SYDE 740

REDESIGNING HEALTH WEARABLES

AUTHORS

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The problem many users face is that they lead a sedentary lifestyle and require motivation in pursuit of their health and fitness goals. However, many user suffer from a loss of interest when pursuing these goals or they find that using a wearable fitness device detrimental to their health due to a fixation on achieving daily metrics such as reaching 10,000 steps each day.

Our design goals were clear. We needed to design a device that would keep the user motivated, provide useful recommendations to help achieve their goals, and better facilitate an understanding of their health. We therefore sought to design an interface to help users reach their fitness goals and not abandon their device

Primary Research

Competitor Analysis

We completed a competitor analysis to assess motivation and 3 other critical areas related to wearable fitness device use. It was through this analysis that a gap began to emerge between what the market currently offers and the research on device success. Importantly, only 1 of the top 5 wearable fitness devices listed for 2020 included motivational support. The full detail of our competitor analysis is shown in Table 1.

Task Analysis

With our focus on how a device may best support its user, we conducted three task analyses to help identify the benefits and limitations of different products currently available on the market.

1. The first task was setting a reminder. Three key area regarding ease of use, navigation, and availability were identified.
2. The second task was sharing activities with friends. Again ease of use and availability were identified.
3. Our final task was viewing analytics. Critically, challenges related to metric displays within a limited screen area were identified.

Personas

To summarize our findings, two personas were created. The first was of the novice user who requires advice and guidance in achieving their health and fitness goals and who may quickly lose interest if not appropriately supported. The second persona is of the prosumer who has a clear plan for achieving their goals yet may place too much focus on metrics and not on what may be best for their overall health.

The Gap

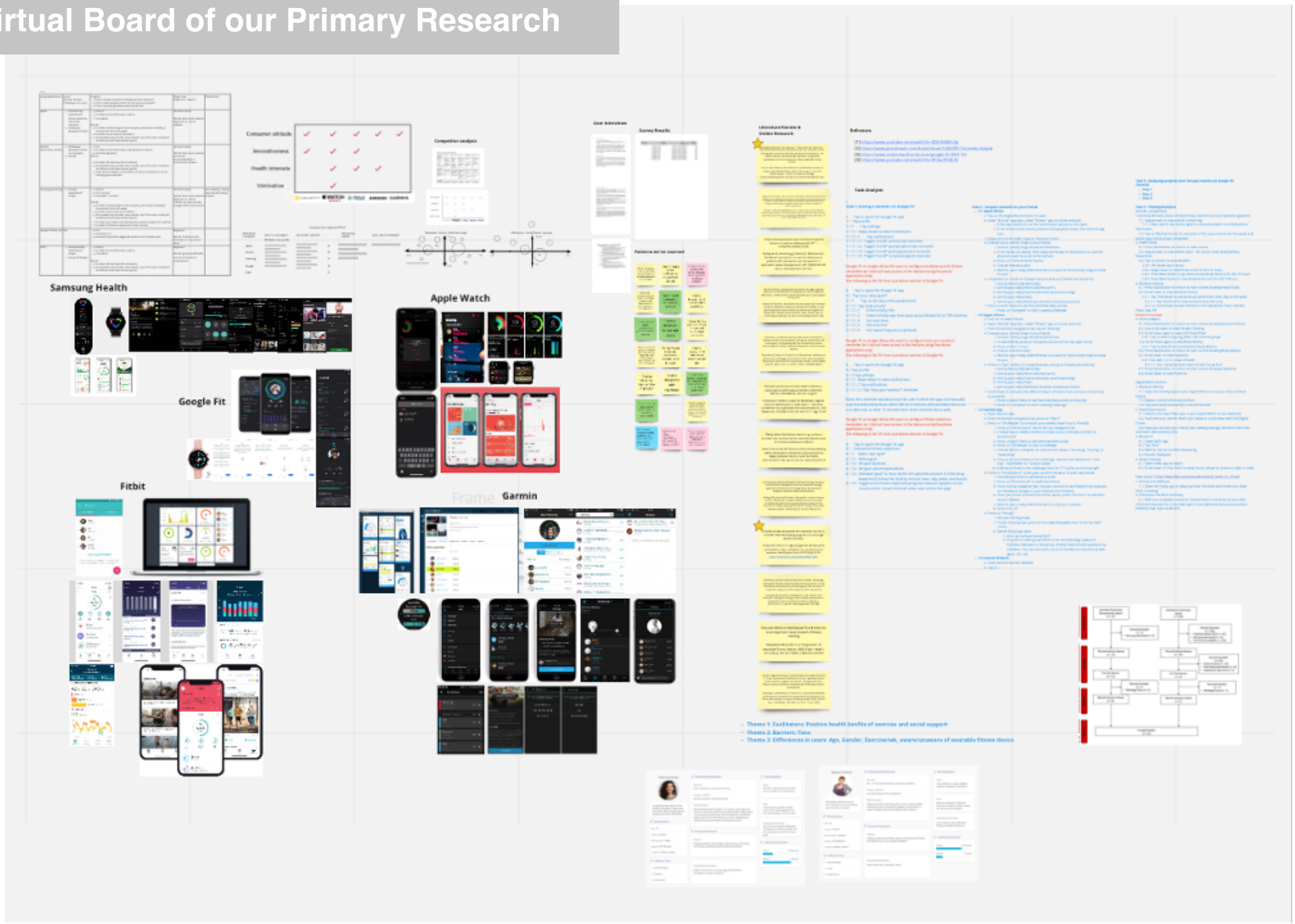
We further researched if there were any devices that currently filled this space and realized a need for such a design. Products like Apple and Samsung only focus on contact with friends whereas Garmin and Whoop focus only on group supports. Again, we identified a need especially with regards to combined group and friend social support and motivation for those that use a wearable fitness device.

User Research

To complement our review of the literature and consumer market, we created an online survey and conducted initial user research to better understand our users. A rich dataset of varied user experiences was collected from 8 users (7 female, 1 male, ages 21 to 68, 1 month to 7 years of wearable fitness device use). From this data, themes related to tracked statistics, social support, and device aids were identified as key areas for device use among our users.

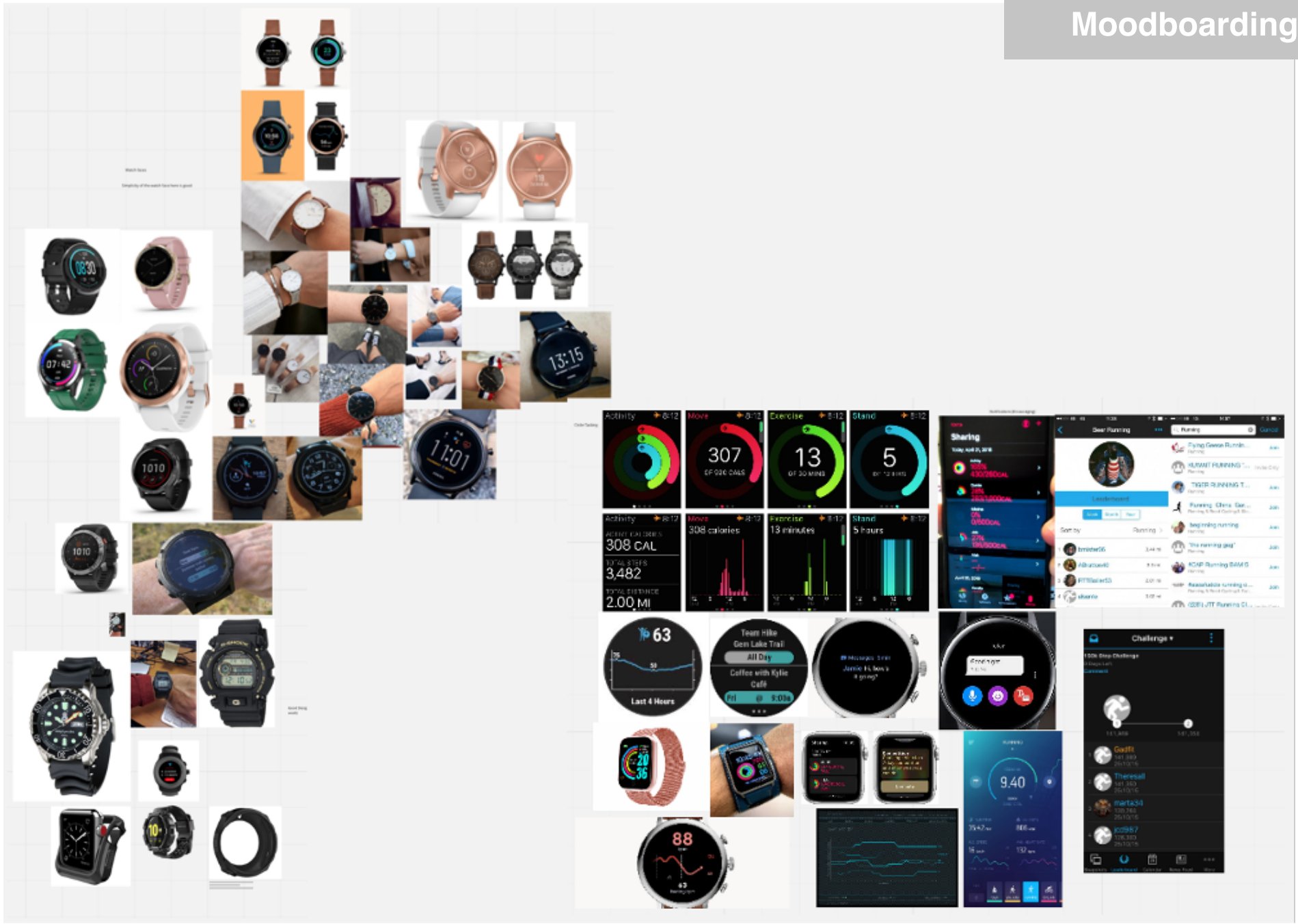
https://uwaterloo.ca1.qualtrics.com/jfe/form/SV_0NUHHEuaMVLg02W

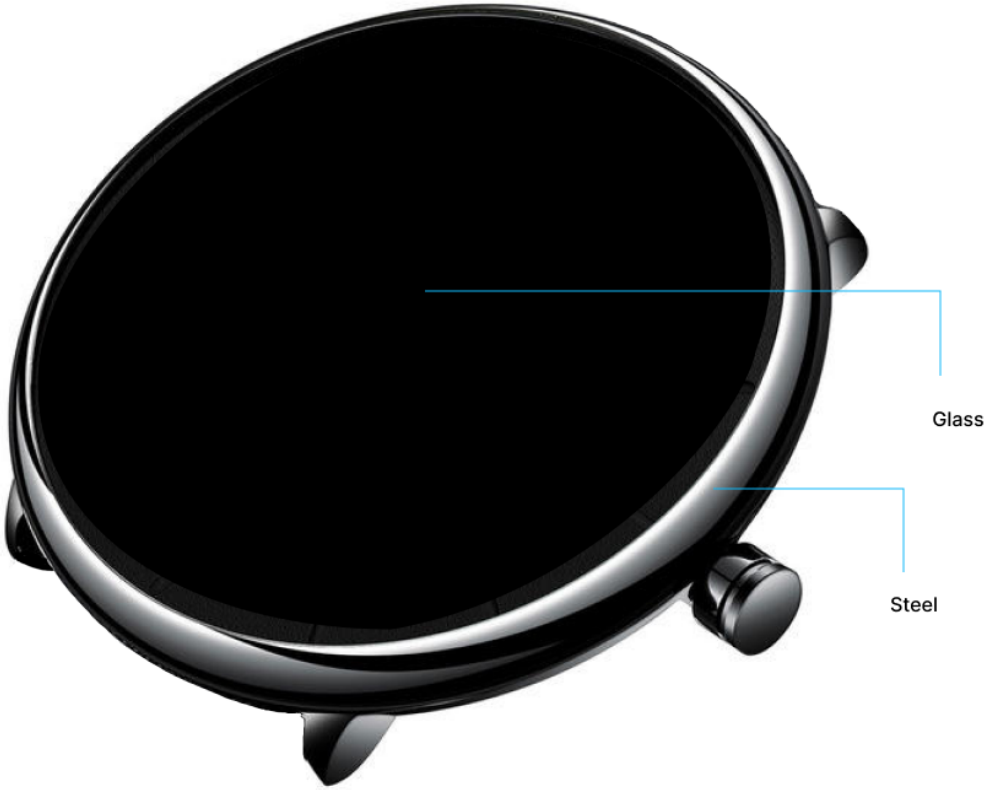
Virtual Board of our Primary Research



There were a number of questions we were interested in understanding, and combining with the research and literature review knowledge to learn, before building and testing ideas.

Moodboarding





https://www.banggood.com/Biden-0124-Ultra-Thin-Casual-Style-Men-Wrist-Watch-Mesh-Stainless-Steel-Strap-Quartz-Watches-p-1377222.html?rmmds=detail-left-hotproducts&cur_warehouse=CN

“Rolex”

https://www.aliexpress.com/item/4000974505945.html

https://www.apple.com/ca/shop/watch/bands

What makes a good watch?

We found that the following three themes tend to summarize what makes a good watch

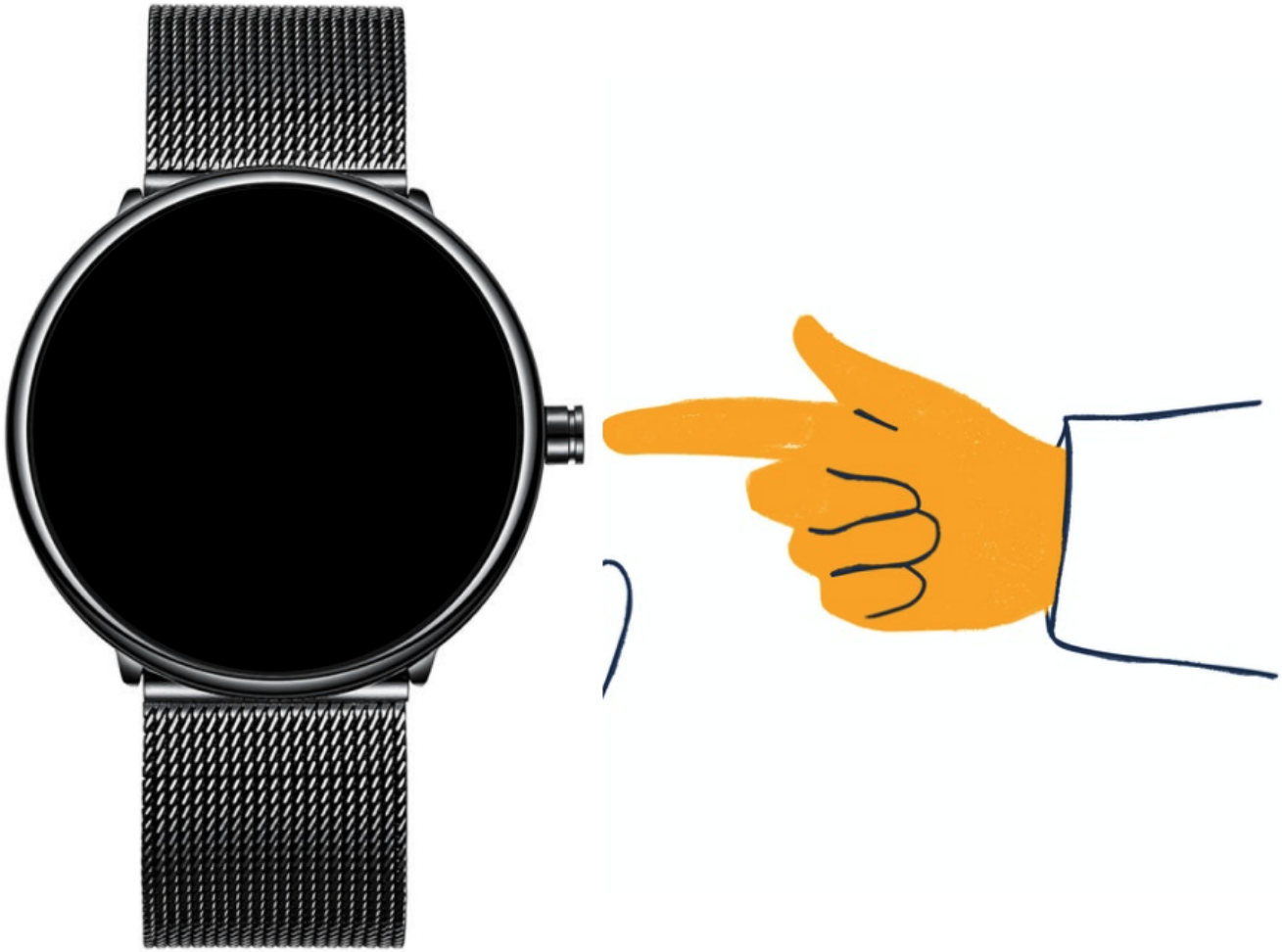
- Quality (materials such as glass, metal),
- Status Symbol (I am wearing a DW watch, but also could be “I want to dress up today!”),
- Delicate (it “affords” being broken or stolen, and it’s not so easy to replace).

In fact, this was later confirmed to us via one of the user testing indicating “[she just] want a Rolex [on her wrist]”.

Equally important however, we also found that the following three themes tend to be the other half of the coin when it comes to watches:

- Versatility (“I can wear this all day, with most outfits”),
- Durability (“I bang my Casio all the time”),
- How much “possibilities” it offers (“Man! I can’t wait to take this watch to do so and so. What else can I do. What does it enable me to do”).

This last theme we thought the Apple Watch does very well (think along the lines: how many different “looks” can you get out of it, customizing different textures and colours of bands and cases, and how to match it with every outfit, … etc.). We thought the Apple Watch did this very well, despite it belonging more to the first category as well.



https://adamfard.com/blog/lean-ux-design
https://www.justinmind.com/blog/button-design-websites-mobile-apps/

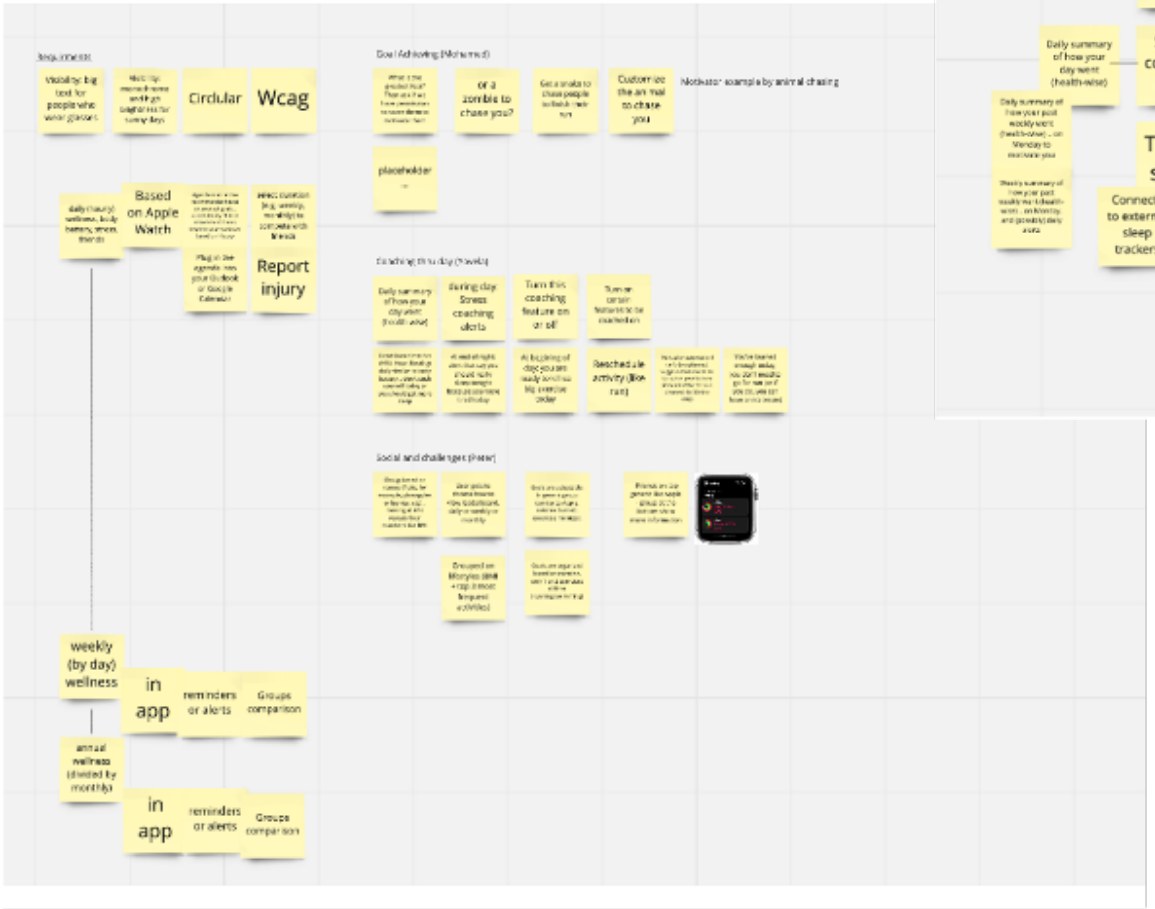
What makes a good “smart” watch?

Now, because we were looking at wearables, this was an equally important question. The following three themes emerged

- Blend in (it doesn’t stand out in a negative or “nerdy” way),
- Complex (it actually does complex and useful functionality that you can’t replicate with an existing device you already have, like a normal watch or smartphone),
- “Simple” (unlike smartphones or computers, when using, you can’t spend too much time on the screen given its size and the unnatural position of your arm elevated. So, it needs to afford simplicity at its core.)

One of the key decisions that was later derived from these three themes were the single home button, and the non-intrusive notifications (all expanded on in the Prototype & Testing section).

Brainstorming



What makes a good health wearable?

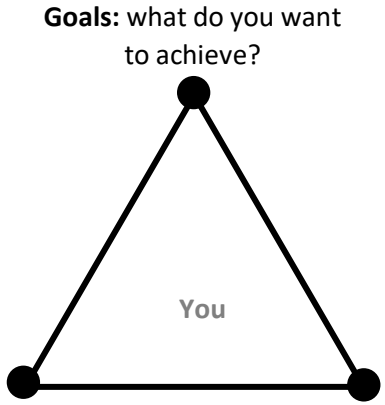
Being not limited to a watch, we then looked at what makes a good health wearable. We defined the word “wearable” loosely here, as we didn’t limit it to devices and objects worn on your wrist, but also looked at anything that can be taken with you (so smartphone applications). The following three themes emerged

- Supportive (it supports you on your journey of becoming healthier. Often by providing you with the right information, and answering your questions at the right time)
- Enabler (Any hard work is often more fun when its social. This could be done by “distracting” you from the hard work by competing with friends, being motivated by their successes, or simply meeting new friends who accompany you in this hard work)
- Accountable (It lets you set metrics, and see history)

We decided to take these themes and built them directly into our core design, and we came up with the following 4 applications to focus on

- **Revamp Classic Notifications** (Notifications become more of a “buddy” who is proactive and supportive)
- **Goals** (Allows you to set tracked metrics, by month or annual)
- **Coaching** (Completes the triangle with the two features above, by enabling you to view your progress and history, have a virtual competition with a virtual character, and ability to adapt by inputting in injury)
- **Social** (Building on Apple Watch friends and Strava. Plus, ability to find new groups and friends based on an activity you’re interested in)

Below is how we imagine the dynamic between users and features playing out



Solution

Chosen Watch to Design on top of

https://www.banggood.com/Biden-0124-Ultra-Thin-Casual-Style-Men-Wrist-Watch-Mesh-Stainless-Steel-Strap-Quartz-Watches-p-1377222.html?rmmds=detail-left-hotproducts&cur_warehouse=CN

Four Applications

Proactive Buddy

Social

Goals

Coaching

Prototyping & User Testing

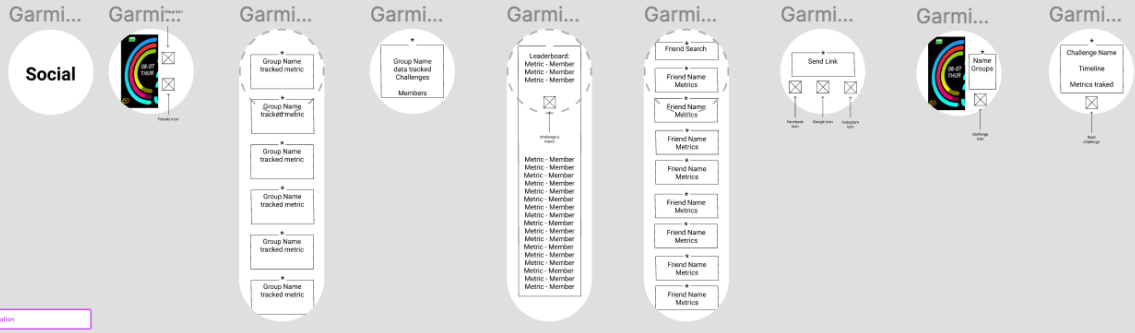
Wireframing and Low Fidelity Prototyping

Yovela: Coaching

Peter: Social + challenges

Home screen (classic clock face), tap hard button to enter "fitness tracker screens"

1. **Fitness tracker home screen:** three half circles like the apple tracker with the user defined metrics on each (left 2/3). Right side two buttons, "groups" and "Friends"
2. **Groups screen:** large display of group names recommended to user by interest. Scrollable
3. **Select group screen:** large display of group name, data tracked, challenges, and members
4. **Challenges screen:** see leader board with display of challenge metric and user names
5. **Friend screen:** large display shows 1 friend info at a time with other friend's info on fringe above and below. Top 1/3 of screen for navigation to search for friends by contact info.
6. **Friend search screen:** pulls up list of scrollable contacts (from phone, Facebook, other social network icon to select which database to use to auto populate list of contacts)
7. **Friend info screen:** Shows users three selected metrics or the info they have chosen to share as well as the groups they are in.
8. **Challenges screen:** extra screen for friends where users can set up a challenge between friends. Same display as above once set up.



Mohamed: Motivation

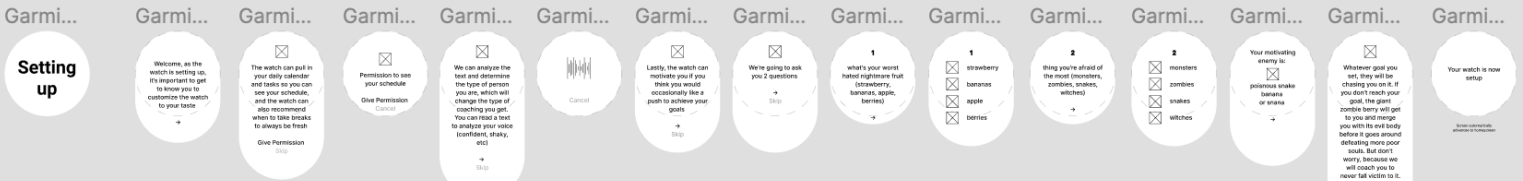
Braindump

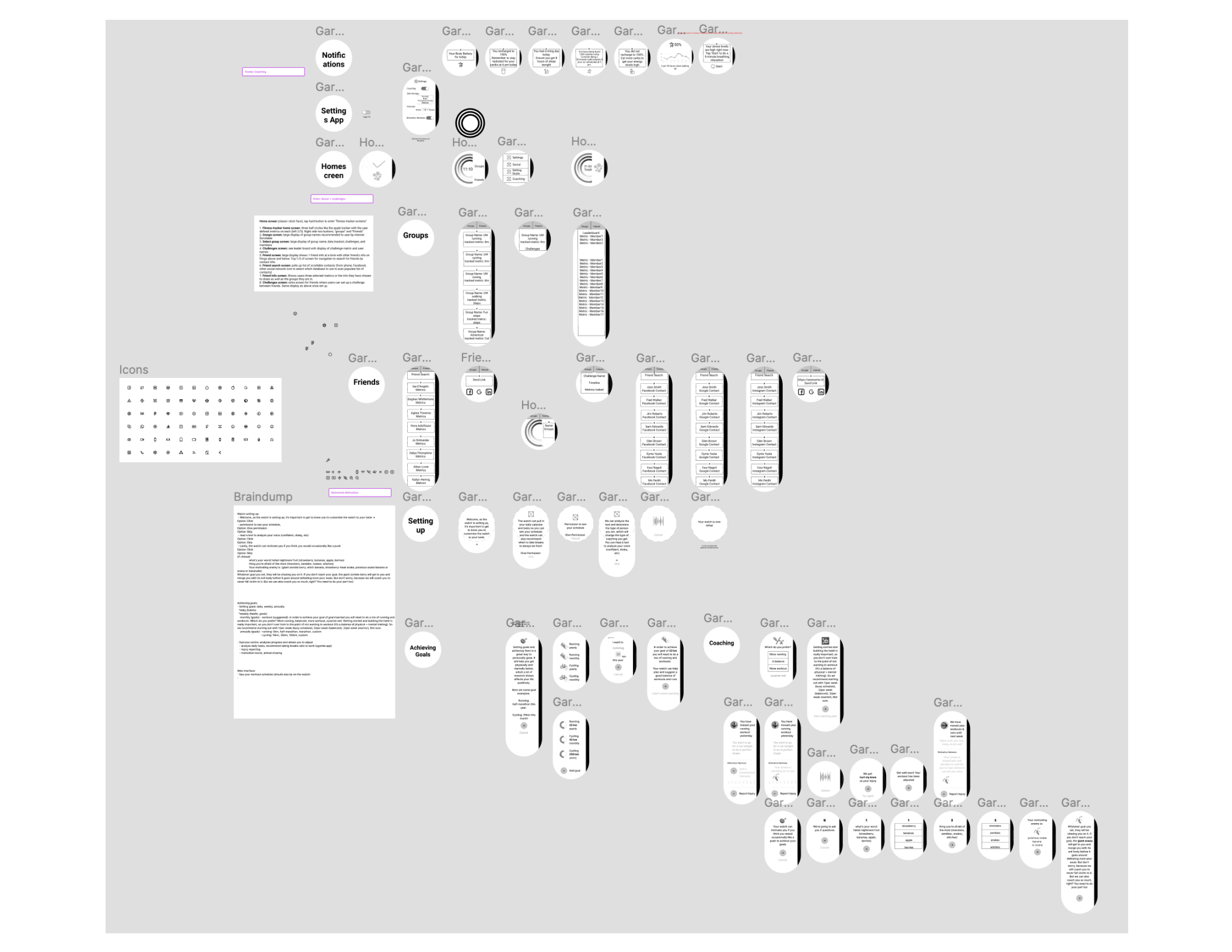
Watch setting up:
- Welcome, as the watch is setting up, it's important to get to know you to customize the watch to your taste →
Option: Click
- permission to see your schedule,
Option: Give permission
Option: Skip
- read a text to analyze your voice (confident, shaky, etc)
Option: Click
Option: Skip
- Lastly, the watch can motivate you if you think you would occasionally like a push
Option: Click
Option: Skip
(if clicked)
what's your worst hated nightmare fruit (strawberry, bananas, apple, berries)
thing you're afraid of the most (monsters, zombies, snakes, witches)
Your motivating enemy is: (giant zombie berry, witch banana, strawberry-head snake, poisnous snake banana or snana or bananake).
Whatever goal you set, they will be chasing you on it. If you don't reach your goal, the giant zombie berry will get to you and merge you with its evil body before it goes around defeating more poor souls. But don't worry, because we will coach you to never fall victim to it. But we can also coach you so much, right? You need to do your part too)

Achieving goals:
- Setting goals: daily, weekly, annually
*daily (habits)
*weekly (habits, goals)
monthly (goals) - workout (suggested): in order to achieve your goal of *goal inserted* you will need to do a mix of running and workouts. Which do you prefer? More running, balanced, more workout, surprise me!. Getting started and building the habit is really important, so you don't over train to the point of not wanting to workout (it's a balance of physical + mental training). So we recommend starting out with 1)per week (busy schedule), 2)per week (balanced), 3)per week (warrior), Not sure.
annually (goals) - running: 5km, half-marathon, marathon, custom
- cycling: 15km, 35km, 150km, custom

- Success centre: analyzes progress and allows you to adjust
- analyze daily tasks, recommend taking breaks ratio to work (agenda app)
- Injury reporting
- motivation boost, animal chasing

Web interface:
- See your workout schedule (should also be on the watch)
-




Gar...
Notific ations
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Setting s App
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Homes creen
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Groups
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Friends
Frie...
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Setting up
Gar...
Achieving Goals
Gar...
Coaching
Icons
Braindump

High Fidelity Prototyping

Peter: Social + challenges

Home screen (classic clock face), tap hard button to enter "fitness tracker screens"

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Gar...

Groups

TEM...

colour 1
colour 1
colour 1

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Gar...

UW running tracked metric: Km

UW cycling tracked metric: Km

UW rowing tracked metric: Km

Show more

Gar...

UW Running
Leaderboard:

1. Shahin Esmond 25.6 Km
2. Masuto Oluwatin 25.4 Km
3. Daryl Andy 23.5 Km
4. Hillary Joella 21.4 Km
5. Henry Sherry 17.9 Km
6. Kev Laura 15.8 Km
7. Abdul Addi 10.8 Km
8. Theodora Gertie 7.2 Km
9. Maria Dax 1.3 Km

Show more

Fram...

Friends +
Name
Name
Name
Name

This screen may not be needed!

Fram...

Friends +
Name
Swam today
Kudos
Cycling yesterday

Limit to one week of activities (or 3-8) maybe "see more"

Fram...

Groups +
UW running tracked metric: Km
UW running tracked metric: Km
UW running tracked metric: Km

Hom...

Name
Groups

Gar...

Social
Idea 1
Friends
Groups

Gar...

Friends
Idea 2
Name
Name
Name
Name

Gar...

Groups
Idea 2
UW running tracked metric: Km
UW running tracked metric: Km
UW running tracked metric: Km

Gar...

Friends

Gar...

Friend Search
Isa D'Angelo
Eoghan White
Aglaia Traverso
Show more

Gar...

Isa D'Angelo
Swam today
Kudos
Cycling yesterday
Kudos
Start Challenge

Gar...

Eoghan White
Swam today
Kudos
Cycling yesterday
Kudos
Start Challenge

Gar...

Aglaia Traverso
Swam today
Kudos
Cycling yesterday
Kudos
Start Challenge

Frien...

Send Link

Gar...

Challenge Name
Timeline
Metrics traked

Gar...

Group Name: UW running tracked metric: Km
Challenges

Gar...

Friend Search
Jess Smith Facebook Contact
Fred Walker Facebook Contact
Jim Roberts Facebook Contact
Sam Edwards Facebook Contact
Glen Brown Facebook Contact
Gynia Yesta Facebook Contact
Esui Nagoli Facebook Contact
Show more

Gar...

Friend Search
Jess Smith Google Contact
Fred Walker Google Contact
Jim Roberts Google Contact
Sam Edwards Google Contact
Glen Brown Google Contact
Gynia Yesta Google Contact
Esui Nagoli Google Contact
Show more

Gar...

Friend Search
Jess Smith WhatsApp Contact
Fred Walker WhatsApp Contact
Jim Roberts WhatsApp Contact
Sam Edwards WhatsApp Contact
Glen Brown WhatsApp Contact
Gynia Yesta WhatsApp Contact
Esui Nagoli WhatsApp Contact
Show more

Gar...

https://awesome.UI
Send Link

Gar...

Setting up

Gar...

Welcome, as the watch is setting up, it's important to get to know you to customize the watch to your taste

Gar...

The watch can pull in your daily calendar and tasks so you can see your schedule, and the watch can also recommend when to take breaks to always be fresh

Give Permission

Skip

Gar...

Permission to see your schedule

Give Permission

Cancel

Gar...

We can analyze the text and determine the type of person you are, which will change the type of coaching you get. You can read a text to analyze your voice (confident, shaky, etc)

Skip

Gar...

Cancel

Gar...

Your watch is now setup

Garmi...

Achieving Goals

Garmi...

Welcome to Goals

You currently have no goals set

What's goals?

Add goal

Garmi...

Running yearly

Running monthly

Cycling yearly

Cycling monthly

more info

Garmi...

Set a goal for

running

22 km

this year

Cancel

Garmi...

In order to achieve your goal of **22 km** you will need to do a mix of running and workouts.

Your watch can help plan and suggest a good balance of workouts and runs

I don't need coaching

Garmi...

Which do you prefer?

More running

A balance

More workout

Surprise me!

Garmi...

Getting started and building the habit is really important, so you don't over train to the point of not wanting to workout (it's a balance of physical + mental training). So we recommend starting out with 1/per week (busy schedule), 2/per week (balanced), 3/per week (warrior), Not sure.

Edit coaching plan

Garmi...

Setting goals and achieving them is a great way to personally grow. It will help you get physically and mentally better, which a lot of research shows affects your life positively.

Here are some goal examples:

Running: half-marathon this year.

Cycling: 35km this month

Add goal

Cancel

Other ...

Garmi...

You current goals set

Running **22 km** yearly

Add another goal

Garmi...

You current goals set

Running **22 km** yearly

Hiking **42 Mins** monthly

Cycling **200 km** yearly

Add another goal

Garmi...

Running **22 km** yearly

Outdoor Run Today

2.38 km

Other Days

Indoor Run 11/03/21

4.23 km

Indoor Run 01/03/21

2.08 km

Indoor Run 18/02/21

3.23 km

Indoor Run 11/02/21

3.38 km

Edit current goal

Garmi...

Today

Outdoor Run

2.38 km

Summary

Total Time

0:27:29

Total Calories

173 cal

Average Speed

10.1 mph

Average Heart Rate

106 bpm

Time in Heart Zones

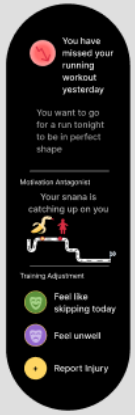
Map

Garmi...

Coaching

Garmi...

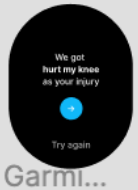
Garmi...



Garmi...

Garmi...

Garmi...



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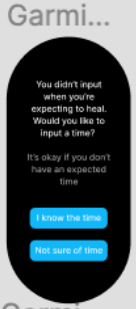

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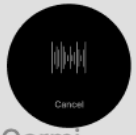

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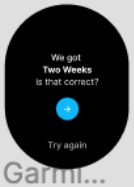

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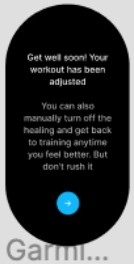

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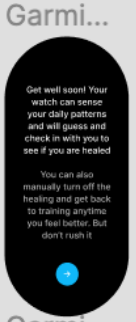

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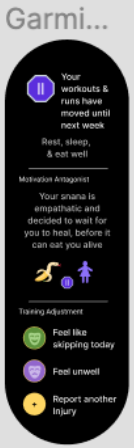

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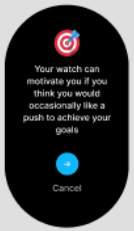

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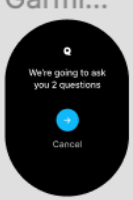

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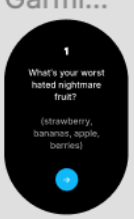

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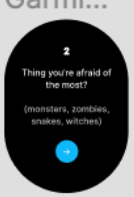

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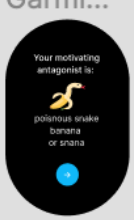

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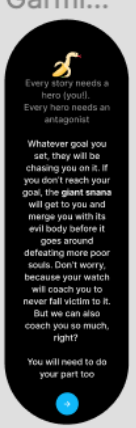


Other ...

Other ...

Other ...

Frame 2

Test scenario:

1.View the two different watch faces
2. Viewing notifications
3. Social: View the leaderboad of a group challenge that has already started on your device.
4. Social: Add a new friend to your device and invite them to participate in a challenge
5. Set-up goal to run 22Km and device coaching feature
6. Setting up annual/monthly goals
7. Checking in with coaching center for injury and adaptive plan

LOFI - questions

Questions to ask/get feedback:

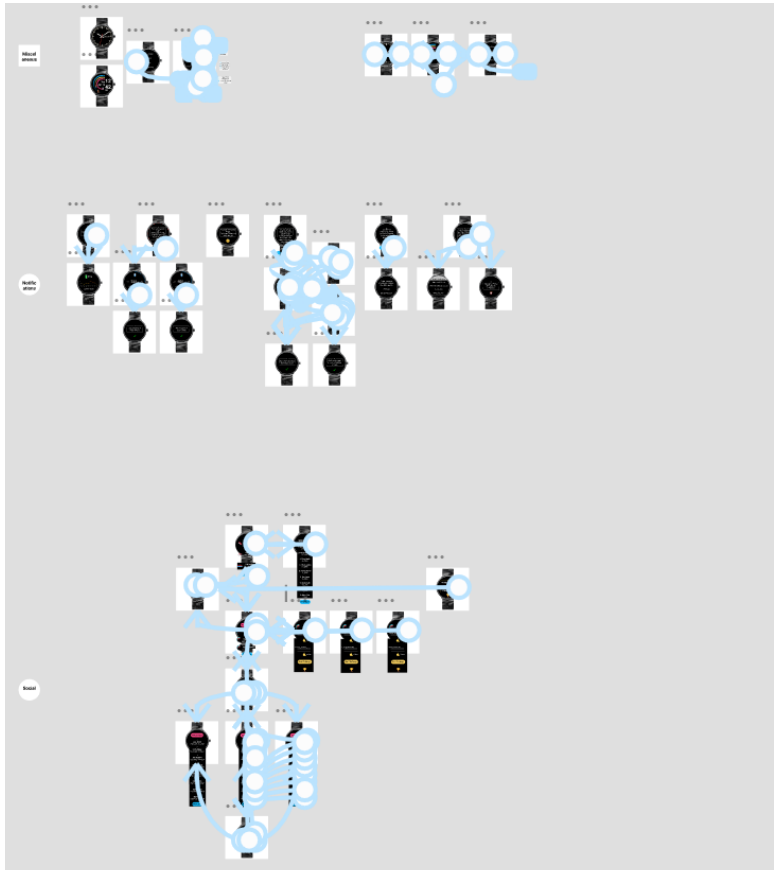
0. Feedback on the watch faces - analog and digital. Does it show enough information?
1. Prefer having two separate forward and backward buttons OR one Home button and swipe right or left to go forward and backward?
2. Semi-circles vs bars (horizontal / vertical) for showing completion?
3. What metrics would you be most interested in taking for yourself? What would you be most interested in sharing with your friends/groups?
4. Would the social feature help keep you motivated to use the device?
5. Would the social feature help keep you motivated to fitness goals'?
6. Would the coaching feature keep you motivated to use the device?
7. Would the coaching feature keep you motivated to fitness goals'?
8. Would the notifications keep you motivated to use the device?
9. Would the notifications feature keep you motivated to fitness goals'?
10. What additional features would help keep you motivated to use the device?
11.What additional features would help keep you motivated to fitness goals'?

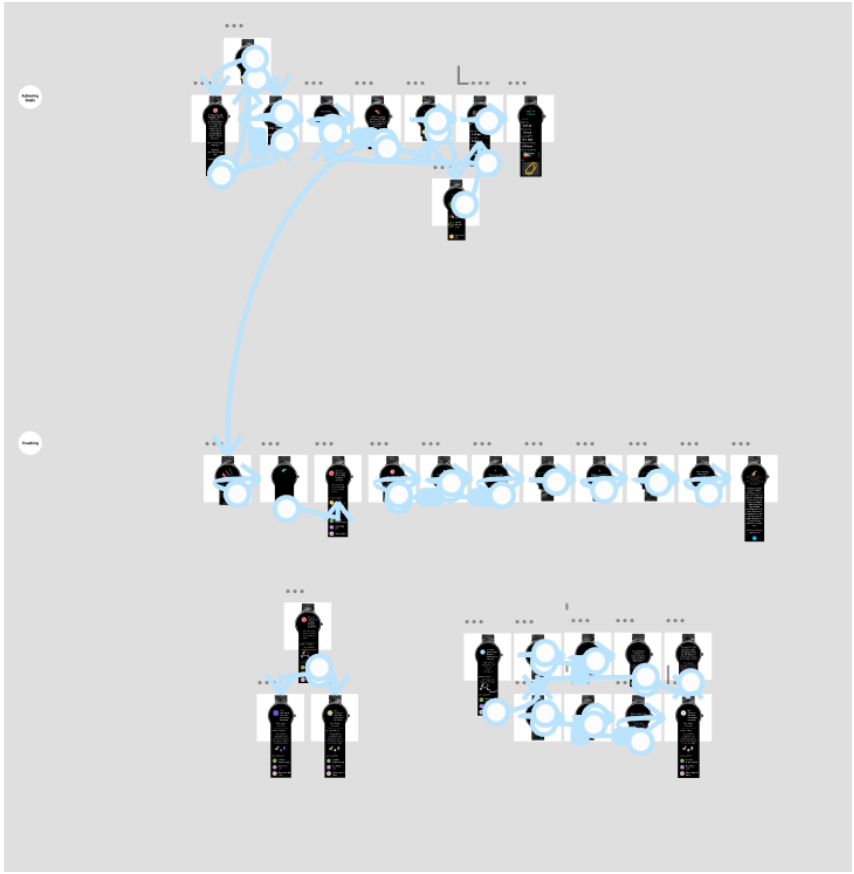
general comment: try to ask questions that get them to talk (like what/how) as opposed to yes and no questions. Also, positive feedback is a sign of trouble!

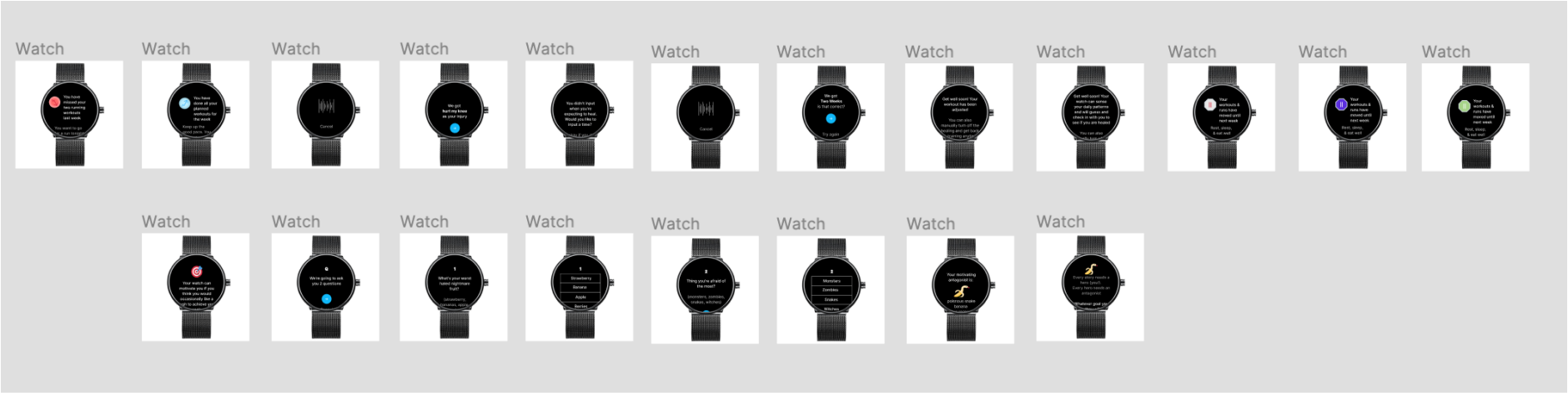
HIFI - Questions

Questions to ask/get feedback:

1. Do you feel informed of your actions when intereacting with the device?
(is the feedback appropriate?)
2. Are the information and graphics easy to understand?
3. Are the navigation tools intutitive? Were you able to easily correct mistakes?
(cancel button, swipe, hard button)
4. Do the buttons perform the expected action?
5. Did you run into a situation where an error message may have helped you avoid a problem?
6. Did you feel that you feel that you required training to use the device, or were you able to associate button colour with a specific action / was use of the deivce intuitive?
(yellow to fill in response, blue to move forward)
7. Did the shortcut of the swipe function and hard button to go back the home screen?
8. Did you find the infromation displayed on each screen useful? Did any screens have information that was not relevant to complete the action on the screen?
9. (we don't have error messages)
10. Did you feel you needed a help menu or additional documentation to use the device?



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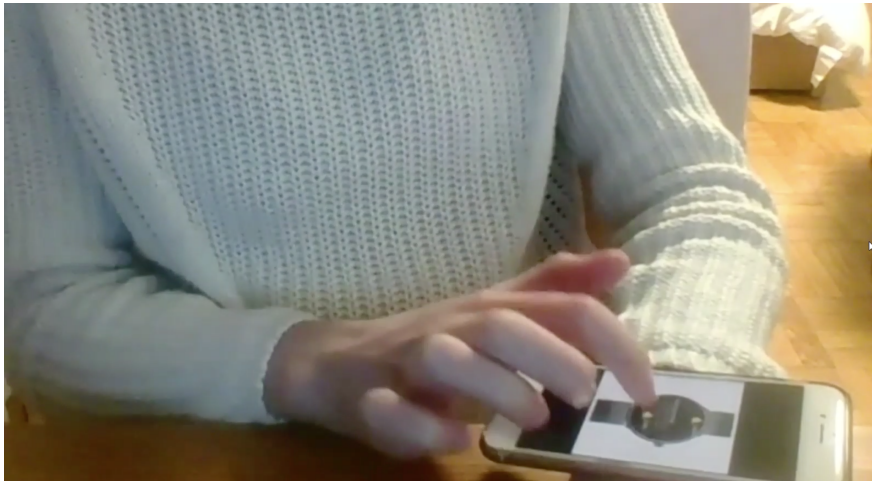
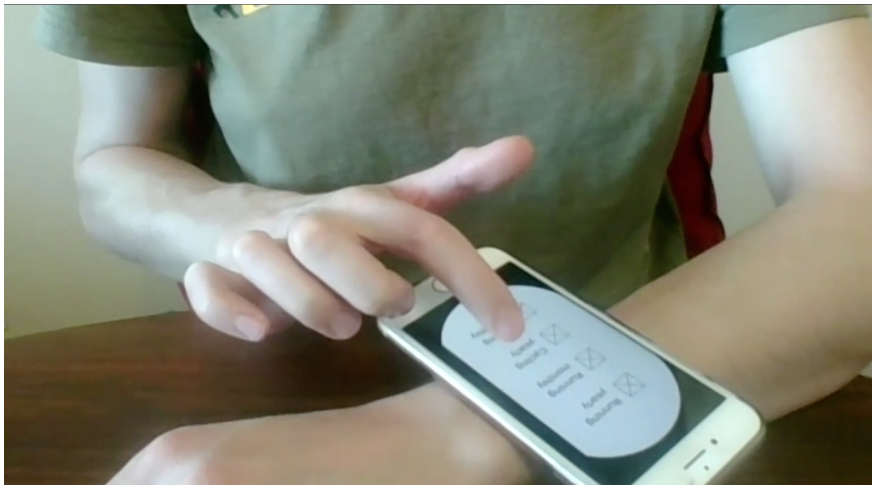
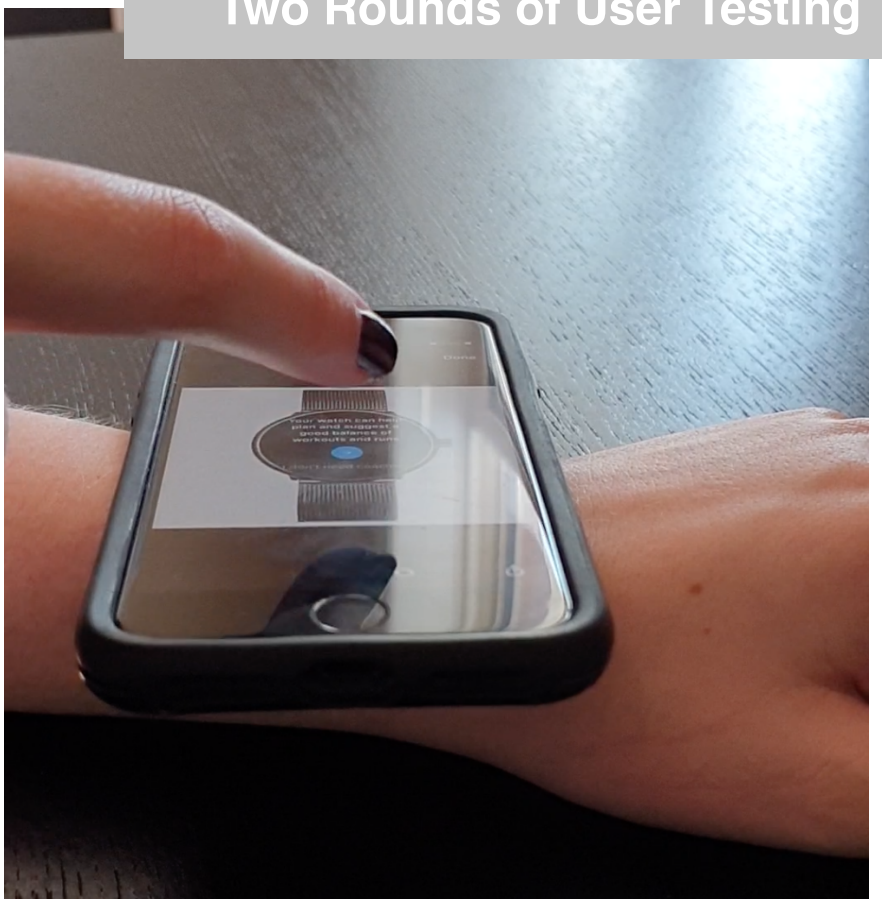
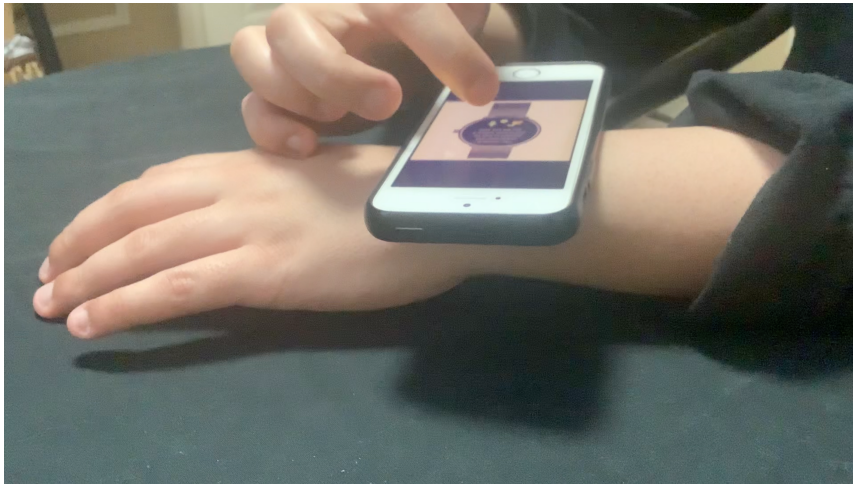
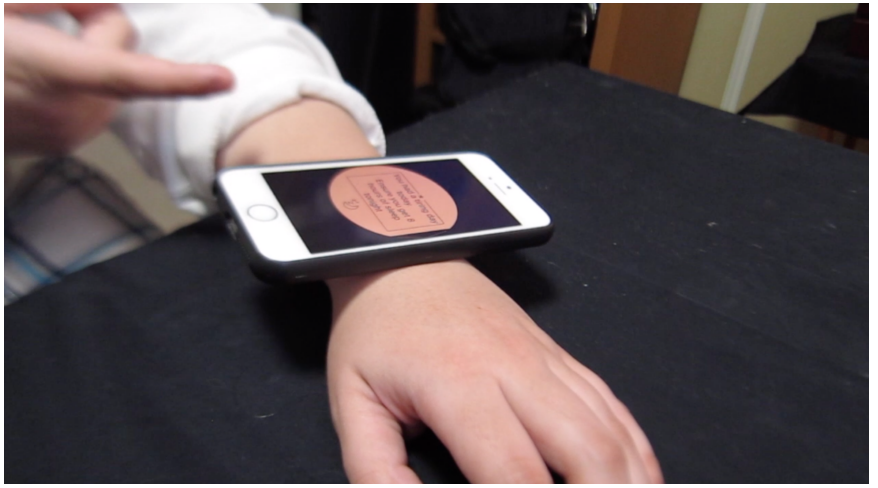
Two Rounds of User Testing











User Testing Results – First round

The participants liked both the watch faces and the notification reminders because it keeps them accountable. In particular, they liked the 'upcoming workout – stay hydrated' and 'high stress – breathing relaxation' notifications. They also liked the Social feature and felt that being able to join groups and compete with others would help them achieve their goals. They indicated that they would share basic metrics with their friends such as steps, heart rate and active minutes. Lastly, the participants found the navigation of swiping back and forth and a hard button intuitive and easy to use.

They generally disliked the large amounts of text as they wouldn't read big paragraphs and suggested to shorten the blocks of text into little paragraphs. While they found the Motivation Nemesis funny, one of the participants did not like it due to its negative connotation and inability to motivate the participant through fear.

For the 'Report Injury' feature, it was also suggested to also include the ability to set your own date in addition to the device setting the date for you as it might not know the severity of the injury. Moreover, one of the participants indicated that they might not find the Interval alert timing useful as it might be persistent. Additionally, we received feedback that having too much emphasis on calories can be damaging especially towards people with suffer from or are prone to eating disorders. As these two issues further relates to the issue of 'obsession with numbers', it was decided that the Interval alert setting would be removed so that notifications are provided only when needed, and "calories" would be replaced with "active/energy". Another recommendation included adding the ability to easily add the amount of water drank for the hydration notification, and different sound modes for the notification alerts.

User Testing Results – Second Round

One participant stated that they did not understand the connection between being recharged to 100% and hydration. To improve this, we could consult a physiologist and dietician to ensure that the content of these notifications provide useful and accurate information to the user. Some of the participants did struggle with navigating certain screens. We also noticed they skimmed through screens that had large amounts of text, and it was suggested that some of these could be hidden in a 'More Info' button.

One of the suggestions was to notify the user when they missed their workout as there is the possibility that some users might be busy and not yet in the habit of working out. Another suggestion was to implement an option that allows the user to choose when they would like to be reminded to do the breathing relaxation when they are notified that their stress levels are high. Feedback on the 'feel like skipping' and 'not feeling well' reporting indicated that having options for the user to reschedule would be helpful as their ability to continue could vary depending on how sick they are. It was recommended that using a 'Cancel' button might make interacting with the device more efficient especially for tasks where they might need to return to the previous screen to edit choices. One of the participants also suggested using haptic feedback such as vibration might help the user know that their interaction was recorded. Moreover, since one participant found the graph to be too small to look at, a zoom-in function could be added to allow users with various physical capabilities to be able to use the device.

Key Lessons & Iterations

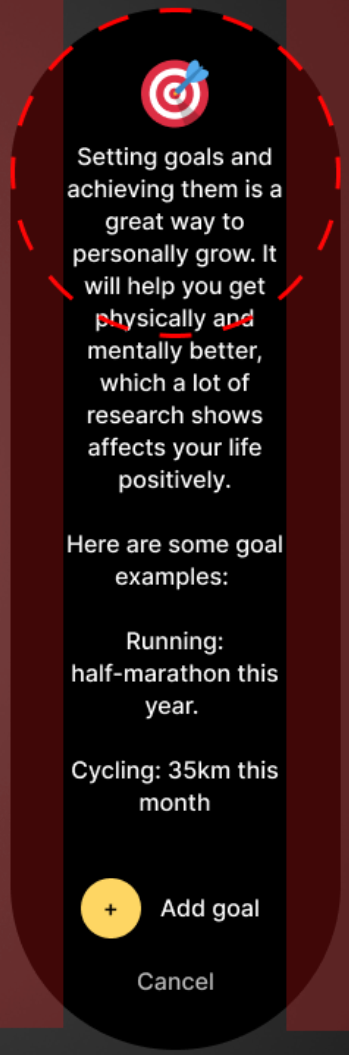
There were a number of noteworthy changes and lessons that our team learnt along the way. They were as follows.

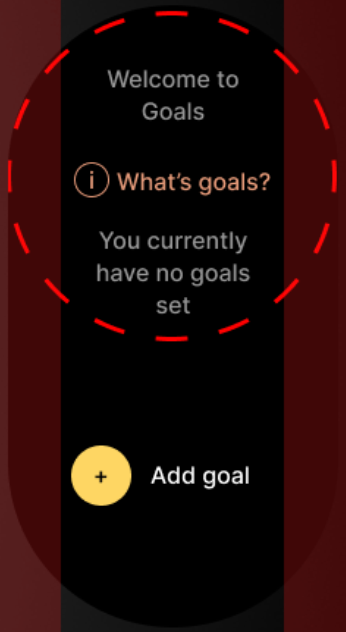
Goals – How much text on circular screen?

Although the team had templates and “borders” in place to design around, one of the improvements we needed to make after our first iteration was reducing the amount of text on the screen in instances. The issue that we noticed was that in some elements, the users we tested with didn’t find the information provided useful and often scrolled throw without reading, but were able to figure out the functionality intended without any problems. Thus, the information provided was redundant, and slowed the user down.

We solved this by moving the information to an “more information” icon the user can click on.

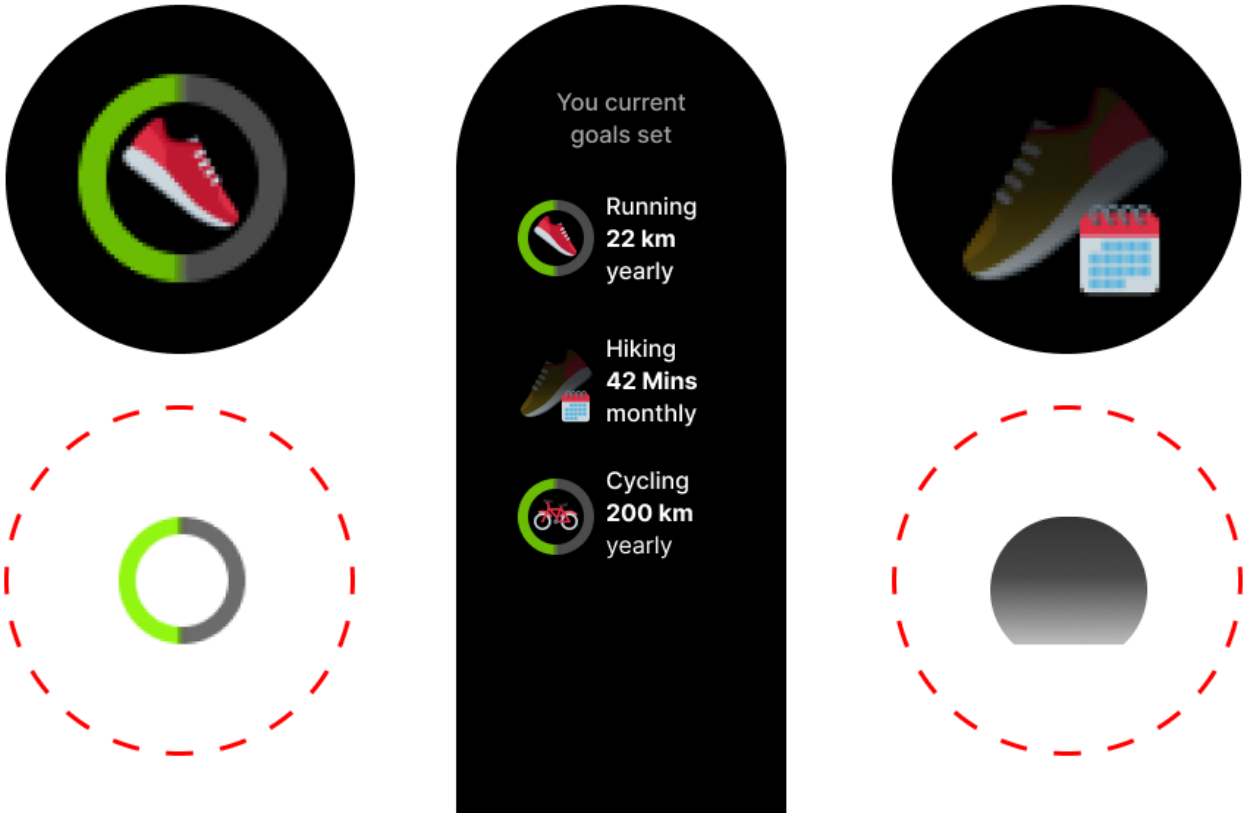

Setting goals and achieving them is a great way to personally grow. It will help you get


Setting goals and achieving them is a great way to personally grow. It will help you get physically and mentally better, which a lot of research shows affects your life positively.
Here are some goal examples:
Running: half-marathon this year.
Cycling: 35km this month
Add goal
Cancel


Welcome to Goals
What's goals?
You currently have no goals set
Add goal

Competitive vs Relaxed

Goal Tracking



Goals – Different Types of goals

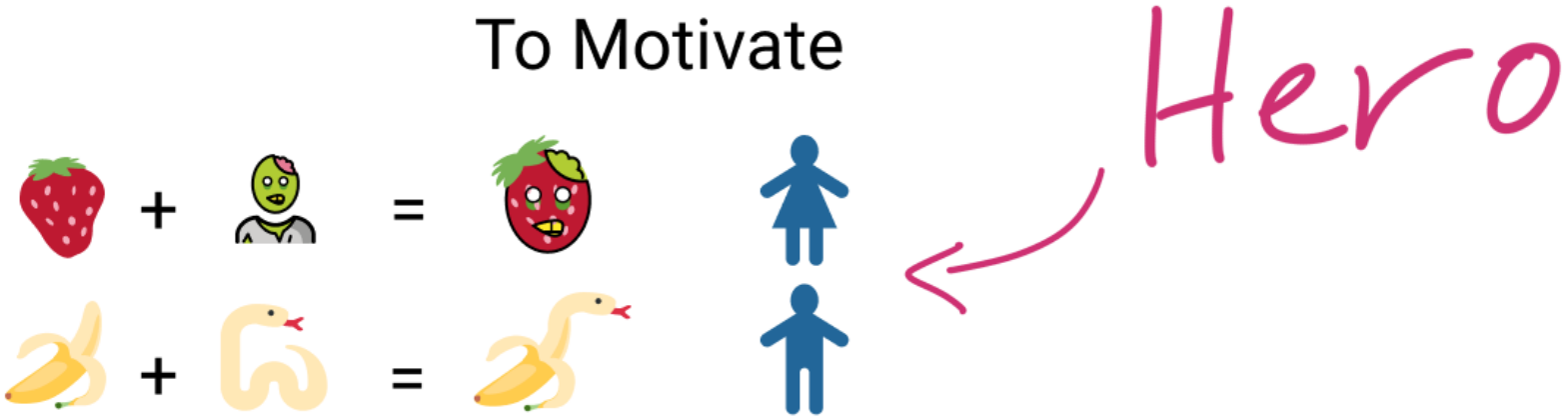
One of the key differences between “pro” wearables (such as Garmin Forerunner watches) and general consumers wearables (such as Apple Watch and Fitbit) was the ability to set tracked goals. It was clear that general consumers wearables aimed for a simpler approach, by reducing the amount of “choosing and decision fatigue” for the users, and omit this feature all together. It is true that not everyone wants to run a marathon. However, the research and literature review told us how important this feature is in terms of health (tracking metrics just by itself without a clear goal tends to make user lose interest eventually, since they’re not working towards anything).

Initially, we designed the visual of the goal with a circle, without any numbers of percentages (in order not to strike a balance between accountability and number obsession). However, it became clear not every goal needs this competitive visual. Some goals are nice-to-have (like, I want to go hiking and photography an hour every week), and some that are event-based (like attempting to run a marathon).

To solved this, we separated goals into two categories:

- Competitive, tracked by distance, represented by ring completion.
- Relaxed, tracked by time, represented by sunrise circle (inspired by sun sunrise).

Antagonist vs Nemesis vs Buddy



Coaching – Who makes the best motivator?

Who makes a better motivator out of these three: Nemesis, Buddy, or Antagonist?

At first, we had the word Nemesis. The choice of wording here became important, as we soon realized from the user testing that not everyone saw the word “nemesis” positively.

The word nemesis, we found, is associated with competition and enemy (which are good), but also enemy tends to be sinister and evil (which are bad). Another suggestion to replace it was “buddy”. The word buddy is associated with journey and accompany (which are good), but also associated with support and positivity (which we thought doesn’t go well with the theme of competition). The word antagonist emerged as a better choice, being associated with journey and accompany (like buddy), and competition (like nemesis) but without the negative side. After all, an antagonist could be an anti-hero.

This last association was an added bonus, as in order for a hero to complete their journey and become a hero (in storytelling) they need to overcome their antagonist. Thus, by our user winning over the antagonist they fulfill their own destiny and become their own hero, which was very fitting with the theme of coaching.

Isa D'Angelo

Swam today

Kudos

Cycling yesterday

Kudos

Start Challenge

UW Running
Leaderboard:

1. Shahin Esmond
25.6 Km

2. Mavuto Oluwatin
25.4 Km

3. Daryl Andy
23.5 Km

4. Hillary Joella
21.4 Km

5. Henry Sherry
17.9 Km

6. Kev Laura
15.8 Km

7. Abdul Addi
10.8 Km

Social – Privacy with friends vs groups

One of the important information that we learned through the iteration, is that there is to be expected a big difference between the information “I want to share with my friends, and a group of people I don’t know and don’t want their judgment”.

Thus, we realized that the privacy of type of information shared with each side need to be changed. We solved this by allowing the user to share and view their activities with their friends only. On the other hand, a group only displays a leaderboard without showing any details (which inspires competition it was intended to provide, without judgement from strangers). Furthermore, users have the ability to become friends with each other from the group leaderboard, and that would allow for their activity information to be shared between them.

Social – Kudos

What can the user do when they see their friends finished an activity? Support them by giving them a kudos (which enables them to communicate with their friends on the activity, support them, in a way that doesn’t require typing and fitting to a small screen watch). This was inspired by the kudos feature on Strava.

Notifications – Useful alerts & Snoozing

The user always had the ability to turn on and off alerts from the settings menu, as well as change the alert timings. However, what happens when a “good” notification comes in at the wrong time? For example, a reminder to hydrate notifications that you want to act on, but it is inconvenient for you to do so now for whatever number of reasons?

We solved this by allowing the notifications to be “snoozed” and re-introduced later during the day. When snoozed, a notification will automatically come back in an hour. If snoozed again, then it goes away for two hours. And if snoozed for a third time then it will go away for an entire day.

In the future, we think we can further enhance this feature by allowing the initial snooze time (the one hour) to be smartly decided based on the type of notification (for example, a reminder to hydrate could be snoozed to an hour initially, but a reminder to walk could perhaps be better if snoozed to half an hour initially).

Next Steps

There were a number of improvements and enhancements we identified, but did not get to work on. They are as follows.

Add more entincing status icons
"You're flying like an airplane"

Make colours, more cohesive and complimentary

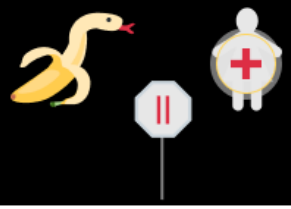
Add Animations

Add more variety in condition
(lower red, not changing, lower blue)

Non Intrusive Notifications

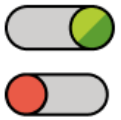
Improve "Affordability"
Non-pressable vs Pressable

Add more meaningful icons on "hero"

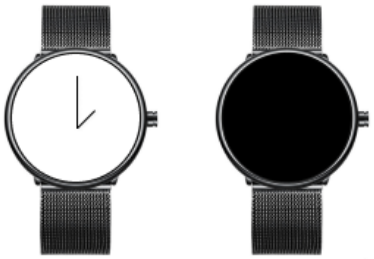


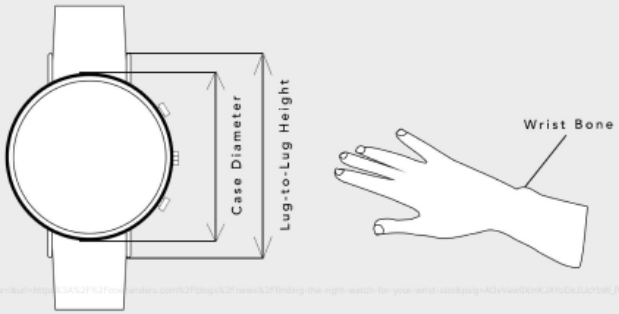
HRV, BMI, Resting HR in the background

Being in Control
Turning on and off features



Add white watchface





Too much Information
vs Too many Clicks

ⓘ Click to view

More Text
More Text
More Text
More Text
More Text
More Text

General

- Make colours more cohesive and complimentary all across
    - Although we picked up and decided on a colour palette at the beginning of our design, the colours throughout the user interface got a little less cohesive with the addition of new features and through the iterative process. Thus, a more cohesive “design language” or standard would need to be put in place moving forward.
- Improve on the “affordability” of elements (such as buttons)
    - Improve on the shapes of elements, such as the “stop sign” hexagonal shape button in the Coaching app, vs a circular one
    - Add animations to the user interface
- Strike a balance between too much tutorial text, and not enough information provided at first glance
    - This goes hand in hand with how much “work” we make the user go through for information, by lowering the number of presses/buttons/levels they need to go through
- Add a way to have a classic White Watch-face, to blend the watch in like a classic timepiece.
- Decide on the physical sizing for the watch, including lugs and wrist bones of different profiles of men and women

Coaching

- Keep it interesting and surprising
- Add more enticing status icons
- Better visual communication
- Add more variety in condition (lower red, lower blue, haven’t changed)
- Add more meaningful icons on “person” to better visually communicate the reason for the pause
- Health Metrics
    - Dieter Rahms is often quoted saying that good design should disappear in the environment, and only appear when it is needed. One of the aspects we decided to apply this is is health metrics (such as heart rate, HRV, BMI, Resting HR, etc). These metrics are all very important for health-related improvements. However, the way they are often presented in current watches (such as Apple Watch, or Garmin although Garmin seems to do a better job) is by throwing metrics and numbers at the user without telling them how these metrics can be used. We didn’t get to design this feature, so the question is, how do we present these tracked metrics in an educating motivating (allows the user to take action), and not overwhelming way to the user?

Goals

Habits' training

- Bring down the longer-term goals into building (or breaking) habits on a daily or weekly basis. These habits can be things like walking a certain time/distance, not stressing out, quitting bad habits such as smoking ("standing every hour" feature on the Apple Watch is a good example of this idea)

Editing and changing goals midway

- How does changing goals midway affect accountability? (is it okay to let someone create goals and change them without trying? Or what should that look like?)

Abandoning goals midway

- It should be okay to abandon goals. In which case, the user should be asked, in their opinion, was it a failure or success? If they say failure, tell them no it's a success .. give them some sort of therapy on the fly?

Breaks/recovery

- More often than not, the productivity of someone is not because they're not working hard enough, but because they're working too hard that they are not letting their body (or mind) rest and recover enough. This concept is true whether it is about job work, or working out. Thus, is it vital for goals. How do we build this in?

It's okay to fail and not achieve your goal

- Failure is often not the end of the road, but the beginning of a new one. Top athletes (and achievers) are often quoted attributing their success to how many times they were allowed to fail when younger. Failure is often a lesson, that could be about learning the goal wasn't the right goal, or the work done wasn't enough. It is a very important tool for reflection without judgment. How can that be built in a wearable?

Choosing goals

- Expand on educating the user on how to choose their goals, and accept (and embrace) their inner goals vs external societal goals (we touch on this in **Notifications**)
- Quite often, there is a conflict between confidence and your "wants". This is due to it being in conflict with competition about social status and success (it's innate, human nature!). This is why the Apple Watch and high-end fashion work so well (oh look! he/she is got the Apple Watch. Oh they have the new iPhone. They're wearing Gucci. They're riding a Lambo … etc.). High-end fashion is an easy way to "succeed" in that social competition. How do we make the goals you want, a source of pride and competition? (we touch on this in **Social**)

Notifications

Proactive useful alerts

- The user always had the ability to turn on and off alerts from the settings menu, as well as change the alert timings. However, this was done on an hourly or time of day basis. One of the interesting feedbacks we received was that some notifications are extremely useful at periodic times, but not outside of these times. Examples of this is if the watch knows you have a broken leg, suggesting articles or tips for how to walk on your broken leg. Another example is with women's health, where suggesting articles or tips on stress or mood changes would be extremely useful, but only during a certain time of month. How do you balance between proactive notifications, and non-intrusive notifications? How do you design better notifications that goes with the theme of "buddy"?

Appendix – Literature Review

Literature Review

We conducted a systematic review of the literature to identify relevant research related to User-computer interface design for wearable devices. Key terms included in our search were exercise, sport, life style, and modification of sedentary behaviour. Of the over 300 articles identified we included only 10 to move forward with when developing our project. It was clear that while exercise and behaviour modification were important and well researched topics, little had been done to apply this research to a wearable fitness device.

Some aspects of modifying behaviour to develop a healthier lifestyle were identified through our literature review. Specifically, the importance of social interaction in motivating people to continue to work towards their health and fitness goals was critical. A complete list of key points is as follows:

- Divided consumers into 2 groups: 1) those who are aware of a wearable fitness trackers; and 2) those who are not aware of it. In both groups, consumer attitudes, personal innovativeness, and health interests had statistically significant and positive associations with the intention to adopt a wearable fitness tracker.[1]
- Support from providers, other attendees, and family are important facilitators of adherence and 'making exercise a habit', as was variety and personalised nature of sessions offered. Barriers included inconvenient timing, cost, and location along with intimidating atmosphere, dislike music/tv, lack of confidence in operating equipment.[2]
- Should consider targeting exercise anxiety, through cognitive behavioural interventions, to aid people to achieve long-term adherence. Limiting factors associated with loss of social support, money time.[3]
- Facilitators to adherence among older adults included: bio-medical benefits, physical ability, staff, group relationship, and social aspects of the group. Barriers included: bio-medical (mental/physical ability), relationship dynamics, socio-economic reasons.[4]
- Exercise maintenance in older adults' facilitators: social aspects, beliefs about benefits of exercise. Barriers, affordability, aversion to gyms.[5]
- Elderly obsess facilitators: desire to go outdoors (consider user preferences for exercise). Barriers: lack of motivation/willpower and pain.[6]
- Home-based exercise adherence used text messages (positive reinforcement messages) to increase adherence through application of the Behavior Change Wheel (framework to designing behavior change interventions).[7]
- Facilitators: positive exercise experiences, beliefs, knowledge, 'keep going' attitude, adjusting and prioritising exercise, having healthcare professionals' and social support. Barriers: lack of motivation, negative social comparison with coexercisers.[8]
- Step and distance tracking was found to be the most important measurement of fitness tracking.[9]
- Groups: Regular exercise (2+ sessions/wk), Non-regular exercise (1 or less sessions/wk). Facilitators: motives regarding positive health related to regular exercise and strength/endurance. Regular exercise facilitator: enjoyment and challenge. Barriers: priority/time.[10]

Table 1 – Competitor analysis; Wearable Fitness Device

Comparison Item	Amazfit Bip	Apple Watch Series 6	Fitbit Versa 2	Samsung Galaxy Watch Active 2	Garmin Vivoactive 3
Task Related					
GPS tracker	Y	Y	Y	Y	Y
Display type	Always on	Always on	Motion/button on	Customizable	On/off with motion
Exercise Description	HR to determine aero/anaerobic (PPG sensor)	HR, Blood O2 (phone app required)	HR, SpO2 (calorie burn, heart rate zone)	HR	Display 7 day HR/steps etc.
Connectivity	Y (Android, iOS)	Y (iOS)	Y (Android, iOS)	Y (Android, iOS)	Y (apps, email, messages)
Reminders	Y (apps, calls, alarms, sedentary)	Y (apps, calls, messages)	Y (apps, calendar, sedentary)	Y (apps, email, messages)	Alert for extreme HR
Illumination	Y (manual)	Y (adaptive)	Y (adaptive)	Y	N
Set Fitness Goals	Y	Y + motivation goal/activities	Y	Y	Y
Visual Features					
Screen size	Square (32.5mm)	Square (40-44mm)	Square (35.5mm)	Circle (34.5mm)	Circle (30.4mm)
Iconography (# icons)	Time, HR, Steps	Time, app, message (cluster apps 20+)	Time, steps, HR, date, goal	Time (1-7 on screen)	1-9 on screen
Button/icon size	Large	Large to small	Large	Large	Large to medium
Colour scheme	4	5	4	4	2
Customizable	N	Y (show most used)	Y (app required)	Y	Y
Analytics	N	Activity ring, O2	Cardio fitness score, SpO2, intensity map, HR zone	Activity type, heart with calories burn, time	Fitness, stress (gauges)
Flow-related					
Type of navigation	Touch, analog dial	Touch, analog dial	Touch, button	Touch, buttons	Touch, analog dial
Hard/soft buttons	Y (one hard dial)	Y (one hard dial)	Y (1 select/back)	Y (2 hard)	Y (one hard dial)
Other					
Battery Life	45 days	16 hours	6 days	3 days	5 days

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Appendix - Prototyping and Testing

Wireframes

Setup

Information screens were created to inform the user about how the watch works by accessing their schedule so that it can remind them of their workouts and to take breaks for instance. A speech-to-text feature was designed as well as a motivating enemy that is based off the user selecting the fruit they hate and a character they are most afraid of. The purpose of this motivator is to motivate the users to reach their fitness goals through the use of fear and humour which makes it slightly scary but still entertaining to use.

Setting Goals

Users will have the ability to set goals within the device itself. They can select the type of activity such as running or cycling and specific measures such as the distance they aim to run or cycle, and the duration (e.g. daily, weekly, monthly or yearly). The device algorithm will then analyse their goal with reference to their fitness level that they input in the partner phone app, and recommend the types of workouts they could do to achieve this goal.
*Note: setting the fitness level requires several measurements such as weight, height, waist circumference, and current exercise habits. This information is confidential and only need to be input once when the user creates a profile, and hence, will not be a feature of the device itself.

Social

This includes socializing with groups and friends and viewing their metrics. Users can view the groups they join and the activity and metric that is tracked and challenged e.g. Running 20 km a year, and can also view a leaderboard of members in the challenge. Moreover, users can view their list of friends and the activity and metric that they share. They can also challenge their friends and search and connect with them through social media accounts such as Facebook, Google and Instagram.

Coaching

Users will receive notifications to coach them throughout the day for aspects such as their Body Battery (as used in Garmin), hydration, recommended hours of sleep, rescheduling workouts based on their energy levels, appropriate dietary needs and a reminder to relax when their stress levels are high. They will be able to turn the Coaching feature on or off and set the alert timings in the device's Settings.

Low Fidelity Prototype

Screens

Note: Since this was a low fidelity prototype, a crown button functionality was not created at the right side of the watch. Instead, a black deadspace was placed on the right side of all screens to function as the hard button for the user testing.

Miscellaneous Screens

Based on the user research, we decided to create Analog and Digital screens since our personas expressed the need to able to seamlessly switch between a sporty and a classic look without having to change their device. Two digital versions were created: one showing the time and Social feature, the other showing the date and Apps button. The Apps screen shows the main four features that were designed, and the Settings screen was updated to include the ability to turn off the Motivation Nemesis. The Settings screen was also separated from the Coaching feature due to the realization that it could be used to house all the device's settings rather than the Coaching only.

Social

These screens were updated to include buttons at the top to easily switch between Groups and Friends. Example names and icons were added.

Goals

These screens were updated to include round buttons to proceed with actions and add goals, and icons to represent the activities.

Coaching

The 'Setting Up' screens were transformed into the 'Coaching' screens which follow from the 'Goals' screen. After users set their goals, they are directed to edit their coaching plan which includes adding a "Motivation Nemesis". It also includes a 'Report Injury' feature which uses speech-to-text to input the injury and reschedule the workout accordingly.

Coaching Notifications

Similar to the wireframes but updated with black outline icons.

Evaluation

Test Scenarios

Test scenarios were identified to test each of the four features. These included viewing the watch faces, social feature, setting goals and coaching notifications.

Questions to ask

A semi-structured interview was conducted with three participants after they completed all the test scenarios. The questions mostly focused on the watch face display, navigation, and whether the social, coaching (Motivation Nemesis) and notifications would keep the participant motivated to complete their fitness goals and use the device.

High Fidelity Prototype

Screens

Note: A frame with a watch bracelet was used and a clickable crown button was added to the right side of the watch. Since we were unable to create an interaction in Figma to swipe on the screen, the white space on the left uses the 'On Drag' interaction to mimic swiping to the right.

Miscellaneous Screens

The Analog watch face was designed to have Sword hands and stick indices to make it look like a dress watch. The Digital watch face design was borrowed from the default Apple Watch but redesigned to include icons to help the users know the metric that is being tracked as well as show the time and date. Flat resemblance icons were used on all the screens. The Settings screen was updated to include a colour-changing Toggle button and pop-out drop-down lists to select the notification categories, alert timings and sound.

Social

The Groups feature uses a reference icon to indicate the broad connectivity whereas Friends uses a resemblance icon of people. Based on the low-fidelity feedback, the "Kudos" interaction was added to interact with friends. A button to start a challenge with each friend was also added. Social media icons were added to indicate the accounts that can be used to share the request link.

Goals

Based on the low-fidelity feedback, the detailed information about setting goals was hidden under the "what's goals?" and "more info" buttons that users can tap on to learn more in order to avoid providing large amounts of text unless needed. These screens were updated to include round yellow buttons to 'add', blue round buttons to proceed with actions and grey buttons to facilitate edits. The activity icons also included a calendar icon to distinguish them as yearly goals. Moreover, the completion of goals is visually indicated by using colour visibility gradients that fill up as the user nears towards completing their goal. This helps to avoid the obsession with numbers.

Coaching

The "Motivation Nemesis" was renamed to "Motivation Antagonist" to reduce the negative connotation. Since feedback from the low-fidelity testing suggested other reasons for pausing workouts, the 'feel like skipping today' and 'not feeling well' features were added to reschedule the workout appropriately. When either of these options are selected, users are redirected to screens that indicate for how long the workouts have been paused and because the Antagonist sympathizes with the user, it will not consume them which makes it mindful of the user's health. The 'Report Injury' feature was further refined to give the user the option to enter their recovery duration so that the workouts can be automatically rescheduled.

Coaching Notifications

The body battery graph uses a colour gradient to indicate high to low fluctuations, and the hydration notification now allows the user to directly add the number of glasses of water that were consumed. The workout suggestion notification allows users to either reschedule or change an activity within the device and the diet notification can show appropriate suggestions for food based on the

user's needs (setup at the start) if they tap to see more. The stress notification was further developed to include the ability to start a breathing relaxation session or be reminded later by swiping from the right if the user is unable to immediately start relaxing.

Evaluation

Test Scenarios

Test scenarios were identified to test all the designed features. These included viewing the watch faces, social feature, setting and viewing goals, using the coaching features and viewing the coaching notifications.

Questions to ask

A semi-structured interview was conducted with three participants after they completed all the test scenarios. The questions were based on Jakob's Ten Usability Heuristics as the goal of this user testing was to objectively evaluate the user experience of the fitness tracker and identify any design issues associated with the user interface.