HCI Assessed Exercise Report

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Introduction

The application we developed for this assessed exercise was FitApp: a web application which allows a user to track their progress as they exercise. The application allows a user to record the exercises they perform and then view statistics of their performance in either tables or graphs. The application also includes a friends list functionality to allow different users to compare their progress, we approached this application with wanting to implement CSCW, as well as strong data visualisation with a variety of graphs to show user data.

A standard workflow for a user would be as follows: firstly, the user would log into their account, which would have records of their exercises associated with it. They would then add the exercises they performed that day, recording the exercises performed and the intensity of each exercise. Once all the data has been entered, the user can go to the analysis page to view a graph which would show a record of their progress over time. The graph would be customisable to show exercises of the user's choice, including the ability to view multiple exercises simultaneously.

While this application sounds like one of many existing applications, there are a few features which set our application apart from others currently available on the market. Firstly, it is the way that the application would present statistics about a user's performance. Most applications currently available on the market only allow a single exercise to be viewed at a time with limited measures of their performance. An example graph can be seen in Figure 1. As can be seen in the figure, only a single exercise can be displayed. Our application would allow multiple exercises to be displayed in the same graph and also view multiple measures, for example the weight at which an exercise was performed and the number of repetitions per set without the need to change any settings for both to be displayed. A proposed example of how this could be displayed can be seen in Figure 2.

Another feature which our application includes that other currently available applications do not have is a friends list feature which would allow a user to add other users they know and be able to analyse their progress as well as their own. A user would have the ability to view their friend's workouts and also view their friends' progress in the analysis graphs alongside their own.

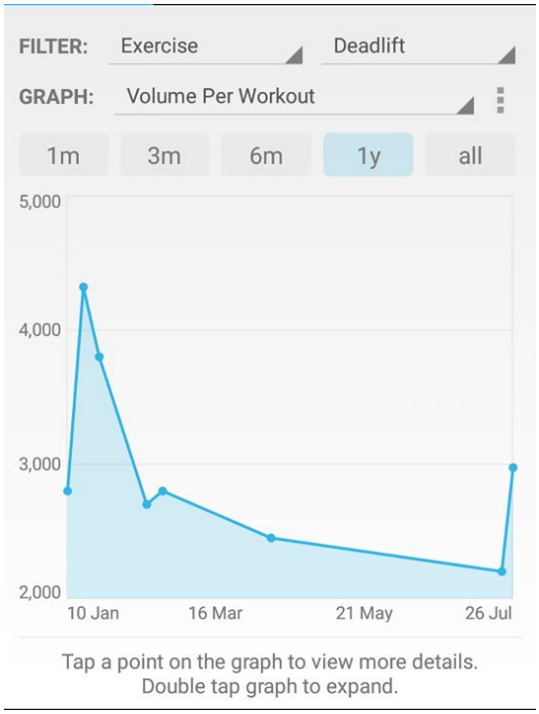

Figure 1: A graph showing a user's track record for the deadlift exercise in the FitNotes app

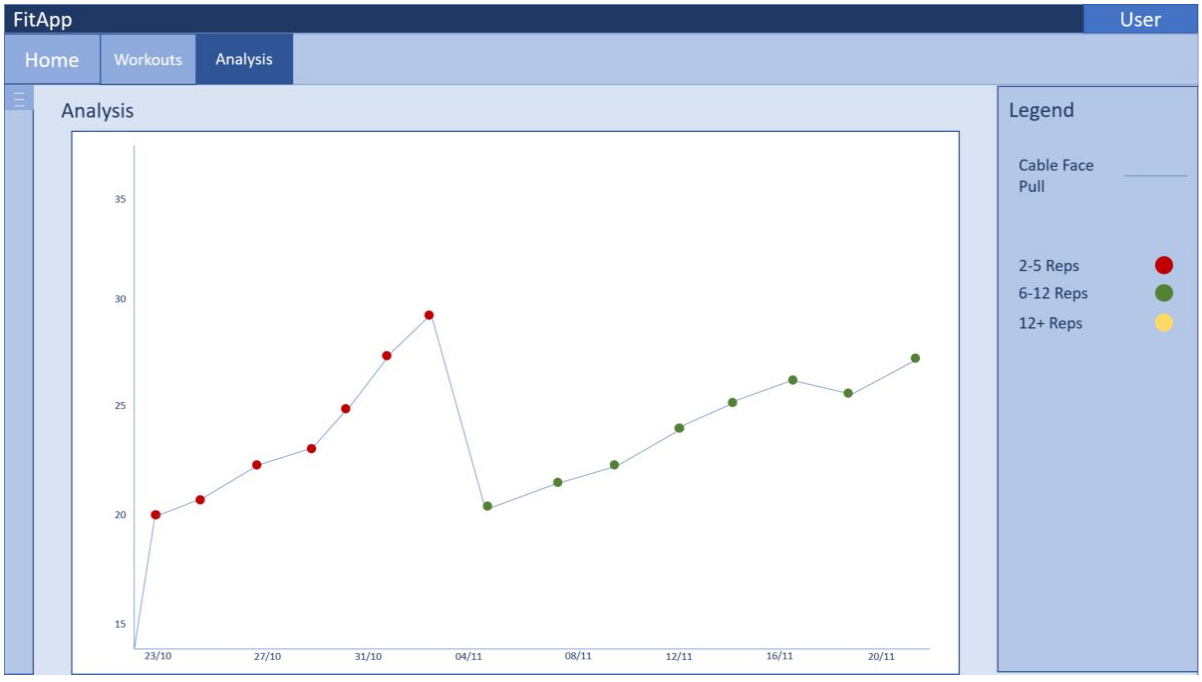

Figure 2: A proposed way to display multiple measures for a single exercise simultaneously, such as the weight and number of repetitions in each set. The weight used in the exercise is recorded on the Y axis, while the colour of the dot for the session shows the number of repetitions in each set

Design Process

We started the design process by brainstorming the features the application could have. The first round had any possible feature we could think of, while in the second round we discussed what features from the initial list were more important and came up with a list of features we wanted to include in the application we were building.

The second step of the design process was designing the UI. We started this using the Design Studio technique. The technique is a three round process. In the first two rounds, each person takes 5-10 minutes to sketch up to six different designs for a page of the application. After each of these rounds, the group has a discussion where they introduce each design and briefly describe the features that separate that design from the others. This is a way to very quickly come up with a wide range of ideas for a potential final design. The third round involves each person choosing a final design and making a more in-depth sketch of it, then explaining to the rest of the group why they chose that design and what features it has. We skipped the third round when designing the UI for our application. Instead, we talked over the designs we had drawn and chose a set of four designs to be drawn out as wireframes in finer detail and presented to others to be evaluated.

This process was repeated for three of the pages we were certain to include in our application: the home page, the add exercise page and the analysis page. The wireframes used for user evaluation can be seen in Appendix A. Table 1 shows the final count of votes for each design. The counts are different for the home page as the same sheet had designs for when a user was and was not logged in.

Page\Count	Design 1	Design 2	Design 3	Design 4
Home Page	4	3	3	4
Add Exercise	0	0	6	1
Analysis	0	6	0	1

Table 1: Count of user votes on their preferred design for each page

The designs with the highest number of votes were used to create a high-fidelity wireframe, which can be seen at https://invis.io/C6PA1WPW58B. Alternatively, some screenshots can be seen in Appendix A. Once the high-fidelity wireframe was complete, we began to implement the application.

Implementation

After coming up with a design for our application, we implemented the application in Laravel, which is a php web-app framework. We also used a MySql server to host the database for our backend. We chose Laravel because of our experience of using web-app frameworks, as well as our knowledge of Laravel toolkits which helped us to build up the app's features faster. Due to time constraints, we were not able to implement all of the functionality that we had laid out in our design. Unfortunately we were not able to implement the graph features, instead we produced tables that allowed us to show the exercises and workouts that users contribute in the app. This was a compromise that we had to make because we were not familiar with producing tables of this complexity in web-app scripting languages, e.g. Javascript. An example of the tables we implemented is shown in Figure 3.

As we were showing the data logged by the user's friends in a table, we decided to not have a sidebar explicitly for this purpose and instead we added a sidebar on the left for managing friend requests, which we also didn't design in advance.

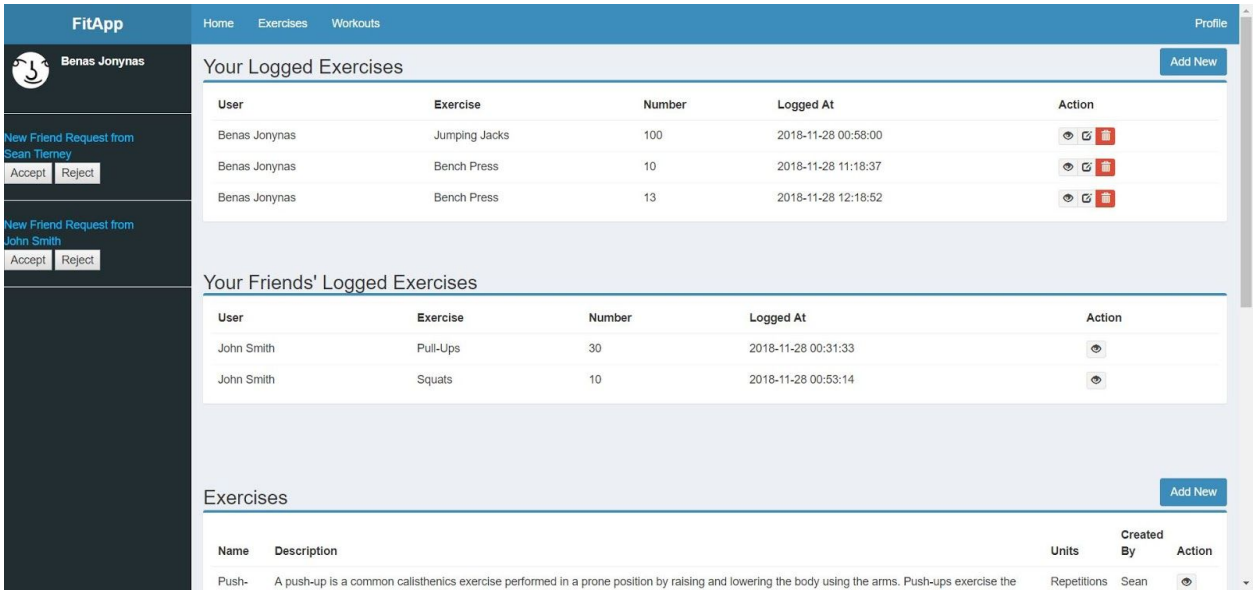

Figure 3: Revised design for showing user data.

When implementing the application, we came across more design aspects that we did not think of during our initial design process, these were as follows:

- UI for editing and deleting user data
- Managing friend requests
- Creating routines

We decided to add these to our design in a non-intrusive manner, so that the feedback that we had received when evaluating our initial design could still be used to justify it. To edit/delete a user's data, we added a couple of buttons into the tables we used to replace the graphs, we used glyphicons representing a notepad to edit data, and a red trash can for deleting an entry. When delete is pressed the user sees a warning beforehand. When the user chooses to edit data the form that was used to create the input is reopened, with the previous values being loaded in so the user doesn't have to enter all of the details again.

Creating routines was an oversight that we had to create a design for as well, we decided to have a form similar to our initial paper designs (see Appendix) with drop down menus for selecting specific exercises and boxes for setting a required amount (be that a time, weight, or number of repetitions). We chose this style of form based on the feedback we received when evaluating our first iteration of designs. A screenshot of the form we implemented is shown in Figure 4.

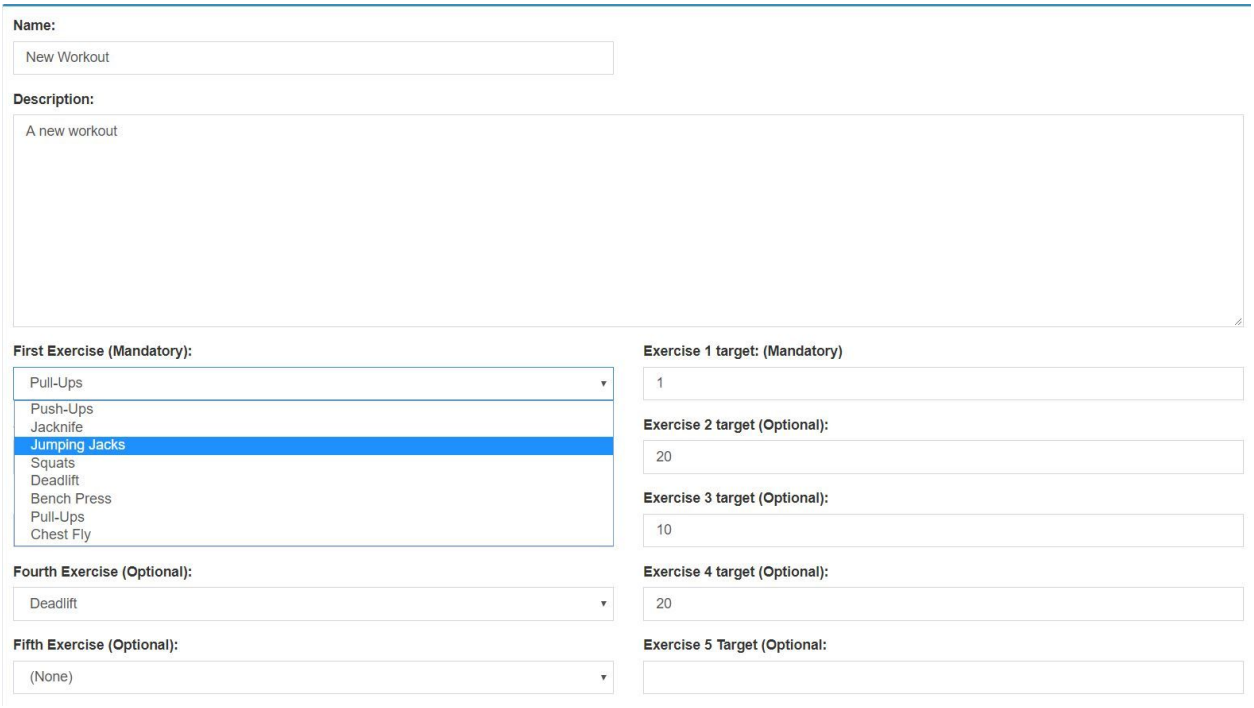

Figure 4: Screenshot of our implementation of the 'Create Workout' form

Evaluation

To evaluate the usability of our application, we conducted a usability study. We produced a test sheet that would lead a user through all the aspects of our application, where we recorded quantitative feedback regarding the number of errors (we define errors as instances of a user moving to the wrong page, or receiving an error state when submitting a form), as well as the amount of time taken to carry out tasks. After this we conducted an interview with each of our

users to take qualitative feedback, in order to gauge how happy users were with our system, outline any problems that users had with our application, as well as any other thoughts that could help us evaluate our application.

The state of the backend database was kept consistent at the start of each experiment, to ensure that it would not become a confounding factor. We had five users from the Boyd Or level 4 computer lab test our experiment, ranging from avid gym goers to those that had never been inside a gym, we tried to diversify the range of experience of our testers to give more generalizable results, as well as to gather feedback from people with different levels of knowledge and perspectives regarding workout routines and exercises. Before we gave out the task sheet we gave a brief scripted introduction to introduce the purpose and use of our system.

The tasks were kept simple and brief to promote a more explorative approach to our application, to potentially improve the qualitative feedback gathered from the interviews afterwards.

The test sheet supplied to users was as follows:

1. Register a new account.
2. Add a new exercise to the system.
3. Log having performed a set of 30 ‘Jumping Jacks.
4. Send a friend request to ‘Sean Tierney’
5. Create a new routine.

	User 1	**User 2**	**User 3**	**User 4**	**User 5**
Task 1	17.2	24.3	15.8	16.1	26.7
Task 2	42.1	67.2	62.2	78.6	53.7
Task 3	27.4	42.2	31.0	35.9	33.0
Task 4	15.1	17.8	16.3	15.2	13.8
Task 5	59.2	82.1	67.7	102.1	89.3

Table 2: Time taken by users to perform tasks (values are t(s))

	User 1	User 2	User 3	User 4	User 5
Task 1	0	1	0	0	1
Task 2	0	1	1	1	0
Task 3	0	0	0	0	0
Task 4	0	0	0	0	0
Task 5	0	1	0	2	2

Table 3: Number of errors during each task

The errors that occurred during the test were as follows:

Task 1) Users submitted password of too short a length, request returned an error.
Task 2) Users clicked the wrong link to create a new exercise but instead went to log an exercise.
Task 3) No errors performed.
Task 4) No errors performed.
Task 5) Users clicked the wrong link to create a new routine but instead went to log a routine, users filled wrong type of data (alphanumeric) into integer 'number' field in workout form.

Looking at the quantitative results we see that there are not any major discrepancies between the number of errors and the time taken to do each task. We must take these findings with a pinch of salt however due to the small sample size of testers..

The qualitative feedback that we got from our test users lined up nicely with these results and brought our attention to possible issues with our system, these were:

- The requirements for choosing a password are not known the first time when registering an account (in the app a password must have at least six characters).
- It is not immediately obvious the difference between the tables for logging the exercises and adding an exercise to the list. Two users noted that they would prefer the tables to be in the other order, however this would result in users having to scroll down the page to see their data, which we believe is much more important to frequent users and the users' feelings may have been influenced by the order of the tasks on the task sheet. This problem was echoed in the last task with workout routines as well.
- The field for entering the target of exercises isn't clear that it only accepts an integer, users attempted to add strings like '10 reps' into the inputbox returning an error when the user tried to submit the form.

Overall we feel that our experiment was very useful in highlighting potential design flaws within our application, unfortunately we were not able to go back and implement changes to our application due to the time constraints of this exercise and working around our schedules. Improvements to the usability of the application are detailed within the next section.

Further Work

The application has a number of ways it could be expanded further. Firstly, and most significantly, the graph functionality was not implemented due to time constraints. The proposed wireframe can be seen in figure 10 in the appendix. The graphs would need to allow a user to select the exercises they wish displayed and to display data from their friends as well. Furthermore, the graphs would need to be able to show multiple measures at once, for example both weight and repetition number for weight exercises. Some ways this could be done would be to colour code additional measures, or to use different symbols to represent different aspects.

Another way the application could be improved is to include ways of discovering other users of the application. This could be done by allowing the user to log in with their Google or Facebook account and synchronising the user's contacts on those accounts with other users of the application. Of course this would require permissions settings to ensure that a user's privacy was not violated. Currently the user selects whether or not to keep their profile private when registering, we would need to implement a way for this to be changed post registration. However, the ability to discover other users could be useful for users to share their progress, which could potentially provide more motivation for them to maintain their fitness regime.

On the topic of privacy, options should be added to allow a user to control how much of the data the user records using the application is visible to their friends. This can include options for specific exercises or routines or specific dates. A possible reason a user might want this could be the user being ill and not performing as well as they normally do on a specific day and thus hiding that data entry to not have it included in their friends graphs. Additionally, a feature to delete an account and all associated data should be included in the application.

Further work could also be done to improve the UI of the application to improve usability. For example, exercises could be categorized to make them easier to find as more and more exercises are added. The application should come with a number of categories by default but also allow users to add more categories as they wish. Changes to the forms for logging exercises as well as new exercises should be edited to give a better understanding of the data types that the fields require, rather than waiting for the user to see the validation error encountered when submitting the wrong types of data.

Conclusion

In conclusion, we believe the planned application could be very useful for tracking fitness and training progress due to its ability to easily share your exercise data with your friends and the graph functionality which would have the ability to display data from multiple users and exercises for easier comparison. Unfortunately we did not have the time to implement all the features we would have wanted in the final application, but we believe that with more time and work this application could become a good fitness tracker.

Appendix

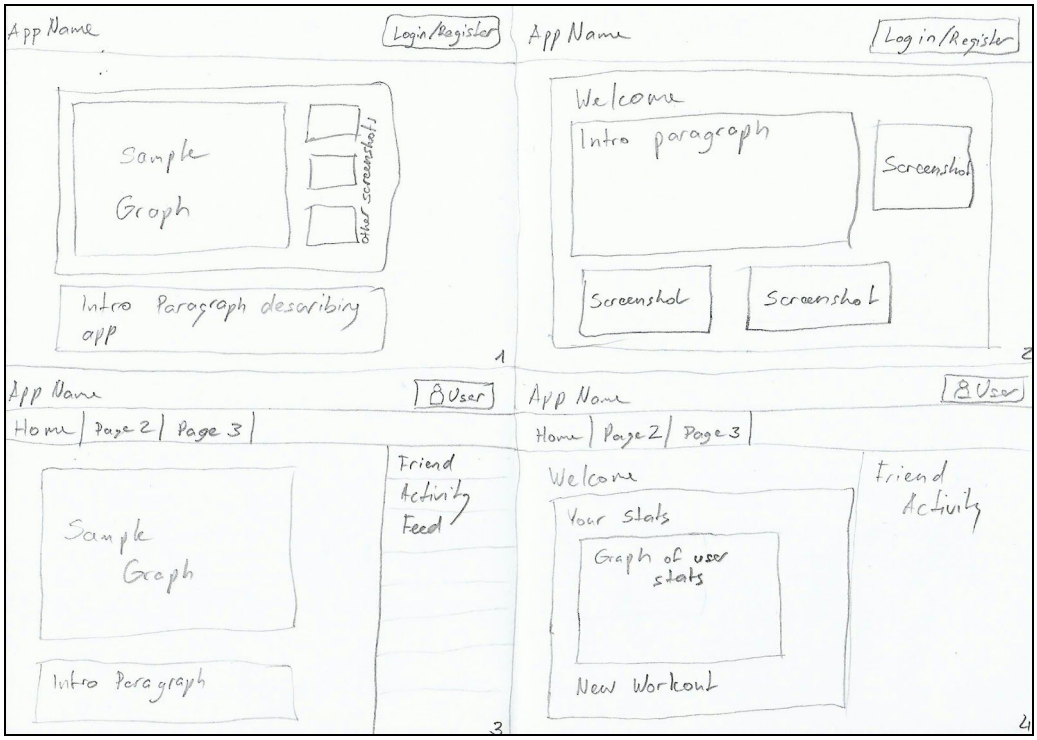

Figure 5: The proposed Home Page designs. Designs 1 and 2 show a home page before a user is logged in, designs 3 and 4 show proposed designs when a user has logged in

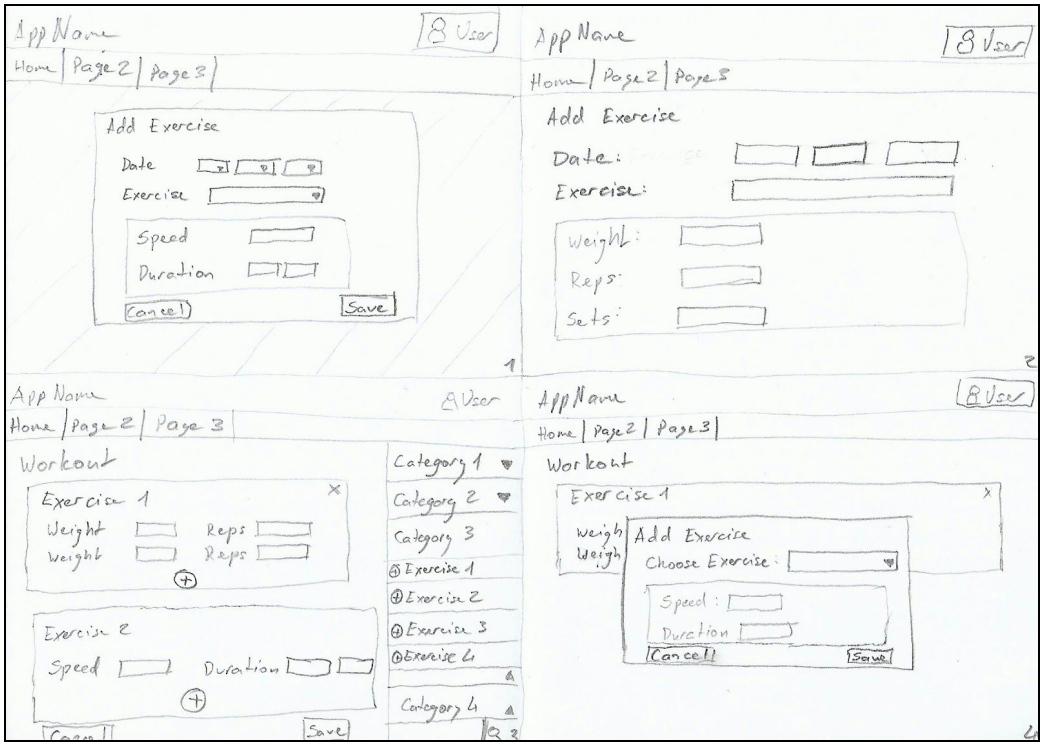

Figure 6: The proposed designs for the Add Exercise page

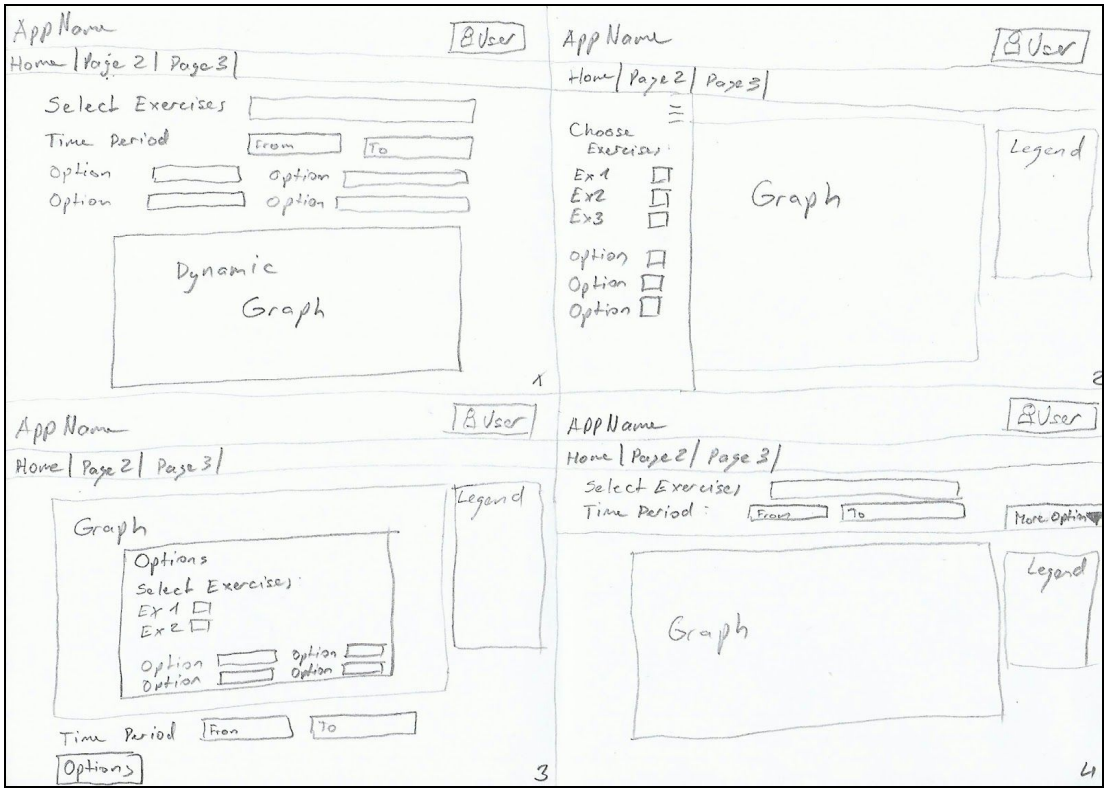

Figure 7: Proposed designs for the Analysis page which is where the user could view graphs of their recorded exercises

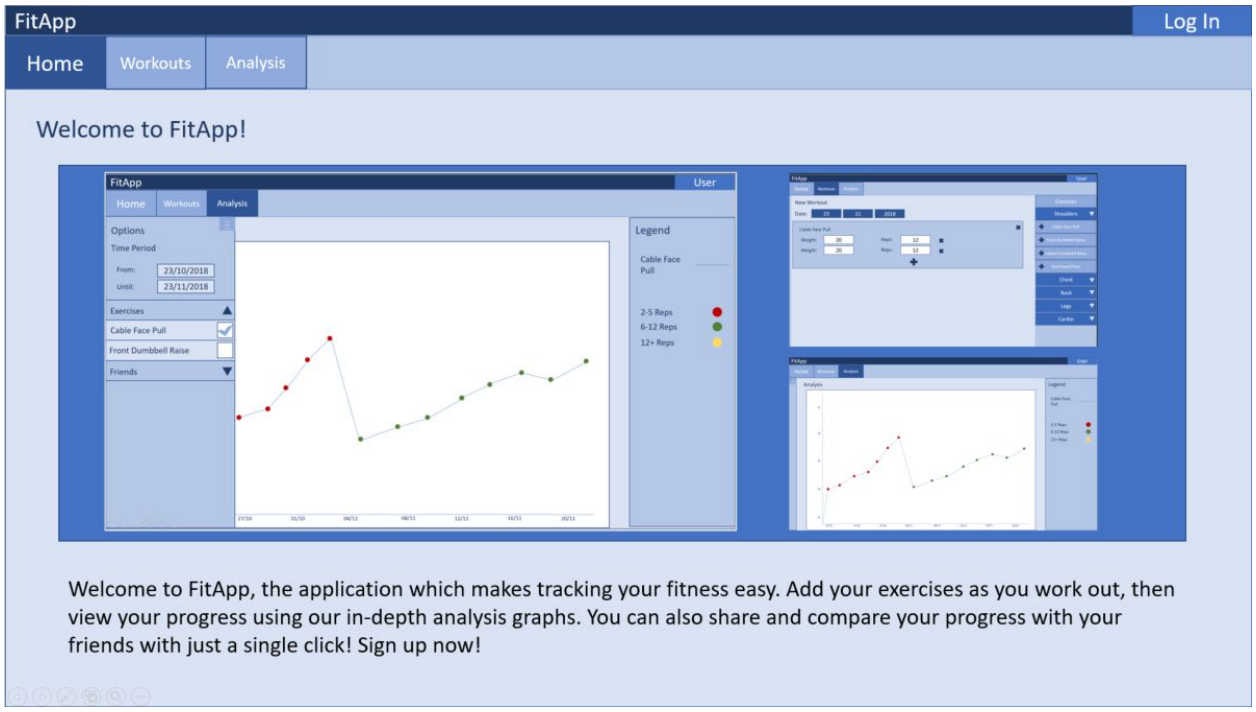

Figure 8: The home page in the high-fidelity wireframe

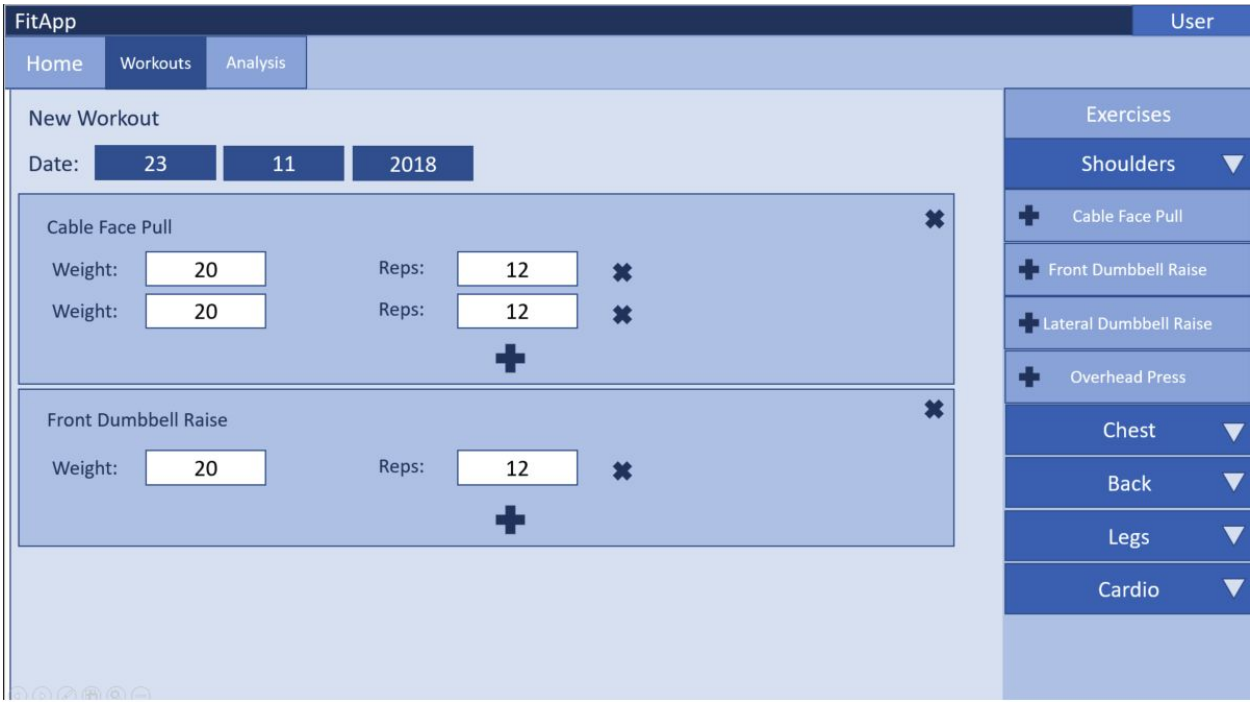

Figure 9: The add exercise page in the high-fidelity wireframe

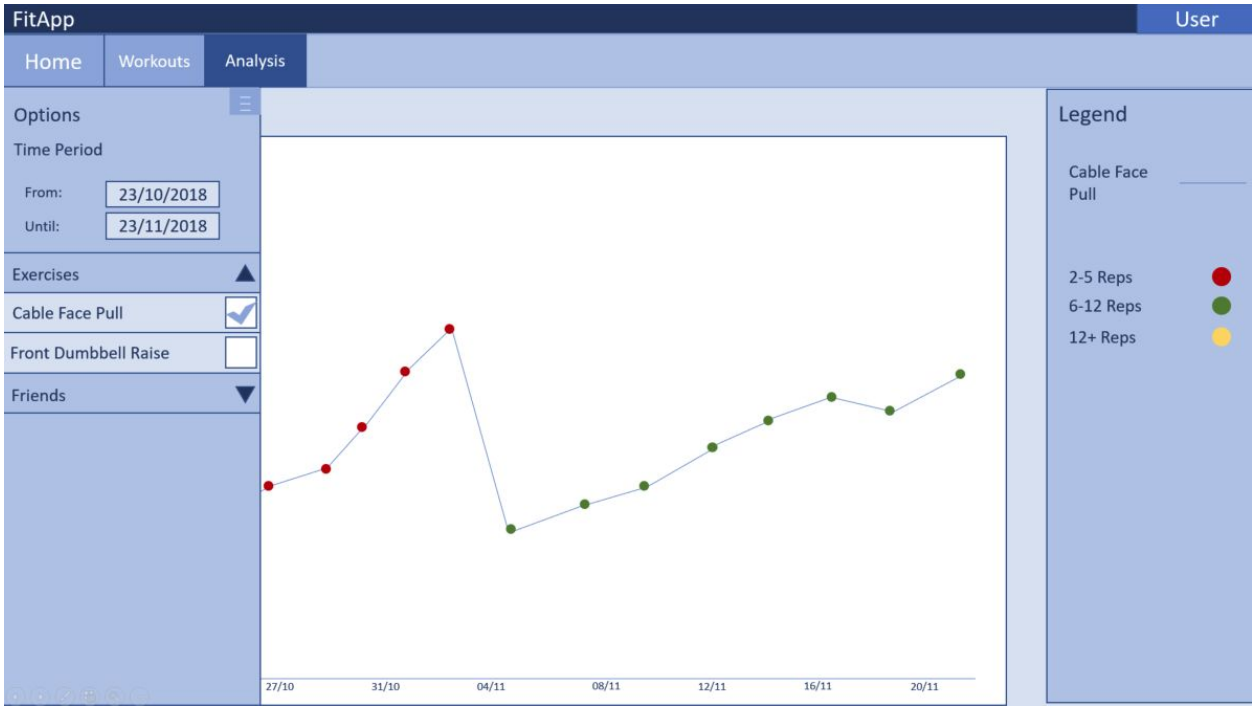

Figure 10: The analysis page in the high-fidelity wireframe