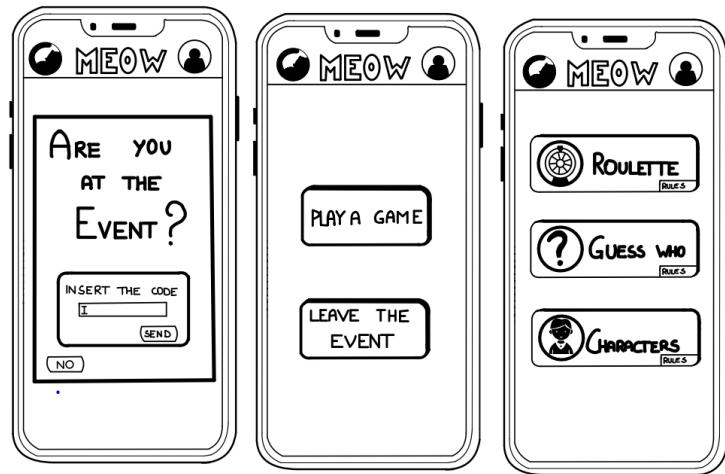


Figure 4.10: Icebreakers

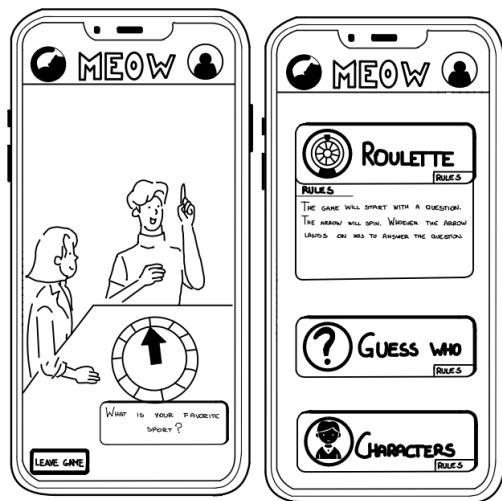


Figure 4.11: Play icebreakers

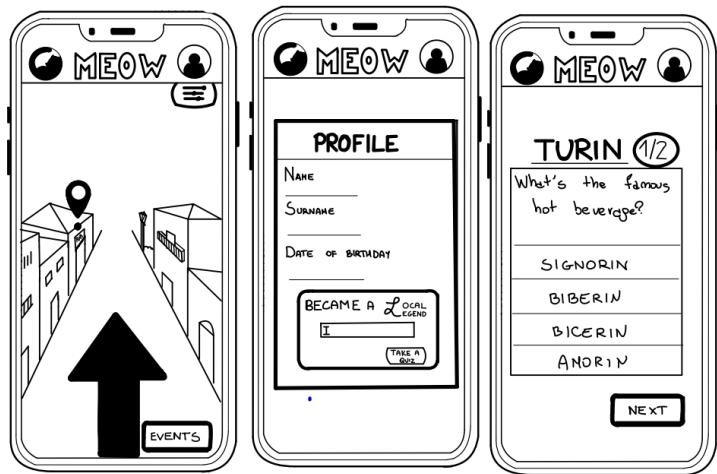


Figure 4.12: Profile

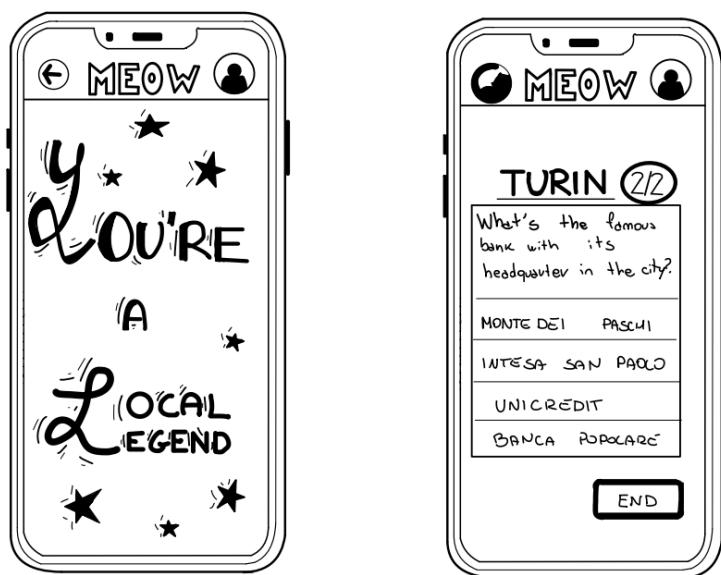


Figure 4.13: Local Legend

Connection to Storyboard, Project Goal, and Tasks

This augmented reality (AR) feature, unlike the original mobile app prototype, has been specifically designed to enhance real-time event discovery and engagement. Its goal is to assist solo travelers in finding and joining local events while fostering social interactions in an immersive and dynamic way. By leveraging AR technology, the application provides users with an interactive map and event details overlaid onto their surroundings, making the process of discovering activities more intuitive and engaging.

By focusing on real-time exploration, the AR integration allows users to seamlessly find nearby events, join activities, and participate in structured interactions that enhance their overall travel experience.

It supports the following tasks:

- **Simple Task:** This task is achieved by allowing users to easily browse and locate nearby events through the AR interface. Events are displayed directly on the user's surroundings, eliminating the need for extensive manual searching and making event discovery a seamless experience.
- **Moderate Task:** The AR feature facilitates social engagement by guiding users toward events and incorporating interactive icebreaker activities. These AR-enhanced icebreakers provide location-based challenges or interactive prompts that encourage users to explore their surroundings and engage with other participants, making interactions more dynamic and enjoyable.

- **Complex Task:** The AR application enables users to become Local Legends themselves by completing a guided process within the app. This process, similar to a quiz, ensures that users have sufficient knowledge of the area before taking on the role of a Local Legend, allowing them to facilitate interactions and provide valuable insights to other travelers.

By integrating these features, the AR prototype enhances solo travelers' experiences by making event discovery more interactive, social engagement more accessible, and personal involvement in the travel community more meaningful.

High-level flow

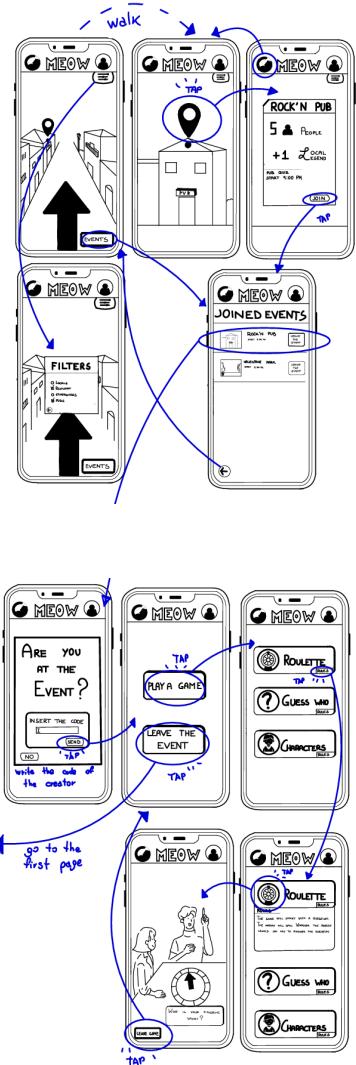


Figure 4.14: Flow diagram for the AR on Mobile Prototype

4.3 Heuristic evaluation

4.3.1 Preparation and Execution of the Evaluation

As a group, we conducted heuristic evaluation sessions on both prototypes to assess usability and identify any potential violations of usability principles. Our approach was structured to ensure comprehensive feedback and meaningful insights into user interactions.

Preparation Process:

- **Prototype Setup:** We ensured that both paper prototypes were prepared in a way that allowed evaluators to engage with them effectively. Each prototype was printed to realistically simulate the app's interface, enabling evaluators to interact physically with various elements such as buttons, menus, and screens. The setup aimed to create an experience as close as possible to using the actual app.
- **Role Assignment:** To facilitate the evaluation, team members were assigned specific roles:
 - One team member acted as the "computer," manipulating the prototype elements to simulate interaction.
 - Another served as the facilitator, providing evaluators with three tasks, the project solution and relevant contextual information.
- **Evaluator Recruitment:** We recruited 4 evaluators for Prototype 1 and 2 evaluators for Prototype 2, ensuring diverse perspectives.

Evaluators were briefed on the project solution, given an overview of the three tasks, and provided with context about the scenario. During the sessions, they carried out the tasks while taking notes on their experiences.

4.3.2 Evaluation Results

The heuristic evaluations provided valuable insights into the strengths and weaknesses of both prototypes, highlighting recurring usability issues and key areas for refinement. The feedback outlined distinct challenges in each version, helping to shape a clearer path toward an intuitive and seamless user experience

The evaluation of **Prototype 1** highlighted key usability challenges, mainly in system feedback, navigation, and interface consistency. Users often lacked clear feedback on their actions, such as missing indicators for applied filters, completed tasks, and active sections in the navigation bar. Navigation inefficiencies were another significant issue. Exiting certain screens was not intuitive, and users had no direct access to the activity list from the navigation bar, requiring unnecessary steps to browse events. Additionally, design inconsistencies further affected usability. Navigation arrows had inconsistent colors, sorting options on the map did not visibly change the map, and redundant elements like extra play buttons and excessive event details cluttered the interface. Overall, Prototype 1 needs improved system feedback, more intuitive navigation, and better interface consistency to create a smoother user experience

While the evaluation of **Prototype 2** revealed key usability issues, mainly

in navigation, system feedback, and error prevention. A major concern was the lack of navigation flexibility, with no back button available on multiple pages and limited control in the quiz section, making it difficult for users to return to previous screens or modify their inputs. Another frequent issue was unclear system feedback, leaving users uncertain about their status in tasks like becoming a Local Legend or event availability based on proximity. The "Joined Events" page also lacked real-time participant status, making it harder to decide whether to join an event. Error prevention and input validation were also problematic, as users were not alerted when entering incorrect confirmation codes, and no validation was applied when selecting a city in the Local Legend quiz. The absence of confirmation prompts for key actions, such as leaving a game or event, increased the risk of accidental choices. Additionally, inconsistencies in interface design contributed to usability challenges. Certain buttons, such as those for returning to the homepage or leaving an event, behaved differently across the app, leading to confusion. Some interactions, like the roulette game requiring users to hold their phone, were impractical for social settings. Overall, Prototype 2 requires improved navigation, real-time feedback, and better error handling to enhance usability and provide a more seamless experience.

4.3.3 List of violations

Prototype 1

1. H1 Visibility of system status (E1)

Where: Activity list (both map and list)

What: Filters that have been applied are not visible.

Why: Users need to be able to see the active filters to understand the current state of the system.

Severity: 3

2. H1 Visibility of system status (E1)

Where: Icebreaker game page (moderate task)

What: The game ends with no feedback message indicating completion.

Why: Users need to be informed when a task is completed.

Severity: 3

3. H1 Visibility of system status (E1 - E2)

Where: Bottom navbar

What: The active section in the navbar is not highlighted.

Why: Users need clear visual feedback on where they currently are within the app.

Severity: 3

4. H1 Visibility of System Status (E4)

Where: Bottom navigation icons

What: Icons lack accompanying text labels (e.g., "World," "Backpack," or "User") to indicate their purpose.

Why: Without text, users might struggle to understand the icons' functions, leading to usability issues.

Severity: 3

5. H2 Match Between System and Real World (E4)

Where: "Join Activity" page

What: The "Local Legend" checkbox is present on the main page instead of being limited to filtering options.

Why: Filtering controls are typically associated with search settings, not main interfaces, which can mislead users.

Severity: 2

6. H3 User Control and Freedom (E4)

Where: "You're [not] a local legend for [city]" screen

What: The bottom "Exit" or "Go Back to Profile" button should replace the top-right "X" to improve navigation.

Why: Users may find it confusing to use inconsistent methods to exit or navigate.

Severity: 2

7. H3 User Control and Freedom (E4)

Where: Accepting/Leaving an event

What: Missing confirmation message when a user accepts or leaves an event.

Why: Without a confirmation, users may make unintended changes without an option to review or cancel their actions.

Severity: 3

8. H3 User control and freedom (E1)

Where: Icebreaker game page

What: After a round ends, users must manually restart the game if they want to play another round.

Why: Users should be able to easily continue playing without having to manually restart the process. Returning to the pre-game page after the end of a round adds unnecessary steps.

Severity: 3

9. H3 User control and freedom (E1)

Where: Map page, event pop-up

What: The event pop-up on the map doesn't have a way to be closed.

Why: There's no way for the user to exit this state when they're done.

Severity: 3

10. H3 User Control and Freedom (E1)

Where: Navigation between activities

What: There is no direct access to the activity list from the navbar.

Users must go through the homepage form each time to view or search for activities.

Why: This creates unnecessary steps for users who may want to quickly review or book new events.

Severity: 3

11. H4 Consistency and Standards (E4)

Where: Navigation arrows

What: Inconsistent arrow colors (some are black, others white).

Why: Users expect consistent visual cues; deviations can cause confu-

sion and reduce interface clarity.

Severity: 2

12. H4 Consistency and standards (E1-E2)

Where: Map

What: Sorting options can be selected from the map, but they only affect the list of activities, with no visible changes on the map.

Why: The presence of a sorting icon on the map suggests that sorting will apply there as well. However, since no changes are visible, it creates confusion and misleads users into thinking the feature is broken or ineffective.

Severity: 3

13. H4 Consistency and standards — H8 Aesthetic and minimalist design (E1)

Where: Activity list page

What: Each activity banner includes a play button icon, despite the entire banner already being clickable.

Why: This creates confusion about where users should click to interact with the activity and introduces redundant elements.

Severity: 2

14. H5 Error prevention (E1 - E4)

Where: Activity page

What: There is no confirmation pop-up when users click "Join" or "Leave" an event.

Why: Lack of confirmation can lead to accidental actions because users might accidentally click the join/leave button without intending to.

Severity: 3

15. H7 Flexibility and efficiency of use (E3)

Where: Filtering event page

What: No way to filter events by type (e.g., cultural, adventure).

Why: Users cannot filter events according to specific interests, which would make it easier to find relevant activities. Currently, users can filter only by outdoor or indoor events and the number of people.

Severity: 2

16. H8 Aesthetic and minimalist design (E1)

Where: Activity list page

What: The activity list shows excessive information about each event without requiring the user to click on it.

Why: Presenting too much information without the need for user interaction complicates the interface and can overwhelm users.

Severity: 2

17. H8 Aesthetic and minimalist design (E1 - E4)

Where: Sorting in the activity list

What: Ascending/descending buttons appear unnecessarily next to the title "Sort", even though they are already placed beside each criterion.

Why: Placing redundant buttons next to the title adds unnecessary elements, reducing clarity of the interface and potentially confusing users.

Severity: 2

18. H8 Aesthetic and Minimalist Design (E4)

Where: Profile page

What: An unnecessary arrow is present, even though the bottom navigation icons already provide a way to go back.

Why: Redundant elements clutter the interface unnecessarily.

Severity: 2

Prototype 2

1. H1 Visibility of system status (E5)

Where: Profile Page (Task: Become a local for a city)

What: The score is missing, making it unclear if the user successfully becomes a "Local Legend."

Why: Users should be continuously informed of their current status in the system.

Severity: 2

2. H1 Visibility of system status (E5)

Where: Page where you choose which game to play (Task: Do an icebreaker activity)

What: It's unclear how to start a game due to the lack of a "Play"

button.

Why: The system should clearly indicate the next steps and available actions.

Severity: 2

3. H1 Visibility of system status (E5)

Where: Page Joined Events

What: Missing status of event.

Why: The user might want to decide which event to participate in based on the number of participants at that moment.

Severity: 3

4. H1 Visibility of system status (E6)

Where: Event selection screen.

What: There is no clear feedback about the proximity required to access the event, leaving users uncertain about whether the event is available to them.

Why: The lack of visibility regarding proximity creates confusion and prevents users from effectively planning their interaction with the event.

Severity: 3

5. H2 Match between system and the real world (E5)

Where: Home page

What: The “Home” button is unnecessary on the home page and unclear as being a “Home” button.

Why: Using a clearer label or icon would make the button more un-

derstandable and align with common conventions.

Severity: 2

6. H2 Match between system and the real world (E5, E6)

Where: Profile Page (Task: Become a local for a city)

What: “Became a local legend” is unclear in its purpose.

Why: The language should be more user-friendly and clearly describe the action or benefit associated.

Severity: 2

7. H3 User control and freedom (E5, E6)

Where: Page description of Event, Page Games, Page “Play Game / Leave the event,” Pages quiz

What: Missing “Back” button.

Why: Users should always have a clear option to go back.

Severity: 4

8. H3 User control and freedom (E5)

Where: Pages quiz

What: It’s not possible to navigate through questions.

Why: Users should be allowed to go back or modify their responses.

Severity: 3

9. H3 User control and freedom (E5)

Where: Page “Play Game / Leave the event”

What: If the user doesn’t want to play but also doesn’t want to leave the event, they are forced into a binary choice.

Why: Users should have more options, such as staying in the event without playing.

Severity: 2

10. H4 Consistency and standards (E5)

Where: Page of games

What: The “Rules” buttons are not clearly identifiable as buttons.

Why: Buttons should be designed to be easily distinguishable from other content.

Severity: 3

11. H4 Consistency and standards (E5)

Where: Page “Joined event”

What: The “Leave the event” button implies that the user is already in the event, yet it asks “Are you at the event?” afterward.

Why: This inconsistency in messaging can confuse users and make the system seem illogical.

Severity: 3

12. H4 Consistency and standards (E6)

Where: Final quiz screen.

What: The button to return to the homepage differs from similar buttons used for the same action elsewhere in the interface.

Why: Inconsistency in button design can disorient the user and create confusion.

Severity: 2

13. H5 Error prevention (E5)

Where: Page Game, Page “Joined event”, Page “Play Game /Leave the event”

What: There is no confirmation prompt when attempting to leave a game.

Why: Lack of confirmation prompt exposes users to unintentional errors.

Severity: 2

14. H5 Error prevention (E6)

Where: Quiz for becoming a Local Legend, at the city input step.

What: The user is required to input a city to start the quiz, but there is no list of available cities, and no validation to prevent incorrect or irrelevant entries.

Why: Without a list of predefined cities or input validation, users are allowed to enter any text, which can lead to incorrect or invalid city names, complicating the process and reducing the accuracy of the results.

Severity: 3

15. H7 Flexibility and efficiency of use (E6)

Where: After entering a code to confirm attendance at the event.

What: The buttons for ”play a game” and ”leave the event” do not clearly explain what happens when each option is selected.

Why: The lack of flexibility in offering a clear path for the different

states of the user affects usability.

Severity: 2

16. H7 Flexibility and efficiency of use (E6)

Where: Roulette game.

What: The game requires the phone to be held in hand to play, but this is neither practical nor efficient.

Why: This limits usability, especially in social settings where holding the phone may not be feasible.

Severity: 3

17. H8 Aesthetic and Minimalist Design (E6)

Where: Confirmation banner for event attendance.

What: The "No" button, which indicates not attending the event, is placed outside the confirmation box.

Why: The incorrect positioning of the button compromises clarity and the aesthetics of the design, confusing the user.

Severity: 3

18. H9 Help Users Recognize, Diagnose, and Recover from Errors (E6)

Where: Confirmation code entry screen.

What: There is no error banner or feedback when an incorrect code is entered.

Why: Without error messages, users cannot recognize that their input is invalid or understand how to correct the issue, leading to frustration

and a poor user experience.

Severity: 4

19. H10 Help and Documentation (E5, E6)

Where: Home page

What: Missing help button for use of the app.

Why: A manual could help the user to understand how to use the app.

Severity: 3

4.4 Selection

We have chosen to use the **mobile prototype (Prototype 1)** as it offers a more intuitive and user-friendly experience for completing tasks. However, recognizing the value of certain features from the AR prototype (Prototype 2), we have decided to integrate some of its functionalities into the selected version to enhance user engagement and interaction. One of the key integrations is a **confirmation system** for event attendance. When an event begins, the creator will receive a unique code that participants must enter to confirm their presence. This ensures greater accountability and improves event management within the app. Additionally, the **game selection** process has been improved. Instead of automatically launching a single ice-breaker activity when the event starts, pressing the "Icebreakers" button will now display a list of available games, allowing users to choose from multiple options. This modification increases flexibility and enhances the overall experience. We have also decided to merge the **quiz feature** from the AR

prototype with the existing quiz used for becoming a Local Legend. This integration maintains the original functionality while incorporating engaging elements from the AR version, making the experience more interactive and enjoyable. By incorporating these features, we aim to enhance the app's playfulness, user engagement, and social interaction, ensuring a more dynamic and immersive experience for users.

Chapter 5

Medium to High fidelity prototype

The two screens of the medium-fidelity prototype were created using Figma. These two screens are the most significant because they align directly with the app's core purpose:

- The **Map Page** motivates users to explore their surroundings and discover activities. The map serves as an interactive guide, encouraging active participation and engagement.
- The **Game List Page** enhances the user experience by offering a variety of games and activities, providing an engaging and playful way for users to interact with the app.

5.1 Fixed Violations

We addressed the following usability violations to improve functionality and user experience:

5.1.1 Fixed violations for Map Page

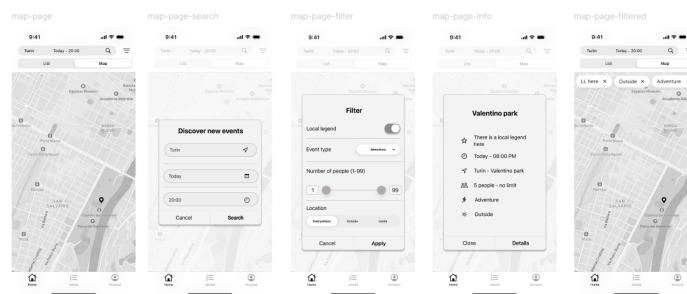


Figure 5.1: Caption

1. H1 Visibility of system status

Where: Activity list (both map and list)

What: Filters that have been applied are not visible.

Fix: Filters are now shown over the map

2. H1 Visibility of system status

Where: Bottom navbar

What: The active section in the navbar is not highlighted.

Fix: The active section in the navbar is highlighted

3. H1 Visibility of system status

Where: Bottom navigation icons

What: Icons lack accompanying text labels to indicate their purpose.

Fix: Icons have a label

4. H3 User control and freedom

Where: Map page, event pop-up

What: The event pop-up on the map doesn't have a way to be closed..

Fix: The event-popup on the map has a button to close and one to go to the details

5. H3 User control and freedom

Where: Navigation between activities

What: There is no direct access to the activity list from the navbar.

Fix: The HomePage now shows the events list or the map according to the segmented control above the page

6. H4 Consistency and standards

Where: Map

What: Sorting options can be selected from the map, but they only affect the list of activities, with no visible changes on the map.

Fix: The sort option has been removed because it was useless

7. H4 Consistency and standards and H8 Aesthetic and minimalist design

Where: Activity list page

What: Each activity banner includes a play button icon, despite the entire banner already being clickable..

Fix: The entire banner is clickable, we've removed the "play game" button

8. Flexibility and efficiency of use

Where: filtering event page

What: No way to filter events by type

Fix: The possibility to filter events by type has been added in the filter module

5.1.2 Fixed violations for Game list

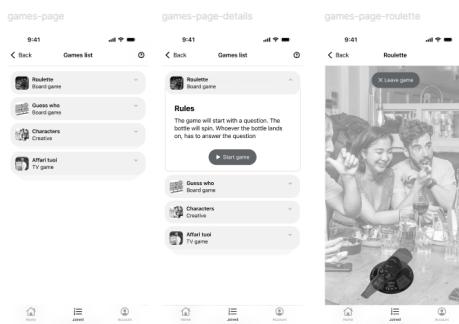


Figure 5.2: Caption

On the Game List page, we integrated the most effective functionalities from the second prototype and addressed several minor issues across both prototypes. Specifically, we incorporated the improvement from the second prototype, which featured a list of icebreaker games instead of just a single game. This enhancement provides users with greater variety and flexibility, improving their overall experience.

- Fixes on Mobile prototype

1. H1 Visibility of system status

Where: Bottom navbar

What: The active section in the navbar is not highlighted.

Fix: The active section in the navbar is highlighted

2. H1 Visibility of system status

Where: Bottom navigation icons

What: Icons lack accompanying text labels to indicate their purpose.

Fix: Icons have a label

- Fixes on Mobile with AR prototype

1. H1 Visibility of system status

Where: Page where you choose which game to play

What: It's unclear how to start a game due to the lack of a "Play" button.

Fix: Added a play button to start the icebreaker

2. H4 Consistency and standards

Where: Page of games

What: The "Rules" buttons are not clearly identifiable as buttons.

Fix: An arrow is showed on each box

These improvements enhance the usability, accessibility, and reliability of

both the Map and Game Pages, ensuring that users can seamlessly explore new places and engage with local activities without encountering confusion or errors. The updated versions of these two key screens can be accessed via the public link: <https://www.figma.com/design/1HE7wcEhvrxW1zbDDHWrK/>

5.2 Plan for the hi-fi Prototype

The plan for the high-fidelity prototype is to sketch a paper prototype incorporating the improvements made to the chosen prototype and then start its implementation. The main violations have been addressed and are now corrected in the screens shown above. The unresolved violations are as follows:

1. H1 Visibility of system status

Where: Icebreaker game page (moderate task)

What: The game ends with no feedback message indicating completion.

Why: Users need to be informed when a task is completed.

Severity: 3

Solution: We will add pop-ups for necessary confirmations and feedback.

2. H3 User Control and Freedom

Where: Accepting/Leaving an event

What: Missing confirmation message when a user accepts or leaves an event.

Why: Without a confirmation, users may make unintended changes

without an option to review or cancel their actions.

Severity: 3

Solution: We will add pop-ups for necessary confirmations and feedback.

3. H5 Error prevention

Where: Activity page

What: There is no confirmation pop-up when users click "Join" or "Leave" an event.

Why: Lack of confirmation can lead to accidental actions because users might accidentally click the join/leave button without intending to.

Severity: 3

Solution: We will add pop-ups for necessary confirmations and feedback.

4. H2 Match Between System and Real World

Where: "Join Activity" page

What: The "Local Legend" checkbox is present on the main page instead of being limited to filtering options.

Why: Filtering controls are typically associated with search settings, not main interfaces, which can mislead users.

Severity: 2

Solution: We will leave the Local Legend selection only as a filter

5. H3 User Control and Freedom

Where: "You're [not] a local legend for [city]" screen

What: The bottom "Exit" or "Go Back to Profile" button should replace the top-right "X" to improve navigation.

Why: Users may find it confusing to use inconsistent methods to exit or navigate.

Severity: 2

Solution: We will replace the "x" button with a more appropriate and intuitive labeled button.

6. H4 Consistency and Standards

Where: Navigation arrows

What: Inconsistent arrow colors (some are black, others white).

Why: Users expect consistent visual cues; deviations can cause confusion and reduce interface clarity.

Severity: 2

Solution: We'll make arrows more consistent

7. H8 Aesthetic and minimalist design

Where: Activity list page

What: The activity list shows excessive information about each event without requiring the user to click on it.

Why: Presenting too much information without the need for user interaction complicates the interface and can overwhelm users.

Severity: 2

Solution: We'll remove some informations as the number of people

8. H8 Aesthetic and minimalist design

Where: Sorting in the activity list

What: Ascending/descending buttons appear unnecessarily next to the title "Sort", even though they are already placed beside each criterion.

Why: Placing redundant buttons next to the title adds unnecessary elements, reducing clarity of the interface and potentially confusing users.

Severity: 2

Solution: We will remove the sort feature entirely because useless.

9. H8 Aesthetic and Minimalist Design

Where: Profile page

What: An unnecessary arrow is present, even though the bottom navigation icons already provide a way to go back.

Why: Redundant elements clutter the interface unnecessarily.

Severity: 2

Solution: We'll remove the arrow from Profile page.

10. H3 User control and freedom

Where: Icebreaker game page

What: After a round ends, users must manually restart the game if they want to play another round.

Why: Users should be able to easily continue playing without having to manually restart the process. Returning to the pre-game page after

the end of a round adds unnecessary steps.

Severity: 3

Solution: Depending on the game, the user will play multiple rounds without exit the game.

Chapter 6

Implementation - High fidelity prototype

The mobile application was developed using React native with Expo, the code for the application can be found on GitHub at the following link:
<https://github.com/polito-hci-2024/meow>.

6.1 Tool, frameworks and libraries

We developed the application using React Native with Expo Go. React Native was chosen because it allows efficient cross-platform development, enabling the creation of a single codebase that runs on both Android and iOS. We used Expo Go because it simplifies the development process by providing a quick way to test the application on real devices without requiring additional setup for native builds. To improve coordination and task management, we used YouTrack. This tool was chosen because it provides an

intuitive interface for tracking issues, managing tasks and maintaining clear communication within the team.

We used several libraries:

- **expo-router:** A file-based routing library for Expo apps, simplifying navigation management.
- **react:** The core library for building composable user interfaces in JavaScript. Essential for any React-based app.
- **react-native:** A framework that allows you to build native mobile applications using JavaScript and React.
- **react-native-maps:** Provides components for integrating maps (Google Maps on Android, Apple Maps on iOS) into React Native applications.
- **react-native-segmented-control/segmented-control:** A segmented control component (tab switch-like UI) for React Native, useful for selecting between multiple options.
- **react-native-map-clustering:** Enhances react-native-maps by enabling marker clustering, improving performance when handling multiple map markers.
- **react-navigation/native:** The core library for navigation in React Native apps, providing a flexible way to manage screens and routes.
- **expo-font:** Helps with loading and using custom fonts in an Expo application.

- **expo-splash-screen:** Manages the splash screen of an Expo app, allowing better control over its display timing.
- **expo-status-bar:** A simple way to customize and control the device's status bar in an Expo app.
- **react-native-reanimated:** A powerful library for smooth and performant animations in React Native applications.
- **expo-sqlite:** Provides an SQLite database for local storage in Expo apps, useful for offline data persistence.
- **react-native-picker/picker:** A customizable picker (dropdown selector) component for React Native applications.
- **react-native-community/slider:** A slider component for selecting values in a range, such as volume or brightness control.
- **react-native-community/datetimepicker:** A date and time picker component for React Native, offering a native-like selection experience.

6.2 Design choices and changes applied to the prototype

Some changes were made to the prototype that were aimed at further improving the user experience, enhancing design consistency, and refining functionality, without being directly related to addressing violations.

- Added “**Starting from**” in the date field of the search popup (Discover new event) to clarify to the user that the events displayed after the search will be those starting from the selected date, not just on the selected date.
- Used a **single slider** to select the number of people in the filter popup due to compatibility issues with components that implemented range sliders.
- Unified the design by making the location field inside the popup the same as the event type field.
- Changed the event page layout (using cards) to fill the entire page. The button was also turned into a clickable card, distinguishable by its color (red/blue depending on whether the user is joined to the event or not).
- Added the ability to get directions to the event location in the event page by opening Google Maps.
- Added an **FAQ button** on the home screen to address any doubts for first-time users of the app.
- In the joined events page, added a **LEAVE button** if the event hasn’t started yet.
- Modified the profile page layout (matching the event-specific page design) to fill the page, adding the number of completed events, events created, and taralli earned.

- To become a Local Legend, only the city is selected, without entering the number of years spent in the city, as in the previous prototype.
- Added a **progress bar** when taking the quiz to become a Local Legend.
- Added an **indicator of the round** when the user plays an ice-breaker.

6.3 Screens of the prototype

Below are some of the most significant screenshots of the high-fidelity prototype, showing the evolution and improvements made to the user interface and user experience based on feedback and testing. Each image is accompanied by a description of the specific design choices and changes implemented.

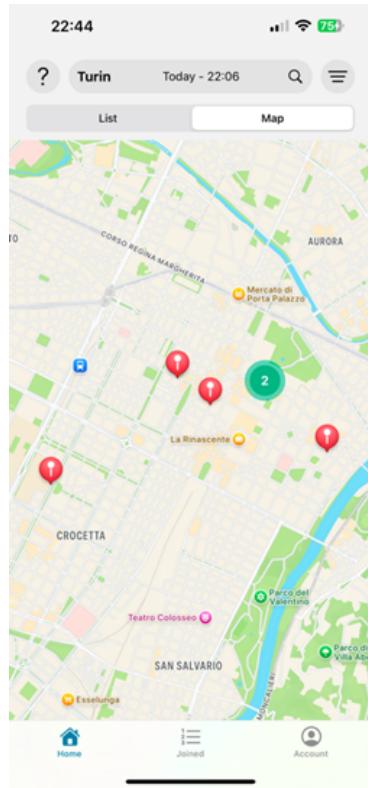


Figure 6.1: Clustered Events on Map

Clusters were added for better visibility in case there are events that are very close to each other and overlap, or if there are multiple events at the same location. This improvement addresses the issue of map clutter and ensures users can easily distinguish between events in high-density areas.

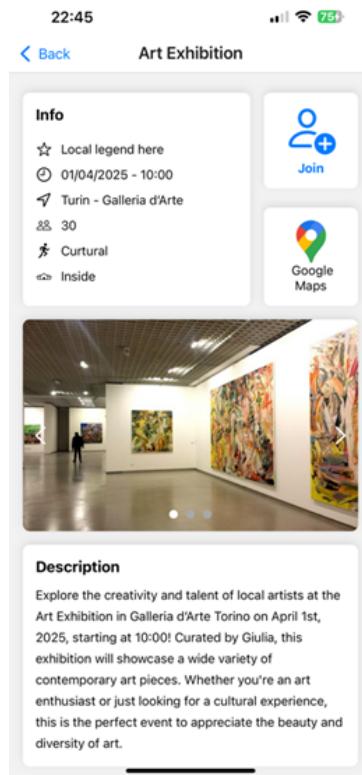


Figure 6.2: Event Details Page with Google Maps Button

The event page design was made more engaging through the use of cards. Additionally, a button was added to open Google Maps for directions to the event location. This feature improves the usability by reducing the effort needed to navigate to an event.

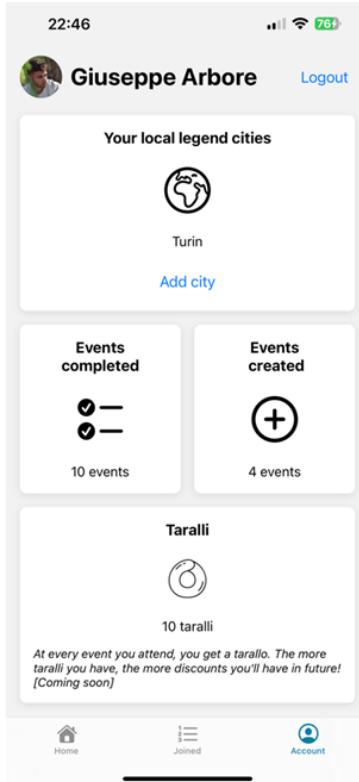


Figure 6.3: Profile Page with Achievements

The profile page was redesigned to create a more engaging and user-friendly experience, featuring a modern card-based layout. This updated design prominently displays key user metrics, including the number of completed events, created events, and the total 'taralli' earned. The introduction of 'taralli' is part of our app's gamification strategy—designed to reward user participation and foster continued engagement. Each time a user successfully participates in a joined event, they earn a 'tarallo,' providing a tangible sense of achievement and encouraging users to remain active within the platform.

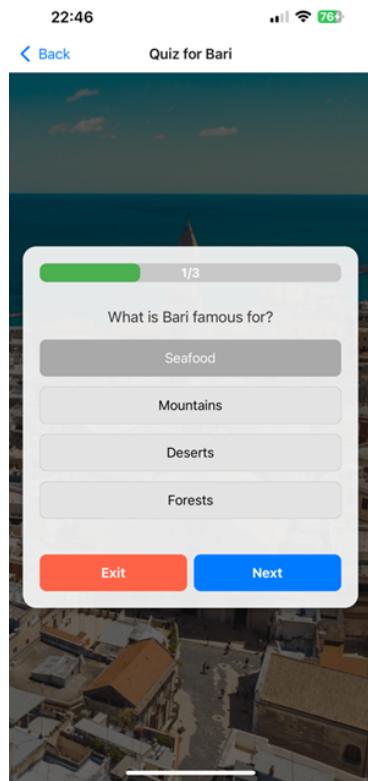


Figure 6.4: Quiz Progress Indicator

In the quiz section (**Complex Task: Become a “Local Legend” for a selected city**), a progress bar was added to make the meaning of the question indicator (e.g., 1/3 in the screenshot) clearer. This enhancement aligns with usability guidelines regarding user progress visibility, improving the overall experience during multi-step tasks.

Below are screenshots showing the fixes already implemented in the Medium to High-Fidelity Prototype, now integrated into the High-Fidelity Prototype.

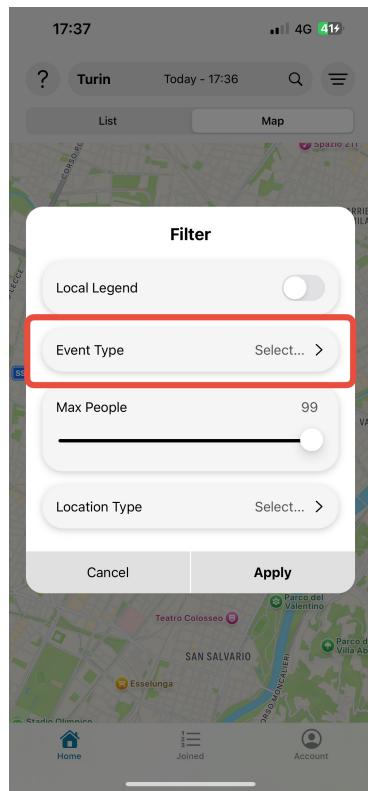


Figure 6.5: Filters on Map

Filters are now displayed over the map (Violation 1), and an option to filter events by type has been added to the filter module (Violation 15). Users can now filter events based on the presence of a Local Legend (**Simple Task: Discover an event attended by a “Local Legend” in the place you’re travelling to**), the event type, the number of participants, and the event location. This adjustment improves the usability of the map view and enhances the user’s ability to find specific event types.

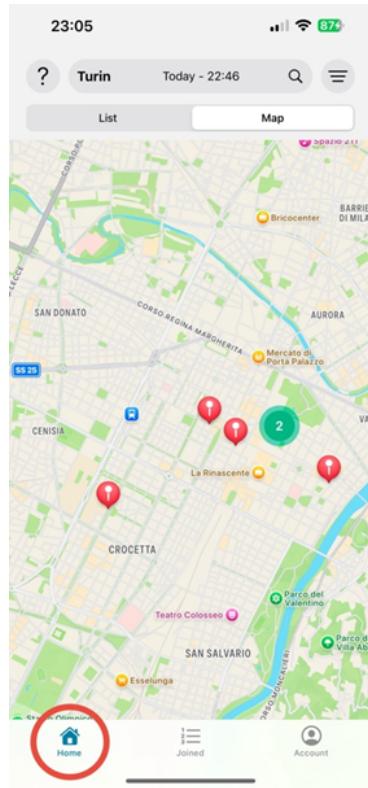


Figure 6.6: Navbar with Active Section Highlighted

The active section in the navigation bar is now highlighted (Violation 3), and icons are accompanied by labels (Violation 4). These changes increase navigability and reduce cognitive load, especially for new users.

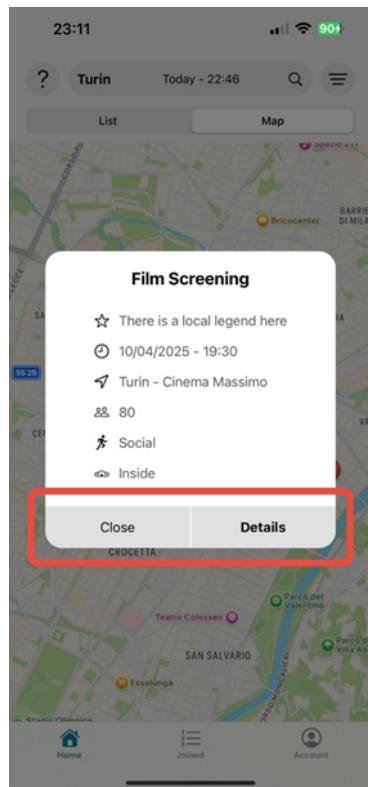


Figure 6.7: Event Popup on Map

The event popup on the map now includes a button to close it and another button to navigate to the event details page (Violation 9). This change improves the user's control over popups and enhances the information discovery process.

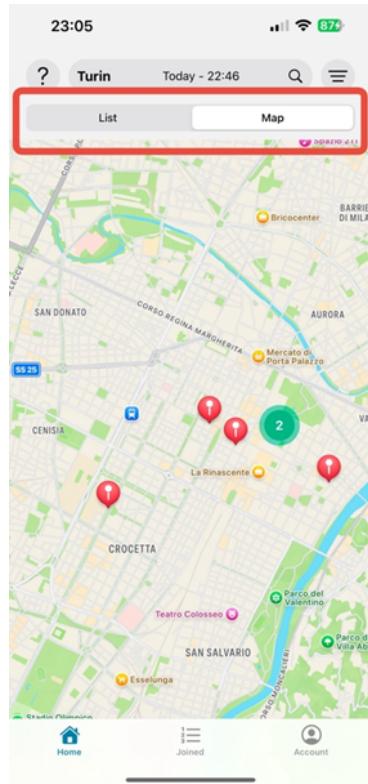


Figure 6.8: Homepage with Segmented Control

The homepage now offers a segmented control that allows users to switch between an events list and a map view (Violation 10). This dual view approach caters to different user preferences and context-specific needs.

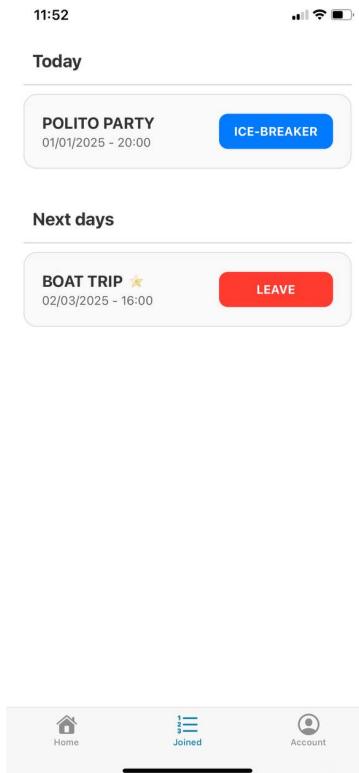


Figure 6.9: Homepage with Segmented Control

The image displays the list of joined events, with a specific focus on an ongoing event where the user can directly start an IceBreaker game. Notably, this represents a shift from what was planned in the low-fidelity prototype. Initially, users were required to confirm their presence upon arrival at an event to officially join it. However, this step was removed as it proved to be ineffective and introduced awkwardness upon arrival. In the current approach, once a user joins an event and the event starts, they can immediately access and play the IceBreaker game without any additional confirmation. This streamlining enhances the user experience and fosters a smoother transition into event participation.

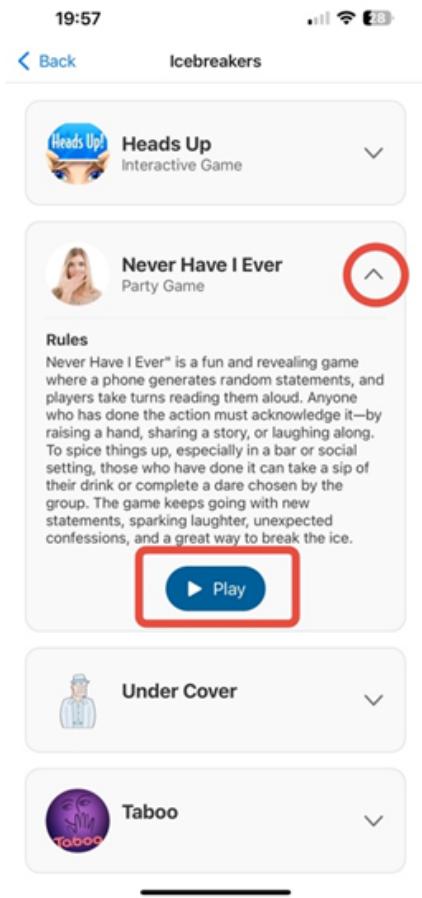


Figure 6.10: Icebreaker Start Button and Arrows



Figure 6.11: Gameplay Adjustment

(Moderate Task: Complete an ice breaker activity during the event you're attending) An interactive play button was added to start the ice-breaker (Violation 2), and arrows were added to each box to indicate navigability (Violation 10). These adjustments contribute to a more intuitive user experience. The screen on the right reflects the improvement related to violation 8. The user is now allowed to play multiple rounds without exiting the game. This modification prevents the interruption of the game flow, aligning better with user expectations and reducing friction during gameplay.

6.4 Standard and Constraints

In implementing the design of the high fidelity prototype key standards and constraints of iOS devices were followed:

1. Navigation and layout

- **Tab bar navigation:** A bottom tab bar is used, following iOS Human Interface Guidelines, providing quick access to different sections (Home, Joined, Account).
- **Back navigation:** A "Back" button is placed on the top-left corner in secondary screens, which is a standard iOS navigation pattern.

2. Typography and readability

- **Consistent Spacing and Alignment:** The interface follows Apple's recommended spacing, padding, and element alignment to maintain a clean and readable UI.
- **San Francisco font:** The app seems to follow Apple's default font for iOS apps, ensuring better readability and consistency
- **Hierarchical Text Size:** Larger fonts for headings (e.g., event title) and smaller, legible fonts for details.

3. Buttons and interactive elements

- **Rounded Buttons:** Buttons such as "Cancel" and "Apply" use rounded corners, which align with Apple's Human Interface

Guidelines.

- **Clear tap targets:** Buttons and icons maintain adequate size and spacing to be easily tappable, improving usability.

4. Filters and selection

- **Toggle switches and sliders:** Standard iOS UI components are used for filters (e.g., event type selection and participant limit slider).
- **Modal Popups for Filtering:** Instead of a separate screen, filtering options appear as an overlay (modal), ensuring a seamless experience.

6.5 Hard-coded and limitations

Although the prototype successfully showcases the core functionality, it still contains certain limitations and relies on hard-coded elements:

- **Users and data:** the prototype is based on a predefined set of user accounts and events. The database is pre-populated and there is not the possibility to add events using the app.
- **Cities:** only two cities are available now (Turin and Bari).
- **Search Bar:** there is no possibility to search a city but you can only select between the two available cities for now. Furthermore, we used "starting from" for the date selection so you cannot select a date range. Same for hours.

- **Data Syncronizzation:** While the changes done using the app (like joining an event or become a local legend for a city) are saved on the device that you are using at that time, there is no syncronizzazione between different devices.
- **Taralli:** The "Taralli" (our rewards for event partecipation) are fully hard-coded for now.
- **Faq:** The user can only read the Faq but if he doesn't find what he/she is searching, he/she cannot open a new question.
- **Navigation to the event:** the navigation system is provided externally by Google Maps and not internally within the app.

These limitations highlight specific areas for potential improvement and expansion in future.

Chapter 7

Usability testing

7.1 Evaluation conducted

The usability evaluations were conducted in Torino to assess the overall effectiveness, intuitiveness, and user experience of the app. The goal was to identify potential usability issues, measure how easily users could complete key tasks, and gather feedback to refine the interface and interactions.

During the evaluation, participants were asked to perform specific tasks within the app. Their interactions were observed to identify difficulties, inefficiencies, and points of confusion.

This process provided valuable insights into how users interact with the app in real-world scenarios, helping to shape improvements that enhance usability and engagement.

7.1.1 Participants

The participants in this evaluation were selected based on the following criteria:

- **Age:** 19-30 years old
- **Expertise with the Meow App:** None (zero familiarity)
- **Usage of Mobile Apps:** Participants use smartphones and apps regularly (at least every day)
- **English Level:** Basic
- **How often they travel:** at least 5 times a year

The participants were as follows:

- **Participant 1:** 19 years old, Italian, high school student.
- **Participant 2:** 25 years old, Italian, barman.
- **Participant 3:** 23 years old, Italian, Politecnico student.
- **Participant 4:** 23 years old, Italian, mechatronics engineer

Tests were conducted at Politecnico di Torino and at a private home.

7.1.2 Team member role

During the evaluation process, all four team members alternated between different roles to gain a well-rounded perspective on the user experience.

This approach ensured that each aspect of the evaluation was thoroughly understood from multiple viewpoints. The roles assigned were:

- **Facilitator:** One team member guided the participants through the tasks, offering instructions and ensuring the evaluation process proceeded smoothly.
- **Observers:** Two members were tasked with closely monitoring participant interactions, noting any difficulties, behaviors, and engagement with the app.

This collaborative approach allowed for a deeper and more nuanced evaluation, ensuring that usability issues and user experiences were thoroughly examined from different perspectives.

7.1.3 Tasks

#	Text of the Task	Success Criteria	Methodology
T1	See the details of the Turin event "Art Exhibition"	The user successfully navigates to the event page and views details like time, location, and description.	Think Aloud
T2	Read the FAQ of the application	The user can locate the FAQ section and correctly identify relevant answers to a sample question.	Think Aloud
T3	Join an indoor event with local participants	The user finds the event using filters and registers for the event.	Think Aloud
T4	Check the starting hour for the event near the Po	The user finds the event using the map and identifies the starting hour from the event details.	Think Aloud
T5	Join an event in Bari for tomorrow	The user discovers and navigates to information about events happening in Bari.	Think Aloud
T6	Leave the "Karaoke" event	The user successfully exits the event.	Think Aloud

T7	Obtain the certification as an expert user for Bari	The user completes all required steps to earn the certification and views confirmation in their profile.	Think Aloud
T8	Start an ice-breaker activity for an event happening today	The user initiates the ice-breaker activity and completes the activity.	Think Aloud

Table 7.1: Usability Testing Tasks

The **Think-Aloud** method was selected to gather real-time user feedback, prioritizing insights into user experience and interaction flow rather than focusing solely on task completion speed. Critical/non-critical errors for each task:

- T1: See the details of the Turin event "Art Exhibition"
 - **Critical Errors:** The participant fails to locate the event page or cannot access event details.
 - **Non-Critical Errors:** The participant struggles to find specific event details like time or location.
- T2: Read the FAQ of the application
 - **Critical Errors:** The participant is unable to find the FAQ section.

- **Non-Critical Errors:** The participant struggles to understand the answers.
- T3: Join an indoor event with local participants
 - **Critical Errors:** The participant cannot find or apply filters to locate the event.
 - **Non-Critical Errors:** The participant struggles with the registration process or misinterprets event categories.
- T4: Check the starting hour for the event near the Po
 - **Critical Errors:** The participant fails to find the event's start time.
 - **Non-Critical Errors:** The participant confuses event details, requiring multiple attempts to find the information.
- T5: Join an event in Bari for tomorrow
 - **Critical Errors:** The participant is unable to find or register for an event in Bari.
 - **Non-Critical Errors:** The participant struggles with navigation and requires extra time to complete the task.
- T6: Leave the "Karaoke" event
 - **Critical Errors:** The participant cannot find the option to leave the event.

- **Non-Critical Errors:** The participant hesitates before confirming the action or misunderstands the exit process.
- T7: Obtain the certification as an expert user for Bari
 - **Critical Errors:** The participant is unable to complete the certification process.
 - **Non-Critical Errors:** The participant misunderstands a step in the process but eventually completes the task.
- T8: Start an ice-breaker activity for an event happening today
 - **Critical Errors:** The participant cannot initiate the ice-breaker activity.
 - **Non-Critical Errors:** The participant struggles to select a game or understand how the activity works.

7.1.4 Metrics

We employed the System Usability Scale (SUS), a well-established and widely used post-test questionnaire. The SUS was selected for its ease of use, efficiency, and cost-effectiveness, making it a suitable choice for our study. Since our evaluation did not require an in-depth workload assessment, the SUS served as a reliable tool for measuring user satisfaction and overall system usability.

Based on the participants' ratings:

- Participants 1: 87.5

- Participants 2: 90
- Participants 3: 92.5
- Participants 4: 85

The average SUS score was calculated to be 88.25% which indicates excellent usability based on the industry-standard interpretation of SUS scores.

Out of 32 tasks, all were successfully completed without any critical errors, resulting in a 100% task success rate. Only minor non-critical errors were observed, primarily involving some initial difficulty in applying filters and locating the correct page. These minor struggles did not impact task completion, further reinforcing the system's overall usability and effectiveness.

Link to the PDF containing the usability testing protocol: <https://github.com/polito-hci-2024/I-Tarallucci/blob/main/A5/Usability%20Testing%20-%20MEOW.md>

7.2 Usability Testing Photos



Figure 7.1: Photos during usability testing

7.3 Insights and Learnings from the Prototype

The usability testing provided valuable insights into the effectiveness of the prototype and identified areas for potential improvement. Overall, the results were positive, with participants successfully completing all tasks and

finding the app intuitive and easy to navigate. This confirms that the prototype is generally user-friendly and efficient in facilitating event discovery and participation.

While the app demonstrated strong usability, a few usability issues emerged that could enhance the user experience if addressed:

1. **Icebreaker Button Recognition:** Some participants did not immediately recognize the button for starting icebreaker activities. A more prominent design or clearer labeling could improve visibility and ease of access.
2. **Event Participation Transparency:** Users expressed interest in seeing real-time data on the number of people who have actually joined an event, rather than just the number of total registrations. Adding this information could enhance decision-making and engagement.
3. **Quick Join Option:** Participants wanted the ability to join an event directly from the preview screen, without needing to open the event details page. Implementing a "Join Now" option from the event preview could streamline the process and improve efficiency.

Addressing these minor usability concerns would further enhance the overall experience, making it easier and more engaging for users to discover and participate in events.

7.4 Suggested Adjustments and Future Additions

7.4.1 Adjustments

Based on the insights gained from usability testing, several refinements have been identified to improve the overall user experience:

- **Enhanced Icebreaker Accessibility:** To improve recognition of the icebreaker feature, an intuitive icon will be added alongside the existing button to make it more noticeable and easily identifiable.
- **Real-Time Participant Count:** To enhance event participation transparency, an additional section will be included in the event details page displaying the number of users who have actually joined the event in real time.
- **Quick Join Feature:** A new "Join Now" button will be integrated into the event preview screen, allowing users to join an event without needing to navigate to the detailed event page. This will streamline the process and improve usability.

7.4.2 Future Additions

Beyond usability refinements, we are also considering expanding the app's features to enhance engagement and interactivity:

- **Expanded Icebreaker Games:** We plan to introduce a wider variety of icebreaker games to provide more engaging and diverse social interaction options for participants.
- **Reward System for Engagement:** A reward system will be introduced, allowing users to achieve specific milestones and earn rewards upon reaching a certain number of "taralli." These rewards may include discounts or other incentives, encouraging continued engagement and participation within the app.

These planned adjustments and future enhancements aim to improve user engagement, making the platform more interactive and rewarding for participants.

Chapter 8

Conclusions

During this semester, we gained a comprehensive understanding of the complexity involved in developing an application, realizing that it is a multi-stage process that requires careful planning and continuous adaptation. It all begins with researching user needs—an essential step to ensure the solution addresses real challenges faced by the target audience. Throughout our work, we discovered how crucial it is to embrace change, especially when building and testing intermediate prototypes. User feedback often revealed that some features did not work as intended, requiring us to make adjustments. This iterative approach allowed us to refine our platform and improve its usability, teaching us the importance of flexibility in meeting user expectations.

Working on a solution for solo travelers made us aware of a key insight: people traveling alone often struggle to fill their free time beyond basic sightseeing. Many desire companionship or seek to share experiences with others, but finding like-minded individuals can be difficult. We realized how social

connections can enhance a travel experience, making exploring a city, dining, or discovering hidden gems more enjoyable when done together. This understanding shaped our vision for the app, which aims to connect solo travelers in the same area and help them meet up, socialize, and enrich their journeys.

Additionally, this project offered us our first hands-on experience with native programming, enabling us to bring our concept to life in a tangible way. It was rewarding to see our initial ideas gradually transform into a functional platform that could genuinely improve the travel experiences of others.

We strived to ensure that work was evenly distributed among all group members, giving each of us the chance to contribute across different aspects of development and acquire new skills. During the semester, all four of us had to be away from Turin at different times for personal reasons. However, we maintained a collaborative spirit throughout, staying connected and ensuring that progress continued despite physical absences. Most of our work sessions were conducted in person, which significantly boosted our teamwork and efficiency. Even when apart, we communicated regularly and ensured that every task was completed on time.

Ultimately, we are proud of what we achieved. We not only built a platform that addresses a genuine need among solo travelers but also gained invaluable experience in app development, teamwork, and problem-solving. This journey has equipped us with both technical skills and a deeper understanding of how digital solutions can enhance human connections and enrich travel experiences.

Appendix A

Link

Interviews

Interviews consent forms

Storyboard

Paper prototypes

Figma prototypes

Usability consent forms

Usability Sus questionaries

Usability testing protocol

Meow app source code