MIE344 Design and Analysis of Information Systems

High Fidelity Prototype

Teaching Assistants:

- Sean Kortschot
- Katie Seaborn

Group #1

Members:

- Kathy Huynh
- Klajd Kapllani
- Kevin Lipiec
- Reza Boushehri
- Maria Bucheli

App Name: SquadUP

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0.0 Executive Summary

A group of developers have generated plans for a mobile application called SquadUp, which will allow users to create and join lobbies that match people who want to participate in a certain sport or entertainment activity, and book the social outing. The Canadian population boosted their physical activity from 20%-142% between 1970 and 1990 [1], and the emergence of D-GPS has also made the ability to connect people that are separated by distance a lot easier [2]. Furthermore, aspects such as effective profile and social graph management and the balance between social party communication and user privacy have characterized successful social media platforms [3]. These observations support the need and practicality of SquadUp's development. The development team identified that the app should be effective to use - capable of uniting people that want to do an activity at a certain time and location, easy to learn - simple to use and consistent with existing apps, and have a good utility - having multiple ways to interact with the system and supported by any modern mobile device. The design should also be clear, engaging, helpful, and satisfying. In order to fit the app to its users, the developers conducted user research using multiple data gathering techniques and analyzed the results to develop a user profile for their application design. Based on this profile, a set of requirements - functional, data, environmental, and user characteristic were established, and two low fidelity prototypes were developed and combined. After conducting a heuristic evaluation on the combined prototype, changes were implemented to develop a high fidelity prototype. In order to

test the functionality of this prototype, a usability testing session will be performed based on an established usability protocol. The results will be analyzed to diagnose usability issues and develop recommended design changes for SquadUp moving forward.

1.0 Project Description

With demand increasing for sports, fitness, and entertainment facilities [1], not a lot has been done to facilitate the process of booking and finding the right people to take part in such events. Finding the right people, at the right place and time can be a challenge, which is where SquadUP (the app we are designing) steps in. SquadUp will allow users to see which sports and entertainment venues are located in their area, encourage users to organize events together by allowing them to create or join pickup games and social outings, and recommend venues near their location once the event has been created. Additionally, users will be able to book facilities automatically through the app.

2.0 Functionalities of the system

The main functionalities of the app, the ability to create and join sport and entertainment events, were generated during the first stage of the project, the user research and requirements. Later in the process, we created the low fidelity prototype, which was put together by combining two sketches created by the team. For the creation of the low fidelity prototype, the Android Design Guidelines [2] were considered, and incorporated in features such as the menu buttons, and pop up screen among others. The last step before designing the high fidelity prototype was heuristics evaluation. The team received feedback, and adjustments were made to improve the design, work flow and clarity of the app. The process leading up to the high fidelity prototype is summarized in Figure 1.

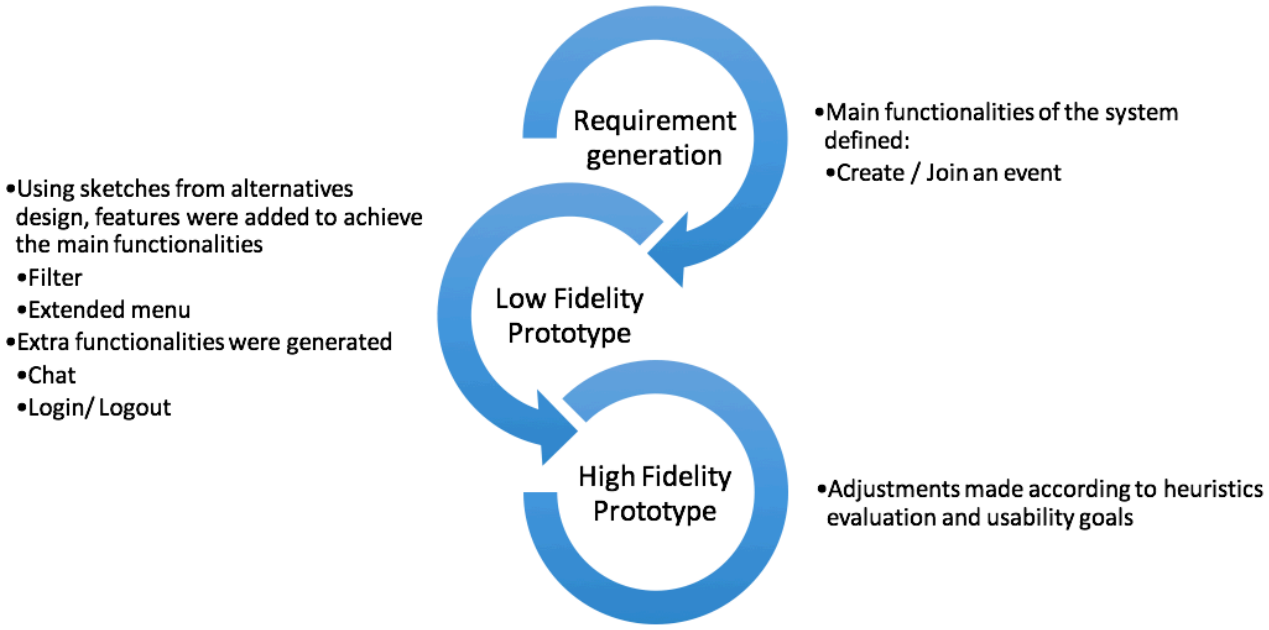


Figure 1 Process of functionality generation

The changes made after heuristic evaluation are presented in table 1:

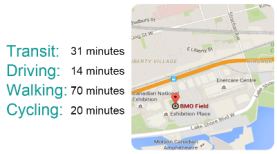
Low Fidelity Prototype	Problem	High Fidelity Prototype
The chat function had to be accessed within each of the events.	The user had to remember where chat was located	We decided to implement the chat in different pages: - Main menu - Menu expansion - Inside each event page This will allow the user to access the chat without having to go back to the main page or to find the particular event.
At the top of the screen, a hierarchical sequence of where the user is in the system was shown. … Basketball > Create Event > Custom Location	It was difficult to fit the entire process due to screen size and caused confusion about the purpose of the feature	Using the hamburger icon, the user can return to the main page. Additionally, the team considered that all Android phones have a back button that can be used to return to the previous page.

Table 1: Changes Made After Heuristic Evaluation

The main functionalities of the system are: creating and joining events. The options displayed will depend on the user preferences such as: search radius, number of participants, and date and time. The option to create an event has some variability, whether the user decides to use an existing facility or define a custom location. This is the reason the team decided to incorporate both functions as part of the usability testing.

The following two Tables present the list of functionalities and features incorporated in the design of the High Fidelity Prototype. Table 2 analyzes the design features, and Table 3 will look at the functionalities implemented.

Implemented Design Features	Justification
Main menu - Menu buttons Create Event > - Welcome John!	The app needs to have a start point for the task. A place where you can see a horizontal perspective of the app (i.e. all functionalities) The buttons are part of the Design Guidelines for Android phones [2] Customization and feedback
Sports page - Button  Baseball >	In the case of the Sports page, we have decided to use icons representing the sport as well as text to allow easy recognition (Redundancy gain)
Left menu expansion - Hamburger icon	It is important for navigation purposes to be able to move from one page to another. In this case, if the user wants to execute another functionality, the start point is the main menu, a specific event page, or the chat. Therefore, the hamburger icon was placed on every page with the mentioned start points. However, it is implemented only in certain pages, given that for the purposes of the usability testing tasks, it would be used only at certain points during the execution The hamburger icon  is part of the Design Guidelines for Android phones
Filter	User preference is a major requirement of the app. It is necessary for the icons used to be clear and intuitive
View participants	A key point to decide whether to join an event or not will be the number of participants, and who these participants are. This functionality is also part of the user preference requirement.

	The team decided to include this feature as a pop up, given that it is additional information for the current page.
Buttons	The buttons used throughout are standardized in shape and colour. A list is denoted by a menu button with an arrow to the side  Button of confirmation or action have a green colour and smaller 
Map	A map is provided as part of the event page, and before the customer makes the decision of joining an event. The feature was incorporated to provide extra information about the event, and if required, provide a route to get to the venue. Additionally, the time to get to the venue according to the different methods of transportation is displayed next to the map 
Time reminder	At the top of the event page, the time remaining until the event is provided, as a way to ensure the user knows exactly when the event will take place. 
Meetup instructions	As a way to facilitate the communication among participants, meetup instructions are provided to users who join the event, as well as to users who create a new event
Confirmation pages	To ensure that the action is correct, and to provide feedback about the current activity, the team has incorporated confirmation pages along the different tasks. For example: - When booking a facility - Creating an event - Joining an event
Multiple navigation routes	The app allows some freedom in terms of how some pages can be reached. For instance, if the user wants the main menu, it can be achieved through: - Left menu expansion (at any point) - After creating/ joining an event

	Another example is the chat, which can be reached by clicking: - Left expansion menu - Main menu - Specific event page This functionality allows the user to reach the main functionalities of the system at any point during the completion of a task

Table 2: Implemented Design Features

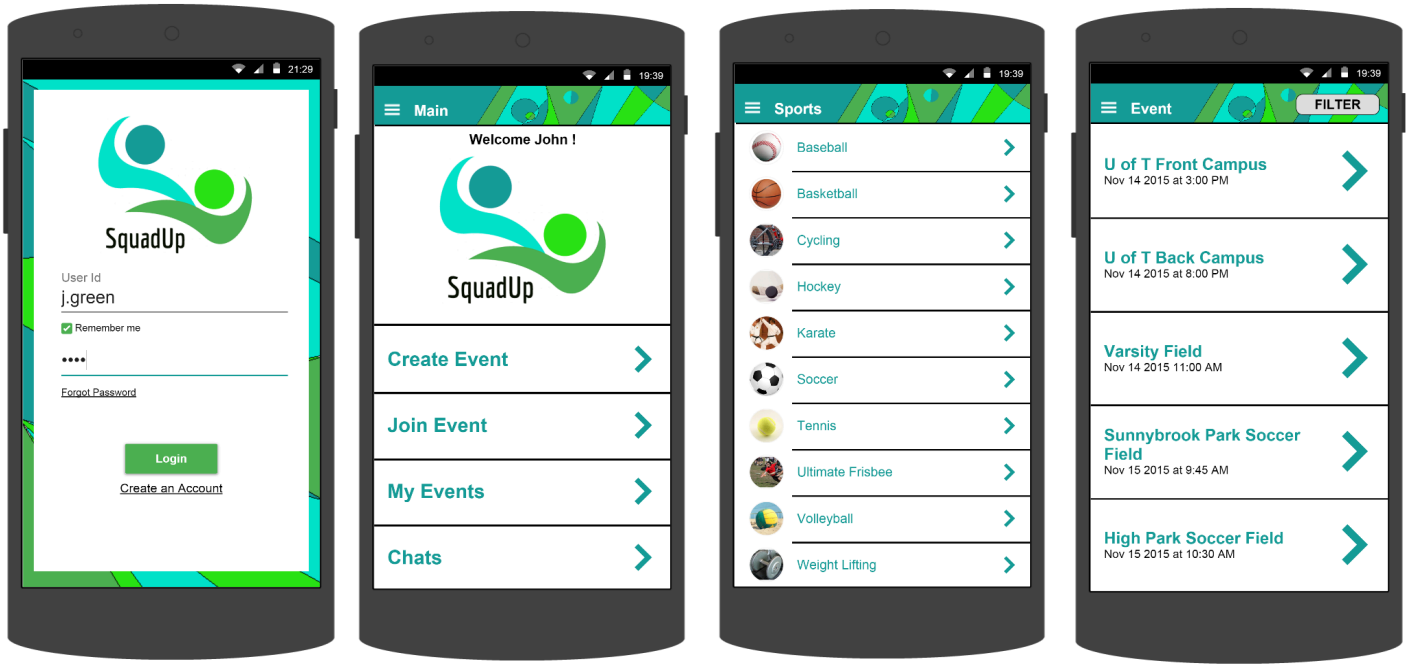
Implemented Functionality	Justification
Book a facility	As part of the creation of an event, instead of being redirected to another page, the app allows the user to perform the booking directly as part of the creation process
Login /Log Out System	Almost every app on the market has this function for reliability and security of the information inputted in the app (e.g. location)
Chat	The chat function was considered to be indispensable for communication among participants, and therefore was also considered for usability testing.

Table 3: Implemented Functionality

3.0 Screencaptures

The functionalities implemented in the system will be explained using a sequence of screencaptures showing four tasks, along with the description of the current screen and the necessary information to continue with the task (i.e. input information). The screencaptures presented below will demonstrate extra functionalities that were not tested during usability testing (E.g. Use of the hamburger icon to return to the main menu).
The following are the four tasks analized:

1. Join a Soccer Event called “Laka Laka”
2. Create a Basketball event by booking a facility
3. Create a Basketball event by setting a customer location
4. Access the Chat for “Laka Laka” event

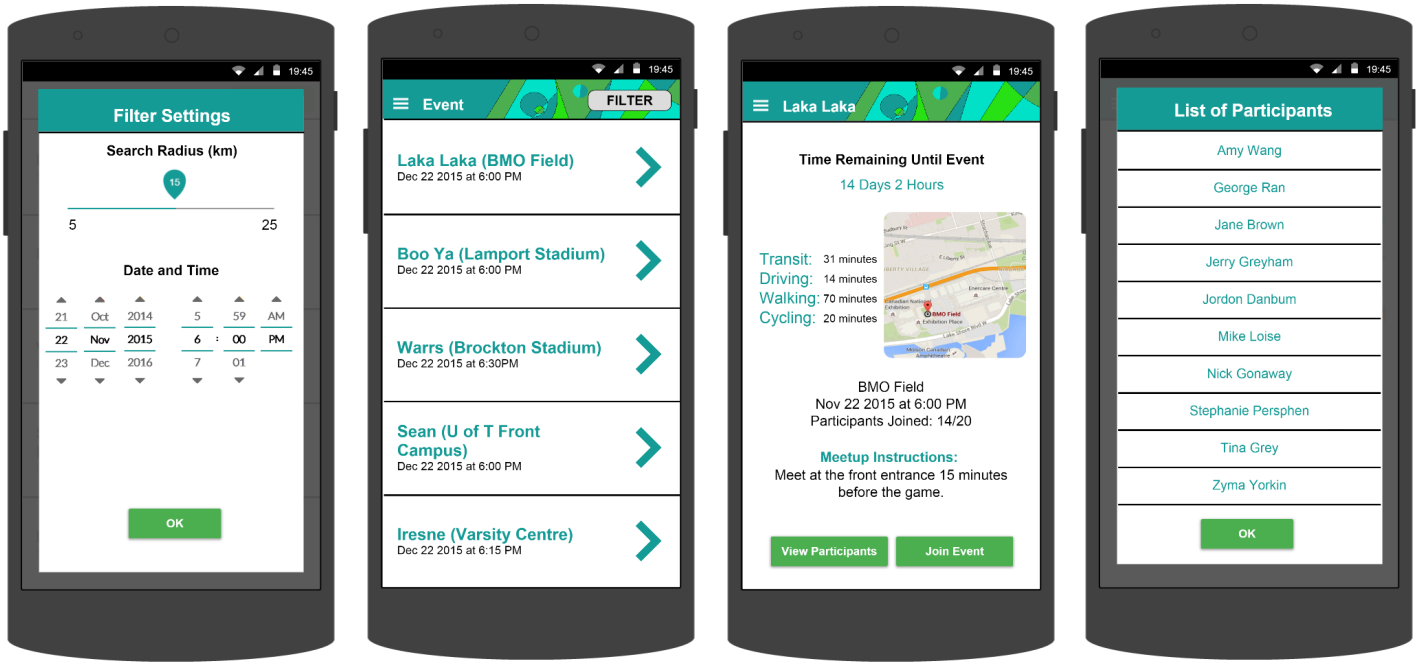


The user is assumed to already have an account created. The login information provided is:
User Id: j.green
Password: 1234

Once users are logged in, they will be directed to the main page. The main functionalities of the system are presented here. In this case they choose the “Join Event” button

The Sports page will be presented next, and users select “Soccer” (Image references [1-10])

Events that match the soccer criteria are displayed. As part of the task it is necessary to modify search preferences: users selects “Filter”

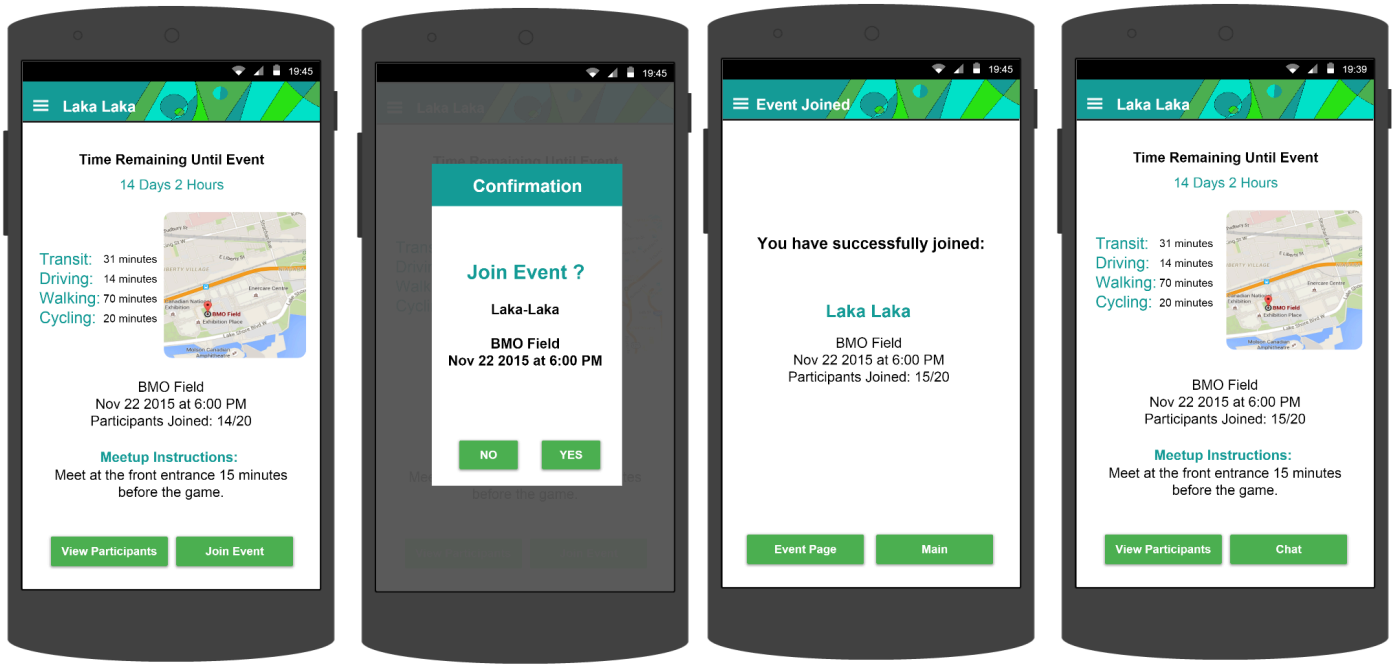


A pop up window appears with the option to adjust search radius and date preferences for events. The user adjusts “Search Radius” to 15 and selects “OK”

The name of new events that satisfy the user’s search preferences are displayed along with their location, the date, and time of the event. “Laka Laka” event is chosen

The event page for Laka Laka provides further information about the event, including a map with the location of the event (BMO Field), transportation methods from the current user location to the event location, along with the travel time of each method. The number of participants and meetup instructions are presented to provide the user with information to choose whether or not to join the event.
User clicks on “View Participants” to view the list of participants that joined the event

A list of participants is presented in a pop-up. The participant names are displayed. The user selects “OK” to close the pop-up

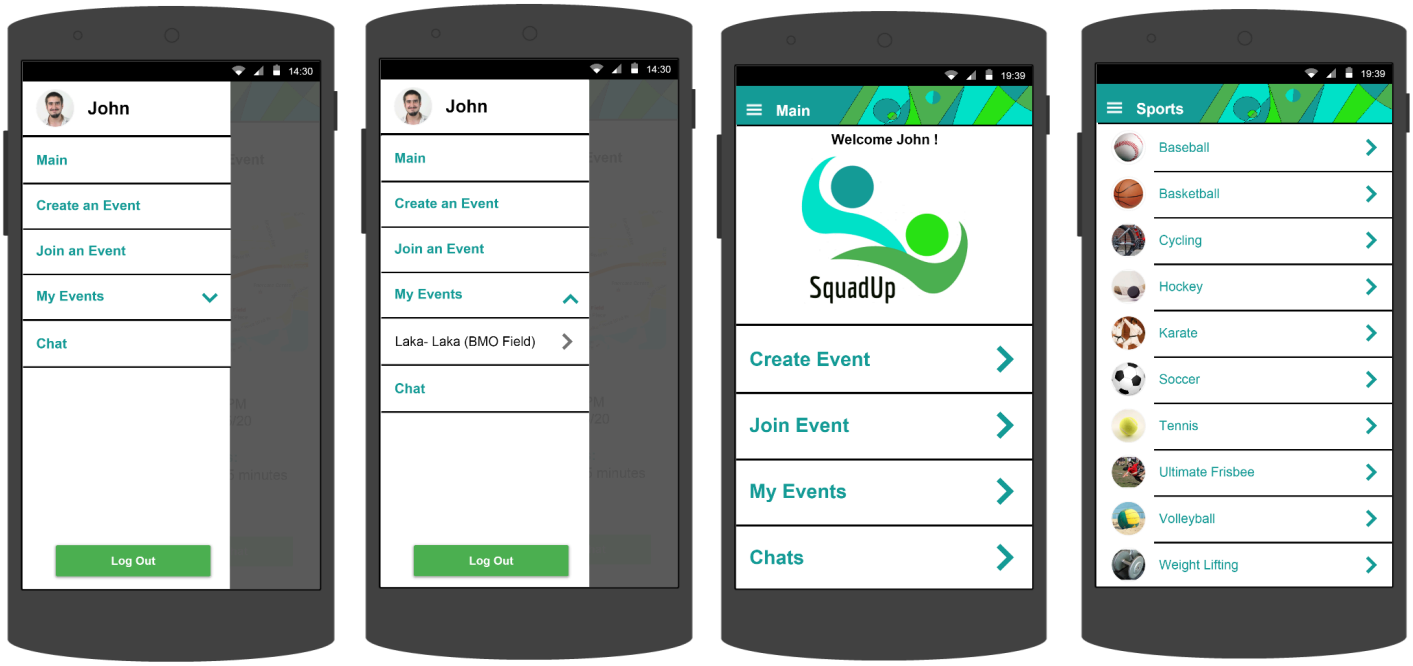


The user returns to the event page. The user wants to join, so selects “Join Event”

A pop up appears, which just makes sure the User wants to join. Additionally, it displays basic information about the event to join. The User selects “YES”

A confirmation page is displayed with the details of the event joined. If the user wishes to see further details about the event, they select “Event Page”

The event page of the joined event is displayed. To check the joined the event, the user selects the hamburger icon 

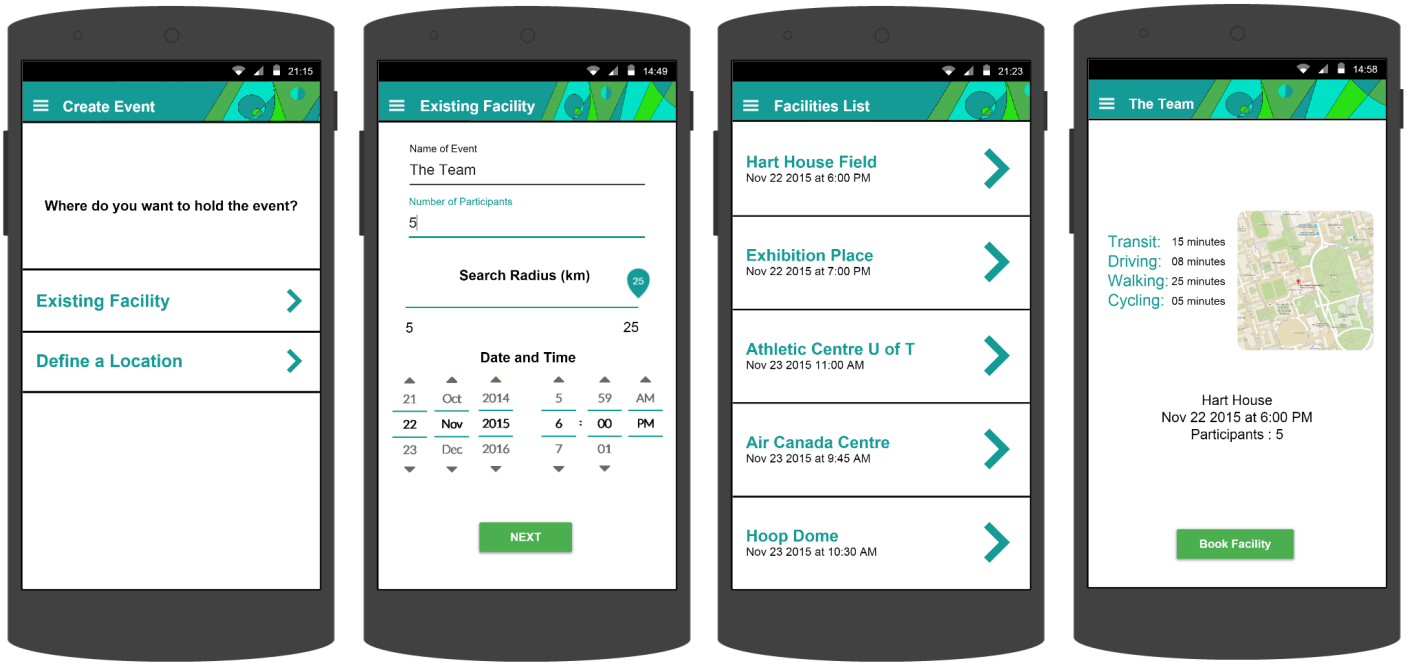


A menu will appear on the left side. The user can view the recently joined event by pressing the downward arrow button

A menu with the event will be displayed. The user can now return to the main menu by selecting ‘Main’, to continue to the next task

The user is back at the main menu. For the second task, they select “Create Event”

The user wishes to join a Basketball event: they select “Basketball”

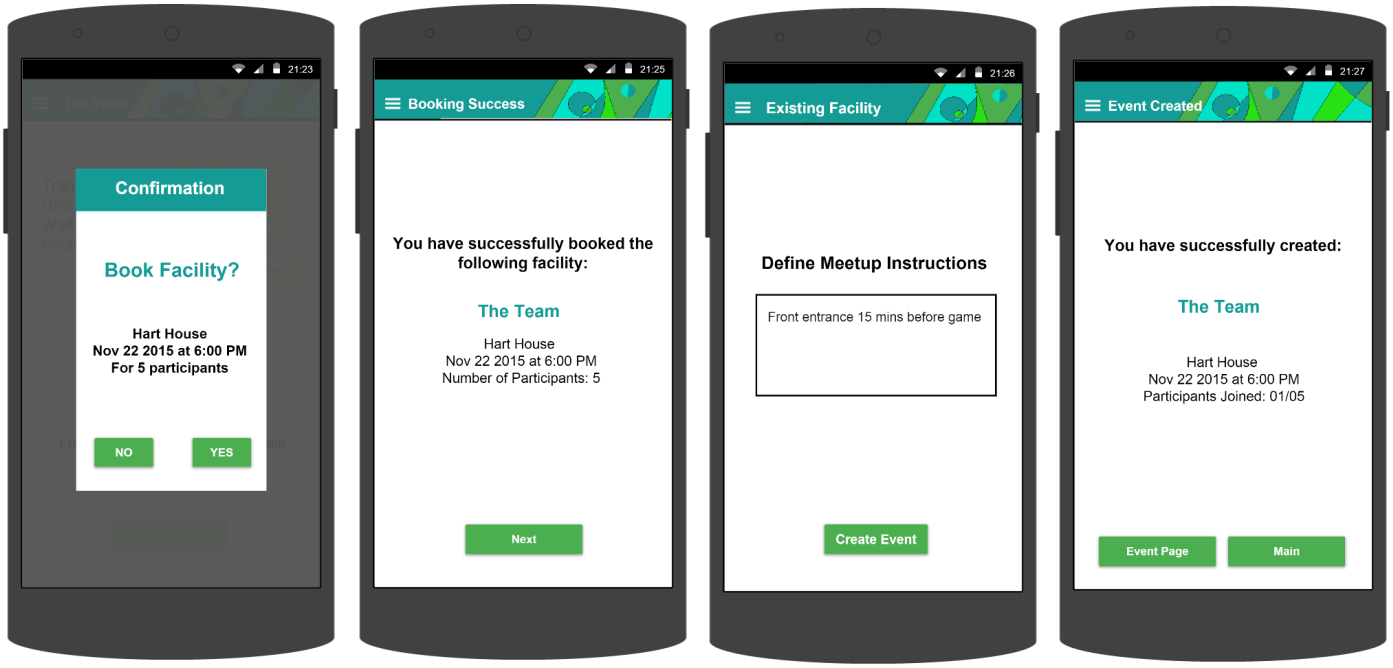


The user wants to book a facility: they select “Existing Facility”

The user sets the Name of the Event to “The Team” by typing in the “Name of Event” input field. They set the number of participants to 5, and keep the Search Radius at 25. The user then selects “Next”

A list of facilities that fulfill the user’s requests will be displayed. The user selects “Hart House Field”

An information page is presented about the chosen facility. The user selects “Book Facility”

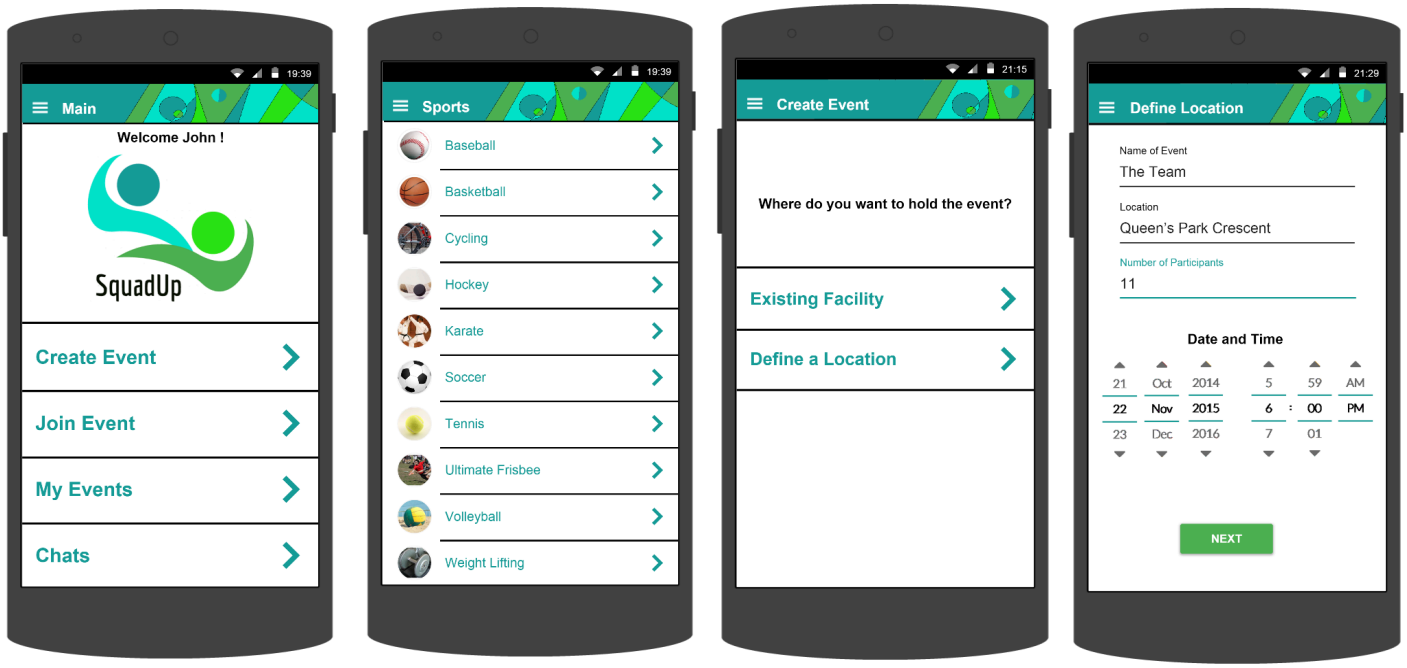


A confirmation pop-up with basic information about the facility appears. The user selects “YES” to continue

A confirmation page that tells the user the booking is created is displayed. The user selects “Next”

After booking the facility, the user defines the meetup instruction by typing: “Front entrance 15 mins before game” in the text area and continues by selecting “Create Event”

A page with the confirmation of the event creation is displayed. If the user wishes to see complete information about the event, they select “Event Page” and complete the same steps performed in task 1. However, to avoid repetition (in this demonstration) the user selects “Main” directly to continue with task 3.

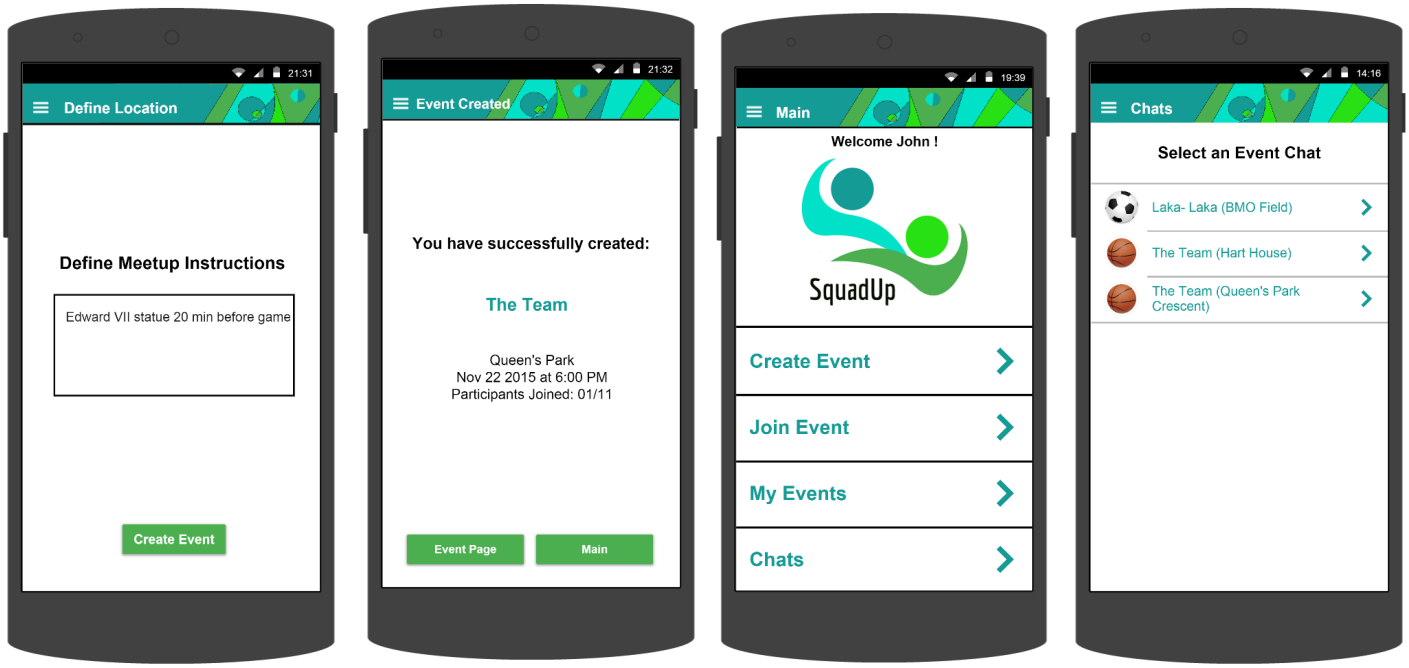


Back to the main page, the user selects “Create Event”

As in task 2, the user will create a basketball event by selecting “Basketball”

For this task, the user chooses “Define a Location”, given that they would like to customize the location, and do not need to use a facility

The user inputs the corresponding information about the custom location: the name “The Team”, location “Queen’s Park Crescent”, and the number of participants: 11. They then select “Next”

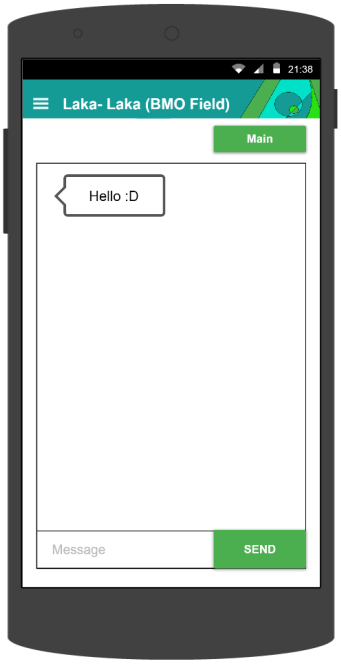


The user will then define the meetup instructions by typing in the text area: “Edward VII 20 min before game”

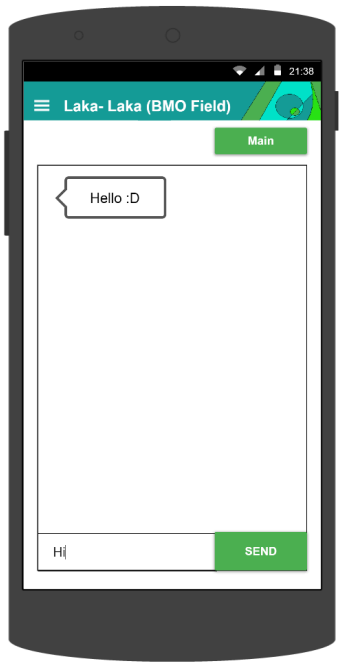
A confirmation page appears, with the relevant information about the created event. As with the other tasks, the user has the option to view the event page with full details or continue directly to main. The user selects “Main” to continue to the third task

For the third task, the user is required to access the chat function by selecting “Chats”

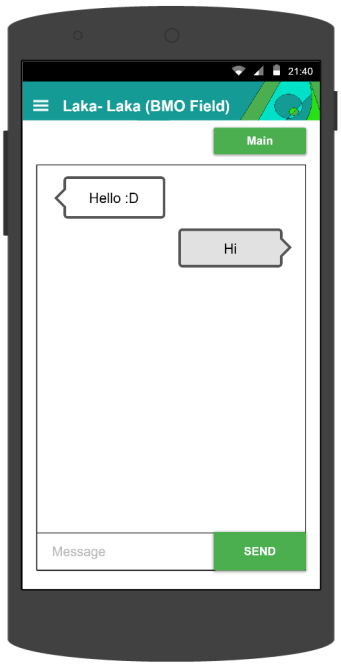
The user is provided with all the events they have joined and created so far. The user selects the Laka Laka event



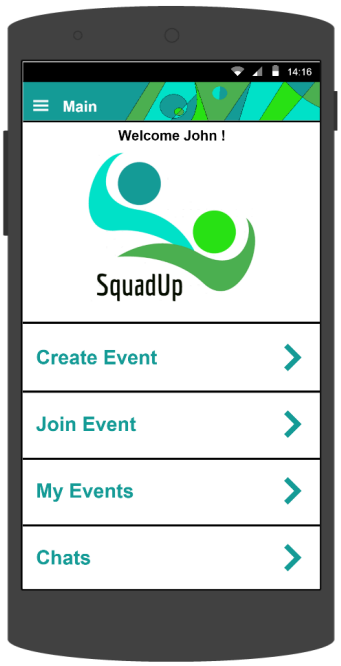
The user can see previous conversations in this screen.



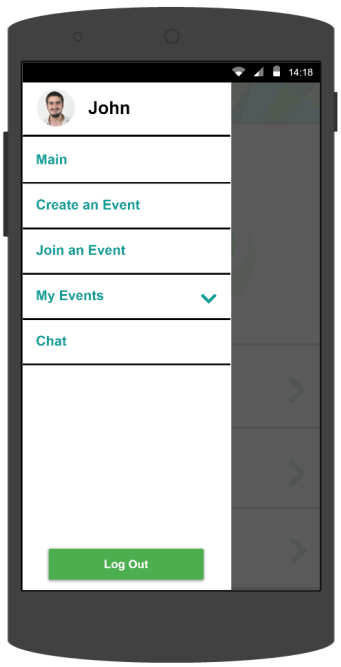
The user wishes to respond to the message; they type “Hi” and select “SEND” to deliver the message

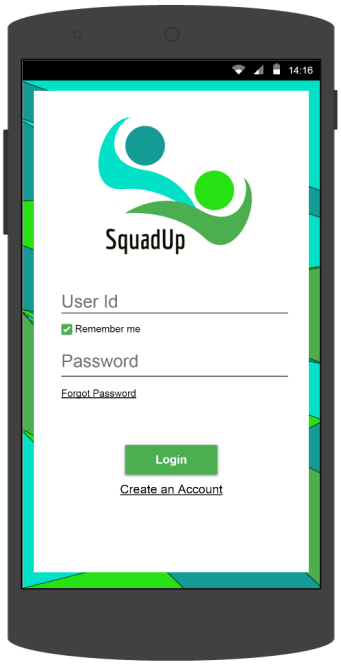


The system displays the message sent. The user returns to the main menu by selecting “Main”



The user had performed all tasks they wanted and wants to log out. They select the the hamburger icon





The right menu appears and the user selects the “Log Out” button at the bottom of the screen	The user is directed to the Login page

For a live demonstration of the app, please follow the instructions in Appendix A.

4.0 Usability Protocol

4.1 Goals of Evaluation:

The goal of conducting this usability evaluation is to measure our high fidelity prototype against Nielsen's Usability Heuristics [15] through usability testing. This will ensure that our app can be used by our user demographic successfully, and without frustration, in order to get feedback which will be used to improve the high fidelity prototype. We want to ensure that full-time students can use SquadUp because they have schedules which change everyday (ie. they have different classes and events planned each day), and have the most need for an app that can organize activities for them. In addition, the evaluation will allow us to identify any design requirements that are not being met, based on the issues that our users encounter.

4.2 Questions of Evaluation:

To guide the usability evaluation, the following questions are explored based on usability goal metrics [16], and the participants’ performances during the usability test. The usability goals “safety” and “easy to remember how to use” were omitted, because they were determined to be less relevant to our app at this time than the other usability goals through team discussion.

To ensure the efficiency of our app:

1) How long does it take the user to complete each task?

To ensure the effectiveness of our app:

2) How many users complete each task successfully? (assuming a successful task is defined as the completion of the task without any intervention)
3) How many errors were committed during each task?
4) Which errors were most frequent?
5) How many errors were committed per unit time during each task?

6) What are the main problems users experienced while performing the tasks?

To ensure our app has good utility:

7) Does the app provide enough information to allow users to complete each task?
8) Does the app allow for clear communication with other users?

To ensure our app is easy to learn:

9) How many times did the user request for help during each task?
10) Does the app allow you to Create/Join an Event without any interferences?
11) Does the app meet your experience level with mobile applications?
12) Were you confused about what to do at any point during each task?

4.3 Evaluation Methods

The team has decided to perform a usability test on a high fidelity prototype of our app, with the implementation of only a small set of features, while controlling the environment in which tasks are to be completed in. Both qualitative and quantitative data will be collected during the usability test, along with different measures such as number and types of errors, which are outlined in section 4.2. The usability test will be applied to users who will be performing the tasks outlined in section 4.3.6. We decided to perform a formative test since we are still in the first iteration of our design, and we are more interested in knowing why the user made mistakes rather than having a set goal the users are expected to achieve. The design shall be refined for summative testing after the initial usability testing is conducted.

We will obtain information regarding the user demographic through the use of a questionnaire before performing the usability test. Observation, timing, and video recording will also be used during the test to identify any problems regarding navigation and task completion using the high-fidelity prototype. Finally, a post-study interview will be conducted at the end of the test to identify any problems participants may have had which couldn't have been obtained via observation or video recording. Observation, timing, and the interview will also be used to answer questions outlined in section 4.2.

4.3.1 Questionnaire

Before performing the usability test, a pre-study questionnaire will be completed by the participant, in order to ensure that the participant fits the demographic profile of the primary user defined in section 4.4.2 . In order to obtain quantitative data, which is easier to analyze, the questions will be closed ended. A questionnaire was chosen to identify demographic information because it is easy to distribute to participants, and fast to analyze. We will be looking specifically

for people who fit our defined primary users: they are full time students, 18 - 25 years old, use sporting or entertainment facilities at least 3 times a week, are familiar with mobile apps and current facility booking procedures, and have trouble organizing their schedules. We will also find out whether participants are iPhone or Android users, as our prototype is based on the Android guidelines. Refer to section 5 for more information about limitations in the usability study. By administering a questionnaire, we will receive quantitative data, which will be used solely for user demographic information. Refer to Appendix B for the questionnaire.

4.3.2 Observation

While one team member is performing the usability test, 2 other team members will use the method of direct observation, in a controlled environment, to collect data from the user, based on the questions that were outlined in section 4.2. The team members will take the role of passive observers. At the start of every task, the participant will be reminded by the team member performing the test to try their best to think out loud during the task. However, since this is a formative test, the participant may also be interrupted by the team member performing the usability test if the team member believes the participant is stuck, they need further clarification on a task, or they have a question. The team members who are observing the participant will take down notes as the participant is performing the task. More specifically, the team members will write down anything the participant does that helps in answering the questions outlined in section 4.2. The method of observation was chosen because it will allow the team to see how users would interact with the app in a hypothetical scenario. The type of data collected will be both quantitative (ie. number of errors, or time to complete a task), and qualitative (ie. any sort of frustration shown by participants). The data will be used to fix any problems in future iterations which were identified via usability testing and to answer questions 2, 4, 6, and 9 from section 4.2.

4.3.3 Video Recording

While three team members are observing and one team member is performing the usability test on the participant, one of the other team members will take a video of the participant as they perform the tasks as a safety measure, in case any portion of the test or interview needs to be reviewed. The video will be used solely for making sure that no information (such as frustrations or confusions from the participant) was missed during the usability test. The video will be taken using an iPhone 5s in a way that the participant's hands and app are captured. The participant will only be videotaped if they agree to sign the consent form (Appendix C), and the data obtained will be the same as the data in section 4.3.2.

4.3.4 Timing

One of our team members will time the participant while they perform the tasks. The data gathered will be quantitative, and used to answer questions 1, 3 and 5 in section 4.2. Users will be timed on how long it takes for them to complete each task. The team member will start timing when the team member performing the usability test says go, and will stop timing when the participant says “I am done”. In addition, the timer will also measure the number of errors made per unit time.

4.3.5 Post-Study Interview

Finally, a post-study interview will be administered by the team members on each of the participants, after the participants complete all of their tasks in the usability test. This will help identify any problems the user had with the app that may have not been identified through observation or video recording. The team members will perform a semi-structured interview - the questions for which are outlined in Appendix D. Prior to commencing with the interview, the participant will be given some insight as to why we will perform the interview (i.e. they will be told that the purpose of the interview is to identify any problems they have with the app that we may have missed). By performing an interview, the team will obtain qualitative data, which can be used to identify participants’ opinions of the app, and to also identify any features of the app that need improvement. The interview will be used to answer questions 6, 7, 8, 10, 11, and 12 from section 4.2.

4.3.6 Evaluation Paradigm

In this section, we will describe all of the tasks that the user will be asked to complete during usability testing.

Task 1: User joins a soccer game

In order to complete the task of joining a soccer game, the participant must:

- Log in with the following account:
    - Username: j.green
    - Password: 1234
- Adjust their search radius to 15 km
- Check how many participants are in the event named “Laka Laka”
- Join the event named “Laka Laka”

Task 2: Creating a Basketball Event Using a Custom Facility

In order to create a basketball event using a custom facility, the participant must:

- Determine the event location by specifying their own location with the following information:
    - Name: The Team
    - Location: Queen's Park Crescent
    - Number of participants: 11
    - Date: Nov 22, 2015
    - Time: 6:00pm
- Write the following meetup instructions "Edward VII statue 20 mins. before game"

Task 3: Creating a Basketball Event Using an Existing Facility

In order to create a basketball event using an existing facility, the participant must:

- Determine the event location by specifying a pre-existing location
- Enter in the following information when prompted:
    - Name: The Team
    - Search radius: 25 km
    - Number of participants: 5
    - Date: Nov 22, 2015
    - Time: 6:00pm
- Select the facility named "Hart House"
- Book the location
- Write the following meetup instructions "Front entrance 15 mins. before game"

Task 4: Accessing the chat function of the prototype

In order to access the chat function of the prototype, the participant must:

- Navigate to the home page
- Access the chat for the Laka Laka event
- Enter "hi" in the event chat

4.4 Practical Issues

This section of the project will focus on the tasks the user will be doing, the testing conditions, the main issues regarding those conditions and finally, the method through which the usability testing will be taking place.

4.4.1 Design of Typical Tasks

After the user has met the user demographic requirements, the usability testing shall begin. The user shall use the application and do tasks according to the stated instructions. Upon completing the tasks, the users shall say “I am done” to signify the end of the evaluation.

Issues with design of typical tasks:

- The tasks which we designed for the usability testing may not be tasks that the user really wants to perform. The user may have different goals and intentions of using the app, and we may not have captured that
- The instructions may confuse the user, as the steps may not be in the same order as the user would perform them (ie. instead of navigating to the homepage to access the chat, the user may rather access it on the event page). Additionally, the instructions could also bias their workflow, and how they choose to interact with SquadUp
- The instructions may not have been specific enough (i.e. when asked to check the number of participants)
- The application is constrained since it is not yet fully developed; as a result, users may be frustrated since they do not have the freedom to use various features that are not implemented using the app

4.4.2 User Selection

The following section of the document contains the primary user group for the SquadUp app. The user groups are developed from analyzing results from interviews and questionnaires. This is particularly important since the application needs to have a specific market it is targeting. Following that, more knowledge about the targeted user group would allow for more accurate usability testing. The application’s users have been defined to be primarily full-time students.

The following section contains attributes of full-time students which have been defined to be frequent users of the app via a questionnaire which was previously administered (refer to Appendix E for the questionnaire)

The primary users of the app were defined to have the following characteristics:

Description: Post-secondary students who utilize sports and entertainment facilities.
Age Range: 18-25
Gender Profile: 50% males and 50% females
Educational profile: Full-time post-secondary students
Frequency of facility use: occasional to frequent
Familiarity with mobile technology: Very familiar with mobile technology and use mobile apps

Familiarity with current facility booking systems: They are familiar with the current booking procedures, as they regularly utilize these facilities.
User Needs: Most of these users have irregular schedules and often have trouble finding people with similar availability and interests for participating in group activities with.

Issues with user selection:

- When and where the users will be available
- Whether or not the users will satisfy the “primary users” requirements

4.4.3 Testing Conditions

We will be conducting the test in the Bahen Centre of Technology, where users will be given a phone containing the application, and a set of instructions for one of the team members to explain to the participants so that they know what task they have to accomplish. Participants will be chosen via word of mouth sampling, and will be given the pre study questionnaire to affirm that they fit the population of users we are testing. There will be 5 users tested, each of whom will be using SquadUp under similar testing conditions. In addition, we shall inform them about the protocol and consent form, and have them sign the consent form. The test will not be longer than 30 minutes.

Issues regarding testing conditions:

The system may be slow due to the processing time of the software (Proto.io) on the phone. This in turn will affect the responses the users have, as well as their performance, which can be biased.

Since the usability test is being done under similar conditions, responses from the users regarding the application may be the same. This may not be an accurate representation of the general public due to the fact that our sample size (5) is not significant.

4.4.4 Evaluation Sessions

All of the team members will be present while the usability test is taking place in the Bahen Centre in a closed room environment. One team member will describe the tasks to the user. Another team member will record the participant while he/she performs the tasks on the phone. The rest of the team members will be present to take down notes. One of these team members will record the time while the user is performing the tasks, another team member will record qualitative data, while the last team member will record quantitative data. Among many other factors, the quantitative data will include the time taken to complete the task, the number of errors made, the number of errors made per period of time, number of users making a particular error, and number of users completing the task successfully. The qualitative data will include

parameters such as the type of error the user made (for example, slip, lapse or mistake), why they made that kind of mistake (we ask them to explain why they did what they did), and general comments that they had about the testing session. One major issue which could arise with the evaluation session is the absence of a team member. Other issues could include the app crashing, a Professor asking us to leave for making too much noise, and/or failure of the recording device (i.e. device crashing or running out of memory).

4.4.5 Evaluators

Since all five of our team members will be expected to be present during the evaluation session, there is no issue in terms of evaluators. One potential issue can be the case when one of the team members is absent from the session. The issue could be solved by having another team member take that team member's role, in addition to their own.

4.4.6 Equipment

Our team will be using an iPhone 5s to film the session. One potential issue may be the phone running out of memory, or the phone running out of battery. In addition to that, the video and audio quality may be low. Other than the phone, we shall not use any other specific equipment except for our laptops to record both quantitative and qualitative data.

4.4.7 Budget

Due to the fact that the camera that will be used is on the phone of one of the team members, the room that will be used does not require booking, any papers will be printed free of charge, and participants are not compensated, no budget is required for the study.

4.4.8 Schedule

Prior to attending a usability testing session, participants will be contacted either through Facebook or email, to find out if they would be able to participate in a usability test run by our team. Our team will create a spreadsheet with the available times for usability testing, ensuring that each participant has 40 minutes per session, as the test was determined to take around 30 minutes through team discussion. In order to ensure that there is enough time in between participants, the participants will be asked to arrive 5 minutes early to make sure that they start on time.

Some scheduling issues are:

- Participants arriving early
- Participants finishing later than they are supposed to

- Participants not arriving at all

4.5 Ethical Issues

In order to identify and deal with ethical issues, the team created a protocol and consent form which was explained to and signed by the participants (refer to Appendix C). The protocol and consent form also identify the possibility that the participants may be videotaped while they perform the tasks on the high fidelity prototype, and ensures anonymity. The team recognizes the fact that the participants have a right to be treated politely, leave when they wish, know the goals of the study, know what will happen to the findings, and know that their information is being kept private. This information is included in the protocol, in addition to the goals of the study, and the consent form which provided the participants with the knowledge that their information would be kept private, no compensation would be offered, the findings will be used solely for evaluating the prototype, and that they are entitled to a copy of the final report.

5.0 Evaluate, Interpret, and Present the Data

Our team performed usability testing on 5 users in a duration of 3 hours. There was a variety of different methods we used to monitor the user's' activities and interactions with the application (SquadUp).

At the end of usability testing we collected quantitative and qualitative data using the methods described in section 4.3 to answer the questions in section 4.2. When analyzing the data we collected, we read through the notes we took during usability testing in order to identify any problems that participants had with the app during the usability test regarding task completion.

5.1 Quantitative data analysis

We collected quantitative data from all the five users doing all the four tasks, this included:

1) Time taken to complete each task (specified for each user in each task)
2) Amount of users that completed each task successfully
3) Amount of errors committed during each task (specified for each user in each task)
4) The most frequent errors committed
5) The amount of errors committed per unit time during each task (specified for each user in each task)
6) The amount of times the user asked for help during each task (specified for each user in each task)
7) The total time it took to complete all 4 tasks (specified for each user in each task)

The following is a summary for each piece of quantitative data relating to the usability test performed by each user. The data was obtained from Appendix F.

***Refer to Appendix F for detailed results for each user in each task**

User 1:

Average time taken to complete each task:
2 minutes
Average amount of errors committed during each task:
0.5 errors/task
The amount of errors committed per unit time during each task:
0.25 errors/minute

Average amount of times the user asked for help during each task:
0.25 times/task
The total time it took to complete all 4 tasks:
8 minutes

User 2:

Average time taken to complete each task:
2.5 minutes
Average amount of errors committed during each task:
0.25 errors/task
The amount of errors committed per unit time during each task:
0.1 errors/minute
Average amount of times the user asked for help during each task:
0.25 times/task
The total time it took to complete all 4 tasks:
10 minutes

User 3:

Average time taken to complete each task:
2.25 times
Average amount of errors committed during each task:
0.5 errors/task
The amount of errors committed per unit time during each task:
0.22 errors/minute
Average amount of times the user asked for help during each task:
0.25 times/task

The total time it took to complete all 4 tasks:
9 minutes

User 4:

Average time taken to complete each task:
2.75 times
Average amount of errors committed during each task:
0.75 errors/task
The amount of errors committed per unit time during each task:
0.27 errors/minute
The amount of times the user asked for help during each task:
1.75 times/task
The total time it took to complete all 4 tasks:
11 minutes

User 5:

Average time taken to complete each task:
1.5 minutes
Average amount of errors committed during each task:
0.75 errors/task
The amount of errors committed per unit time during each task:
0.5 errors/minute
The amount of times the user asked for help during each task:
0
The total time it took to complete all 4 tasks:
6 minutes

Number of users that completed each task successfully: 5

All the 5 users completed all 4 tasks successfully, implying that the tasks flowed in a logical format. However, this does not imply that there weren't any critical issues regarding the app - some users asked for assistance (since this was a formative test), and clarification.

The most frequent errors committed
According to the data we collected, mistakes varied among users:

The "Filter" menu was one problem which 3 users had difficulty dealing with. The following outlines the problems users encountered:

When asked to select a search radius of 15 km, users were confused about where to do that, and the filter button on the top right of the page was not obvious to them.

According to the design principles, the “Filter” button did not show affordance, since users did not know that it was a clickable button.

Another frequent error occurred when users tried scrolling through the list of sports, as the list was unscrollable (two users had difficulties dealing with that). This shows that this specific feature in our application was not consistent with the user’s mental model, since they expected to be able to scroll.

Although there were other errors which users made, the errors were not prevalent across all the users; therefore, not a lot can be said about whether it is a human error or a design error. For example, one user pointed out that there is no back button, another user was confused about what the different options meant, and one user was confused about the keyboard (this could have been due to the fact that she is used to an iPhone, not Android).

Time to Complete Task (mins.)

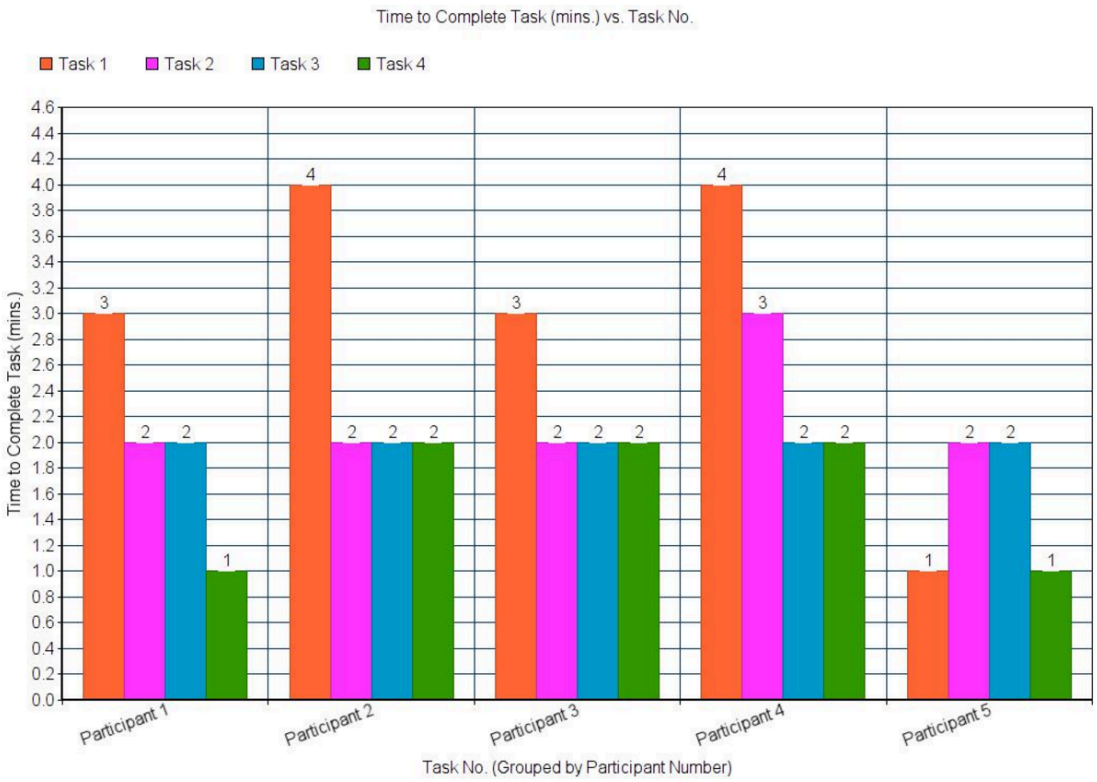


Figure 2

According to Figure 2, most of the participants (4 out of 5) took the longest amount of time to complete task 1. One reason may be because they had to get acquainted with the application first. Additionally, task 1 had a longer process compared to the other tasks, which naturally takes longer to finish.

Number of Errors

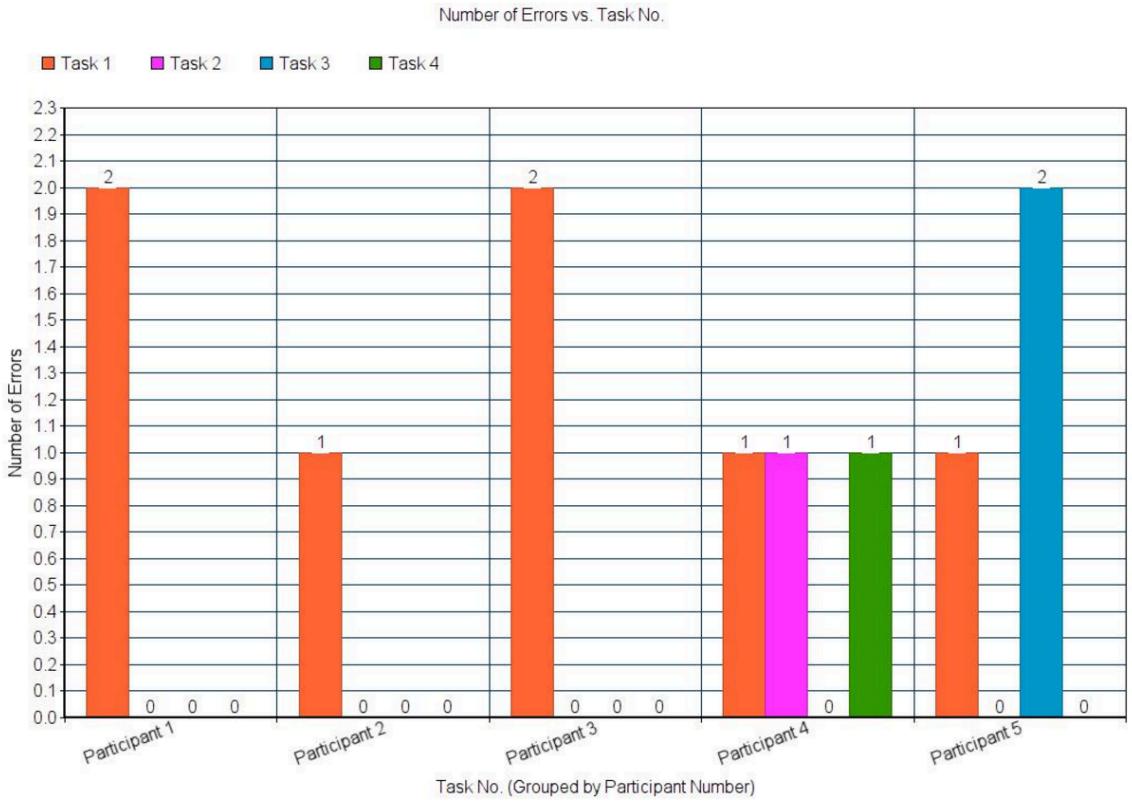


Figure 3

As it can be shown in Figure 3, with the exception of participants 4 and 5, the number of errors committed during the usability test was the highest for task number 1 - 63% of total errors came from task 1 (7 errors in task 1/11 total errors * 100). This could have been due to the fact that users were just presented with the app, and needed some time to learn how to use it

Number of Times Help Asked

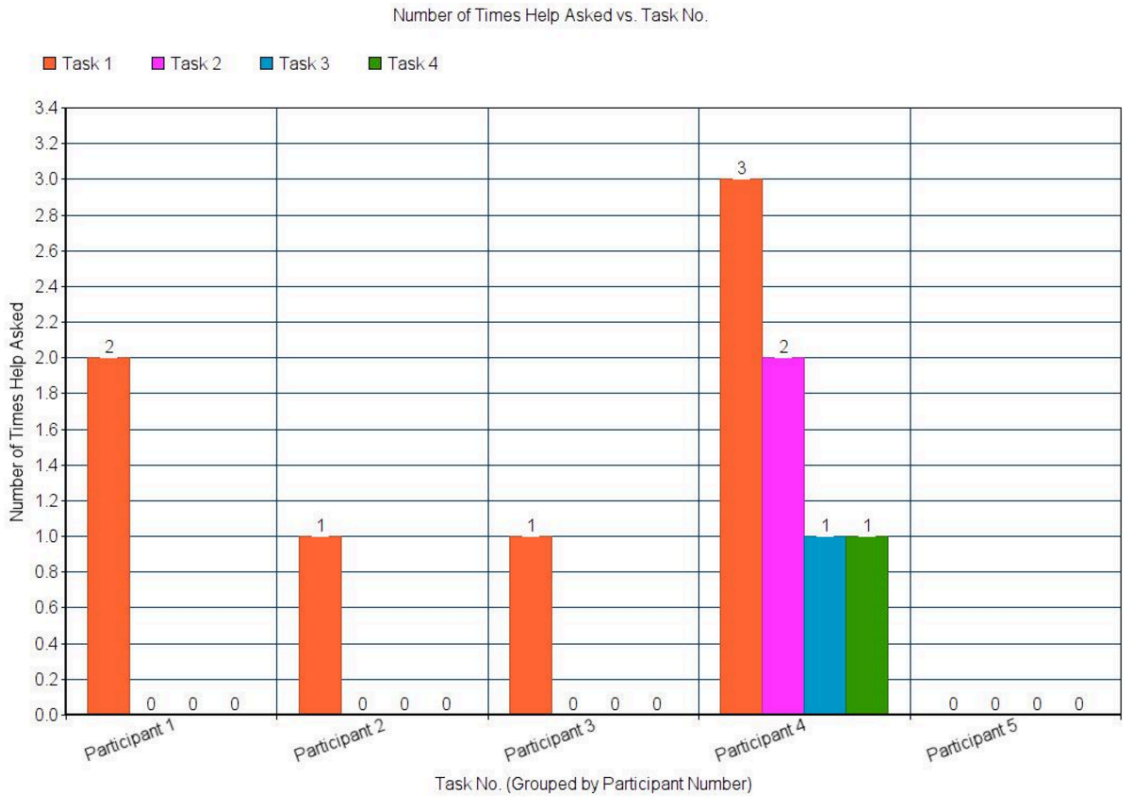


Figure 4

As it can be shown in Figure 4, 63% of the time, users needed help during task 1. Again, this could have been due to the fact that users were still learning how to use the app. Participant 4 needed help more often than the other participants. Participant 4 could have been a possible outlier, but it's hard to say for certain because our sample size is too small.

5.1.1 Methods Used to Analyze Quantitative Data

We used the data from the usability testing in order to analyze them through charts, percentages (eg. number of errors in a task per total errors), and observations throughout the evaluation. We used them in order to accurately analyze the quantitative results and deduce precise conclusions based on various data such as number of errors and time to complete each task.

5.2 Qualitative data analysis

We also collected qualitative data from all the five users doing all the four tasks, including:

1) The main problems the users experienced during each task
2) Whether or not the app provided adequate information to complete each task
3) Whether or not the app allowed for clear communication with other users
4) Whether or not the app allowed users to complete each task
5) Whether or not the app met the user's experience level with mobile apps
6) Whether or not users were confused at any point

The answers to these questions can be found for each user performing each task in Appendix G, and the last column of the table in Appendix F. In order to analyze the data, we grouped all of the comments and answers participants made to the interview. A brief summary of this data is given below.

User 1:

There was a confusion about the keyboard and the main button's functionality. The "view participants" page did not scroll up or down which additionally led to some mild confusion i.e. the user's mental model was different from the design of the system. Thirdly, the purpose of the of the search radius was unknown which may be due to lack of affordance of the option.

Suggestions from user 1:

- "Modifying the design of the first page may be useful since there is a lot of white space"
- Inputting an expertise level may be beneficial since the process if too long for users who already know what they want.
- As a result if the previous suggestion, implementing a search function may be useful so users can search the event name immediately without going through all the process.

User 2:

There was a confusion about the keyboard since the user did not know how to slide it down. Secondly, the filter button on the top right of the page which is intended to adjust the search radius was not so visible, so the user missed it. Lastly, the user also missed the "view participant's" option, which can also be related to bad placement and low visibility.

Suggestions from user 2:

- Implementing a back button may be useful since some users may be confused
- When booking a location, it would be better if the complete address of the location is given to the user

- “Book facility” and “Book event” can be differentiated more easily and cause less confusion if named in a more clear way.

User 3:

There was a confusion about the keyboard since the user did not know how to slide it down. Secondly, the filter button on the top right of the page which is intended to adjust the search radius was not so visible, so the user missed it. Lastly, the booking instructions did not show up for this user which can be attributed to certain technical errors. It is worth noting that none of the other users faced this problem.

Suggestions from user 3:

- The map can be larger in size so that it is easier to see and analyse
- It may be hard for iphone users to use the android keyboard, if we have both type of keyboards, it would be it better
- Making the filter option more noticeable and affordable through modifying its name or position would be result in lower chances of making an error.

User 4:

There was no back button which made it hard for the user to understand how to go back to a previous page. Additionally, the user got confused about the “Main” page and the “Event page” since he did not know what the purpose of each option is.

Suggestions from user 4:

- Implementing a back button may be useful since some users may be confused
- Modifying the names of some options eg. the “Event page” would be useful in order to avoid confusion regarding the purpose of each option.

User 5:

There was no back button which made it hard for the user to understand how to go back to a previous page. Secondly, the user got confused about the “Main” page and the “Event page” since he did not know what the purpose of each option is. Thirdly, there was a confusion about the keyboard since the user did not know how to slide it down. Lastly, the filter button on the top right of the page which is intended to adjust the search radius was not so visible, so the user missed it.

Suggestion from user 5:

- Implementing a back button may be useful since some users may be confused
- Modifying the names of some options eg. the “Event page” would be useful in order to avoid confusion regarding the purpose of each option.

- Making the filter option more noticeable and affordable through modifying its name or position would be result in lower chances of making an error.
- It may be hard for iphone users to use the android keyboard, if we have both type of keyboards, it would be it better

5.2.1 Methods Used to Analyze Qualitative Data

In order to analyze the qualitative data, we decided to group the data in a table which we presented in section 5.4. We created the table by writing down all of the issues participants had, and ranking them based on the severity of the issue. Using this table, we had a group discussion to determine what needed to be fixed in a future iteration of the prototype. We decided that critical issues, moderate issues, and frequent mistakes were immediate changes that needed to be made. Minor issues were changes that we will consider should we have time to consider them.

5.3 Aspects Influencing Results

In this section we will talk about different factors and aspects of our usability test that may or may not have influenced the results. More specifically, we will talk about the validity of our test, biases associated with the test, and the ecological validity of the test.

5.3.1 Validity

Overall, the usability test had moderate validity. A possible source for bias regarding the data was the fact that only 5 participants completed the usability test. Although 5 participants are enough to find the major usability problems with the prototype, they are not enough to perform any sort of statistical analysis which could have been used to validate data such as the most common type of error made. Although we collected this data anyways, with a higher sample of participants this specific piece of data could have been different. Additionally, since all of the participants attend the University of Toronto, there weren't any participants representing the primary users from other universities or colleges which can lead to biased results. However, that being said, the study did measure what we expected. All of the questions in section 4.2 were answered (in section 5), and we figured out which aspects of the high fidelity prototype we need to change in order to result in higher user success rates regarding task completion. In order to try to make sure that validity didn't influence our results, we measured and took down notes relating to the questions in section 4.2 which we previously defined, and we did not measure different aspects for each participant - the data collected was of the same type for each participant (i.e. data was gathered for each participant based on the questions in section 4.2, and none of these questions were ignored or skipped for any participant). Additionally, we attempted to minimize any sources of bias concerning the design of tasks for the usability test, and also minimize any environmental factors influencing the usability test. We did this by

performing the usability test in a closed environment with minimal outside interference, and designing the tasks in a logical, realistic order (i.e. users were asked to join an event before accessing the event chat).

5.3.2 Biases

One noticeable bias during our usability testing session was how the instructions were phrased for each task. User 1 complained that during Task 3, the instructions involve the user entering the name of the event they would like to create, prior to selecting the facility it will be held at. This was counter-intuitive for the user, resulting in extra time being added to the task. User 2 stated that the instructions seemed out of order, forcing them to define the meetup instructions for the event that they created after it had already been booked. Another major bias that affected the time it took for each user to complete the tasks was the speed of the proto.io mobile application. During Task 1, User 1 had trouble logging into the app because it was slow to respond. During Task 3 for the same user, the app froze, forcing us to pause our usability testing session. During Task 4, User 1 struggled with the slow responsiveness of the keyboard and textboxes. The other users also had issues with the keyboard, and the overall speed of the usability testing session.

5.3.3 Ecological Validity

Overall, our usability testing session had high ecological validity. The session took place inside the Bahen Centre on the University of Toronto St. George campus, which suited our user demographic well, since the users were full time post-secondary students, and it can be assumed that they would be in a quiet environment since they spend the majority of their time in school studying. The lighting and heating levels in the room where the session was completed were moderate and wouldn't have noticeably impacted our results. For the most part, the room was at a comfortable noise level, although a couple users commented that the room got more silent when the testing session began, which could have affected their concentration on the tasks. The room was also located close to a professor's office, which also could've been a distracting sound source, since the professor was having office hours at that time. Furthermore, since the room was small and intimate, it is possible that the users were influenced by the Hawthorne effect [17], influencing more productive completion of tasks than they otherwise would by themselves. Conversely, having five people observing them could've also had the opposite effect, making users self-conscious about how they were performing the tasks and reducing their performance.

6.3.1 Software Limitations

The following section describes software limitations related to the conducted usability study. The date picker is a feature that is part of the design but couldn't be implemented given that the

software being used did not provide the widget. The team decided the feature should be kept, and it was incorporated as a static image (Figure 5).

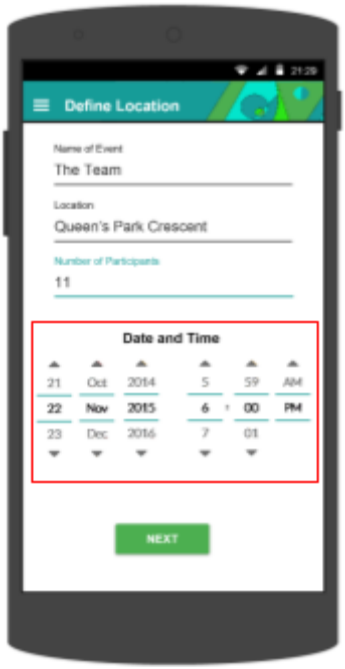


Figure 5 - Static date picker

Entry No.	Limitation Description
1, 8, 15, 19, 42	**App is lags or freezes**
1,17, 61	**Screen is unscrollable**
2,4	**keyboard without text area**
5, 18, 43, 51	**Hard time exiting the keyboard**
11	**Keyboard does not appear when text area clicked**
64	**Keyboard go button does not send participant to new page**

Table 4 Limitation of the Design, Entry No. refers to the corresponding column in tables provided in Appendix F and G.

5.4 Interpretation of the Results and Recommendations

As seen from the experiences of each user doing all 4 tasks using SquadUp, patterns of common errors and mistakes are noticeable. Our team will highlight the most common ones and redesign the application in order to prevent similar errors from occurring with future users of the app. After testing SquadUp on all of the users, we took note of all of the problems and divided them into 3 categories: problems that are critical, problems that are moderate, and problems which are minor. The results show that we experienced 6 critical problems, 8 moderate mistakes

and finally, 10 minor mistakes. Critical issues are defined to be issues which stopped users from completing a task, moderate issues are issues which caused users to perform tasks less efficiently, and minor issues are defined as features that just affected the overall impression of the user interface. We intend to modify the design of SquadUp in order to achieve two goals:

1) Reduce the number of errors and confusions that users encounter whilst using the application
2) Minimize the number of critical, moderate, and minor errors that we have, since they make the application harder to work with.

Table 5 lists each issue encountered by participants during usability testing and provides a description, analysis and recommendations for each. The table is organized by the entry number in the raw data (Appendix F and Appendix G), the type of issue encountered, a description of the issue, a reason why the issue occured, recommended changes to fix the issue, and the priority the team gave the issue.

Entry No.	Category	Description	Analysis	Recommended Changes	Priority
9, 17, 36, 52	Other	Difficulty adjusting the search radius to precise value	Hard to see number values while adjusting the search radius because it was too small (visibility of text)	Change input method: allow users to type search radius number	Critical
40, 41, 49, 50, 66	Information	Chat is missing information: time, sender information, location	Inconsistent with user expectations	Add missing information to chat messages	Critical
9, 17, 59, 62	Attention	Filter button was not visible	Contrast of background and button colours	change the button colour to yellow for better contrast and increase visibility	Critical
26, 55	Visibility	Map is small and hard to read	Map is not legible (visibility principle broken)	If fully functional, the map will be a link to Google Maps. where you can zoom in and out	Critical
37, 45	Work Flow	Define meetup instructions for facilities was expected to appear before booking is completed	Inconsistent with user expectations	Define meetup instructions on the same screen where you view and book the facility	Critical
9	Attention	View participant was ignored	Participant missed step from the	N/A	Moderate

			instructions, likely not due to design issues		
17, 56	Attention	Confusion about selecting 'Event Page' or 'Main' button at the end of tasks	Inconsistent with user expectations	Replace 'Event Page' button with 'Next' button and delete 'Main' button. 'Next' button will direct them to the events page where they can choose to go to main.	Moderate
21	Information	Add level of expertise to user preferences	Inconsistent with user expectations	Add level of expertise to event page	Moderate
22	Information	Add distance from events	Inconsistent with user expectations	Add distance to events to search results and events page	Moderate
25	Information	Option to make events private	Inconsistent with user expectations	Add option to make event private when creating the event	Moderate
39	Information	Add complete address of venue to event information page	Inconsistent with user expectations	Add full address of venues to events page	Moderate
48	Information	Add type of event on the event information page	Design principle broken (Recognition rather than recall)	Add type of information to the events page	Moderate
28	Information	Add general information about the facility	Inconsistent with user expectations	Add a link to the venue website or information page	Moderate
29, 57	Information	Add picture of facility	Inconsistent with user expectations	Add picture of the facility or event location to the events page	Moderate
31	Information	Add graphics to main page to explain menu options	Inconsistent with user expectations	Add icons to menu items	Minor
32	Information	Add search function for events (which names are known)	Inconsistent with user expectations	Add search bar	Minor
24	Information	Add option to invite participants to a given event	Inconsistent with user expectations	Allow users to add/invite participants by inputting their usernames	Minor

Table 5: Rank of Each Type of Issue Participants Experienced

5.4.1 Screencaptures of Recommendations

The following section provides the screencaptures of the major changes that would be implemented in the system, if the process would continue.

Description	Analysis	Recommended Changes
Difficulty adjusting the search radius due to small text	Low visibility of text	Change input method: allow users to type search radius number (Fig 6)
Filter button was not visible to participants	Low contrast between background and button colours	Change the button colour to yellow for better contrast and increase visibility (Fig 7)
Chat function is inconsistent with user expectations	Chat is missing information: time, sender information, location	Add missing information to chat function (Fig 8)
Problem with workflow order	Define meetup instructions for facilities was expected to appear before booking is completed	Define meetup instructions on the same screen where you view and book the facility (Fig 9)

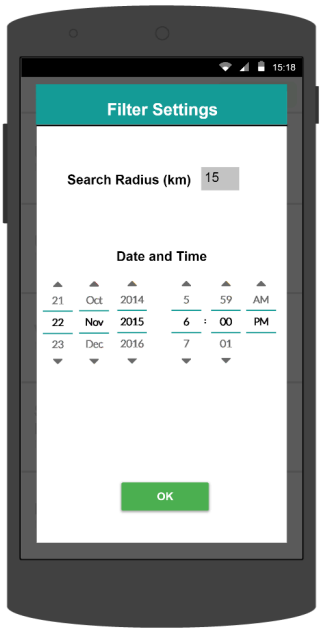


Fig 6

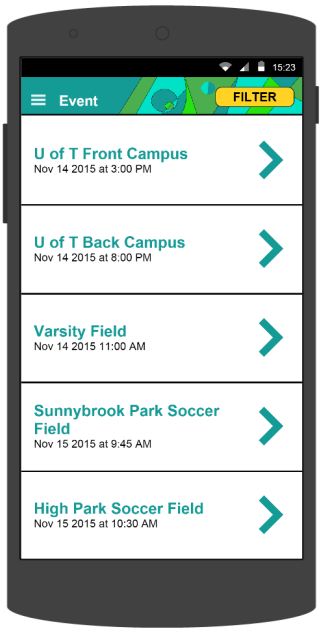


Fig 7

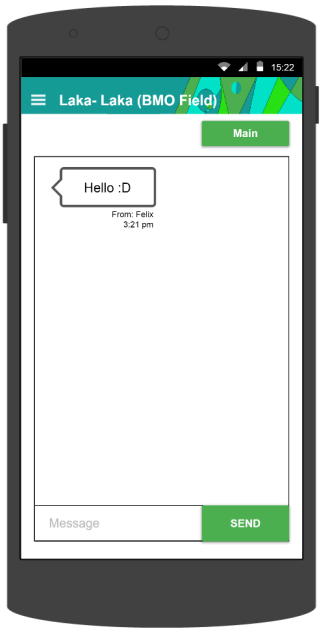


Fig 8

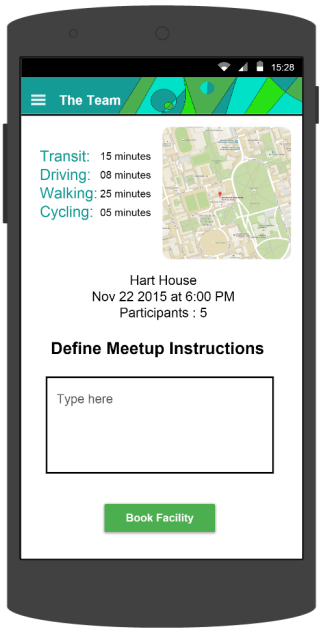


Fig 9

Appendices

Appendix A - Instalation Instructions Proto.io

Instructions:

1) Download the zip folder called *Group 1- Prot.io*
2) Extract all elements from the folder
3) Open the Group1 - Proto.io folder
4) Open the *frame.html* document. A page of your default browser will launch with the life version of the prototype.
5) The prototype is ready to test.

Appendix B - Usability Testing Questionnaire

The following questionnaire was given to participants before they performed the usability test.

The purpose of this questionnaire is to obtain the user demographic information (eg. age, occupation, facility use, etc.) which we need to determine if you fit the demographic of users that we have defined for our app. Please answer each question with a “yes”, “no”, or “sometimes”.

1. Are you a full time student?

2. Are you between 18 and 25 years of age?

3. Do you use facilities at least 3 times a week? (sports, entertainment, etc.)

4. Are you familiar with mobile applications and booking procedures?

5. Do you have trouble organizing planning social activities around your schedule?

6. Are you an Android or iPhone user? *Please circle one.*

   Android iPhone

Appendix C - Protocol and Consent Form

This was the data collection protocol given to participants before they were the high fidelity prototype and the tasks they needed to complete. The participants were guided through parts 1-11, and were then given a consent form to sign. If they didn't want to sign the consent form, the team did not perform the usability test on them.

Data Collection Protocol: SquadUp User Research and Requirements

1. **Project Title**: High Fidelity Prototype Usability Testing

2. **Investigators**:

Maria Bucheli (majo.bucheliteran@mail.utoronto.ca)
Kevin Lipiec (kevin.lipiec@mail.utoronto.ca)
Kathy Huynh (kathy.huynh@mail.utoronto.ca)
Reza Boushehri (Reza.kbboushehri@mail.utoronto.ca)
Klajd Kapllani (kl.kapllani@gmail.com)

3. **Purpose**: The purpose of our study is to identify and understand potential issues with the high fidelity prototype developed by the team based on the functions tailoring to each of the use cases created by the team. The app will allow users to see which fields, gyms, arenas, and

entertainment venues are open near their area, and encourage users to organize events together by allowing them to post pickup games. The app will also recommend open fields or arenas near the user's' location once the events have been created. In addition, users will be able to directly book facilities needed for their activity through this app.

4. **Process to be followed**: The team will give the participants a background of the app, go through the protocol and the conditions on the consent form with them, and then have them sign the consent form. The team will then have the users complete a brief questionnaire to ensure that they fit the base criteria of the user demographics. Upon completion, the usability evaluation session will begin and last a maximum of 30 mins. When the session is over, the team will administer a semi-structured interview with the user to determine how well the design follows Nielsen's Usability Heuristics and any other design improvements that are necessary.

5. **Participant selection:** To choose participants, the team will be looking for people who are full time students, 18 - 25 years old, use facilities at least 3 times a week, are familiar with mobile apps and booking procedures, and have trouble organizing their schedules. These participants will be identified from the pre usability test questionnaire, and will only be allowed to participate in the usability test if they meet this criteria.

6. **Relationships**: We have no relationship to our participants

7. **Risk and benefit:** There will be minimal risk to the participants. The only risk may be that the participants may feel that they have wasted their time. The only benefit will be to contribute to the education of the investigators. Participants are free to withdraw before or at any time during the study without the need to give any explanation.

8. **Consent details**: We will brief the participants about the purpose of the study, explain the attached consent form to them, and ensure that they consent to participate and sign the consent form.

9. **Compensation**: Participants will not be compensated.

10. **Information sought:** After completing the usability study, the team would like to have a better understanding of the problems participants had while carrying out the tasks with the high fidelity prototype, with respect to Nielsen's Usability Heuristics. The team will be looking to gather quantitative data. The types of problems the team is looking for are: participants misinterpreting functions in the prototype, participants failing to complete a task, participants abandoning the task, participants getting confused about the functionality of the prototype, and participants completing a task incorrectly. The team would also like to identify exactly where these problems are occurring so that the necessary changes can be made to future versions of the design.

11. **Confidentiality**: Personal information and responses will be kept confidential by the investigators. Names are kept solely for internal use and will NOT be released or submitted as a part of any documents. The only use will be to include excerpts or copies in the assignment submitted, but names and other identifying information will not be submitted. Additionally, the team may videotape the participant while they are performing the tasks on the prototype. The video will be used solely for identifying any problems the users have with the prototype that the team initially missed, and will not be accessible by anyone other than the team members. The participants identity shall be kept private.

Consent Form: SquadUp User Research and Requirements

I hereby consent to participate in a study conducted by Kevin, Reza, Kath, Maria, or Klajd for an assignment in the University of Toronto course called MIE344, Ergonomic Design of Information Systems.

I agree to participate in this study the purpose of which is to identify and understand potential issues with the high fidelity prototype developed by the team based on the functions tailoring to each of the use cases created by the team.

I understand that:

- The procedures to be used are questionnaires, completion of tasks using the prototype, and interviews
- The usability team may need to film me while I perform the tasks
- The usability test should last no more than 30 minutes
- I will receive no compensation for my participation
- I am free to withdraw before or any time during the study without the need to give any explanation
- All materials and results will be kept confidential, and will not be accessible by people who aren't part of the team
- My name and any identifying or identified information will not be associated with the data
- I am entitled to receive a copy of the final report, should I ask for one

To be completed by the participant

Name (please print) _____

Signature_____ Place and Date _____

To be completed by the investigator(s)

Name (please print) _____

Signature

Appendix D - Interview Questions

To guide the usability evaluation, we will ask the users the following questions based on the app requirements:

1. Does the app meet your standards for customization (search radius, etc.), and are there any issues that interfere with your ability to set your preferences?
2. Does the app provide too much/too little information about an event to help you decide whether to 'Join an Event'?
3. Does the app allow you to 'Create an Event' to your liking? Are there any issues that interfere with your ability to do so?
4. Does the app influence your decision on what method of transportation to take to the event venue? If not, what changes to the app would allow that to happen?
5. Does the app provide adequate information about the event venue? Is this information displayed well?
6. Does the app allow for clear communication with other users using 'Event Chat'? Is the feature easily accessible and usable?
7. Does the app meet your experience level with mobile applications? Are there any features in particular that would improve this?
8. What are the main problems you experienced while performing the tasks?
9. Were you confused on what to do at any point?

Appendix E - Pre Study Questionnaire

This section shows the questionnaire that was created by the team in order to find the primary users of the app, and the user preferences regarding apps and leisure activities. In this report, the use of this questionnaire was to define the primary user group.

User Profile for Design of SquadUP

Welcome to our questionnaire! We are designing an app called SquadUP which will help users find and meet up with people in their area that want to participate in a certain sports/entertainment activity (ex. organizing a pickup hockey game). The purpose of this questionnaire is better understand our potential app users and our design requirements.

Personal information and responses will be kept confidential by the investigators. Names are kept solely for internal use and will NOT be released or submitted as a part of any documents.

1. Name: _____

2. What is your gender?
    a. Male
    b. Female
    c. Other: _____

3. What is your age? _____

4. What is your current occupation?
    a. full-time student
    b. full-time worker
    c. part-time student/worker
    d. caregiver
    e. other: _____

5. What is your current level of education?
    a. high school
    b. post-secondary
    c. graduate level
    d. post-graduate
    e. other: _____

6. How often do you use arenas, centers, gyms, and entertainment or sporting facilities?
    a. never
    b. once a week
    c. twice a week
    d. three times a week
    e. more than 3 times a week

7. What kinds of sports or entertainment activities do you enjoy?

    _____

8. What is your primary mode of transportation?
    a. public transit
    b. driving
    c. biking
    d. walking
    e. other: _____

9. What is the longest (in minutes) that you would be willing to commute for a social activity?
    a. 10 - 19
    b. 20 - 29
    c. 30 - 39
    d. other: _____

10. How far do you live from your social circle using public transportation (in minutes)?
    a. 10 - 19
    b. 20 - 29
    c. 30 - 39
    d. other: _____

11. Are you willing to participate in social activities with strangers?
    a. Yes
    b. No

12. How many people do you usually go out with during leisure time?
    a. 0
    b. 1 - 2
    c. 3 - 4
    d. Over 4

13. How much money would be willing to spend when booking a facility?
    a. $0 - $10
    b. $11 - $20
    c. $21 - $30
    d. Over $30

14. Which type of activity do you enjoy more?
    a. Group activities
    b. Individual activities

15. How comfortable are you with meeting people online?
    a. 1 - not comfortable
    b. 2 - somewhat comfortable
    c. 3 - neutral
    d. 4 - comfortable
    e. 5 - very comfortable

16. On a scale of 1-5, how much do you rely on technology to plan your activities?
    a. 1 - I do not use technology to plan activities
    b. 2 - Rarely
    c. 3 - Sometimes
    d. 4 - Most of the time
    e. 5 - I only use technology to plan activities

17. Have you ever had too few people to participate in an activity with?
    a. yes
    b. no

18. Are you actively looking for people to participate in activities with?
    a. yes
    b. no

19. Name a mobile app you enjoy using. Explain what you like about it (features, design, etc.)

_____
_____
_____
_____

20. Describe how you and your friends meet up on the day of the activity

_____
_____
_____
_____

Appendix F - Table of Raw Data (Quantitative)

This is the table the team created during usability testing to gather quantitative data. The table is organized by entry number, participant, task number, time to task completion, number of errors, number of times help was required, and whether they completed the task. Additionally, any comments the user made during usability testing were inputted here.

User 1:

Time taken to complete each task:
- Task 1: 3 Minutes
- Task 2: 2 Minutes
- Task 3: 2 Minutes
- Task 4: 1 Minutes

Amount of errors committed during each task:
- Task 1: 2
- Task 2: 0
- Task 3: 0
- Task 4: 0

The amount of errors committed per unit time during each task:
- 0.25 errors/minute

The amount of times the user asked for help during each task:
- Task 1: 2
- Task 2: 0
- Task 3: 0
- Task 4: 0

The total time it took to complete all 4 tasks:
- 8 minutes

User 2:

Time taken to complete each task:
- Task 1: 4 Minutes
- Task 2: 2 Minutes
- Task 3: 2 Minutes
- Task 4: 2 Minutes

Amount of errors committed during each task:
- Task 1: 1
- Task 2: 0
- Task 3: 0
- Task 4: 0

The amount of errors committed per unit time during each task:
- 0.1 errors/minute

The amount of times the user asked for help during each task:

Task 1: 1

Task 2: 0

Task 3: 0

Task 4: 0

The total time it took to complete all 4 tasks:

10 minutes

User 3:

Time taken to complete each task:

Task 1: 3 Minutes

Task 2: 2 Minutes

Task 3: 2 Minutes

Task 4: 2 Minutes

Amount of errors committed during each task:

Task 1: 2

Task 2: 0

Task 3: 0

Task 4: 0

The amount of errors committed per unit time during each task:

0.22 errors/minute

The amount of times the user asked for help during each task:

Task 1: 1

Task 2: 0

Task 3: 0

Task 4: 0

The total time it took to complete all 4 tasks:

9 minutes

User 4:

Time taken to complete each task:

Task 1: 4 Minutes

Task 2: 3 Minutes

Task 3: 2 Minutes

Task 4: 2 Minutes

Amount of errors committed during each task:

Task 1: 1

Task 2: 1

Task 3: 0

Task 4: 1

The amount of errors committed per unit time during each task:

0.27 errors/minute

The amount of times the user asked for help during each task:

Task 1: 3

Task 2: 2

Task 3: 1

Task 4: 1

The total time it took to complete all 4 tasks:

11 minutes

User 5:

Time taken to complete each task:

Task 1: 1 Minutes

Task 2: 2 Minutes

Task 3: 2 Minutes

Task 4: 1 Minutes

Amount of errors committed during each task:

Task 1: 1

Task 2: 0

Task 3: 2

Task 4: 0

The amount of errors committed per unit time during each task:

0.5 errors/minute

The amount of times the user asked for help during each task:

Task 1: 0

Task 2: 0

Task 3: 0

Task 4: 0

The total time it took to complete all 4 tasks:

6 minutes

Entry No.	Participant No.	Task No.	Time to complete Task (Min)	No. of Errors	No. of times help is required	Task Completion (1/0)	Comment
1	1	1	3	2	2	1	App lags at the start, unscrollable screen
2	1	2	2	0	0	1	Shows keyboard but nowhere to type, can't scroll
3	1	3	2	0	0	1	Order in which instructions is presented does not match work flow, purpose of seach radius is not clear
4	1	4	1	0	0	1	Keyboard and textbox problem
5	2	1	4	1	1	1	confused about exiting the keyboard, filter button was not obvious, did not click view participants
6	2	2	2	0	0	1	N/A
7	2	3	2	0	0	1	N/A
8	2	4	2	0	0	1	Had to press send button (for chat) multiple times before app responded
9	3	1	3	2	1	1	Difficulty adjusting the search radius, confusion finding filter button
10	3	2	2	0	0	1	N/A
11	3	3	2	0	0	1	keyboard did not display when participant selected text area
12	3	4	2	0	0	1	N/A
13	4	1	4	1	3	1	N/A
14	4	2	3	1	2	1	N/A
15	4	3	2	0	1	0	App froze in the process and task was stopped
16	4	4	2	1	1	1	N/A
17	5	1	1	1	0	1	Non-scrollable screen, confusion about the filter button, hard to use 'scrollbar' for search radius, even page was not used or visible, couldn't decide whether to click main or event page after task completion
18	5	2	2	0	0	1	Issues with exiting the keyboard
19	5	3	2	2	0	1	App lagging, was searching for meetup instructions before completing booking process
20	5	4	1	0	0	1	N/A

Table E1: Table of Raw Data

Appendix G - Table of Raw Data (Qualitative)

This is the table of raw data created by the team during usability testing to gather qualitative data. The table is organized by entry number, participant, interview question (the interview can be found in Appendix C) and comment.

Entry No.	Participant No.	Question No.	Comment
21	1	1	Add level of expertise for user preferences
22	1	2	App does not show distance from event
23	1	3	Confused by the search radius appears for existing facility but not define location
24	1	3	Wants to be able to invite participants as a part of the process of creating an event
25	1	3	Would like to have the option to make the event private
26	1	4	Map is small and hard to read
27	1	4	Transportation options are useful
28	1	5	Would like more general information about the facility
29	1	5	Would like to see a picture of the facility
30	1	6	Emphasis should not be placed on chat function, especially on the main page
31	1	7	Would like to see less white space on main screen, and more pictures/graphics
32	1	8	Would like to have a search function for event names
33	1	8	The procedure to join or create an event may be too long
34	1	9	The flow is very good and intuitive
35	1	10	The icons on the sports page are very useful
36	2	1	It was hard to accurately set search radius
37	2	2	Defining meetup instructions happen after the booking, he was expecting to do this before
38	2	2	Confused about booking a facility and creating an event

39	2	5	Event information page is missing complete address of the venue
40	2	6	The chat is missing who is sending the information
41	2	6	Chat is missing the time it was sent
42	2	7	The app is slow, but overall good
43	2	8	keyboard and navigation issues (i.e. speed)
44	2	9	It was very intuitive
45	5	2	Defining meetup instructions happen after the booking, he was expecting to do this before
46	5	3	No issues, it's pretty intuitive
47	5	4	Transportation options are useful, but invisible
48	5	5	The type of event (e.g. soccer/basketball) was missing from the event information
49	5	6	The chat is missing who is sending the information
50	5	6	Chat is missing the time it was sent
51	5	8	keyboard and navigation issues (i.e. speed)
52	3	1	Difficulty sliding (Search radius)
53	3	2	It was good, liked meet up instructions
54	3	3	It was good
55	3	4	Map is small and hard to read
56	3	4	event page button at the end of the tasks were not intuitive
57	3	5	Would like to see a picture of the facility
58	3	6	Chat is clear and simple
59	3	7	Filter button was not visible
60	3	7	Keyboard was different from Iphone
61	3	8	Unscrollable
62	3	9	filter button was not visible
63	4	7	Expecting transition animations between the app screen
64	4	1	Keyboard: go button was not working
65	4	9	It was intuitive
66	4	6	Chat is missing the time it was sent

67	4	6	The chat is missing who is sending the information

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Note:

- The background and Logo images were created my team members
- Remaining pictures taken from google using “Labeled for noncommercial reuse with modification”

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