
HUMAN COMPUTER INTERACTION PROJECT

SHARE YOUR SPORT

HUMAN COMPUTER INTERACTION COURSE AT SAPIENZA UNIVERSITY OF ROME

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Index

| | |
|--|-----------|
| 1 Introduction | 4 |
| 1.1 Abstract | 4 |
| 1.2 Overview | 4 |
| 2 Requirement analysis | 4 |
| 2.1 Competitors | 4 |
| 2.1.1 SPYN:Discover Sports Near You | 4 |
| 2.1.2 Running (Adidas) - alias Allenamento Corsa e Fitness di adidas | 4 |
| 2.1.3 GoSporto | 5 |
| 2.1.4 Oyeplay | 6 |
| 2.2 Questionnaire analysis | 6 |
| 2.2.1 Questionnaire on general information | 6 |
| 2.2.2 Questionnaire on our project | 8 |
| 2.2.3 Conclusions | 12 |
| 2.3 Users analysis | 12 |
| 2.3.1 Persona 1 - Alex | 12 |
| 2.3.2 Persona 2 - Vanessa | 13 |
| 2.4 Functionalities | 13 |
| 2.5 Focus Group - Interview | 14 |
| 2.5.1 Introduction and hypothesis | 14 |
| 2.5.2 Presentation of focus group profiles | 14 |
| 3 Task analysis: HTA & STN | 15 |
| 3.1 Hierarchical Task Analysis (HTA) | 16 |
| 3.2 State Transition Network (STN) | 16 |
| 3.3 Create a training session | 16 |
| 3.4 Join a training session | 17 |
| 3.5 Do the login | 18 |
| 4 Mock-up and Prototype 1 | 19 |
| 4.1 Mock-ups and main functionalities | 19 |
| 4.2 Prototype 1 | 22 |
| 5 Expert Based Evaluation | 24 |

| | | |
|----------|---|-----------|
| 5.1 | Heuristic Evaluation | 24 |
| 5.2 | Molich and Nielsen's Heuristics | 24 |
| 5.3 | Expert report | 25 |
| 6 | Prototype 2 | 26 |
| 7 | Think Aloud | 29 |
| 7.1 | Brief review of the think aloud session | 29 |
| 7.2 | Conclusions of the think aloud session | 30 |
| 8 | Controlled Experiment | 30 |
| 8.1 | Problem | 30 |
| 8.2 | ANOVA One-Way Analysis | 31 |
| 8.3 | Analysis of ANOVA results | 31 |
| 9 | Conclusion | 32 |
| 9.1 | Future works | 32 |

1 Introduction

1.1 Abstract

The idea comes from a university competition in which a smart solution must be proposed. Our idea started from the fact that by analyzing some aptitude tests the average student or worker spends too many hours on books or at work. The goal is to entice the primary actor to do sport.

1.2 Overview

Based on those assumptions we started to think about an app that would serve as a medium to connect each other all people who share the same passion for a sport and in general for physical activities. Therefore we considered an app with as main goal the possibility for the user to connect with others joining sports events and creating events. In addition to this, we also thought to arrange the app in a way to allow, also through future developments, for other activities like sharing their workout and their statistics, make a public challenge with the possibility to take them directly from their favourites sport app. With this idea in mind we investigated on the real needs of the people and as a consequence we focused on specific sports and only a subset of the features mentioned before.

In the following section we will show further insight we gained from the interviews and the questionnaire on the perceived needs of the users.

2 Requirement analysis

2.1 Competitors

2.1.1 SPYN:Discover Sports Near You

You need a social space for talking about sport? This is the best app we have found for discovering and booking sports and fitness around you.

Advantages

- Join sports conversations happening near you
- Hire sports coaches to get trained in particular who is the best for your idea of workout
- Find sports clubs, gym near you(sorted in the list by your GPS location)
- Creation of a community
- No problems of finding a player who has similar skill level and stays nearby
- Schedule activities with possibility to book event sport session

Disadvantages

- It is active only in some cities of Bangalore and Mumbai
- Don't give you any suggestion on manage healthy body
- It does not give you the possibility to show how to do sport

2.1.2 Running (Adidas) - alias Allenamento Corsa e Fitness di adidas

Runtastic is one of the best app in the world in the digital health and fitness space. It has as sponsor and as parent company Adidas. It is suggested for professional player for the amount of facilities it delivers. The main sport offered are running and workout.

Advantages

- Social profile of the user
- Good support service
- Possibility to analyze past stats and new challenges which you can create yourself
- Possibility to create workout that are useful for you
- Ranking between friends into a same challenges
- You can improve your stats everyday reaching new goals
- Food advice for eating healthy
- Access to Adidas products, special offers and promotions or access to top-class events

Disadvantages

- Premium facilities
- You do not book into a game
- It is not useful that the app say to you when is preferable to change your training shoes
- No community with people similar to you in terms of skills (no possibility to create new relationship)
- Too much advertisement

2.1.3 GoSporto

GoSporto is to encourage more people to play sports. It is created with the idea that nowadays there is a strong latent need to play sports but a lot of people miss out because of three major factors: places to play are not easy to find, network of similar skilled team-mates/opponents are not available readily and regular motivation to keep playing is missing.

Advantages

- Creation profile, adding all sport and skill levels giving the possibility to link similar people
- Maintaining data and generates real-time score, stats
- Creation of a community with different profile of people who want to compete and improve or those who want to learn a new sport
- No problems of finding a player who has similar skill level and stays nearby

Disadvantages

- Work free on Web but not on Android app
- Does not give you any suggestion on manage healthy body
- Does not give you the possibility to show how to do sport
- The app has a low number of teams and players
- Available only to few type of sport
- Real-time booking is only available in the Delhi-National Capital Region

2.1.4 Oyeplay

OyePlay makes it easy to find and book a badminton court or a swimming-pool class. You can discover playgrounds, training centres, tournaments, adventure sports, even coaches.

Advantages

- Based online discovery and booking platform for any sports grounds, training centers, coaches, events and adventure sports
- Hire sports coaches to get trained in particular who is the best for your idea of workout
- No problems of finding a player and game who you need for playing
- Schedule activities with possibility to book event sport session

Disadvantages

- Does not give you any suggestion on manage healthy body
- Does not give you the possibility to show how to do sport
- It is based only in India

2.2 Questionnaire analysis

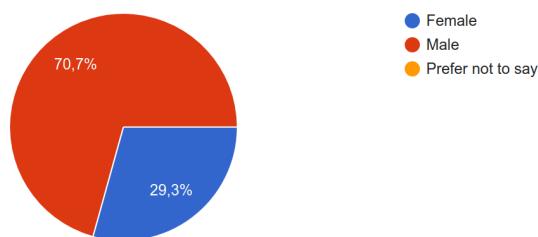
In this section we will see the questionnaire results used to validate and to improve our original idea.

2.2.1 Questionnaire on general information

The following questions were asked to potential users in order to understand the typical user interested in the idea behind the application. Despite this, they are purely general questions.

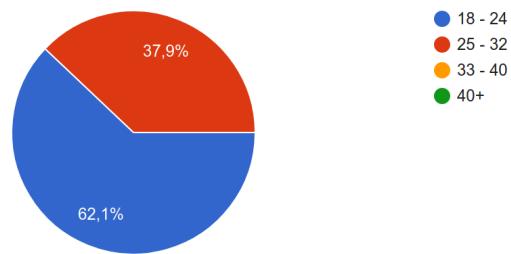
Are you male or female?

58 risposte



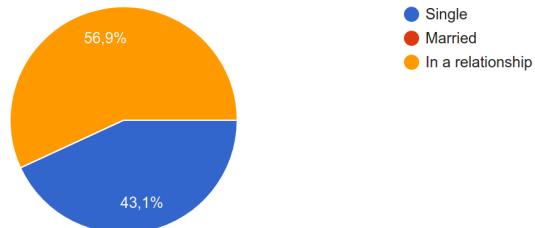
How old are you?

58 risposte



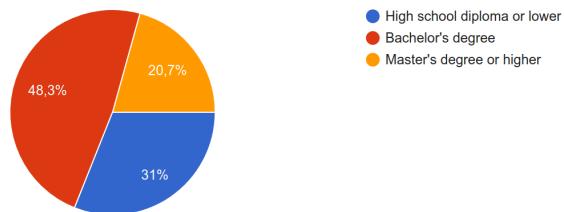
What is your status?

58 risposte



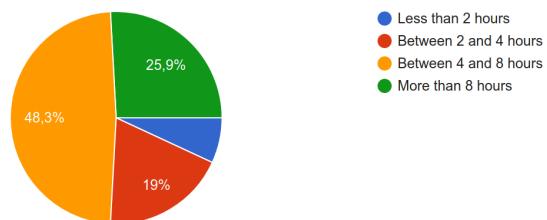
What is your level of education?

58 risposte



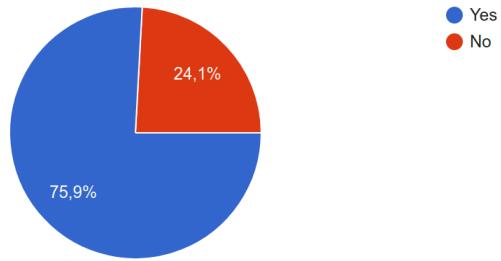
During the day, how many hours do you spend studying or working?

58 risposte



Do you practice sports?

58 risposte



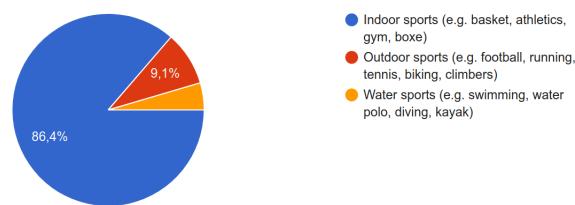
2.2.2 Questionnaire on our project

The following questions was asked users in order to understand the efficiency and interest in the idea of application. The questions have been divided in two main categories in order to target two main classes of people: the ones who play sport and the ones who do not play sport. In particular, for the ones who play sport we were interested in if they play sport as a part of a community or not.

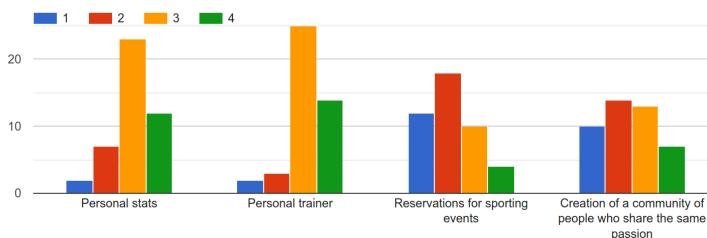
People who play sport

Which of these categories does the sport you play belong to?

44 risposte

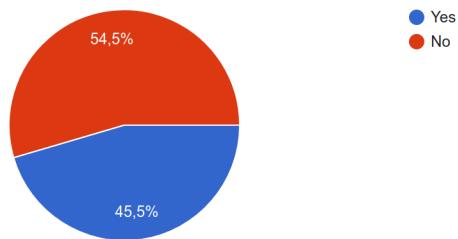


What features would you like to have in a sports app? (1 - not so important, 4 - very important)



Are you part of a community/group of people with whom you practice sport?

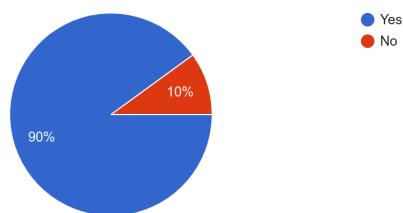
44 risposte



I am part of a community

Would you like to involve other people in the practice of sport through your community?

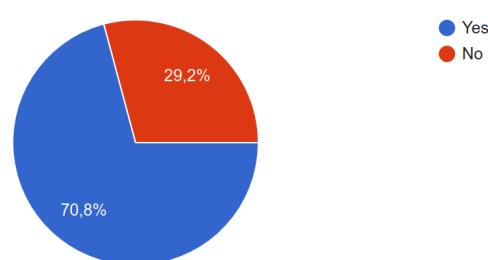
20 risposte



I am NOT part of a community

Would you like to meet new people who share your passion for sport?

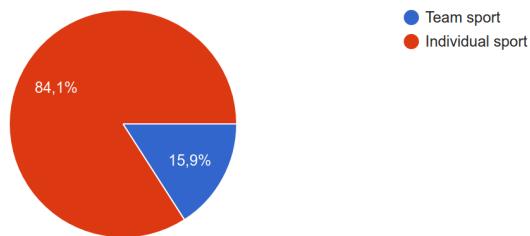
24 risposte



You DO practice sports

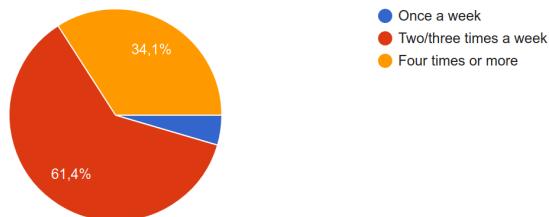
Do you practice an individual or team sport?

44 risposte



How many times a week do you play sports?

44 risposte

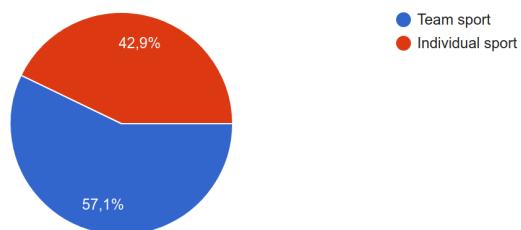


People who DO NOT play sport

You DO NOT practice sports

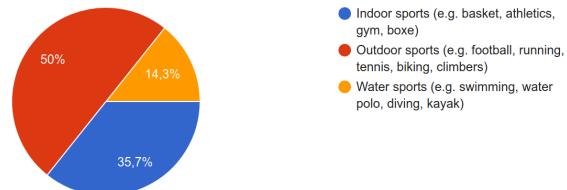
Would you rather play a team sport or an individual sport?

14 risposte



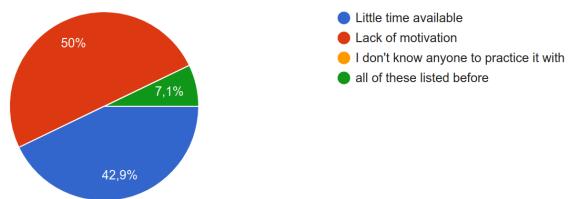
Which of these sports would you rather do?

14 risposte



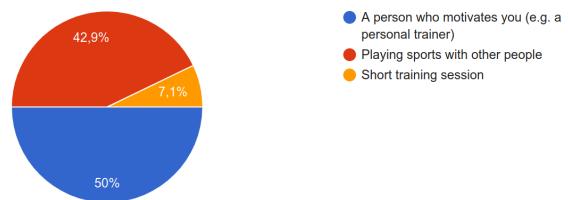
Why can't you play any sport?

14 risposte

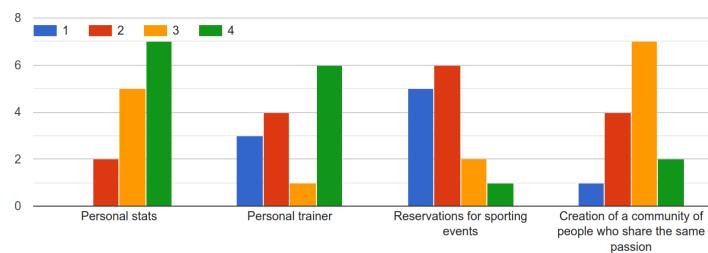


What could prompt you to change your mind about that?

14 risposte

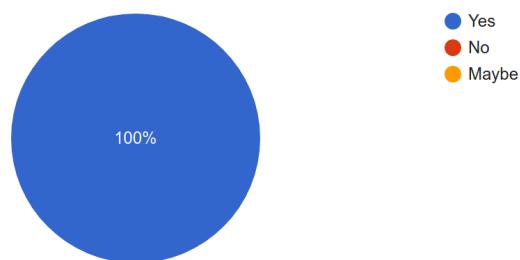


What features would you like to have in a sports app? (1 - not so important, 4 - very important)



In your opinion, can sport bring people together?

14 risposte



2.2.3 Conclusions

Good and interesting considerations emerged from the analysis of the questionnaire submitted:

1. General considerations
 - (a) the 100% target of our potential users have an age between 18 and 35 years
 - (b) more than 75% target play sports
 - (c) at least 75% target are involved in study or work activities for 4-8 hours a day
 - (d) more than 70% target, among people who play sport or not, prefer an indoor sport
2. Users who play sports
 - (a) more than 80% target play individual sports al 3 times a week
 - (b) approximately half target play sport in group but the 90% of others would play sport in community
3. Users who do not play sports
 - (a) more than 60% target do not play sports due to lack of motivation
 - (b) more than 90% target would get involved in a sport thanks to a person or a community who motivates him

In particular, due to the 1.d consideration we reviewed the idea of focusing the app on the outdoor sports. The new requirement emerged imposes us to give a more broad support to the indoor sports users through specific app features.

2.3 Users analysis

Based on what we have gathered from the questionnaires we can infer two main user profiles which will be described in the following.

2.3.1 Persona 1 - Alex

User profile

- Gender: Male
- Age: 24
- Status: In a relationship
- Level of education: Bachelor's degree
- Hours of study: 6 hours
- Practice sport: Yes

Persona

Alex is a 24 old guy which is an out-of-town student attending his master's degree in mechatronic engineering and due to this he is very committed to study. Nevertheless he has always played some sports and he would like to have an app that will allow him to involve in some outdoor sports or activities his girlfriend and his friends when he is at his hometown and to find for other playmate when he is out-of-town. He has always played football but he is interested also to athletics and like a lot to keep track of his progresses.

Scenario

It is the middle of the summer, Alex has done all the exams and he is coming back to his hometown. He likes a lot to spend time outdoor so he would like use an app to join, in the weekend, some of its friends to play football or to find a colleague who wants to practice some running on the beach. In particular, he wants that the app easily allow for creating an event specifying the time and the location and connects with who has agreed to join him.

2.3.2 Persona 2 - Vanessa

User profile

- Gender: Female
- Age: 26
- Status: Single
- Level of education: High school diploma
- Hours of work: 8 hours
- Practice sport: No

Persona

Vanessa is a 26 years old lady which lives in a big city, namely Rome. From many years she is working as a secretary in a law firm and for this reasons everyday she has lots of work to do. However she want to practice some sports in particular indoor sports like yoga but to make it more engaging she would like to practice it together with other girl who has the same interest and little time available.

Scenario

It is Saturday, she has not to work and she would like to spend the afternoon practising yoga. In order to do this she would use the app to organize an event, stating the location, the time, the length of the workout and what sport to practice. She wants that the app will push someone else to join her. Furthermore, since she wants to practice an indoor sport, she wants that the app will suggest public space in which do that besides the possibility to do workout at home.

2.4 Functionalities

After obtaining all this information about the habits and attitudes of potential users we have drawn up a list of possible features to implement in our app which can be seen in the following. Of all those functionalities we decided to implement in the first version of our app the first four functionalities of the list (from (a) to (d)) and delegate the remaining functionalities to subsequent and future versions.

1. Personal stats (High priority)
2. Personal trainer (High priority)
3. Reservation for sport events (Medium priority)
4. Creation of a community of people who share the same passion (High priority)
5. Video lesson (Low priority)
6. Explanation of the exercises / Personalized plan / Create a workout plan / Weekly goals to encourage a regular physical activity (Low priority)
7. Diet program based on your type of physique / Nutrition advice / Nutrition / Personal nutritionist (Low priority)
8. Contact other users to meet them in events or matches (Medium priority)
9. Challenges with ourselves / Info regarding foods to increase performances (Low priority)
10. Brief and intense workouts for have people who have limited amount of time available (Medium priority)
11. Possibility to link it with smart-bands / Possibility to obtain points based on how much I train / Possibility to make custom training and to view the training of other people (Low priority)

We believe that the features are indispensable features that the user expects to find in any sports app (for this reason they have a higher priority from the user) and that we certainly include in our initial hypothesis. However, analyzing the context of the survey we see that most people already practice sport in the community and those who don't, in community or not, would like to do a sport in the community anyway. In the light of these considerations, giving for sure the first two features the second ones would certainly emerge as an index of satisfaction for the end user. Finally, the second two identify the features not present in competitors or that should be improved and that would allow the product to emerge in the market.

2.5 Focus Group - Interview

2.5.1 Introduction and hypothesis

With the interview we want to understand why the target group has prioritized the use cases "personal stats" and "personal trainers". The a priori assumptions are as follows:

- Users are influenced by other market players (sports apps) by the fact that they believe that the use cases in question are obvious for such an app and expect to find them a priori
- Users are affected by the contingency of the COVID health emergency

If we note that users consider such cases of use to be essential regardless of the above hypotheses (and therefore discarding them), we must ask him directly for the reasons in order to resolve this issue.

If that is the case, we need to look into the following points in order:

1. If they already use sports apps that implement such use cases
2. If, in case, they'd be willing to change sports apps
3. If they would be willing to import this data into our app by sharing the data from the "health app" in order to integrate it with the "social" functions we have envisioned for our app

At the end of the interview the following scenarios could be configured in order of desirability:

1. Priority has been given to such cases of use for one of the two a priori hypotheses mentioned above; having clarified the issue we can give priority back to our cases of social use
2. The priority to such cases of use is independent of the two a priori hypotheses above: we must find a way to include such cases of use in our app with the following alternatives:
 - (a) creating a data sharing with the app they already use
 - (b) by directly implementing such use cases
3. The social features of our initial hypothesis have not been validated by users and should therefore be discarded

2.5.2 Presentation of focus group profiles

Chiara is a 22-year-old student of Economics and Finance at Luiss Roma. Most of her time is spent studying, studying more than 8 hours a day between classes and other things, however she manages to divincolarsi between study and sport through sports apps such as Runtastic that present excellent training plans that can be followed by even the most inexperienced people or when possible search fitness training sessions presented in the gym near home.

Marco is a 24-year-old student of Computer Engineering at the University of Bologna. Marco is considered a true sports enthusiast as he is able to carve out space every day to make sport, as he claims that the sport after the study for at least 2 hours. He has his own group in his gym with whom he meets every day at 18.30 in the gym. Mainly he does weightlifting while when for study reasons he is not able to organize himself with his friends he performs

sports activities offered by the gym such as boxing.

Lucrezia is a 25 years old student in Economics and Finance at LUMSA university. She spends most of her daily time studying. Three times a week she has a training session at the late afternoon without any sport app. She's interested in sharing her training sessions with other people, each one with his own sport app or training plan.

Riccardo is a 25 years old finance advisor at Aetos Partners firm. He spends most of his daily time at work, for an average 8 hours a day. He has his workout at the evening 3-4 times a week following his own training plan without any sport app. He's interested about the idea of sharing his training sessions with other people.

Giacomo, a student of Computer Engineering at the University of Pisa, has always been passionate about running and loves to practice this activity, together with walking, on a treadmill. For this reason he has always been interested in keeping track of his progress through smart watches like FitBit and using the app attached. Giacomo is therefore interested in having his training statistics at hand and therefore does not need a virtual personal trainer. Despite this he has expressed his willingness to participate in sporting events related to running.

Giovanni, a medical student at the University of Rome 'La Sapienza', has always practiced sport but in recent years he has focused on the gym and in particular on weightlifting. Because of the restrictions imposed in this period he felt the need to start using apps that would allow him to continue, albeit in a limited way, the sport activity at home. The app he used is Freeletics, which provides training plans tailored to your fitness with the relevant training videos. Therefore Giovanni's interest could be to give a social aspect to his workouts and not to have personal statistics or personal trainers.

In conclusion we can see that the focus group focused on discussing why there was a preference for "personal stats" and "personal trainers" use cases. Most of the users confirmed our hypothesis that the user in this moment, due to the restriction to stay at home, is subject to use smart applications and all of them have the features of personal trainers and stats. Among the solutions we have proposed, most say that they would be willing to share their information and workouts from other applications with the goal of not giving up the flexibility of being able to use multiple different workouts depending on the application you use. To sum up, in the first version of the app, we will implement the user profiling, stats and personal trainer and creating and participating in an event.

3 Task analysis: HTA & STN

In this section we are going to show the Hierarchical Task Analysis (HTA) and the State Transition Network (STN) of some tasks which can be done inside our app. The tasks covered by our analysis are:

- After having created an account, the user may want to create a training session
- The user might want to join an existing event or training session that reflects his preferences
- The user wants to join an event near him without defining his specific needs
- The user does the login in the app

Note: We suppose that there are already some events in the system in order to be able to carry on the second and the third task.

3.1 Hierarchical Task Analysis (HTA)

Hierarchical task analysis is a task description method and a variant of task analysis. HTA is used to produce an exhaustive description of tasks in a hierarchical structure of goals, sub-goals, operations and plans. In HTA, tasks are broken down into progressively smaller units.

3.2 State Transition Network (STN)

A state transition network is a diagram that is developed from a set of data and charts the flow of data from particular data points (called states or nodes) to the next in a probabilistic manner. State transition networks are used in both academic and industrial fields. State transition networks are a general construct, with more specific examples being augmented transition networks, recursive transition networks, and augmented recursive networks, among others.

3.3 Create a training session

To perform this task the user has to log in the app, then from the home page he can tap on the AddEvent button (the plus symbol at the bottom right corner). Now the CreateEvent page will show up and the user can fill every required fields: the date, the time, the activity, a brief description, the level of training required and the maximum number of participants allowed.

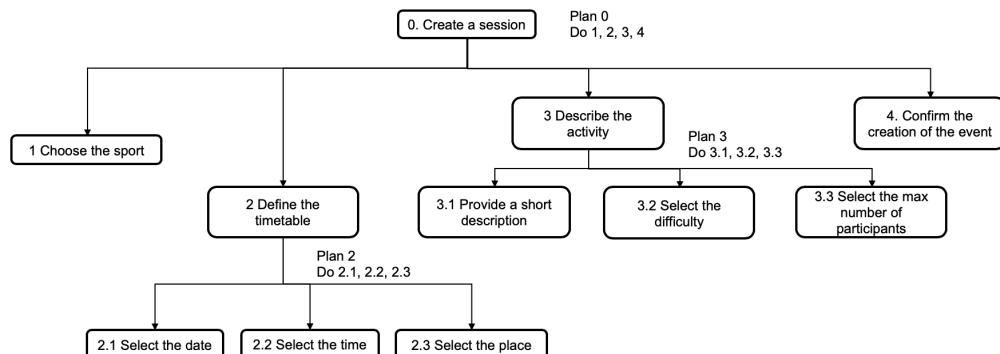


Figure 1: HTA: Create a training session

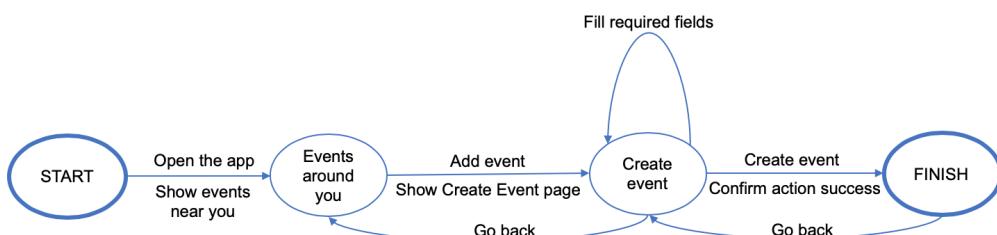


Figure 2: STN: Create a training session

3.4 Join a training session

To perform this task the user has to log in the app, then from the home page he can proceed in two ways:

1. he can choose to participate to a generic event that is near him without further selection
2. he can choose to search for a specific events that fits his current needs e.g. sport, time available to train, place, level required.

It should be noted that our idea is to show in the home page all the events that are near the user without distinguishing them on the sport or other metrics. This can be done since in the settings of the account the user has to specify the city in which he lives in this way all events in a specific area can be suggested to the user. Alternatively, the user can focus his research based on his needs or preferences for instance choosing for a specific sport or a level of training required because currently he is not in shape.

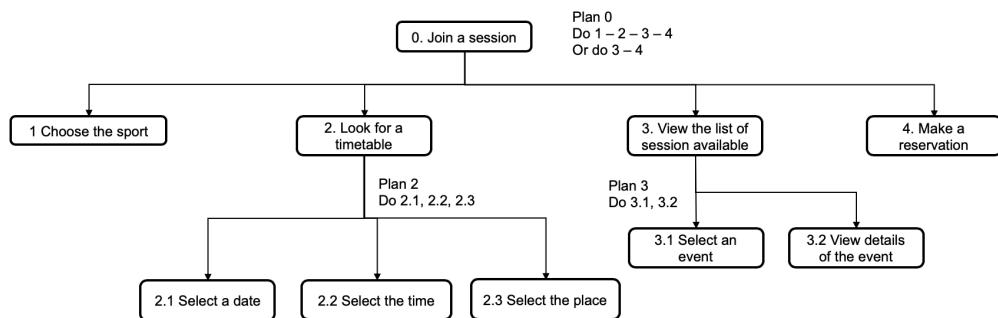


Figure 3: HTA: Join a training session

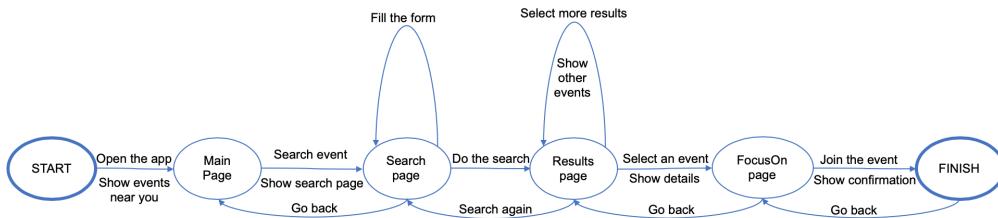


Figure 4: STN: Join a training session (using the search)

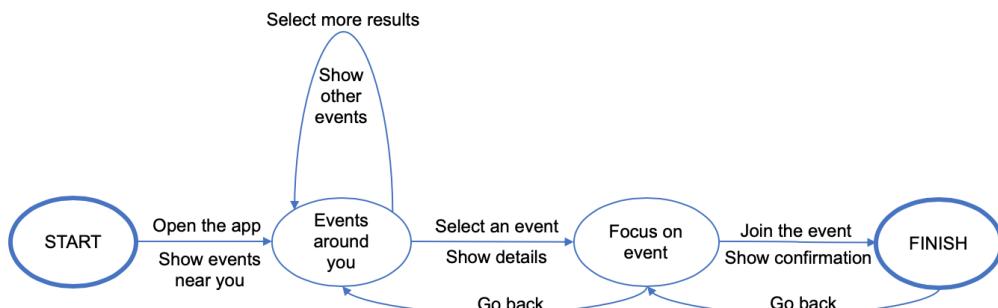


Figure 5: STN: Join a training session

3.5 Do the login

This is a very basic task that the user has to do when he opens the app for the first time or right after he has logged out. He can choose to do the log in in two main ways: the first one consist in using his email address and the password chosen in the registration phase or, as second way, he can choose to log in using a social account, in this case, Google or Facebook.

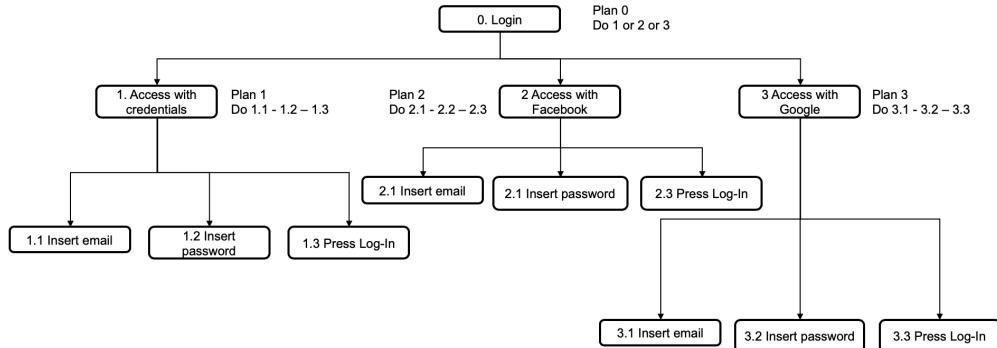


Figure 6: HTA: Login in the app

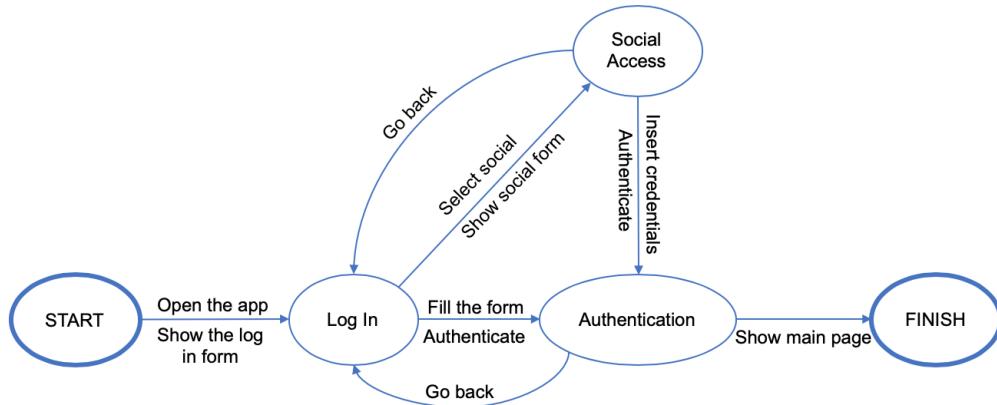


Figure 7: STN: Login in the app

4 Mock-up and Prototype 1

4.1 Mock-ups and main functionalities

In this chapter we are going to present the mock-ups of our app done in Balsamiq and the real counterpart done in Android Studio. Analyzing the results we got from the questionnaires, we decided which functions and features to put in this section. The HTA and STN section describes the behaviour of the application in a more accurate way. The mobile app is designed for general user typologies that usually practice some sports and wants to share with other the time they spend doing physical training. Therefore, the user may create a training session in order to involve others or simply join an existing one. The main action the user can do are:

- **Log in** with email and password and through Social account (Facebook and Google)
- **Sign Up** and then complete the questionnaire to know more about user preferences
- **Join an event** choosing one from the home page
- **Join an event** using the search
- **Create an event** and set all its characteristics
- **See user's statistics** and allow the app to get them from other sport app
- **See history of past events** and see their details

In the following pages we will show how some of them can be done inside our app. Note: other tasks like editing user description or event characteristics are not going to be showed because trivial.

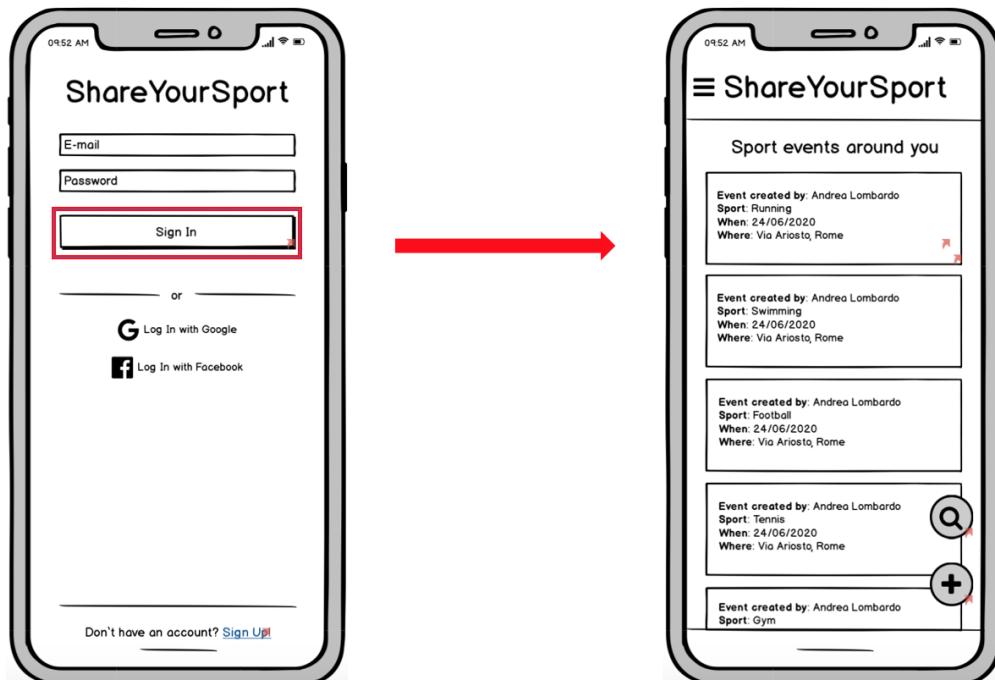


Figure 8: Task - Do the Login with user's credentials

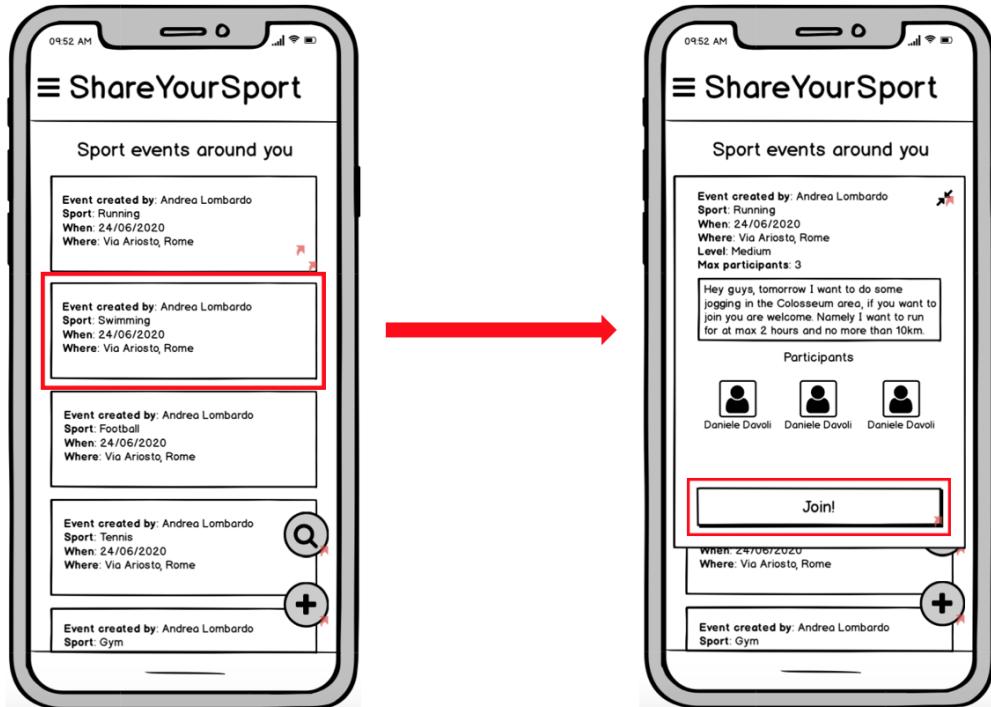


Figure 9: Task - Join an event near you

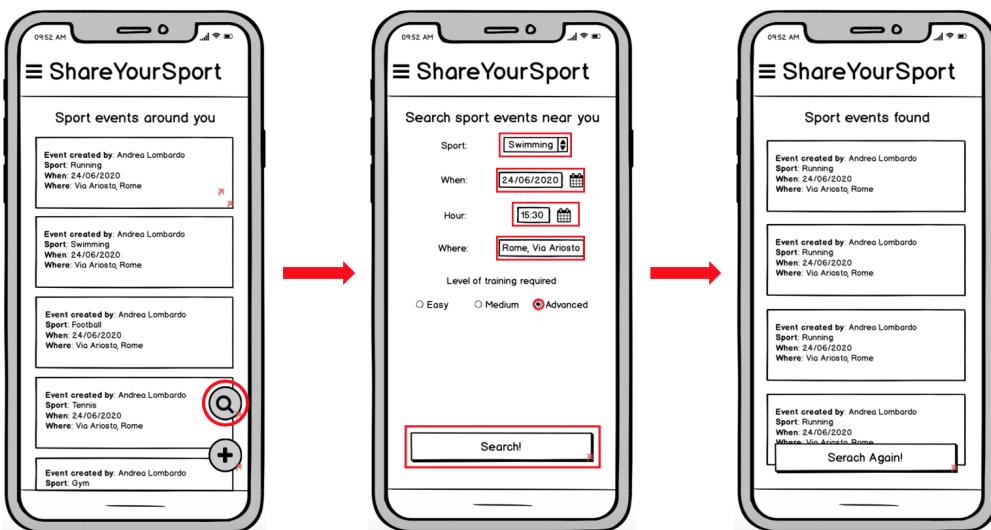


Figure 10: Task - Join an event searching for a specific one

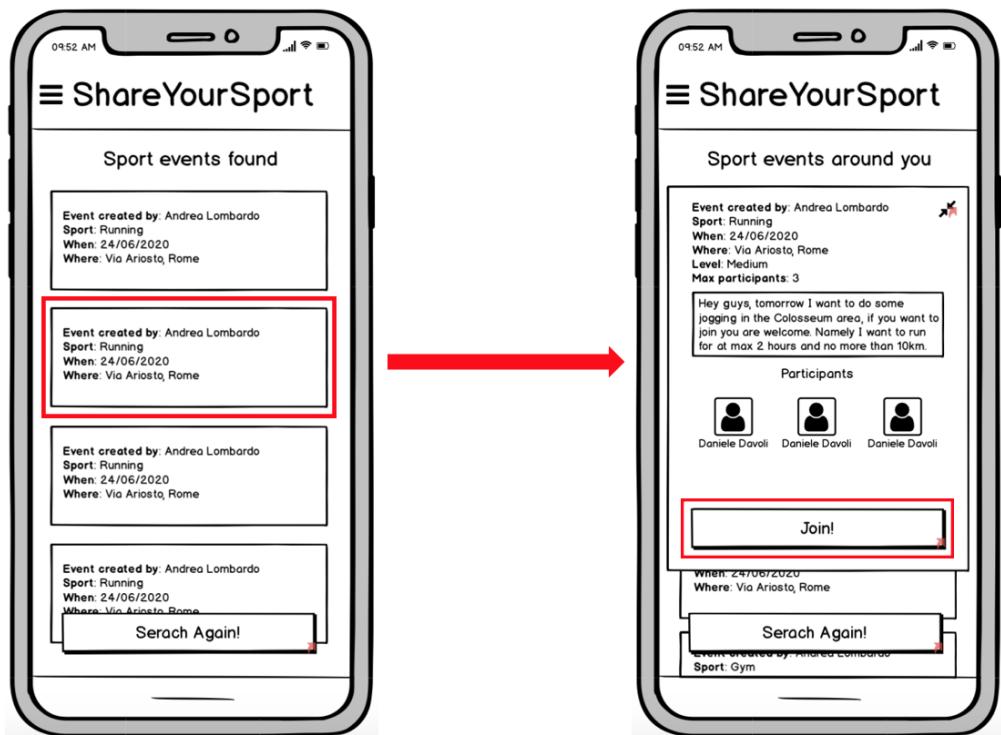


Figure 11: Task - Join an event searching for a specific one (second part)

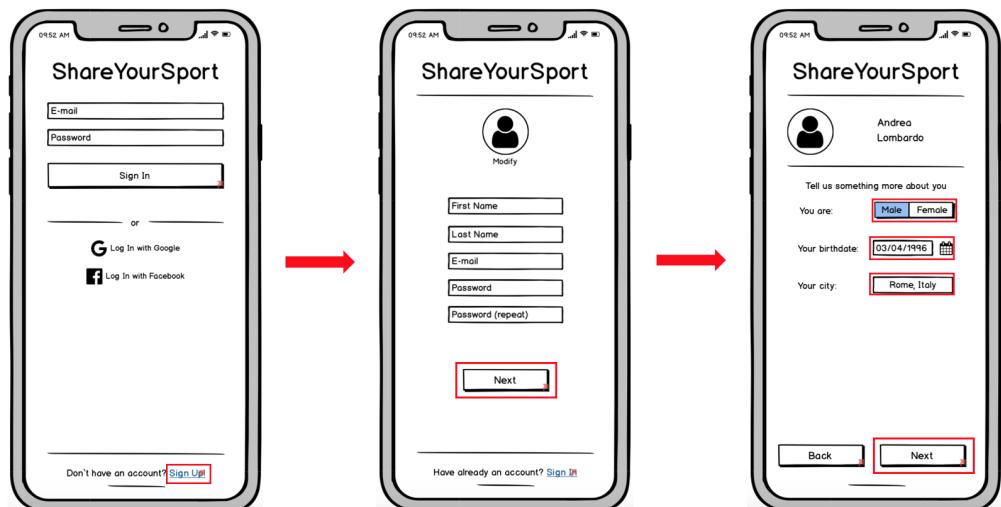


Figure 12: Task - Registration for a new account

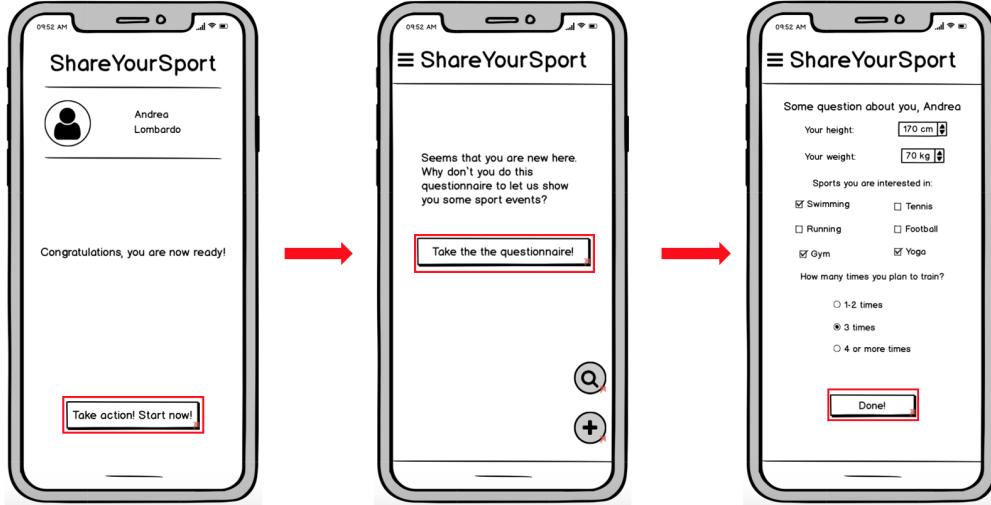


Figure 13: Task - Registration for a new account (second part)

4.2 Prototype 1

The first prototype was created following the mock up design illustrated previously and all of them were built with the HTA and STN of those tasks in mind. In addition to main tasks, secondary features which are complementary to the main ones have been also implemented such as:

- the user has the possibility to allow the app to take statistics from other installed sport apps
- the user has the possibility to change settings and information related to its user profile (e.g. the max distance for events)
- the user can do the questionnaire as soon as he registers a new account
- the user can see its progress in the statistics section of its profile

The GUI has been designed according to the following characteristics:

- essential
- used React Ionic framework
- followed Android Flat Design guidelines
- usage of the same color, font and structure in all the screens

In the following we can see some screenshots taken from the app, namely the prototype 1, designed on the preliminary insights we got from the interview, questionnaires and focus group.

Log In

Enter your e-mail

Enter Password

Log In

G Log In with Google

f Log In with Facebook

Don't have an account? [Sing Up](#)

(a) Log in page

Share Your Sport

12/05/2020

Roma

Daniele Davoli

Danilo Marzilli

SWIMMING

Gara di nuoto a Fregene

01/02/2019

Roma

Andrea Lombardo

Danilo Marzilli

TENNIS

Torneo di Piazza Sempione

12/04/2020

Roma

Daniele Davoli

(b) Main page

Search a sport ev...

Search sport events near you

Sport Diving

When 01 05 2020

Session time 14 10

Bari

Level of training required

Easy

Medium

Advanced

Search

(c) Search events page

Share Your Sport

Sport events you booked

RUNNING

Corsa a Villa Ada

12/05/2020

Roma

Daniele Davoli

Danilo Marzilli

Sport events you partecipated

SWIMMING

Gara di nuoto a Fregene

01/02/2019

Roma

Andrea Lombardo

Danilo Marzilli

(d) Your events page

5 Expert Based Evaluation

The evaluation takes place in the laboratory or in the field through user collaboration with the aim of carrying out functionality and usability tests on the current system. It is useful to evaluate both design and implementation and, ideally, the evaluation process should be considered at all stages of the project life cycle.

Evaluation techniques should achieve multiple objectives including: to evaluate the possible extent of system functionality, e.g. the task that users are interested in; to evaluate of the effect of the interface on the user, e.g. the user's experience of interactivity or how easy to learn and use or user satisfaction; to identify specific problems, e.g. errors, confusion and unexpected results. Heuristic evaluation and cognitive walk through are examples of expert based analysis methods.

5.1 Heuristic Evaluation

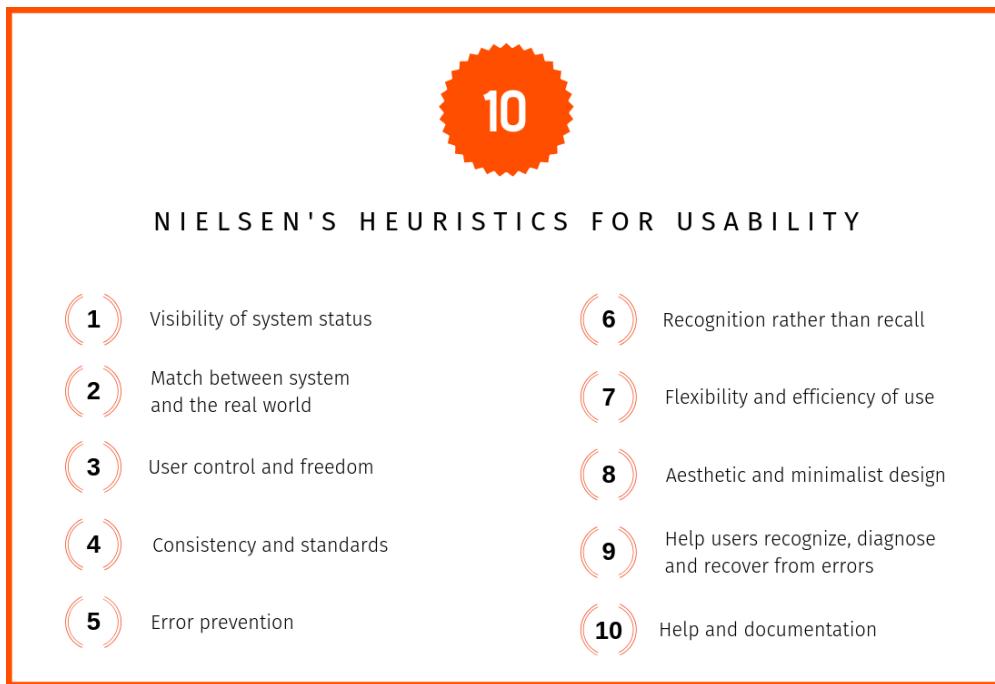
A heuristic evaluation is a usability inspection method for computer software that helps to identify usability problems in the user interface design. This method was developed by Jakob Nielsen and Rolf Molich and it is basically based on the comparison between your own interface and the usability principles. Given those usability criteria, called "the heuristics", the interface and its compliance to them will be examined then the analysis will produce a list of potential usability issues.

5.2 Molich and Nielsen's Heuristics

Molich and Nielsen developed a list of heuristics, in particular they are 10 and they are described in the following:

1. **Visibility of system status:** the system should always keep users informed about what's going on, through adequate feedback within a reasonable timeframe.
2. **Match between system and the real world:** the system should speak the user's language, following real-world conventions, using words, phrases and concepts familiar to the user and making the information appear in a natural and logical order, rather than using system-oriented terms.
3. **User control and freedom:** since users often make mistakes by choosing the wrong system function, they need a clearly "emergency" exit to leave the unwanted state. For this reason, the system should support undoing and resetting.
4. **Consistency and standards:** follow platform conventions so that users do not have to understand whether different words, situations or actions have the same meaning
5. **Error prevention:** having a careful design that prevents the occurrence of a problem - ring in the first place is better than a good error message, so eliminate conditions prone to error or check for them and present users with a confirmation option before they engage in the action
6. **Recognition rather than recall:** minimize user memory load by making objects, actions and options visible. The user does not need to remember information from one side of the dialog. The system operating instructions should be visible or easily retrievable whenever appropriate
7. **Flexibility and efficiency of use:** allow users to customize frequent actions with accelerators. Accelerators, not seen by the inexperienced user, can often speed up interactions for the experienced user so that the system can provide both inexperienced and experienced users
8. **Aesthetic and minimalist design:** dialogues should not contain information that is irrelevant or rarely needed, because each additional information unit in a dialogue competes with the relevant information units by reducing their visibility.
9. **Help users recognize, diagnose and recover from errors:** error should not be expressed in codes, but in plain language, precisely indicating the problem and constructively suggesting a solution

10. **Help and documentation:** it may be necessary to provide help and documentation, although it is better if the system can be used without documentation. Any information should be easy to look for, focused on the user's task, then make a list of concrete steps to take, and not be too extensive



5.3 Expert report

In this case the evaluation was done by our professor Prof. Ing. Valeria Mirabella. After the expert based evaluation, it has been reported that the following heuristics have been violated:

| Frame | Heuristic violated | Severity | Description / Comment |
|------------------------------|---|----------|---|
| Login page | Help users recognize, diagnose and recover from errors | 3 | Include a Forgot password? link |
| Sport events around you | Error prevention Recognition rather than recall | 3 | The magnifying glass icon overlaps one event. It seems that can access event details and not that you access the search function. |
| Search sport events near you | User control and freedom | 3 | Users could need a clearly marked "emergency exit". Put a "cancel/back" button |
| Your Events | User control and freedom | 3 | Some search function or could be useful. |
| Search sport events near you | User control and freedom | 2 | Search by event participants/creator could be useful. |
| Search sport events near you | Help users recognize, diagnose, and recover from errors | 3 | Provide cancel participation function |

where the severity number reflect the following statement:

- 0 - I don't agree that this is a usability problem at all
- 1 - Cosmetic problem only
- 2 - Minor usability problem
- 3 - Major usability problem
- 4 - Usability catastrophe

6 Prototype 2

After having received the expert-based evaluation with the list of heuristics violated in Prototype 1, we made some changes to the structure of the application in order to improve it and solve these issues:

- **Problem 1 - Frame: "Login Page", Heuristic violated: "Help users recognize, diagnose and recover from errors", Severity: 3** When the user open the app for the first time he has to log in before being able to carry on different tasks. The classic login page we designed was lacking of a link that allow the user to recover the lost password so in order to solve this issue we simply added in this page a "Forgot password?" link that will lead the user in the step necessary to change the password.
- **Problem 2 - Frame: "Main Page", Heuristic violated: "Error prevention, Recognition rather than recall", Severity: 3** The magnifying glass and the plus symbol could have been misunderstood by the user about their functionalities and also they could have been a source of error since they were floating. To solve this problem we used a tab bar in the bottom side of the app made up of two buttons with a name and a small icon for the related functions of "Create event" and "Search event".
- **Problem 3 - Frame: "Search Page", Heuristic violated: "User control and freedom", Severity: 3** The Search Page was lacking of a Cancel button that would have allowed the user to come back to the Main Page in the case he changed idea of looking for an event or he has simply pressed the search button unintentionally and want to come back. To solve this issue, we simply added a Cancel button in the Search Page.
- **Problem 4 - Frame: "Your Events Page", Heuristic violated: "User control and freedom", Severity: 3** This page reported the events the user participated in the past, the events the user created and those which the user is willing to participate. This page was lacking of a search function that would have allowed to search through the events according to specific characteristics, i.e. events happened in 2019. To solve this we added to the original design of the app a tab bar with only one button namely the Search button.
- **Problem 5 - Frame: "Search Page", Heuristic violated: "User control and freedom", Severity: 2** The original search page would allow user only to search events on its characteristics like time, place, sport and so on, in addition to this the expert suggested us to implement the possibility to search an event based on its creator or its participants. To solve this usability issue we decided to add a "preliminary" page before the search one in which it is asked to the user which kind of search he want to do. After this page, depending on the choice we show to the user the page in which there is a specific form.
- **Problem 6 - Frame: "Search Page", Heuristic violated: "Help users recognize, diagnose, and recover from errors", Severity: 3** In order to solve this issue instead of adding another button that allowed the user to cancel its participation to the event, we taught it will be a better way to do this giving to the same button a double behaviour. More precisely whenever the user tap on the event it subsequently will see the details of the event and a Join button will appear. Now to join the event he clicks on the button Join and after that it will change to "Joined" and if the user click again on this button it will go back to "Join" and this means he has cancelled its participation to the event.

In the following pages, we will see in-app screenshots showing the changes which have been made to the app after the expert based evaluation.

The screenshot shows a mobile application's login screen. At the top, there is a header with three horizontal lines and the text "Log In". Below the header are two input fields: "Enter your e-mail" and "Enter Password". A large blue button labeled "Log In" is centered below the password field. Below the "Log In" button are two social login options: "G Log In with Google" and "f Log In with Facebook". At the bottom of the screen, there is a link "Don't have an account? Sing Up".

(e) Login page - Before

The screenshot shows the same mobile application's login screen after changes. The layout is identical to the previous version, featuring the "Log In" header, input fields for email and password, the central "Log In" button, and the social login options. However, a new link "Forgot your password?" has been added just above the "Log In" button. The "Don't have an account? Sing Up" link at the bottom remains the same.

(f) Login page - After

The screenshot shows a mobile application's search interface for sports events. The title is "Search a sport ev...". It includes a search bar with the placeholder "Search sport events near you". Below the search bar are several filter options: "Sport" set to "Diving", "When" set to "01 05 2020", "Session time" set to "14 10", and "Bari" as the location. Under "Level of training required", there are three options: "Easy", "Medium", and "Advanced", with "Advanced" being checked. At the bottom of the screen is a large blue "Search" button.

(g) Search page - Before

The screenshot shows the same search interface after changes. The layout is identical, with the search bar, filters for sport, date, session time, and location, and the "Level of training required" section. The "Advanced" filter is still checked. However, the "Search" button at the bottom has been split into two buttons: a larger blue "Search" button and a smaller white "Cancel" button directly below it.

(h) Search page - After



Sport events you participated

SWIMMING

Gara di nuoto a Fregene

01/02/2019
 Roma
 Andrea Lombardo
 Danilo Marzilli

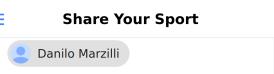
Sport events you created

TENNIS

Torneo di Piazza Sempione

12/04/2020
 Roma

(i) Your Events page - Before



Sport events you participated

SWIMMING

Gara di nuoto a Fregene

01/02/2019
 Roma
 Andrea Lombardo
 Danilo Marzilli

Sport events you created

TENNIS

Torneo di Piazza Sempione

12/04/2020
 Search

(j) Your Events page - After

Search a sport ev...

Search sport events near you

| Sport | Diving |
|--|------------|
| When | 01 05 2020 |
| Session time | 14 10 |
| Bari | |
| Level of training required | |
| Easy | |
| Medium | |
| <input checked="" type="checkbox"/> Advanced | |

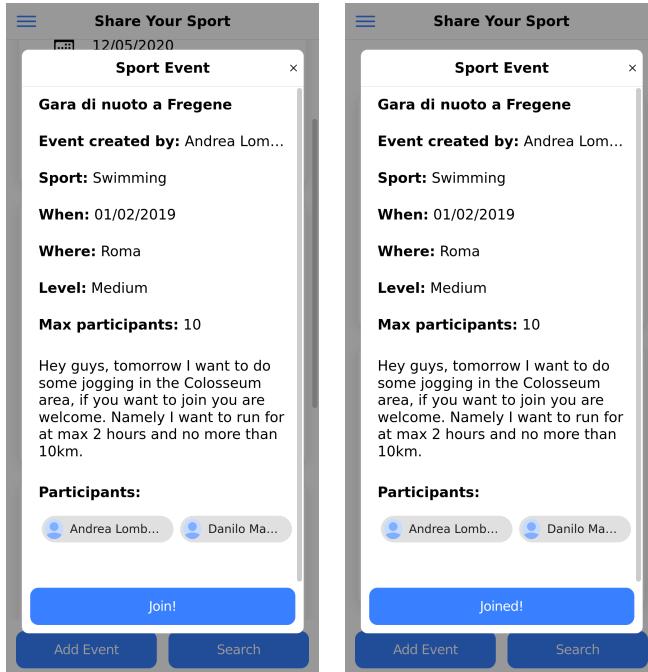
(k) Search page - Before

Search sports

Search sport events near you

[Go back](#)

(l) Search page - After



(m) Focus on event page - Before

(n) Focus on event page - After

7 Think Aloud

The think aloud is a kind of evaluation method based on simple rules. Specifically, it's necessary to choose a group of people and perform experiments using the following criteria:

- We must explain to the users who we are and what we are doing
- We explain that we are testing the application not them
- Each member has to accomplish the same task individually
- While executing the task, each user has to say aloud what he's doing, what he thinks it's happening and any doubt
- Each person used the ShareYourSport app on a smartphone, in some case provided form us
- The user can quit when he wants and we will not be able to help them
- During the experiment, we took some note by pen and paper

7.1 Brief review of the think aloud session

The evaluation through the think aloud methodology has been carried on a set of 12 people, all of them with an average age of 24, equally distributed among male and female and also among worker and student. Moreover, most of them had the high school diploma whereas the rest had the bachelor's degree. Then we explained to them the task they had to accomplish, in particular "search for an event that fits their interests and join it", and provided the smartphone with the app. More precisely, they had to: open the app, search a specific event through the search function, specify the characteristics of the event they are looking for, do the search and then, from the page of the results, choose the event they like most. It has to be noted that we provided the app already with a user profile so users don't need to register themselves before being able to do this task.

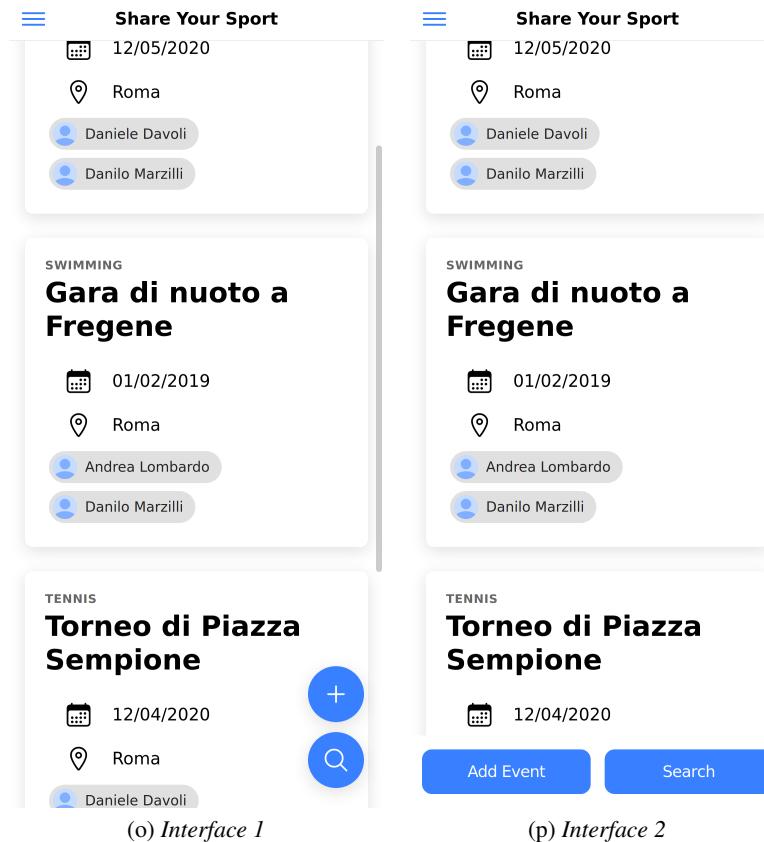
7.2 Conclusions of the think aloud session

All the users did not have found any problem in carrying on that task and as a consequence the interaction was smooth. Furthermore they appreciated the layout of the app, its responsiveness and the simple design. Some of them explored the app and wanted to execute other task like creating an event, seeing past event they participated and so on. Overall, we can say that the results obtained are fulfilling since almost everyone completed the task without problems.

8 Controlled Experiment

8.1 Problem

We have decided to implement, during the design phase, two distinct interfaces related to the "Create event" and "Search event" tasks. In particular, we used for the first interface two floating button on the bottom right side of the app namely a plus symbol and a magnifying glass respectively related to the first and second task. We thought that this way might have been more intuitive and faster respect to other approaches but, as it has been highlighted from the Prof. Mirabella, this approach could be misunderstood by users about their functionalities additionally their overlap with the events might be a source of errors and unwanted actions. For these reasons, we designed another interface replacing these icons with a tab bar on the bottom of the app with two buttons for the respectively actions. In order to understand if this new idea could be really more useful we needed to perform a controlled experiment. Our initial assumption was that in this second way the interaction could be more fluid and errors free.



8.2 ANOVA One-Way Analysis

The controlled experiment has been performed using the ANOVA One-Way analysis. The one-way analysis of variance (ANOVA) is used to determine whether there are any statistically significant differences between the means of two or more independent (unrelated) groups. A one-way between-group ANOVA implies that the categorical predictor contains categories that are independent (that is scores in one category are unrelated to those in another). Therefore we used the between groups approach to do the ANOVA analysis. We asked to 12 different people to perform a specific task. All the users will be divided in two groups in order to perform the experiment under different conditions, in this case two different UI design. More precisely, the first group will use the interface which has two floating button in the bottom right side of the app to implement the functions "Create event" and "Search event". The second interface will explore the usability of the tab bar in the bottom of the app.

About the data we can say:

- **Who?** (participants): 12 people, all aged between 20 - 26

- **Variables**

- *independent*: two interfaces
 - *dependent*: time to execute the task

- **Hypothesis**

- *null*: there are no differences between the two interfaces
 - *our*: we guess users will complete the task in less time using the second interface

- **Experiment**

- *task*: search an event by its characteristics and join it
 - *assumptions*: user is already logged and there are some events already in the system through which look for

- **How to apply ANOVA?** We measure through a chronometer how much time each user spent to perform the required task with the respective interface. All those value have been collected in order to execute in a second step the analysis.

8.3 Analysis of ANOVA results

The ANOVA analysis was executed through the related plugin offered in Excel which let do this kind of analysis in an easy way without having to do calculations by hand. The results of the analysis showed that $F > F_{crit}$ so as a consequence the null hypothesis has to be rejected this means that the two interfaces are not the same about their usability. We guess that the first interface got worst results not because it doesn't clearly represent the functionalities it implement, namely "Search event" and "Create event", but because their overlapping with the events caused unwanted actions respect to what the user wanted to do. For example, some times the user can have lost time because he wanted to click on the plus button (Create event) but in fact he touched on the event and got its description so he has to come back and click again. Therefore the second interface performed better respect than the first one in fact the users spent less time to do that task and he got significantly less errors. In the following we can see the analysis carried on through Excel:

| Interface 1 | Interface 2 |
|-------------|-------------|
| 26,5 | 21 |
| 25 | 20,5 |
| 21,5 | 22 |
| 27,5 | 23 |
| 26 | 21 |
| 23 | 20 |

Figure 14: Results of the experiment

Analisi varianza: ad un fattore

RIEPILOGO

| Gruppi | Conteggio | Somma | Media | Varianza |
|-----------|-----------|-------|-------------|-------------|
| Colonna 1 | 6 | 149,5 | 24,91666667 | 5,141666667 |
| Colonna 2 | 6 | 127,5 | 21,25 | 1,175 |

ANALISI VARIANZA

| Origine della variazione | SQ | gdl | MQ | F | Valore di significatività | F crit |
|--------------------------|-------------|-----|-------------|-------------|---------------------------|-------------|
| Tra gruppi | 40,33333333 | 1 | 40,33333333 | 12,77044855 | 0,00506552 | 4,964602744 |
| In gruppi | 31,58333333 | 10 | 3,158333333 | | | |
| Totale | 71,91666667 | 11 | | | | |

Figure 15: Results of the ANOVA analysis

9 Conclusion

In conclusion we can firmly state that through this project we have learnt not only technical skills but more in dept about qualitative aspects of the User Interface design. Overall, we have strengthened a way of working centered on the user needs and necessities and based on this to structure and to design the software application. Furthermore we have also gained experience about the phase of testing in order to validate our UI design and, based on the insight we gathered, further refine the app architecture. In addition we gained experience in using app for fast prototyping and mockup design like Balsamiq and Android Studio for the implementation part. In the last part we have also better understood about testing technique like ANOVA, think aloud and expert based evaluation.

9.1 Future works

Due to the Covid-19 situation we haven't had much of a chance to collaborate together in a more suitable way, so for this reason we decided to implement to general app architecture and design and the main functionalities that allow the app to be used even only in a basic way and in particular we implemented the possibility to create an event, search for it and join an event. Moreover we implemented the possibility for the user to get statistics from other sport apps. Obviously we implemented the registration phase, the login and the questionnaire the user has to do as soon as it register.

Other interesting ideas to be implemented in future version in the app are:

- **internal messaging system:** to allow users of the app to communicate directly each other without passing through other app
- **share on social media:** the possibility for the user to share events he created on social media to involve other people

- **share workout and challenge:** to allow users to share their workout in order to be easily copied by others and their challenges
- **import workout from other apps:** to allow people to continue to use their favourite app for workout
- **statistics:** implement them in a more detailed way to allow the user to see their progress

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