

Final Report - EZGuyz

SpaceCom

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Project abstract

“SpaceCom” is a conjunctional abbreviation of the two words “Space” and “Community”. With “Space”, our team intends to provide an area with all the necessary information that will help international students in their integration process. With “Community”, we plan on building a bridge between international students and their new societies in hopes of unifying the diversity in a community into a single one.

In this project, the team members tackle the concurrent problem of having sparse information over different platforms that may render new incomers confused over credibility, availability and authentication of these informations, and in order to solve this inquiry, we present, in this report, a centralized platform that includes: groups, events, help, gatherings and other useful tools for easing the integration process of internationals.

Needfinding

The domain of interests

Based on our experience as off-site and foreign students, we realized that the process of integrating into a new community is usually not an easy task: during our academic path, we talked with many foreign and relocated students, which shared with us a set of common problems, ranging from the difficulty of finding an accommodation in the new country to the lack of knowledge about events and opportunities where it's possible to know new people and make new friends. Hence, we have opted to study the process of integration for newly incomers into new communities.

First round of interviews

In the first round of interviews, we selected a set of students and workers that relocated into a different city, either abroad or in the same country, to seek better job and study opportunities. We also selected, as an extreme user, a student that attended his whole academic path in Turin while always being in contact with foreign students. During the interviews, we focused on the process of adapting to a new routine and facing the change of culture by getting to dabble into a new one. We also wanted to extract common needs from people coming from different backgrounds.

The majority of the interviews were carried remotely, via Google Meet, and this due to the participants living abroad or in another city. All the interviews were audio recorded with a mobile device. Participants have shown their consent of being interviewed through a paper that they signed prior to holding the interview.

Each interview has been conducted by 2 team members: an interviewer, who managed the flow of the interview by asking questions, and a writer who took notes about the answers of the interviewee.

In the first round of interviews, we selected the following participants:

- **Mario Mastrandrea** - An Italian computer science student who is part of the Erasmus program in Iowa, United States.
 - *Interviewer: Francesco Rosati*
 - *Writer: Giuseppe Lazzara*
 - *Key quotes:*
 - *"I wanted to have many experiences, integrate into a different culture, learn English also for the workplace and change habits. This allows you to appreciate what you have, what is in a different context and what is better for you and what not"*
 - *"In America you have a linguistic and cultural barrier. It is more difficult to get in touch with the locals above all and settle in at the same time"*
- **Hanane Chami** - A Libanese computer science student who permanently moved in Paris, France, to seek better career and job opportunities
 - *Interviewer: Peter ALHachem*
 - *Writer: Simone Paniati*
 - *Key quotes:*
 - *"I moved not because of the way I worked and not because I couldn't find anything in the place where I was, but because of the kind of experience I would have had"*
 - *"It wasn't easy to meet new people because of lack of opportunities"*
- **Federica Franco** - An Italian worker who decided to intra-move in the small city of Conegliano, Veneto. She is looking for new experiences, better job opportunities and a change in her lifestyle
 - *Interviewer: Simone Paniati*
 - *Writer: Francesco Rosati*
 - *Key quotes:*
 - *"It is hard to reach stability at first because as a foreigner you have a lot of paperwork to do and no one helps you to do them. It also takes time to accommodate to the system here"*
 - *"I am the only exchange student in class and I felt welcomed by my classmates. I have found a small group to go and eat lunch with"*

- **Tommaso Natta** - *The extreme user*: an Italian student who attended his whole academic path in Turin while being in strict contact with foreign student
 - *Interviewer: Giuseppe Lazzara*
 - *Writer: Peter ALHachem*
 - *Key quotes:*
 - “*For a foreigner to integrate in the community I live in it is not quite easy because they come from different backgrounds and different countries and also italians are gathered along each other and they don't need to make connections as much*”
 - “*It might be a good idea to force locals to interact with foreigners, it will help both sides on the long term*”

Questions asked during the first round of interviews to the normal users

- Hello, what's your name? What's your profession? How old are you?
- What was your previous country / city and your new country / city?
- What was the reason for you to move to a new city?
- What were your expectations before coming? How far from reality they were?
- Can you describe your new community in three words?
- What are three similarities between your old community and your new community (city)?
- What are three differences between your old community and your new community?
- Can you name at least two habits that you picked up from your new community?
- On a scale from one to five how hard was it to find accommodation in your new city?
- Did you reach stability? If so, when did you approximately reach it? And what were the tools that helped you reach it? If not what in your opinion would be the right assistance to reach stability?
- On a scale from one to five how hard, in your opinion, is it easy to find new people in your new community? And why did you choose this number?
- On a scale from one to five how do you rate your experience in a new city so far? And why did you choose this number?
- Can you state at least 1 new service that you have liked in your new place of living? And at least 1 that you have disliked? And why?
- What are the means of transport that you use in your new city? How easy is it to use them?
- On a scale from one to five how interested would you be to use a platform that will ease your integration in a new city? And why did you choose this number?
- When you go to a new city and assuming that you have only free time, what would be your main interest?

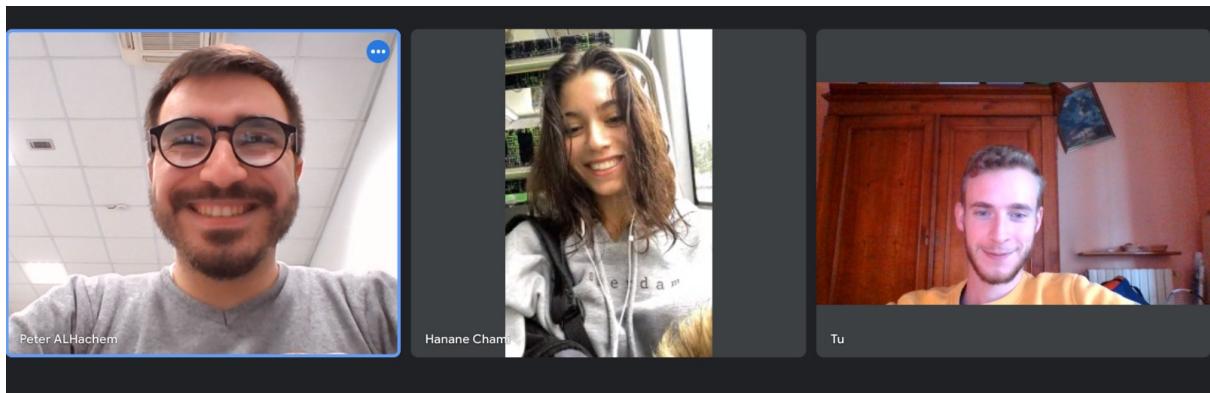
Questions asked during the first round of interviews to the extreme users

- What is your name? What is your profession? How old are you?
- By virtue of what means were you able to meet your international friends?
- Can you give me three words to describe the people you have met which are originally different from your community?
- In your opinion, what were two barriers that you have encountered with your friends at the beginning of your friendship? And what were their solutions?

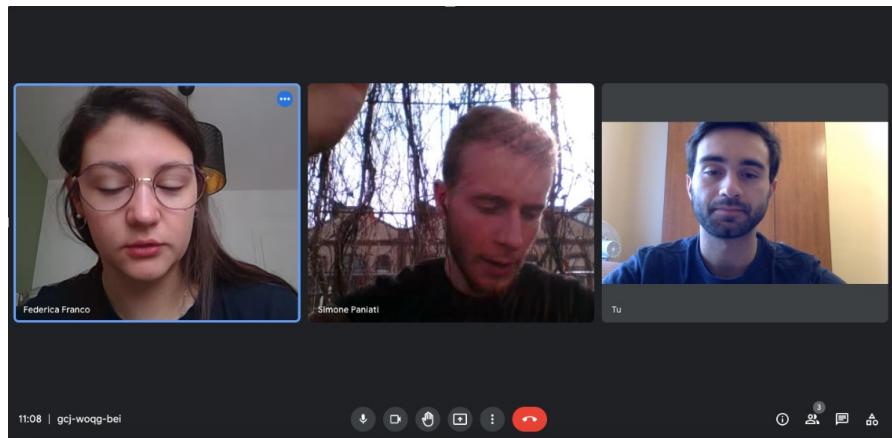
- What were the main problems you have witnessed people struggling to do and needed help with?
- Can you define, through what you have seen, the integration process? How, do you think, can it be improved?
- Can you give me at least two activities that you did with your friends that, in your opinion, helped them in the integration process?
- On a scale from one to five how easy is it for a foreigner (Italian or otherwise) to integrate in the community you live in? And why did you choose this number?
- Do you intend, in any case, to stay in touch with people after they move out again from your community? If so, how do you plan on doing so? And if not, what are the reasons for it?
- On a scale from one to five how interested would you be in a platform that will help you connect with people that come to your new city? And why did you choose this number?



Picture 1: Mario's interview



Picture 2: Hanane's interview



Picture 3: Federica's interview



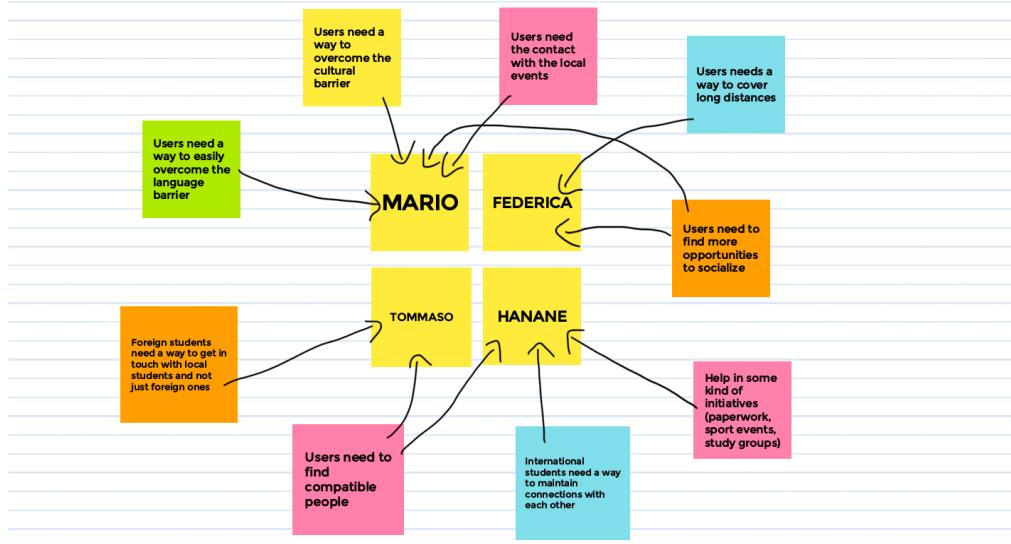
Picture 4: Tommaso's interview

Based on the outcomes of the interviews, we have found a huge deficit in the communication between the locals and the incomers, as well as a lack of direct access, sometimes difficult, in the transportation sector. We believe these two arguments are two of the most important drawbacks that hold new incomers from an easier integration in the society they relocate into.

At this link you can find all the consent forms of the interviews that were conducted in the first round:

First round of interviews - Consent Forms

Initial synthesis



Picture 5: First round of interviews brainstormed needs

The common user needs that emerged during the interviews were the following:

- **Connecting locals and newly incomers** - According to our primal study, citizens are generally welcoming and friendly with foreigners. On the other hand, not many actions gravitate towards emphasizing this connection as meetings and gatherings that push towards this direction are not much done outside the domain of work.
- **Providing better transportation** - Regardless of the location of the participants, the conflict related to transportations to new incomers remains a unified matter during the interviews. It is difficult to get accustomed to, somewhat, complex modes of transportation or few reachable means.
- **Informing newly incomers about local events and initiatives** - Newly incomers have found it challenging to reach the information concerning either the paperwork they have to do in their new place of living or the events that might be happening in their place of living, providing them with these sort of information will drastically help them integrate better.
- **Narrowing down the language and cultural barrier** - Reaching stability is directly connected to a great communication in terms of speaking and socializing. Regardless of some relatives that might be in the same region of relocation, our participants have found a difficult time to integrate when they don't know how or where to communicate with people.

Based on the preliminary study described above, we have found several common points that have been shared during the interviews that highlighted problems faced by our interviewees. Through these ideas, we were able to extract various key factors that were highlighted and processed as introductory needs. Consequently, according to a unified emphasis of the interviewees on the subsequent matter as well as the diversity of options that this field holds ,

the members of the team decided to explore the following specific domain: **Integration of international students through communication and information.**

Second round of interviews

During the second round of interviews, we conducted three additional interviews that were specifically oriented over the more detailed domain of interest. In particular, two of the participants were chosen because they attended several events with local organizations, while a third one was chosen because he qualified as a *domain expert* being a volunteer who is in charge of cultural events and international meetups within the Erasmus organization. The three interviews were conducted with the same methodology as the first ones.

1. **Tony Saliba** - A computer engineer graduate from the Polytechnic of Turin. He has since moved to Amsterdam and he's working for a well-renowned company there. Through Tony, we are able to discuss his affiliation with a local organization like private residences, international gatherings as well as to get his insight on the constant change either from Lebanon to Turin or from Turin to Amsterdam
 - *Interviewer: Giuseppe Lazzara*
 - *Writer: Simone Paniati*
 - *Key quotes:*
 - “I decided to move in different cities to improve myself”
 - “In Italy it was really easy to socialize and make new friends while in the Netherlands it’s a bit more difficult because of the lack of time”
 - “I really liked the events organized by Italian students for International students: it would be awesome to have more events of that kind”
2. **Aifric Deane** - Aifric is an Irish student doing her Erasmus in Turin, studying Urban Science at PoliTO. She qualifies as an invested international student in the events within her new society considering that it's not her first Erasmus exchange to Italy. With Aifric we are able to elaborate a specific view about the local events held in Turin and Siena where she had her first experience. Her contribution is considered as one of the important cores to our ongoing study
 - *Interviewer: Francesco Rosati*
 - *Writer: Peter ALHachem*
 - *Key quotes:*
 - “I used to exploit the ESN network much more in Siena than in Turin because the city was smaller and there weren’t many international students; it felt like it was less easy to make friends. Now I stopped going to events because I have found friends that I hang out with”
 - “Erasmus students are a specific branch of international students and people who live longer here do not have the same opportunity to access information for events the same as Erasmus students, it would be nice to have the opportunity to meet more internationals not related to Erasmus”

■ “I remember that in Siena it was more challenging since I have not done it before but as soon as i went to events, I directly made friends”

3. Lorenzo Ambrogio - Lorenzo is a current volunteer who is in charge of cultural events and international meetups within the Erasmus organization. With Lorenzo, we found a perfect fit to the profile of domain expert due to his role in encouraging international students to participate in local events that will help the integration process of newly incomers.

- **Interviewer:** Giuseppe Lazzara
- **Writer:** Peter ALHachem
- **Key quotes:**

- “We organize many events which help international students to get to know each other, like City tours, language cafès and daily trips. We also help international students by giving them informations about local events and daily activities“
- “Many international students don't participate to our events because they are too shy or because of the costs”
- “We can reach many international students at once thanks to social networks”

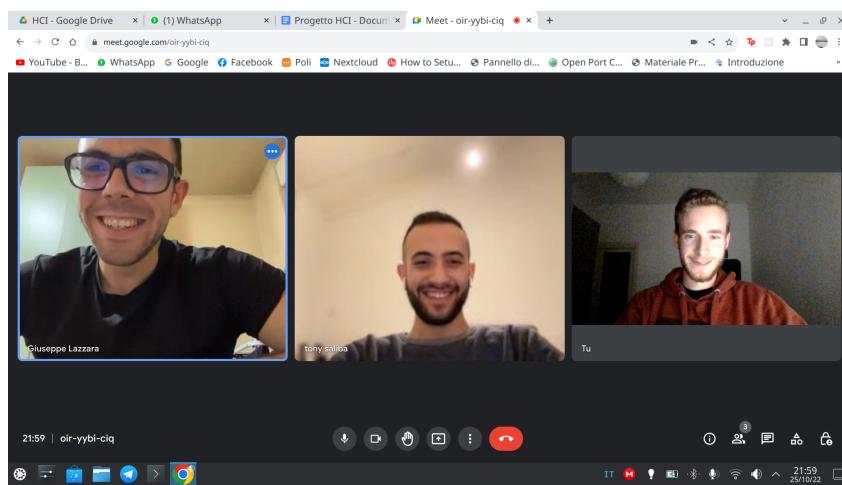
Questions for the Domain Expert

1. Hello, what's your name? What's your profession? How old are you?
2. Can you mention two reasons that were motives for becoming responsible in this organization (Erasmus)?
3. Can you describe, in three words, the work you do in this organization?
4. Can you describe, in three words, the international people that you are in daily contact with?
5. Can you give me three benefits that you have encountered while working with internationals?
6. Can you specify at least three events that you organize for new international students? What activities, in your opinion, have helped the integration of international students through the help of Erasmus?
7. Can you give me three ways you use to attract students to be part of the events you conduct?
8. On a scale from one to five, how much, in your opinion, are International students interested in being part of the Erasmus events that you organize? Why did you choose this number?
9. What are the three main problems, in your opinion, that restrict international students from attending your events?
10. On a scale from one to five how, through the people you have met, is it easy to integrate in a new community with new rules and new ambiance? Why did you choose this number?
11. In your opinion, how can we improve the communication between local organizations and the international students?
12. On a scale from one to five, how easy is it to get in contact with newly incoming students and share with them the events you organize? Why did you choose this number?
13. On a scale from one to five, how interested would you be in a platform that will help the connection between international students and organizations (like yours) to be less complex ? And why did you choose this number?

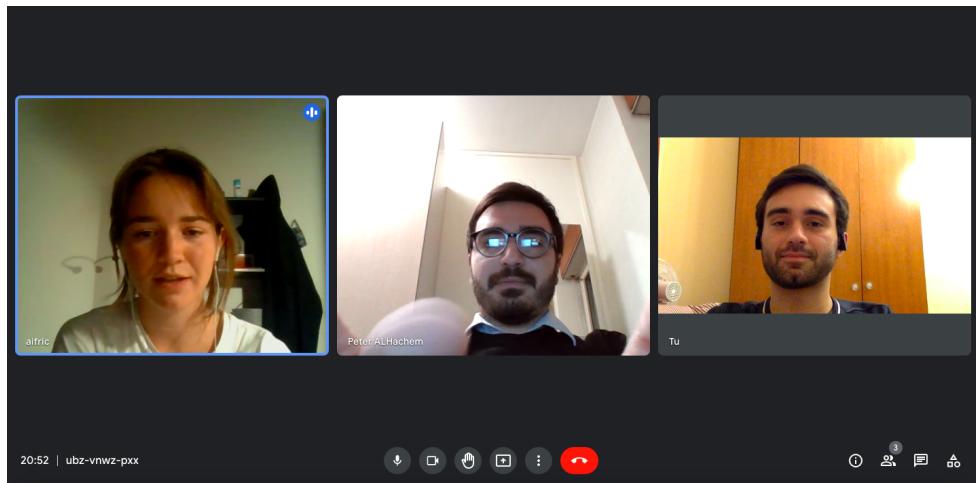
Questions for the immediate user

1. What is your name? How old are you? What is your profession?
2. What is your previous country / city and what is your new country / city?
3. What is the reason for you to move to a new city?
4. Can you give us at least three events / activities you have attended in your new city? What was so special about these events?
5. Can you give me three ways you get updates of new events in your new city?
6. Can you give me three means of help you use to get paperwork done in your new place of living?
7. On a scale from one to five, in your opinion, how beneficial were these events in your integration process? Why did you choose this number?

8. Can you describe, in three words, the events you have attended in your community? Why did you choose these words?
9. Can you give us three similarities between the events held in your old and new community?
10. Can you give us three differences between the events held in your old and new community?
11. On a scale from one to five how hard, in your opinion, is it easy to find new people in your new community? And why did you choose this number?
12. Have you had the opportunity to join any initiative? (like study groups, social events, sports events). If yes, can you explain, in two sentences, the pros and cons of this experience? If not, why didn't you do it?
13. Can you give us at least one way that, in your opinion, will help improve the communication between local organizations and international students?
14. On a scale from one to five, how easy, in your opinion, is it to access information (whether it is for help or for entertainment) in your new community? Why did you choose this number?
15. On a scale from one to five, how interested would you be in a platform that will help the connection between international students and organizations to be less complex? And why did you choose this number?



Picture 6: Tony's interview



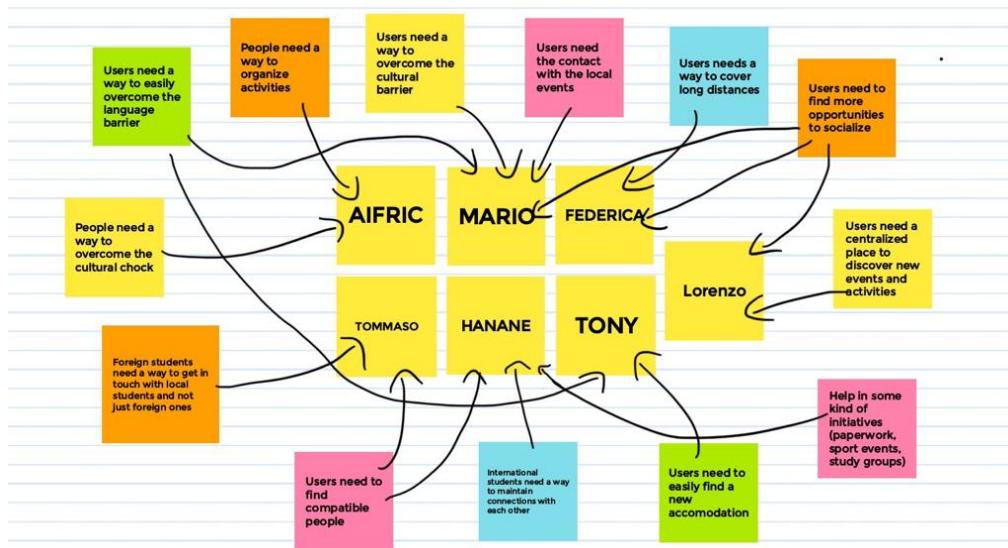
Picture 7: Aifric's interview

In the light of the interviews, the team members have found an emphasis on **the importance of accessing information** that is unavailable in common and easy ways. Participants have explicitly connected unanimously the access of information to diverse locations and digital platforms. This communication has created, according to them, some ambiguity on the various modes to gather events and initiatives. During the interviews, the members were able to discover a common trait that explains the undeniable relationship between previous and current experiences and its effect on retrieving information about local activities.

At this link you can find all the consent forms of the interviews that were conducted in the second round:

Second round of interviews - Consent forms

Final synthesis



Picture 8: Final brainstormed needs

After an exhaustive investigation of the various arguments made through all seven interviews done in both our initial and final studies, we were able to deduce the following enhanced needs and for each one of them, we brainstormed 5 solutions:

- **Ameliorating the bond between international students and local citizens:**
In fact, the several studies made were able to show a considerable gap between international students and their new locals. The majority of our participants have neglected the human and physical aspects of their relations with locals and this has resulted in an increasing barrier of communication between these two sides. This need can be satisfied by:
 - Advertising local events to reach as many international students as possible. Social media play a key role in this situation
 - University clubs or working groups that usually join different students from different fields together: this could be useful to get in touch students from different backgrounds
 - Creating student groups that create initiatives to eat together at the canteen or outside in the premises of their place of study
 - Joining competitions of different type where international students can test themselves and connect with people
 - Creating a network of ambassadors that are in charge of helping international students during all their stay
- **Detecting compatibility between international students and their chosen groups:**
One of the most evident reasons revealed during our study is the cultural diversity between the members that have participated in our interviews. This diversity is evidently defined through a large plethora that goes from cultural all the way to principles and beliefs. And in order to respect their ideologies, limits and concerns, our participants prefer to be part of groups where they feel accordant with their members and where they can be themselves. In order to facilitate the meeting of like-minded people, we identified this solutions:
 - Surveys to match a person with similar ones inside the community
 - Ideology groups that have the same principles and beliefs
 - Using known platforms like Google Meet, Tinder or Meetup in order to find people close to your place of living
 - Match people based on their Google search history
 - Match people based on their common hobbies, interests and activities
- **Narrowing down the available resources to access needed information:**

Whether it is for legal or entertainment purposes, our participants presented some valid justifications about the vagueness and diversity of sources to access the targeted information. Not only that, but it is very important to take notice of the credibility and verification of the information that is acquired by people who are witnessing a new

experience in a new environment. We brainstormed 5 solutions that could be useful to aggregate and verify informations from various sources:

- A paper/digital newspaper that share on a weekly or monthly basis a set of news that could be useful for the international student
- An University board or digital wall where all types of flyers are shared in one place to avoid repetitiveness
- Organizations or InfoPoints that are responsible on publishing and providing informations on demand for students that show credibility and verification
- Voice announcements in gathering places where events are mentioned to all the people
- Mail chain subscriptions that notifies you with updates on a daily, weekly or monthly basis

Presenting our top solution

After a thorough analysis of the available solutions, the team members were able to narrow down the diverse solutions into a main one that revolves around three essential ideas that satisfy the general view of our intended project. We then have chosen to focus on the implementation of a “Digital Wall” as a final product that covers all the necessary ideas we have mentioned in our brainstorm. The following are the three main ones:

- Our product must be a centralized platform, with a great emphasis on the digital aspect.
- Our product must provide a survey at the beginning of the experience to let students express things they really like.
- Improvement of surveys with information on local events and their suggestions.

All these solutions have been included in a centralized platform that includes groups, events, help, gatherings and other useful tools for easing the integration process of internationals. This platform is survey and category based and can be performed through physical checkpoints or digitally.

At this link, you can find our brainstormed user needs for each round of interviews and its associated solutions

Brainstormed User Needs

Tasks and Storyboard

Based on some thorough brainstorming demonstrated in our previous study, the team members have narrowed down a plethora of solutions to a single one which, from our

standpoint, presents a concrete answer to the problem we have mentioned previously. The solution presents the following: **A category-based “Digital Wall”**; This platform will **centralize all needed information** into one place with a **personalized user experience** over preferences, likings and constraints.

Establishing the tasks

Following the previous analysis of the proposed solution that was agreed upon by the team based on the needs collected during our interviews with the targeted audience, the team members have gathered three different tasks that, accordingly the proposed solution needs to perform:

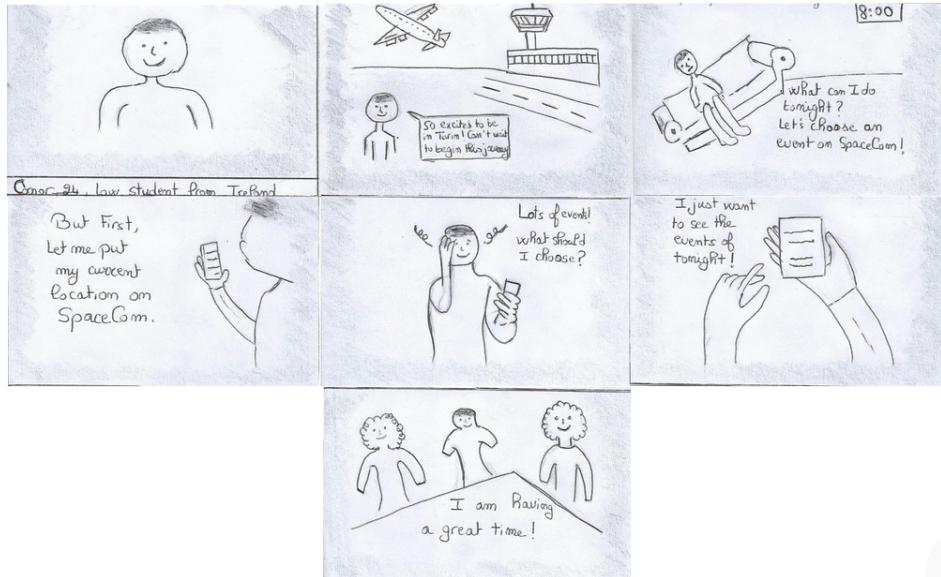
1. **Browsing the digital wall to discover new events (Simple):** This task simply englobes scrolling the platform in the aim of finding appropriate information. During the performance, announcements in the form of images and / or texts will be displayed with their appropriate descriptions.
2. **Filtering events based on specific characteristics (Moderate):** This task presents the access to narrow down information based on even more specification. The filters could represent : recency (date selection), price, categorical (events, sports, study groups, offices...), etc.
3. **Reset interests of the platform (Complex):** Since the platform will be referenced by a survey taken at the initial point of setting up the digital wall, the platform will display the information based on the interests of its user (country of origin, language of display, focused categories, unwanted posts...) and in order to change these preferences, a specific section should be accessed and confirmation of these changes should be needed.

The tasks were thoroughly chosen to showcase different aspects of the solution that we would like to highlight based on their level of difficulty and on the main target behind the main proposed solution based on our interviews as well. As a matter of fact, presenting tasks that, through the proposed solution, will facilitate the interaction between the users of the deployed solution and their main target which is finding events in their new cities. The team members firmly believe that the targeted audience able to choose their global interests, filter their preferences and understand the mechanism behind choosing their likings will not only cover the main objectives behind an easier integration process but also ease their approach towards understanding other diverse features in our prototyped solution.

Creating the storyboard

In spite of the enhancement of the level of generalization and complexity in our study, the team members have opted to use a storyboard as a means of clearness and simplification for an elaborated understanding of our solution. Through it, we aim to represent a character that

describes our targeted audience as well as **proposing an illustrative solution** by the means of a centralized platform. We have also aimed to **state some of the featured actions** that will facilitate the understanding of the solution. By way of a story, we were able to answer a few concerns on the process of integration, the main goal of this study.



Picture 9: Illustrated Storyboard

With the implementation of our storyboard, the team was able to identify strong arguments that present an emphasis on the matter of the storyboard and provide further clarity to some ambiguity that might have been encountered in the past. The strengths are presented as the followings:

1. **Covering the designated tasks:** The storyboard clearly elaborates the tasks established previously and regardless of their complexity, each one was portrayed by a significant drawing which explains them with a clearer intention.
2. **Identifying our targeted community:** In the first two sketches the team members have made sure to represent their targeted people through a brief introduction of the character and a further explanation of his purpose in the following sketch. This clarifies the representation of our study and the people it concerns.

On the other side, the storyboard implemented does not fully represent the complete detailed motivation behind our project but identifies an overview of what we intend the platform to include. Based on this analysis, the team has concluded some imperfections that we intend to ameliorate in the next process which includes prototyping. These weaknesses contain:

1. **Specification of the story in the sketch:** In fact, the storyboard represents a very narrow situation within many diverse scenarios, and due to the limitations and brevity of what a storyboard should accomplish we were unable to cover all the possibilities that might be also considered as important in our project.

2. **Small Discontinuities in the story flow:** The flow of the story shows a bit of discontinuity when it comes to the actions represented, although the story is well organized and correctly structured, it is somewhat visible the gap passing from one sketch to another. This decision was taken based on a trade-off between visualizing all the tasks which we have considered critical to implement and having some discontinuity.

The storyboard implemented, despite some defects, serves as a well-rounded representation of the tasks that are essential for the users to catch an overview of our final solution.

As a matter of fact, the storyboard presents an easy way to comprehend the intentions behind our centralized platform and it typically serves as a representation of a solution to critical user needs concerning the diversity in finding information and the ambiguity in its communication. By materializing this solution into a story, we were able to implicitly represent a way to solve the problem of the integration process.

Low-fidelity prototype

In our transition from a theoretical perspective to a more practical one, the team members have decided to explore some modalities that will render all our explanations a concrete meaning. The modalities considered include the possibility of **Artificial Intelligence** implementation and this motive was crucial for their examinations. The modalities that have been included are four: **Mobile-based application**, **Speech-based chatting bot**, **Interactive SmartWatch**, **Web-based application**.

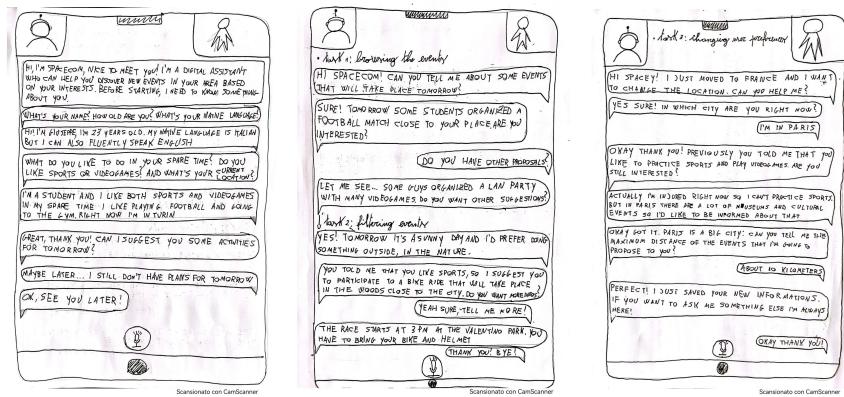
After a thorough investigation, the team members have settled on the implementation of two prototypes based on **Speech-based chat bot** and **Mobile-based application**.

1. **Mobile-based application:** The team were ultimately challenged to choose between a mobile or web based application but based upon the community we desire to target and deducting from the interviews conducted in previous studies, people are more likely to use a mobile-based application rather than a web one, which coincides with our goal to reach the most people possible.
2. **Speech based Chatting bot:** Through speech recognition, we aim to provide diversity in the approach of our topic. With using the speech feature in the prototype, we are able to include a considerable amount of people who identify through this mode of functionality that, from their reflection, is easier to interpret and better to use. Without neglecting the fact that through this modality we showcase a very popular and important feature of Artificial Intelligence and its interaction with humans.

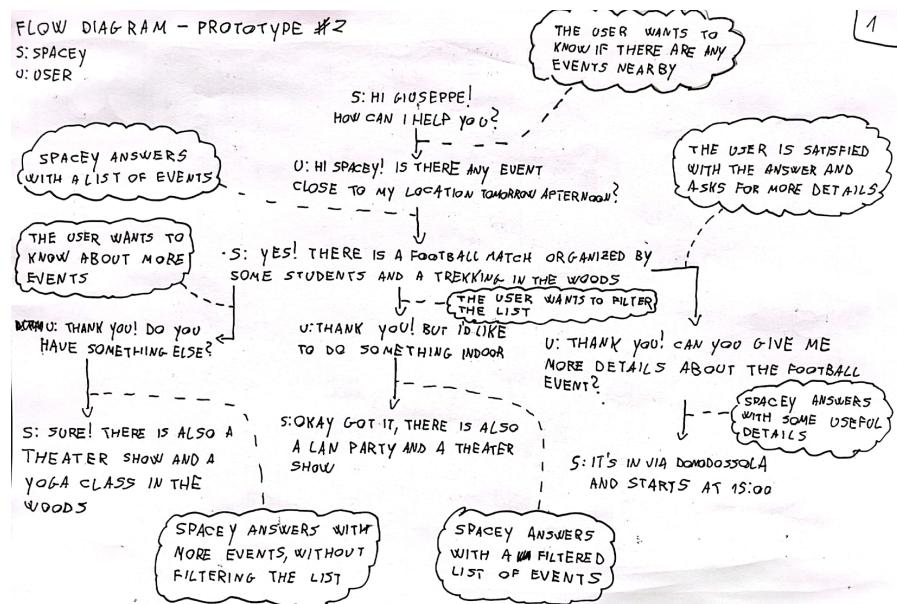
Paper prototypes

SpeechBot

The motion of our main character in the storyboard showcases a direct connection to this prototype. As a matter of fact, the dialogue that is introduced in our storyboard explains the possible presence of a prototype that is speech based and that interacts with our determined user. The tasks, on the other hand, are partially represented through the crucial ones that are cited previously through a contextual prototype that invokes a chat as a means to present them. However, the team members have found it somewhat complex to represent the tasks on a speech based platform that requires infinite possibilities and scenarios.



Picture 10: SpeechBot paper prototype



Picture 11: SpeechBot High-Level Flow Diagram

After a deep analysis of our prototype's features and functionalities, based on simulated trials and performed through the "Wizard of Oz" prototype techniques, the team members were able to come up with the following advantages and disadvantages.

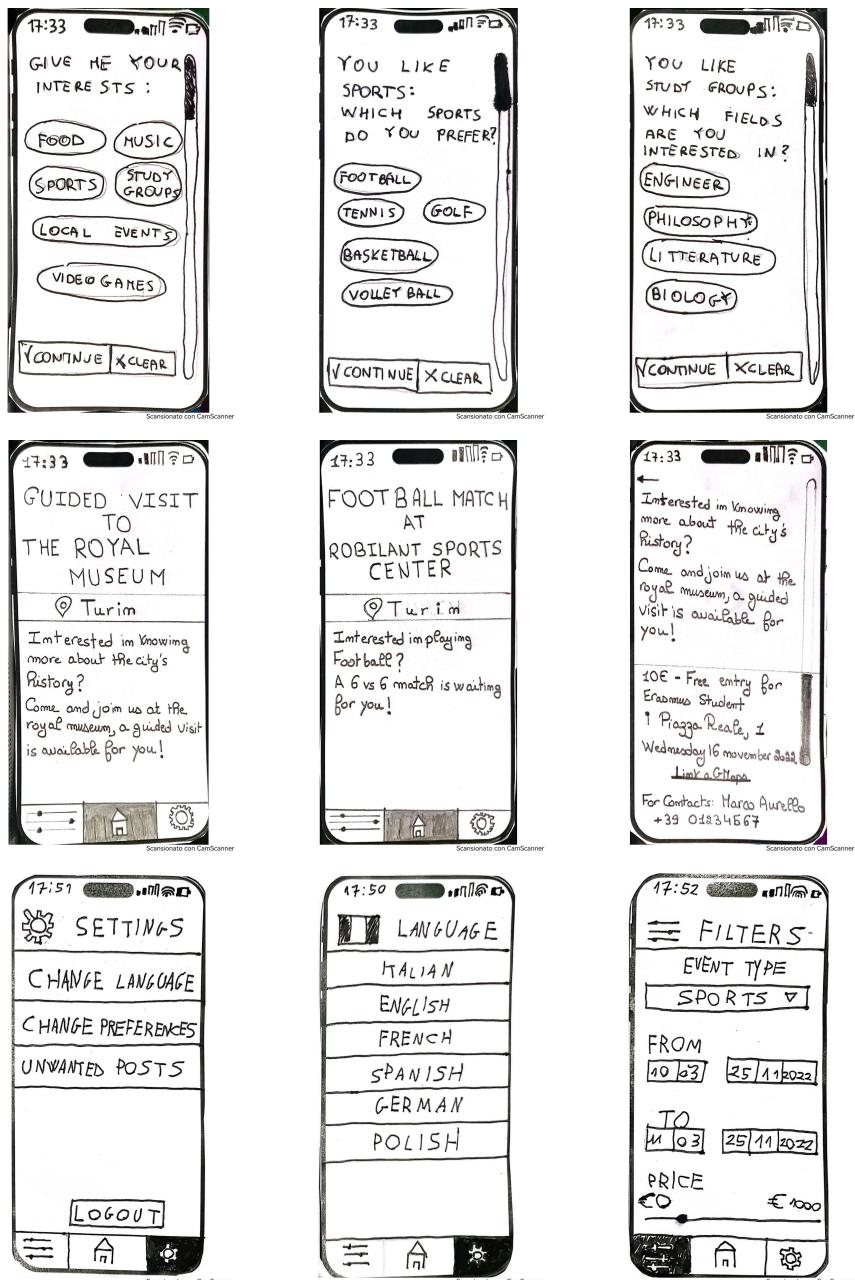
The team members were able to reflect on the promising aspect: **speech recognition is linked to artificial intelligence**. As a matter of fact, SpeechBot represents a **simpler interaction from a user point of view with less learning expectancy** with respect to other applications that might require extensive training.

On the other hand, SpeechBot requires a **critical implementation with respect to the keywords needed and their appropriate responses** which complexify the process of deployment. And in terms of performance, SpeechBot is instructed to **display one event with each speech iteration** and thus **slow down the process of finding the optimal response** for the users, presenting a boring experience for them. Adding to that, the **prototype is unable to handle tasks that need the intervention of other senses** such as the change of users with the SpeechBot.

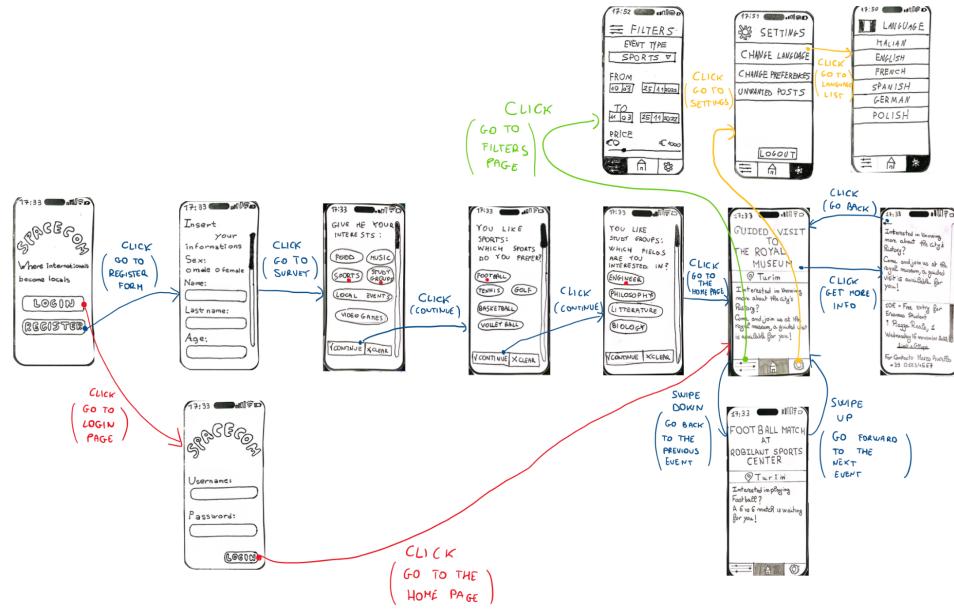
Mobile App

The pictures drawn in the storyboard represented a preliminary idea on what we wanted to convey through our mobile application. In terms of tasks, the team members find it crucial to include the features that were stated in a previous slide regarding their importance but also focus on implementing diverse ones to englobe all possible scenarios our targeted people might find useful, and easy to access through perceptual and haptic means.





Picture 12: Mobile Application Paper Prototype



Picture 13: Mobile Application High-Flow Diagram

After further experimentation of our prototype's functionalities and services, the team members were able to conclude the following advantages and disadvantages.

The team has focused on the importance of **parallelizing the tasks that the application can handle to provide the user a better experience** and a more detailed mode to access its features. In Addition, the mobile app provides a **faster and simpler way to access the information** rather than waiting for a SpeechBot's response.

On the other hand, users might find the **process of interacting with the application a bit challenging**, especially within the first attempts, which may require some period to understand its full functionalities. It is important to annotate that **the team members have not found other crucial holdbacks** that might interfere with the experience of our targeted users.

Choosing a prototype

Based on the previous analysis of the advantages and disadvantages of both prototypes, the team members have reflected on the **overlaying complexity** that a SpeechBot can have, especially when it comes to **dealing with speech recognition** and the environment it surrounds. Although the first prototype presents a clearer mode to exploit the artificial intelligence side, the team members have opted to **develop the second prototype related to mobile application and its services**.

Concerning the **inclusion of features from SpeechBot to the mobile app**, the team members have settled on the option of **portraying a speech based interaction** that will render the user capable of substituting touch screening interaction with a voice one. However, **this feature**, in

our opinion, does not match any crucial user need that was found in the needfinding phase and keeping it will not affect the integrity of our prototype.

Medium-Fidelity Prototype

Through our Medium-Fidelity prototype, starting from the registration, the user can simulate to select his interests related to the activities and events that he wants to attend.

After the login or the interests selection, the user can browse through the events and activities that are happening in their area.

There is also the possibility to filter the events based on their preferences according to the tasks.

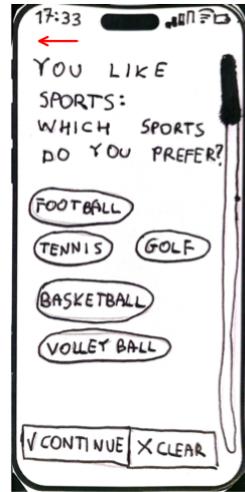
Since this is a Medium-Fidelity prototype, we were not able to implement all the possible interactions (like the selection of the different interests and the AI suggestions), all the possible feedbacks (through animations and popups) and the final design of the app.

Low-Fidelity prototype changes

Before starting to develop our Medium-Fidelity prototype, we reflected on what could and should be improved in the previously developed Low-Fidelity prototype on paper. Below, there are all the screenshots with the changes made, highlighted in red.

Firstly, we found it necessary to add buttons with a back arrow on various screens, so that the user can instinctively navigate back to the settings page or to the events page (picture 12).

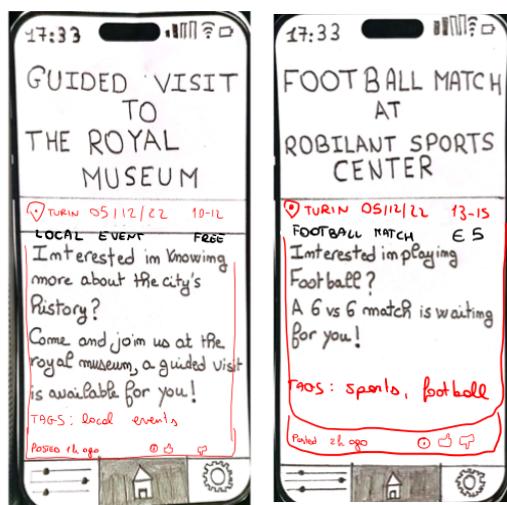




Picture 14: Back Arrow buttons

Subsequently (picture 15), we deemed it necessary to incorporate more details regarding individual events, such as time, location, date, event category, and information on why the AI had recommended that specific event to the user on the events page. This is because we aim to provide the user with the most important information about the event they are viewing at a visual first impression.

Additionally, through the like and dislike buttons, we want the user to "interact" with the AI by providing feedback and shaping the next suggested events according to their interests, thus personalizing and enhancing their user experience.



Picture 15: New Details on Event items

Design and creation process of the prototype

In our team of four, we used Figma as the tool to create our Medium-Fidelity prototype. Figma is a collaborative design and prototyping tool that allowed us to work together efficiently.

During the creation process, we divided the work according to the three tasks previously described. Each group member was responsible for a part or the entire flow of tasks and screens (depending on the expected amount of work) associated with each task. In this way, we were able to make the whole process more efficient and the work of each member independent from the others work.

The design and creation process involved several steps. First, we reviewed our paper prototype and identified its limitations, such as the lack of interactivity and dynamic elements. We then translated the key features and functionality from the paper prototype into digital components in Figma. This included creating screens, defining navigation flows, and adding interactive elements like buttons, form fields and menus.

To cover the three tasks mentioned, we designed the prototype to simulate the user's experience through the platform.

For the first task, "**Browse the wall and choose the event**", we created screens that showcased event listings, including relevant details such as event titles, dates, and locations. Users could scroll through the events and click on them for more information.

The second task, "**Apply filters to the events**", was addressed by incorporating filter options into the prototype. We created screens where users could select filters such as date and time range, event type, and price range. Upon applying the filters, the prototype dynamically updated the event listings to reflect the user's interests.

The third task, "**Reset the interests of the platform**", was implemented by including a dedicated settings screen. Users could access this screen to reset their previously chosen interests, by starting the same operations flow that happens after the signup. The settings screen lets also the user modify other personalized settings such as the application language or the notifications preferences.

By using Figma to create the Medium-Fidelity prototype, we were able to overcome the limitations of the paper prototype. Figma allowed us to add interactive elements, such as clickable buttons and dynamic content updates, which provided a more realistic user experience. Additionally, Figma facilitated collaborative work, enabling team members to work simultaneously, provide feedback, and make real-time revisions to the prototype.

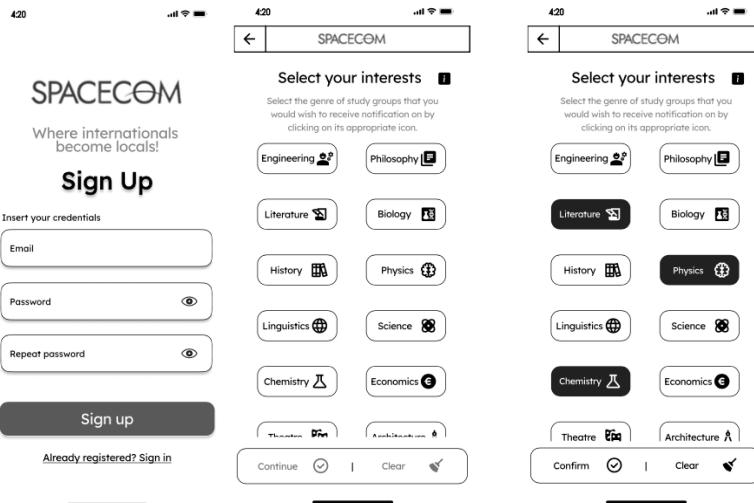
For these reasons, the Medium-Fidelity prototype resulted in a more refined and representative prototype for testing and evaluation, with respect to the Low-Fidelity prototype.

Most significant screens and features of the prototype

Initial setup

Signup page: the registration phase in which the user inserts its general information, like sex, country, language etc...

Interests selection: the user selects his interests. After this selection, the user is redirected into a more specific page where new interests are proposed. After finishing the process, the user is redirected to the home page.



Picture 16: Signup page and Interests selection

General usage

Login page: Once the user signed up, he can access the application by inserting his credentials.

Home page: After the login is set, events are displayed on the home page based on the previously selected interests done in the signup process. The user can like, dislike or show more information about a specific event.

Filters: The user can filter events based on price, date, time and event type. During the filter selection process, the user can reset all the previous choices and can remove any previously applied filter. After the filters are applied, the user is redirected back to the home page where only the events that meet the specified criteria are shown.



Picture 17: Login page, Filters page and Home page with events

Application settings

Settings page: In the settings page the user has the possibility to change some fields like the password, language, location, etc...

Reset interests: From the settings page, the user has the possibility to reset the previously inserted interests. After the user starts the process, the application asks him to select its interests just like in the initial setup phase.



Picture 18: Settings page and Reset interests message

At this link you can find our Medium-Fidelity prototype:

[Medium-Fidelity prototype - EZGuys](#)

Heuristic Evaluation

After a detailed implementation of the Medium-Fidelity Prototype envisioned by our team, our colleagues represented by the group “Cinemini” have conducted a [heuristic evaluation](#) based on the prototype we have explained in the previous section.

The other team of students demonstrated commendable effort and dedication in their evaluation, showcasing their commitment to providing valuable feedback despite a few minor misunderstandings. Regarding the evaluation, it included several violations that were signalized and several pieces of advice to implement during our High-Fidelity Prototype that our team has considered carefully.

According to the evaluators, they were able to identify high severity violations that needed to be reviewed by our members during the final deployment of our prototype, the violations on hand included:

1. The unavailability of editing the interests chosen by the users nor adding new ones as users may develop new interests over time or would want to remove already selected interests. The evaluators, unanimously, agreed that having a “Reset” feature to the interests only may be considered a waste of time in terms of efficient access to the features.
2. The unavailability of a list that displays the selected interests of the user. According to the evaluating team, users who do not frequently use the application may forget the interests they have selected at a previous time, and a list to show them the identified interests is not present.
3. The list of filters is only accessible through the Filter Page. Based on their explanation, the evaluators explained that giving only access to displaying the filters through the Filter page is not enough and that a shortcut to show the filter in the Home page should be presented.

Based on a thorough examination of the heuristic evaluation conducted by our fellow colleagues and taking into consideration the violations that were mentioned towards our prototype, our team were able to present the following arguments:

1. Although the explanation of one task revolved around “Resetting the interests of the user in the application” which is the main reason for the implementation of the Interest page with a Reset-based mechanism, the team members have reconsidered the interface of the Interest page to present an editing feature of the interests as well as a clear button that will reset the state of all interests to be unselected in the application. In such a way, we were able to append the idea mentioned by our colleagues and prevail over the integrity of our task mentioned previously.

2. The Interest page will accordingly display the last state of the interests that were confirmed and changed by the user so when opening the page, the user will be able to see his selected categories and the unselected ones where it may be possible to add new features through the editing feature we have previously explained.
3. Based on a careful investigation that was done on our behalf towards several applications that contain a “Filter” feature within their implementations, the team has concluded that a “List of filters displayed through the home page” is not implemented through any interface. As a matter of fact, the team insisted on omitting this violation and displaying through the means of the Filter page we implemented the current applied features of the users which also render the Home page less crowded and consequently aesthetically cleaner.

High-Fidelity prototype

The SpaceCom High-Fidelity prototype has been developed as a web application specifically designed to be run on a mobile phone. Several third party libraries has been used and these are the most relevant ones:

- **React:** As a front-end framework the team members decided to use the React framework because of its rich ecosystem of graphic libraries, community support and team members skills about its usage. This ecosystem helps to accelerate development, solve common problems and speeds up the overall development process, which is trivial during the prototyping phase. It is also way faster than developing a native mobile application
- **MUI graphic library:** The team members decided to leverage the MUI library in order to reuse a set of common graphical components adhering to the standard of material design, thus making the application more consistent and appealing
- **Express and SQLite:** As a backend infrastructure, the team members decided to build a small server based on the Express framework which interacts with a small SQLite database to fetch and store the data in a persistent way. This architecture allows a certain degree of dynamism when using the application by letting the user to filter through events and by specifying their interests which are stored in the database and can survive the application restart.

The overall architecture of our project recalls one of common social network applications. It's made of different pages:

- **Events feed:** The home page of the application. It shows a list of events based on the preferences and filters specified by the user. For each event the user has the possibility to see a set of basic information like the price, the location and a small description.

The user also has the possibility to flag an event as *favorite* and to expand the event information to learn more details about it.

- **Filters page:** In this page the user has the possibility to specify a set of filters in order to filter the events based on a series of attributes like the price, date, location and category.
- **Settings page:** A list of settings that allows the user to fine tune the behavior of the application
- **Interests selection page:** A section of the application in which the user has the possibility to specify his interests in order to receive suggestions that are more relevant to him. The flow starts by specifying a set of main categories and, for each category, the user has to specify at least one subcategory. At the end of the process, the user is redirected to the home page where only the events related to the specified categories are displayed. The selected categories are persisted in the database and they survive the application restart.

Even though the prototype gives the user a certain degree of freedom, it still has some limitations:

- It lacks an artificial intelligence engine which is in charge of selecting the events to display. The filtering of the events is simply based on the categories and filters specified by the user
- The set of events available is limited and it is hardcoded in the database
- It can only be used by a single user since it doesn't provide a login mechanism
- The set of categories and subcategories is limited
- Many of the application settings like the language selection, theming, password reset and notifications are not implemented

Github repository: <https://github.com/polito-hci-2022/SpaceCom>

Usability Testing

After the final implementation of the application, the team decided to conduct four usability testing in order to retrieve useful feedback that will eventually lead towards ameliorating some aspects of our system.

The participants to our usability testing were strictly chosen based on the target audience for our vision: International students living abroad ranging from 18 to 27 years of age with minimum expertise in social media and digital devices and applications.

The usability testing was performed using a mobile phone with good internet connection through the means of the Google Meet and Zoom softwares. In this way we were able to enlarge the landscape of international students to include people studying outside of our living place.

Here are the people performing our test:

- **Simone Forno** - An Italian Electronics Engineering student who is part of the Erasmus program in Leuven, Belgium.
 - *Facilitator:* **Simone Paniati.**
 - *Observers:* **Giuseppe Lazzara, Peter ALHachem.**
- **Alain EL Khoury** - A Lebanese student pursuing a double degree in Fluid Dynamics and Aircraft Propulsion Systems in Toulouse, France.
 - *Facilitator:* **Peter ALHachem.**
 - *Observers:* **Francesco Rosati, Simone Paniati.**
- **Christian Giummo** - An Italian student majoring in Management who is part of the Erasmus program in Vigo, Spain.
 - *Facilitator:* **Giuseppe Lazzara.**
 - *Observers:* **Francesco Rosati, Peter ALHachem.**
- **Boulos Mansour** - A Lebanese Computer Science student at the University of Turin.
 - *Facilitator:* **Francesco Rosati.**
 - *Observers:* **Giuseppe Lazzara, Simone Paniati, Peter ALHachem.**

The candidates to our usability testing were asked to perform diverse tasks, it is important to note that the following tasks are ordered by difficulty level going from simple to medium and finally complex.

Here are the following tasks:

T1 - Quick look at the application.

T2 - Navigate the home page and browse for an event.

T3 - Apply filters to the event.

T4 - Reset the interests of the platform.

The tasks presented above were precisely evaluated according to a specific success criterion that was decided by the team members. You can find an abstract of the usability protocol performed in the following link: [**Usability Testing protocol link.**](#)

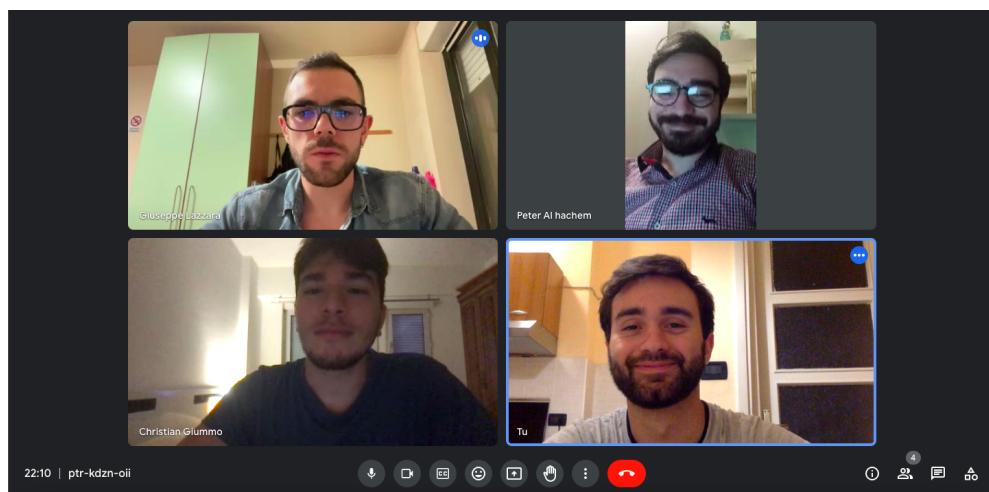
After conducting four different usability testing successfully, the team members were able to extract some promising points annotated by our evaluators and some important problems that needed further efforts to overcome. It is important to emphasize that a Post-Test Questionnaire was performed at the end of each test using the well-known System Usability Scale technique (SUS) and the mean average of the scores returned was 87.3 / 100. The following index reported by the SUS documentation showed an excellent understanding of the application from our candidates.

In addition, the participants unanimously agreed on the simplicity of the application, the tidiness and esthetically correctness of our graphical user interface and the smoothness of the flow inside the application itself. The team, based on the previous feedback, was able to deduce a great implementation regarding the colors chosen, the interfaces of the pages, the representations of the components within each page.

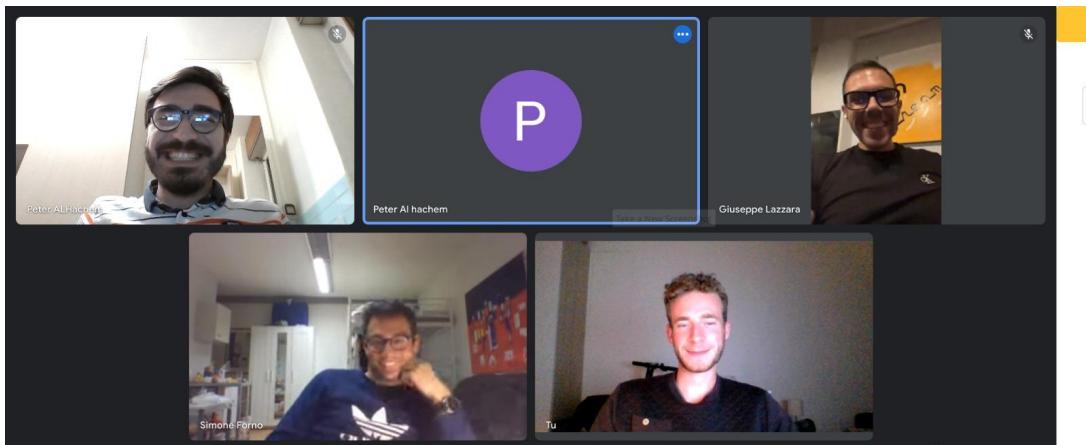
On the other hand, the usability testing performed was extremely crucial in extracting some critical issues within our application:

1. **View more details of an event by clicking anywhere on the event component:** one main issue that was frequently arisen, relates the user immediately clicking on the whole event component for further details of the description rather than noticing the “View More” button that we have implemented.
2. **Emphasis on the free events:** According to the participants, free events should be highlighted in a different way both in the home page of the application (color, text font) and also while performing the filtering task by potentially including an easy-to-access Free event component.
3. **Shortcuts for the date filter:** An important time waste issue that was highlighted to us was the selection of the dates in the filters, especially near enough ones (today, tomorrow, this weekend) and its clearance in the following process. A compact suggestion was a clear button specific to the date filter and implementing names of near dates.
4. **Select all the subcategories in one click:** A unanimous problem that was presented to the team was the fact that there was no option to a shortcut that selects the subcategories of a specific interest with a simple click.
5. **In the food category, substitute the “All” option:** One participant highlighted to the team members, performing the test at that time, the ambiguity surrounding the “All” button while selecting the “Food” category. The ambiguity arose because we had three diverse buttons to this category but implicitly the “All” button contains all the other sub-categories.

The team took the described issues as important suggestions to improve the application in the future through the explanation provided above. With further discussion, we have included additional options to the suggestion list that concerns: keeping the state of the liked posts when performing the last task of resetting the interests and hiding the events following the current date and time.



Picture 19: Usability Testing with Christian Giummo



Picture 20: Usability Testing with Simone Forno



Picture 21: Usability Testing with Alain El Khoury



Picture 22: Usability Testing with Boulos Mansour

In this link you can find all the consent forms of the usability testing performed by the team members:

Usability testing - Consent forms

Conclusions

Main learnings from the project

During the semester, the team members of EZGuyz, have been able to pack diverse and fruitful aspects in the process of developing an application that targets a part of a society. One of the main emphases that we were able to understand is that coding is not the center point of our development journey, in fact the implementation path also considers a vision, a purpose, searching for needs within a targeted society and a lot of discussion and brainstorming.

Our decision in selecting the “Humans meets AI” theme was from our important belief of merging the work between society and AI, well programming in general. And when it comes to our project, we were able to learn to listen to the feedback, opinion and suggestions of people that were objective point of views on daily life problems regarding a topic we tried to present to them.

Working on this project was, without a doubt, an abundant experience in diverse aspects outside the realm of programming that we have yet to experience.

Our feedback about the project

During our project, the team used the strategy of communicating brainstormed ideas to each other, whether it was in the writing part or in the programming part and then, based on several conditions regarding our expertise and field of interests, we divided the tasks of the whole project. In each step of the way, each team member was instructed to perform his associated tasks and during a global meeting, usually held during the week-ends, the other team members fine-tuned the corresponding work.

This allocation of responsibilities allowed us to maximize our complementary expertise, ensuring efficient and high-quality work. We maintained constant information exchange and active communication among ourselves to ensure smooth progress and deliver results that met the team's expectations.

Furthermore, throughout our project, we experienced several positive outcomes. Firstly, we saw significant improvements in our teamwork skills as we collaborated closely on various tasks.

We learned to find trade-offs between different opinions within the group, allowing us to reach consensus efficiently. Additionally, conducting interviews and usability testing helped us enhance our English and communication skills. It provided us with valuable opportunities to practice articulating our thoughts and ideas effectively. Furthermore, our project allowed us

to refine our programming skills, as we faced challenges and found creative solutions along the way.

However, we did encounter some challenges throughout the process. The initial phase of finding a topic that captured the interests of the entire team required some effort. It took time to identify a subject that motivated and engaged each member, but once we found it, we were able to move forward.

Another problem we faced was the difficulty in managing the time schedule for all the group members. Coordinating everyone's availability and ensuring productive work sessions proved to be a task in itself.

Additionally, communicating ideas effectively during interviews posed a challenge, as we had to ensure that our thoughts were conveyed clearly to the interviewees.

Overall, despite the highs and lows that we have encountered during the project, the team was able to reach a satisfactory result with a very well-rounded project that was very well appreciated by the people who have used it.