

# Neighborhood Sports: The design, evaluation, and discussion from a Human-Computer Interaction Perspective

Patrick J. Feeney, Adam Gillfillan, Shayan Sinha, and Pratyush Swamy

North Carolina State University  
CSC 554 – Human-Computer Interaction  
Dr. Robert St. Amant  
May 4, 2014

**Abstract.** Neighborhood Sports is an interactive mobile-friendly application designed to increase the number of adults playing recreational team sports. Neighborhood Sports was implemented by closely following common human-computer interaction (HCI) principles. Neighborhood Sports improves upon competitors like Facebook and Meetup by increasing the convenience with which users can find and join local pick-up games. To prove the effectiveness of Neighborhood Sports, we performed both an analytical evaluation and an empirical evaluation. Results of both evaluations shows the effectiveness of designing with HCI principles. The results also show promise for Neighborhood Sports as a popular application among target users.

## 1 Introduction

Studies have shown that physical activity increases one's lifespan and has many healthy attributes like reducing stress and lowering risk of heart attack [1]. Like many young adults, we enjoy playing recreational sports. We often find it challenging, however, to know where to go locally to play team sports in a casual environment. Our application intends to link people with similar sports interests.

Surprisingly, a 2006 study showed that only 15% of U.S. adults partake in exercise or partake in sports on an average day [2]. Consider that these same adults surveyed spent nearly 5 hours a day in front of the TV. Participants were asked which sports they play when exercising. 5% of the respondents play basketball, while football, baseball, and soccer account for 1.5% each. In comparison, 30% of the participants exercise exclusively by walking. We hope that our application will increase this paltry 1.5% in the sports mentioned above.

In our research we have found that one doesn't need to be a world class athlete either. One doesn't have to do high amounts of activity or vigorous-intensity activity to reduce your risk of premature death. A person can put themselves at lower risk of dying early by doing at least 150 minutes a week of moderate-intensity aerobic activity [3]. That is merely 2.5 hours a week.

Neighborhood Sports is an interactive mobile-friendly application designed to increase the number of adults playing recreational team sports. Neighborhood Sports was implemented by closely following common human-computer interaction (HCI) principles. To prove the effectiveness of Neighborhood Sports, we performed both an analytical evaluation and an empirical evaluation. In this paper, we discuss the purpose, design, and the evaluation of Neighborhood Sports. We also look at the small selection of similar applications. We conclude the paper with a discussion of the future of Neighborhood Sports and the design challenges we faced from an HCI perspective.

### 1.1 Problem Statement

Daily physical activity for teens and adults can help offset obesity, hypertension, high cholesterol, heart conditions, gout, stroke and some cancers. Exercise has also been proven to improve mood and help

one sleep better [3]. The problem is that there really are no places to join a team oriented sport without a major commitment. There are no alternative applications that are specific to sports. There are a small set of social media applications like Meetup but they are not specific to sports; however, Meetup has sub-sections that are sports-oriented.

These applications are far reaching in their design for meeting up, but are focused on planned gatherings rather than encouraging the convenience of spontaneity. For example, to attend some sports gathering, you must register a profile and “request” to join the group before you are able to see the meeting time and location. Our application has a focus on “pick-up” games—sports meetings that are either not pre-planned or are planned no more than a week in advance.

The competition also does not have an interactive map that helps browse locations of meetings. By placing the sports events as “markers” on a map, our application embodies a minimalist design that corresponds to the mappings of the real world; namely, an event occurs at a physical location in our application just as in the material world. Our application offers a channel for adults to conveniently locate local recreational sports games of interest.

Our design follows closely to HCI principles. One of the HCI challenges we face is to design a minimalistic interface that is clear, simple, and consistent. It should be burdensome on the user’s working memory load. Next, we want the user to be able to reverse their actions, if necessary. For example, if the user creates an event but later wants to remove the event. In addition, the design of Neighborhood Sports is based largely on the primary stakeholders—our target users. We understand their needs through scenario-based interviews. The end user’s experience is important to us.

## **2 Purpose**

### **2.1 Task Domain**

Discussion of the task domain is best expressed through example. Suppose “Karen”, age 36, would like to play tennis once a week but doesn’t know anyone who plays tennis. Karen is also an above average tennis player. She is also a single mom and her schedule changes often, sometimes “last minute”. If she were on a team that had to meet at specific times she estimates that she would miss 30% or more of the games. This would make it not worth her time nor be fair to teammates. If she had a low cost solution where she could see tennis games in advance for several different times in her area, she would be more inclined to be more active per week.

Maybe “John”, age 25, wants to play baseball, even if it is just casual hitting and fielding. Now that he has the Neighborhood Sports app, he now knows when he can go play casual baseball. He likes using our app because there is no long-term commitment; after all, he has a hectic work schedule.

These people both have interests to play team sports. They both have hectic schedules which change often. This makes them not want to commit to a team sport on a deep level. The Neighborhood Sports app solves this problem. Now that they know where to go to get physical activity, they are enjoying the health benefits that come along with physical activity. We believe more adults would partake in physical activity if it was team-oriented and convenient. Our application bridges convenience with the social benefits of team sports.

### **2.2 Target Users**

We are targeting one of the most popular demographics in the U.S. and worldwide – the 18 to 55 year old crowd, both men and women. According to U.S. census data collected in 2007, 151 million Americans in this age bracket participate in recreational sporting events multiple times a year [4]. This

data suggest that the market potential for our application is enormous. This data, however, does not detail those who choose only individual sports over team sports for convenience reasons. The most popular team sports like basketball, baseball, and soccer show a sharp downward trend, for the number of participants, from the young teen demographic to our target demographic. This suggests there is a potential need for convenience in team sports game formation to bridge the gap.

### **2.3 Representative Scenarios**

Scenarios in represent the use-cases for an application. Neighborhood Sports is a great way of joining local recreational sporting events. The following represents the main use-case of our application. Suppose a user wants to play a game of pick-up basketball but he doesn't have any friends that he can ask to join. Neighborhood Sports enables the user to browse the local basketball games that are happening now or within the week. With a sufficient user base, it is likely that the user will be able to find a game of basketball near his location. Once the user finds a basketball game near him, he adds himself to the game by "joining" the event. He then drives to the location and enjoys a game of basketball. He knows exactly where the basketball game is at because the event is located on an interactive google map. Furthermore, the address is provided to the user.

Next, consider another use-case of Neighborhood Sports. Suppose the same user wants to play a game of basketball. The user knows this time that he wants to play at Carmichael Gym on N.C. State's campus. In addition, he wants to begin at 7pm tomorrow and wants a full 5v5 game with a couple of extra players for substitutions. The user can "create" an event by using a simple form designed with HCI principles in mind to be aesthetically pleasing and cognitively unchallenging. In a matter of seconds, the new event is created and displays on the map. Other Neighborhood Sports users can then join his game.

## **3 Related Work**

The primary reason we decided to design Neighborhood Sports was because there exists no other application that integrates all of the features we wanted. Applications that are similar were identified through the feedback provided by the prospective users (Section 4.1). The most prominent applications of similar concept are Facebook, Meetup and TransLoc. Each of these applications provides a purpose similar to what we sought to do, yet not specific for sports. We were inspired by each of these applications in our design of Neighborhood Sports.

TransLoc is an interactive bus tracking application that provides users information on bus routes, locations, and arrival times. TransLoc has a minimalist map interface design similar to what we sought to implement in Neighborhood Sports. It uses google maps as its foundation, much like we do. TransLoc uses custom "marker" icons that represent the bus. We borrowed this concept as well. Users of Neighborhood Sports know what sport is being played through the event icon marker on the map: a football icon for football, etc.

Facebook is primarily a social networking application. It utilizes its profound user base to provide a "groups" functionality. Through this groups functionality, users can join local recreational sports groups to collaborate game times with like-minded individuals. The major HCI problem with Facebook's groups feature is that it is very difficult to find the sports groups a user may be interested in. For example, a simple query of "Soccer in Raleigh, NC" returns a small list of items unrelated to a group who plays soccer in Raleigh, NC. It is this clear HCI limitation that prompted us to improve.

Meetup is a social networking application that enables users to get together to "learn something, do something, and share something" [5]. The focus of Meetup is clearly not on sports gatherings.

However, Meetup has been a significant inspiration in the design of our system. It essentially has a far better “groups” feature than Facebook has.

Also, one thing that we strived for was a simple interface and we used Nielsen’s Heuristics for User Interface Design to make sure that our interface was simple enough so that a novice can use it with ease while at the same time responsive enough that an expert user would give instant feedback about any action that he takes. The big limitation of Meetup, however, is that it is not immediately clear where and when games are going on for a given sport or group. This alone removes the convenience factor from users wanting to play a team sport pick-up game. To discover the location and time, a user often must first “request” to join the group. Later, an administrator of the group adds the user to the group and then the user can receive notifications about game times. This is simply too much overhead for the average user who wants to play a pick-up game. Finally, there is no map integration for the location of the game. This makes it unnecessarily difficult to just play a team sport pick-up game.

For the design of our system, we were influenced heavily by the HCI research of Jakob Nielsen [6]. In 1994, Nielsen proposed a revised set of heuristics designed to equip user interface designers with a set of usability standards. The following represents our implementation of a sub-set of these heuristics in to Neighborhood Sports.

**Visibility of the System Status.** It is important that our application provides feedback for any action that a user takes. Therefore, we provide a notification prompting the user about any changes in the state of the application. For example, the user action of “joining” an event results in an alert message notifying the user they have successfully joined the event. The user must press “ok” to remove the notification.

**Match between System and Real World.** Keeping things simple is central to the design of Neighborhood Sports. Icons on the map are an image of the event’s sport. Clicking on them informs the user of the day, time, and number of players that are attending the pick-up game. Another obvious match between the system and the real world is the fact that our application uses a map. The map corresponds to the physical location of real world objects, streets, and buildings.

**Consistency and Standards.** All pages look similar and behave in similar ways. All pages, with the exception of the main page, have a Back and Submit button which perform in accordance to their literal meaning. Also, the forms that are used to “Register” a user and “Add an Event” have clear instructions wherever necessary. The forms are simple and follow a simple layout with a sense of flow which user can understand intuitively.

**Error Prevention.** The application can be used by any user with or without knowledge of the basic principles of Computer Science. All necessary information to complete a task is provided to the user. The system is designed in such a way to prevent large changes in system state without confirmation.

**Helping the User to Recognize, Diagnose and Recover from Errors.** A significant number of validity checks, constraints, and instructions are used to maintain and protect the system’s state. This ensures that incorrect form input is handled and corrected by the user without affecting the consistency of the system. Since this system’s potential use is by people with little to no technical background, it was essential in our design that these checks and constraints are used.

**Aesthetic and Minimalist Design.** We like things simple and easy. Though simple, this principle is perhaps the most powerful. We are aware of the relationship between the features and the complexity of the screen. Therefore, we designed Neighborhood Sports to display only relevant and necessary information on the screen. No clutter is displayed.

The novelty of our system is that it combines the power of collaborative technologies with a convenient interactive mobile map interface to find local pick-up games.

## 4 Design

The first task in designing our application is the brainstorming phase. We thought about different application ideas for a project and settled on an idea similar to Neighborhood Sports. This brainstorming phase is imperative in the hybrid design model we used: a spiral/rapid prototyping design process. This is very similar to an agile approach to development. After we formed a few conceptual ideas, we designed paper prototypes for the functionalities of the system. These initial prototypes are found in Appendix A.

Before designing our application, we interviewed a sample of target users. We followed HCI principles in interviewing and presented the interviewees with a representative scenario. This scenario was based on our rapid prototype design. We talked to four people whose replies are found in Appendix B.

With the feedback we received from the interview sessions, we formed a basic set of requirements that users sought in the app. We followed an agile development process whereby the end goal of the application is not a hard requirement. Rather, mini milestones of task completion represent the entirety of our design process. After reaching each mini milestone, we evaluated our progress to ensure the best HCI design principles were followed. If they matched, we continued on to the next feature. In addition to the feedback we gained from interviewing, we received equally valuable feedback from our HCI professor, Dr. Robert St. Amant. Dr. St. Amant provided feedback on the initial paper prototypes as well as the design in its nearly completed state.

To keep the agile development process fluid and quick, we maintained an online code repository on GitHub. By using GitHub, multiple developers were able to “branch” and simultaneously implement differing variations of the same feature. From there, the best design was chosen and implemented. Weekly team meetings helped us decide on the next important feature to implement. Often, we found ourselves with a great idea to implement, but simply not enough time. Section 7.2 details the features we would like to implement in the near future.

### 4.1 User Interviews & Prototypes

Our design was changed frequently in order to accommodate the suggestions made by users. We came to understand that users do not want a lot of functionality in an app for a specific task; rather, that the app enables the user to complete the task in an efficient and intuitive way. The following is a brief discussion of the design decisions we made with respect to the interviews.

In the interviews, we asked individuals how they usually find people to play team sports. Most of them answered that they used either Facebook groups or just ask their friends directly. One user mentioned Meetup. All interviewees were interested in using an application that was built specifically for this task. They noted they could find all the related information at one place without the clutter of a more general interface like Facebook groups. One of them even mentioned that using Facebook groups is not very convenient.

Another important concern of the interviewees was how quickly they would be able to find pick-up games near them. This is the primary reason we decided to use a Google map as our homepage. Events are populated at the appropriate location of the event. This basic idea is where the competition goes so wrong. For the competition, to find an event, you must jump through many pages. This is neither efficient nor easy.

Many of the interviewees were concerned with how easy it would be to find out about specific sports. This is the primary reason we decided to use sports icons as the “markers” for events on the map. By mapping the common image of a “football” to a football event, users can easily determine what sport is taking place.

During this discovery process, we discovered people don’t like to fill forms and they like a simple user interface. Therefore, we decided to make it very simple to perform the primary tasks of user registration, event creation, and joining an event. For example, to create an event, a user must choose options from simple drop down menus. This is less error prone than text entry and is very easy. The only text entry is in the location field.

## 4.2 Backend

The foundation of Neighborhood Sports is based on the Model View Template (MVT) design pattern. This is similar to the more popular Model View Controller (MVC) architecture. We used python to write all of the backend functionality. Django provided us with a comprehensive web framework. We stored all event data in an SQLite database.

The Model portion of the MVT architecture encompasses the structure of the event. This includes all fields that are stored in the SQLite database for an event: sport, players, address, time, weekday, latitude, and longitude.

The View portion of the MVT architecture houses all of the logic used to communicate information between the Model and Template. Logic such as form handling and address to latitude and longitude conversions are handled in the View. Each Template has a corresponding View.

The Template portion of the MVT architecture represents the page that is displayed to the user. All of the frontend development is placed in to the corresponding Template for a page. The HTML markup and CSS styling as well as all JavaScript and jQuery calls go here.

## 4.4 Frontend

The frontend of Neighborhood Sports features a minimalist and aesthetic design. We used the standard web technologies like HTML, CSS, and JavaScript to develop the frontend. Powerful technologies like gmaps.js, jQuery, Bootstrap, and timepicker.js were used to enhance our application. In this section, we discuss some of the frontend design decisions we made for Neighborhood Sports.

**Map.** The map is the foundation of Neighborhood Sports. We used a wrapper library for Google Maps called gmaps.js. This library allows for easier manipulation of map properties such as the CSS styling and the marker icons.

**Icons.** The icons of Neighborhood Sports encode sport information in the actual image. For example, a “football” event is represented by a map marker icon of a “football.” This allows for a slick interface and a less cognitive load on the user. The icons we used are freely available online [8].

**Bootstrap.** Bootstrap is a boilerplate web framework useful for enhancing the aesthetics of a web interface. Bootstrap provides our application with beautiful buttons and forms.

**Timepicker.js.** Timepicker.js is a JavaScript library we used to improve the form submission process. In the initial implementation of Neighborhood Sports, the user entered the time of the event through text entry. This resulted in an increased number of errors. Timepicker.js still allows this option, but adds an

aesthetic slider interface. The slider interface allows the user to tap arrows “up” and “down” to navigate between the hour, the minute, and am/pm choices. An example of this is best seen in Section 4.6.

#### 4.5 Walkthrough: Task 1 – User Registration.

Our application uses a simple map interface (Image 1) to indicate all the activities within a particular area. Different sports activities are marked with icons corresponding to the sport. Information for each one of them can be seen in a pop up (Image 2) once they are tapped upon. Images 3 shows how a user can register with an email address and password.

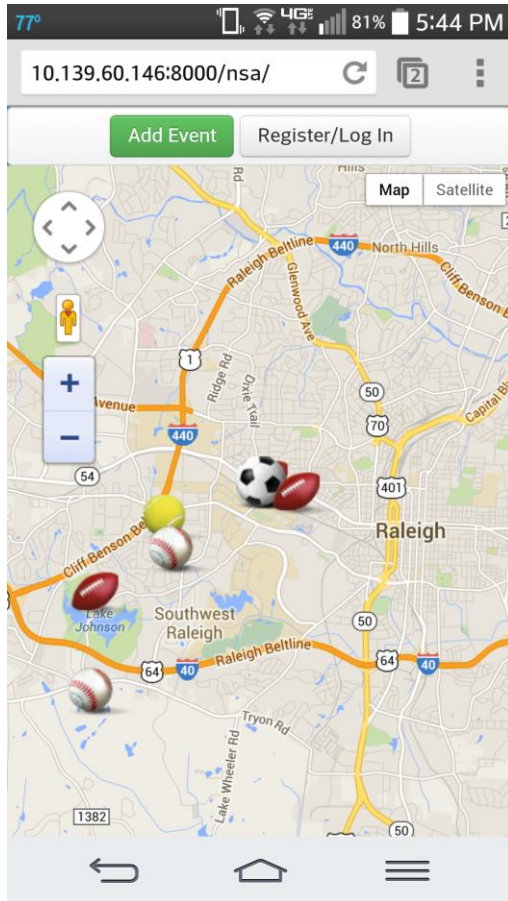


Image 1

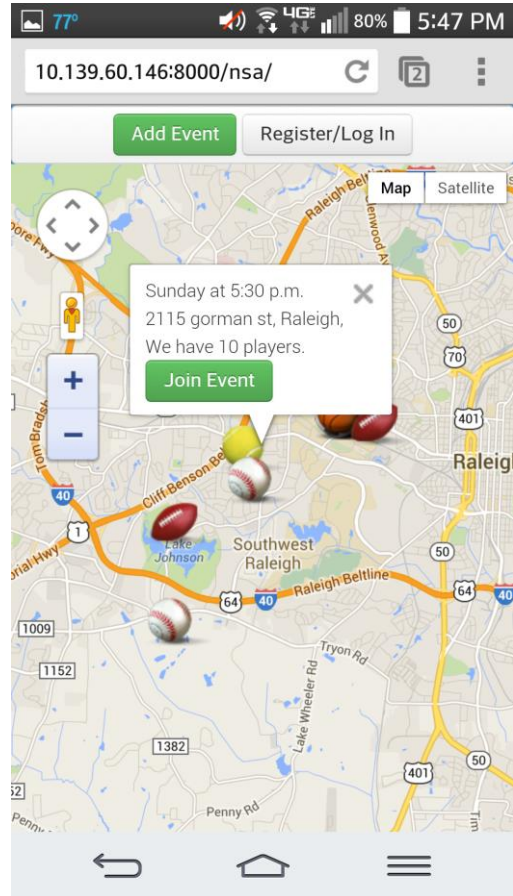


Image 2

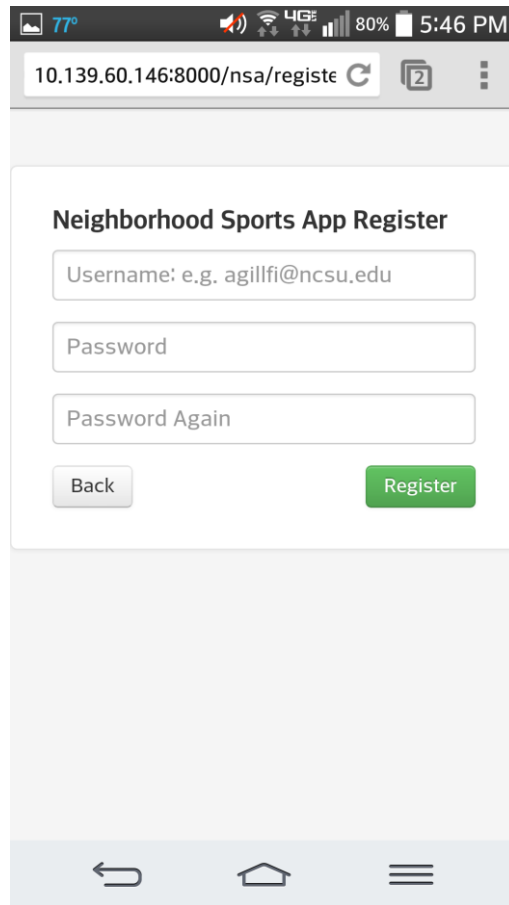


Image 3

#### 4.6 Walkthrough: Task 2 – Create an Event.

Create Events require users to give information about the sports they are interested in playing, the number of players they have, and other relevant information as shown in Images 4-6. These images also showcase the use of lists for selecting varying options. The sport the user chooses is used to mark the location on the maps. This helps in distinguishing between different sporting events.



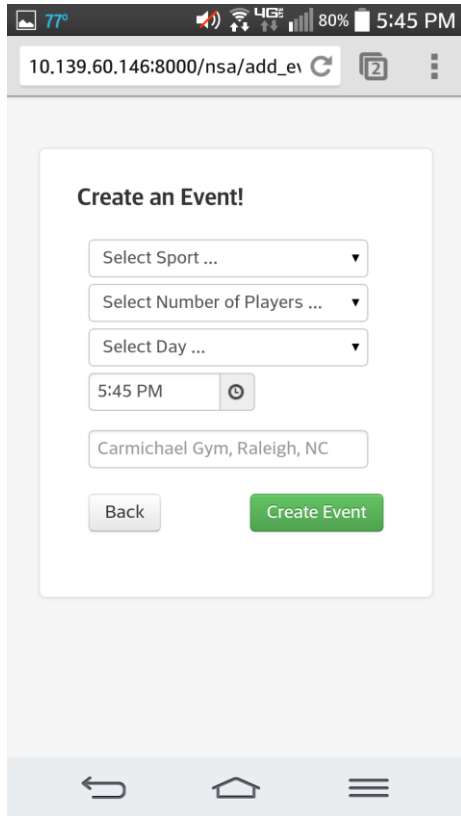


Image 4

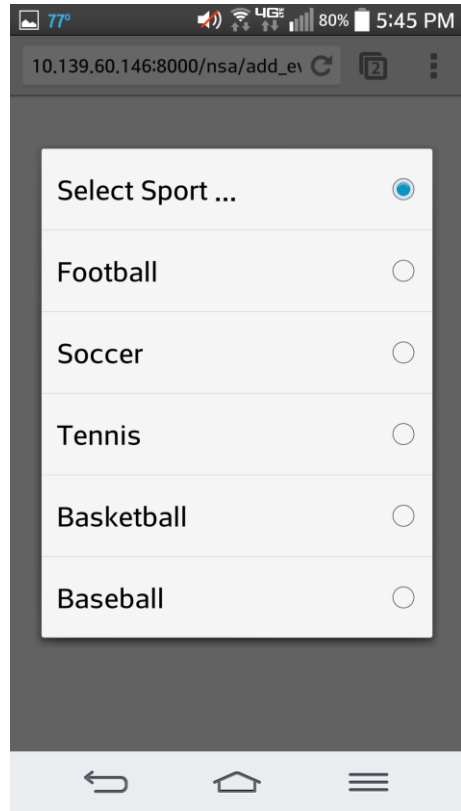


Image 5

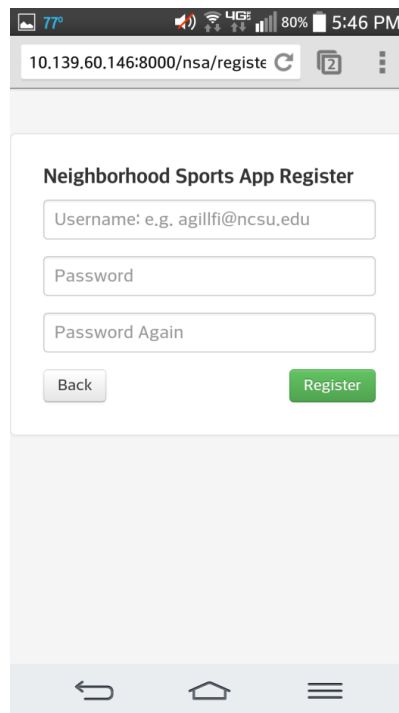


Image 6

#### 4.7 Walkthrough: Task 3 – Join an Event.

Joining an event requires the user to identify the sport he wants to play. Then, find the details about it like what day and time. These details are shown in the pop up in Image 7. If everything suits the user's requirements, then all the user must do is tap on the 'Join Event' button. This action will push a message to the user informing him he has been added to the list of players for that event. Also, the required number of players' count is also decreased so that the event creator knows how many people have already registered for that event.

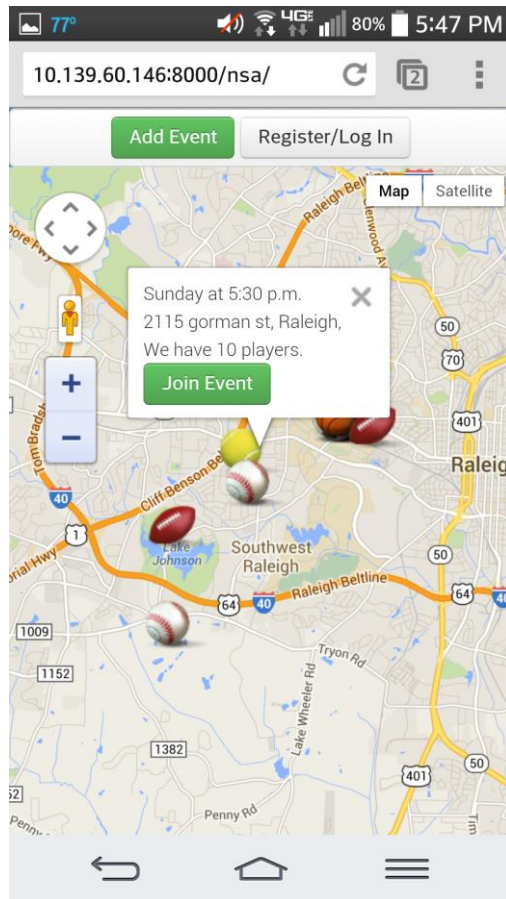


Image 7

## 5 Analytical Evaluation

Each task of a user centered app should be evaluated by models that can predict human behavior. This is important since slight improvements in the overall design of the system can provide significant usability improvements in efficiency. The Model Human Processor (MHP) can make general predictions about human performance [7]. MHP is a predictive model described by a set of memories and processors that function to a set of principles. It is the foundation for the Keyboard Level Model (KLM). The KLM captures and calculates the physical actions a user must carry out to complete tasks on an interface. Both of these models are represented in the CogTool analytical evaluation tool. CogTool allows us to wireframe the design of our system and accurately predict the time it takes for a user to complete a task. To maintain

consistency, the same set of tasks used for the empirical evaluation in Section 6 were used in the analytical evaluation. Appendix C contains the wireframes and visualizations for each of the tasks mentioned below.

### **5.1 Task 1 – User Registration**

Using CogTool we created wireframes structures to evaluate the performance of the task of creating a profile. User registration requires a tap on the “Register/Login” button on the home page and then the “Register” button on the login page. This takes you to a simple form that asks you for your email id and password. We ask the user to enter the password again as a verifying mechanism which ensures the user has entered information that they intend to. Since this task is simple, CogTool estimates a user should take about 25 seconds to register.

An analysis of the results showed us that almost 15 seconds of the total time, or 60%, was spent on entering the username and password. This led us to identify all other areas where we could save time by providing alternate interaction styles than touch keyboard entry.

### **5.2 Task 2 – Create an Event**

The Create an Event requires the user to tap the button 'Add Event' on the homepage. This takes the user to a form where they enter the event information. The form contains the following three drop down menu lists: choice of sport, choice of number of players the event has, a choice of the weekday they wish to play. We also require the user to enter the time and location of the game. This requires the user to interact with the on-screen keyboard. We tried to minimize the user's interaction with the on screen keyboard as typing is one of the more error prone activities on the touch screen. While modelling, each of the lists/menus were traversed to choose an item and significant text was entered to check for major time consuming areas. CogTool predicted a user task completion time of about 35 seconds.

Creating an Event is an information intensive task. The user is required to provide a lot of information and this takes time. This can be seen in Appendix C. Text entry accounted for 23 seconds of the total time, or 66%, for the completion of task.

### **5.3 Task 3 – Join an Event**

Joining an Event is the easiest task we modeled. CogTool predicts the user should take about 5 seconds to complete the task. To join an event, a user must identify the sport that they are interested in, tap on its icon, process the event information, and finally tap on the “Join Event” button. The system then pushes a notification which informs the user of the completion of task. The user must tap the “Ok” button to complete the task.

It was a good design decision to use a map interface to populate the local pick-up games. This removed the need to provide a search function. A search function would require the user to type in keywords in a search box. This is how the competition does it. We know from the above task analyses that text entry is a very time intensive task. Instead, in Neighborhood Sports, the user can browse all the events through the map and then tap on an event of interest. The user can then read the details and choose to “join” the event. This also saves time if the user doesn't find their first preference. The user need not enter in more keywords; instead, a simple tap of a different icon displays the relevant event information.

### **5.4 Conclusions**

The analytical evaluation showed that most of the time a user spends is on text entry. For common mobile touch screen devices, the time to press individual keys to enter details does not depend on their

positions; therefore, the time for each keystroke remains constant for all typing tasks. While creating applications that would be used on a touchscreen device it is important that the use of on-screen keyboard is reduced as much as possible. Text entry on a touch device is a frequent cause of errors. These errors can greatly affect the time required to complete the task. It is for this reason that we limited the use of on-screen keyboards as much as possible.

## 6 Empirical Evaluation

As mentioned in the Section 5, we decided the users should perform the three standard tasks with standard inputs. These 3 tasks are the following: Register a User, Add an Event and Join an Event. All other variables and results corresponding to this experiment have been broken down into small segments and talked about in detail below.

### 6.1 Method

**Independent and Dependent Variables.** We decided to break the participants into groups of experts and novices since it would give us a contrast of results. The independent variables were these groups of users. Performance of each group, or an individual, did not affect the results of any other. The dependent variables of our experiment are both the qualitative and quantitative measures. The qualitative measures include user ratings in response to questions like “how difficult was this task.” A copy of the questions asked is attached in the Appendix D. The quantitative measures include the number of errors the user made, the total time required to complete the task, and the number of actions to complete the task.

**Sample.** Our sample consisted of 4 people between the age groups of 22-29. They all had experience with touch-based devices and are aware of the general principles of interactions with those type of systems. They were broken down into groups of two as either being an expert or novice users. This is expanded upon in the following section.

**Quantitative.** To analyze our application quantitatively, we monitored user action and recorded the results of the following measures: the number of errors the user made, the total time required to complete the task, and the number of actions to complete the task. These three measures were recorded for each task.

**Qualitative.** To analyze our application qualitatively, we asked two sets of questions to the user. The purpose of the first set of questions was to assess aesthetics, navigation, and interaction features of the application. The other set of questions were framed based on ease of completion of the individual use cases/tasks of the application. In order to compare feedback we framed the questions based on rating scale from 1 (easy) to 5 (hard).

**Procedure.** We tested two different groups in the experiment. The first group of people, the “novice” group, were not provided with any working knowledge of the application. The second group of people, the “expert” group, were allocated 15 minutes to become familiar with the application. The feedback was obtained from all users immediately after completion of each task. Then, the results of the qualitative and quantitative results were compared.

## 6.2 Quantitative Results

**Time to Complete Task.** To create a profile, the average time taken for both novice and expert user was almost the same—about 33.5 seconds. Similar was the case for adding an event task where the time taken by an expert user was only about 3 seconds less than the novice user. For joining an event the average time taken for both users was close—4.9 seconds for experts but only 3.6 seconds for novices. This implies that previous knowledge of the application is not a significant factor in quicker task completion.

**Actions to Complete Task.** The number of actions for all task for both novice and expert users were the same. Transitions in each action for both sets of users were the same. Each user took the minimum number of actions to complete each task.

**Errors.** There were no transitional or interface errors reported by any of the users in this experiment. Typing errors were encountered by both sets of users while using the onscreen keyboard on entering event details such as event location.

## 6.3 Qualitative Results

**Task 1 – User Registration.** For both expert and novice users the average difficulty level rating for registering a user were the same. The average and worst case rating for the task were 1 and 2 respectively (1 being easy and 5 being hard) for both groups.

**Task 2 – Create Event.** The result also showed that adding an event task was very convenient for both expert and novice users. The same average ratings were observed for the clarity of options displayed on the page. The average and worst case ratings for the task were 1 and 2 respectively (1 being easy and 5 being hard) for both groups.

**Task 3 – Join Event.** Using icons to depict the kind of sports being played was highly beneficial and helped maximize user ratings for the ease of identification of a sport category. Both average and worst case rating for the use case was 1 (1 being easy and 5 being hard).

**General.** The general average ratings of aesthetics, navigation and interface of the application was 1. The response proved that the application was pretty and minimalist. It was easy to navigate between pages and interact with the map interface. It is interesting to note that for all categories we received the same average responses from both groups. This small variance can perhaps be attributed to our small sample size; this is a pilot study, after all. We should expect to see more variance in results of an experiment with a larger and more diverse sample.

## 6.4 Analytical vs. Empirical

Our empirical evaluation results were very similar to the analytical evaluation results of the system. CogTool predicted a Task 1 completion time of 25 seconds. The empirical results showed it took 33.25 seconds, or a 33% increase. CogTool predicted a Task 2 completion time of 35 seconds. The empirical results show an average of 32.5 seconds, or a 7% decrease. CogTool predicted a Task 3 completion time of 5 seconds. The empirical results show an average of 4.3 seconds, or a 14% decrease. Overall, CogTool was fairly accurate in its prediction of user actions.

Another observation that we made was that there was almost none or very little time difference for expert and novice users for all the tasks that they performed. And since these times are consistent

with the analytical evaluation it can be inferred that the performance of a “novice” user is at par with “experts” of the system. We consider this a testament to the system’s simplistic design and minimalistic interface.

## **7 Discussion**

### **7.1 HCI Design Challenges**

During the course of this project, we have learned, implemented and used HCI principles to improve on the design and user interface for our system. Design decisions regarding features to include and features to exclude have actually been settled using HCI principles. This approach has led to a design that is easy to understand and simple to follow.

Using a mocked up implementation for some of the backend interactions has led us to devote our time in improving the user interface. Within the purview of this project our implementation has most of the elements of the user interface that we would want in an application that is ready for the industry. Mocked up behavior includes storing user registration information to our database. Also, when joining an event, no back end modification of the event takes place. This certainly would not be the case were it a full implementation. It is really important and worth repeating that the front end wasn’t in any way compromised because of this. It would look exactly the same if the back end was fully implemented.

### **7.2 Future Work**

There are some features that we would like to implement in the future. For example, it may be a good addition is a push notification that informs the event creator about other users that join the event. In addition, a profile page for each user would help a user to know all the events that they created or requested to join. This would keep them updated about all the activities that they may be a part of.

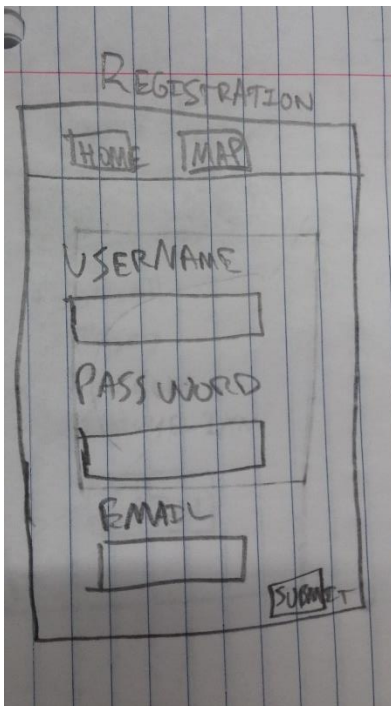
Another feature that may be worthwhile is to provide the user the ability to distinguish between the events for the current day and those in the near future. Currently, sports events show on the map regardless of the weekday. One potential implementation is to update the icons if the sporting event was happening today and contrasted it with other icons on the map interface. For example, if a football pick-up game is taking place today, the image icon would be in color. However, if a football pick-up game is taking place in the future, the image icon would be “grayed” out to signify it is less important.

## 8 Appendix

### Appendix A



Home Page



Registration

CREATE EVENT

HOME MAP

SPORT  
[ ]

Players  
[ ]

DATE  
[ ]

LOCATION  
[ ]

CREATE

Create Event

JOIN EVENT

HOME MAP

Football  
5 players  
5/30/2014  
CARMSCHABEL GYM

JOIN

Join Event



## Appendix B

### Interview 1

1. Do you know of any such mobile or web application that already helps you in doing so?

Answer: Facebook forums is a good place to find about such meetups.

2. Would you use such an application?

Answer: Yes I would use such an application

3. How do you usually find people/friends to play with?

Answer: facebook forums, whatsapp

4. Any suggestions/features that you would like to see that might make your experience better?

Answer: I should be able to turn the notification on-off so that if somebody is already planning to meet I can go and play. However if i do not want to play on a certain day then I should be able to turn that notification off displaying a custom message to anybody who tries to contact me.

5. What feature you would not include in the app, which you think might complicate things for you?

Answer: Too many screens will complicate the process. The UI should be clean and concise and should service the needs of the people with as few screens as possible. I would not want Chat/messaging service to be included in this as there are a plethora of such apps already available. This would make the app like any other chatting app.

6. Any new feature/information that you think would be better to include?

Answer: Addition of social media plugins so that I can sync with facebook, twitter, may be send friend requests to those guys whom i play with regularly.

7. Would you want to communicate/chat/comment with people?

Answer: No, that would be a drag.

8. Would you like any kind of recommendation(s) from the app?

Answer: If there is a way to customize the recommendations then yes otherwise no. In other words, I would like to get recommendations on a certain set of products only not all, so if something does not interest me and it comes up on my screen or my quick panel every time i might get irritated.

### Interview 2

1. Do you know of any such mobile or web application that already helps you in doing so?

Answer: facebook app solves the purpose. Using a facebook private group or a google plus circle helps in getting guys together, You get notifications when someone posts a get together time.

2. Would you use such an application?

Answer: Yes i would use such an app because logging in to face book or using the facebook app is not very convenient.

3. How do you usually find people/friends to play with?

Answer: Usually they are people from my friend circle or work colleagues who have the same interest in a sport. If they don't respond on facebook a phone call does the job.

4. Any suggestions/features that you would like to see that might make your experience better?

Answer: Ability to add the person in the group to contact list and then call the person directly by pressing a button if he doesn't respond to notifications in a timely fashion. Also signing in and registering should be easy. There should be a feature to have close friends with whom you regularly get together.

5. What feature you would not include in the app, which you think might complicate things for you?

Answer: Too many menus, and features that complicate the app might make the app difficult to use.

6. Any new feature/information that you think would be better to include?

Answer: Privacy should be of concern. A person's contact information and details should be shared with a person requesting the information only upon approval.

7. Would you want to communicate/chat/comment with people?

Answer: Yes, that would be a great feature.

8. Would you like any kind of recommendation(s) from the app?

Answer: Recommendations from users using the app might help in improving the app

### **Interview 3**

1. Do you know of any such mobile or web application that already helps you in doing so?

Answer: No

2. Would you use such an application?

Answer: Yes

3. How do you usually find people/friends to play with?

Answer: I don't find

4. Any suggestions/features that you would like to see that might make your experience better?

Answer: Information of who all are joining the event.

5. What feature you would not include in the app, which you think might complicate things for you?

Answer: Don't send information of every event, just send it for the type of events I subscribe for.

6. Any new feature/information that you think would be better to include?

Answer: No

7. Would you want to communicate/chat/comment with people?

Answer: Yes of course, that my main moto

8. Would you like any kind of recommendation(s) from the app?

Answer: No

### **Interview 4**

1. Do you know of any such mobile or web application that already helps you in doing so?

Answer: I do not.

2. Would you use such an application?

Answer: Yes, because I could use more friends in adulthood and my friends are not always around. People that I usually play tennis with travel from time to time for their job.

3. How do you usually find people/friends to play with?

Answer: I only really have one or two other people I would even consider to ask to play a sport or exercise with me. Long term local friends.

4. Any suggestions/features that you would like to see that might make your experience better?

Answer: Maybe you can send me auto updates on where and when games are commencing

5. What feature you would not include in the app, which you think might complicate things for you?

Answer: I like simple things so don't add too many things which are not related

6. Any new feature/information that you think would be better to include?

Answer: No

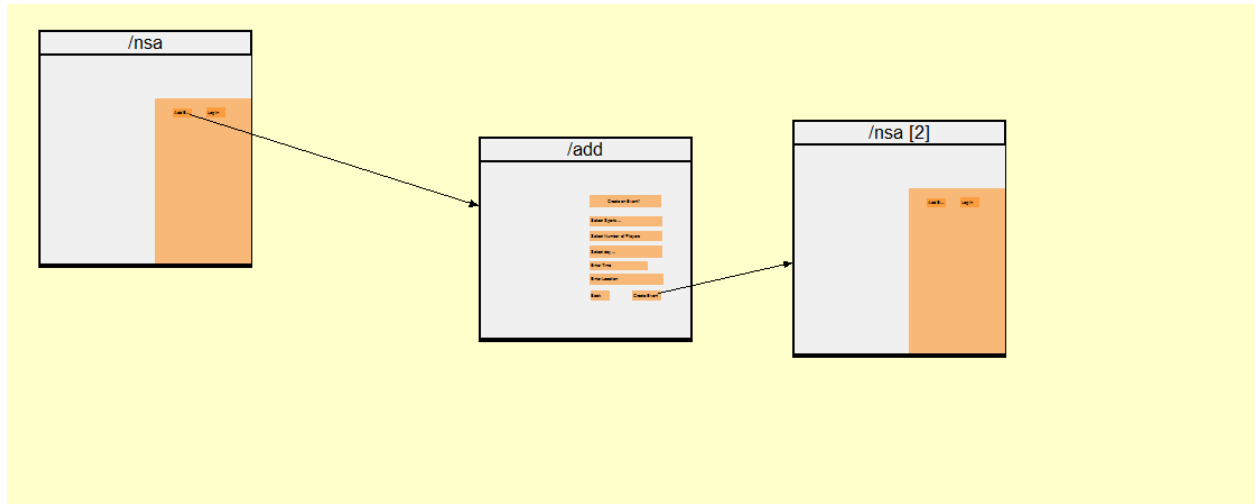
7. Would you want to communicate/chat/comment with people ?

Answer: Yes, I would love to be able to do that.

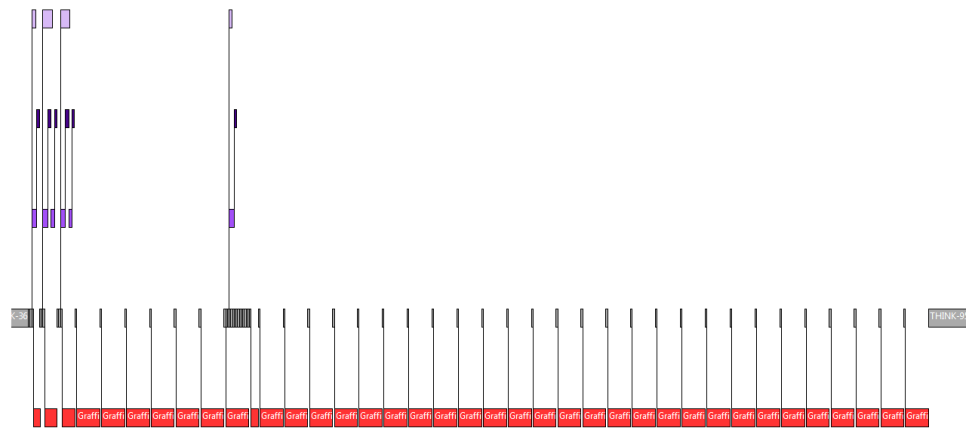
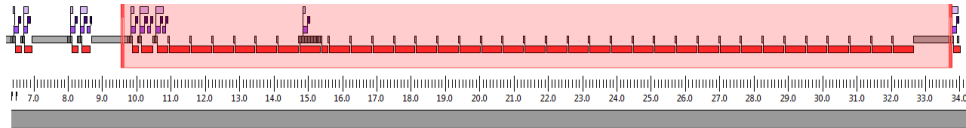
8. Would you like any kind of recommendation(s) from the app?

Answer: No

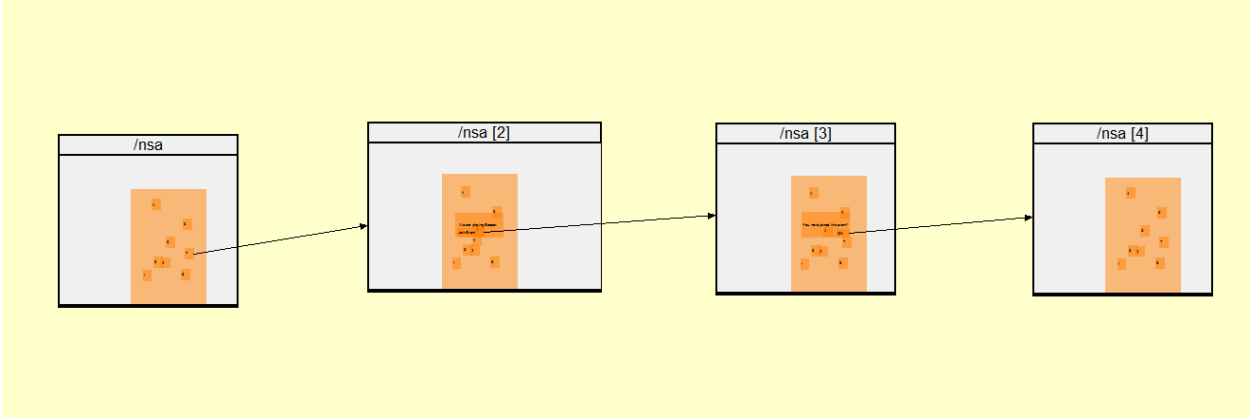
## Appendix C



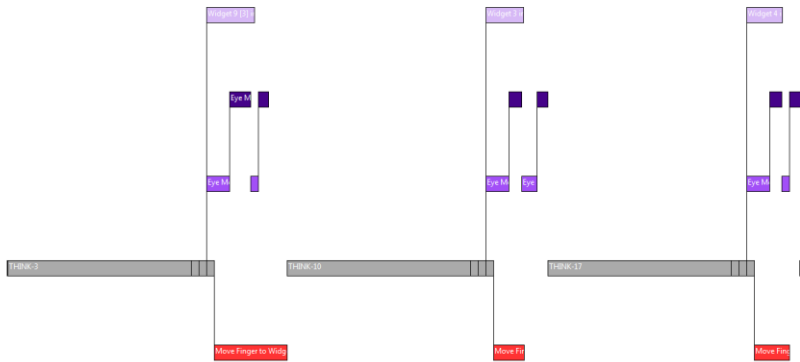
**Add Event**



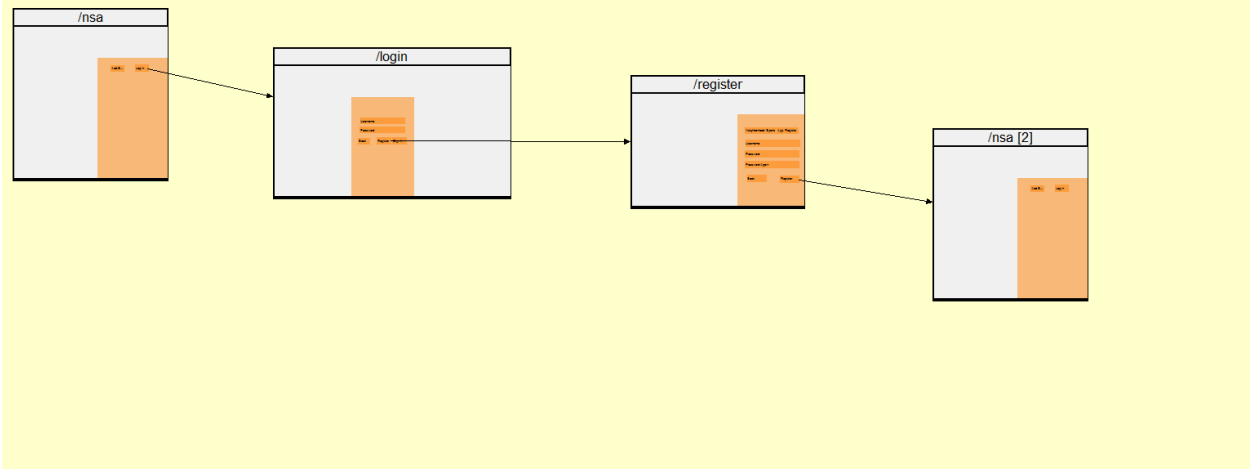
**Add Event Visualization**



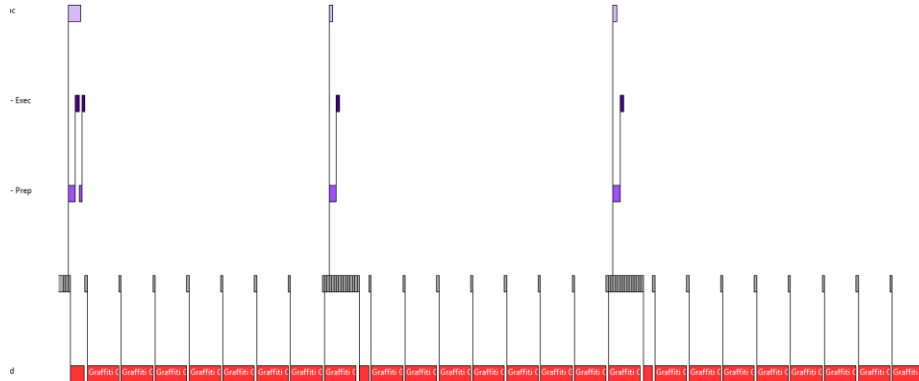
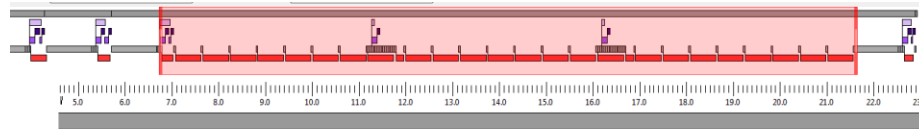
**Join Event**



**Join Event Visualization**



**Register**



**Register Event Visualization**

Project: HCI\_Mobile - CogTool

Tasks	HCI_Project_Mobile	Add Event	Join Event
Register User	24.9 s	34.9 s	5.2 s

**CogTool Task Completion Times**

**Appendix D**

Experiment Questions

Qualitative -

- On a scale of 1 to 5 (1 being pretty & minimalist, 5 being ugly & cluttered), how would you rate the aesthetics of the app/website as a whole?
- On a scale of 1 to 5 (1 being easy, 5 being hard), how difficult was it to navigate between pages?
- On a scale of 1 to 5 (1 being easy, 5 being hard), how difficult was it to interact with the map interface?

1. Task - Create A profile

Qualitative -

- On a scale of 1 to 5 (1 being easy, 5 being hard), how difficult was it register yourself?

Quantitate -

- Time to complete a task
- No of Actions to complete a task
- No. of errors

2. Task - Add an Event

Qualitative -

- On a scale of 1 to 5 (1 being easy, 5 being hard), how difficult was it to add an event?
- On a scale of 1 to 5 (1 being clear, 5 being ambiguous), how clear were the options on the page?

Quantitative -

- Time to complete a task
- No of Actions to complete a task
- No. of errors

3. Task - Join an Event

- Qualitative -

- On a scale of 1 to 5 (1 being easy, 5 being hard), how difficult was it to identify a sport that you were interested in? (Gulf of Evaluation)
- On a scale of 1 to 5 (1 being easy, 5 being hard), how difficult was it to join an event?

Quantitate -

- Time to complete a task
- No of Actions to complete a task
- No. of errors

## 9 References

- [1] Wang G., Pratt M., Macera C.A., Zheng Z.J., Heath G. Physical Activity, Cardiovascular Disease, and Medical Expenditures in U.S. Adults. Annual Behavioral Medicine, 28, 88-94 (2004)
- [2] U.S. Department of Labor. Sports and Exercise. Bureau of Labor Statistics. <http://www.bls.gov/spotlight/2008/sports/> (2008)
- [3] Center for Disease Control. Physical Activity and Health. <http://www.cdc.gov/physicalactivity/everyone/health/index.html#ImproveMentalHealth> (2011)
- [4] National Sporting Goods Association. Sports Participation in 2007. <http://www.census.gov/compendia/statab/2010/tables/10s1212.pdf> (2007)
- [5] Meetup. <http://www.meetup.com> (2014)
- [6] Heim, S. The Resonant Interface: HCI Foundations for Interaction Design. Pearson Education, 173-174 (2007)
- [7] Heim, S. The Resonant Interface: HCI Foundations for Interaction Design. Pearson Education, 234-244 (2007)
- [8] Nordic Factory. <http://www.nordicfactory.com/creative/illustrations/free-sports-icons-download/> (2014)