CC: Cancer Care
CSE 440 AB
27 February 2017

3f: Final Report

1. Title: CC:

2. Team members and roles

- Alison Maher: CEO, external relations manager, interviewer
- Clara Lu: COO, product manager, team cheer leader
- Peter Li: CDO, creative designer, writer, and comic artist
- Sam Crow: CTO, editor and comic artist

3. Problem and solution overview

One of the main problems with cancer treatment is that patients have to keep track of various pieces of information, including side effects, medications, appointments and bills. Caregivers rely heavily on the patient's memory to help explore solutions for their symptoms, and remembering these details week to week can be challenging for both parties. Our proposed solution at the beginning of this project was to streamline the tracking process for patients and provide simple means of communicating this information to caregivers. We did this by including a calendar, and a wearable to automatically track some data, however as we iterated more, we realized some of our needs had changed. Our newer solution gets rid of the calendar because most smartphones already come equipped with a calendar, and including another one just becomes an extra hassle. We got rid of the wearable because it represents an entry cost, and is difficult to compare to manually tracked data. Now, our newest goal is to allow the user to track data as quickly as possible by making it easy to log the type of symptom and the severity. This allows for simple graph comparison and allows the user to view trends in the data. There is still the ability to export the data to the nurse, however since the data is all from the user, they have to power to choose what to share.

4. Initial paper prototype

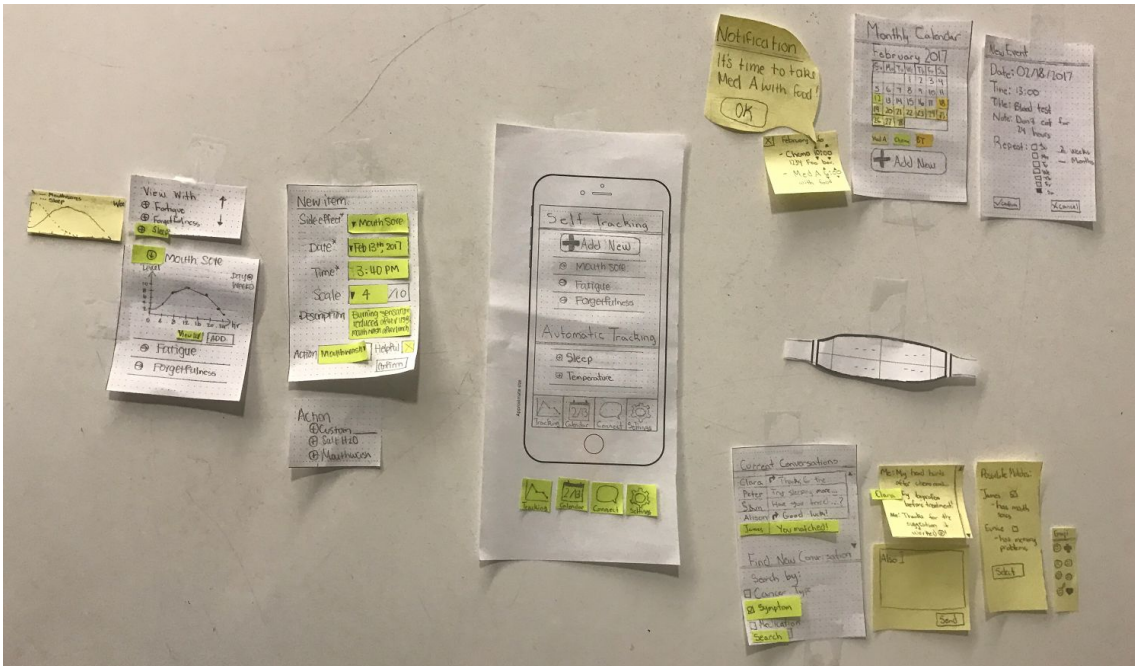


Figure 4.1: Initial paper prototype overview

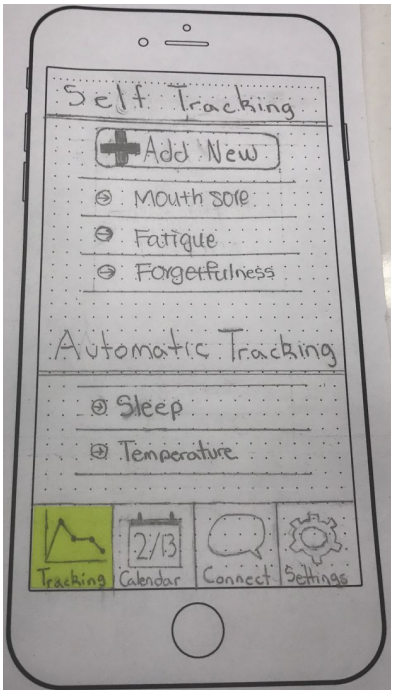


Figure 4.2: Tracking page

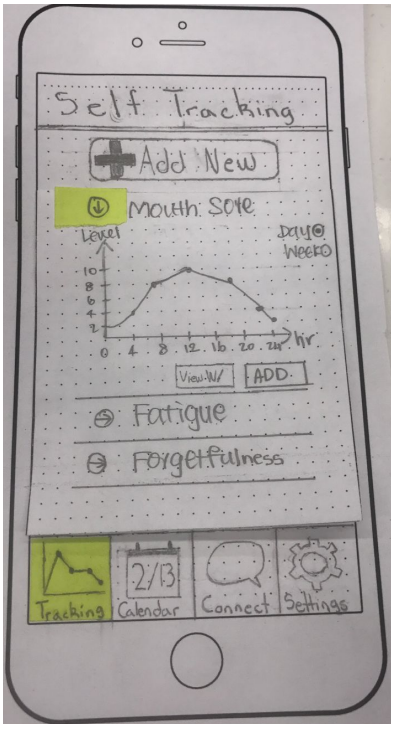


Figure 4.3: Severity graph for one symptom

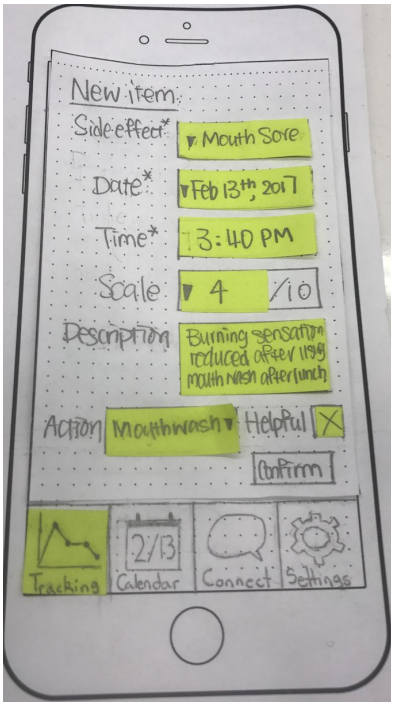


Figure 4.4: Side effect entry view

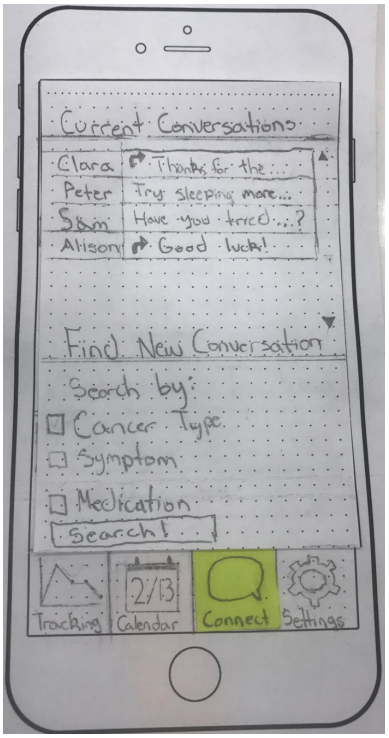


Figure 4.5: Connect view with list of contacts

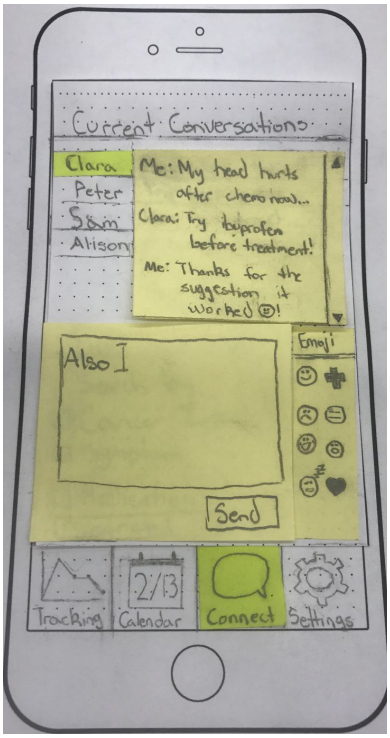


Figure 4.6: Conversation view

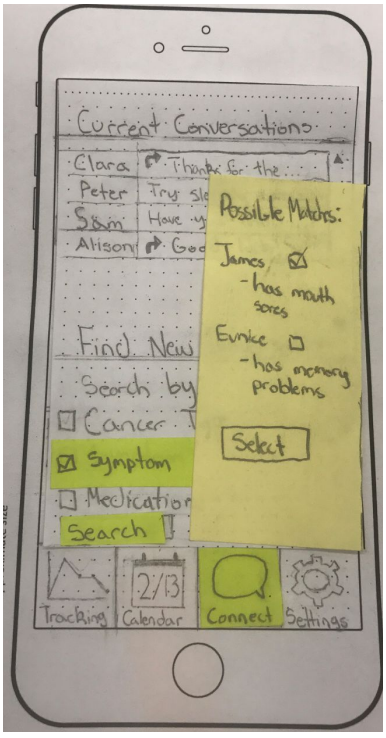


Figure 7.8: Search results

Our initial paper prototype includes a calendar for tracking events and a wearable device for recording side effects. The first primary task it supports is tracking side effects. Users can expand each side effect in the list to record an occurrence. They can also talk to the wearable device to record side effects. For the second primary task, users can connect to other people in similar situations. The connect view shows all conversations that the user has started and allows users to find new people to communicate with.

5. Testing process

Our testing began with two heuristic evaluations conducted with members of the Subtrackr project in this class. To conduct these evaluations, we slowly walked members of the other group through our main tasks, allowing them to interject with questions and noting irregularities. After both tests, we identified many aspects of our design that were unintuitive or inconsistent from their notecards, and graded the severity and fixibility of each issue. We fixed most of the issues in order of how important they were to our overall functionality, but we also identified other issues that weren't entirely consistent with where our vision of the design was going.

After updating our prototype we started conducting usability tests. The first one was done in CSE 002. We chose the participant because he didn't have much previous background in design or knowledge about our project or interface, and therefore he should've been able to provide us some

unbiased opinion as a user. We chose the environment because it was easily accessible, contained a group of tables and chairs in the corner where we could operate, and was not too loud. The test was conducted by giving the participant a series of tasks. We had a few members of our group take notes on issues while the others played the role of computer and facilitator. We realized that we broke the tasks into instructions that were too short and simple. We ended up basically walking the user through the entire prototype with each instruction, and answered too many questions, instead of allowing the user to explore the design. Based on our own observation, and the feedback we received, we revamped our entire design.

For our next two tests, we prepared a scenario that was more broad and less detailed, which allowed for more user interaction and exploration. We told them that we couldn't answer questions until the end, allowing us to see how easy or difficult it was to overcome confusions. We did these tests on our updated prototype, and overall, the tests went smoothly and validated that most features of our updated design was straightforward and intuitive. We noted issues as they came up and fixed these minor tweaks for the final paper prototype. We utilized the same format with notetakers, a computer, and a facilitator. We chose the second participant because they were the family member of a cancer patient. This provided one of the key backgrounds that we were designing for in the first place. For the third participant, we had originally hoped to get either the nurse or cancer survivor that we had interviewed previously, but we were unable to do so because of their schedules. In the end we chose another user who knew nothing about our design. This ended up working out because we had completely recreated the paper prototype, so it was helpful to observe the unbiased input of an uninformed user.

6. Testing results

Through the heuristic evaluations, we encountered many small user errors that we wouldn't have noticed when we were focused mainly on functionality. On many of our screens, we didn't have a clear procedure on what happens if the user goes back. Do the changes stay until the user confirms or cancels? What happens if they click on another tab? What if the user doesn't want to share their personal treatment information on the app? These were some of the most relevant questions that came up when conducting these tests. The first two violate the "help users recognize, diagnose, and recover from errors" heuristic and the "help and documentation" heuristic. The last one violates "user control and freedom." As a result of these errors, we added more popup menus that confirm if a user wants to complete their current action, especially if it's deleting a data point or going back without saving. We then created a Settings tab, where the user could edit the amount of information they share. This is the updated prototype we used for the usability testing.

For our first usability test, we encountered some consistency issues on our own end. We told the user to pretend that they were a new user creating a new account. However, our home page came pre-populated with symptoms as an example. This lead to an error in our scenario, which we had to fix as "assume these are the symptoms you are actually tracking". We also realized we didn't have to test the login screen because it wasn't one of the important tasks we were focusing on. Some

of the fixes we had from our heuristic evaluations resulted in new issues. For example, we added explicit buttons for automatic tracking and manual tracking, but the display on the home screen wasn't entirely explicit about which was which. These issues were fixed in our next two tests by writing a better and more consistent scenario. Some of the issues that the user found was that the conversations window was crowded, and it was confusing what was going on all the time. In particular, they argued that the "Find New Conversations" portion of the window doesn't always have to show up because it isn't as important as the actual conversation. The user also noted the inconsistent tab labeling. The home bar has a label "Connect", but the actual page had no such label. Furthermore, the user noted that while we had a swipe to delete command, it wasn't explicitly labeled, and thus wouldn't be clear for many users. We fixed this by adding an explicit delete button (along with delete confirmation). This also brought up the question about whether deleting in the calendar was for a certain instance or for the sequence if it was a recurring event. We fixed this issue with another pop up screen. We had an undo button because of the deletion, but the functionality of it was ambiguous and hidden in the "Settings" tab.

In the end, we realized quite a few things. First of all, we didn't need to have the calendar because most smartphones have built in calendars, so why reinvent the wheel. The undo button was confusing because of the lack of spatial locality, and it would be simpler to provide a prompt on the page that the delete was happening on. Finally, the automatic tracking was confusing to the user. Based on feedback from James in our previous presentation, who suggested that it might be a barrier to tracking because of the cost and hassle, we decided to remove the wearable. There was also some confusion as to how to compare the manually and automatically tracked data. How exactly does sleep or temperature translate to a severity scale from 1 to 5 in order to compare it with the manual symptoms? This led to a cleaner home screen but also made the input of data difficult because of all the number of clicks and required fields needed to enter a new data point. Thus we decided to separate the graphs from the input of data to make entering a new point with a single required field, the severity, even faster. We also added a "Discover" tab which contains information on symptoms and the suggested solutions based on user/professional advice. We realized this was pertinent information for users that we had previously considered, but had fallen out of favor with originally in comparison to the calendar and other features. This entirely revamped prototype was used for both the second and third usability tests.

For our second and third usability tests, we encountered an issue when the user tried to click on the plus sign to log a new data point, only to realize they had to click and drag to input. They then tried to click on it again to find more information related to tracking nausea. However, we did not find this to be an issue we needed to fix since after viewing an error popup screen once, the users were able to figure out the correct actions to complete the tasks. During our second test, it was suggested that we should color code the severity scale so that there was a visual indication of the scale, so we colored in that particular portion of the interface. Furthermore, we noticed that our newer prototype violated the heuristic of "recognition rather than recall" when the user tried to search for a new user to match with. We didn't list what the user had matched on, so the user had

no qualifying information on who they might be connecting with. Next, we encountered an issue where it was difficult for the user to know how to edit a page on the graph. To edit a certain datapoint on a certain day, they clicked on the day radio button. We fixed this problem by adding help text that the user could hide if they wanted to. We also realized that defaulting to the day view rather than the week view of the graph would perhaps be most pertinent. Finally, we forgot to add explicit back buttons, which the users pointed out on when editing data points. This was solved by adding back arrows with popups in case the user hadn't saved their changes. In the end, all the iteration of our prototypes caused our design to become simpler and cleaner. This allowed the user to more easily navigate through different pages of our design, and focuses more on the specific tasks that we set out in the beginning which were to connect to other similar patients and to track relevant treatment data. There is room for improvement such as adding back in the capability for automatic tracking if the user already has a wearable they would like to integrate or to more explicitly integrate the caretakers and their advice, especially on the discover tab.

7. Final paper prototype

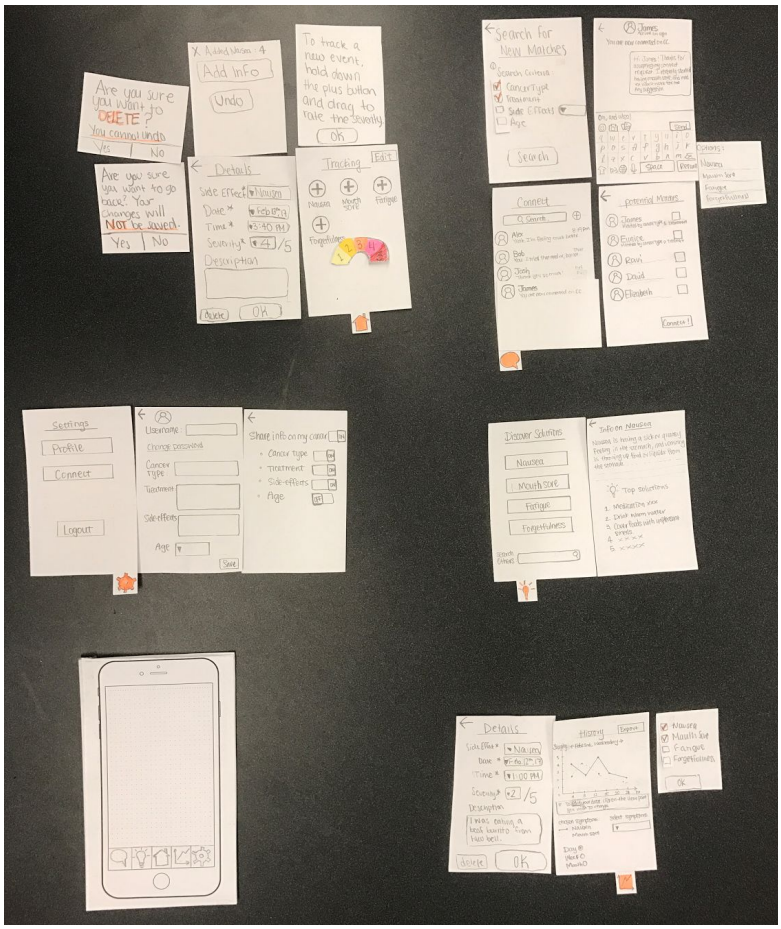


Figure 7.1: Final paper prototype overview

Our final paper prototype has many improvements over the initial paper prototype.

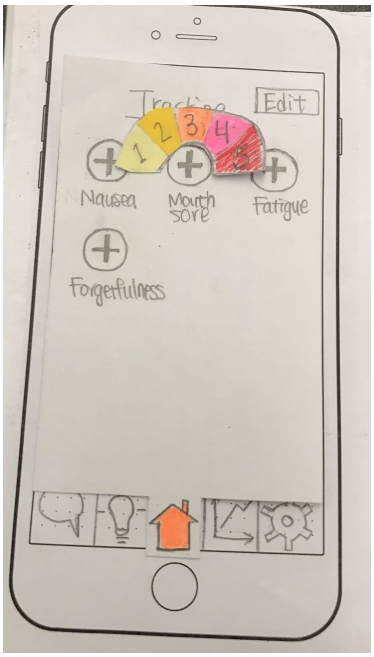


Figure 7.2: Tracking page with severity level popup

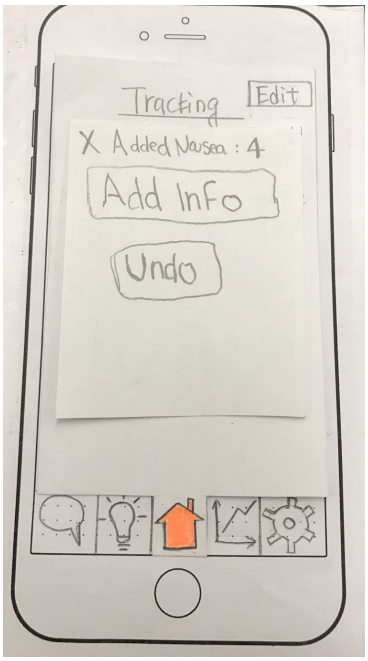


Figure 7.3: Tracking confirmation dialog

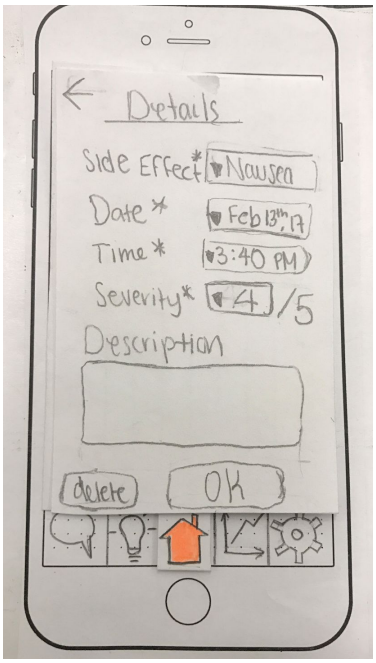


Figure 7.4: Side effect detail view

The final paper prototype has a much simpler interface for recording side effects. To record a side effect, users can tap and hold the plus button. A severity popup appears, and the user can drag their finger to a severity level. The application records a data point when the user lifts their finger from the screen. If the user wants to add more information or delete the point, they can open a details view.

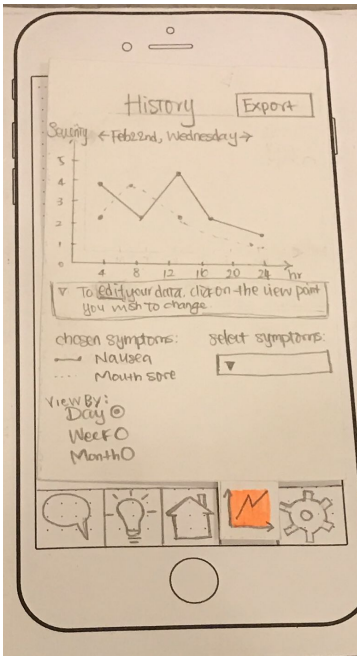


Figure 7.5: History view

The history view shows one graph of symptom severity over time. Users can select one or more symptoms to show. The user can tap on a point to open a details view that allows them to edit or delete it.

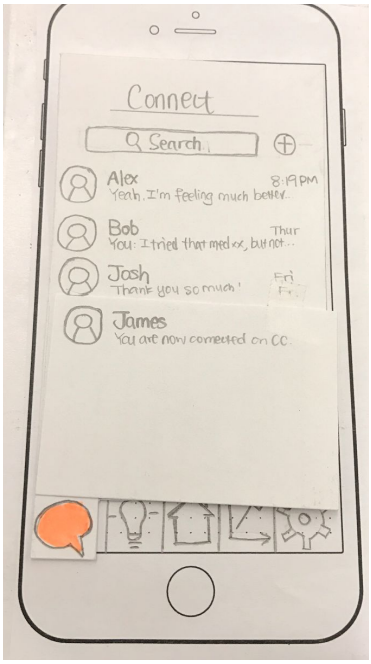


Figure 7.6: Connect view with list of contacts

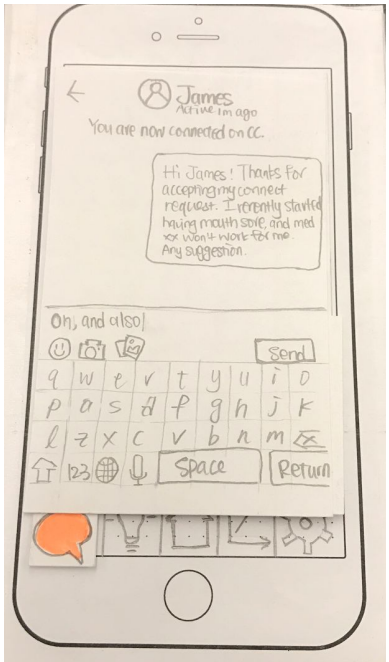


Figure 7.7: Conversation view

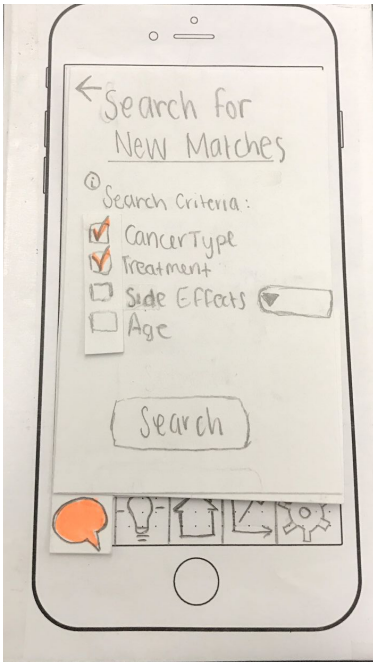


Figure 7.8: Search view

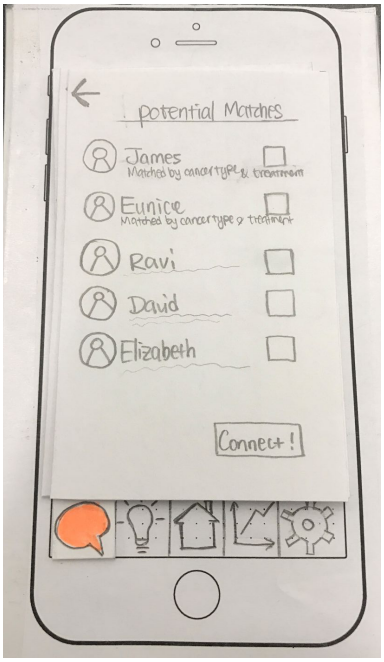
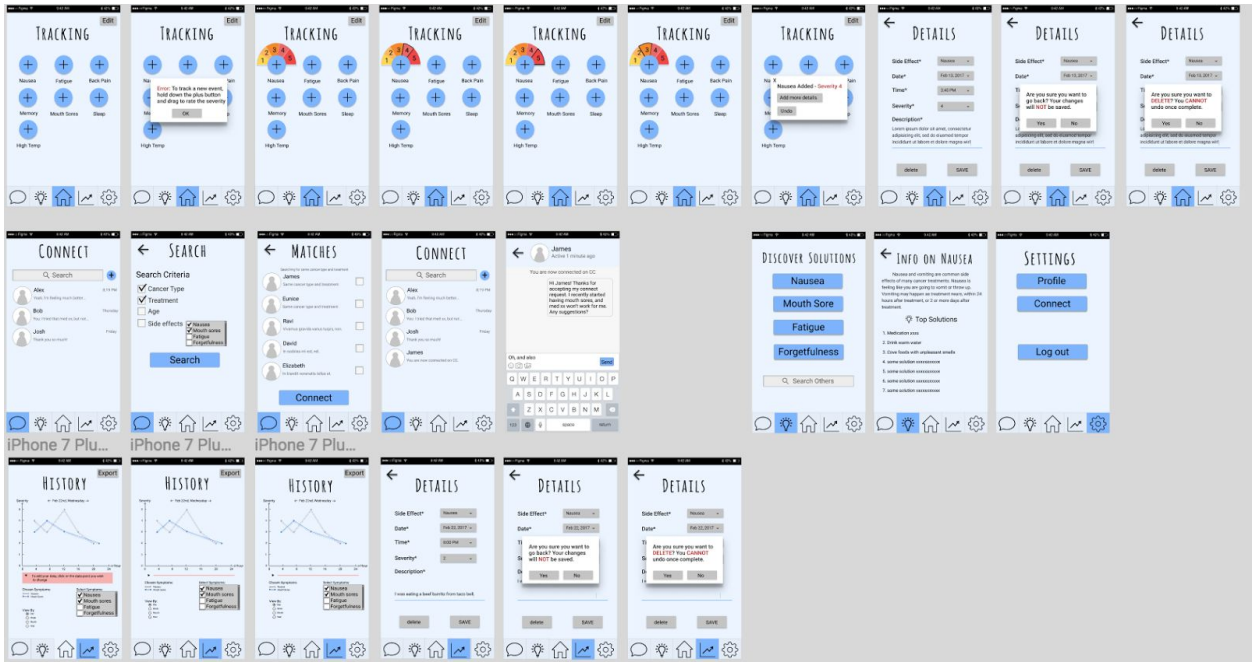


Figure 7.9: Potential matches view

Users can communicate with each other using the connect interfaces. The main connect view shows the conversations the user has started. Users can search for new contacts based on several criteria. When a list of results appears, they can select one or more people to add as contacts.

8. Digital Mockup

- **Overview images of digital mockup**



- **Task 1: Tracking Side Effects**

  The tracking/home screen appears when the application opens. To add a new instance of a side effect, the user holds down the plus button for that symptom and drags to indicate its severity on a rating of 1 to 5 (Figure 1.1). After submitting a new data point for a side effect, a pop-up screen will direct users to add optional additional information to that data point. They also have the option to undo the data point they added (Figure 1.2). After tapping the "Add Info" button, users can edit any of the details of the data point they created or add a description to give more details around the event (Figure 1.3). To view the history of a side effect or compare the histories of multiple side effects, users can navigate to the history tab. There they can use the dropdown to select the side effects they wish to view and edit/delete data points by clicking on their location in the graph (Figure 1.4). After the user clicks on a data point, they can edit the details of the event as well as delete the event all together (Figure 1.5). Within the "Discover Solutions" tab, users can view more details about the side effects they are tracking as well as search for information on side effects they are not already tracking. (Figure 1.6) After clicking on the side effect, users will be given a detailed description of the side effect with suggested solutions from experts. (Figure 1.7)

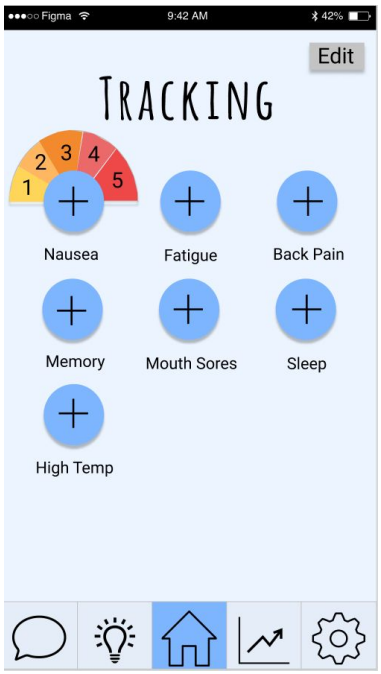


Figure 1.1

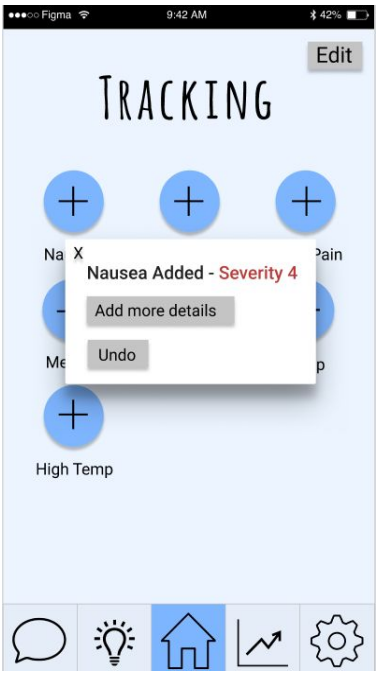


Figure 1.2

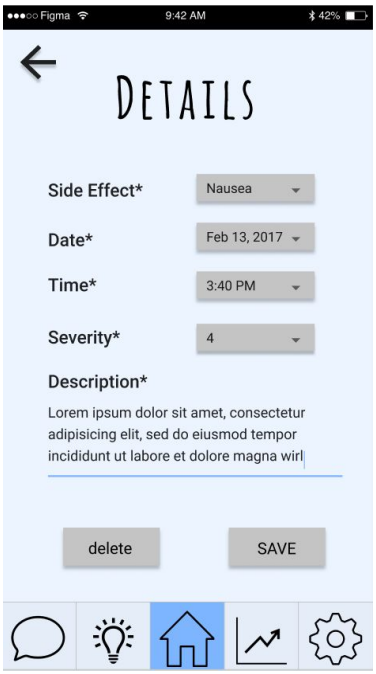


Figure 1.3

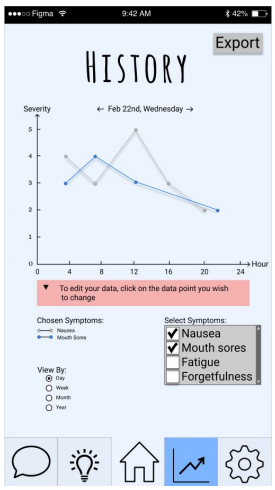


Figure 1.4

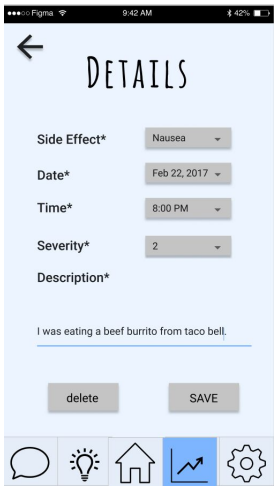


Figure 1.5

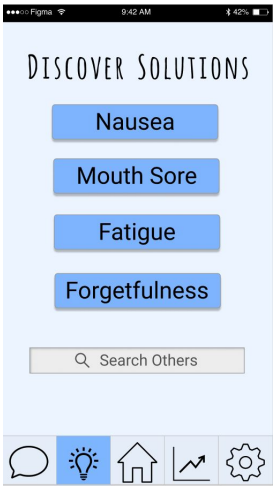


Figure 1.6

Figure 1.7

- **Task 2: Connecting with Similar Patients**

  In the "Connect" tab, users can see the current conversations they have with other patients and add new matches using the "+" button (Figure 2.1). After clicking on a conversation, users will be able to view previous messages as well as send new messages (Figure 2.2). When users click the "+" button, they can search for new matches based on their desired criteria (Figure 2.3). After searching, users can see who they matched with along with what search criteria they have in common. They can choose to select the users they wish to connect with or go back if they change their mind (Figure 2.4). To update their profile, change the information they share in the connect page, or logout, users can navigate to the "Settings" page (Figure 2.5).

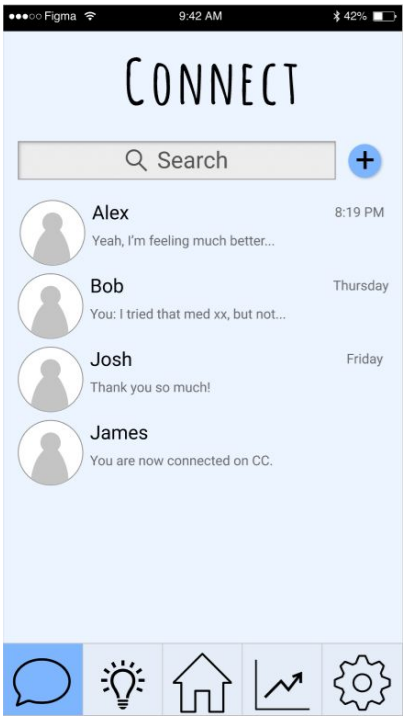


Figure 2.1

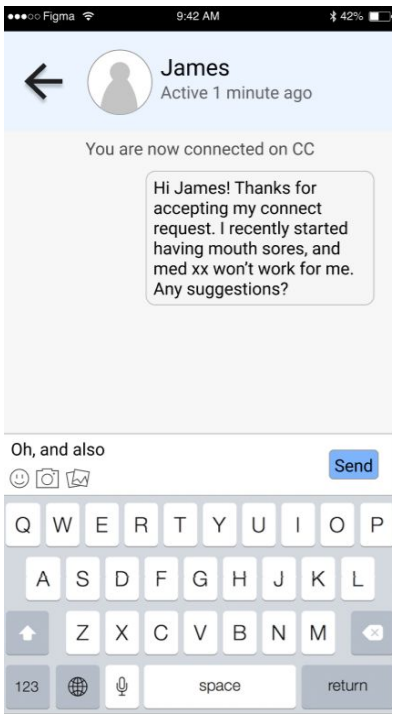


Figure 2.2

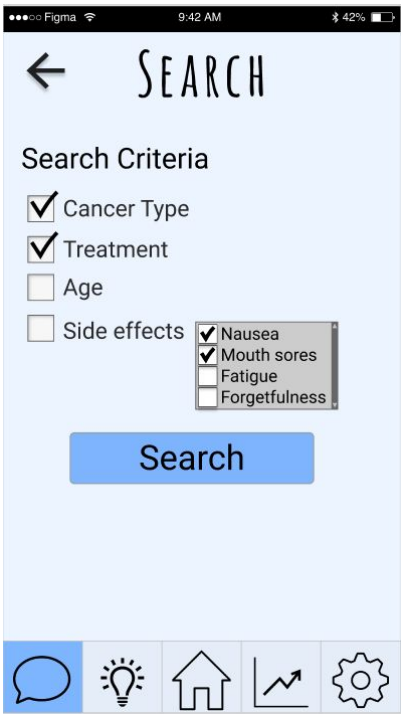


Figure 2.3

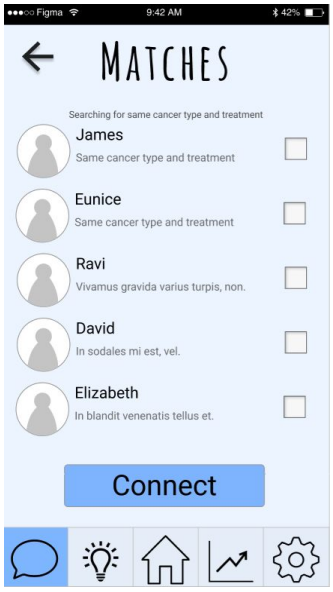


Figure 2.4

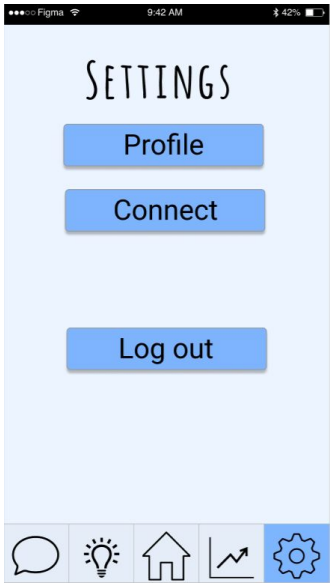


Figure 2.5

- **Decisions and changes made in implementing the digital mockup.**
    - We didn't have any major change to our paper prototype except minor changes to some UI elements due to the limitations of the tool we used.
    - For our History page, when a user selects symptoms, instead of showing a drop down menu which was what we had on our paper prototype, we changed it to a embed screen, because it is more intuitive to users that they can select multiple options in the embedded screen.

- We also added highlighted borders to the severity scale to help clarify which number you are selecting - this helps users avoid errors.

9. Discussion

Through the process of iterative design, we learned that creating the perfect design on one's first try is nearly impossible. Stages of creating, testing and editing allowed for errors to be found early and cheaply. What we originally thought was a decent design ended up having many bugs that we would not have found without our heuristic evaluations and user tests. We ended up changing the entire interface based on the first stages of the design process that resulted in a simplification of the interface and a narrower focus on our two major tasks. Thus, the iterative design process was a key aspect in our ability to make those large decisions and come to a design that we are proud of.

The iterative design process shaped our final design tremendously. Throughout the initial stages of the design process, we identified several large issues that helped shape our final design. Firstly, we realized that our original design had too many pop-up screens. Through this early identification, we were able to update the interface completely to simplify the screens and cut down on the amount of pop-ups needed to accomplish our tasks. We also received feedback to change the interface to ensure that tracking a new symptom was faster. This led to an easy tracking interface as the home screen of the application, thus eliminating the extra clicks needed to accomplish the same task in our original design. We also simplified the graph feature by making all of the graphs viewable from a single graphing interface. This ended up making it easier to compare symptoms and identify trends.

Other major design decisions that were influenced by the design process involved the use of a wearable device with automatic and voice command tracking. Through the prototyping and initial testing process, we realized that not only were those features difficult to implement, but they also complicated the design to the point that our original tasks were not as clear or easy to use. This led to an elimination of those features, which allowed us to focus more of our energy on getting the design of our main tasks right instead of molding them to work with the wearable device.

Our main tasks did not change too much as a result of our usability tests. Rather, our focus around these tasks changed by the end of the process. For example, we had originally extended our first task, tracking symptoms, to include tracking other information, such as medications, through a calendar feature. Throughout the design process, we discovered that this extension of our original task did not improve the design, but rather inhibited the ease of use of the application. Eliminating the calendar feature resulted in a narrower focus on our tracking task.

We also eliminated the wearable feature from our tracking task as a result of the design process. This allowed us again to focus more closely on our original task and on getting our main interface working correctly. As a result, we learned through this process that trying to implement all of our design ideas and features at once can hinder the overall design in the long run. Rather, focusing on the main tasks and getting those working correctly will allow for other features to be implemented later on.

We think we could have used more iterations upon our design. We would have liked to have tested the design with more users who met the background we were targeting, including cancer patients or survivors, to get a better understanding of any updates that needed to be made based upon our target users. Including more iterations would have also helped to identify any new bugs in our final design and digital mock up.

10. Appendix

Steps we walked through during testing:

Introduction: Hi, my name is ____. Thank you for agreeing to participate in our user test. The application that we have designed is targeted to assist cancer patients in tracking their side effects during treatment. We will be providing you with a set of tasks to complete using our paper prototype in order to test its ease of use and identify any design issues. We would like you to imagine to the best of your ability that you are a cancer patient while you are completing the following tasks. As you complete the tasks, please think aloud - try and vocalize anything and everything you are thinking as you complete the tasks. We are not able to answer any of your questions, so if you get stuck at any point, please voice those questions and try to work through the task to the best of your ability. Do you have any questions before we start the user test?

1. So let's say you have been using the app for awhile. You are feeling nauseas and want to track a new occurrence of the side effect with a severity rating of 4. How would you go about doing this? Where would you add a description to the side effect?
2. Now assume you would like to learn more about possible solutions to nausea. Where would you look to find more information and suggestions?
3. Let's assume you want to take a look at the history of your nausea over time. How would you compare the history of nausea with that of mouth sores?
4. How would you edit or delete an occurrence of the nausea side effect on a specific date?
5. Now let's assume you want to chat with a similar patient. Where would you do this?
    a. Try to find a new user based on similar cancer type and treatment
    b. Let's say you want to start a new convo with James. How would you do this?
6. How would you edit the info you share in the connect page?
7. Where would you edit your profile info?

Critical Issues:

Test 1

- The participant was confused by the automatic tracking buttons
- The participant found the calendar feature confusing and difficult to use. The repeat feature was not intuitive and was not consistent with other applications. There was no way to change to view of the calendar to a different month. Also, the participant found the colors in the calendar to be confusing.
- The participant found that deleting an event using a swiping motion was not intuitive, especially for novice users.

- The user found the undo button in the settings page unclear. It was not intuitive what happens when the undo button is clicked.
- The participant found the "View w/" button on the graph difficult to discover and isn't easy to use.

Test 2

- The participant did not recognize the tap-and-drag procedure to record the severity of a side effect. When they tapped on the side effect button, the dialog explained the procedure. This let them successfully record side effects.
- The participant tried tapping on the side effect entry buttons to find solutions, instead of switching to the solutions/ideas tab.
- The participant did not recognize that they could tap on graph points to edit them.

Test 3

- The participant did not recognize the tap-and-drag procedure to record the severity of a side effect. When they tapped on the side effect button, the dialog explained the procedure. This let them successfully record side effects.
- The participant did not recognize that they could tap on graph points to edit them.