REWIRE

BA INDUSTRIAL DESIGN
MAJOR PROJECT

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REWIRE

Contents

1.0 INTRODUCTION

1.1 Abstract

In this report BFRBs have been researched and a product and app solution has been developed to help users in education manage their BFRB. This has been achieved through a smart ring and pendant wearable. Rewire aims to track and store data of the users behaviours and display this on the app. This allows users to understand trends and triggers. Rewire completes these tasks in the form of jewellery, attracting no unwanted attention to the user, avoiding any stigma associated with BFRBs.

1.2 Introduction

Managing BFRBs is tricky for anyone, but throughout education it can be even harder. 75% of people that experience BFRBs found it more difficult during education (Osborne, 2022). There is currently very limited alternatives on the market to help people who have one or more BFRB.

1.3 DOUBLE DIAMOND DESIGN PROCESS

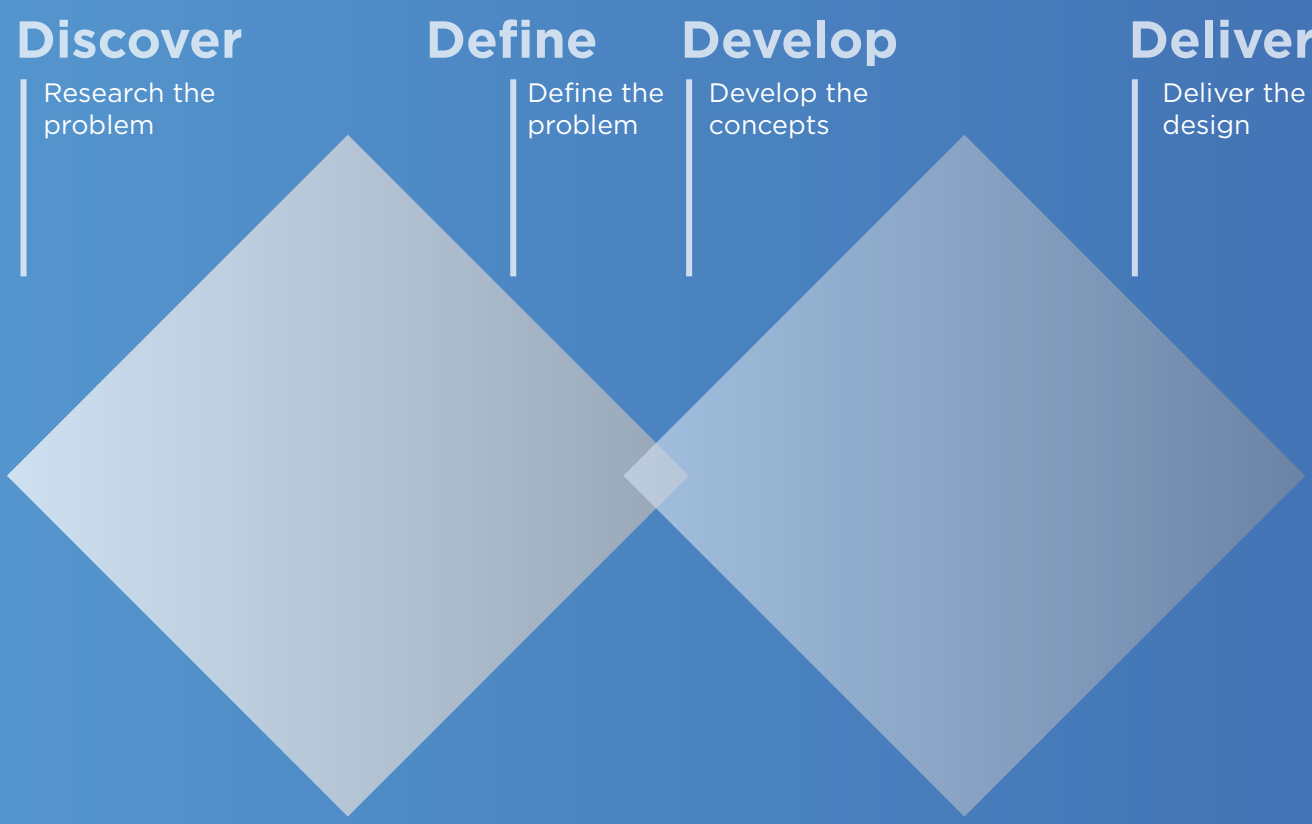


Figure 1, Double Diamond

The design process used for this project was utilised the Double Diamond. A process which involves four key stages; **Discover, Define, Develop** and **Deliver**. This has been used in this project to allow for the problem to be focused upon before the solution was identified. The double diamond also ensures that designs are revisited and evaluated to ensure that the best design is the final design. See the contents page 4, for a break down of each part of the double diamond.

1.4 PLANNING - GANTT CHART

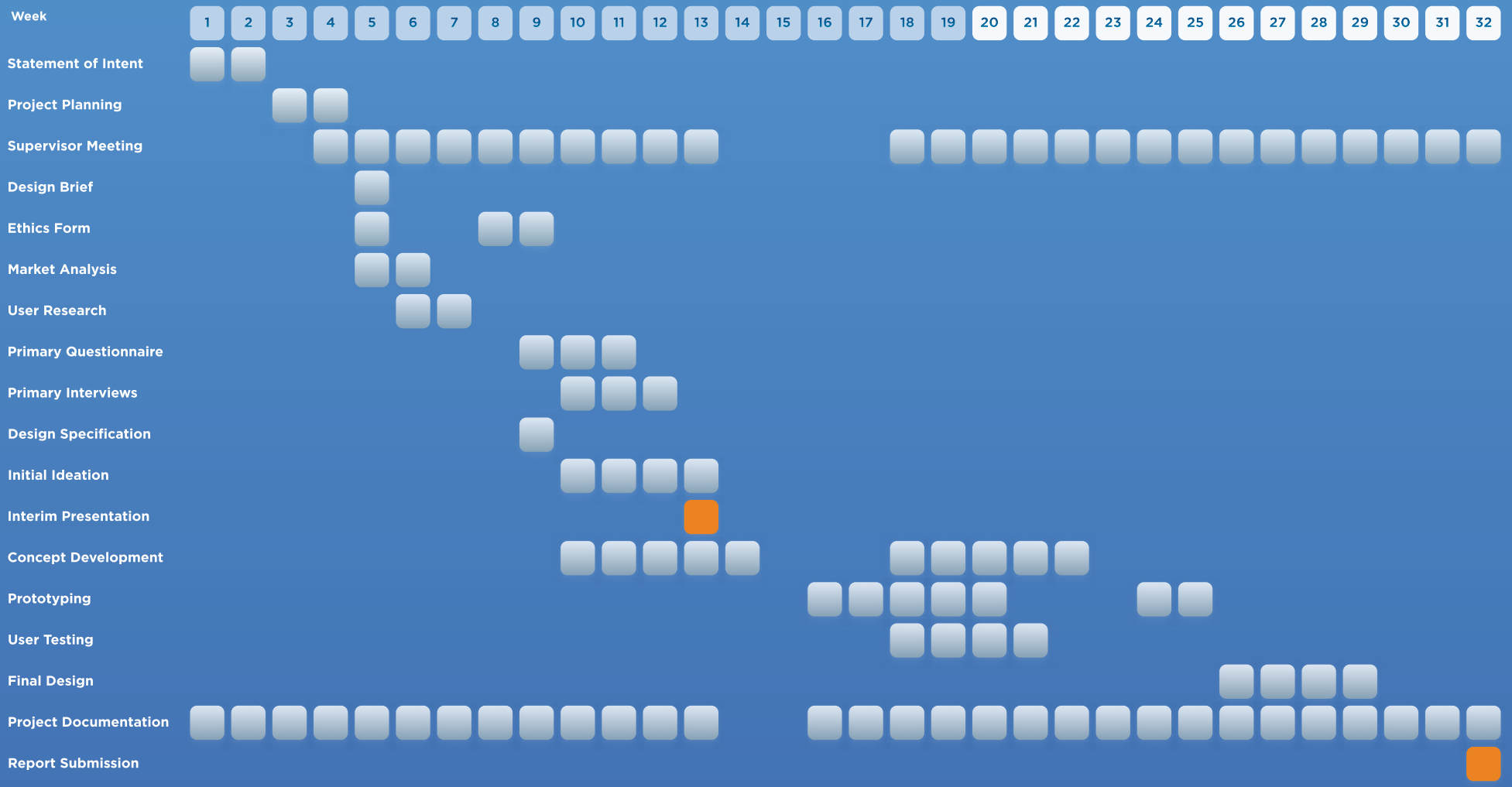


Figure 2, Gantt Chart

1.5 Brief

Context

The aim of the project is to help manage the urges of people who experience body-focused repetitive behaviours as a result of stress/anxiety in education within 18-25 year olds through a smart health solution.

Theme

Objective

2.0 DISCOVER

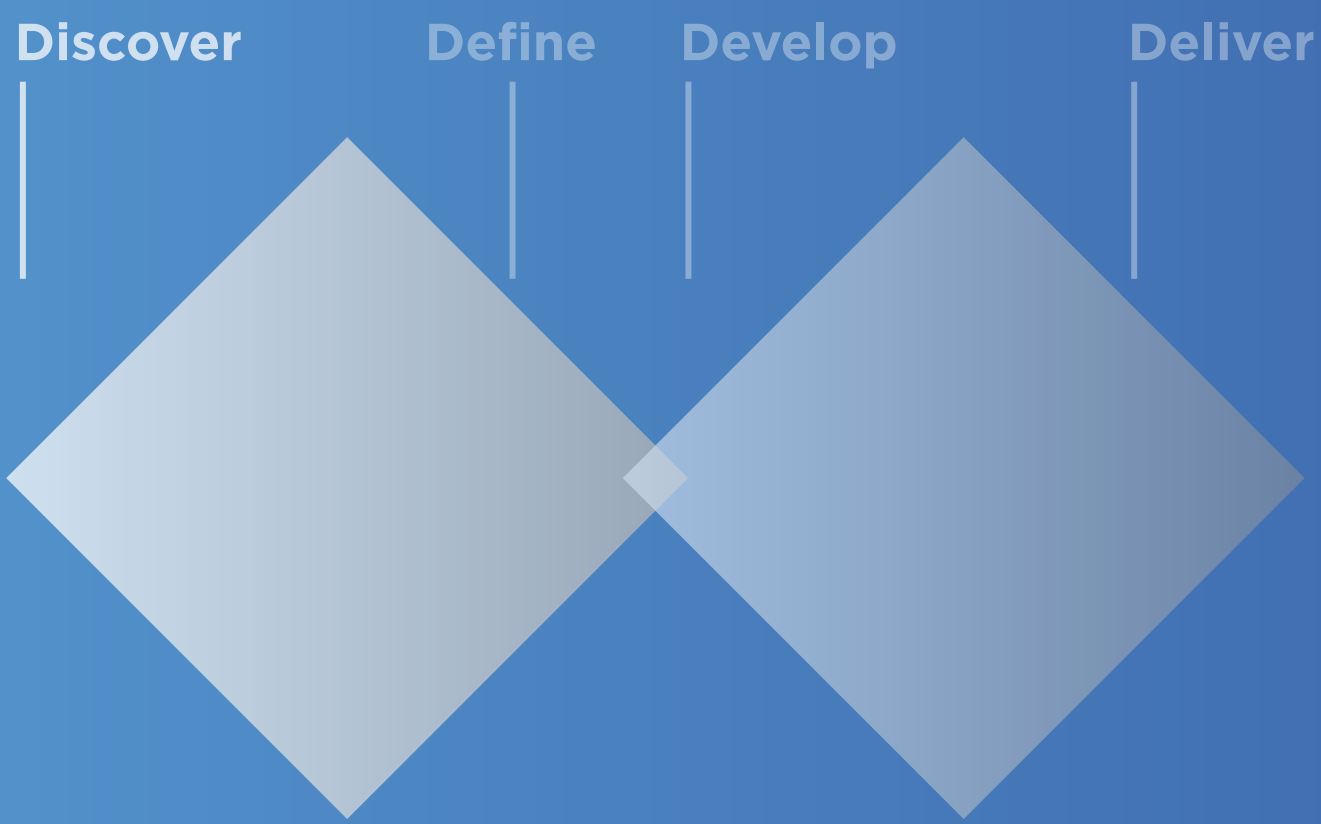


Figure 3, Discover Double Diamond

2.1 Body Focused Repetitive Behaviour

BFRB stands for a Body Focused Repetitive behaviour, these can manifest in different ways, from hair pulling, to cheek biting. BFRBs are associated with OCRD. The BFRBs that are most common include; nail biting, hair pulling and skin picking, all of which require the users hand and head, other BFRBs such as cheek biting have not been looked into for this project.

Some of the effects of experiencing BFRBs include; **shame** and **embarrassment**, **mental difficulties**, **physical impacts** and changes in the form of hair loss, scars and torn/ damaged nails.

The Three Most Common BFRBs:

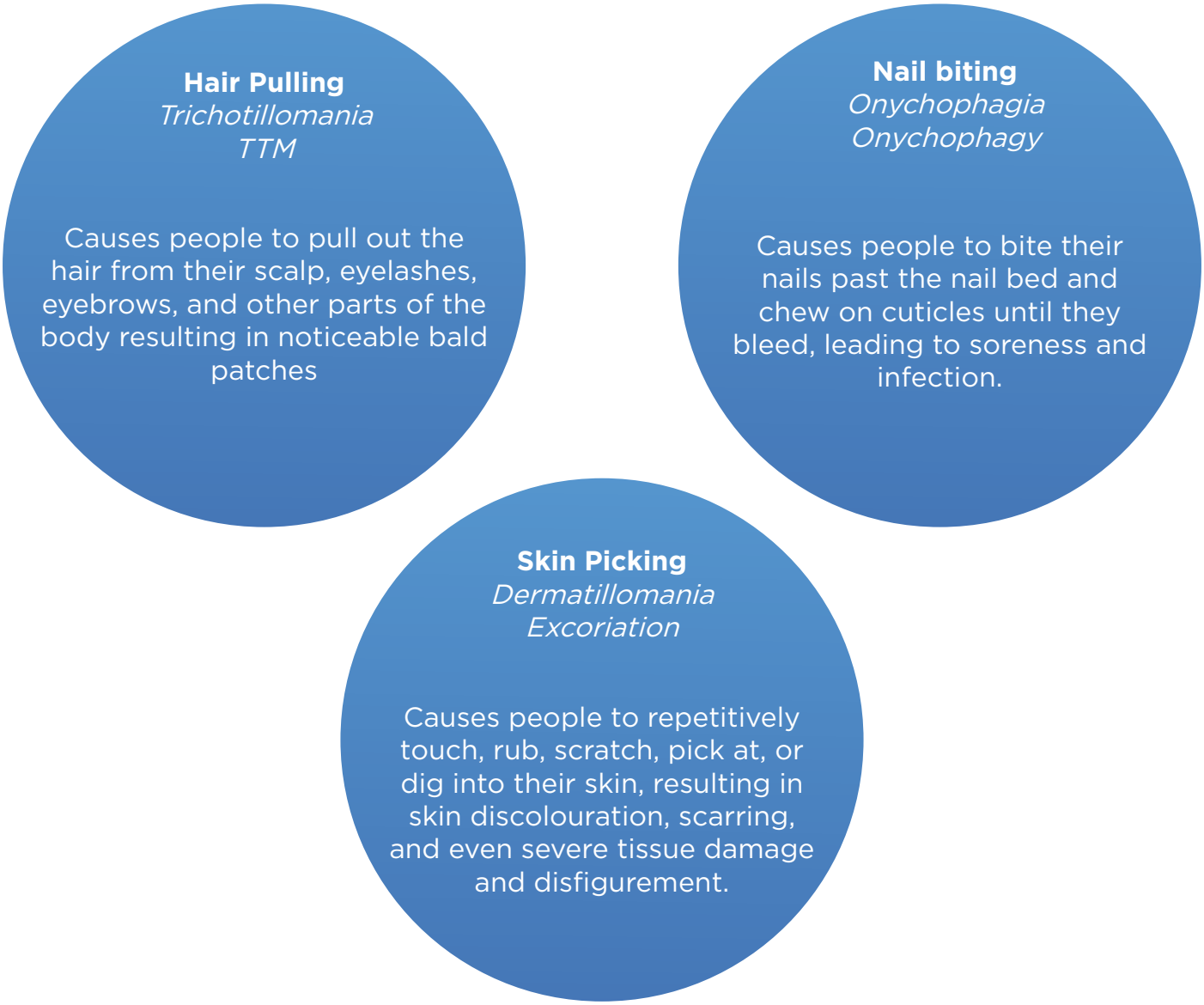


Figure 4, (TLC Foundation for BFRBS, 2021)

Causes of BFRBs

There are many different causes of a BFRB, and it varies between different Individuals. However there are some common triggers which can be identified, see figure 5, (Teng et al., 2004). It is thought that BFRBs may also be inherited from parents to their children (TLC Foundation for BFRBS, 2021).

Figure 5, (Teng et al., 2004)

Effects of BFRBs

BFRBs are thought to effect 1 in 20 people (TLC Foundation for BFRBS, 2021), with 10-25% of young adults experiencing nail biting (Roberts et al., 2015). Effects of BFRBs vary depending on the specific behaviour. However, there are some effects which are shared between different behaviours. While BFRBs create a lot of distress they also allow for a satisfaction once an urge has been completed (Roberts et al., 2015). **Guilt, shame, anger** and **sadness** are often felt by those wanting to stop/reduce their BFRBs (Roberts et al., 2015).

Figure 6, (Grant et al., 2021)

2.2 Current Treatment Methods

To treat BFRBs there is currently no form of medication that can be taken. However, there are psychotherapies such as CBT and applications which aim to try and get the user to stop their BFRB.

Cognitive Behavioural Therapy

CBT is a form of psychotherapy which aims to tackle the present issues that a patient may be feeling. While this differs from other forms of psychotherapies, CBT is proven to be effective when it comes to treating BFRBs.

CBT is divided up into five main Sections. These include: situations, thoughts, emotions, physical feelings, and actions, and aims to alter the way that the patient thinks and behaves (NHS, 2019).

In order for CBT to work the user must follow advice from their therapist and complete 'homework' between meetings. This can include writing down when they have a behaviour, where it was and what caused it, as well as how they felt at that time. This can often be difficult for the patient to complete as they are experiencing heightened emotions.

Products

Another solution people can try is **products** such as fidget-spinners/cubes, fake hair to pull and stress balls.

These are used in an attempt to replace the behaviour with a less harmful one. This can allow the user to relieve their anxieties or stresses without exhibiting the harmful behaviours on themselves. However, through primary research is was found that only 45% found the products actually helped in some way for their BFRB urges (Osborne, 2022).

Applications

Other ways of treating BFRBs is for the user to utilise an App. Apps aims to give the user a place to write down details of behaviours and uses different frameworks to get the user to experience a behaviour change.

Frameworks used include Nudge Theory, Gamification and Motivation. These are often combined to retain the users management of BFRBs.

2.3 Existing Applications

Current apps on the market are limited an app only solution. Four apps which were identified to help users with BFRBs include: TrichStop (Hair Pulling) (GINI-APPS.LTD. 2022), Turn (Impact Collective. 2022), Quitzilla (Andrii Hula. 2022) and I am Sober (all types of BFRBs and other additions) (I Am Sober LLC. 2022).

These apps use the same frameworks as one another, as well as having a primary market for people that have addictions, not BFRBs. They all allow for self monitoring. The apps limitation are that they require the user to input the data about the actions, something which can be very difficult for people to remember after the behaviour due subconscious nature of BFRBs.

4/4

With all four apps use streaks a form of **gamification** and **nudge theory**

2/4

I am Sober and Turn utilises a **community** feature to share experiences and struggles

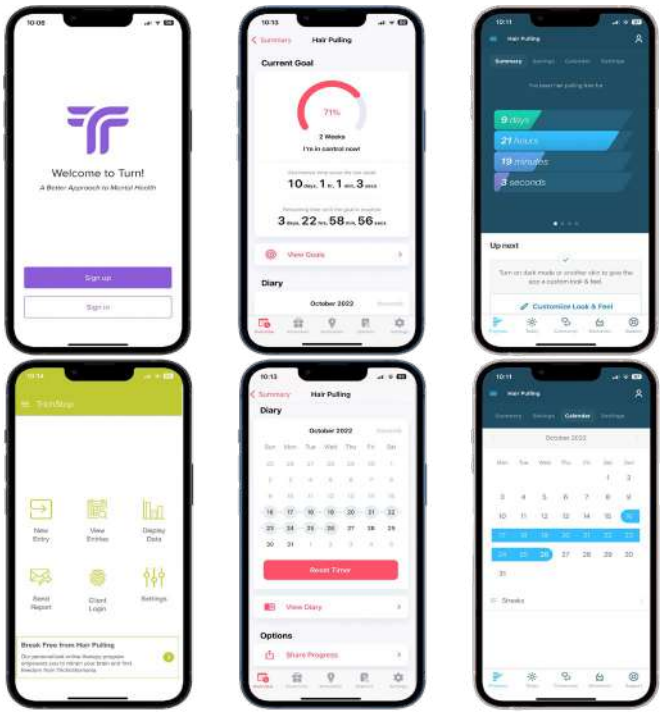


Figure 7, Current app solutions

3/4

Three using motivational **quotes**

4/4

All are free to download. However, three have paid subscription options

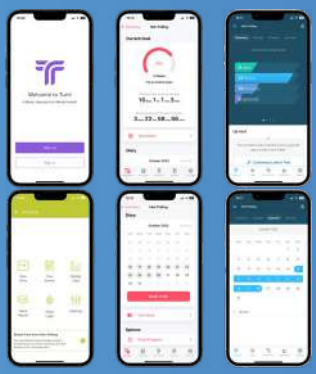
CBT

High Support

REWIRE

Low Automation

High Automation



Low Support

Figure 8, Market Positioning Prediction

2.4 Frameworks

Nudge Theory

The aim of nudge theory is to achieve a behaviour change in people without realising. This sub-consciously assists the user to make decisions. Nudge Theory allows the individual to be in control by setting their own goals or "Mission Statement." It is designed to not limit the user but to guide them into the way of thinking that they want to achieve (Dennis, 2022). The digital nudge cycle can be used to understand the stages required.

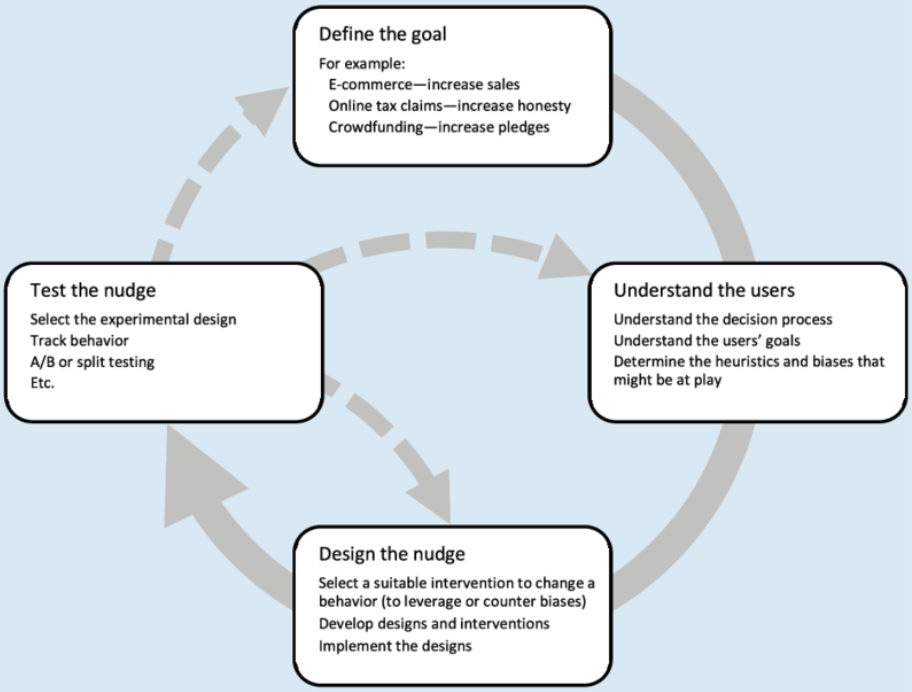


Figure 9, Nudge Theory (Schneider et al., 2018)

Nudge is broken down into 6 principles (Thaler & Sunstein, 2021):

- Incentives
- Understand mappings
- Defaults
- Give feedback
- Expect error
- Structure complex choices

Gamification

Gamification can be used in a wide variety of ways within UX/UI. However, a behaviour change is required for an app to help manage a BFRB. Gamification content allows the user to feel as though they are in a competition, even if it's with themselves (Bamidis et al., 2016). Gamification takes advantage of the inherently competitive nature of people by using a feature like streaks. Streaks incentives the suppression of BFRBs.

Currently gamification isn't used that much in medical apps with only three apps that use it within the NHS Library (Edwards et al., 2016). Gamification has been used regularly to create behaviour change.

2.5 Technology

Wearable technology

Current and past wearables include Google Glass, Apple Watch and FitBit. All of which have different intended purposes. There has been a wide range of public opinion amongst wearables with Google glass being a failure to the Apple Watch, which is now the most purchased watch in the world (Apple Inc., 2021).

Watches	 *Samsung Smart watch*	 *Apple Watch*
Glasses	 *Bose Frames*	 *Google Glass*
Rings	 *Oura Smart Ring*	 *Motiv's Smart Ring*

Figure 10, Wearable Technologies Table

The Oura Ring is particularly interesting due to its incredibly compact size, for a device which measures a lot of body parameters it is only slightly larger than existing jewellery. This demonstrates the extent of **miniaturisation** within electronics. **Custom PCBs** can be designed for all shapes and sizes. **Sensors** can then be mounted onto round circuit board. Additionally, **batteries** can be shaped to fit inside complex spaces.

Figure 11, Technologies needed for Product

Feasibility of Required Technologies

These technologies required research and understanding based on insights made during the develop section.

RFID

RFID technology allows for a passive device, requiring no power. This allows RFID to be used in wearables to trigger code. This ensures that the device is only tracking movement when the RFID tag is present.

Battery

Using the RFID triggering method also allows the device to have a significantly increased battery life, due to it only being on during the RFID connection. To ensure that the battery life is substantial enough a Lithium-ion battery will be used. These have the ability to hold their charge for longer and are a more efficient battery compared to others (Cheremond, 2013).

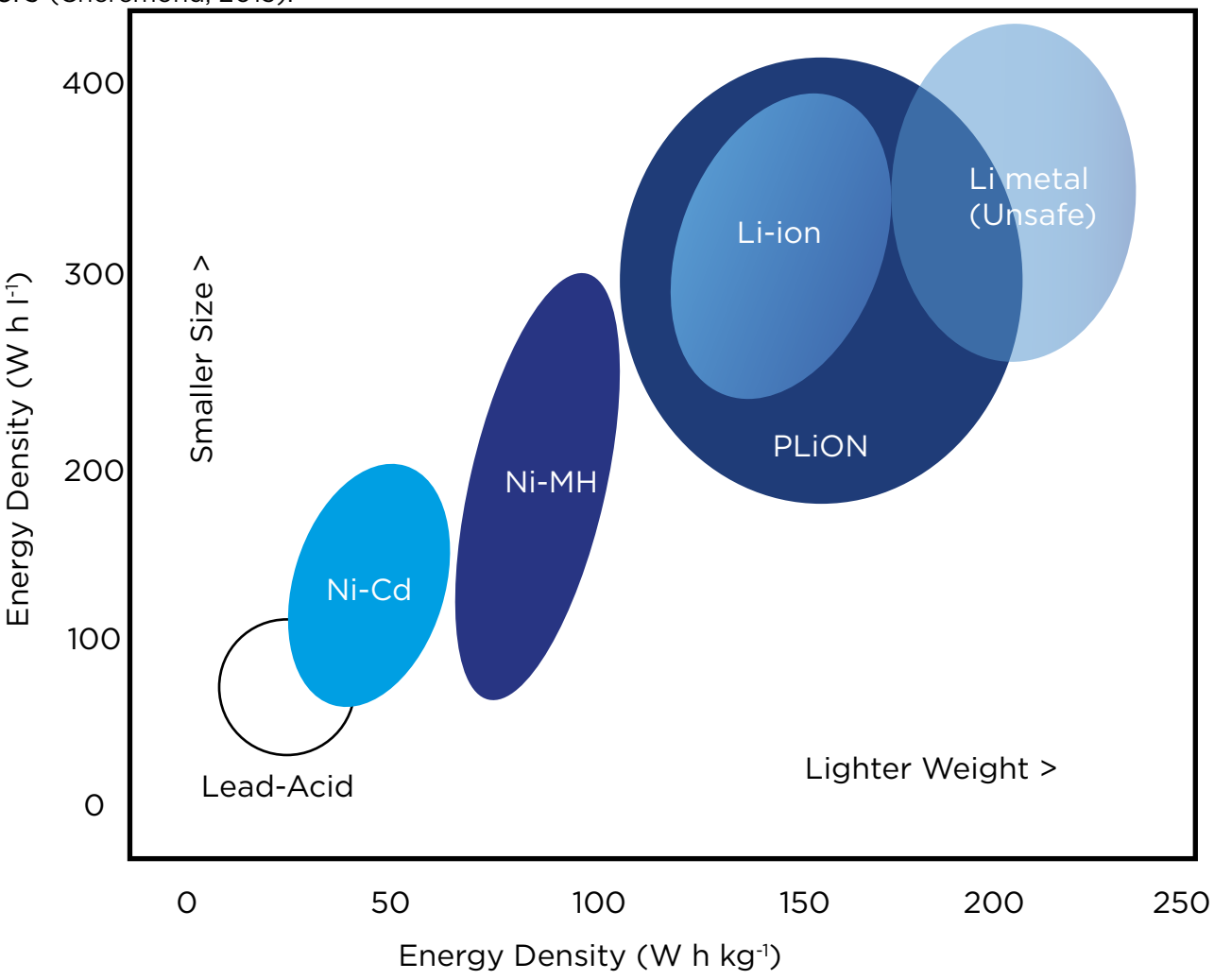


Figure 12, Battery comparison graph (Cheremond, 2013)

Sensors

6-axis accelerometer and gyroscope - to measure change in movements of each finger, to provide tracking information.

RFID receiver - to identify when to start tracking for BFRBs.

Coin vibration motor - to provide haptic feedback to the users, this is a factor which limits the size of the ring heavily. Piezo Buzzers or vibration motors can also be used but these would have to be custom made to fit the ring.

Tracking Technology

Tracking fingers is difficult due to the complex movement that is so different to any other tracked body part. Other parts of the body which are more commonly used for tracking body parameters include the wrist.

The action of raising the hand to the face is done commonly without a BFRB action taking place. There is a need to ensure that the device is only tracking actual actions of a BFRB, which is why the fingers themselves need to be monitored for movement.

There are several different ways of sensing movement of the fingers. See figure 13 for different technologies that could be used to track fingers. From further development in section 4.3 it is vital to ensure that tracking of the fingers uses one or more of these methods.

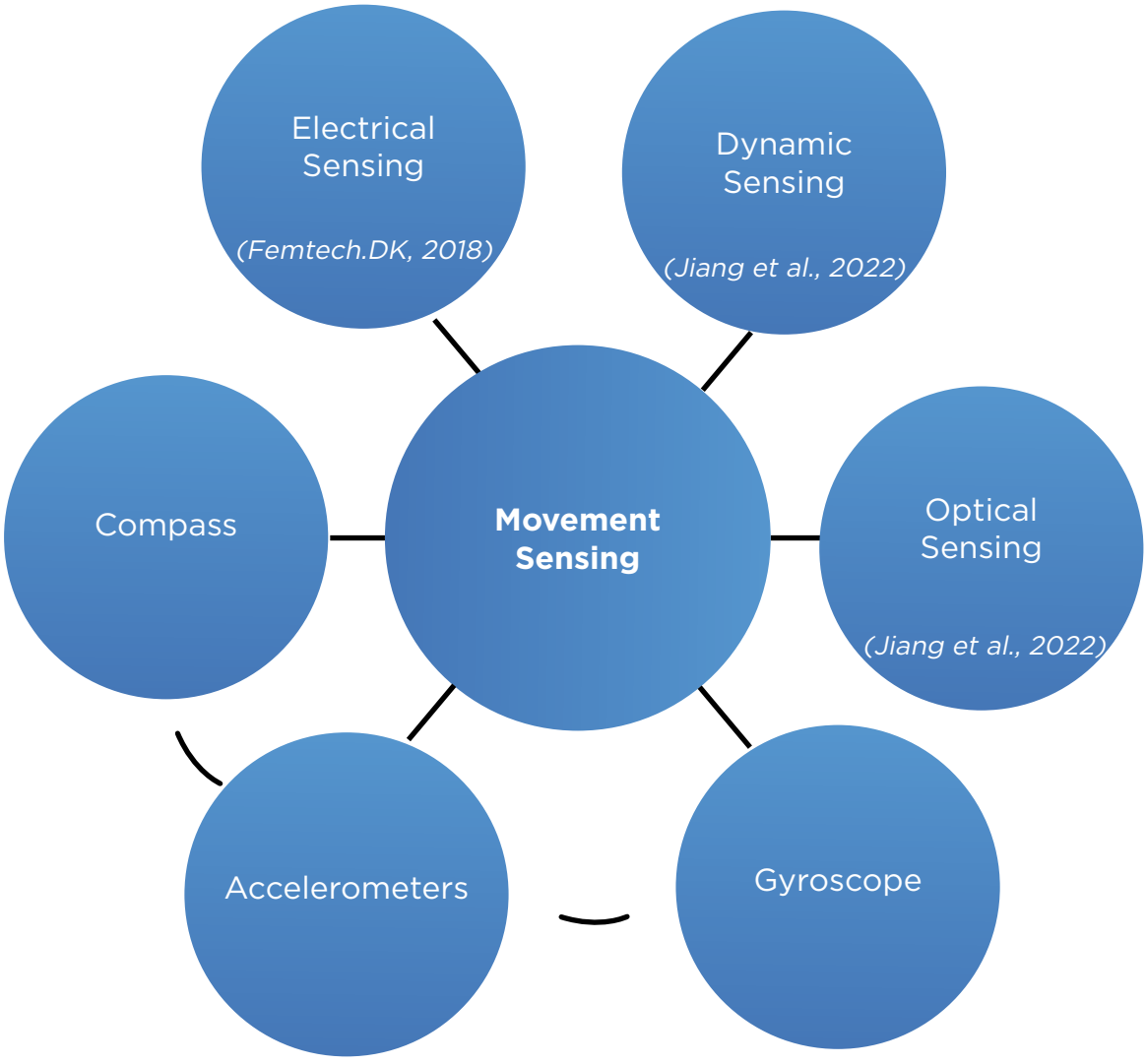


Figure 13, Types of Tracking Technology

2.6 The User

Stakeholders

Stakeholder mapping is used in order to take a step back and see all the different stakeholders that may have be associated with the solution in the project. From the primary user who the app is designed for to the tertiary stakeholders who may have limited access to the app to provide assistance to the user as shown in Figure 14.

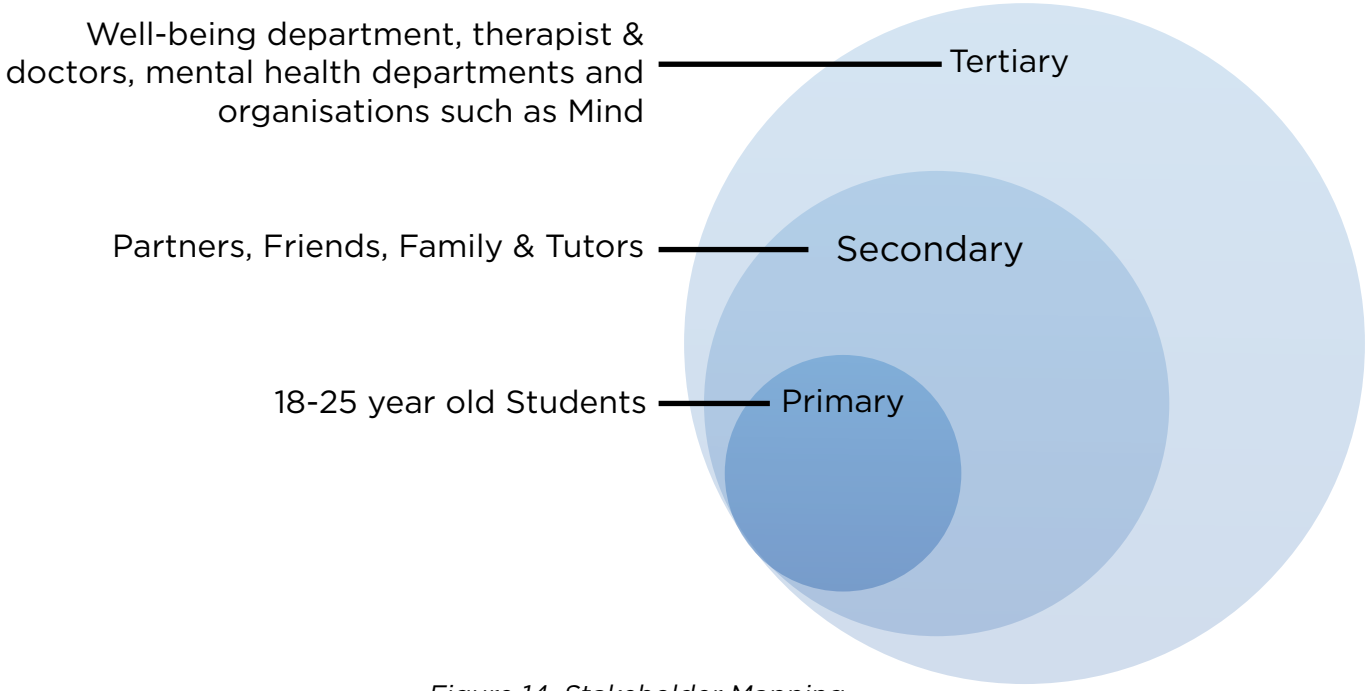


Figure 14, Stakeholder Mapping

Target User

The target market consists of 18-25 year old students who experience any of the following; Hair Pulling, Skin Picking and Nail Biting. Students were chosen due to the enhanced pressure of exams and higher education which can cause people to start showing a BFRB or make the behaviours more frequent, as shown in primary research (Osborne, 2022).

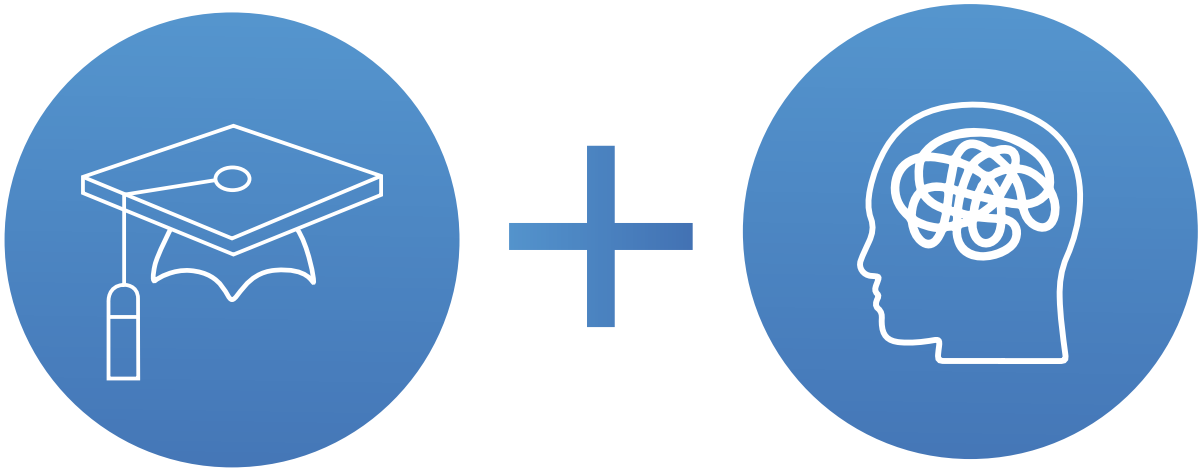


Figure 15, Identifying the target user

'Sometimes I don't even notice that I've pulled so much hair out, then I think "has anyone seen me doing this?" I feel so embarrassed'

Name: Alex Conroy
Age: 24
Education: Masters University Student - Studying Speech and Language Therapy
Interests: Cooking, social events and shopping
Struggles: Pulling hair from: scalp, eyebrows and eyelashes. Experiences anxieties when in unfamiliar or stressful situations such as starting a Masters at university with lots of deadlines.

Figure 16, User Persona 1

"When I study I **can't stop**. I try and continue with studying and **I won't even realise** until my friends all look at me "

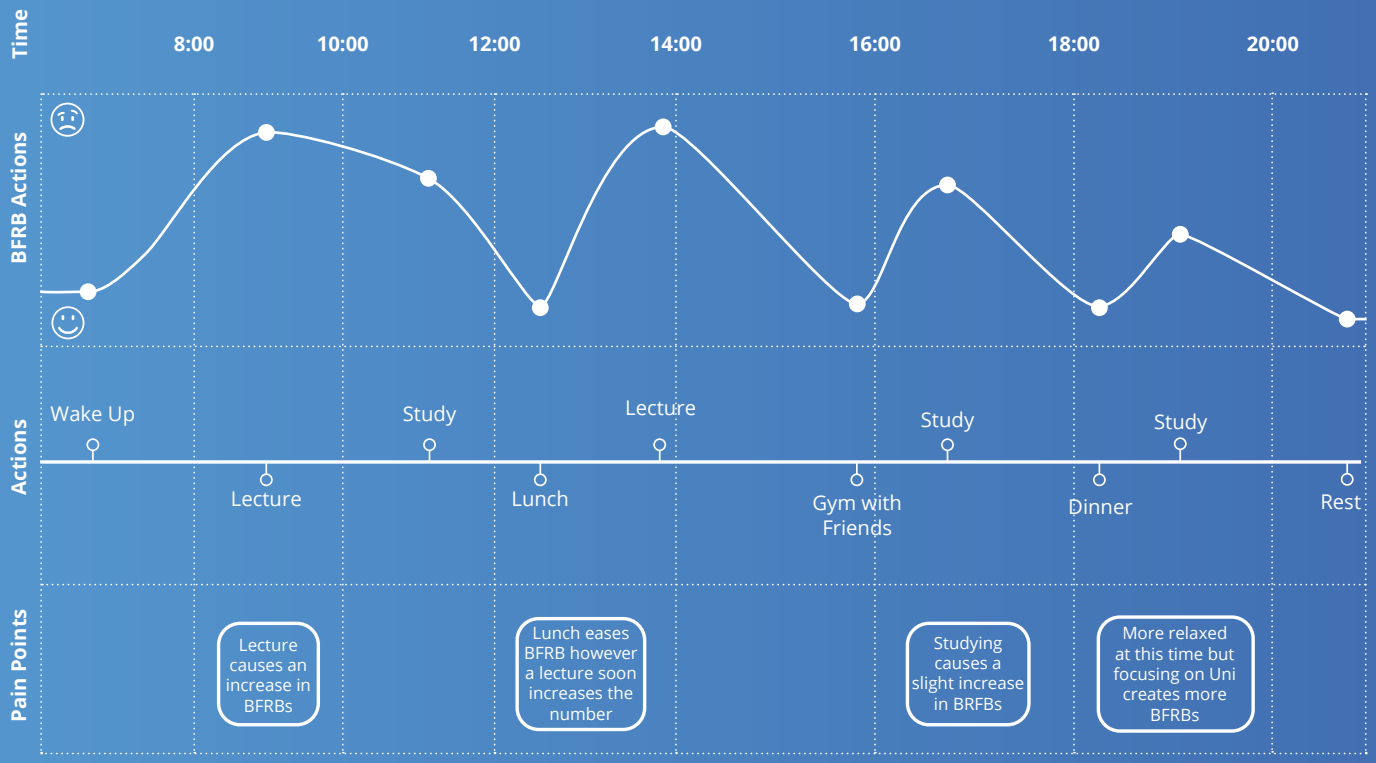
Name: Sam Chamberlin
Age: 18
Education: Year 13, about to complete A-Level exams
Interests: Gym, football and computers
Struggles: Face skin picking, stresses of revising and completing exams. Can not keep track of when/how often picking is happening and is not aware of doing the action most of the time.

Figure 17, User Persona 2

2.7 User Journey Mapping

The user journey map shows the users change in emotions throughout a typical day. It looks at the ‘pain points’ of the day and gives an opportunity to identify solutions. Completing this stage allows for the designs to not be limited to what the user may perceive the issue to be. Therefore, this stage allows the designer to see problems which the user may not have identified.

Alex Conroy



Sam Chamberlin

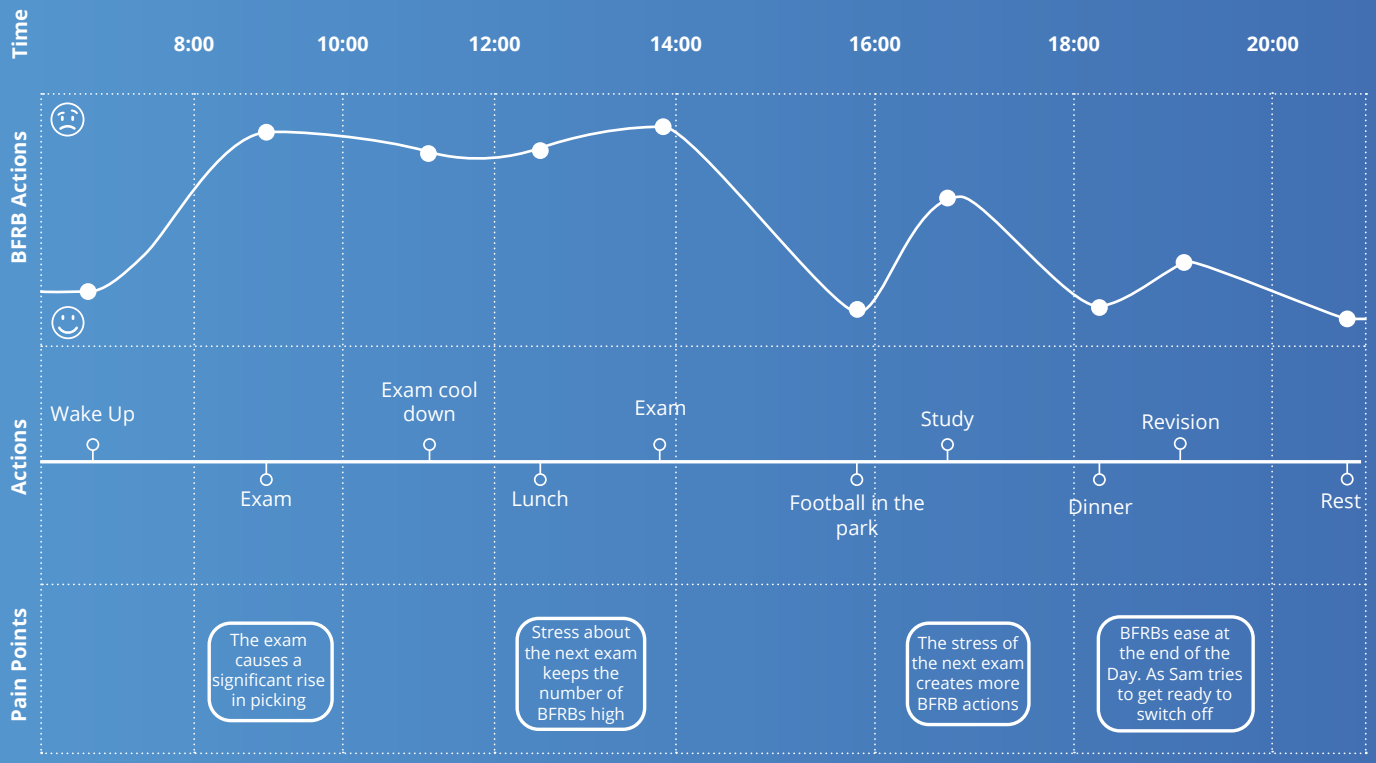


Figure 18, User Journey Maps

2.8 Colour Theory

The utilisation of Colour Theory permits the correct emotions to be felt when the user is interacting with the app. The primary colour that is used for the project is a blue gradient which includes a subtle change from RGB #5798D0 to #406CAF. The colour additionally increases the interaction of the app by utilising the Multi-Model Interaction discussed in Human Factors 2.9 and the branding colours in section 4.15.4.

Orange	• **Energy** • **Enthusiasm** • **Happiness** • Spiritual	Many feelings are in line with the Aims. However, spiritual doesn't fit too well
Green	• **Calming** • Natural • **Motivating** • **Optimistic**	Green has some feelings in line with ReWire
Blue	• **Productivity** • **Calmness** • **Serenity** • **Sincere**	All of Blues feelings are in line with ReWire and how it wants the user to feel
Purple	• **Imagination** • Wealth • Creativity • Royalty	Not many of the emotions are in line with the aims of ReWire
Red	• Love • Passion • Power • Anger	Red is a very strong colour. However it feels misaligned to the ReWire aims
White	• **Peaceful** • **Cleanliness** • Innocence • **Minimalist**	The emotions and feelings related to white are in line with the aims of ReWire

Figure 19, Colour Theories (York Graphic Designers, 2012)

2.9 Human Factors

Haptics

Haptics add another layer of feedback to communicate an actions status, for example when the wrong password is entered and the phone will slightly vibrate. Haptics are part of **Mulit-Model Interaction** (Jia et al., 2020). Haptics have the ability to subtly and discretely notify the person wearing the device.

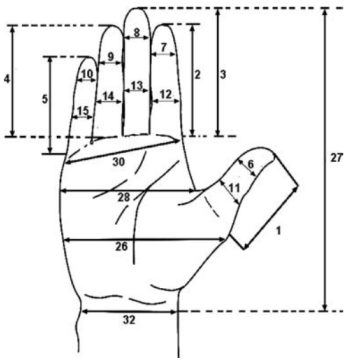
Types of Haptics

Figure 20, Haptics (Apple Inc., 2021)

In the case of ReWire it is key that the Haptic is only for the user and no one else. The most important haptic in the case of ReWire is to notify the user as to when they are conducting a behaviour.

Anthropometric Data of the Hands

Understanding the users anthropometric data is essential for designing a product that can be used by people within the lower 5th percentile and the upper 95th percentile of human hands.



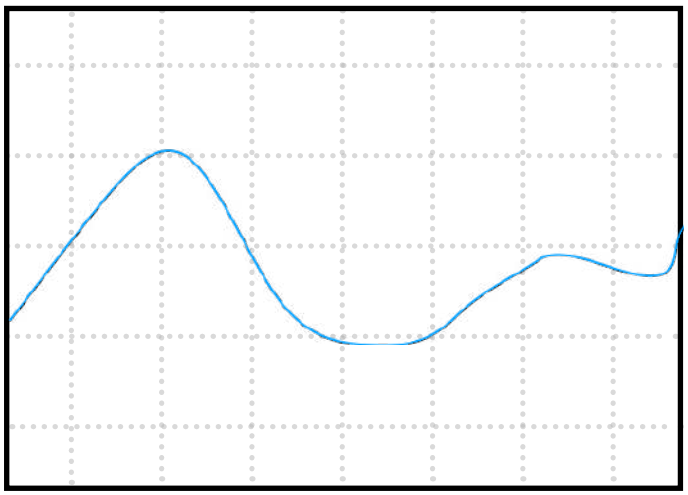
	Males (n = 92)				Females (n = 73)			
	Right Hand		Left Hand		Right Hand		Left Hand	
Hand Dimension	5th	95th	5th	95th	5th	95th	5th	95th
(11) Breadth at second joint of digit 1	18.26	22.63	18.09	22.26	16.13	19.21	15.77	18.64
(12) Breadth at second joint of digit 2	17.40	21.23	16.85	20.41	15.25	17.93	14.79	17.33
(13) Breadth at second joint of digit 3	17.72	20.96	17.09	20.46	15.60	17.84	15.03	17.27
(14) Breadth at second joint of digit 4	16.39	19.63	16.13	19.40	14.46	16.99	14.18	16.50
(15) Breadth at second joint of digit 5	14.50	17.66	13.89	17.33	12.29	14.82	12.26	14.63

Figure 21, Anthropometric Data, (Cakit et al., 2012)

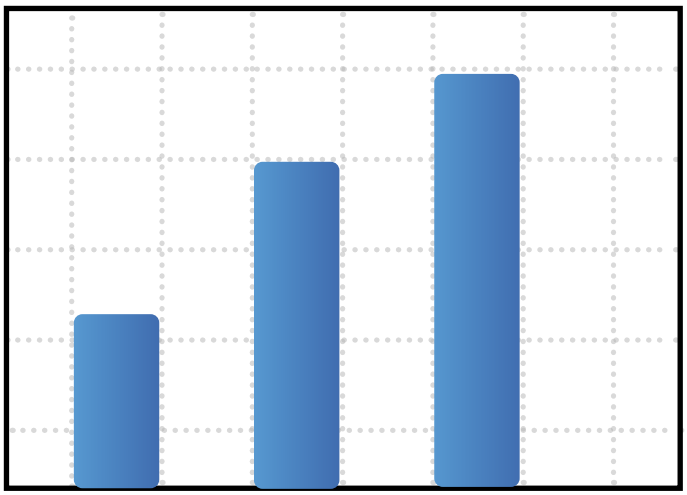
Graphs

Graphs are used to convey information to the user. Therefore, they can understand data in a simple and quick Way. Information about the graph can be added to provide further understanding. Using a graph for trends and data is useful for the users to Understand. However, ensuring the correct graph is selected decides how easily the user can understand the data (Apple Inc., 2022).

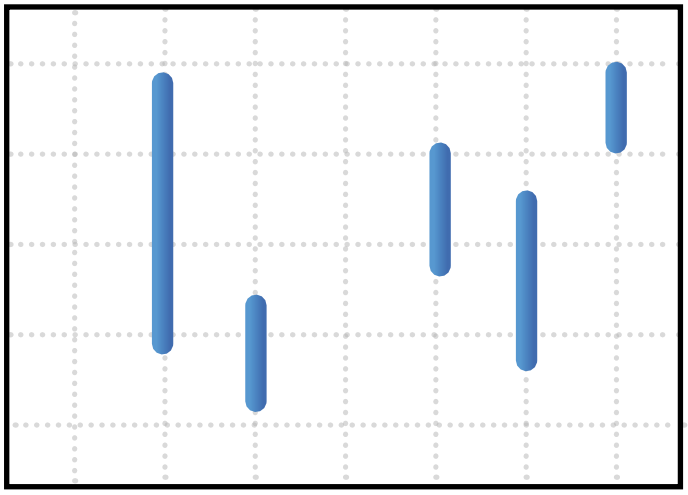
Line Graph



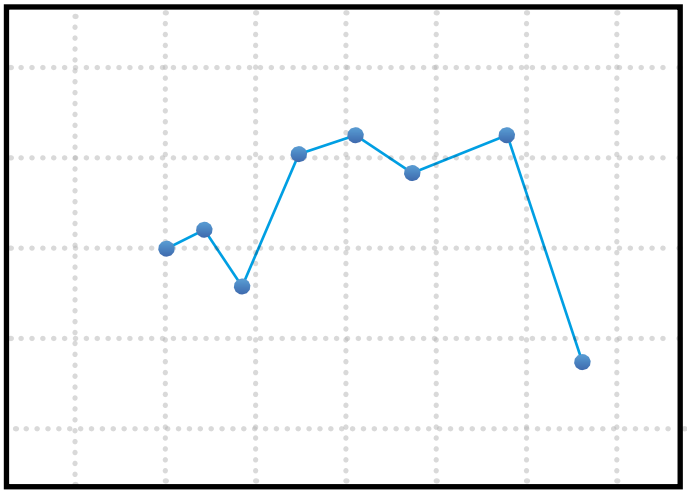
Bar Graph



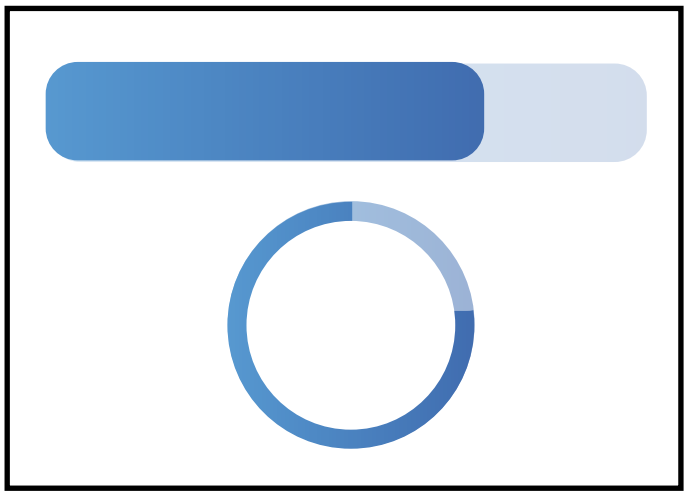
Waterfall Graph



Scatter Graph



Progress bar



Comparison Bar Graph

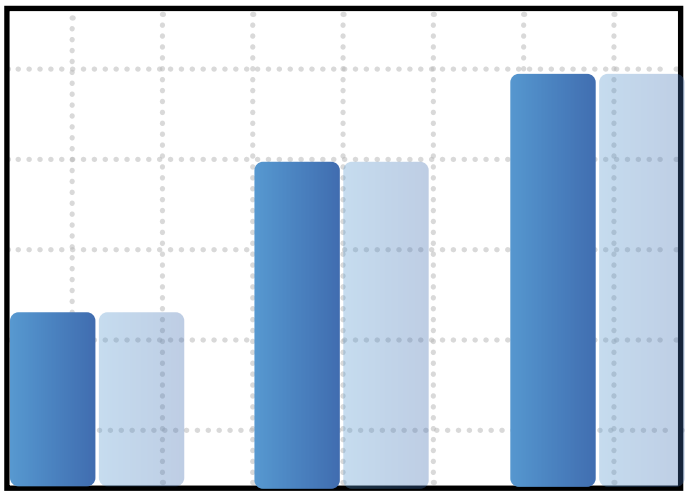


Figure 22, Types of Graphs

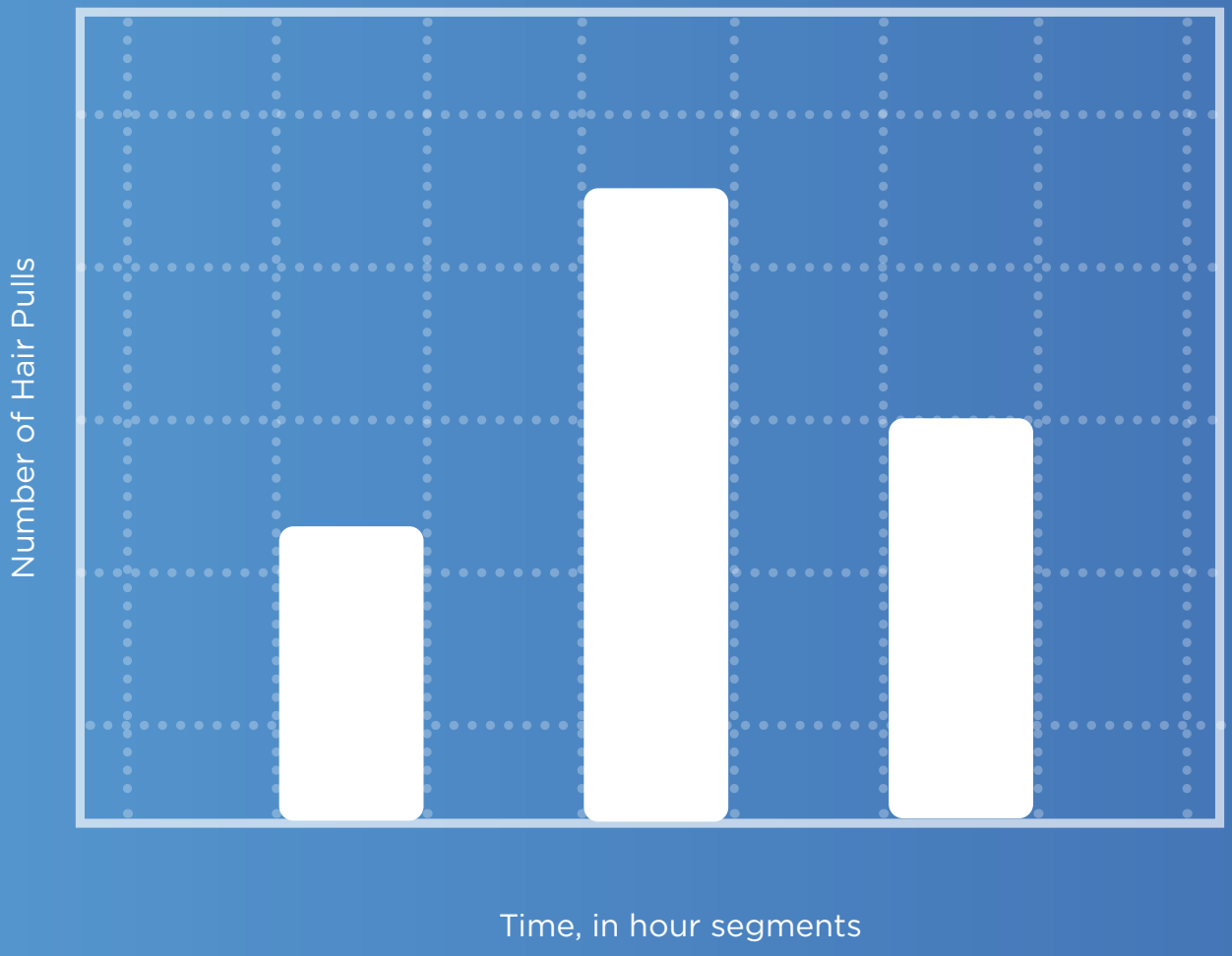


Figure 23, Final Graph Design

The simplest graph that users will recognise and understand is a Bar Graph. This will allow the users to see when and how often they exhibit a BFRB action. This graph has the number of actions in hour intervals.

Over a period of time there can be trends that are highlighted which aid the user in identifying a trigger. This is an example of the graph required for the application to visualise data quickly and easily.

3.0 DEFINE

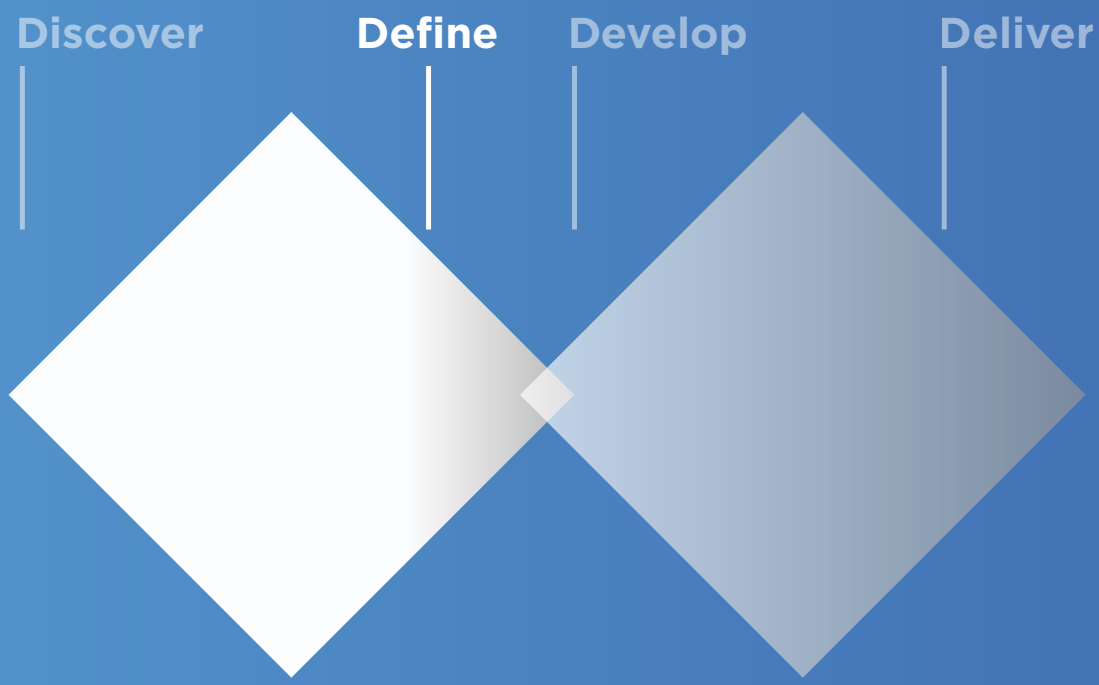
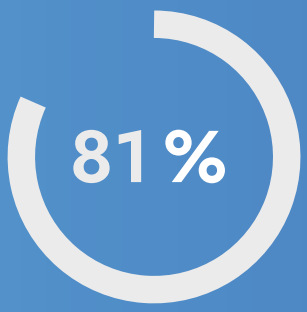


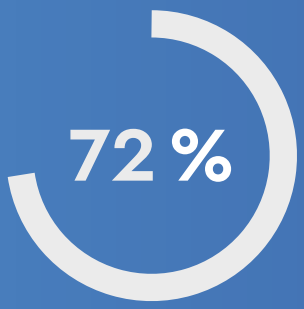
Figure 24, Define Double Diamond

3.1 User Research Questionnaire

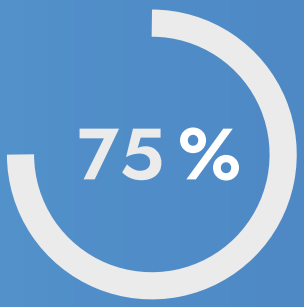
Primary user research from 14 users show key statistics about their experiences of BFRBs. See appendix C1 for questions and responses. The users answered questions from a Reddit page for people with BFRBs. The questionnaire showed a clear link to the target market and shows how much existing products fail to work. The questionnaire helped to identify where the issues are and how people are suffering. This helped define the best solution.



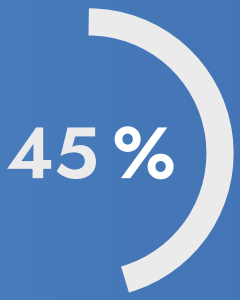
Tried the use of other applications and products



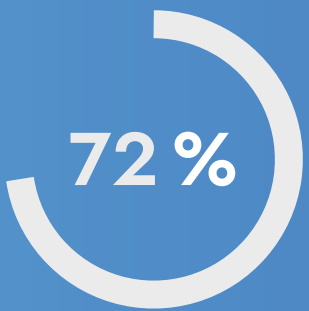
Used the app: I am Sober



Felt the urges were worse at **higher education**



Thought the current solutions **didn't work** for them



Of the stress/anxiety was caused during **university**

Experienced **stress/anxiety** at education

Figure 25, Results of Questionnaire

How have the apps made an impact on your life?

"By knowing how many days I've gone without major pulling sessions (more than 5 lashes in one spot), I can judge how long to expect before my lashes are back."

"It helps me be more aware"

"They had a positive impact on my life and the habit to begin with but eventually I lost interest"

What about the experience of the app could be improved?

"I think having the apps look more engaging would want you to log in"

"Community features could be utilised more"

Easier to insert info

Figure 26, Results of Questionnaire

3.2 Expert Interview

A qualified cognitive behavioural therapist was asked questions about CBT and what it offered. This was completed online via a semi-structured interview. Key insights and findings are shown in figure 27/28. The findings allowed for the project to be shaped by an industry expert allowing a better understanding of how and why the therapy is ran in the specific way.

Figure 27, Expert Interview Results

What is a replacement behaviour?

"A replacement behaviour is used to prevent the harmful actions. We use a technique called exposure response prevention. This is when we cause the behaviour to happen in a controlled environment and try and replace the behaviour."

What could be used to prevent BFRBs?

"Creating a change in the environment allows the client to be separated from the situation and can reduce or even stop the urges. Another way of distracting the mind maybe by playing mind heavy activities."

Does CBT need to be catered to an individual?

"People react differently to situations and methods of therapy meaning that a solution that works for them has to be found, not everyone finds the same things helpful."

What makes CBT different from other therapies?

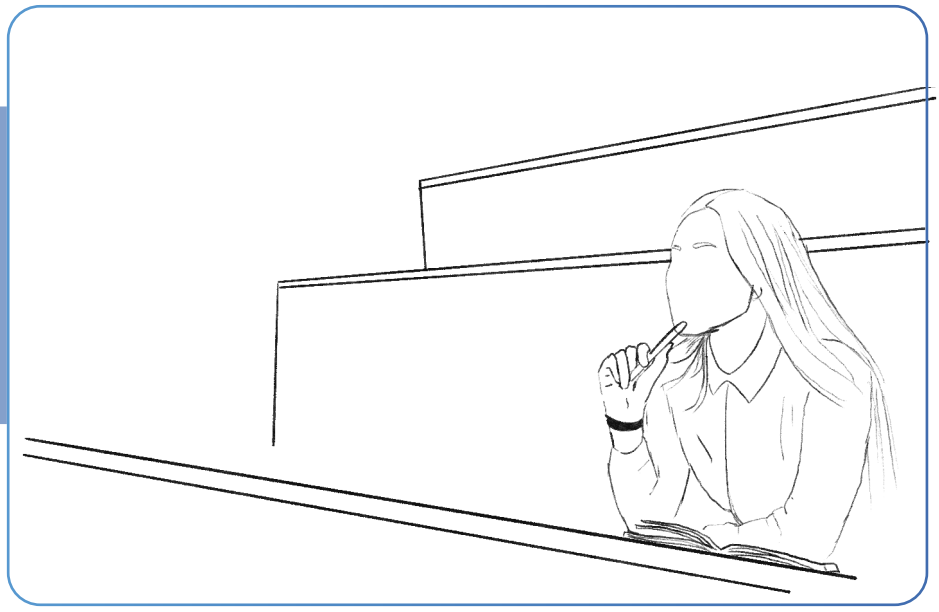
"CBT is very much about actively engaging in solutions and works by talking about the present feelings, thoughts and emotions."

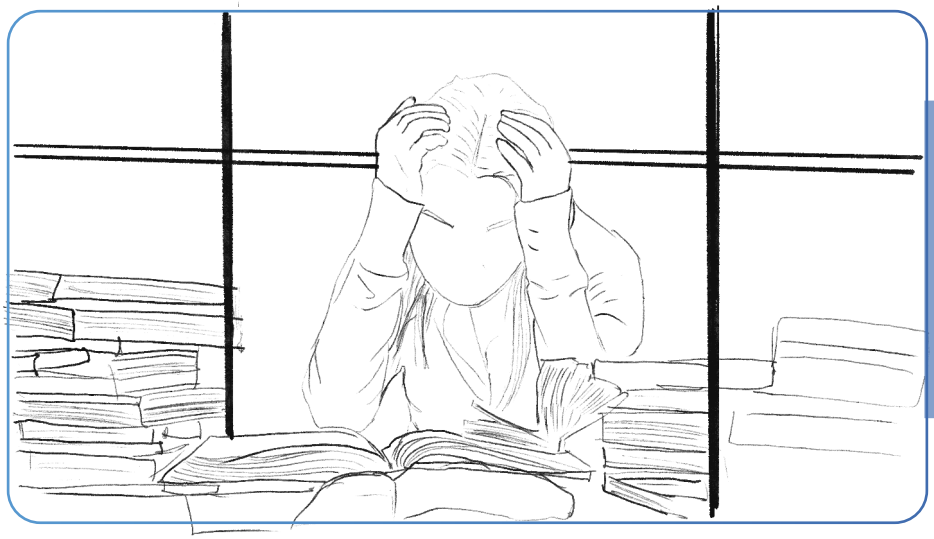
Figure 28, Expert Interview Results

3.3 Storyboard

From primary and secondary research that has been gathered, the storyboard shows how the issues that people may face and how the product/app could help towards managing the BFRB (Osborne, 2022, TLC foundation for BRFBs, 2021).

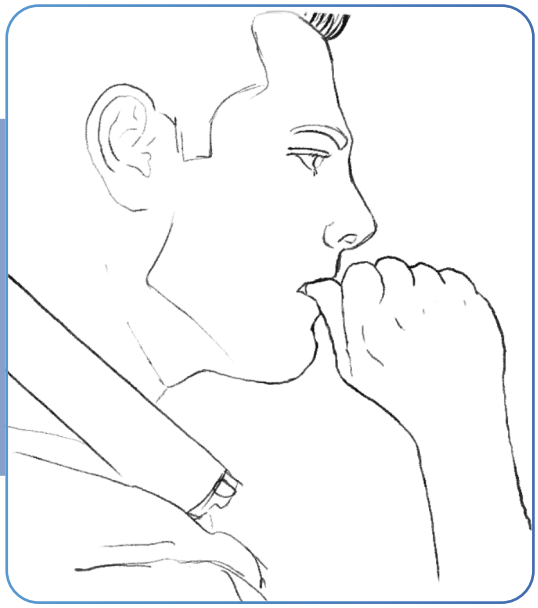
The user in their class or lecture may become stressed, anxious or bored and begin a BFRB.





During studying or revision, stress and anxiety can build up in BFRB sufferers. This can lead to episodes of their action such as hair pulling.

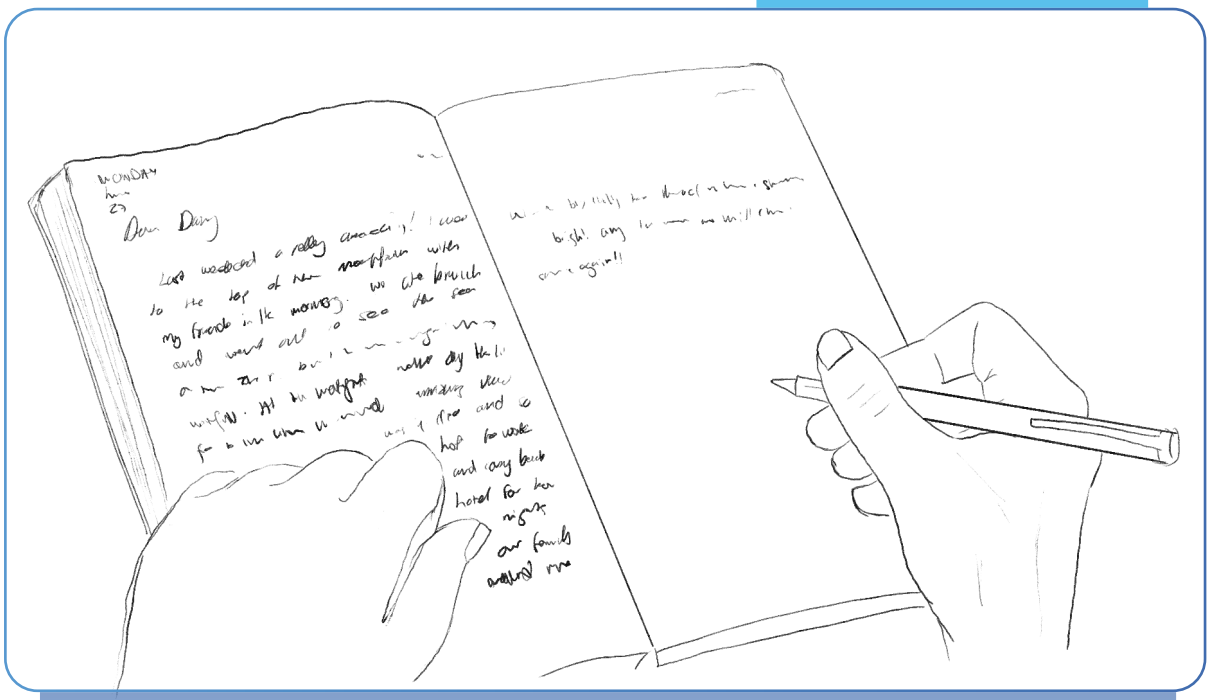
Work for assignments or outside stresses of a student can be overwhelming and cause the users to experience their BFRB. This can cause physical damage to the user as well as harm their mental state.



This could be an area of development for a product, to take the place of the therapy.

People who wish to seek help with BFRBs have to speak with a GP. This can be intimidating for people and they may not feel comfortable in doing so. Meaning that they look for alternatives. Once people do go to a GP they may refer them to a CBT. This process can then take around six weeks or more (NHS, 2022).

This could be an area of development for a product. Taking the place of self written notes about episodes.



Once they have spoken to a CBT, they will be asked to keep a diary to record details about the BFRB. This can be very challenging for people who are new to the process of CBT.

Figure 29, Storyboard of the problem

3.4 Moodboard















Forms and styles can be inspired from the moodboard. In this case jewellery trends are researched to ensure that products are staying within traditional jewellery boundaries. The objective is to not attract unwanted attention, ensuring that stigma is kept to a minimum.

Electronic rings and other wearables were also included to prove the concept of miniaturisation.

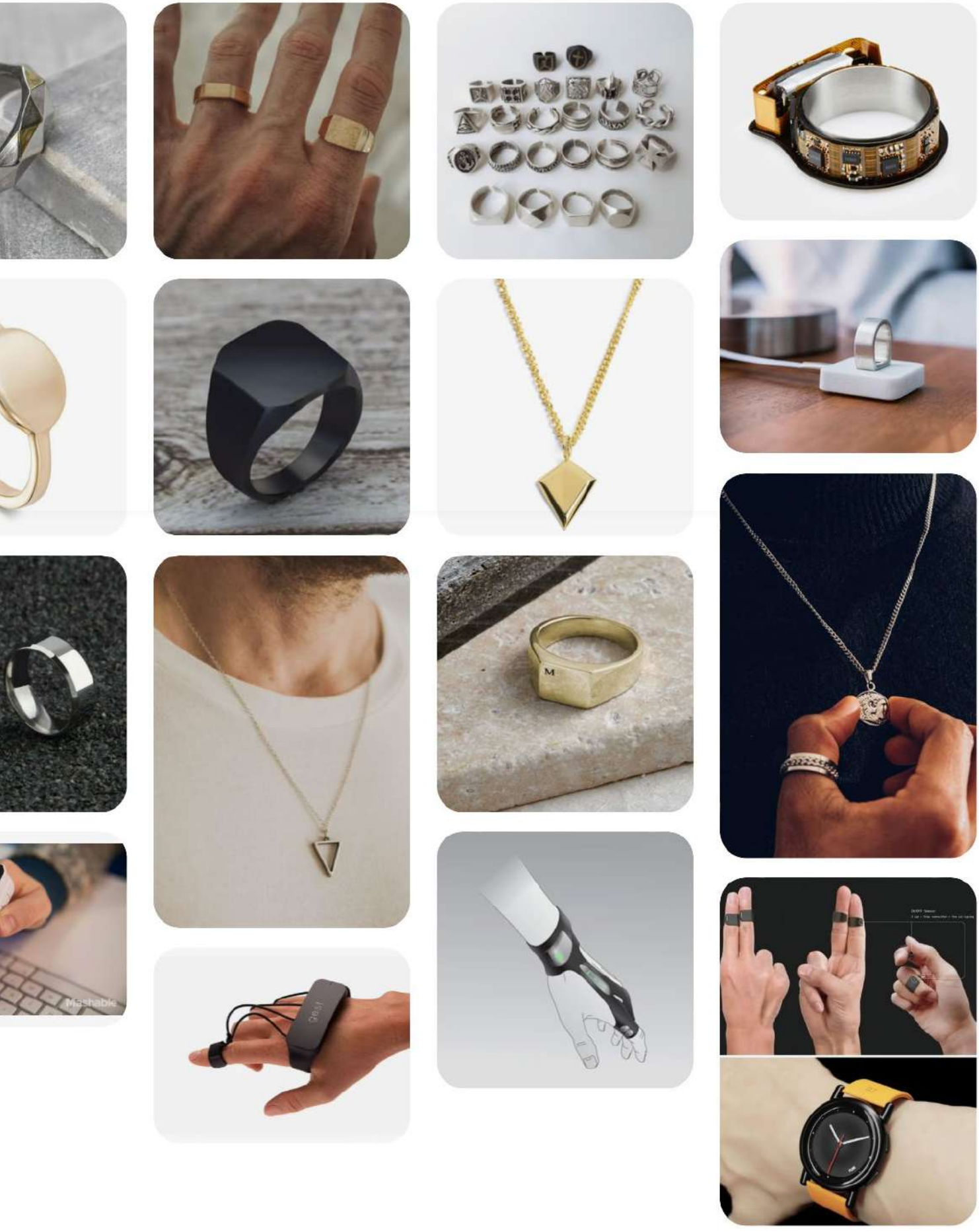


Figure 30, Moodboard, (Osborne, 2023)

3.5 Initial Design Concepts

All the concepts are for potential products that could help users manage their BFRBs.

Concept 1

A device which would **attach onto the users laptops** during a lecture or Studying. This device would **monitor** the user with cameras. Once the user starts to complete an action the device would alert the user to the action with an **LED indicator.**

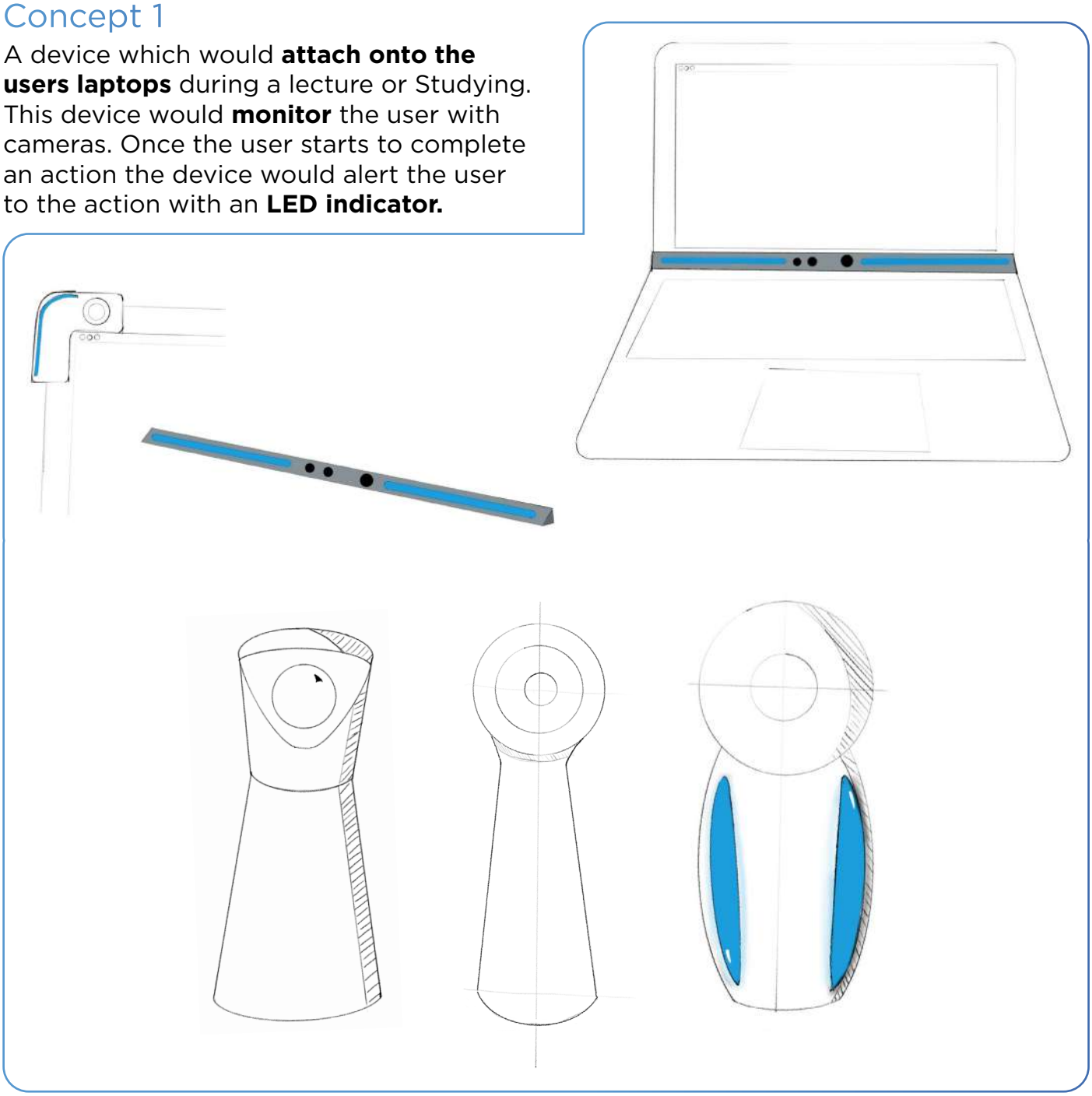


Figure 31, Concept 1

The issues with Concept 1 is that there is a visible notification that is shown to the user which is visible to other people.

Concept 2

Another concept, is an **application only solution**, figure 32. This would work in a similar way to existing addiction applications. Requiring **the user to input data** using the application and recall details of the event after they finish. However, as previously mentioned the Rewire product must be able to monitor the actions when they happen to record the time, location and the frequency of the action completed.

The idea of mixing Concepts 1 & 2 would create a solution that the **users phone** may be able to track the actions using the cameras and a **smart AI system**. Therefore, the app tracks and records data for the user. However, this concept would require the users phone to be on and face them at all times during a lecture or study session.

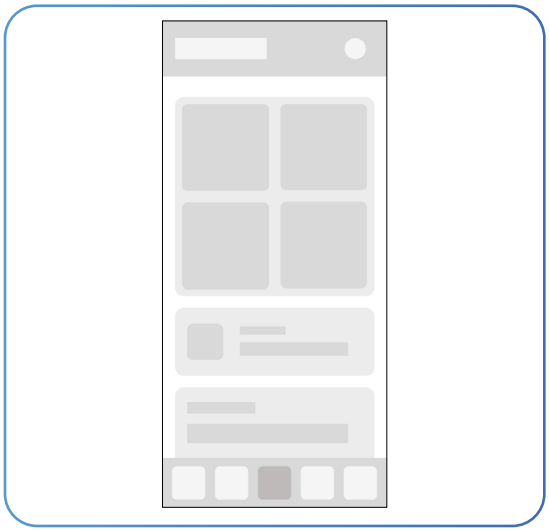


Figure 32, Concept 2

Figure 34, Concept 4

Concept 3

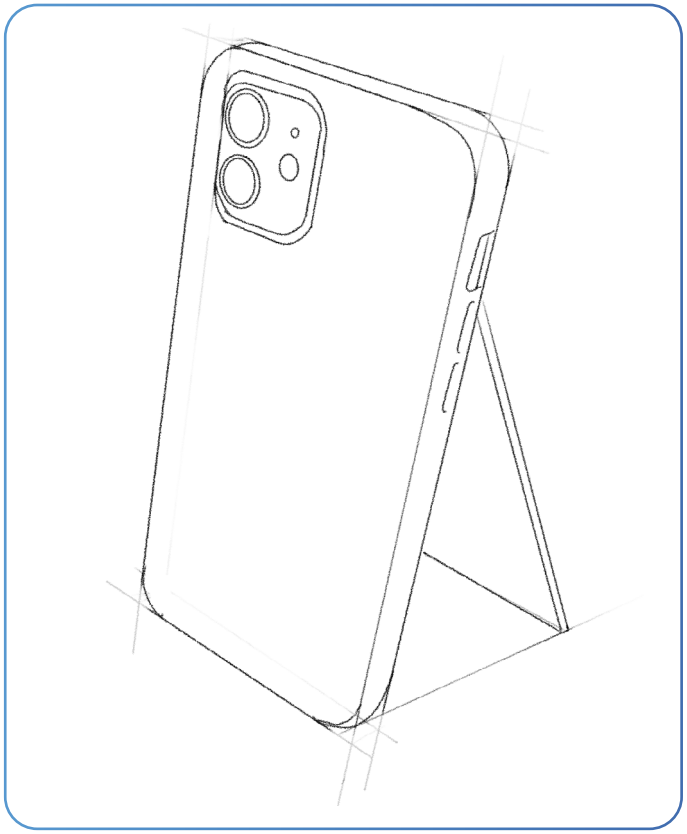


Figure 33, Concept 3

Concept 4

The final concept is the ability to use a **wearable**. This **tracks and records data** of each individual action. Concept 4 is a device that is **permanently monitoring** finger movement so that the user can identify exactly when throughout the day that they are exhibiting these behaviours. Overtime, with the use of the app **trends and triggers** would then be established.

The wearable would be a product which is normal to wear and doesn't attract any unwanted attention. Such as glasses or a watch shown in Figure 34.

The addition of the app means that there is **no need to create any visible notifications** to the user so that others can see. Haptics can be used to inform the user of an action.

3.6 Overview of Design Concepts (Evaluation)

A datum matrix completed the evaluation of all the different concepts. This demonstrates how effective each design compares to one another, and the PDS. The matrix allows for designs to be progressed and developed, or for designs to be dismissed.

Design Requirement form the PDS	Concept 1 	Concept 2	Concept 3 	Concept 4 
Ease of Use	=	=	=	DATUM
Subtle Design (Discrete)	-	=	-	
Informative	=	=	=	
Uses Gamification and Nudge Theory	-	=	=	
No False Triggers	-	-	-	
Create awareness to the user	=	-	-	
Be able to be worn everyday	-	-	-	
+ - =	+ 0 - 4 = 3	+ 0 - 3 = 4	+ 0 - 4 = 3	

Figure 35, Datum Evaluation 1

Design Direction

From the matrix it was clear Concept 4 was the leading solution. As the Datum, Concept 4 was used to compare against the other designs. All other concepts had more than one negative point against the PDS.

The wearable route is shown to be the most Effective. Development of this concept continues into the 'develop section'.

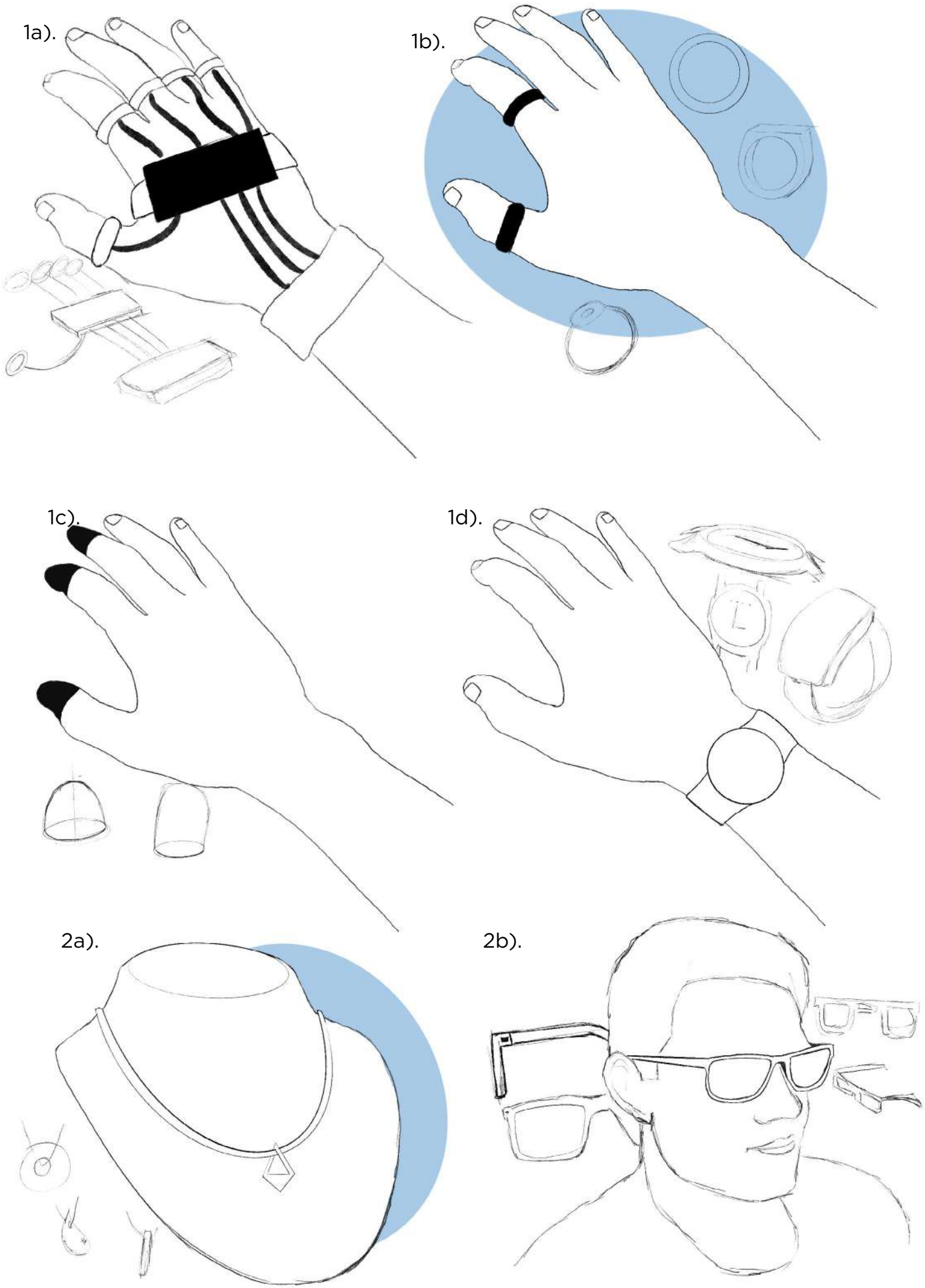


Figure 36, Wearable Ideation

4.0 DEVELOP

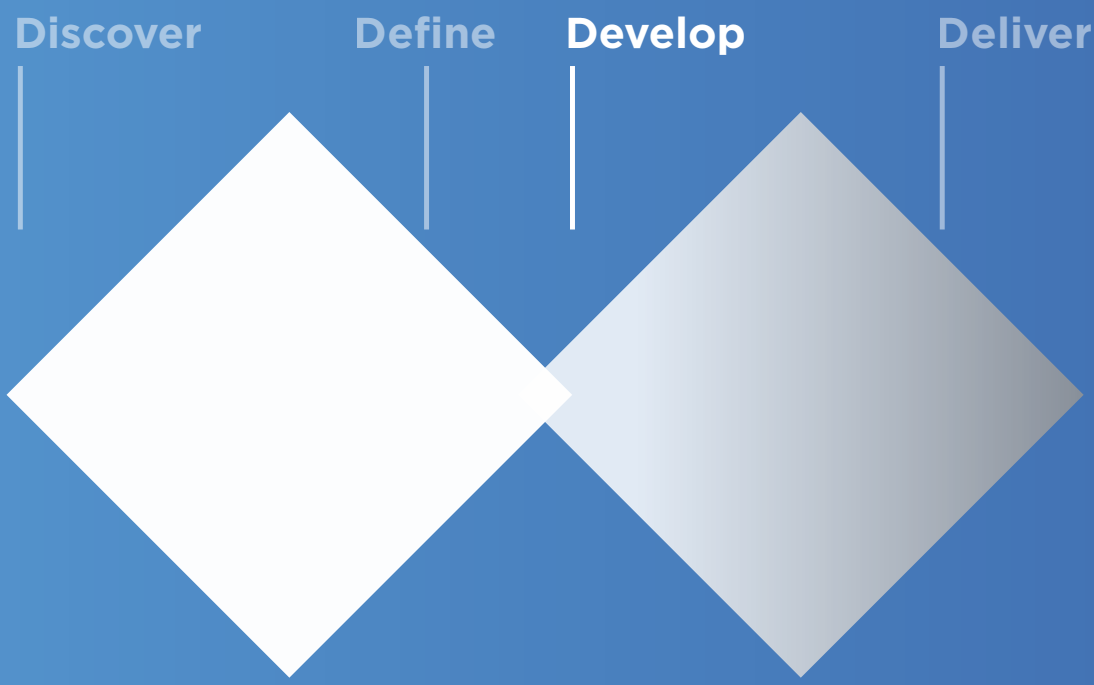


Figure 37, Double Diamond Develop

4.1 Aims

From primary and secondary research in conjunction with analysis the project has been narrowed down. The aim of the study is to help individuals manage their BFRBs. Through applying **gamification** and the use of **nudge theory** to create awareness for **self monitoring** as a way of reducing the urges felt by the individuals. This will be done via a physical wearable **product** and supported by an **application**.

Product Features:

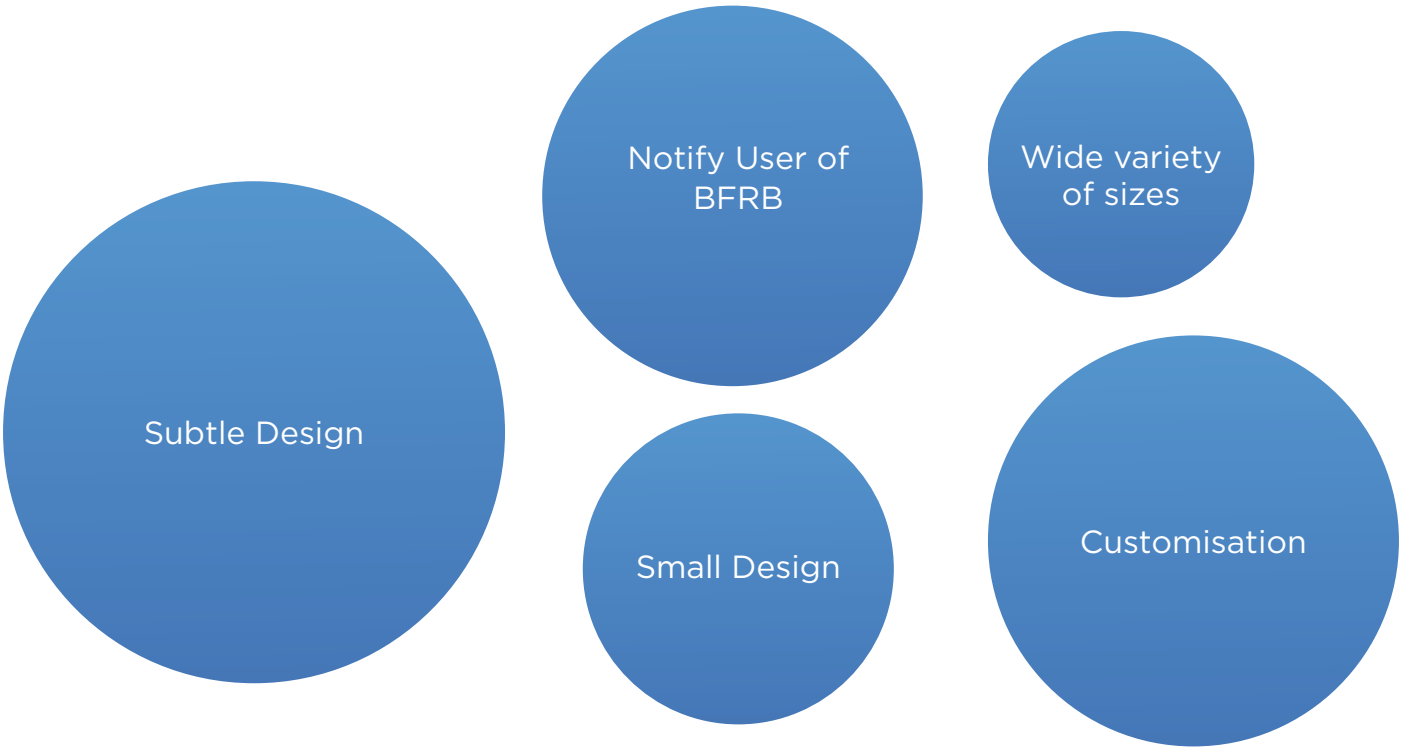


Figure 38, Product Features

App Features:

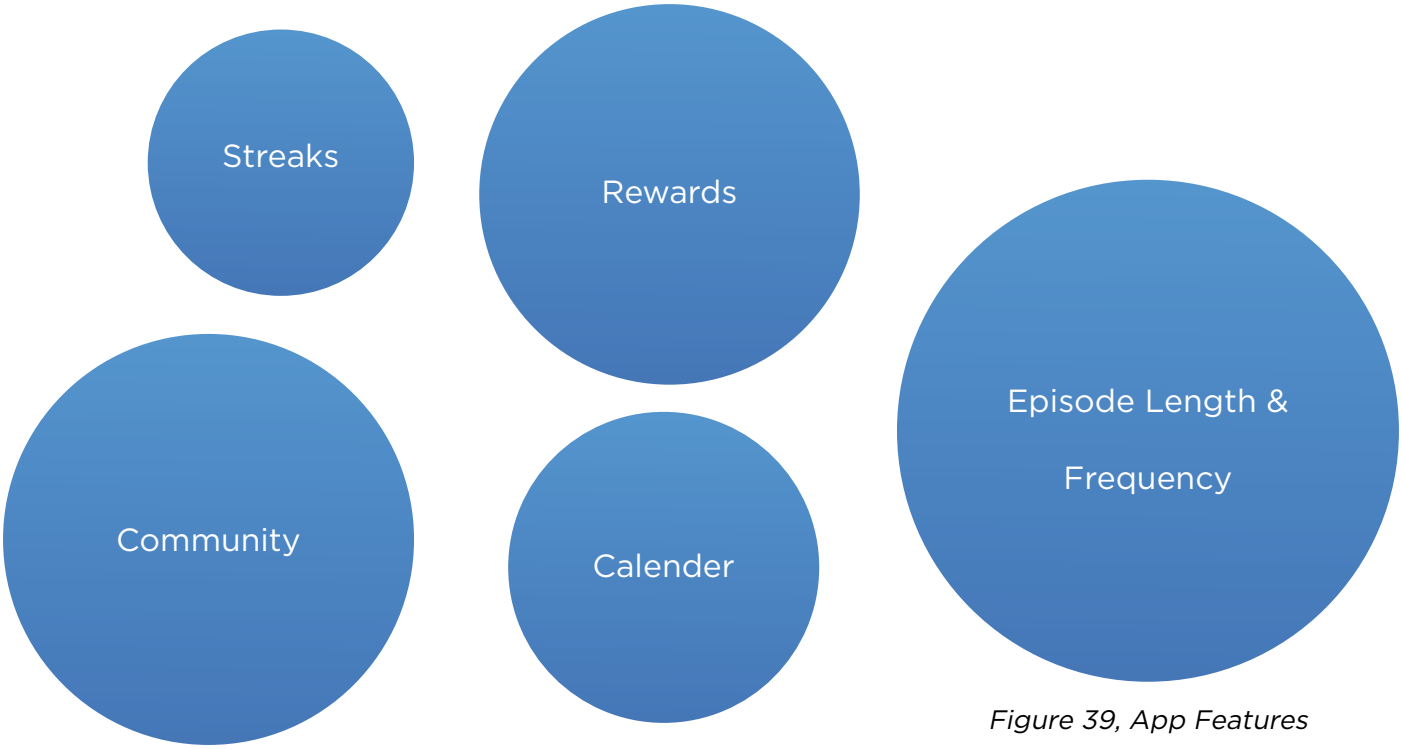


Figure 39, App Features

4.2 Revised Product Design Specification

1.0 Function

1.1 Create self awareness to the action of BFRBs
1.2 Have a battery life that lasts the week
1.3 Not draw attention to the user when using the product
1.4 Communicate to the user patterns
1.5 Give the user an idea of how much the behaviour occurs with details of when and for how long for (in the app)
1.6 Be able to help calm the user
1.7 Show real, live data
1.8 Give the user an area to add emotions
1.9 Include a calender
1.10 Support with motivational quotes
1.11 Give the user a place to share their experience with a community
1.12 Give the user virtual rewards which can motivate them to collect them
1.13 Allow the users to connect with professionals
1.14 Be customisable

2.0 Performance

2.1 Must notify the user to the action of the BFRB
2.2 Not go off unintentionally
2.3 Must connect to an application
2.4 Must be simple and easy to use
2.5 Must be rechargeable
2.6 Must be electric
2.7 Be used everyday
2.8 Must be stylish
2.9 Feel premium
2.10 Reliable application
2.11 Can push notifications to encourage or warn the user of an episode
2.12 Work with CBT offered by the NHS

3.0 Human Factors

3.1 Intended user - 18-25 year old students
3.2 Be able to fit both males and females
3.3 Designed to fit lower 5th percentile and upper 95th percentile
3.4 Simple to put on and take off
3.5 Simple interactions, on/off the other information will be sent to the application
3.6 Tell user when the action is taking place
3.7 Easy to see or feel the notification
3.8 As few buttons as possible
3.9 Charging must be easy

4.0 Environment

4.1 Be able to be worn around during everyday life
4.2 Used in temperatures of -10ºC - 60ºC
4.3 Be used in conjunction with an application
4.4 Rain and dust proof
4.5 Must still work after experiencing -20ºC -75ºC

5.0 Size and Weight

5.1 Must be able to be worn

5.2 Must be discrete
5.3 Must be lightweight
5.4 Not over 100 grams (total)
5.5 Premium weight (heavy for the size)
5.6 Mobile application to fit on IOS phones

6.0 Service Life

6.1 Last for at least 10 year period
6.2 Repairable by authorised centre
6.3 Application to be supported until the discontinuation of the product or until a successor (product or app)

7.0 Sustainability Strategy

7.1 Must be able to taken apart for recycling at the products end of life
7.2 Not use any harmful electronics or elements
7.3 Minimise materials which cause social unrest in the world
7.4 Maximise materials from recycled electronics
7.5 Battery life must last over 1500 cycles

8.0 Quality & Safety

8.1 Must follow regulation with ISO 9001 quality
8.2 Must be able to be used daily for 10 years without failure
8.3 No small parts which could be easily removed and swallowed
8.4 Must be suitable for users over the age of 18 (product & app)

9.0 Market Price

9.1 RRP between £100-£175
9.2 There should be a 4 times increase from manufacturing cost
9.3 App should be free on the App Store
9.4 Premium features in the app must be paid for monthly
9.5 Monthly subscription costs of £5-£15 a month

10.0 Standards and Legislations

10.1 Comply with BSI
10.2 Follow CE mark standards
10.3 Follow UKAC standards
10.4 Comply with RoHS
10.5 Comply with the WEEE directive

11.0 Product Maintenance

11.1 IP65 water and dust proof rating for cleaning

12.0 Materials

12.1 Non-toxic polymer
12.2 BPA Free
12.3 Can not be brittle
12.4 Premium materials
12.5 Must be resilient

13.0 Manufacturing

13.1 Injection moulded
13.2 CNC machined or turned
13.3 Mass manufacturable, no batch production methods

Figure 40, PDS. For the first PDS see appendix A

4.3 Concept Selection

Another datum matrix was used to identify the best concept to progress into the development segment of the Double Diamond. In this case all concepts are paired with an app, this is to allow the wearable tracker to communicate to the user.

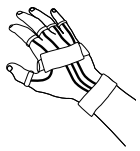
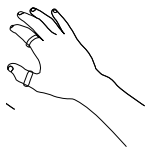
Design Requirement form the PRS	Concept 1 	Concept 2 	Concept 3 	Concept 4 	Concept 5 
Can track fingers	-	-	+	DATUM	-
Subtle Design (Discrete)	=	=	-		-
Unisex	=	=	=		=
Simple to use	+	=	=		=
No False Triggers	+	=	=		=
Be able to be worn everyday	=	=	-		-
+ 2 - 1 = 3	+ 2 - 1 = 3	+ 0 - 1 = 5	+ 1 - 2 = 3		+ 0 - 3 = 3

Figure 41, Datum Evaluation 2

From the matrix, the datum is the strongest design. However, there are other concepts which have some strengths compared to the datum. Concept 1, has the ability to reduce false alarms. This would work by only triggering the datum to start tracking when Concept 1 is close to the device. This will reduce the false triggers and create a better user experience.

Figure 42, Concept 4 (Datum)

Figure 43, Concept 1

4.4 Industry Review Evening Evaluation

The IRE was a chance to demonstrate to industry experts the design idea and the current concepts. Feedback was given which helped the design decisions later in the development process. Key feedback from the evening included:

"Make sure that customisation is possible. Maybe try adding to the design, accessories that the user could buy after."

Industry Expert 1

"Track treatments and medication taken as well as BFRBs"

Industry Expert 2

"Design with cost in mind, making lots of rings will be expensive at this scale of miniaturisation"

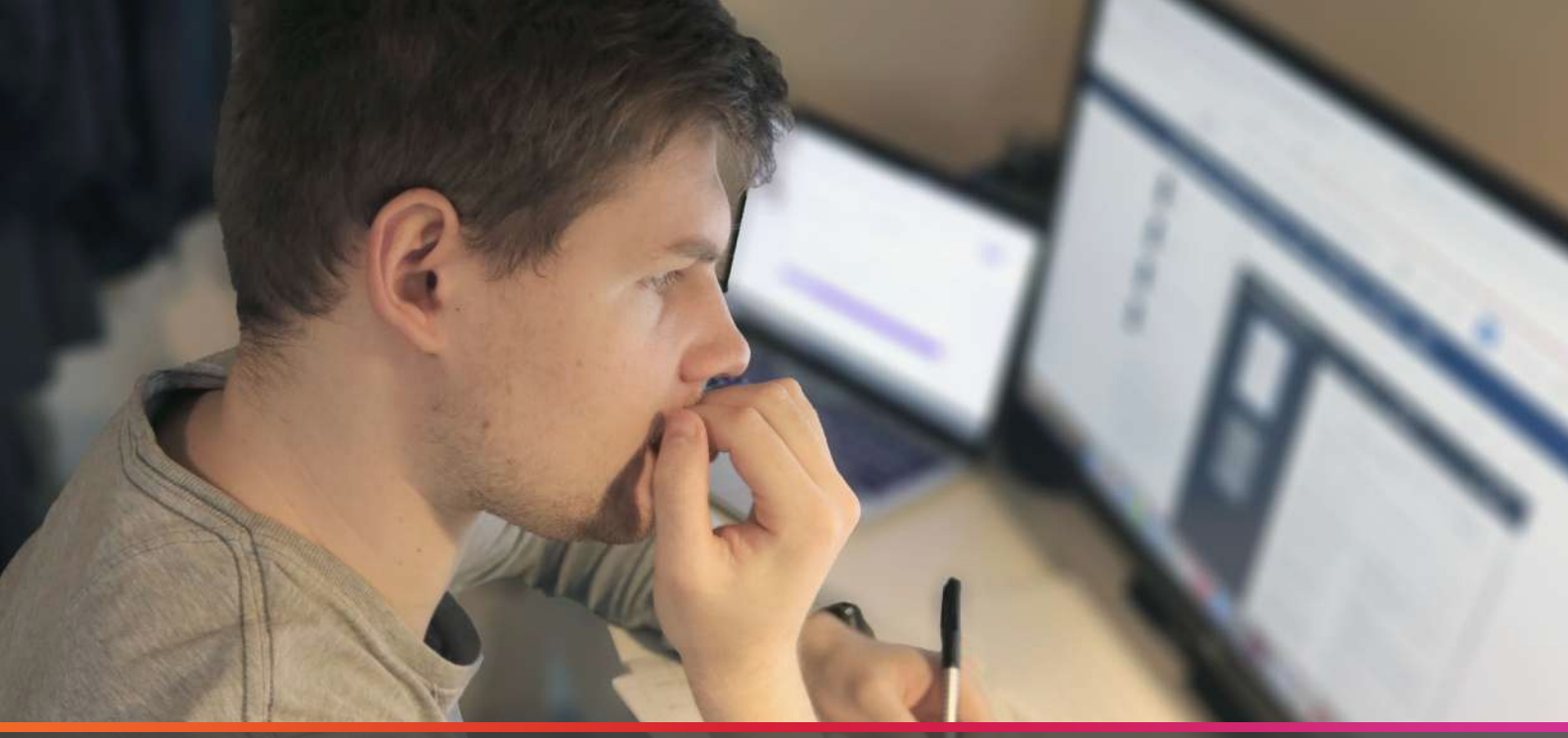
Industry Expert 3

"Use Period Tracking apps for inspiration of data visualisation"

Industry Expert 4

"Small coin cell motors or buzzers with metal parts could save space in the design and therefore reduce the size of the ring"

Industry Expert 5



BFRB MANAGEMENT

USING AN APPLICATION AND A SMART WEARABLE TO CREATE SELF-AWARENESS OF BFRBS

A Body Focused Repetitive Behaviour, (BFRBs) is when an individual experiences intense urges to pull, pick or bite hair, skin or nails. This can have a number of triggers, one of which being stress and anxiety of education. Current solutions require the user to input data into an app

KEY FINDINGS

"Reduced self-esteem, and increased avoidance of social situations due to shame and embarrassment"

(Grant et al., 2021)

1 or 2 in 50
have experienced hair pulling
(TLC Foundation for bfrbs, 2021)

2-5%
pick skin
(TLC Foundation for bfrbs, 2021)

1 in 20
could have BFRBs
(TLC Foundation for bfrbs, 2021)

Nail biting effects
20-30%
of people
(TLC Foundation for bfrbs, 2021)

65%
with TTM never get treatment
(Grant & Chamberlain, 2015)

Experienced stress/anxiety at education

Of the stress/anxiety was caused during University

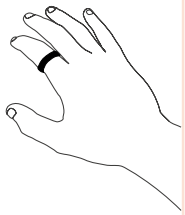
Thought the current solutions didn't work for them

Felt the urges were worse at higher education

INITIAL CONCEPTS

The Ring tracks the movement of the index finger to be more precise than any wrist worn wearable

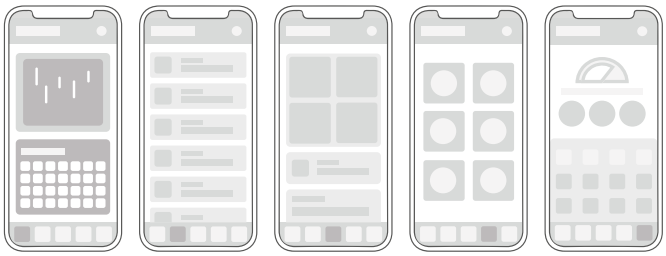
Gamification is used on the ring with 5 small discrete LEDs which light up white for every hour episode free. The aim of this game is to keep 5 lights lit up



The Pendant is connected to the ring to ensure no false triggers are activated; the ring will not trigger a notification without being close to the pendant

By creating the ring and pendant a discrete tracking device can be created to ensure that the user feels comfortable while tracking their BFRB

WIREFRAMES



PROGRESS
Graph and Calender

COMMUNITY
Messaging and post area

HOME PAGE
Dashboard with quick information form other pages

REWARDS
Area to see what goals you have achieved and future ones to go

SUPPORT/RELAX
Help section as well as meditation and calming technique area

Figure 44, IRE Board

4.5 Design Development

4.5.1 Rings

Ideation of ring designs. The three highlighted in blue were chosen as they are inconspicuous, minimal and blend in with other pieces of jewellery.

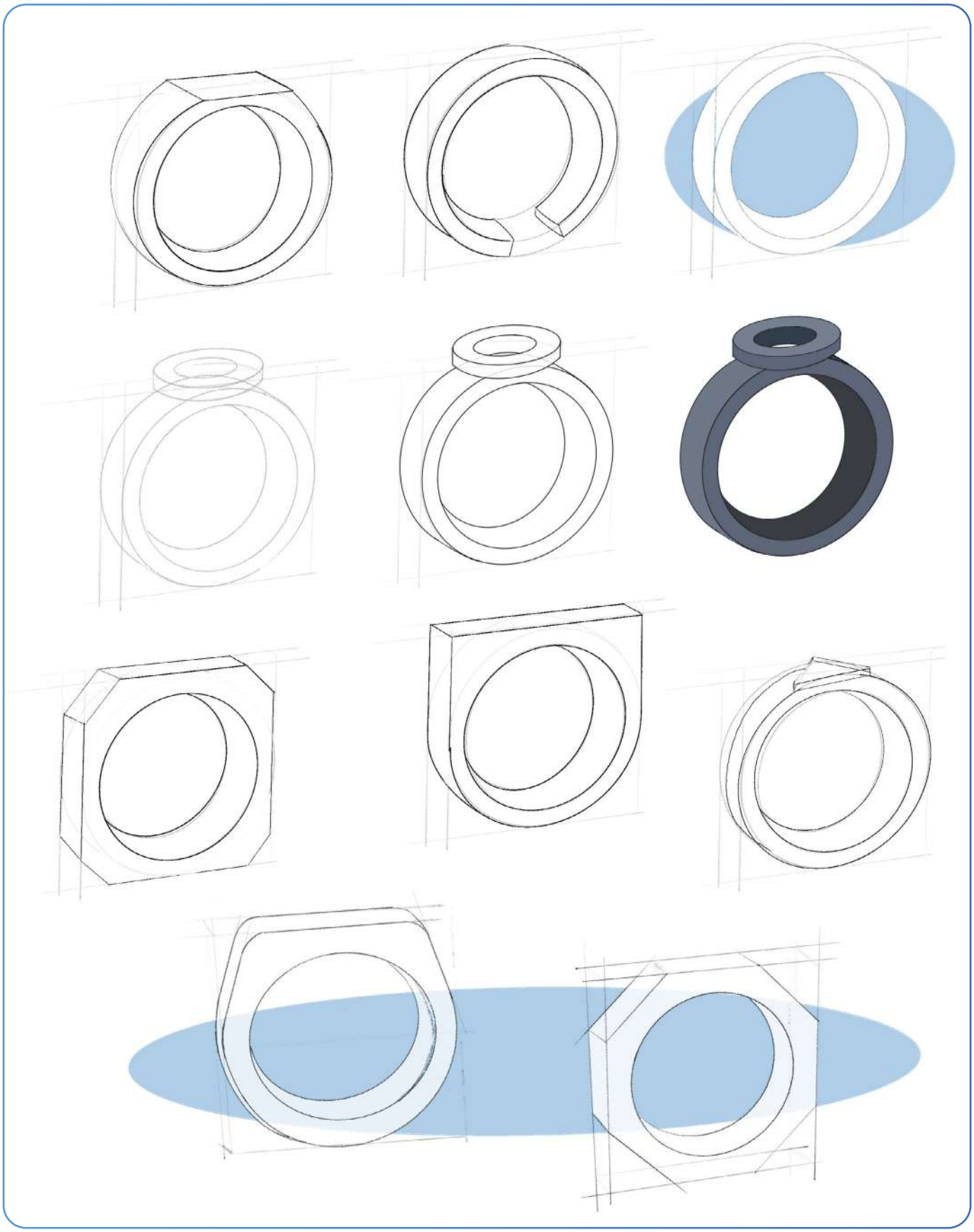


Figure 45, Ring Ideation

Figure 46, Ring Selection

Rapid Prototyping

Text within the blue boxes discusses evaluation of a design and the design decision

Figure 47, 1st Prototype

Once designs had been chosen, the first part of development was to use a FDM 3D Printer. To understand some fundamental parts of the design, in terms of the size and scale of the parts.

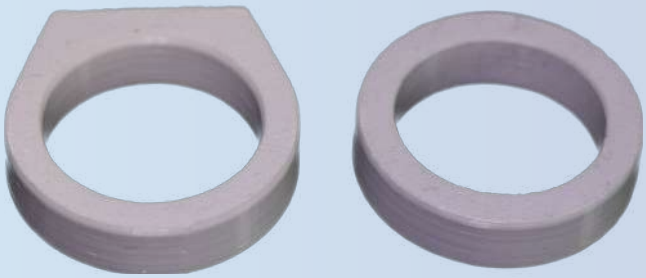


Figure 48, 2nd Prototype

It was clear from the first 3D prints that the design was far too slim to include any Electronics. Therefore the CAD was altered to show the thicker design required by the constraints of the haptic motor.

Figure 49, Ring prototypes

It was important that as part of the design from the PDS and the feedback, there had to be an option for customisability. To reduce the cost of manufacturing and give users the option to change up the look of their Rewire ring. The outside was designed to become a modular part which can be easily swapped for a different look. Not only does this allow the user to customise the ring, only one part of the electronics has to be produced. Therefore, saving money in the production costs. This figure 49 shows the inner part (electronics), and the outer part in three different designs.

Multiple sizes would be required due to the anthropometric data researched in section 2.9. This explains the next iteration of the ring design which was made up from a three-part ring.

This design included both a women's and men's middle Section. Both holding the electronics. The outer section is the customisable part of the ring. The inner section of the ring is an extruded ABS sizing part. Materials selection is detailed in appendix D. This means that the user can create a customised and well fitted ring.

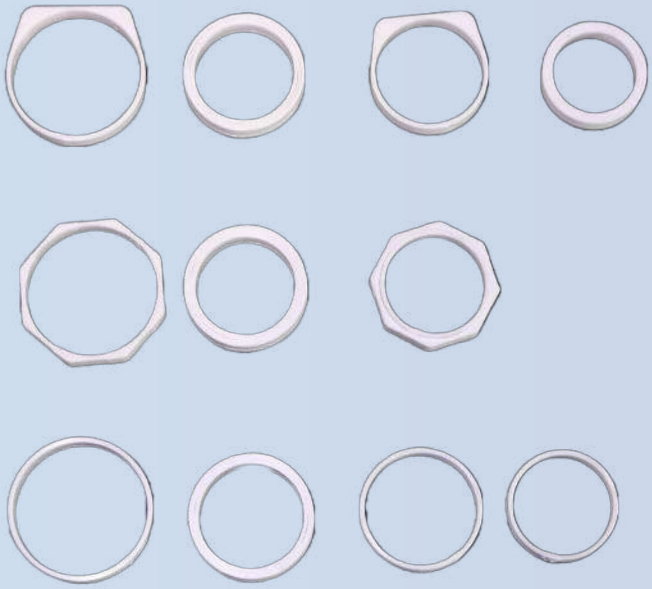


Figure 50, Ring sizing prototyping

Figure 51, 3 part ring size

This three-part design was made with the idea that there will be a male and female design. Primarily this is due to large differences in the size of male and female hands, as discussed in the section 2.9. In order for the ring to not look oversized on the women or smaller fingers, the width of the ring was reduced in width from 7mm on the larger ring to 5mm for the smaller ring.

Figure 52, Final Ring design print

After careful consideration on the overall size of the ring, it was important to 3D print and assess the overall dimensions of the ring. Both ring sizes feature the same three designs.

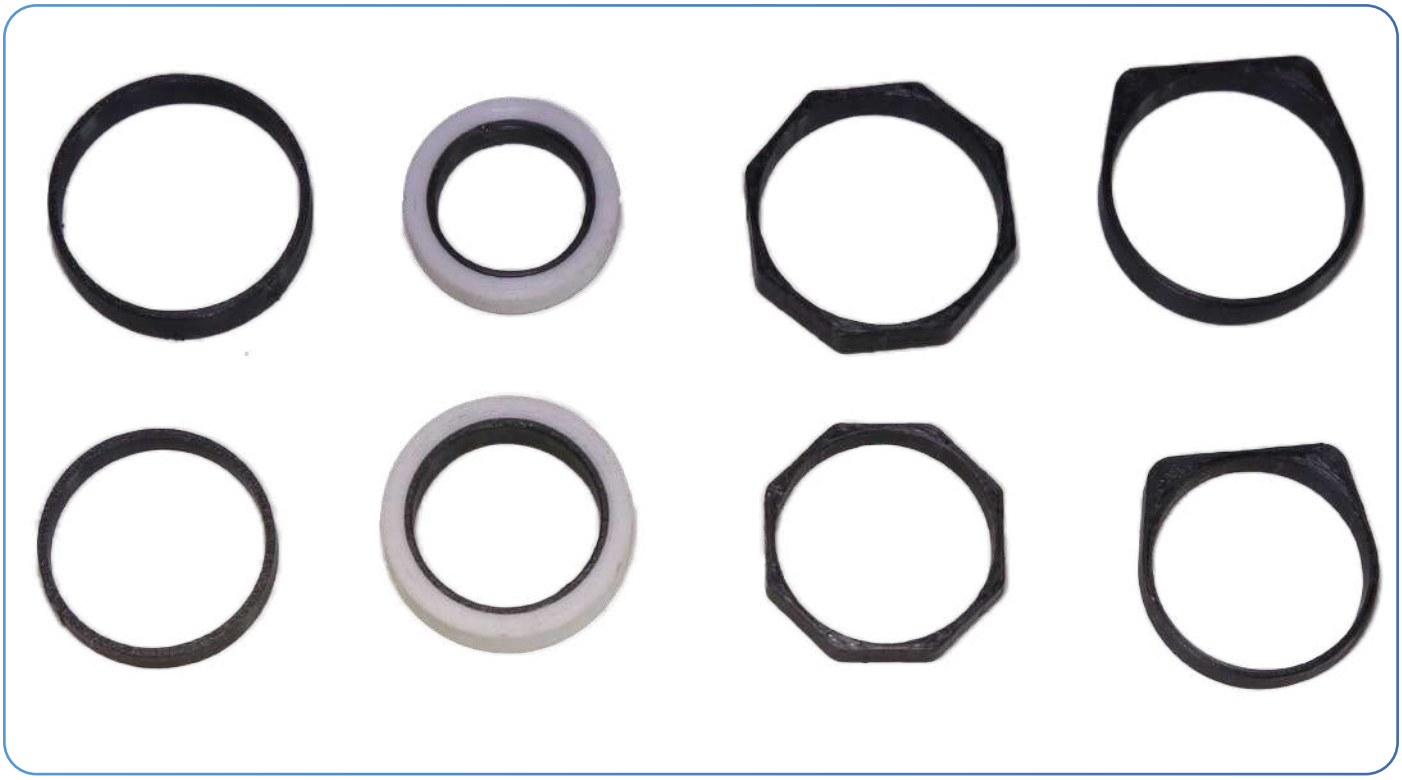


Figure 53, Final design with all parts

The white middle section holds all the sensors, electronics and the haptic motor.

4.5.2 Pendant

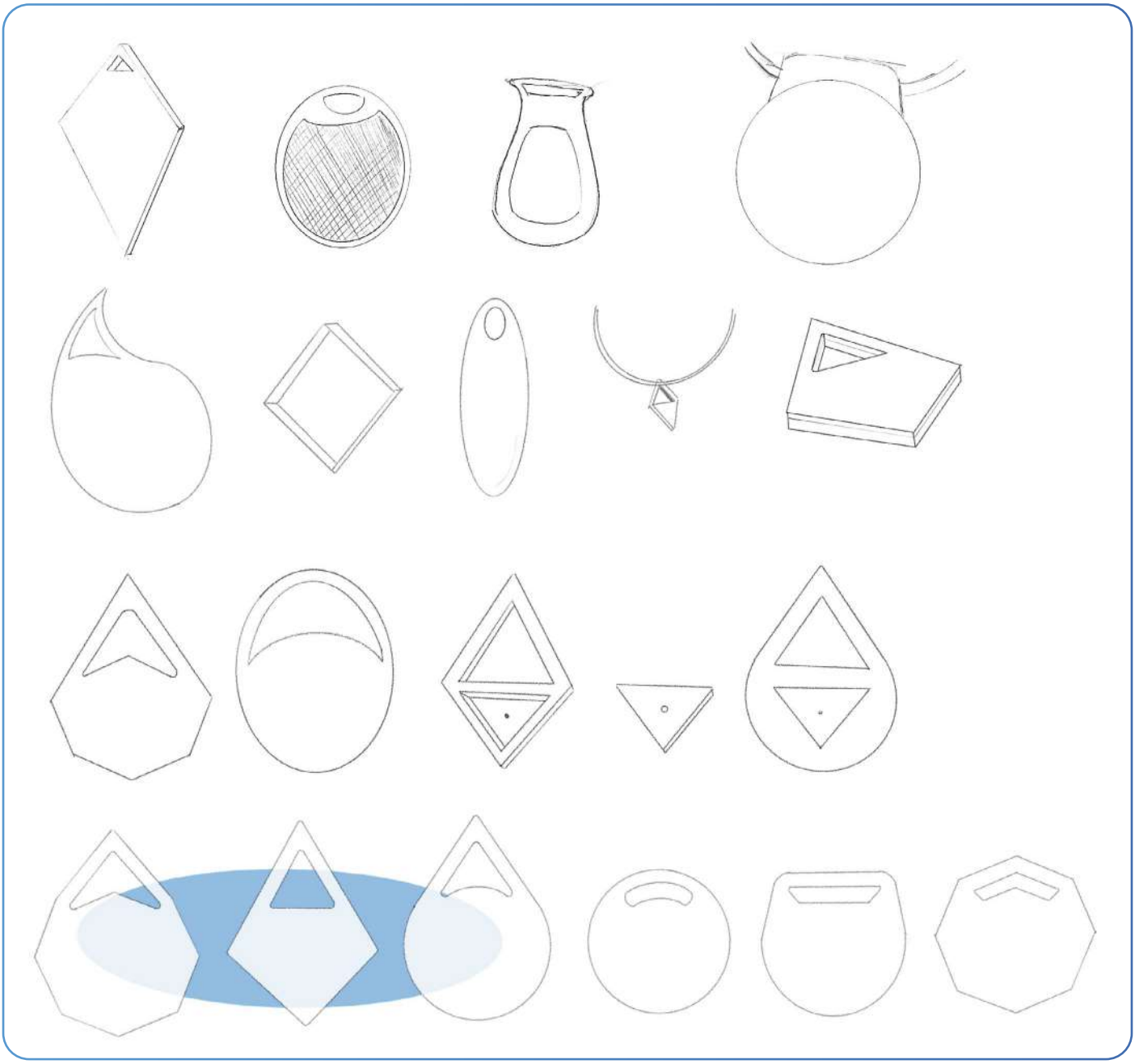


Figure 54, Pendant ideation

Figure 55, 1st prototype

Figure 56, Ideation print

The pendant device will be a passive device only holding an RFID Tag. This keeps the pendant thin. The design started out with ideation which allowed for different designs quickly. The highlighted designs were then chosen to be developed further after some physical prototypes were printed to better understand the size of the concepts.

Rapid Prototyping

Figure 57, Final Design Prototype

This was used to confirm the overall size and shape. Each of the designs represent the three rings. Users can match the pendant to the ring or even choose to alter the combination.

Fitting the RFID Tag

Fitting the RFID coil into the pendants while trying to keep the pendants customisable lead to the design of the tags being removable. These can be inserted into other pendant shapes.

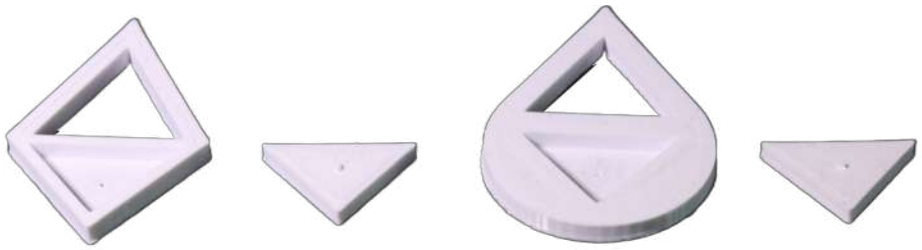


Figure 58, RFID Prototypes

However, would become fiddly and be a part which could easily be lost.

Altering the design to include the RFID coil inside each pendant keeps the product all in one piece.

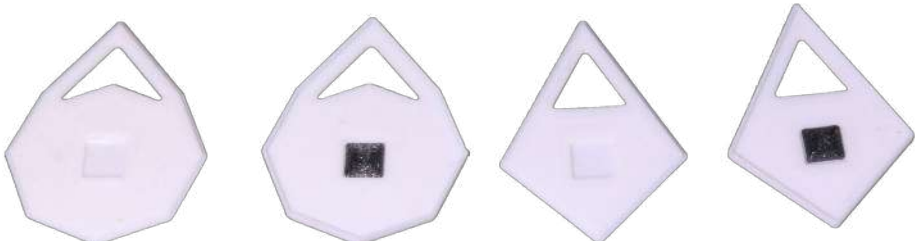


Figure 59, 2nd RFID Prototype

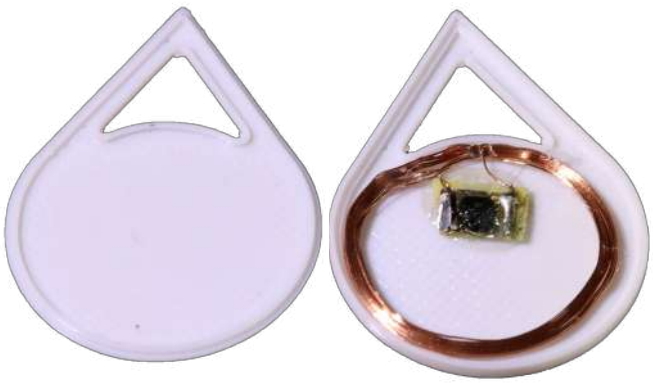


Figure 60, Final Prototype

The final iteration of the pendant included adding the RFID coil within the Design. This allowed space for the chip and the copper coil.

4.5.3 Charger

Creating the charger to be easily used was crucial as part of the human factors in the PDS. The same design process as the ring and the pendant was used to find the right Design. The unique challenge of trying to create one charger for all sizes required many different concepts.

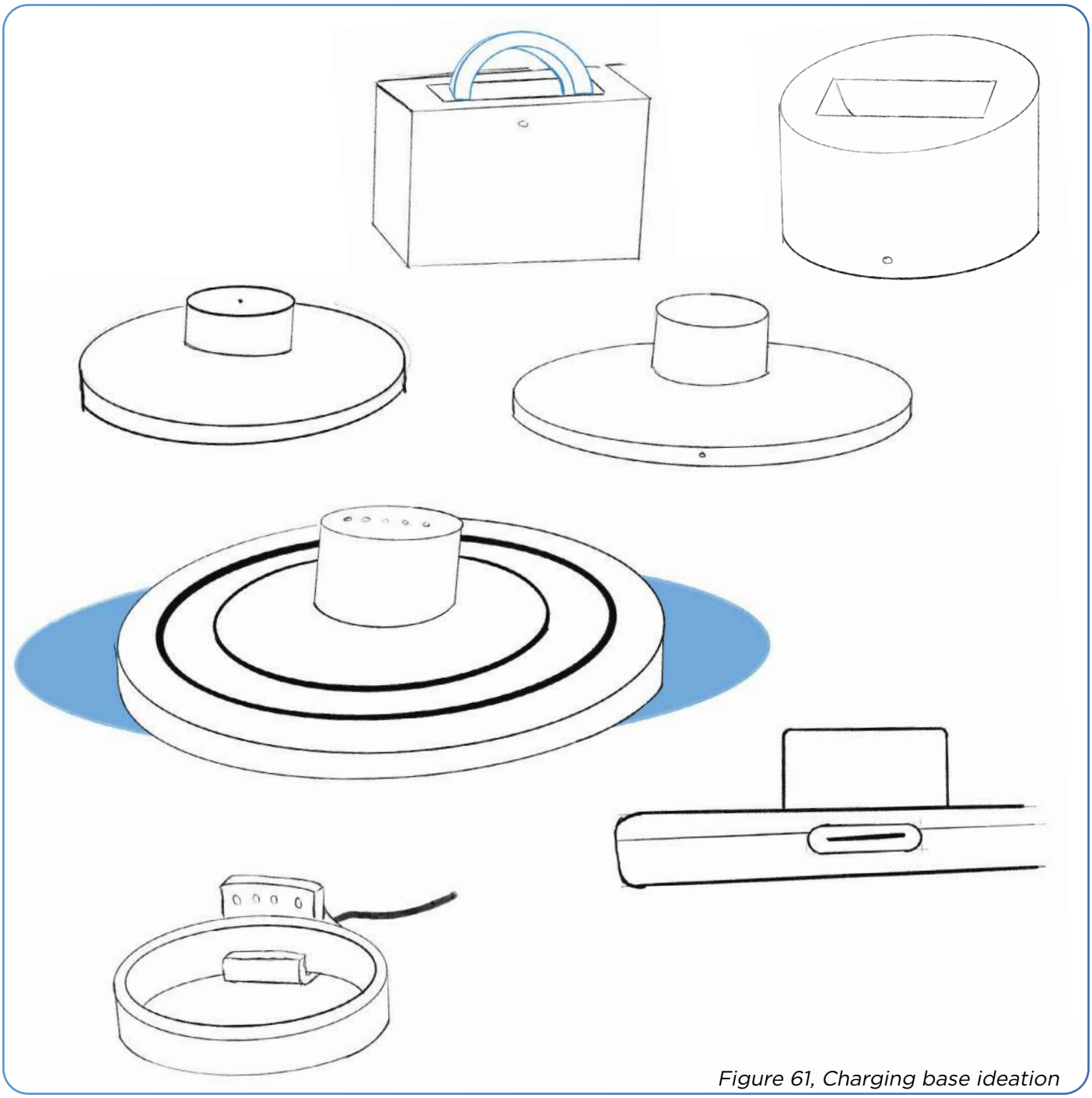


Figure 61, Charging base ideation

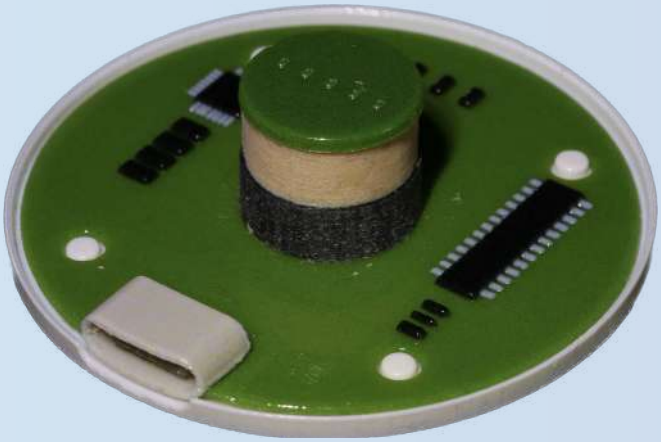
The first iteration was printed. However, it did not fit other sized rings. It also felt too small for users to be able to use comfortably. Feedback from users said that it failed to be informative enough with only one LED.

Figure 62, 1st Prototype

After the feedback a new iteration of the design was created and 3D printed. This includes 5 LEDs to give a clearer charging status.

It also featured a larger design which could be used with both the small and large rings in all sizes.

Figure 63, Charging base, J850 print



On the inside of the charging station, the coil in the centre of the PCB uses wireless technology. The USB-C port follows EU directives and legislations, which need to be achieved as part of the PDS.

Figure 64, Printed Circuit board

Figure 65, Final design with ring

4.5.4 CMF

Once the designs of the rings were completed the CMF needed to be chosen. Rewire is a premium product that matches current jewellery styles. Metals are used to provide quality and realism of jewellery. Taking inspiration from the moodboard, certain CMF kept coming up.

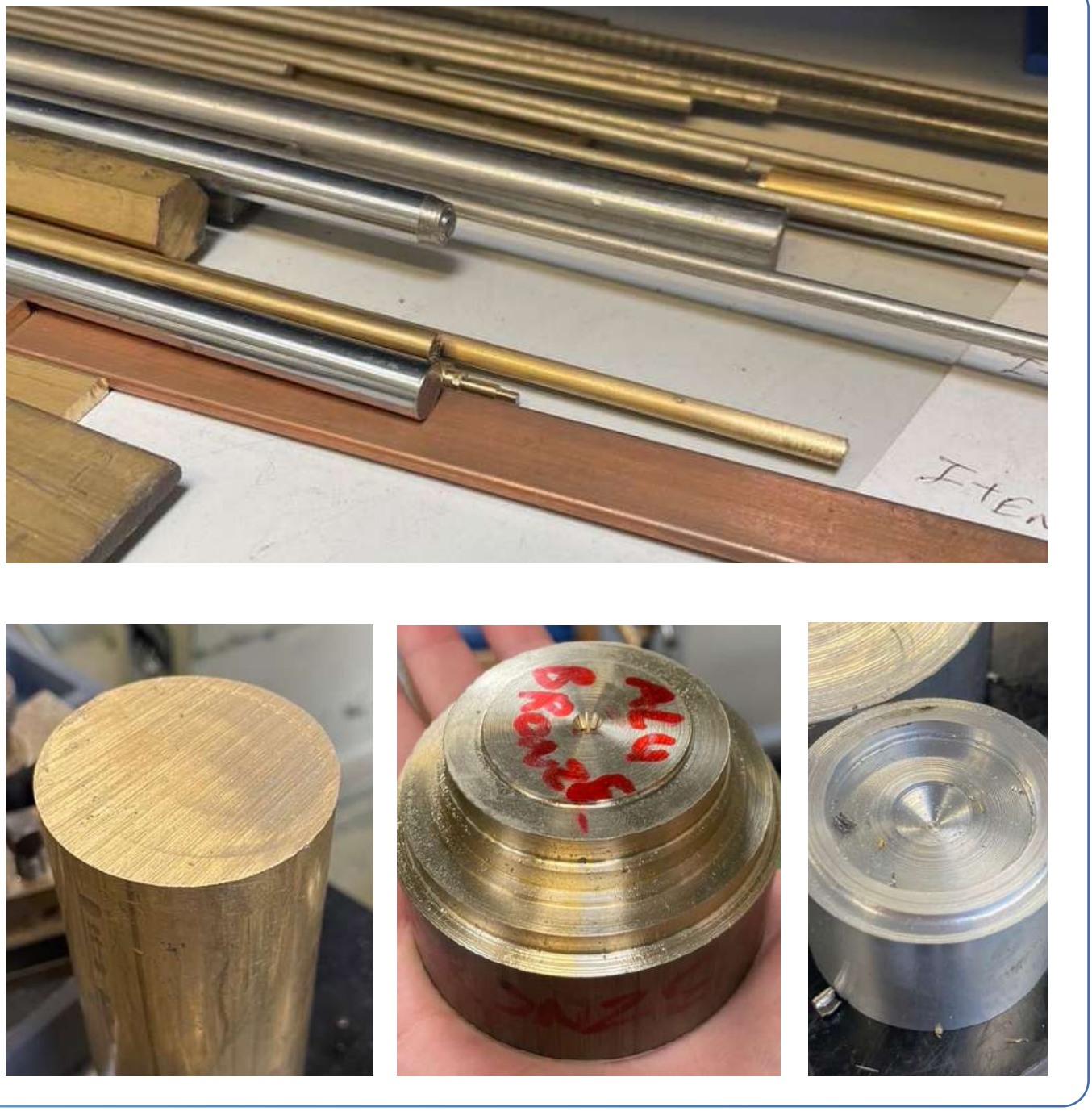


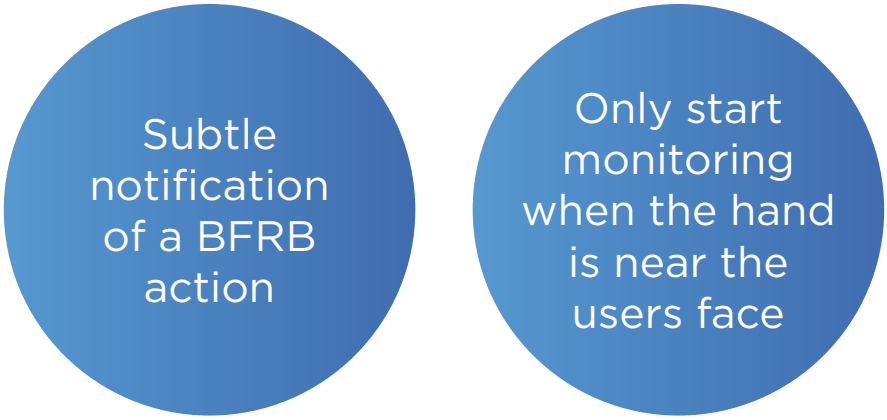
Figure 66, Metal inspiration

Materials used included brass to match with gold jewellery and aluminium for silver. A budget option of an ABS outer shell would be finished in either matte white or matte black.

4.6 Proof of Concept

To show how the product would work a PoC (proof of concept) was create. This is an example of how the product would work in a basic format. With a PoC the size of the product is not representative of the final product, as well as some of the technologies used to create the PoC may be different.

The PoC needed to show several key features that the real product would have, these included:



There would be features that the PoC could not achieve due to limitations of cost, part availability and complexity. These features include:

PoC - Components

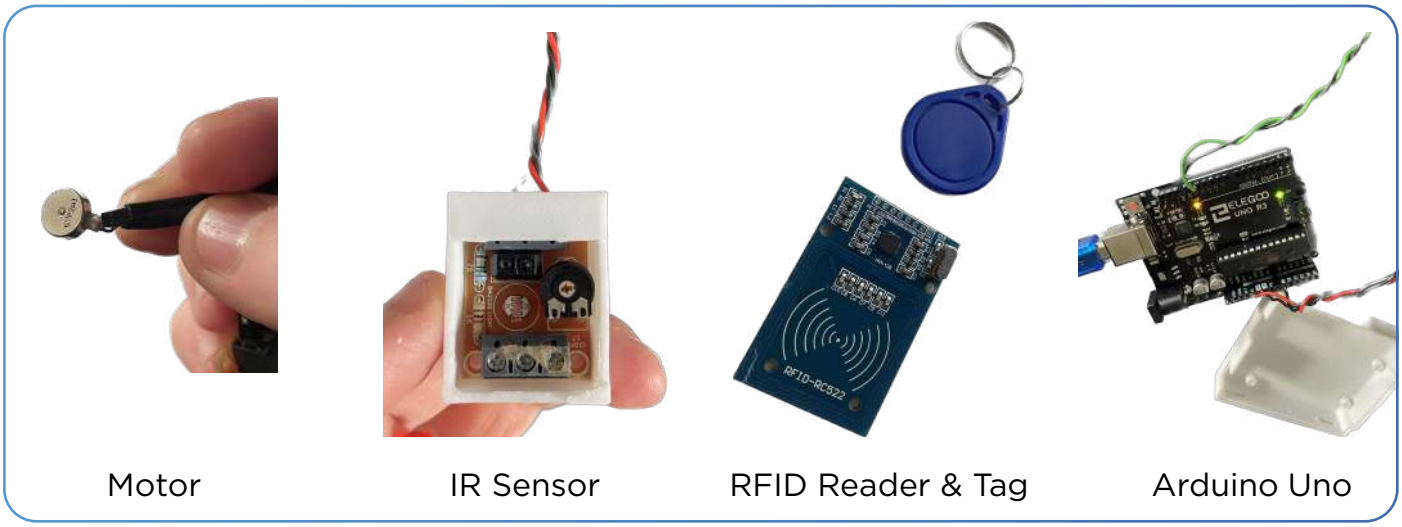


Figure 67, Components

Wiring diagram

The wiring diagram in figure 68, demonstrates the electronics to allow for the code to work correctly. In this example the motor is not required to have a motor driver as it works off 5V power.

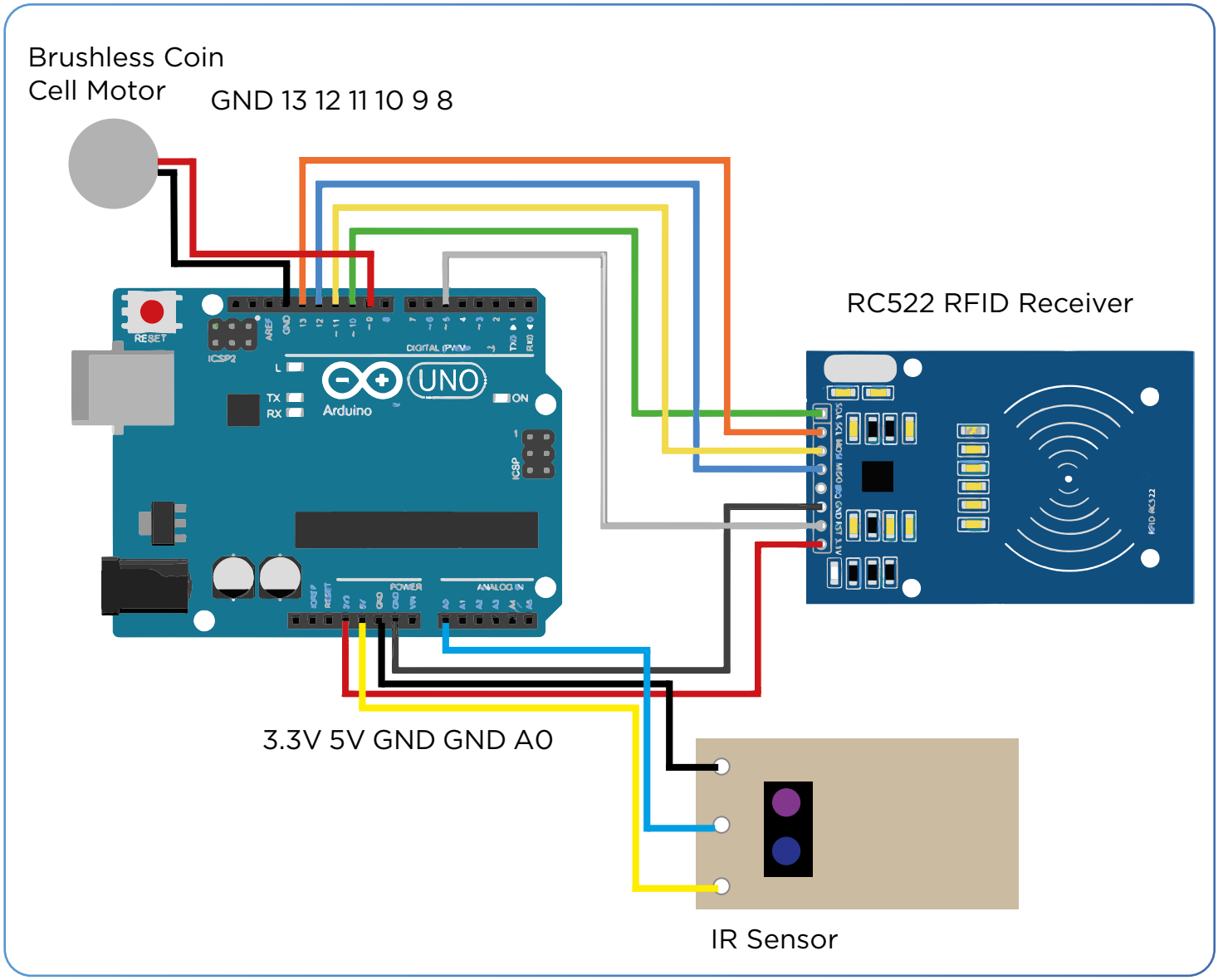


Figure 68, Wiring diagram

System Diagram

Flow chart to show how the code behaves for the PoC.

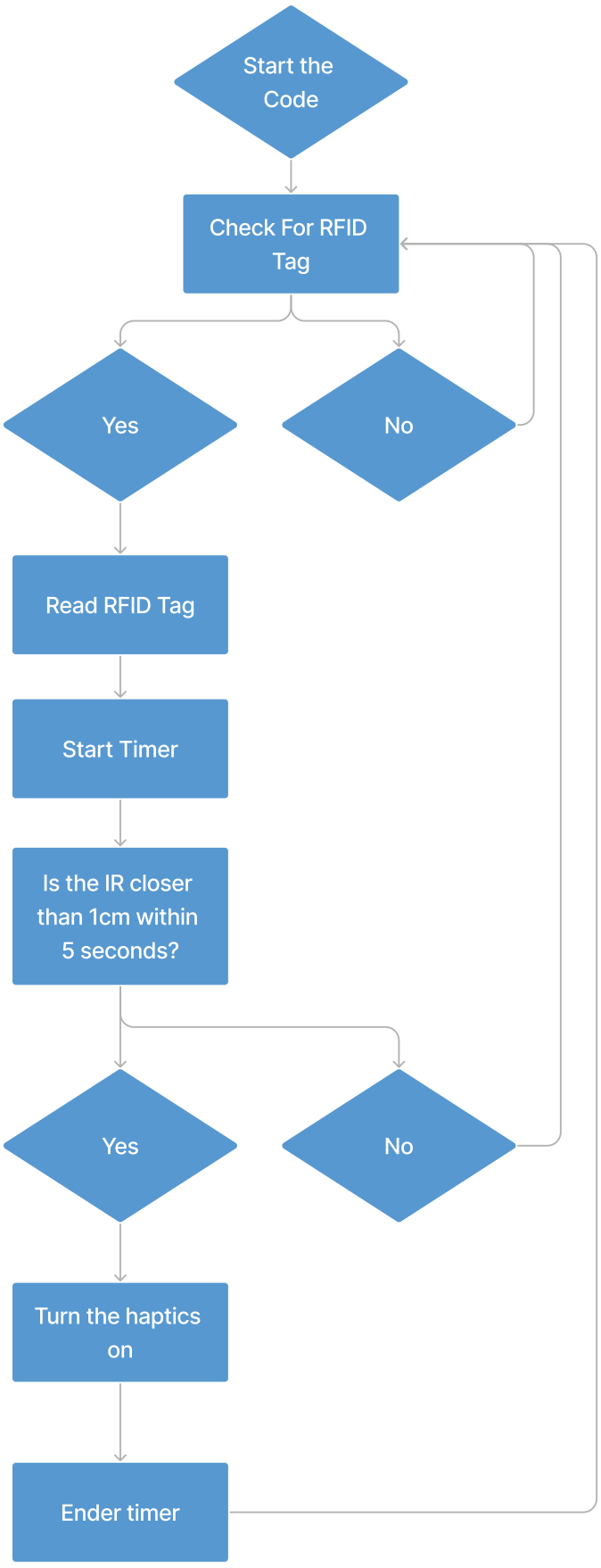


Figure 69, Flow Chart

PoC - Code

```
#include <MFRC522.h> // include the MFRC522 RFID reader library
#include <SPI.h> // include the SPI library

#define SS_PIN 10
#define RST_PIN 9

const int IR_sensor_pin = A0; // set the IR sensor pin to analog pin A0
const int LED_pin = 8; // set the LED pin to digital pin 8

MFRC522 rfid(SS_PIN, RST_PIN);

void setup() {
  pinMode(IR_sensor_pin, INPUT); // set the IR sensor pin to input
  pinMode(LED_pin, OUTPUT); // set the LED pin to output

  SPI.begin(); // initialize the SPI bus
  rfid.PCD_Init(); // initialize the MFRC522 RFID reader module
  Serial.begin(9600); // initialize the serial communication
}

void loop() {
  bool tagDetected = false;

  if (rfid.PICC_IsNewCardPresent() && rfid.PICC_ReadCardSerial()) { // if a new RFID tag is detected
    Serial.print("Tag UID: ");
    for (byte i = 0; i < rfid.uid.size; i++) { // print the tag's UID (unique identifier)
      Serial.print(rfid.uid.uidByte[i] < 0x10 ? " 0" : " ");
      Serial.print(rfid.uid.uidByte[i], HEX);
    }
    Serial.println();

    tagDetected = true;
  }

  if (tagDetected) { // if RFID tag is detected
    unsigned long startTime = millis(); // record the start time of detecting RFID tag

    while (millis() - startTime <= 10000) { // continue running the IR sensor for 10 seconds
      int distance = analogRead(IR_sensor_pin); // read the analog value from the IR sensor
      distance = map(distance, 0, 1023, 0, 5); // convert the analog value to a distance in cm

      if (distance <= 1) { // if the distance is less than or equal to 1cm
        digitalWrite(LED_pin, LOW); // turn on the LED
      } else {
        digitalWrite(LED_pin, HIGH); // turn off the LED
      }

      delay(100); // wait for 100 milliseconds before reading the IR sensor again
    }
  } else {
    digitalWrite(LED_pin, LOW); // turn off the LED when RFID tag is not detected
  }

  rfid.PICC_HaltA(); // stop communication with the tag
  rfid.PCD_StopCrypto1(); // stop encryption on the RFID reader module
}
```

Figure 70, Code

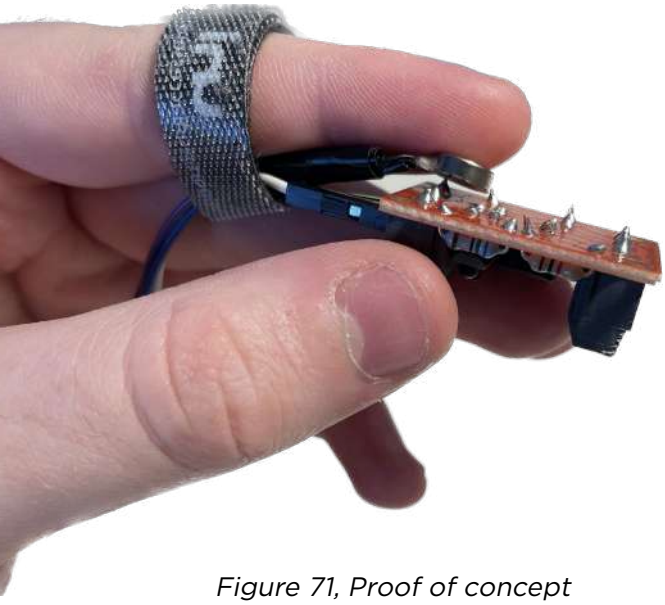


Figure 71, Proof of concept

The IR sensor and the brushless haptic motor are then mounted on the users finger.

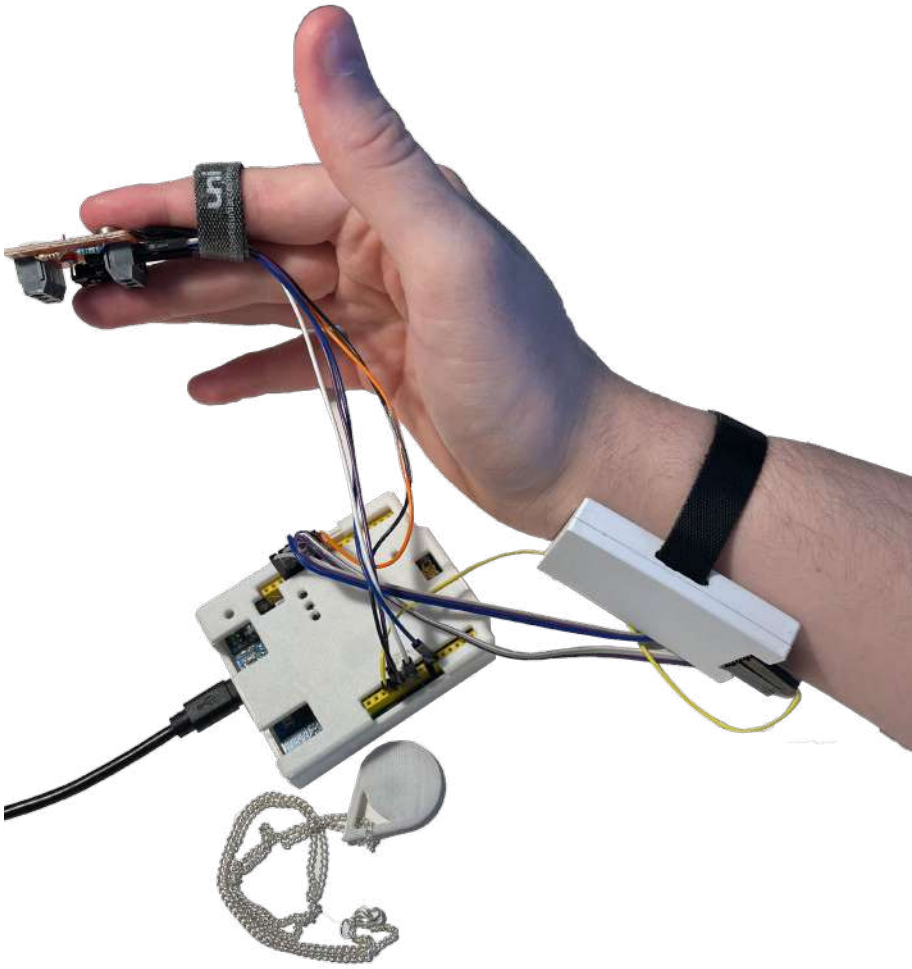


Figure 72, Proof of concept

The ardunio and RFID Tag reader are attached to the wrist.

Figure 73, Proof of concept

The RFID Tag is within the necklace which is worn around the neck of the user.

Figure 74, Proof of concept

4.7 Information Architecture

Information architecture is created to provide an understanding of the features within the app. It also shows the navigation between pages.

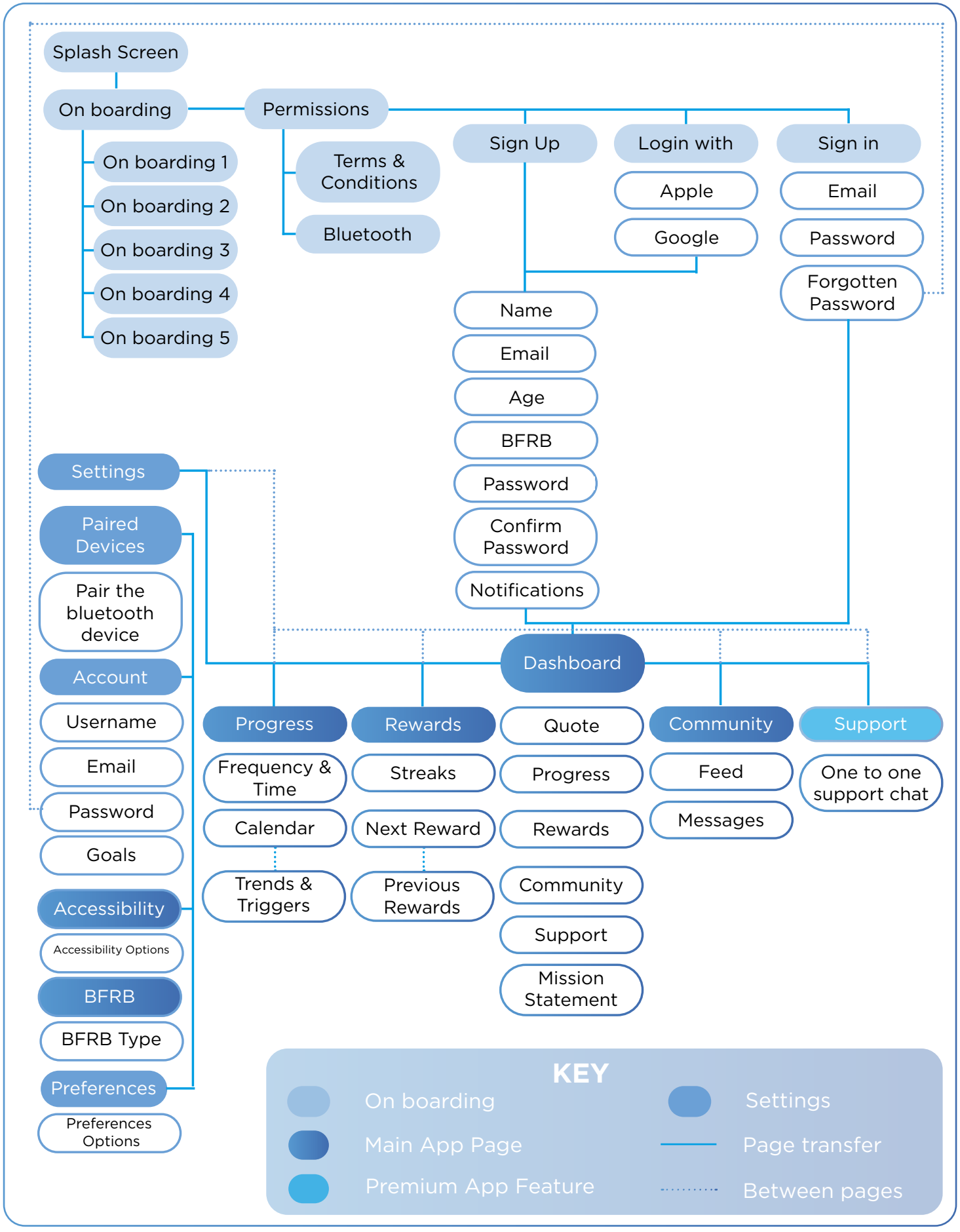


Figure 75, IA

4.8 Low Fidelity Wireframes

To begin the process of the application development low fidelity wireframes were created to be able to brainstorm ideas for the UX/UI.

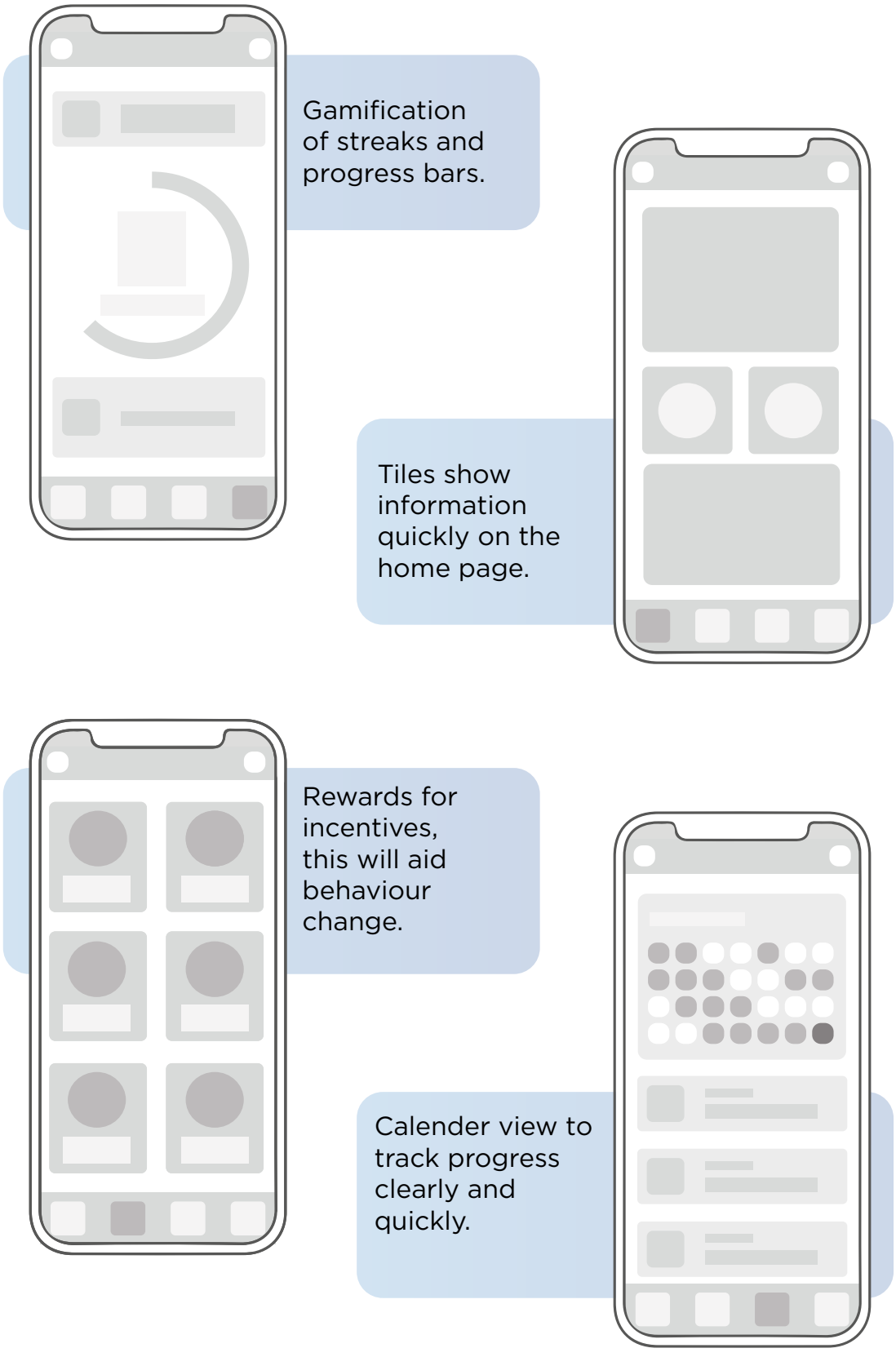
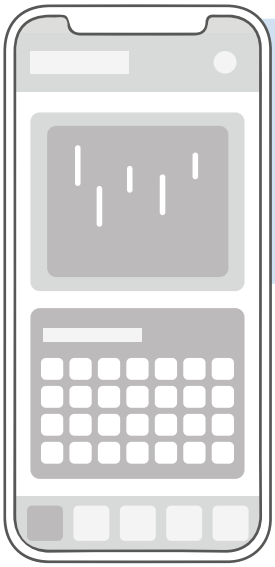


Figure 76, Low Fidelity Wireframes

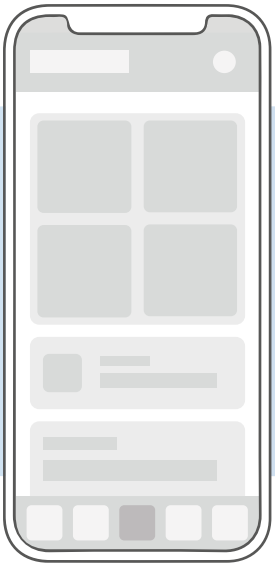


Progress Page

Graphs and Calendar pages are displayed. The tabbed view is used along the bottom of the screen to show where the user currently is.

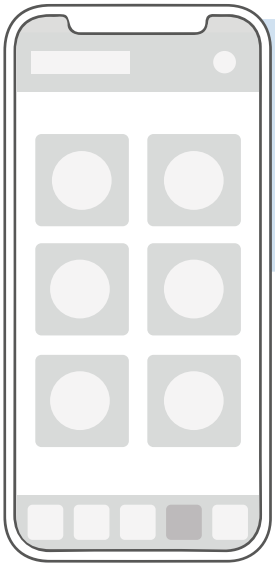
Community Page

Messages between users to help each other provide support.



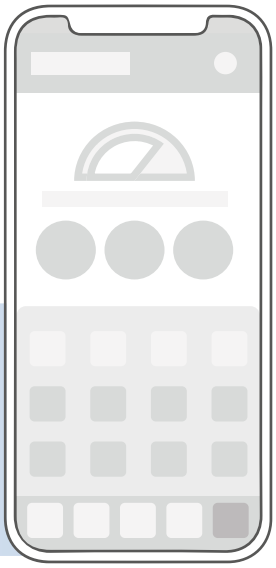
Dashboard

The home screen of the app. This allows the users to see information from other pages at a quick glance.



Relax Page

To allow users to relax if they are feeling particularly stressed.



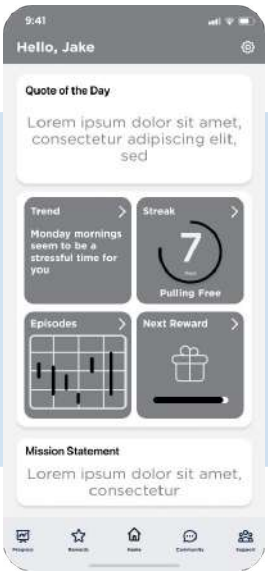
Rewards Page

Gamification of the application. This includes progress bars and rewards to be won.

Figure 77, Low Fidelity Wireframes

4.9 Mid Fidelity Wireframes

Mid Fidelity wireframes allow for evaluation and a better understanding of the content that will be on each page.



Dashboard Page

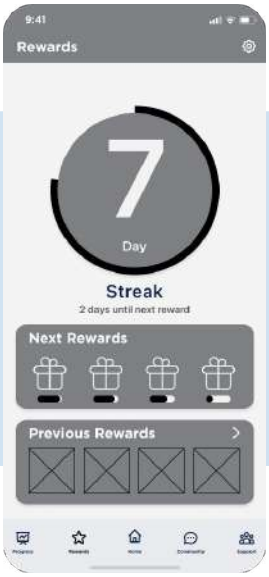
The dashboard is comprised of key information which the user may need to see upon opening the app. Here there is a "Quote of the day" where Rewire will give the user a new motivational quote. Additionally, a quick view tile of the four other pages. Finally a "Mission Statement" which is where the user can tell themselves their motivation or reason for using Rewire.

Progress Page

A graph & calender are displayed to give an overview of the day and the month. More information can be provided with a tap.

Trends

After tapping on one of the tiles a trend will pop up giving the user additional information on the day or trigger.



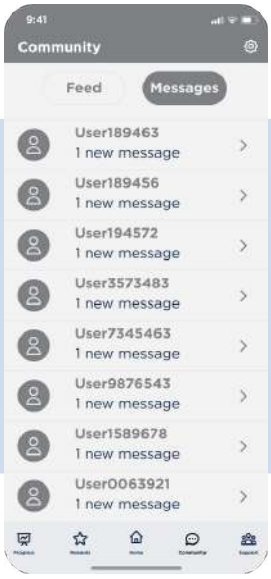
Rewards Page

Area to see what goals the user has achieved and future rewards. Progress bars within the "Next rewards" tile provide gamification to the user and inspires them to work towards their own goal. A large streak is also displayed which provides a nudge and gamification to attempt to push the user into keeping the streak going. Therefore, achieving their goal of stopping the BFRB.

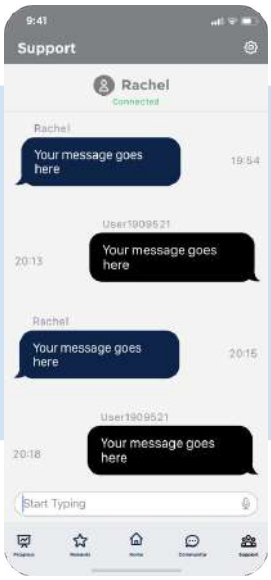
Figure 78, Mid Fidelity Wireframes

Community Page

Within the community page there is public posting, in which users can anonymously share experiences.

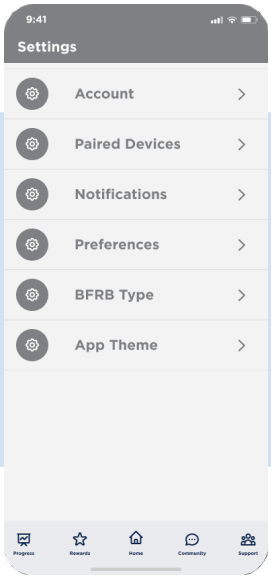


Users can also message each other within the messages tab, this allows users to share their journey.



Support Page

The help section is a place where users can speak to a professional therapist about struggles or progress that they might be having. The feature would allow for one-to-one conversations, allowing the user to share their specific problems. This feature is part of the premium version of the app and would require a subscription payment to unlock.



Settings

Settings page is where all the personal information and other app settings are. Each section has its own individual sub-sections allowing for better organisation and therefore navigation within the app to allow users to take control and personalise the app to their needs.

Figure 79, Mid Fidelity Wireframes

4.10 Prototyping Product and App

To get the prototype ready for online usability testing and other evaluation methods a digital prototype was needed. Users could use it on their own phones and provide feedback.

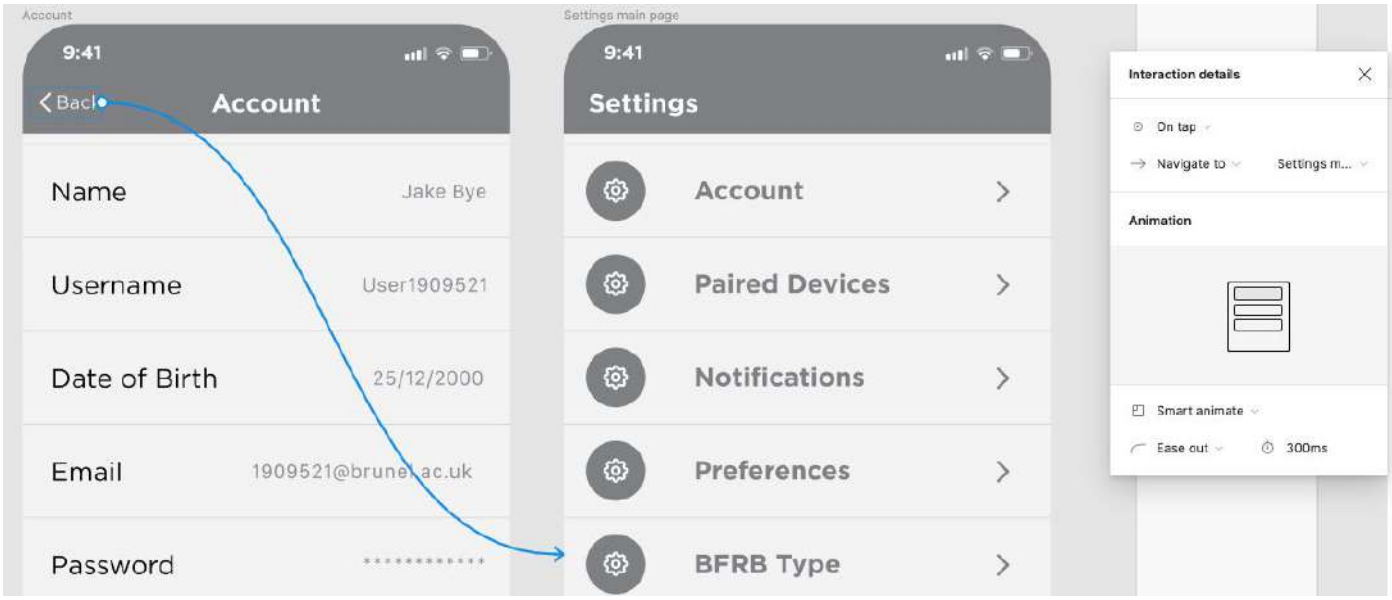


Figure 80, App Interactions

The transitions of the app change the way that the users interact. In this prototype "Smart Animate" has been used for the transitions as these provide a more complex and interesting experience for the user. 300ms is the time it takes for the transition to complete this is in-line with the recommended time (Laubheimer, 2020).

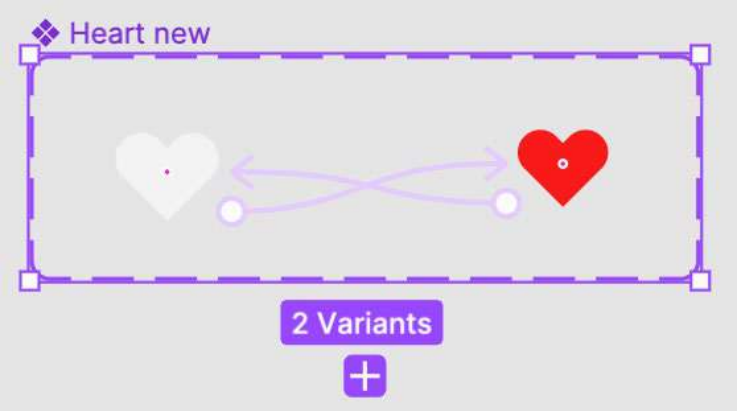


Figure 81, variants

Component variants are used throughout the application. This allows the users to be able to use the app as if it was developed. Allowing them to use more of the app and provide feedback.

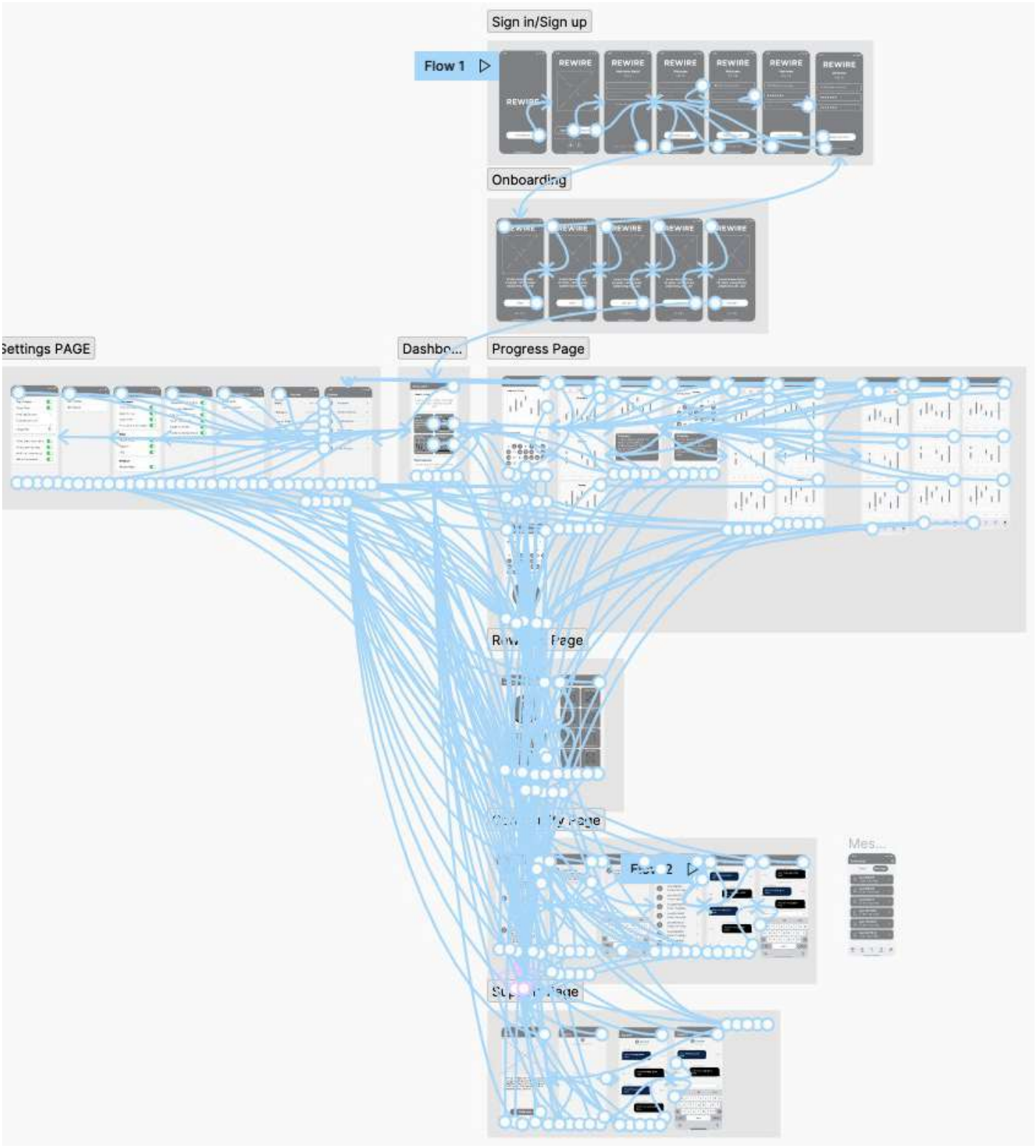


Figure 82, Prototyping

Using Figma all the pages are linked together to allow screens to go to other screens. Additionally allowing the users to access each page from the tabbed view at the bottom of every page.

4.11 User Evaluation

Content, Usability and Efficacy testing have been used to evaluate the app.

4.11.1 Content Testing

For content testing four different designs of the same page are created. Users are then asked to give feedback on each page as well as rank the designs. This evaluation can then be applied to the rest of the application and other pages.

Design V1

❤4

User 1	User 2	User 3
"All CTAs need to be the same on the designs"	*"This graph is confusing. There is no indication as to what is on the axis."*	*"Calendar is clear and hows me that I've not been showing behaviours on the highlighted days"*

Figure 83, Design v1

Design V2

❤8

User 1	User 2	User 3
"The bar graph is certainly more appealing to look at as its much more understandable in a shorter amount of time"	"The calender appears to be selected with the bands instead of showing a streak."	*"While the graph is better there still isn't an indication of the axis and what it is actually showing me "*

Figure 84, Design v2

Design V3

❤1

User 1	User 2	User 3
"The design here is a bit too busy. There is a lot of information which I don't think is relevant to the PROGRESS page"	"The text under the icons is too small, however I like the tabbed view of the pages. Maybe make the page you're on really stand out on this bottom menu."	*"Clear that tiles are to be pressed and further information would be shown, but the graph is still confusing in this style"*

Figure 85, Design v3

Design V4

❤2

Figure 85, Design v5

User 1

"The content here is very simple and clean, however there is too much empty space for the app to look complete"

User 2

"Unlike other pages the tiles here have no indication that further information would be provided upon clicking them."

User 3

"The countdown for days remaining until next reward looks messy and unfinished, I would change this or not have it in the progress page."

Design Decisions

15 Users were asked to signpost their favourite design using a red-heart. This showed that Design V2 and V1 where the most Popular. Comments taken from the two designs were combined and the final design of the progress page was then created.

Figure 86, Design Decisions

Labelled axis on the graph and a coloured bottom tab menu to indicate the page.

4.11.2 Usability Testing

As part of the evaluation, paper and digital prototypes were made to gain a better understanding of the usability of the app. A SUS is used to rank statements on the usability of the app, this can be found in Appendix C2.

Paper Prototype

Figure 87, User 1

User 1

"There are some elements of inconsistency throughout the paper prototype"

Figure 88, User 2

User 2

"Sometimes unclear what page I'm on in the main section of the app"

Figure 89, User 3

User 3

"The graph seems a little confusing to use and understand"

Digital Prototype - Onboarding

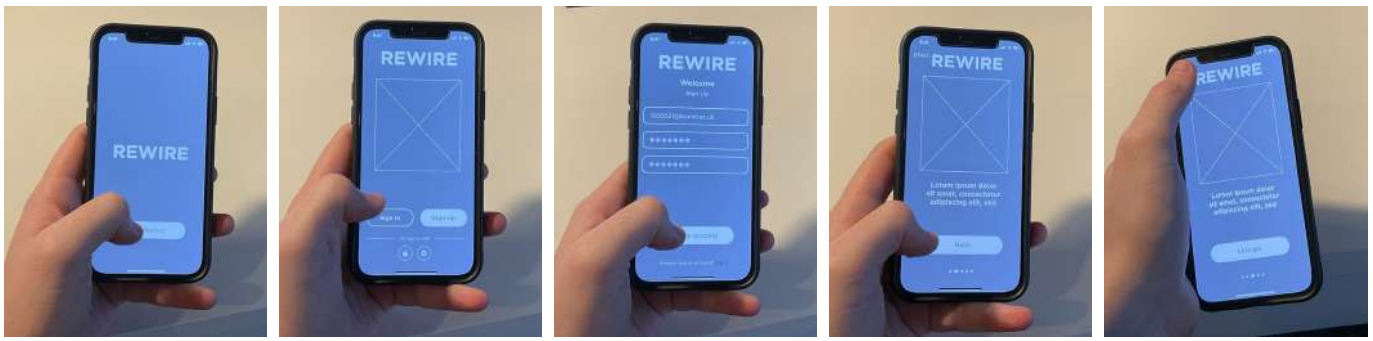


Figure 90, Prototyping

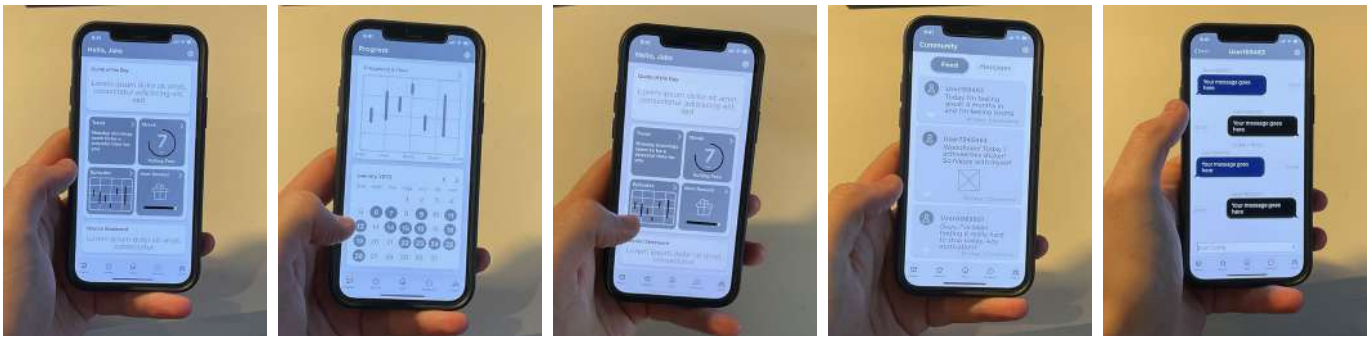
Feedback

"Add a feature to show where the user is in the onboarding process to give the user an understanding of what is to come"

"The user will need to be able to see terms and conditions of use, especially with data sharing"

"The text in the buttons for next on the onboarding says "lets go" each time not next"

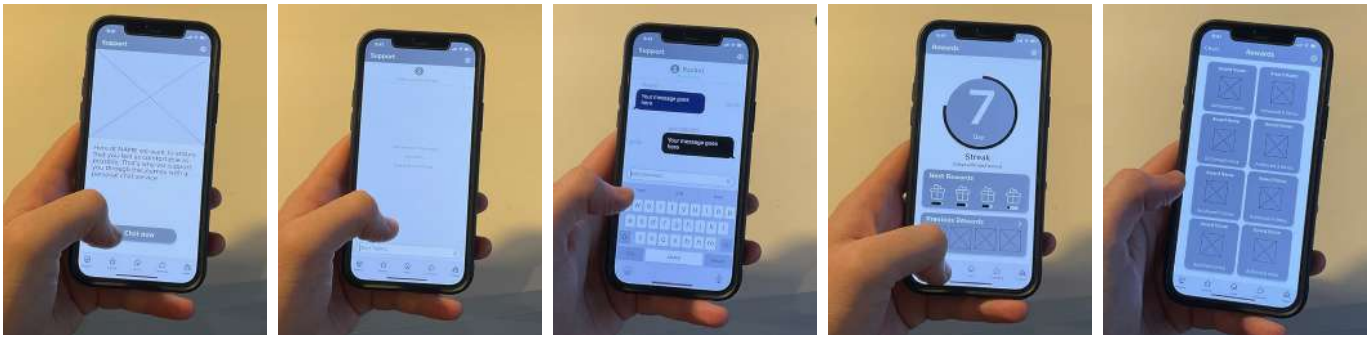
Digital Prototype - Main App Features



"Add swipe from the side of the screen to go back, it would feel more intuitive."

"Buttons (CTA) are a little small, making it hard to press these at times"

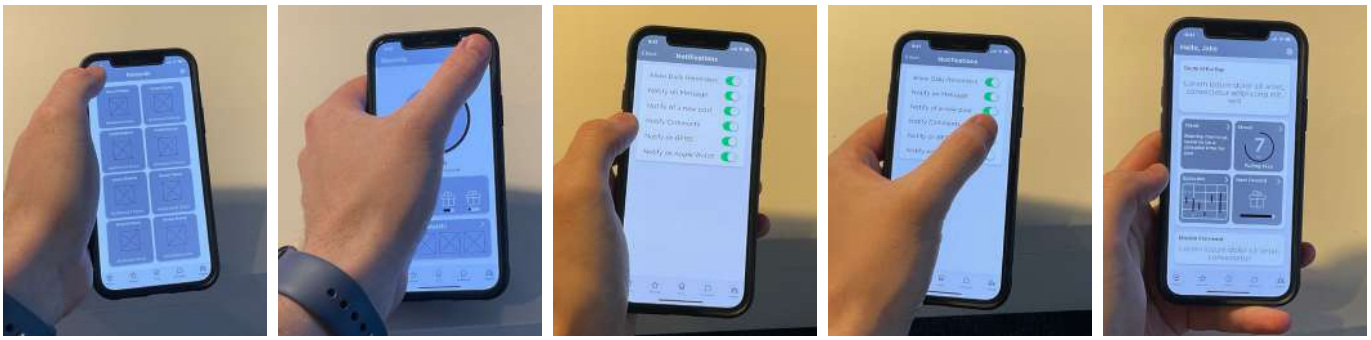
"I feel a little lost when it comes to the graph and where I am within the layout"



"Text under the icons in the tabbed view is so small it's pointless to have it."

"Throughout the digital prototype there are scrolling features which shouldn't be there"

"The text in the buttons for next on the onboarding says "lets go" each time not next"



"There is no button to go back to the home in the settings pages, only the tab along the bottom"

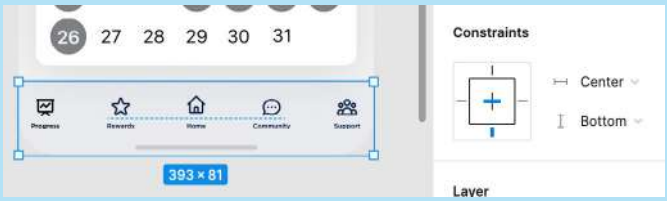
"Buttons in the top left or top right are hard to reach with one handed use, these could be kept at a minimum amount of buttons"

"I think adding more gestures throughout the app would allow for more secondary features."

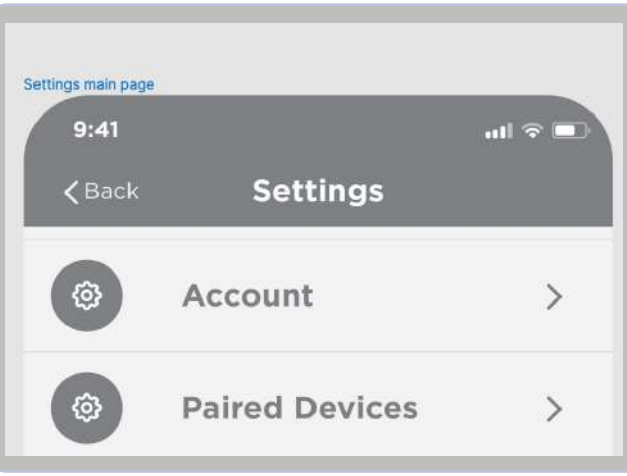
Figure 91, Prototyping

Design Changes

The design needed to change to reflect the evaluation. Parts of the design that were changed have been identified:

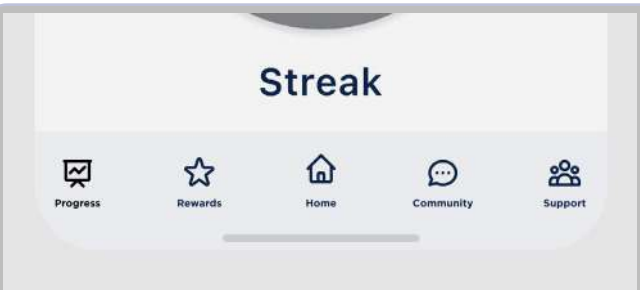


Constraints need to be added to keep components from scrolling on pages where they should not be moving.



The settings page now contains a back button after a user pointed out that they feel they should be able to exit settings outside of the bottom tab menu.

A view to show the status of onboarding was added to show the user clearly how far into the process they are and how much further there is to go.



The text under the icons was not removed to allow the users to understand the meanings of the icons.

For users to be able to clearly understand the app and how it tracks data and its terms and conditions, a new page has been added to the onboarding process to allow users to see and understand this information.

Figure 92, Design Changes

4.11.3 Efficacy

Evaluating the efficacy of an app involves assessing its ability to bring about changes in user behaviour and effectively address the problem. To conduct efficacy testing, a specific period of time must elapse during which users engage with the app and its effects are measured. . However, accurately evaluating efficacy is challenging when there is insufficient time and an incomplete version of the app for users to download.

Although, there are certain elements of the design which can be used to evaluate the app. The framework used throughout the application includes nudge theory and gamification, which through literature can be used to measure the effectiveness of the framework. Gamification has been proven, over the years, to improve people's motivation and performance, most notably in education (Hervas et al., 2017). Nudge has been proved to also be a more powerful tool than simply giving instructions (Hervas et al., 2017). Both frameworks need to reach *Behavioural Momentum*, once this is achieved then it is possible for the user to experience and maintain a behaviour change (Hervas et al., 2017). Within gamification there are different forms such as goals, leaderboards, achievements, points and Badges. These are the most commonly used form of gamification (Hervas et al., 2017). Streaks are also used in this same way these nudge people into a behaviour change as it allows for them to make a choice to keep the number going up.

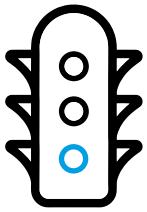
4.11.4 Expert Feedback

The other way to assess the efficacy of an app and the product as a system is to speak with an expert. A cognitive behavioural therapist was asked about Rewire and its impact on users.

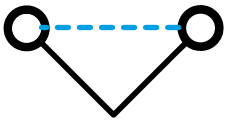
Figure 93, Expert Feedback

4.11.5 Heuristic Evaluation

Heuristic evaluation is a method of identifying problems within a user interface. It is part of an iterative process which can allow for design to be created with usability in mind (Nielsen & Molich, 1990). There are set criteria that the design can be assessed against.

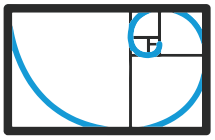


This was given 0, as the visibility of the system status is very clear

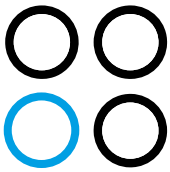


This was given 0, as the usability is very clear in terms of the flexibility & efficiency of use

Match between system and the real world was scored 1 as this problem is only cosmetic

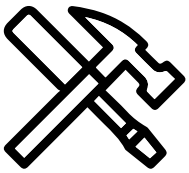


The app is kept minimal and simplistic

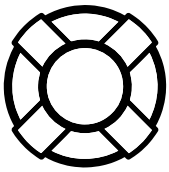


The user freedom and control was given a 1 due to the fact that consistency is throughout but there is ways that it could be implemented in a better way

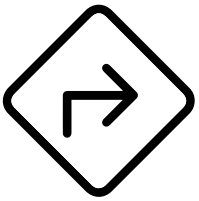
User Freedom and controls was scored 0 as there is a clear way for the users to control settings



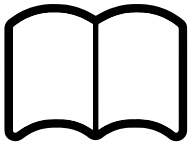
The error prevention scored lowed because the system is automated and doesn't require users to input data incorrectly.



This was given 3, as the app doesn't show if there is an error



This was given 0, as the app uses CTA that are used in many other apps to keep features understandable



This scored high at 3, due to the fact that there is no section on the app that has a place for help to be achieved.

Figure 94, (Interaction Design Foundation, 2021)

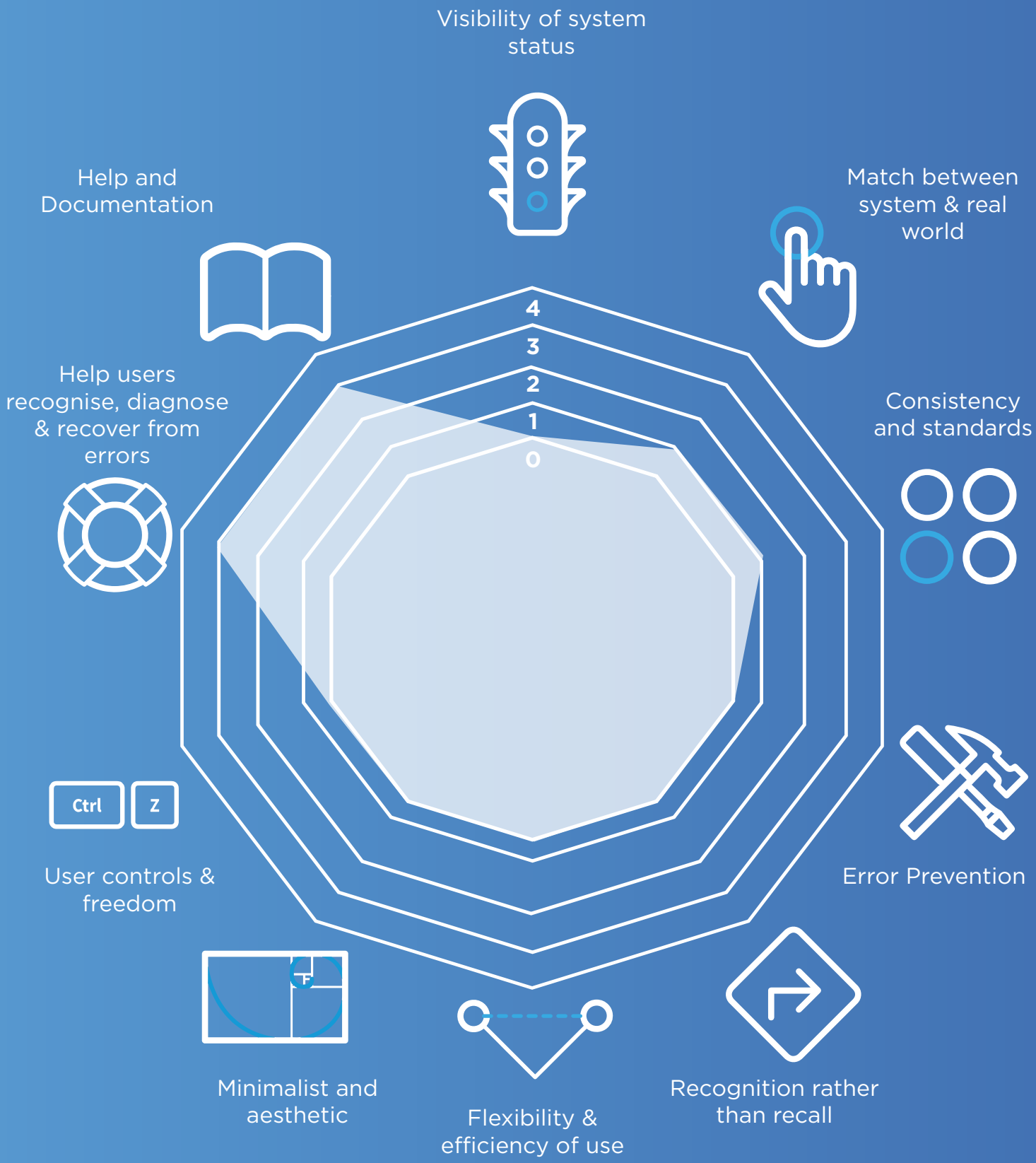


Figure 95, Heuristic Evaluation

0 = I don't agree that this is a usability problem at all
1 = Cosmetic problem only: need not be fixed unless extra time is available on project
2 = Minor usability problem: fixing this should be given low priority
3 = Major usability problem: important to fix, so should be given high priority
4 = Usability catastrophe: imperative to fix this before product can be released

4.12 Design For Manufacture

Ensuring that parts are ready for DFM starts with the CAD process. Different features and fastenings are implemented at the beginning of the project. Several parts were designed for manufacturing out of ABS by injection moulding. There are several different features that were required for this process, such as a lip and groove fastening feature as well as draft angles and injection/ejection pin locations.

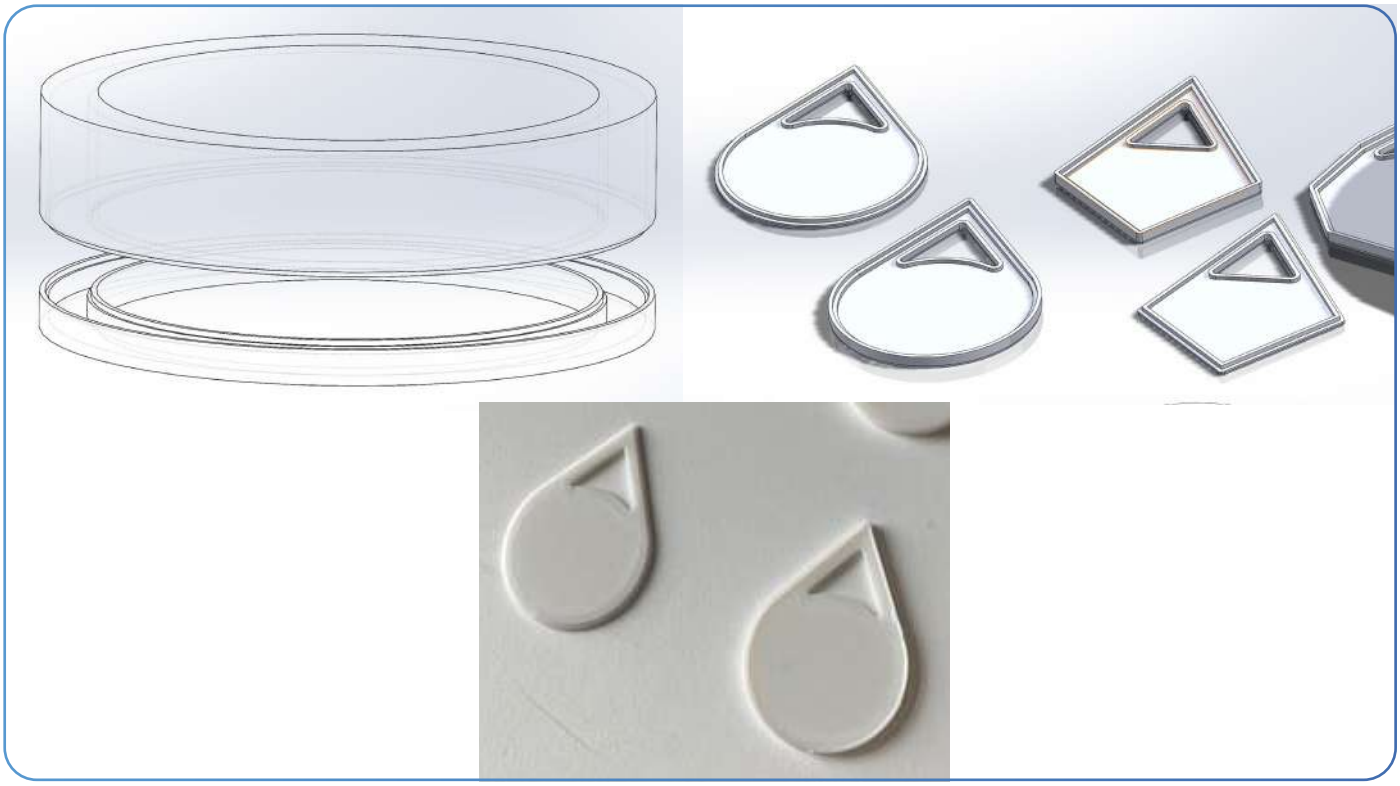


Figure 96, DFM on CAD & Prototyping

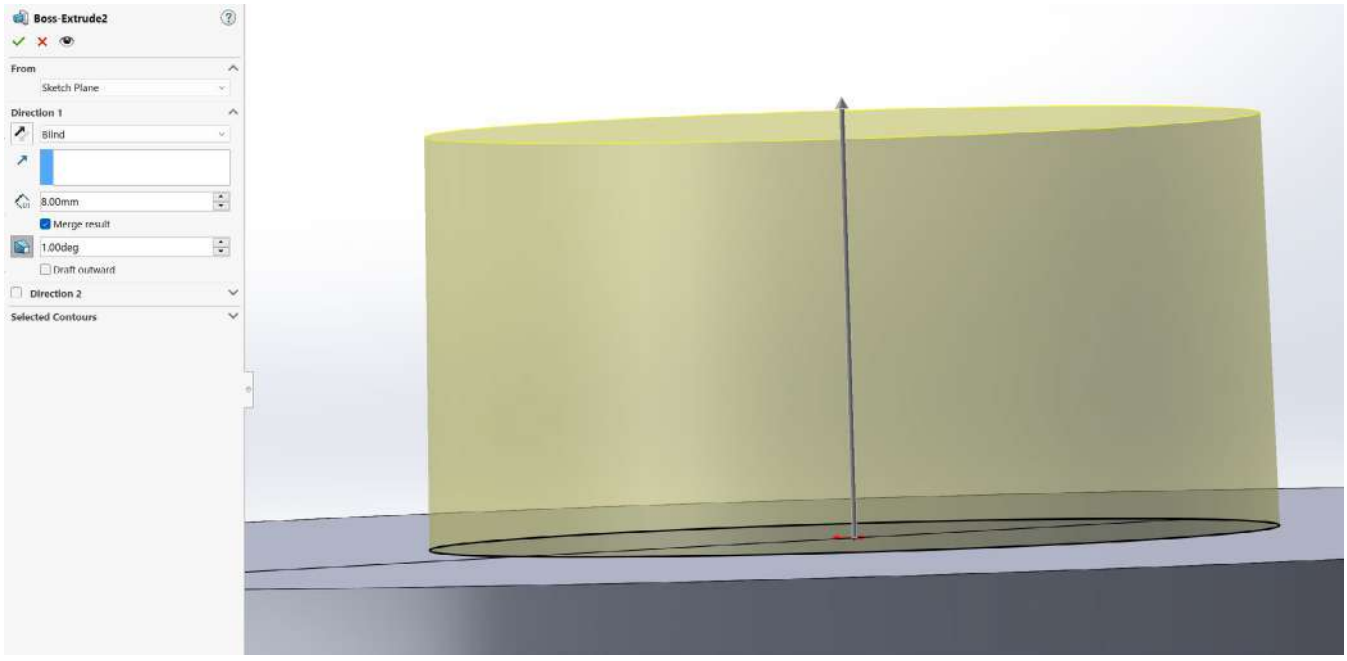


Figure 97, DFM Draft angles

The rings have been designed so that only two different sizes of the electronic section are required. These are the highest costing parts to be manufactured, limiting the cost of manufacture.

Other parts are intended to be CNC machined in a mass-manufacturing process. The pendants will be created using a casting process. A mould that would create one of the pendants is shown in Figure 98. This mould contains components for four pendants. The post processing is to be carried out after the molten metal is poured, cutting the excess tree of metal and polishing.

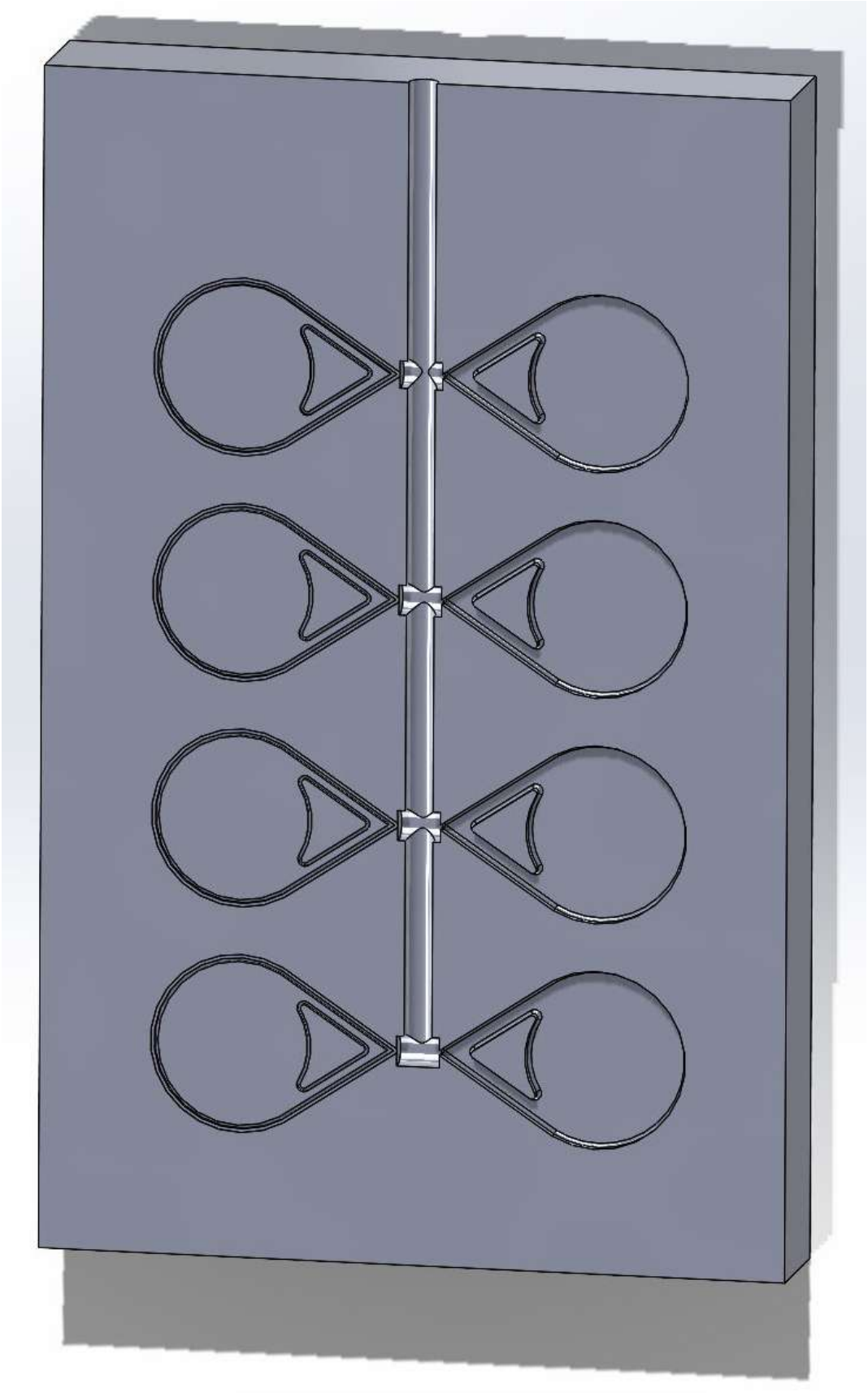


Figure 98, Casting Mould

4.13 Technical Drawings

For all technical drawings please see appendix E.

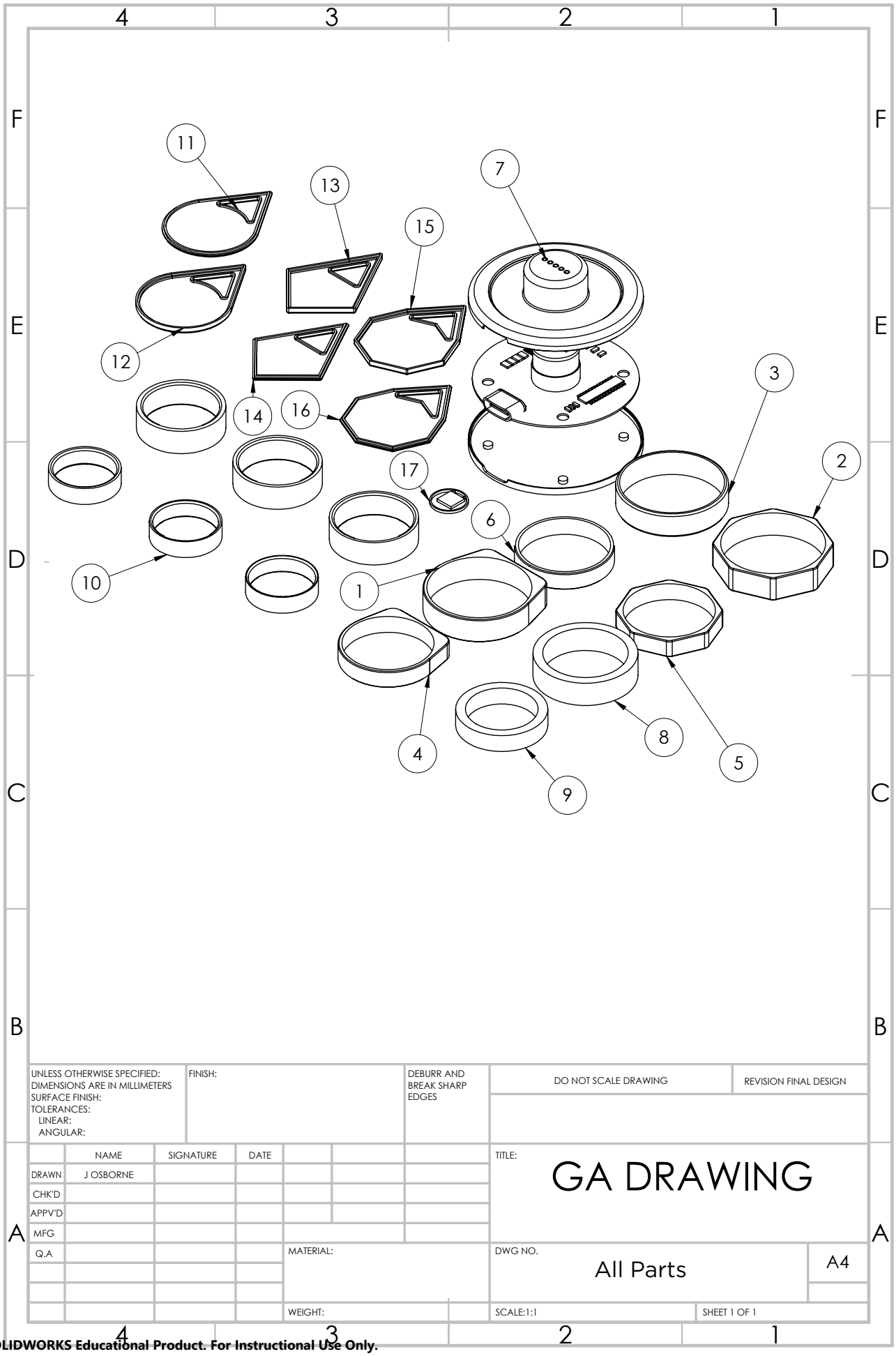


Figure 99, Technical Drawing All

4.14 Bill of Materials

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	outer ring men flat	INJECTION MOULDED ABS/CNC MILLED	1
2	outer ring men octo	INJECTION MOULDED ABS/CNC MILLED	1
3	outer ring men ring	INJECTION MOULDED ABS/CNC MILLED	1
4	outer ring women flat	INJECTION MOULDED ABS/CNC MILLED	1
5	outer ring women octo	INJECTION MOULDED ABS/CNC MILLED	1
6	outer ring women ring	INJECTION MOULDED ABS/CNC MILLED	1
7	Charger pcb	INJECTION MOULDED ABS	1
8	Mid Rings Men	INJECTION MOULDED ABS	1
9	Mid Rings women	INJECTION MOULDED ABS	1
10	Inner Rings all	EXTRUDED ABS	1
11	circle A PART	Upper circle pendant part, ABS, CAST BRASS/ALUMINIUM	1
12	circle B PART	Lower circle pendant part, ABS, CASR BRASS?ALUMINIUM	1
13	FLAT A PART	Upper flat pendant part, ABS, CAST BRASS/ALUMINIUM	1
14	FLAT B PART	Lower flat pendant part, ABS, CAST BRASS/ALUMINIUM	1
15	Octo A PART	Lower part of octogon pendant part, ABS, CAST BRASS/ALUMINIUM	1
16	Octo B PART	Upper part of octogon pendant part, ABS, CAST BRASS/ALUMINIUM	1
17	RDIF TAG	RDIF Coil	1

Figure 100, BoM

For the plastic material selection see appendix D.

4.15 Branding

4.15.1 Name

The brands name is a crucial part of the branding. It needed to be inspired by what the app aims to do. A mind-map was created to develop ideas. A handful of ideas were developed further.

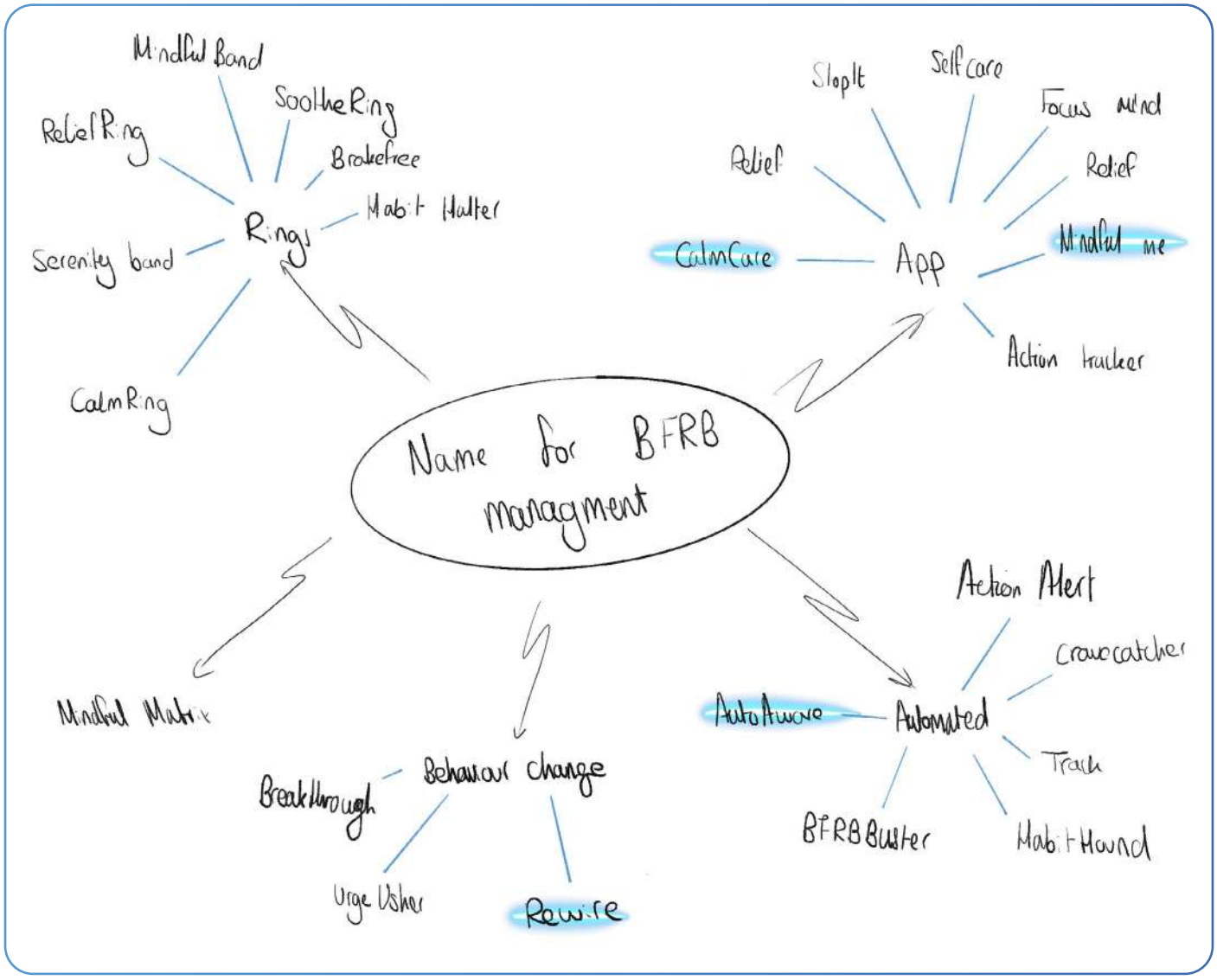


Figure 101, Mind map

CalmCare

CalmCare gives connotations of a product which keeps the user calm but also cares about them

Rewire

Rewire implies that the brain will be rewired to break the BFRB, with a new behaviour change and way of thinking.

AutoAware

AutoAware uses the automation of the product in its name as well as the idea of the user becoming aware of the BFRBs

Mindful Me

Mindful Me gives connotations of a more personal product that wants to help. However, it feels more like a mental health product name

The final design choice was to use **Rewire** as it fits the product that is provided to the users as well as being short and easy to spell, therefore great for marketing the product.

4.15.2 Slogan

With the name decided, the next stage of the branding was the slogan. Ideas are initially brainstormed to find the best fit.

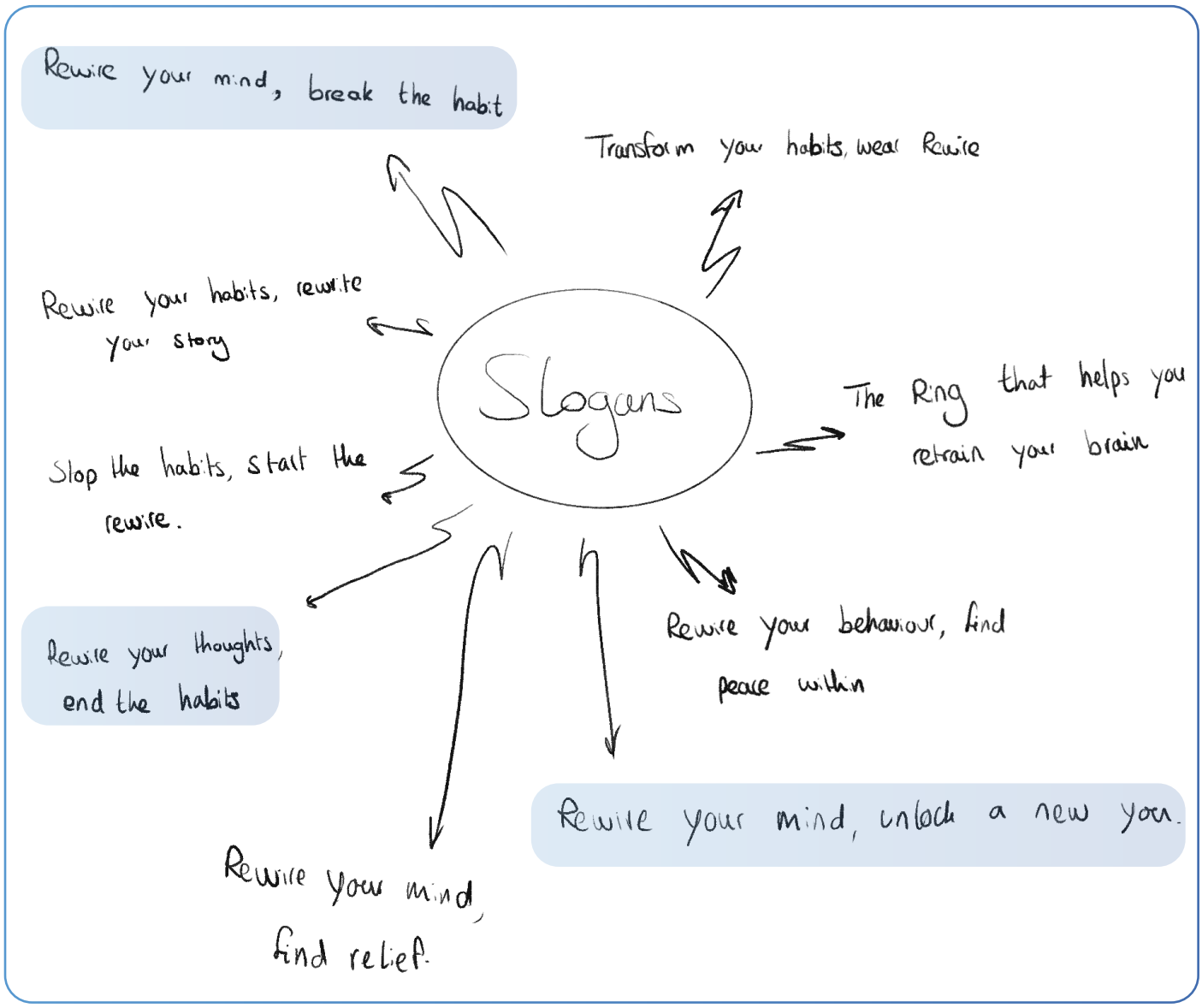


Figure 102, Mind map

From this competitive slogans are highlighted in Figure 102. The final slogan chosen is:

Rewire your mind, break the habit.

4.15.3 Type

The typeface needs to ensure that information is clearly displayed and can convey a message clearly and quickly to the user. Different typefaces were explored as shown in figure 103.

Rewire Rewire Rewire **Rewire** **REWIRE** Rewire REWIRE

Figure 103, Typefaces

A simple Sans Serif typeface, Gotham and Gotham Book have been used. This font has commonly been used in other companies as it has such a good clarity known for its "basic draftsmen lettering" (Hoefler, 2023).

Gotham

ABCDEFGHIJKLMNOPQRSTUVWXYZ

Gotham Book

abcdefghijklmnopqrstuvwxyz

4.15.4 Colours

The colours of the brand have a large impact on how the user feels about the product.

In the case of Rewire a blue gradient is used on a white background. The background is used to show a clean aesthetic as the brand is aiming to recreate the trust of a doctors colour theory is used from section 2.8. Within the app the white is a slight off-white which means that text is less harsh than a white background.

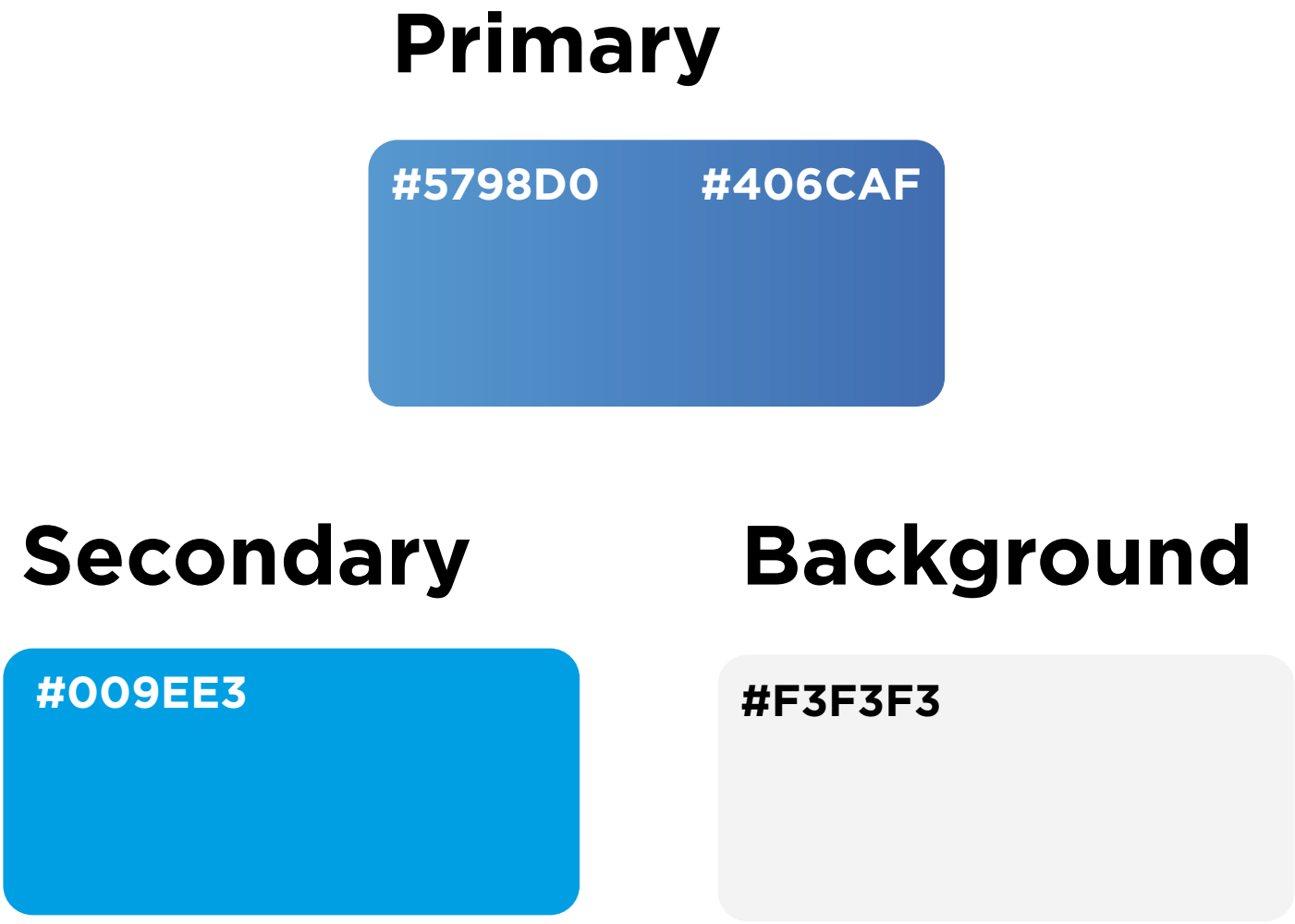


Figure 104, Colours

4.15.5 Logo

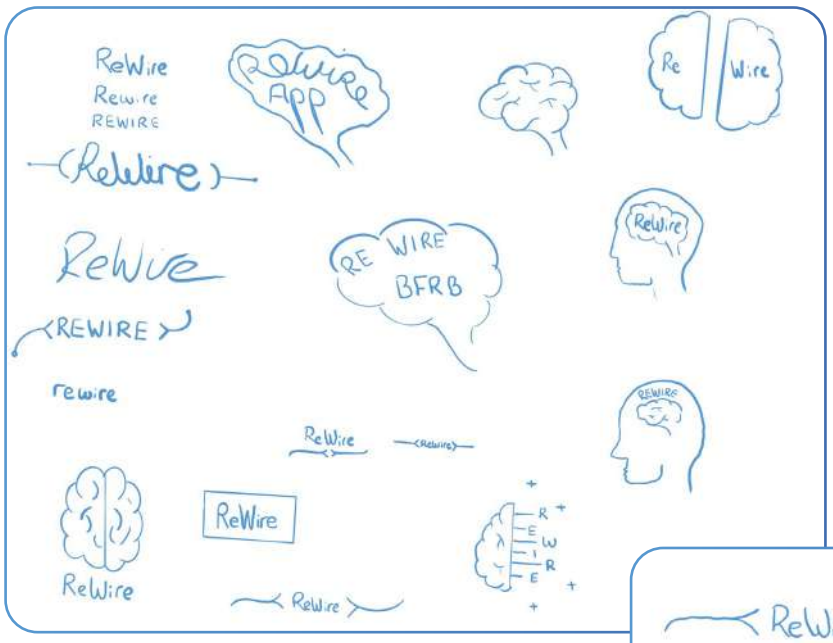


Figure 105 A, Logo Ideation

The logo is a key part of the brand. This is what the user will see whenever the product is viewed. It is important to convey the right messages that follow the product, brand and the purpose of design.

Cues that inspired the rewire logo ideation include:

- The Brain
- Synapses
- Wiring

Figure 105 B, Logo Ideation

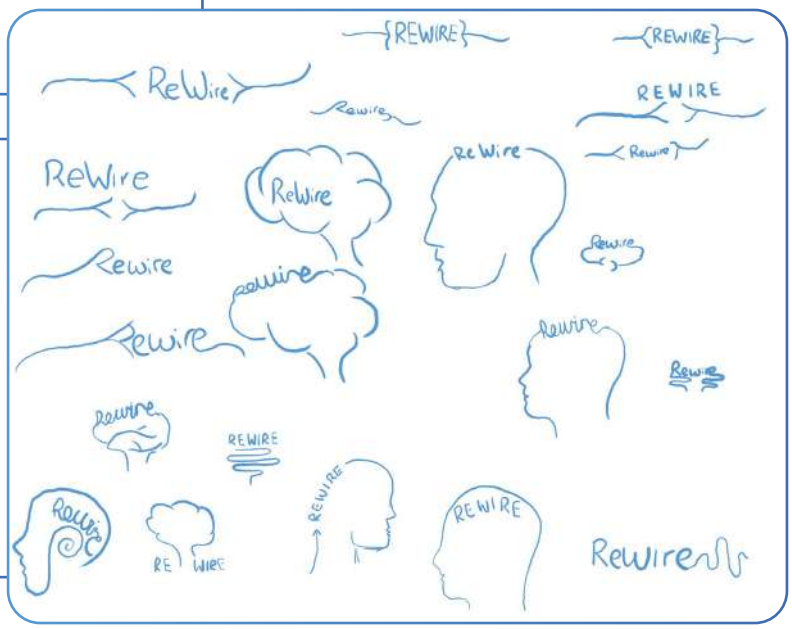


Figure 105 C, Logo Ideation

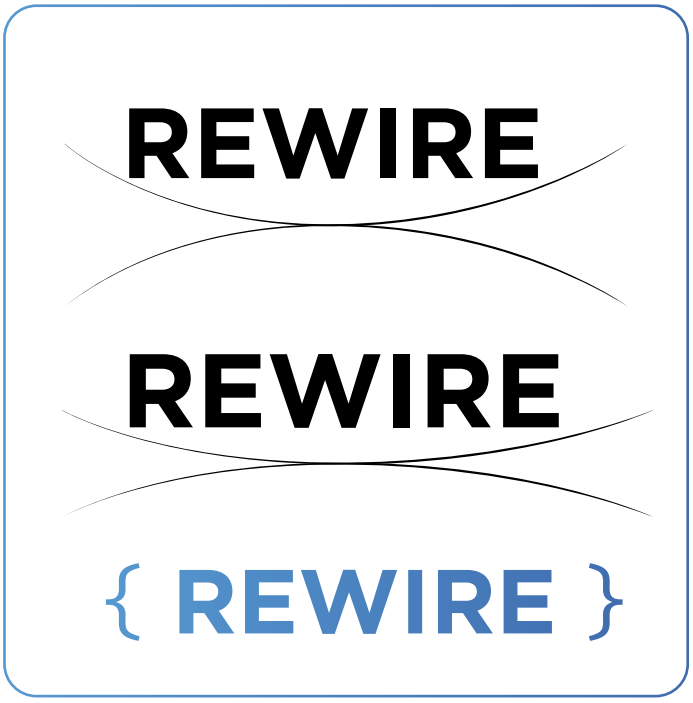


Figure 105 D, Logo Ideation

Figure 105 E, Logo Ideation

The final logo that was chosen. This displays the name of the brand, Rewire, clearly and simply. The minimal icon is placed under the Name. This is taken from altering behaviour change within the brain, more specifically the neurons used to send information throughout the brain.

The logo is limited to being White, black or Rewire Blue Gradient, as shown in figure 106.

Figure 106, Final Logo

4.15.6 Brand Values

Brand values are a crucial part of any brand. In the case of Rewire, there needs to be a real sense of trust and understanding. There have been brand values created in order for the customer to feel as though the product and brand is something that they can trust. These are values that the product and app must follow.

Empowerment

Empowerment is aimed at making the user feel like they are in control, and to allow them to be empowered to change their behaviour.

Honesty

It is crucial for the brand and the product to be honest, this is because the aim of Rewire is to allow the user to see, understand and take control of their BFRB.

Community

When having a way of having an open discussion is a way that people can feel part of a community and talk to people who are going through the same things.

Compassion

It is important to understand that everyone is human and no one can experience a behaviour change overnight and this needs to be made clear the user.

Empathy

Empathy with users when the behaviour change doesn't always happen as quickly as the user would like. BFRBs can be difficult to deal with which is why Rewire needs to be a place where people can relax.

Awareness

Automatic monitoring and awareness is at the core of the Rewire brand, allowing the user to rest easy knowing that episodes will be logged.

4.16 App Icon

Rewire app icon is what the user will see when downloading the app as well as every time they open it. It was important to create a simplistic and minimal design which the user would like on their phone screen everyday.

Figure 107, App Icon Development

Figure 108, App Icon

5.0 DELIVER

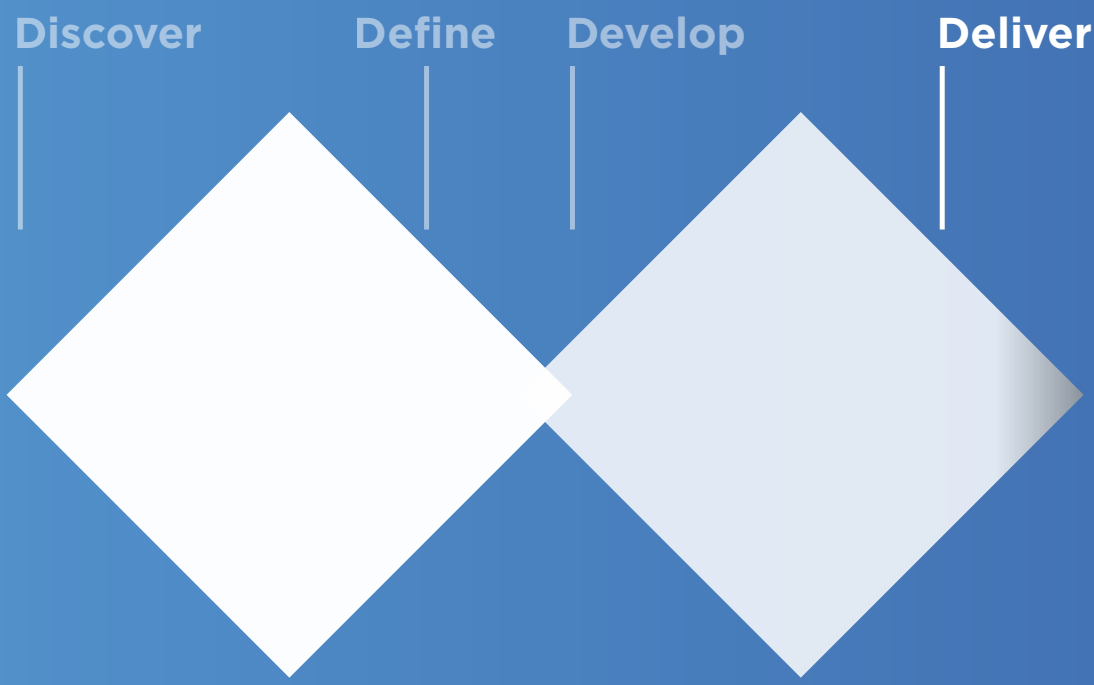


Figure 109, Deliver Double Diamond

5.1 Final Design Images

The final deliverable consisted of three designs of smart rings available in a small and large size. These all come in four colour/material options, Brass, Aluminium, Black and White ABS. There are three matching pendant designs that follow the ring designs, they are also all available in these finishes. The charging base is available in either the ABS White or Black.

To accompany the products there is an app, section 5.4, which will be used to show interactions and data collected from the Rewire ring.

Figure 110, All of Rewire Products

5.2 Final Design - Ring

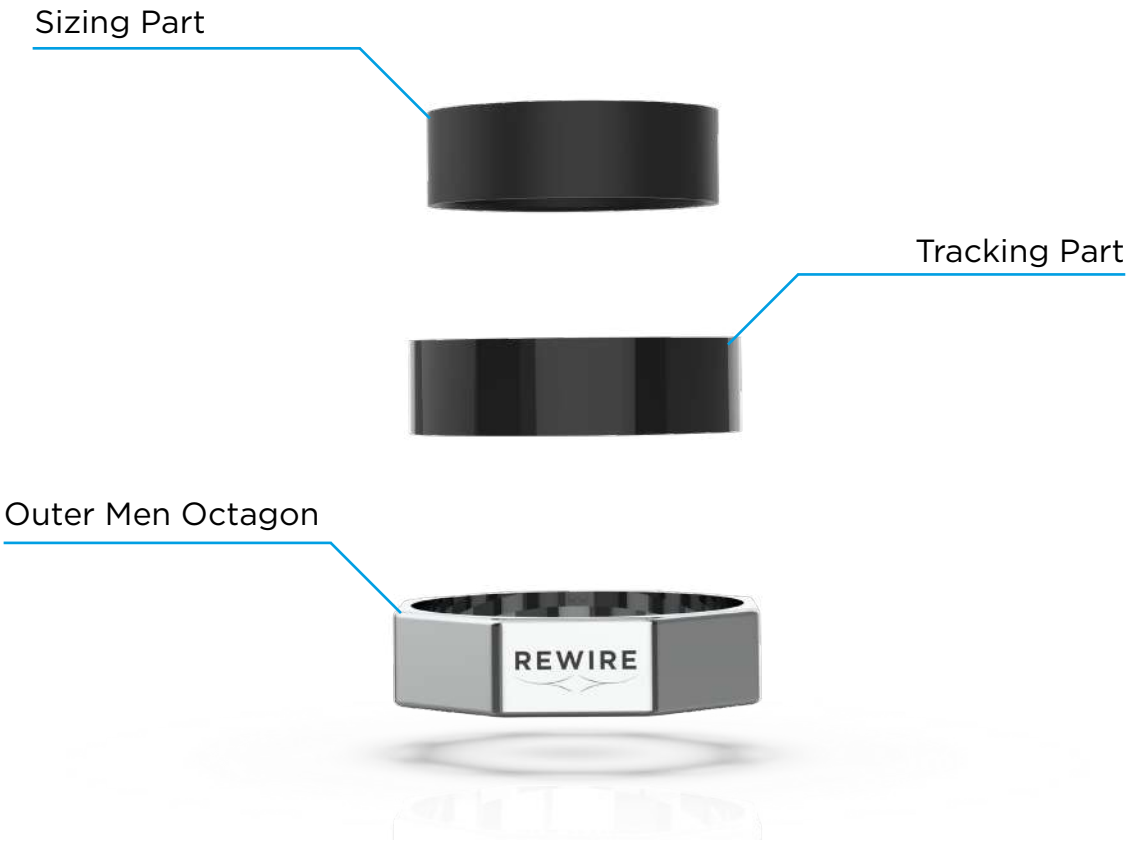


Figure 111, Rewire ring Exploded Parts

Figure 112, Rewire Rings, chargers and Pendants

Figure 113, Men's Ring on Hand

Figure 114, Close up of rings

Figure 115, Rings and charger

Figure 116, Close up of Women's Octagon Ring

Figure 117, Pendant and Ring being modelled

5.3 Final Design - Pendant

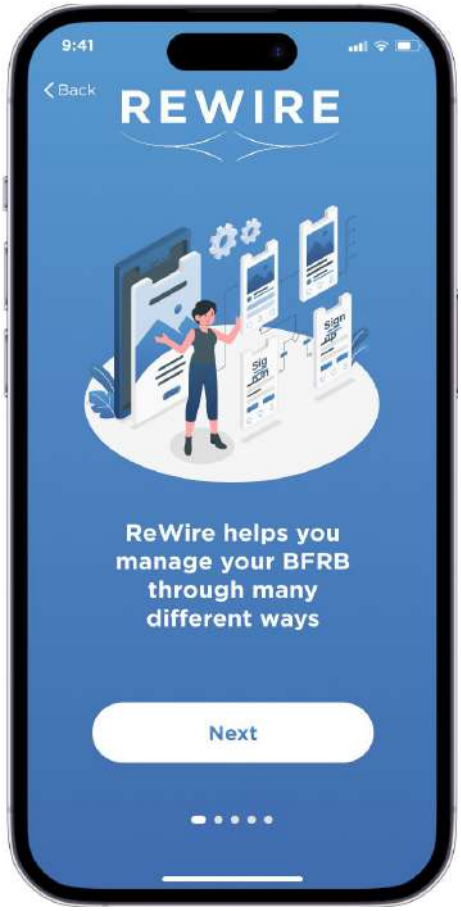
Figure 118, All Types of pendant

Figure 119, ABS “Budget” Ring and Pendant

Figure 120, Brass/Aluminium Ring and Pendant

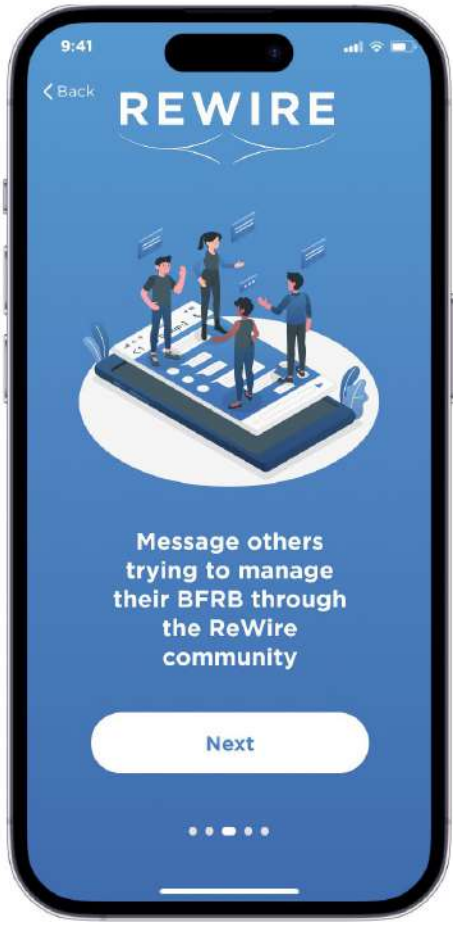
5.4 Final Design - Application

Splash Screen



Onboarding 1

Onboarding 2

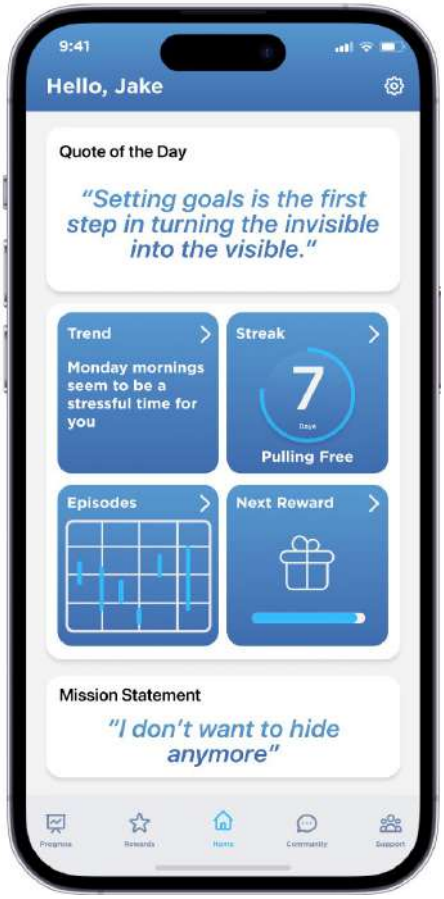


Onboarding 3

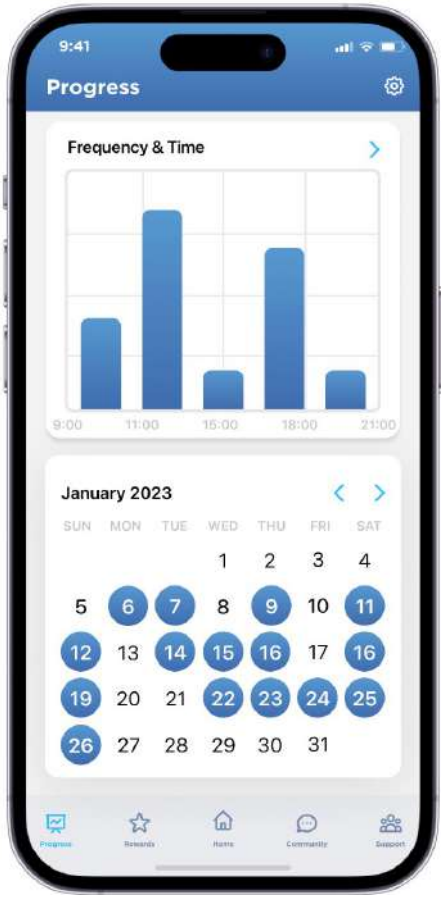
Onboarding 4

Onboarding 5

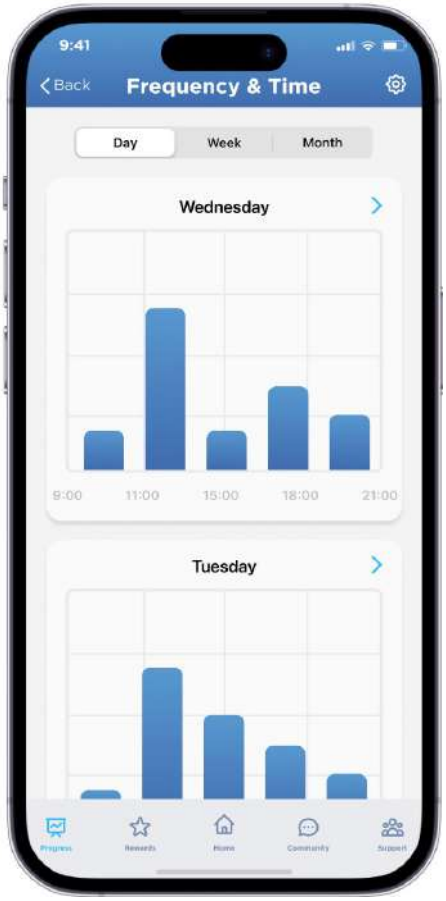
Figure 121, Onboarding, https://storyset.com" illustrations by Storyset



Home dashboard with motivational quotes and key insights

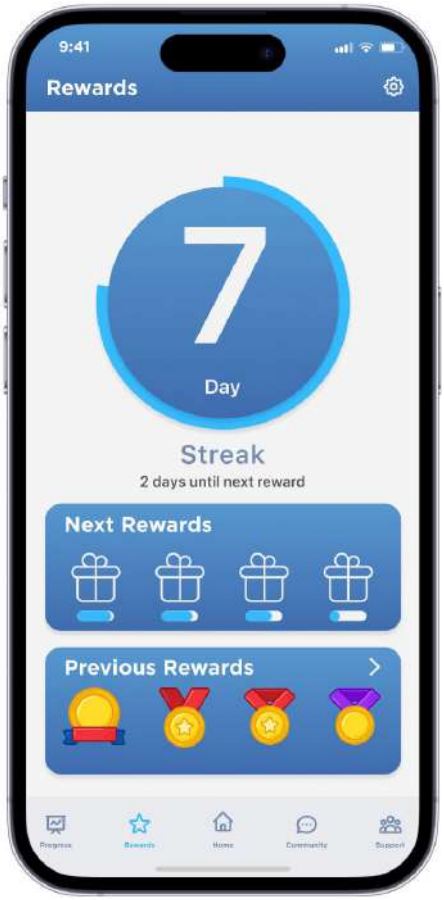


Progress page, with graph and streak calender

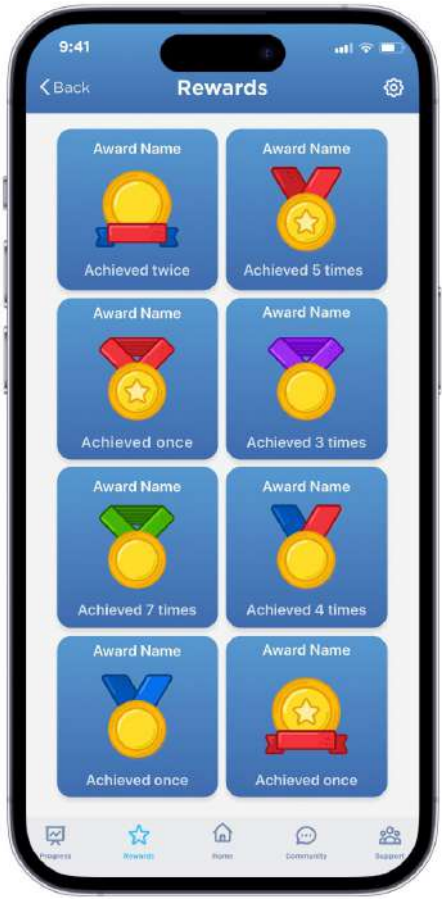


Increased detail of graphs over days, weeks or months

Progress page showing a trend and showing the user a potential trigger

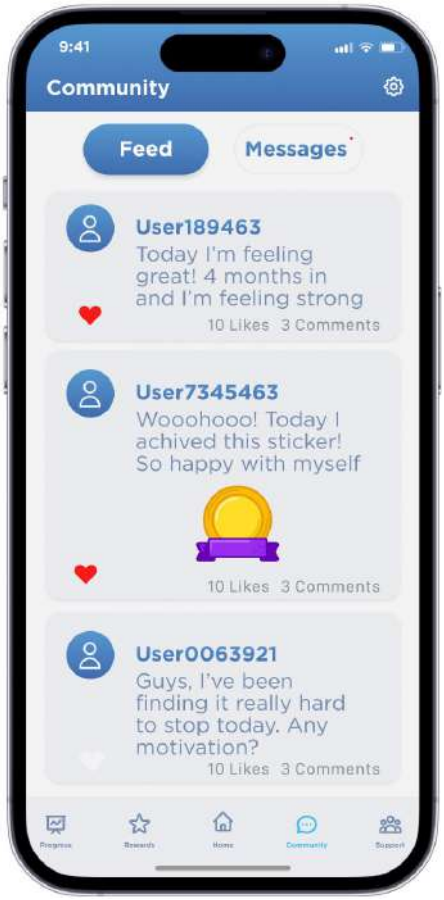


Rewards page, showing progression to next rewards and their Streak

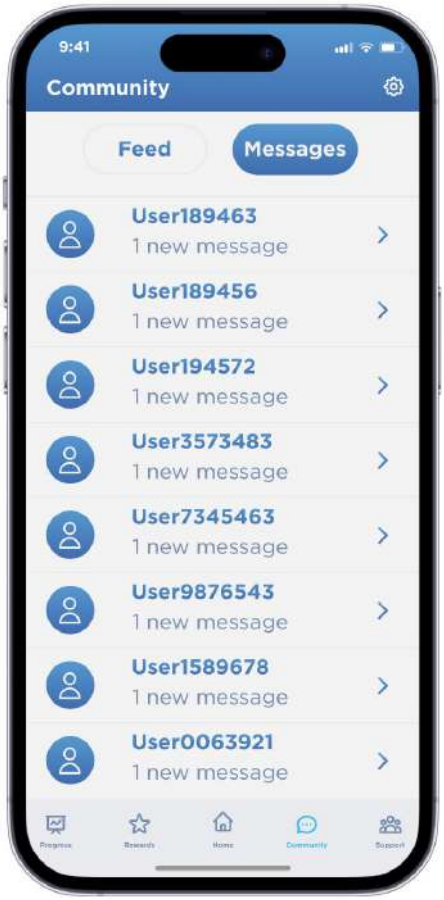


Previously achieved rewards page to allow the user to collect rewards

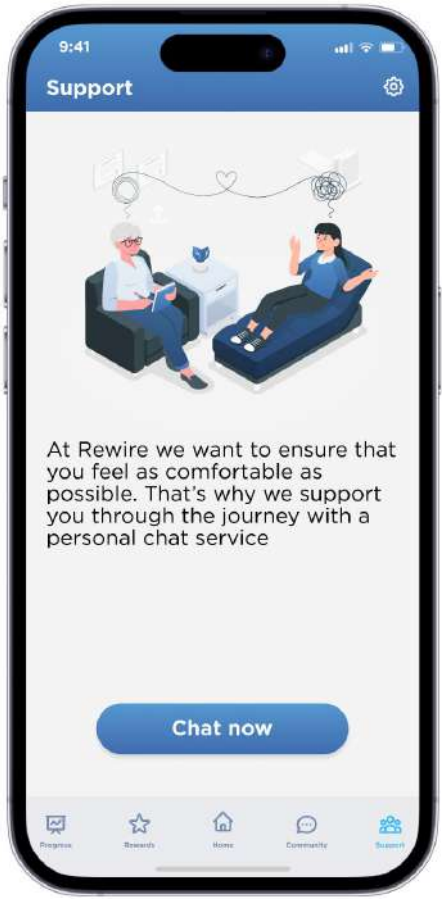
Figure 122, App Pages



Community Feed page to see others posts and thoughts

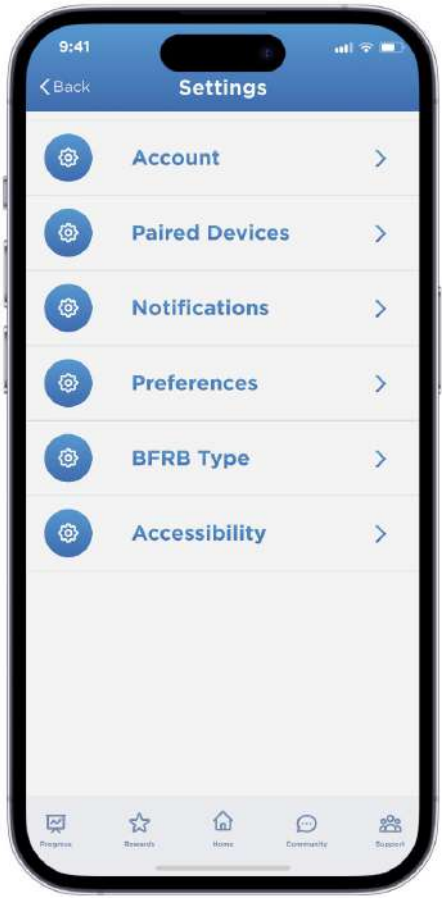


Community Messaging page, this allows for direct messaging anonymously

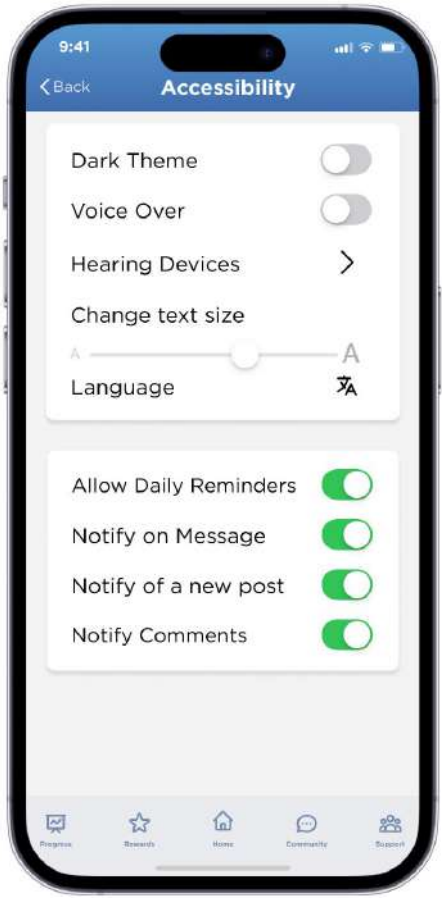


Support page splash screen explaining how it works for new users

1 On 1 chat with a therapist allows users to get advice from professionals



Settings page allows for a lot of control over the app and what it tracks



A range of accessibility options to ensure the app can be used by anyone

Figure 123, App Pages

5.5 Working Prototype

https://www.figma.com/proto/WzG3Nm9ri3okA857uXmgiU/Final-Application?page-id=0%3A1&node-id=1-278&viewport=667%2C897%2C0.33&scaling=scale-down&starting-point-node-id=1%3A278

Figure 124, Splash Screen

6.0 OUTRO

6.1 Evaluation

Evaluation against the PDS

Please see appendix F1 for areas which have and have not achieved the PDS with the Rewire product. For evaluation of market position see appendix F2.

Evaluation SWOT

S

- Subtle Haptics
- Stylish Design
- Automated Tracking
- Companion App
- Rewards Page
- Community Page
- Easy sizing system
- Trends & Trigger feature
- Wireless Charging Station
- Customisable Design
- Full support from a therapist

W

- Manufacturing costs
- Custom complex PCBs
- Requires users to wear both necklace and ring together

O

- Ability to add designs to customisable parts
- Work with a programme which follows a CBT programme
- New market which allows for the Rewire product to be sold
- Open up the target to any user with a BFRB

T

- Cognitive behavioural therapy
- Application alternatives
- Manufacturing many parts will be costly
- Expensive price

Figure 125, SWOT Analysis

6.2 Further Improvements

With Rewire having a successful launch, there is scope in the future to integrate the CBT therapy within the Rewire product. This can be in the form of a programme to keep up with weekly goals and tasks, while also checking in with one of the therapists through the app. This could potentially save the NHS hours in time with virtual appointments. The programme would allow users to have an end goal. This could allow for more motivation while using the app.

Another area for future development is the DFM of the ring. Manufacturing is complex due to the rings small size. With more sales and funding then this process could become more efficient and cheaper.

Further Opportunities

- Adding more features within the app, such as the programme previously discussed.
- Changes within fashion trends can be mirrored in the Rewire product by simply adding more styles of rings.
- Expanding the target user to anyone with a BFRB would increase the sales of the product. It could be difficult to understand triggers due to the complex day-to-day activities that some users may experience, unlike a student with a timetabled routine.

6.3 Conclusion

Rewire is completely unique with the automated tracking of wearable devices and its integration with BFRB focused applications. Rewire's aim was to create a product for 18-25 year olds in education to help manage their BFRBs. This was completed with smart wearable devices. The primary key design feature of the Rewire product is the subtly of design with matching styles of traditional jewellery. This stops unwanted attention to the user and allows them to focus on their goals in confidence. Feedback from an expert and other research papers on the frameworks efficacy emphasise there is hope that if developed Rewire could genuinely help sufferers of BFRBs gain control. **Rewire their mind and break their habits**.

Overall, the project allowed me to gain a deeper understanding of every part of the design process. Theories learnt from all modules have been applied to enable the level of detail required in this project. While this project was challenging, the outcome is something which I can look back and be proud of.

7.0 BACK MATTER

7.1 References

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https://storyset.com" illustrations by Storyset

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Thaler, R.H. and Sunstein, C.R. (2021) Nudge. New Haven: Yale University Press.

York Graphic Designers (2012) Colour theory - the meaning of colour: What do colours mean, York Graphic Designers. YGDNEW11 http://yorkgraphicdesigners.co.uk/wp-content/uploads/2015/05/York_Graphic_Designers_logo.png. Available at: https://yorkgraphicdesigners.co.uk/colour-theory-part-1-the-meaning-of-colour/ (Accessed: May 1, 2023).

7.2 Glossary

BFRB	Body focused repetitive behaviour
IRE	Industry review evening
PDS	Product Design Specification
DFM	Design for Manufacture
SWOT	Strengths, Weaknesses, Opportunities & Threats
CTA	Call to Action
OCRD	(Obsessive Compulsive Related Disorders)
SUS	System Usability Selection

7.3 Appendix A - Initial Product Design Specification

1.0 Function

1.1 Create self awareness to the action of BFRBs
1.2 Not draw attention to the user when using the product
1.3 Communicate to the user patterns
1.4 Give the user an idea of how much the behaviour occurs with details of when and for how long for
1.5 Be able to help calm the user
1.6 Show real, live data
1.7 Give the user an area to add emotions
1.8 Include a calender
1.9 Support with motivational quotes
1.10 Give the user a place to share their experience with a community
1.11 Give the user virtual rewards which can motivate them to collect them all

2.0 Performance

2.1 Must notify the user to the action of the BFRB
2.2 Not go off unintentionally
2.3 Must connect to an application
2.4 Must be simple and easy to use
2.5 Must be rechargeable
2.6 Be used everyday
2.7 Must make the user feel comfortable
2.8 Feel premium
2.9 Use push notifications to encourage or warn the user of an episode

3.0 Human Factors

3.1 Intended user - 18-25 year old students
3.2 Be able to fit both males and females
3.3 Designed to fit lower 5th percentile and upper 95th percentile
3.4 Simple to put on and take off
3.5 Simple interactions, on/off the other information will be sent to the application
3.6 Tell user when the action is taking place
3.7 Easy to see or feel the notification
3.8 As few buttons as possible
3.9 Ensure that charging (if required) is easy

4.0 Environment

4.1 Be able to be used around during everyday life
4.2 Used in temperatures of -10ºC - 60ºC
4.3 Be used in conjunction with an application
4.4 Rain and dust proof
4.5 Must still work after being exposed to -20ºC -75ºC

5.0 Size and Weight

5.1 Must be able to be worn
5.2 Must be discrete
5.3 Must be lightweight (for a wearable)
5.4 Not over 100 grams (total)
5.5 Premium weight (heavy for the size)
5.6 Mobile application to fit on IOS phones

6.0 Service Life

6.1 Last for at least 10 year period
6.2 Repairable by authorised centre
6.3 Application to be supported until the discontinuation of the product or until a successor (product or app)

7.0 Sustainability Strategy

7.1 Must be able to be taken apart for recycling at the products end of life
7.2 Not use any harmful electronics or elements
7.3 Minimise materials which cause social unrest in the world
7.4 Maximise materials from recycled electronics
7.5 Battery life must last over 1500 cycles

8.0 Quality & Safety

8.1 Must follow regulation with ISO 9001 quality
8.2 Must be able to be used daily for 10 years without failure
8.3 No small parts which could be easily removed and swallowed
8.4 Must be suitable for users over the age of 18 (product & app)

9.0 Market Price

9.1 RRP between £90-£200
9.2 There should be a 4 times increase from manufacturing cost

10.0 Standards and Legislations

10.1 Comply with BSI
10.2 Follow CE mark standards
10.3 Follow UKAC standards
10.4 Comply with RoHS
10.5 Comply with the WEEE directive

11.0 Product Maintenance

11.1 Water and dust proof to be cleaned

12.0 Materials

12.1 Non-toxic polymer
12.2 BPA Free
12.3 Can not be brittle
12.4 Premium materials
12.5 Must be resilient

13.0 Manufacturing

13.1 Injection moulded
13.2 CNC machined or turned
13.3 Mass manufacturable, no batch production methods

Brunel University London

PARTICIPANT INFORMATION SHEET

Study title

Preventing behavioural additions for students who experience stress or anxiety as a result of education

Invitation Paragraph

You are being asked to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

What is the purpose of the study?

The aim of this study [Nov 2022-May 2023] is to This study aims to investigate the perceptions of current and potential customers towards the use of products and applications tackling habit reversal or behavioural addictions.

Why have I been invited to participate?

You are invited to participate because you are an expert in the field/are within the target market for the product. Therefore, the researcher would like to hear your opinions and experience regarding these products in the past.

You are invited as I believe you have relevant knowledge and insights into my target users, People that have experience with helping people who have these tendencies. Approximately 20 relevant participants will be involved in this study, aged 18 years or older, who have had close contact with my target users for more than 6 months.

Do I have to take part?

As participation is entirely voluntary, it is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and you may be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time up until 16th April 2023 and without having to give a reason.

What will happen to me if I take part?

The research will be conducted in the form of interviews, online meetings, by telephone or in person (if in person, a well-ventilated room on campus will be used), ensuring social distance. Each session will last approximately 20-30 minutes. You will be asked questions and given enough time to answer and/or discuss these questions and make suggestions/comments.

Are there any lifestyle restrictions?

There are not any life style restrictions.

What are the possible disadvantages and risks of taking part?

-Please be aware that while every effort is made to ensure your safety, vaccination is proven to decrease the risk of transmission of Covid-19 and to reduce the likelihood of severe illness.
-Face coverings should be worn by researchers and participants wherever possible for in-person interviews.
-Researchers and participants should wash or sanitise their hands regularly.

What are the possible benefits of taking part?

There is no direct benefit to the participants. However, you may find your voice are heard and acted upon; you may help improve the quality of life of people who suffer from these impulsive tendencies by making the treatment easier for them.

What if something goes wrong?

If something goes wrong and you wish to complain about the experience, you can contact the Chair of the Research Ethics Committee of College of Engineering, Design and Physical Science Research Ethics Committee, Professor Simon Taylor (simon.taylor@brunel.ac.uk)

Will my taking part in this study be kept confidential?

All information which is collected about you during the course of the research will be kept strictly confidential until 30 June 2023. Any information about you which leaves the University will have all your identifying information removed. I will store the data in a password protected online folder, Brunel H drive, and the participants can withdraw it at any time up until 16th April 2023 and without having to give a reason.

With your permission, anonymised data will be stored and may be used in future research – you can indicate whether or not you give permission for this by way of the Consent Form. If during the course of the research evidence of harm or misconduct come to light, then it may be necessary to break confidentiality. I will tell you at the time if I think I need to do this, and let you know what will happen next.

If the researcher needs to email multiple participants in one go, the potential participants' email will be 'BCC'ed, so nobody can see their email address.

Will I be recorded, and how will the recording be used?

I intend to audio record the interviews as I plan to transcribe the data. I will use a laptop/smart phone (password protected) to do the recording. The participants' permission will be sought in advance, and I will clearly indicate before the recording starts. The recording data will be transferred to a GDPR compliant platform (e.g., a Brunel-owned computer) within three days of the data collection and cleared from the recording device so no other people will accidently access it. The data will be destroyed once the transcription is completed, before the 1st May 2023.

The recording will be made to facilitate the transcription of user responses for the situational interviews. You will be informed before the recording and the recording will only be done upon your approval.

What will happen to the results of the research study?

The results will be written up as part of my final year project dissertation. The participants will not be identified in any report or publication unless you specifically request it.

Who is organising and funding the research?

I am researching this project for my final year project dissertation, and there is no funding for this project. The research is being organised by myself Jacob Osborne in conjunction with Brunel University London.

What are the indemnity arrangements?

Brunel University London provides appropriate insurance cover for research which has received ethical approval.

Who has reviewed the study?

Dr Arthi Manohar, my major project supervisor

Research Integrity

Brunel University London is committed to compliance with the Universities UK Research Integrity Concordat. You are entitled to expect the highest level of integrity from the researchers during the course of this research

Contact for further information and complaints

Researcher name and details:

Jacob Osborne, 1909521@brunel.ac.uk

Supervisor name and details:

Dr Arthi Manohar, arthi.manohar@brunel.ac.uk

For complaints, Chair of the Research Ethics Committee:

Chair of the Research Ethics Committee, College of Engineering, Design and Physical Science Research Ethics Committee, Professor Simon Taylor (simon.taylor@brunel.ac.uk)

7.5 Appendix B2 - Approval Letter

College of Engineering, Design and Physical Sciences Research Ethics Committee
Brunel University London
Kingston Lane
Uxbridge
UB8 3PH
United Kingdom

www.brunel.ac.uk

21 March 2023

LETTER OF APPROVAL

APPROVAL HAS BEEN GRANTED FOR THIS STUDY TO BE CARRIED OUT BETWEEN 18/11/2022 AND 01/05/2023

Applicant (s): Mr Jacob Osborne

Project Title: Major Project - 1909521

Reference: 40255-A-Mar/2023- 44237-2

Dear Mr Jacob Osborne

The Research Ethics Committee has considered the above application recently submitted by you.

The Chair, acting under delegated authority has agreed that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that the conditions of approval set out below are followed:

- **The agreed protocol must be followed. Any changes to the protocol will require prior approval from the Committee by way of an application for an amendment.**
- **Please ensure that you monitor and adhere to all up-to-date local and national Government health advice for the duration of your project.**

Please note that:

- Research Participant Information Sheets and (where relevant) flyers, posters, and consent forms should include a clear statement that research ethics approval has been obtained from the relevant Research Ethics Committee.
- The Research Participant Information Sheets should include a clear statement that queries should be directed, in the first instance, to the Supervisor (where relevant), or the researcher. Complaints, on the other hand, should be directed, in the first instance, to the Chair of the relevant Research Ethics Committee.
- Approval to proceed with the study is granted subject to any conditions that may appear above.
- The Research Ethics Committee reserves the right to sample and review documentation, including raw data, relevant to the study.
- If your project has been approved to run for a duration longer than 12 months, you will be required to submit an annual progress report to the Research Ethics Committee. You will be contacted about submission of this report before it becomes due.
- You may not undertake any research activity if you are not a registered student of Brunel University or if you cease to become registered, including abeyance or temporary withdrawal. As a deregistered student you would not be insured to undertake research activity. Research activity includes the recruitment of participants, undertaking consent procedures and collection of data. Breach of this requirement constitutes research misconduct and is a disciplinary offence.

Professor Simon Taylor

Chair of the College of Engineering, Design and Physical Sciences Research Ethics Committee

Brunel University London

7.6 Appendix B3 - Amendment Letter

College of Engineering, Design and Physical Sciences Research Ethics Committee
Brunel University London
Kingston Lane
Uxbridge
UB8 3PH
United Kingdom

www.brunel.ac.uk

2 March 2023

REQUEST FOR CHANGES

Applicant: Mr Jacob Osborne

Project Title: Major Project - 1909521

Reference: 40255-A-Mar/2023- 44107-1

Dear Mr Jacob Osborne

The Research Ethics Committee has reviewed the above application and would wish to make the following comments:

B2 - Please could you give us a link to the application that you will be asking your participants to review or if it is not available then more detail about what they will be testing.
As the participants are being expected to test your application please explain the following

1. How this will be facilitated
2. Will they need to download the app to their own device?
3. If so, what data will it gather from them?
4. Please upload a 'walkthrough' of the features of the app, including screenshots if available

In the light of the above, **please note that the revisions/information required must be provided, and approved, before the study can commence**. Please make the relevant changes to your original BREO application and resubmit, along with any amended documentation.

- In order that your research is not unduly delayed, it is in your best interests to resubmit your application as soon as possible (preferably within the next 10 days). Please note that applications awaiting changes for longer than three months will be archived, and a new one will need to be submitted.

Please direct any queries relating to your application to CEDPS-Research@brunel.ac.uk

Kind regards,

Professor Simon Taylor

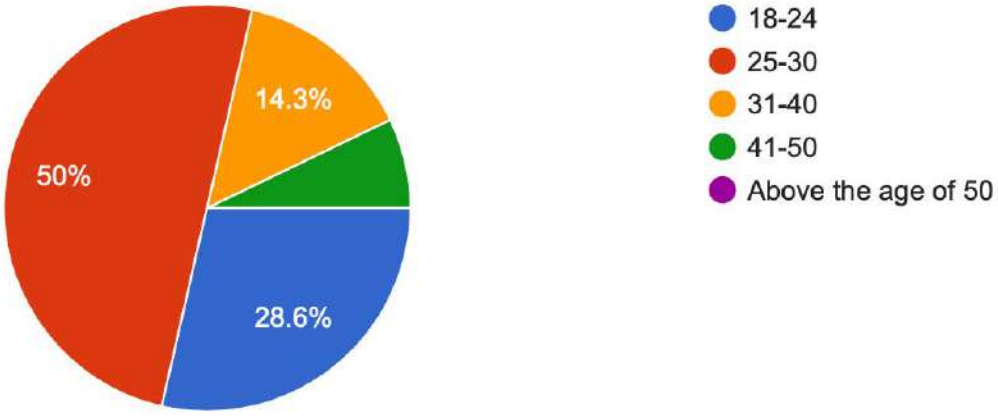
Chair of the College of Engineering, Design and Physical Sciences Research Ethics Committee

Brunel University London

7.7 Appendix C1 - Raw Data

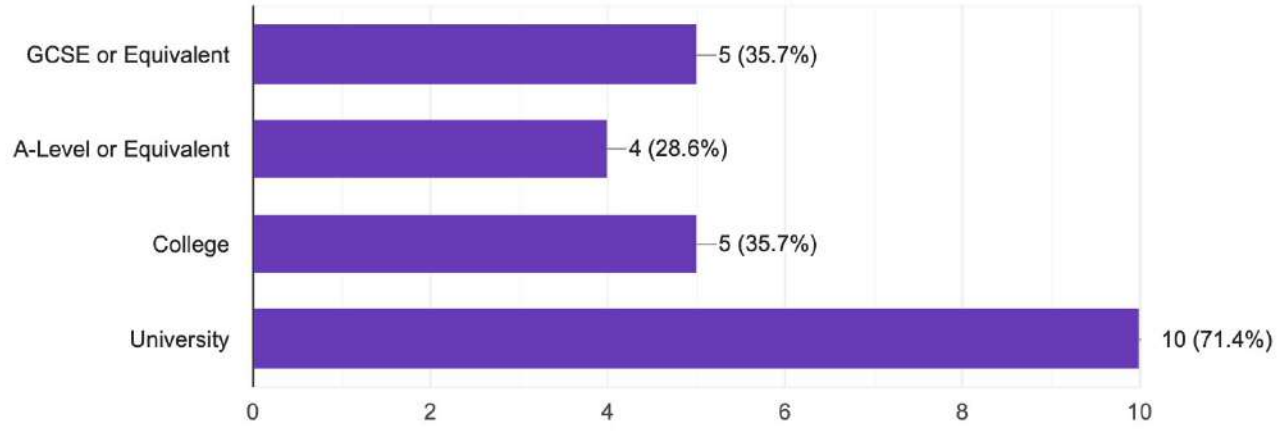
Age (Must be over 18)

14 responses

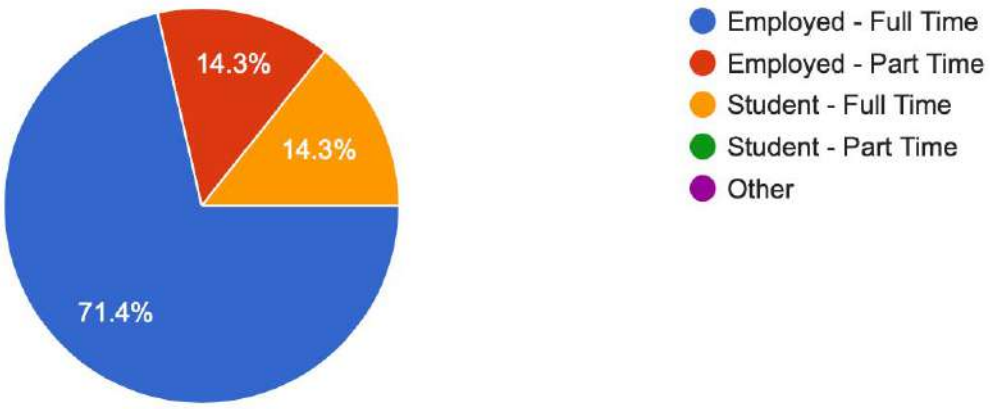


What levels of education have you completed?

14 responses

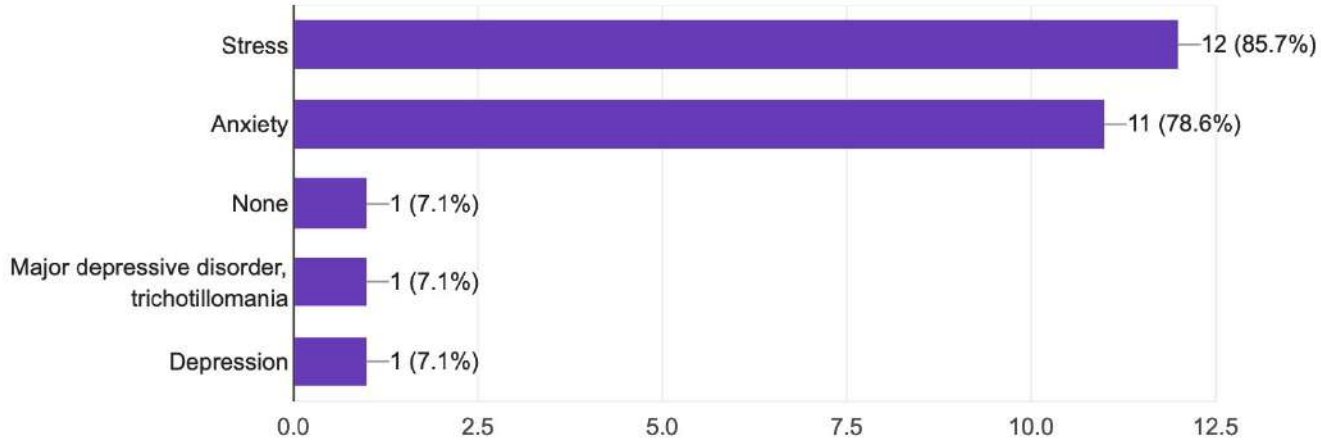


14 responses



Have you ever experienced stress or anxiety at any stage of your education?

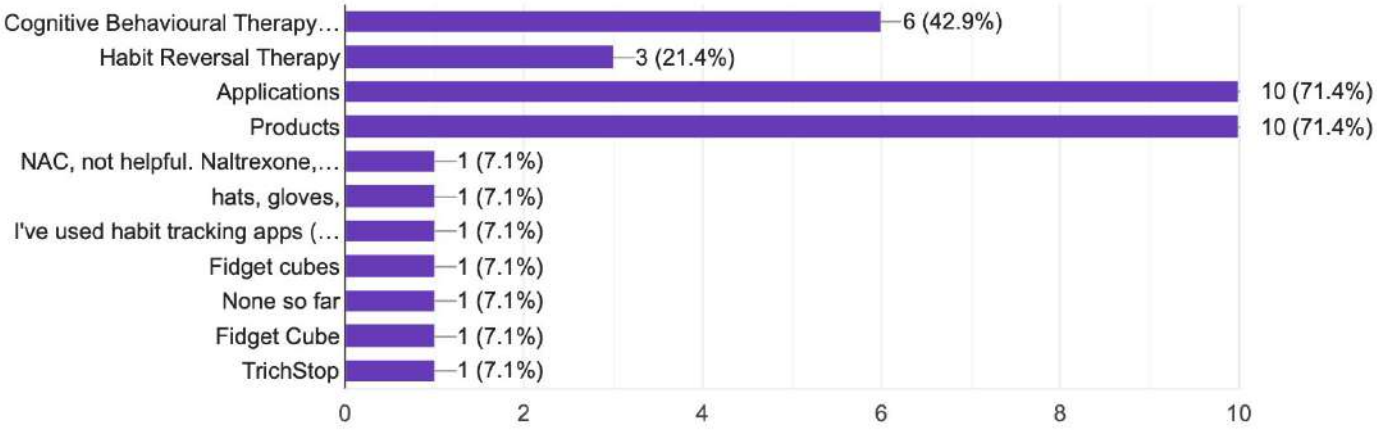
14 responses



Have you tried anyways (*e.g., products or techniques*) to stop the urges of pulling? If so, what are they and how successful are they? (*Please state them in the other section)*

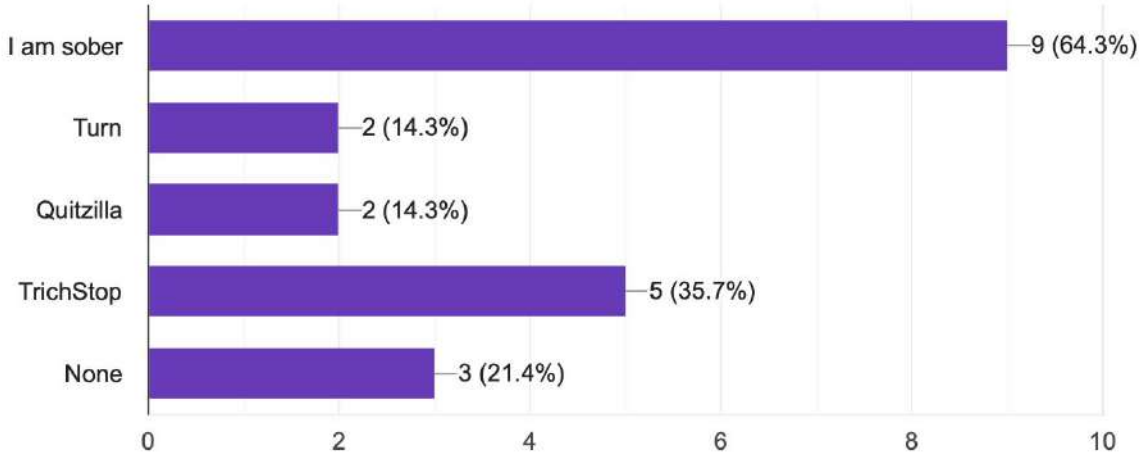
Copy

14 responses



Have you ever downloaded the following applications: I am Sober, Quitzilla, TrichStop, or Turn? If there are any other apps, *please state them in the other section.*

14 responses



How do you feel about these app(s)? *Do you think they are good? Bad? Useful? etc*

11 responses

I think useful. They probably can be really good for some, and bad for others. If anything, they give you a sense of how your journey might be going.

I think I Am Sober is helpful, just not as a standalone resource. For me personally, I liked how you could share progress and/or frustrations with other users. I don't think it's discouraging to hear people relapse, it was honestly comforting to have proof that addictions/impulses are hard to beat and there are tons of people rooting for you.

I think that the app is useful to track my hair pulling behavior via measuring the amount of time that I have stopped pulling for. This helps me stay mindful of my progress and motivates me to do better.

Unhelpful

They were somewhat useful.

N/A

The motivational quotes are awesome. I think quitzilla allowed me to figure out a pattern of when I pull so I can be more cognizant if the future. I think the app is only as helpful as you make it because you gotta use it wisely. Or else it's just going to discourage you when you reset your timer.

They are hard to continuously use and require a lot of manual input

Didn't really work for me

They seemed to work initially however, after around 4 weeks I stopped using the App

Was very boring to look at

What about the experience of the app(s) could be improved? *In the way it works, looks or feels?*

9 responses

I haven't used it in a bit, so I can't remember specific things I would change.

No comment

Easier to insert info

N/A

I think having the apps look more engaging would want you to log in.

Feel like it scares you away from breaking the streak you create

It's just limited to a diary

Community features could be utilised more

Make it look more modern and less like an android UI on IOS

What aspects of the app(s) do you enjoy? *Why are they good? What features are the most useful?*

9 responses

I love knowing how long I've gone between major pulling sessions. This way i also have an idea of how long it takes for the lashes to grow back.

I liked being able to document how hard it was to stay on track. I made the "journey" feel more realistic, it's never just a straight line.

The most useful feature is the ability to write down reasons why I want to stop pulling and uploading pictures of how I looked after excessive pulling. I enjoy this feature because it helps motivate me more than just keeping track of time since I last pulled.

I liked the simplicity of some of them. I don't need a to. If different pages and buttons on the app, just the timer and maybe a notes section

N/a

The motivational quotes! I wish there were more than 1 a day!

I like the way you can add a lot of detail into the pulling episodes

Streaks are a good motivator

Was fairly clear once you understood the application

How have these app(s) made an impact on your life?

8 responses

By knowing how many days I've gone without major pulling sessions (more than 5 lashes in one spot), I can judge how long to expect before my lashes are back.

The app is helping me reduce my hair pulling behavior

It helps me be more aware

N/A

Yes! It made me realize my triggers.

They had a positive impact on my life and the habit to begin with but eventually I lost interest.

To begin with these apps were helpful

It seemed to work really well as it meant that I could look back in the day and see if there is a pattern from when the habits are displayed.

Are there any changes that you would add to the existing apps to make them better for you?

9 responses

Unsure

Idk

I think that all features of the app should be free instead of locked behind a paywall.

No

N/a

Prettier interface.

I would like to see them show where other people are on their journey, but ensure that my identity is kept anonymous

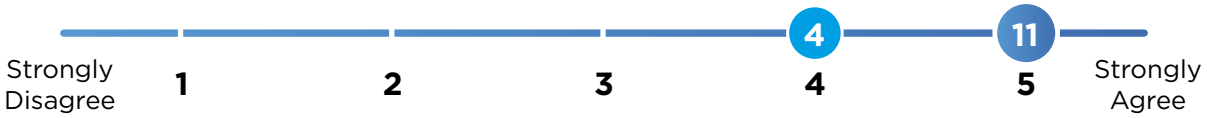
I'd make the app more customisable

I would add a community page to get motivation from other users who understand what it is like to go through this experience

7.8 Appendix C2 - Raw Data (testing)

User Evaluation - Open to all

I think that I would like to use the ReWire App



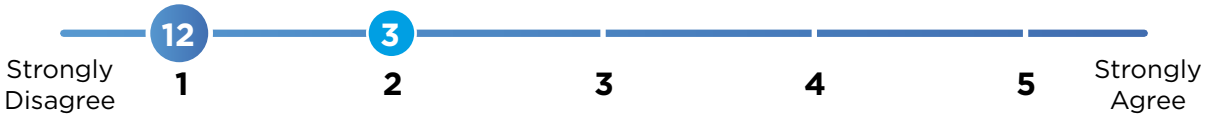
I found the ReWire App unnecessarily complex

I thought the ReWire App was easy to use

I think that I would need technical help with using the ReWire App

I found the various functions in this ReWire App were well integrated

I thought there were too many inconsistencies within the ReWire App

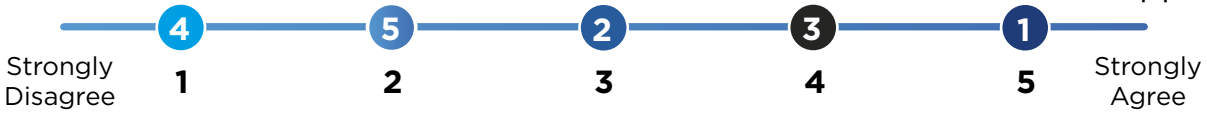


I would imagine that most people would learn ReWire App very quickly

I found the ReWire App very cumbersome to use

I felt very confident using ReWire App

I needed to learn a lot about BFRBs before I could use the ReWire App



User Evaluation - BFRB Suffers only

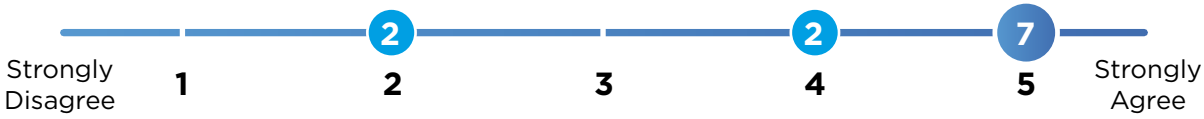
The app makes me feel positive about managing BFRBs

I would like to try this product out, to manage a BFRB

This app will help me document and see trends about the BFRBs

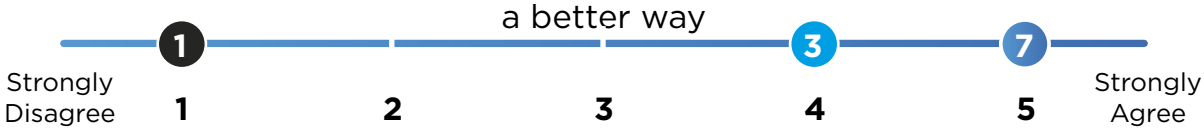
Having the frequency and the time of each episode helps see where episodes happen and helps identify triggers

I find rewards in apps useful as I want to unlock more rewards



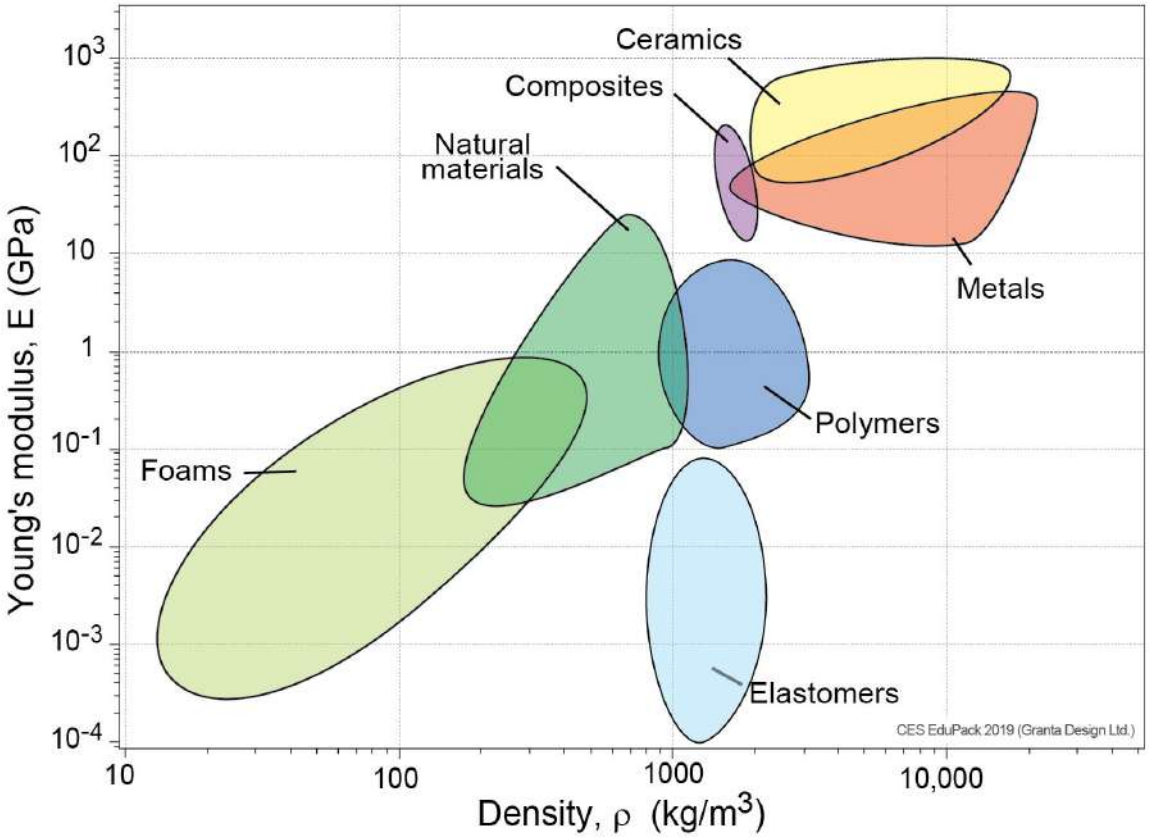
I would like to be able to share my journey with other people for support

The chat option in the app would allow me to manage my BFRB in a better way



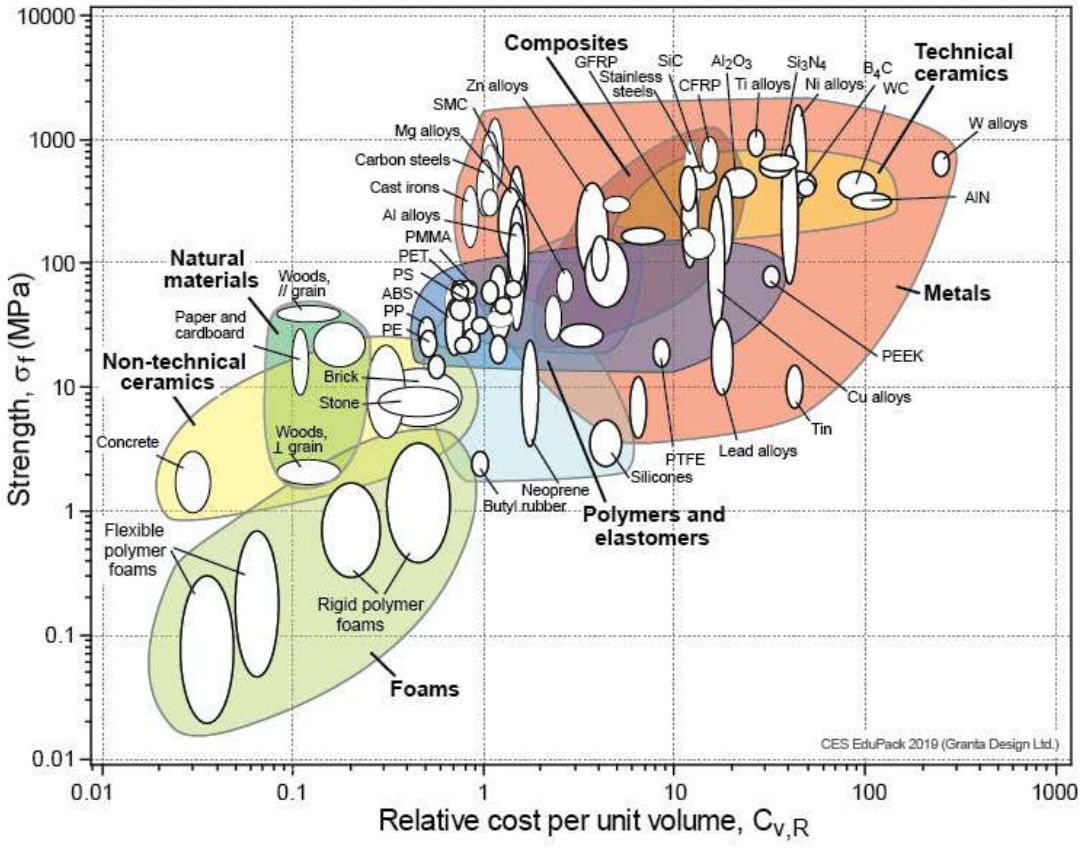
I would like to try this product out to manage my BFRB

7.9 Appendix D - Material Selection



(CES EduPack, 2019)

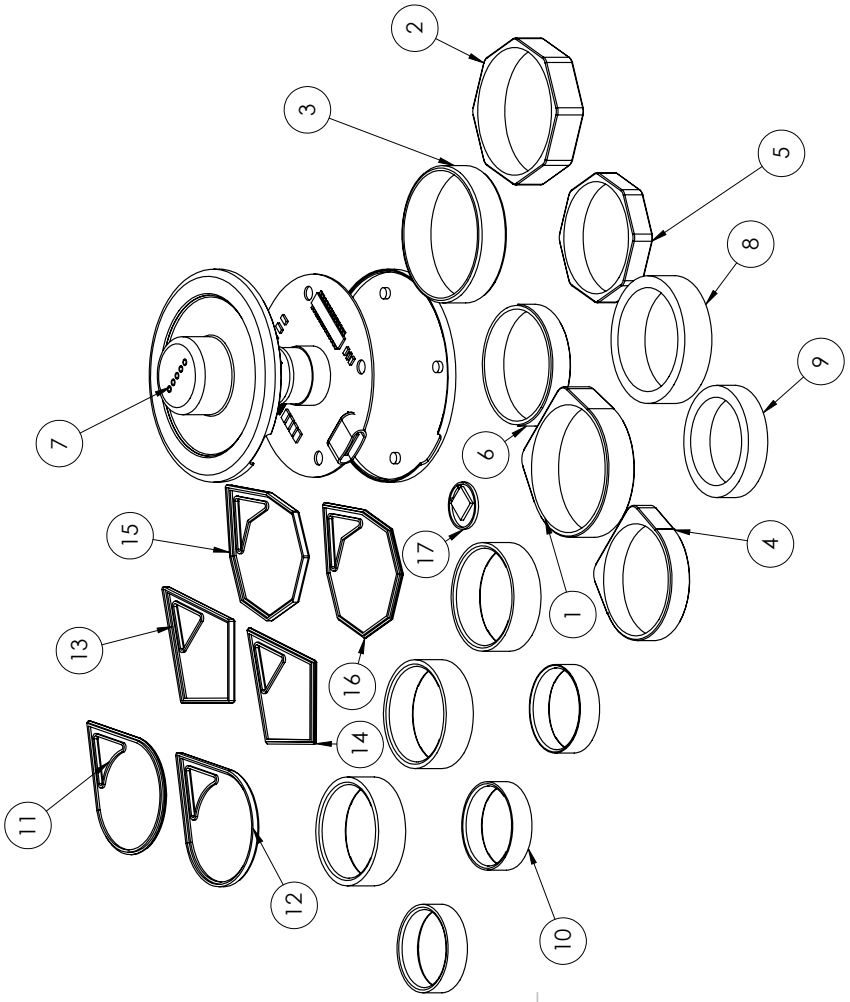
Plastics are used to hold the electronics and for the sizing ring component due to the good properties of the material. ABS is chosen out the polymers available as it is low cost, recyclable and strong.



(CES EduPack, 2019)

7.10 Appendix E - Technical Drawings

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	outer ring men flat	INJECTION MOULDED ABS/CNC MILLED	1
2	outer ring men octo	INJECTION MOULDED ABS/CNC MILLED	1
3	outer ring men ring	INJECTION MOULDED ABS/CNC MILLED	1
4	outer ring women flat	INJECTION MOULDED ABS/CNC MILLED	1
5	outer ring women octo	INJECTION MOULDED ABS/CNC MILLED	1
6	outer ring women ring	INJECTION MOULDED ABS/CNC MILLED	1
7	Charger pcb	INJECTION MOULDED ABS	1
8	Mid Rings Men	INJECTION MOULDED ABS	1
9	Mid Rings women	INJECTION MOULDED ABS	1
10	Inner Rings all	EXTRUDED ABS	1
11	circle A PART	Upper circle pendant part, ABS, CAST BRASS/ALUMINIUM	1
12	circle B PART	Lower circle pendant part, ABS, CASR BRASS?ALUMINIUM	1
13	FLAT A PART	Upper flat pendant part, ABS, CAST BRASS/ALUMINIUM	1
14	FLAT B PART	Lower flat pendant part, ABS, CAST BRASS/ALUMINIUM	1
15	Octo A PART	Lower part of octogon pendant part, ABS, CAST BRASS/ALUMINIUM	1
16	Octo B PART	Upper part of octogon pendant part, ABS, CAST BRASS/ALUMINIUM	1
17	RDIF TAG	RDIF Coil	1



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
ANGULAR:

FINISH:

DEBURR AND BREAK SHARP EDGES

	NAME	SIGNATURE	DATE
DRAWN	J OSBORNE		
CHKD			
APPVD			
MFG			
QA			

MATERIAL: ABS, BRASS, ALUMINUM

WEIGHT:

DO NOT SCALE DRAWING

REVISION: FINAL DESIGN

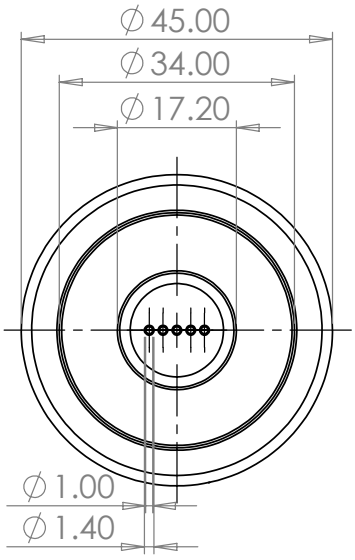
TITLE: All Parts

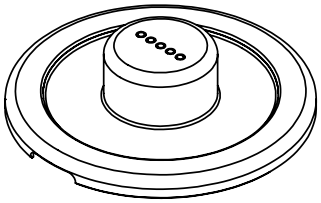
DWG NO. BoM

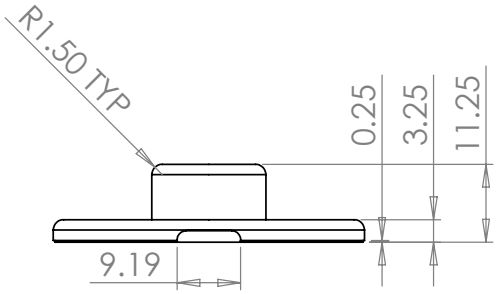
A3

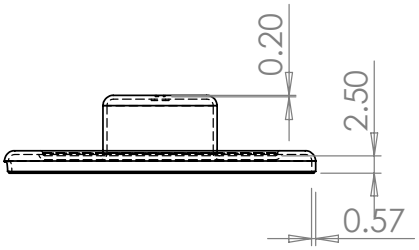
SCALE: 1:1

SHEET 1 OF 1

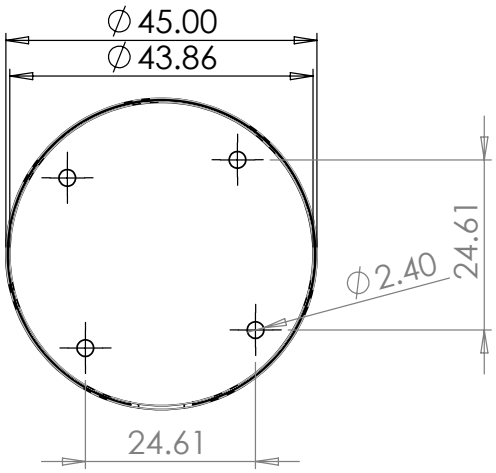


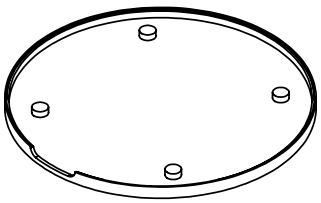


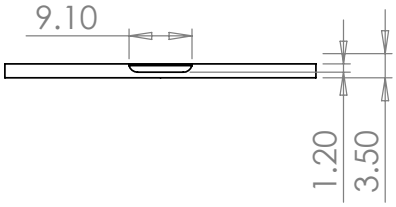


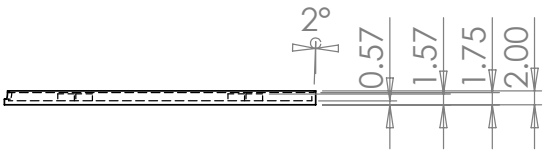


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: Finish from injection moulding		DEBURR AND BREAK SHARP EDGES. Remove injection point			DO NOT SCALE DRAWING	REVISION Final Design
	NAME	SIGNATURE	DATE			TITLE:	
DRAWN	J Osborne					Upper Shell	
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL:		DWG NO.	A4
				ABS		Charger pcb UPPER	
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

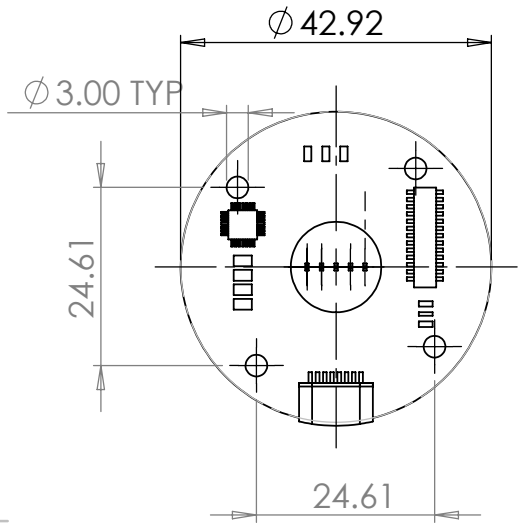


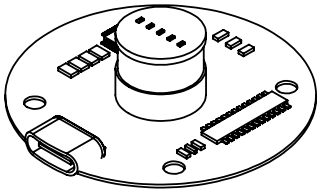


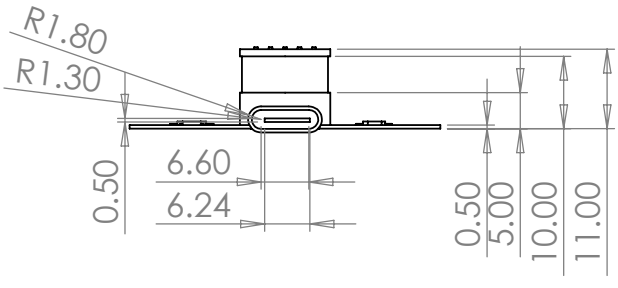


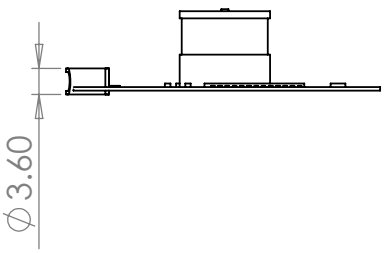


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH: INJECTION MOULDED		DEBURR AND BREAK SHARP EDGES/ REMOVE INJECTION MOULDING POINT		DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			TITLE: LOWER CHARGER CASE	
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL: ABS		DWG NO. Charger pcb lower	A4
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1



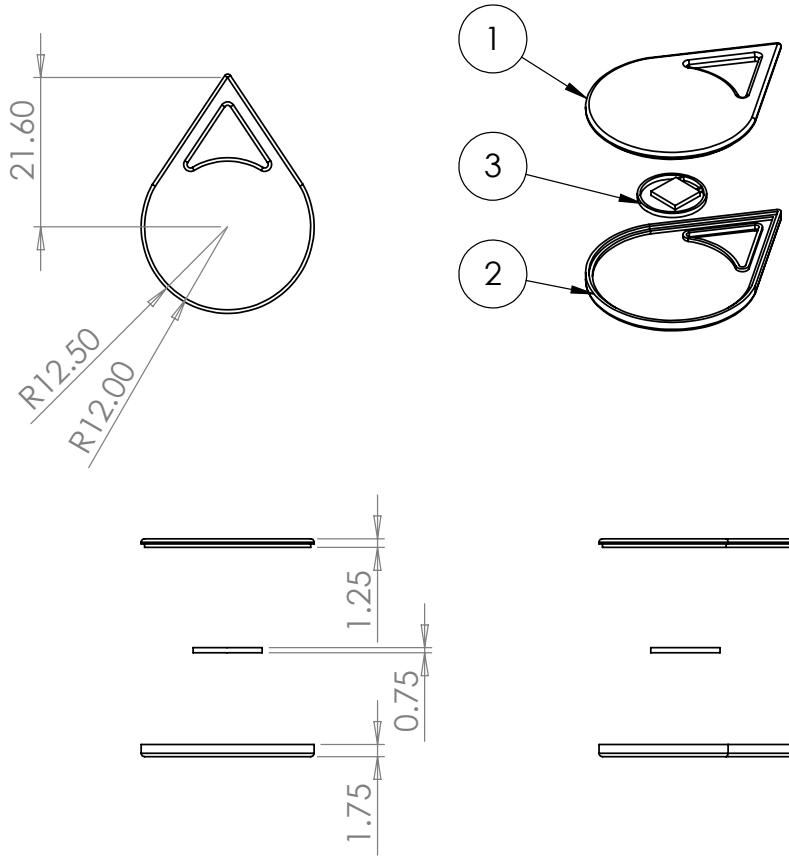






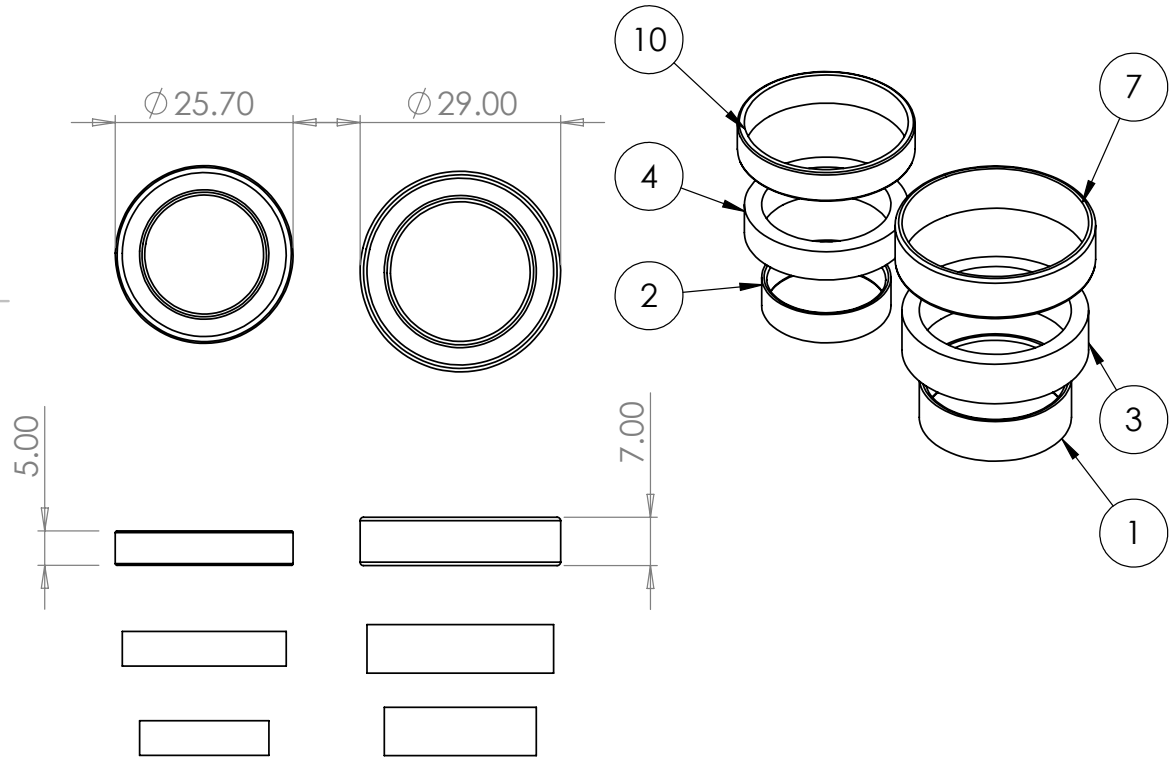
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: PCB		DEBURR AND BREAK SHARP EDGES			DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			TITLE: PCB	
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL: PCB		DWG NO. Charger pcb	A4
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	circle A PART	Upper circle pendant part	1
2	circle B PART	Lower circle pendant part	1
3	RDIF TAG	RDIF Coil	1



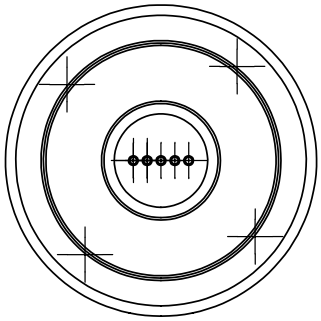
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH: PAINT/POLISH		DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION FINAL DESIGN	
	NAME	SIGNATURE	DATE		TITLE: GA DRAWING CIRCLE PENDANT		
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A					MATERIAL: ABS/BRASS/ALUMINIUM	DWG NO. CIRCLE A & B PART	A4
					WEIGHT:	SCALE:1:1	SHEET 1 OF 1

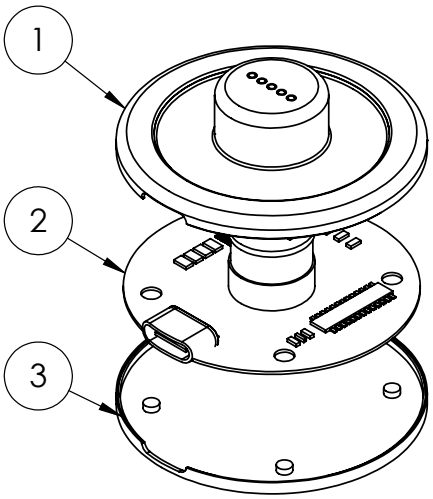
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Mens inner finger 20.2mm	EXTRUDED ABS PLASTIC	3
2	Womens inner finger 16.9mm	EXTRUDED ABS PLASTIC	3
3	Mid Rings Men	INJECTION MOULDED ABS	3
4	Mid Rings women	INJECTION MOULDED ABS	3
7	outer ring men ring	INJECTION MOULDED ABS/CNC MILLED	1
10	outer ring women ring	INJECTION MOULDED ABS/CNC MILLED	1

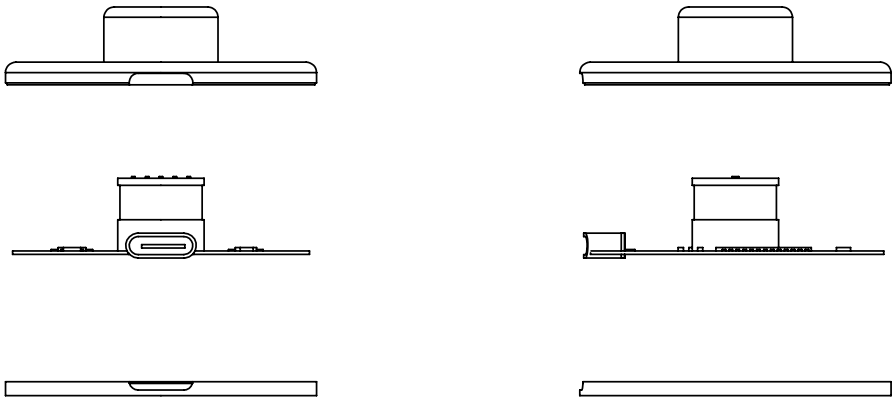


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH: ASSEMBLE		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			TITLE: CIRCULAR RING ASSEMBLY	
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL:		DWG NO. CIRCULAR EXPLODED	A4
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	CHARGER UPPER	Upper section of charging base	1
2	CHARGER PCB	PCB of the charging base	1
3	CHARGER LOWER	Upper section of charging base	1

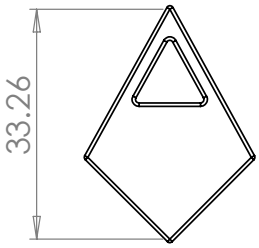


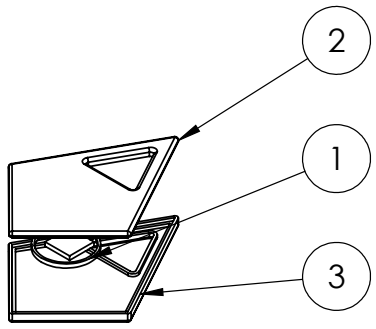


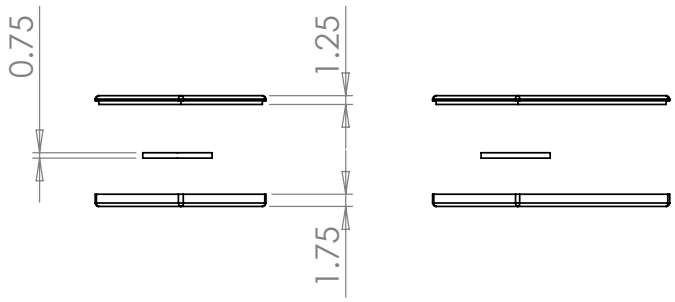


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH:		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			TITLE:	
DRAWN	J OSBORNE					GA DRAWING	
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL:		DWG NO.	A4
						CHARGING BASE	
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	RDIF TAG	RFID Coil	1
2	PENDANT UPPER FLAT	Upper section of the pendant	1
3	PENDANT LOWER FLAT	Lower section of the pendant	1







UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
ANGULAR:

FINISH:

DEBURR AND BREAK SHARP EDGES

DO NOT SCALE DRAWING

REVISION FINAL DESIGN

	NAME	SIGNATURE	DATE
DRAWN	J OSBORNE		
CHK'D			
APPV'D			
MFG			
Q.A			

MATERIAL:

WEIGHT:

TITLE:

Exploded View Flat Pendant

DWG NO.

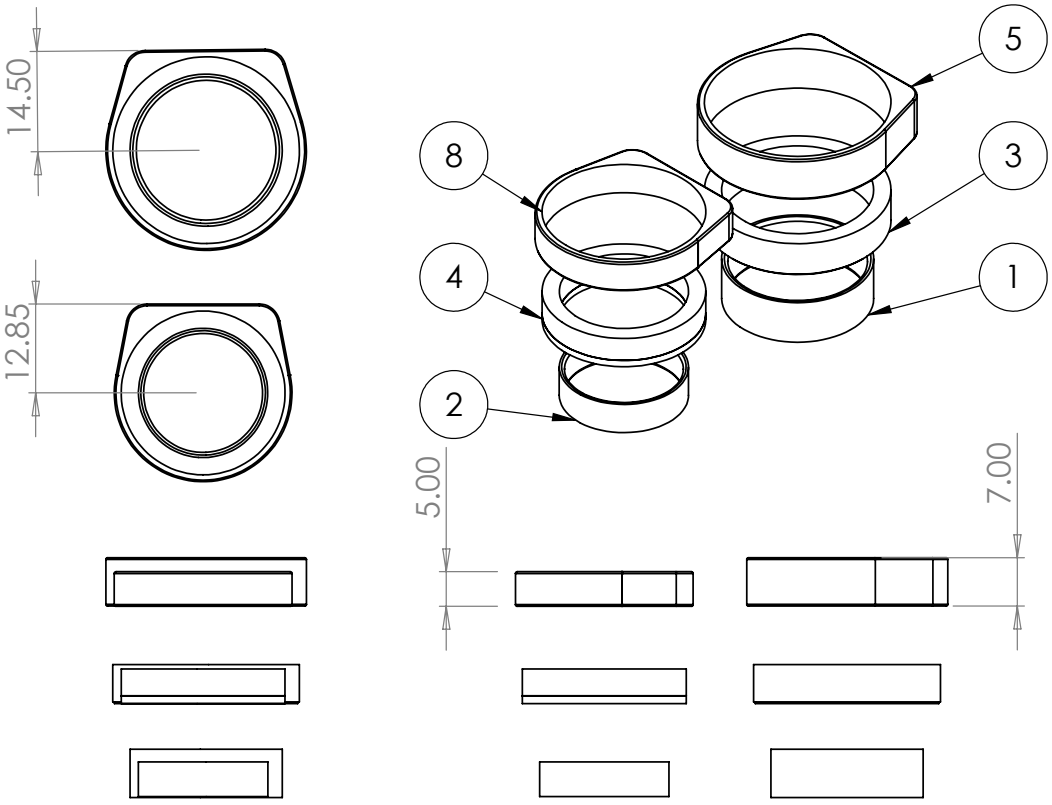
FLAT ASSEMBLY

A4

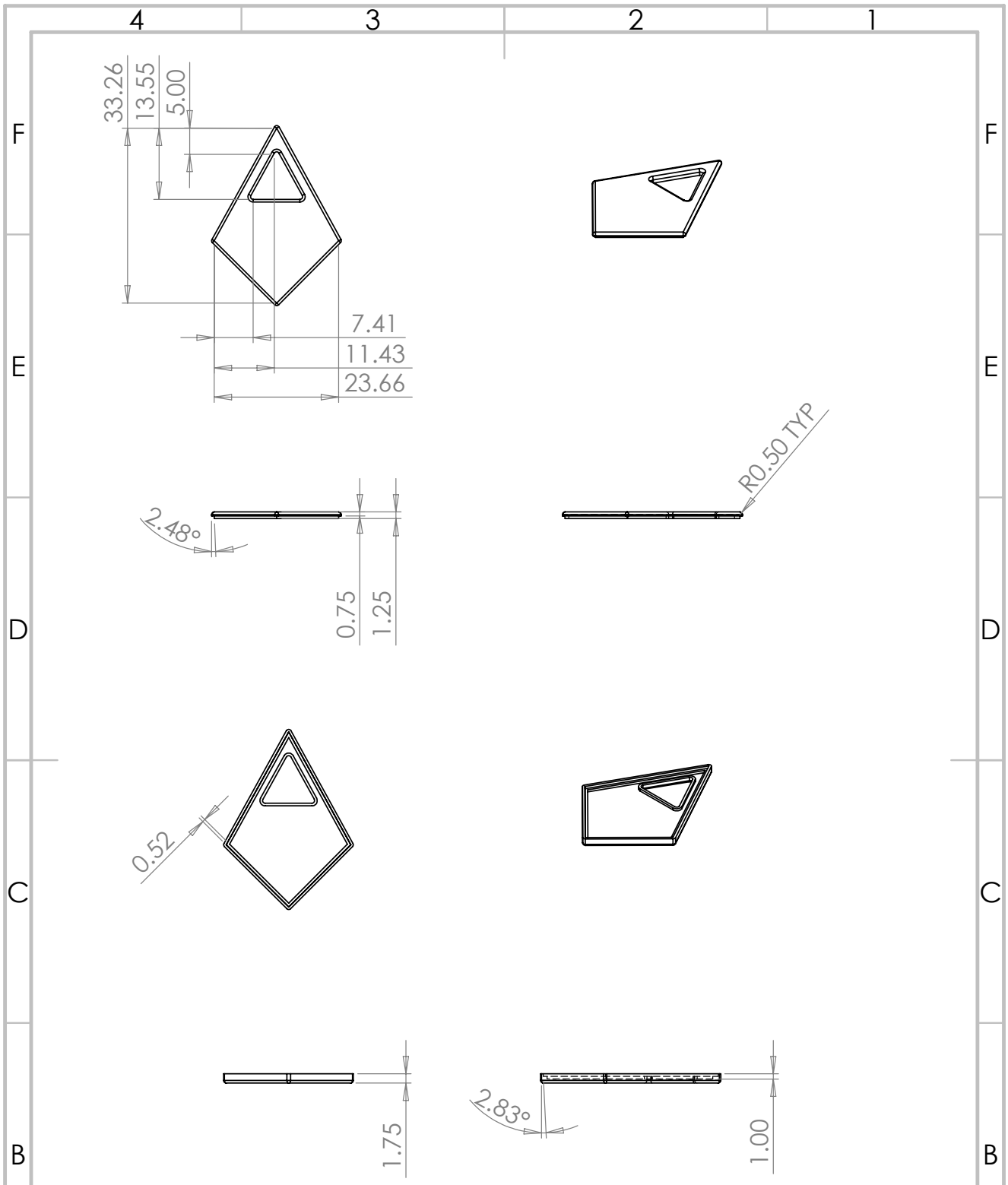
SCALE:1:1

SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Mens inner finger 20.2mm	EXTRUDED ABS PLASTIC	3
2	Womens inner finger 16.9mm	EXTRUDED ABS PLASTIC	3
3	Mid Rings Men	INJECTION MOULDED ABS	3
4	Mid Rings women	INJECTION MOULDED ABS	3
5	outer ring men flat	INJECTION MOULDED ABS/CNC MILLED	1
8	outer ring women flat	INJECTION MOULDED ABS/CNC MILLED	1



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH: ASSEMBLED		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			TITLE: EXPLODED VIEW OF FLAT RING	
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL:		DWG NO. FLAT EXPLODED	A4
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: PAINTED/POLISHED	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING REVISION FINAL DESIGN

	NAME	SIGNATURE	DATE
DRAWN	J OSBORNE		
CHK'D			
APPV'D			
MFG			
Q.A			

TITLE: CIRCLE PART A

MATERIAL: ABS/BRASS/ALUMINIUM

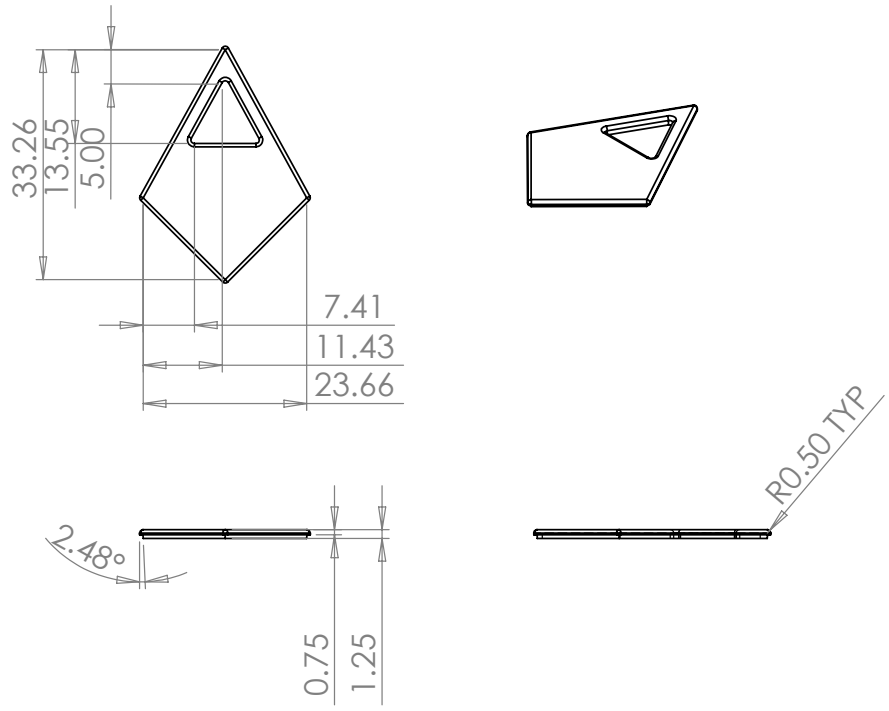
DWG NO. CIRCLE PART A

A4

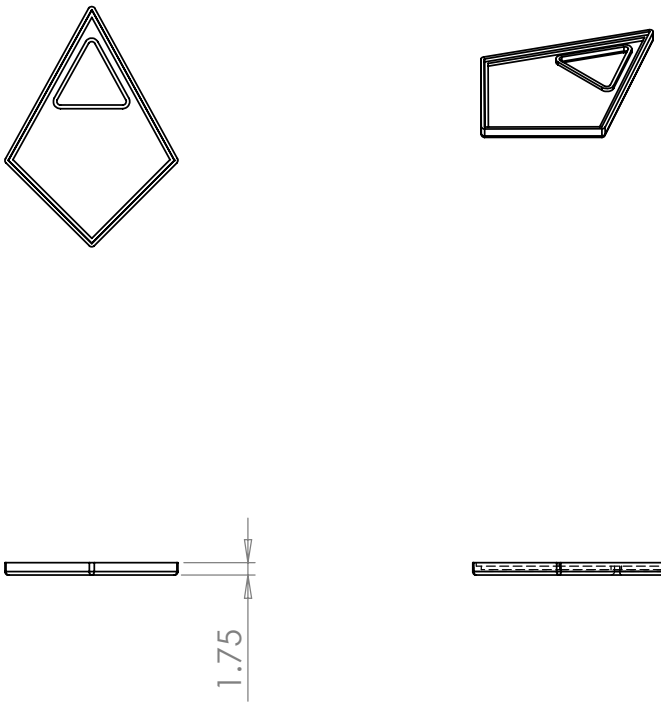
WEIGHT:

SCALE:1:1

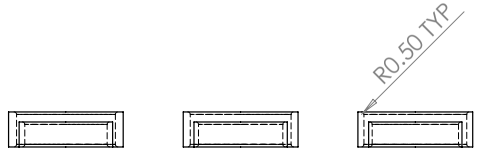
SHEET 1 OF 1

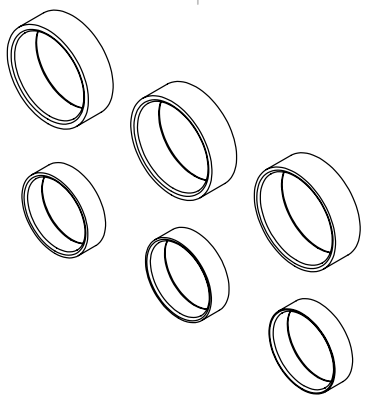


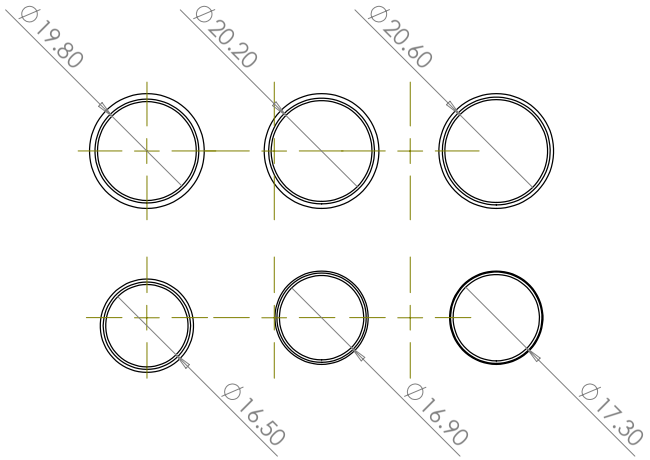
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: PAINTED/POLISHED	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION FINAL DESIGN			
	NAME	SIGNATURE	DATE				TITLE: CIRCLE PART A
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL: ABS/BRASS/ALUMINIUM		DWG NO. CIRCLE PART A	A4
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

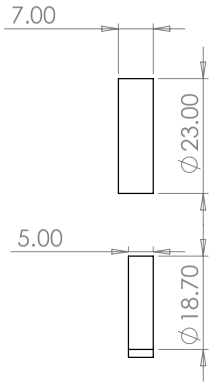


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: PAINTED/POLISHED		DEBURR AND BREAK SHARP EDGES			DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			TITLE:	
DRAWN	J OSBORNE					FLAT PART B	
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL:		DWG NO.	A4
				ABS/BRASS/ALUMINIUM		FLAT PART B	
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

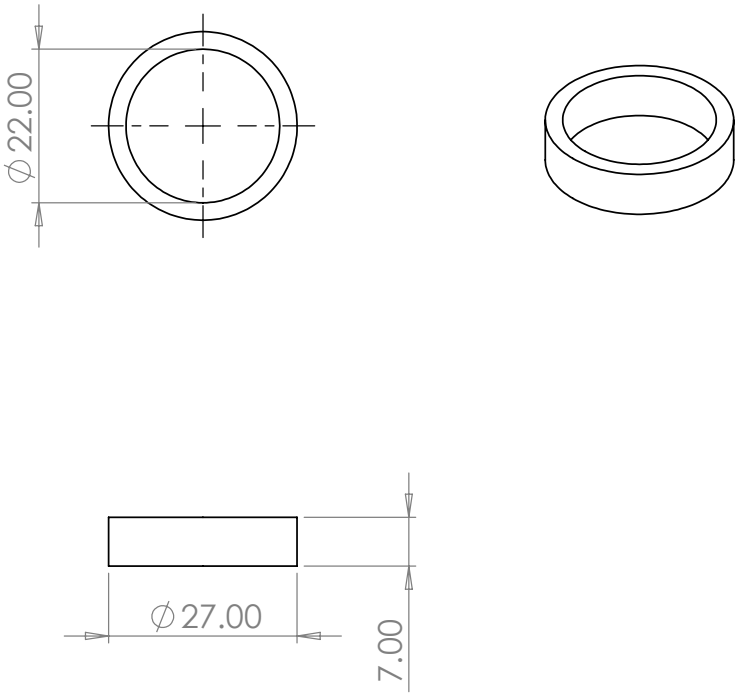








UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH: PAINTED/POLISHED		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			TITLE:	
DRAWN	J OSBORNE						
CHK'D							
APP'V'D							
MFG							
Q.A				MATERIAL: ABS/BRASS/ALUMINIUM		DWG NO. Inner Rings all	A3
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: SELF FINISHING	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING / REVISION FINAL DESIGN

	NAME	SIGNATURE	DATE
DRAWN	J OSBORNE		
CHK'D			
APPV'D			
MFG			
Q.A			

TITLE:
MIDDLE SECTION OF THE LARGER RING

MATERIAL:
ABS

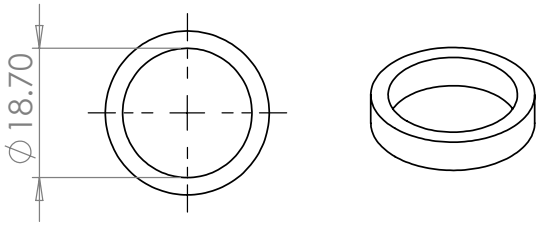
DWG NO.
Mid Rings Men

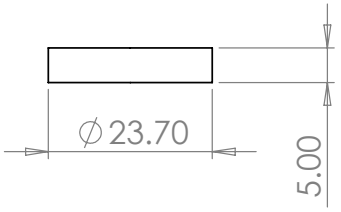
A4

WEIGHT:

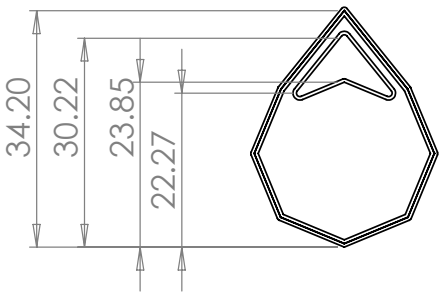
SCALE:1:1

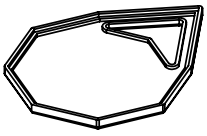
SHEET 1 OF 1

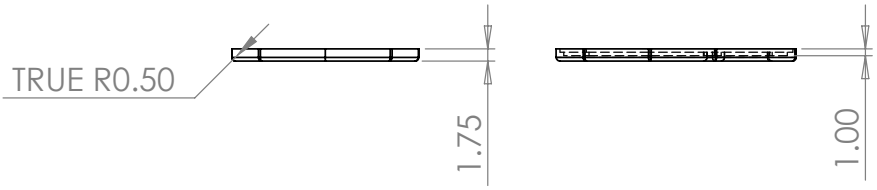


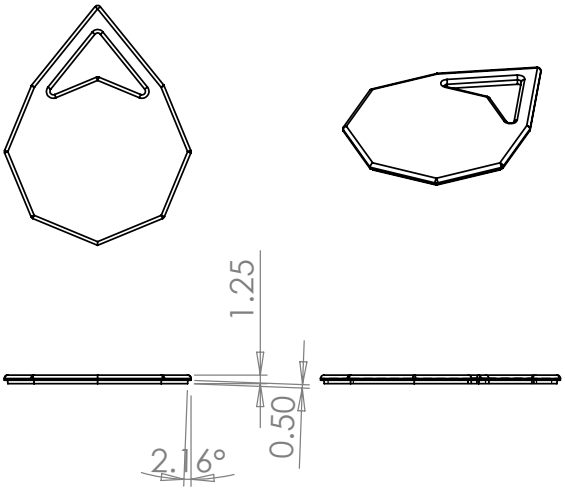


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: ABS SELF FINISHING		DEBURR AND BREAK SHARP EDGES			DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			TITLE: MIDDLE SECTION OF THE SMALLER RING	
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL: ABS		DWG NO. Mid Rings women	A4
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1



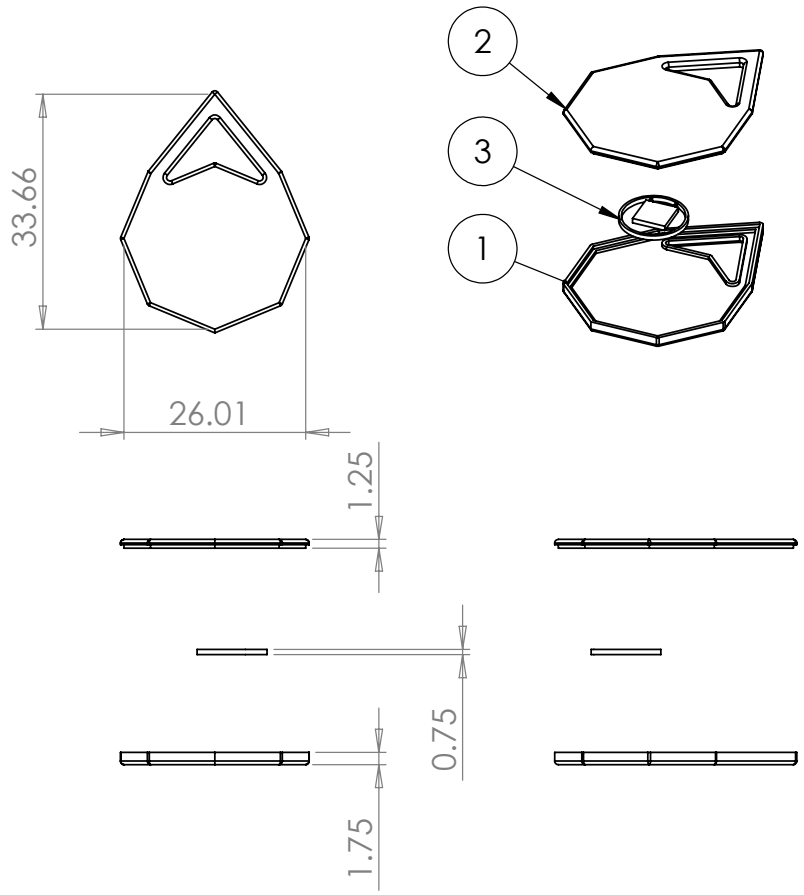






UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: PAINTED/POLISHES	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION FNAL DESIGN			
	NAME	SIGNATURE	DATE				TITLE:
DRAWN	J OSBORNE						OCTOGON PENDANT A & B
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL: ABS/BRASS/ALUMINIUM			DWG NO. Octo A & B PART
							A4
				WEIGHT:	SCALE:1:1	SHEET 1 OF 1	

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Octo A PART	Lower part of octogon pendant	1
2	Octo B PART	Upper part of octogon pendant	1
3	RDIF TAG	RDIF Coil	1



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: PAINTED/POLISHED	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING / REVISION FINAL DESIGN

	NAME	SIGNATURE	DATE
DRAWN	J OSBORNE		
CHK'D			
APPV'D			
MFG			
Q.A			

TITLE:
GA DRAWING
OCTOGON PENDANT

MATERIAL:
ABS/BRASS/ALUMINIUM

DWG NO.
OCTO ASSEMBLY

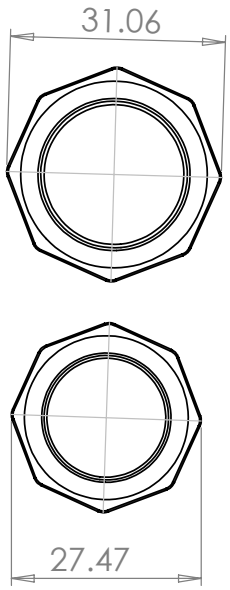
A4

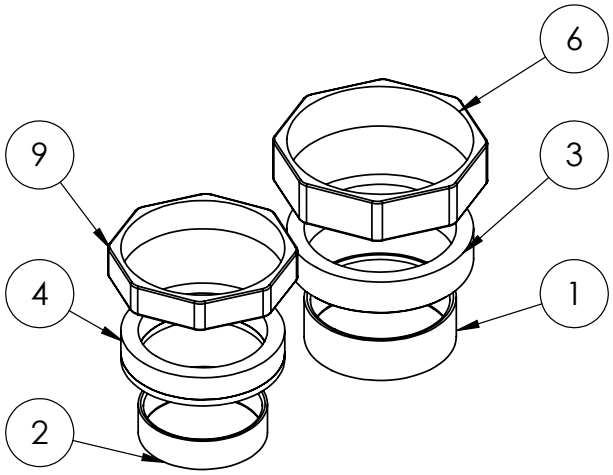
WEIGHT:

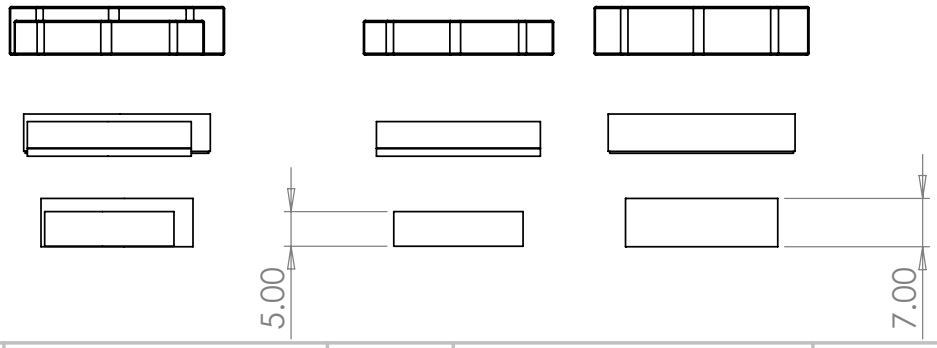
SCALE:1:1

SHEET 1 OF 1

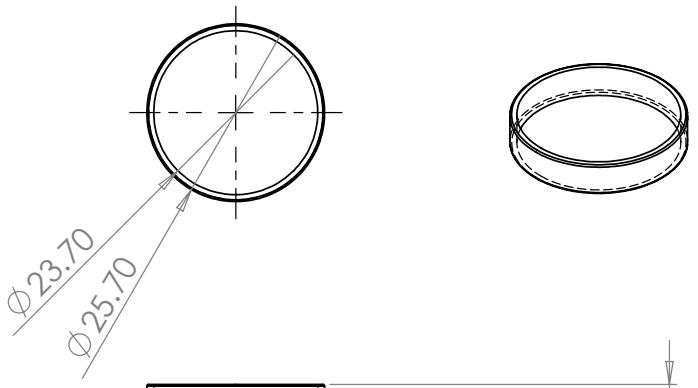
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Mens inner finger 20.2mm	EXTRUDED ABS PLASTIC	3
2	Womens inner finger 16.9mm	EXTRUDED ABS PLASTIC	3
3	Mid Rings Men	INJECTION MOULDED ABS	3
4	Mid Rings women	INJECTION MOULDED ABS	3
6	outer ring men octo	INJECTION MOULDED ABS/CNC MILLED	1
9	outer ring women octo	INJECTION MOULDED ABS/CNC MILLED	1

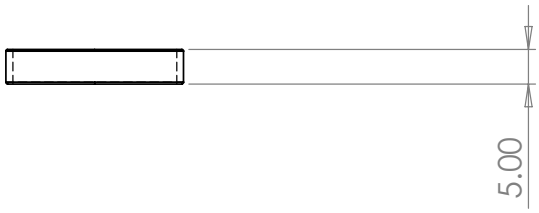


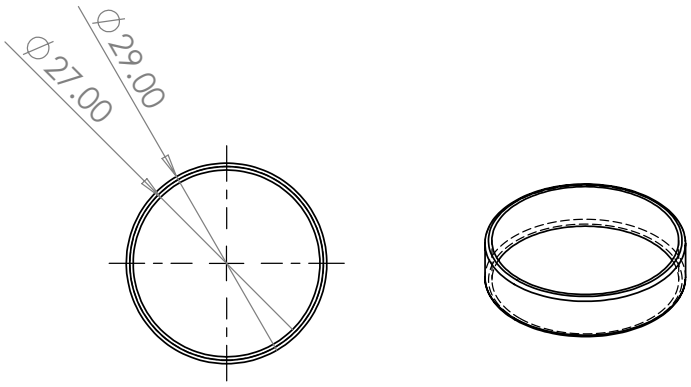


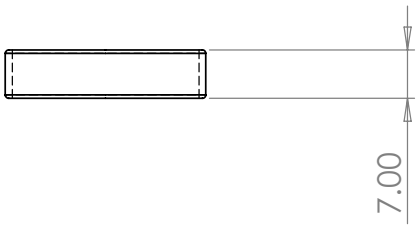


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH: ASSEMBLED		DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION FINAL DESIGN	
	NAME	SIGNATURE	DATE		TITLE: EXPLODED VIEW OCTOGON RING		
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL:	DWG NO. OCTO EXPLODED		A4
				WEIGHT:	SCALE:1:1	SHEET 1 OF 1	









UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: PAINTED/POLISHED	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING / REVISION FINAL DESIGN

	NAME	SIGNATURE	DATE
DRAWN	J OSBORNE		
CHK'D			
APPV'D			
MFG			
Q.A			

TITLE:
MEN AND WOMENS CIRCLUAR RINGS

MATERIAL:
ABS/BRASS/ALUMINIUM

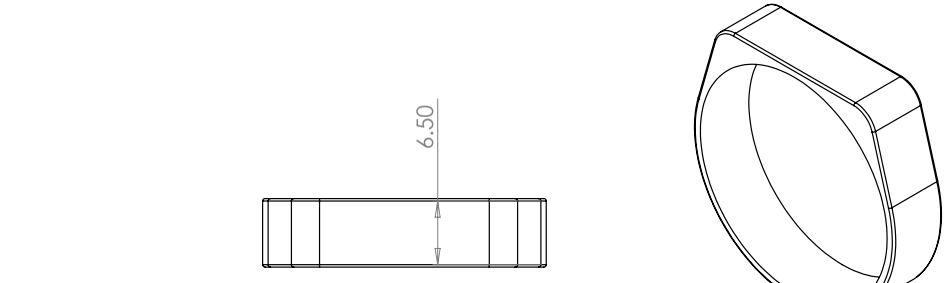
DWG NO.
OUTER RING CIRCLES

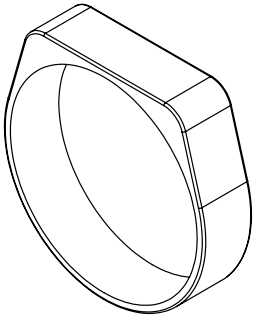
A4

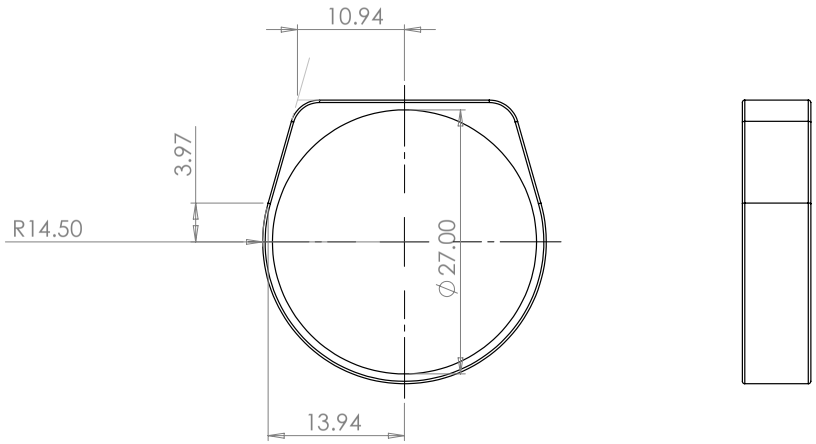
WEIGHT:

SCALE:1:2

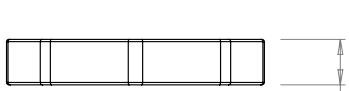
SHEET 1 OF 1

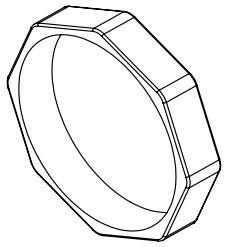


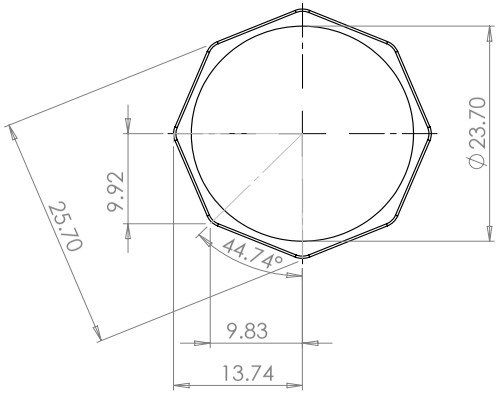


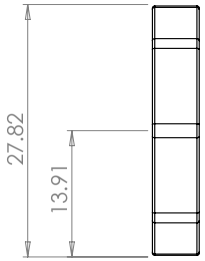


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH: POLISHED		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE			NAME	
DRAWN	J OSBORNE					Jacob Osborne	
CHK'D							
APP'V'D							
MFG							
Q.A				MATERIAL: ALUMINIUM/Brass		DWG NO. outer ring men flat	A3
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

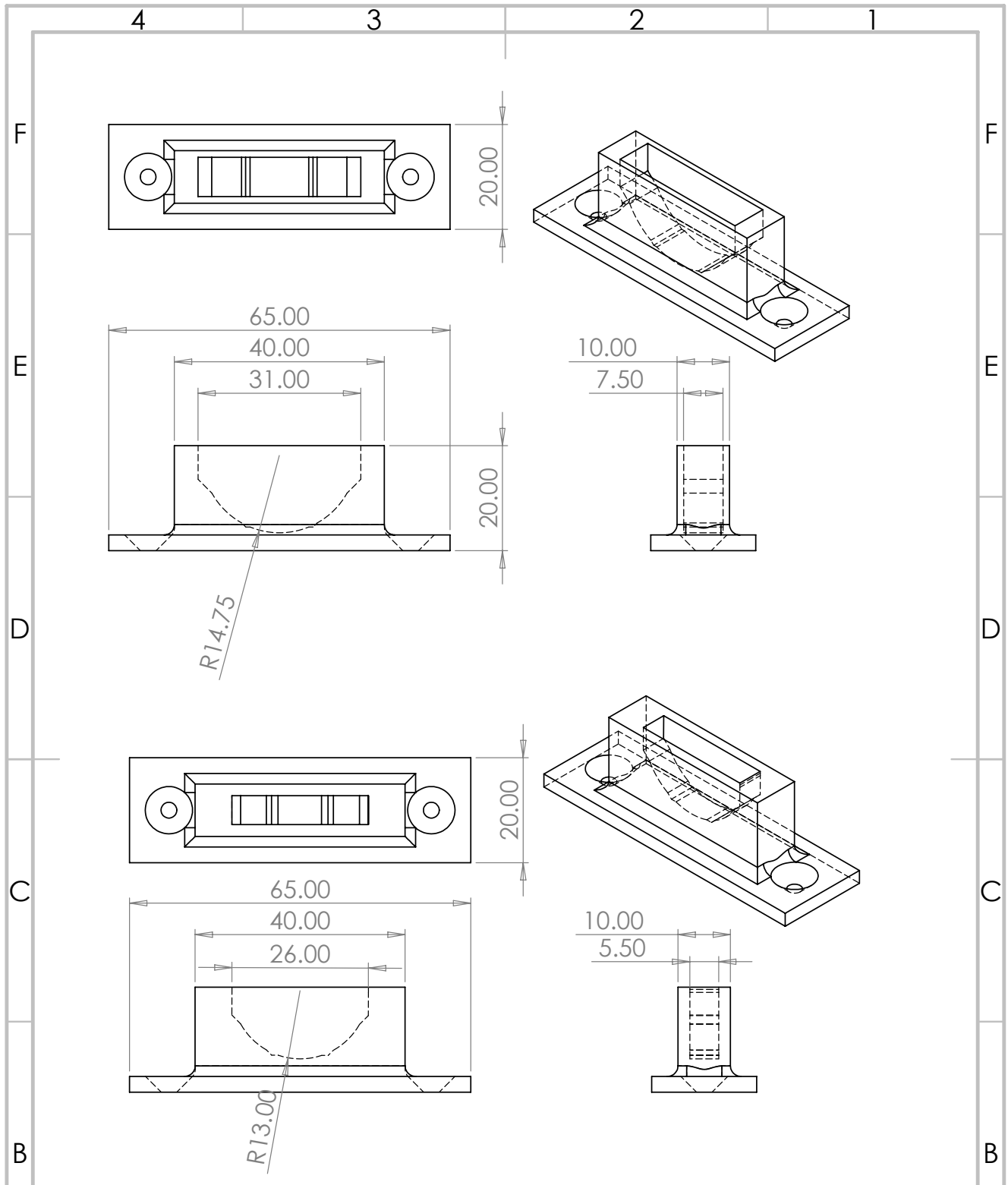








UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: POLISHED			DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION FINAL DESIGN
	NAME	SIGNATURE	DATE		NAME: JACOB OSBORNE	
DRAWN	J OSBORNE					
CHK'D						
APPV'D						
MFG						
Q.A				MATERIAL: BRASS/ALUMNIUM	DWG NO. outer ring women octo	A3
				WEIGHT:	SCALE: 1:1	SHEET 1 OF 1



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH: 3D Printed	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION			
	NAME	SIGNATURE	DATE				TITLE: Laser engraving Jigs
DRAWN	J OSBORNE						
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL:			DWG NO. Jigs
							A4
				WEIGHT:		SCALE:1:1	SHEET 1 OF 1

7.11 Appendix F1 - PDS Evaluation

1.0 Function

1.1 Create self awareness to the action of BFRBs
1.2 Have a battery life that lasts the week
1.3 Not draw attention to the user when using the product
1.4 Communicate to the user patterns
1.5 Give the user an idea of how much the behaviour occurs with details of when and for how long for (in the app)
1.6 Be able to help calm the user
1.7 Show real, live data
1.8 Give the user an area to add emotions. **The app doesn't have a page for emotions during the day**
1.9 Include a calender
1.10 Support with motivational quotes
1.11 Give the user a place to share their experience with a community
1.12 Give the user virtual rewards which can motivate them to collect them
1.13 Allow the users to connect with professionals
1.14 Be customisable

2.0 Performance

2.1 Must notify the user to the action of the BFRB
2.2 Not go off unintentionally
2.3 Must connect to an application
2.4 Must be simple and easy to use
2.5 Must be rechargeable
2.6 Must be electric
2.7 Be used everyday
2.8 Must be stylish
2.9 Feel premium
2.10 Reliable application
2.11 Can push notifications to encourage or warn the user of an episode
2.12 Work with CBT offered by the NHS

3.0 Human Factors

3.1 Intended user - 18-25 year old students
3.2 Be able to fit both males and females
3.3 Designed to fit lower 5th percentile and upper 95th percentile. **There are currently only 3 sizes available, however these can be easily added to ensure that they fit the users.**
3.4 Simple to put on and take off
3.5 Simple interactions, on/off the other information will be sent to the application
3.6 Tell user when the action is taking place
3.7 Easy to see or feel the notification
3.8 As few buttons as possible
3.9 Charging must be easy

4.0 Environment

4.1 Be able to be worn around during everyday life
4.2 Used in temperatures of -10ºC - 60ºC
4.3 Be used in conjunction with an application
4.4 Rain and dust proof
4.5 Must still work after experiencing -20ºC -75ºC

5.0 Size and Weight

5.1 Must be able to be worn
5.2 Must be discrete
5.3 Must be lightweight
5.4 Not over 100 grams (total)
5.5 Premium weight (heavy for the size)
5.6 Mobile application to fit on IOS phones

6.0 Service Life

6.1 Last for at least 10 year period
6.2 Repairable by authorised centre
6.3 Application to be supported until the discontinuation of the product or until a successor (product or app)

7.0 Sustainability Strategy

7.1 Must be able to taken apart for recycling at the products end of life. **Due to the size of the products it is very difficult to use removable fasteners.**
7.2 Not use any harmful electronics or elements
7.3 Minimise materials which cause social unrest in the world
7.4 Maximise materials from recycled electronics. **This is very hard to ensure at this stage.**
7.5 Battery life must last over 1500 cycles

8.0 Quality & Safety

8.1 Must follow regulation with ISO 9001 quality
8.2 Must be able to be used daily for 10 years without failure
8.3 No small parts which could be easily removed and swallowed. **The very nature of the size of the rings are small making this very difficult to achieve.**
8.4 Must be suitable for users over the age of 18 (product & app)

9.0 Market Price

9.1 RRP between £100-£175
9.2 There should be a 4 times increase from manufacturing cost
9.3 App should be free on the App Store
9.4 Premium features in the app must be paid for monthly
9.5 Monthly subscription costs of £5-£15 a month

10.0 Standards and Legislations

10.1 Comply with BSI
10.2 Follow CE mark standards
10.3 Follow UKAC standards
10.4 Comply with RoHS
10.5 Comply with the WEEE directive

11.0 Product Maintenance

11.1 IP65 water and dust proof rating for cleaning

12.0 Materials

12.1 Non-toxic polymer
12.2 BPA Free
12.3 Can not be brittle
12.4 Premium materials
12.5 Must be resilient

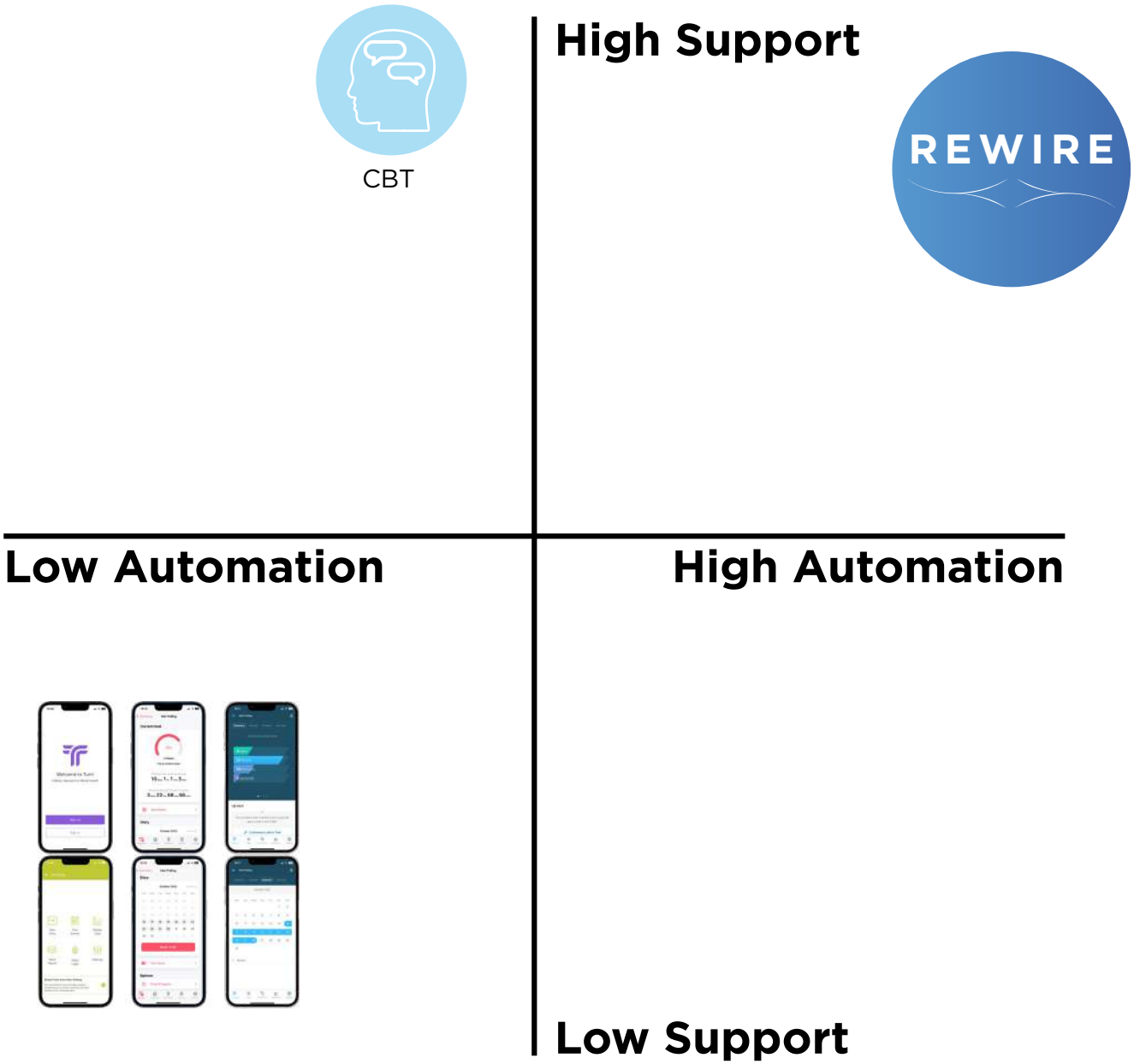
13.0 Manufacturing

13.1 Injection moulded
13.2 CNC machined or turned
13.3 Mass manufacturable, no batch production methods

Key

= Achieved
= Unachieved

7.12 Appendix F2 - Re-visited Market Position



Shows that Rewire is within the predicted target maket as thought in section 2.3

7.13 Appendix G - Meeting Notes

12th October

Major Project Meeting:

- App is good. Nudge / Gamification.
- Tourettes
- Parents design → Stakeholders.
- Go into specific for 1 condition.
- Research heavy. which is a better condition. Parent support.
- Systematically research. Apps, products
  - ↓ Peer reviewed documents.
  - ↓ Fidget toys.
- Online drive with documents
  - ↳ Research.
- Logbook → Physical or digital
- Final submission report.
- Ethics in two weeks time (↑ low - medium)
  - ↳ Parents, lectures, social workers, Students
- Finish all research + ethics. Propose the few ideas before the end of the term
  - ↳ Primary research collection

- Their input on using products
  - ↳ not the condition.
- Tuesday. → ~~wednesday~~. → next week.
- Market research → Be Critical

Compare and contrast.

4 critera to measure against.
↓
identify

160 → MS meeting → wednesday morning

Methods / Process → Methodology.

Human Centered
User centred
Stakeholder centred.
Design Friction
AI / Machine Learning
} Methodoly

ACM → Search Nudge + Condition. e.g. ADHD

Gamification + Condition.

18th October 2[...]

Major Project Meeting 2

- App → (Nudge) / Gamification
  - ↳ Streaks - rewards
- Look into Framework of apps
  - ↳ how successful were they?
- → Anonymous.
- Persona → communities. → Ranking → figures & leaderboard
  - ↓ motivation.
- Ethics of communities → think of it.
  - → Shareing.
  - ↳ Book Influence Robert Kel...
- Demonstrate the product:
  - 2 rooms 1 mic / speaker in each room.
  - ↳ wizard of OZ prototype.
- Insecurity → Aesthetic.
- Condition: Spectrum. No severe addiction.
- Book: "why can't I stop" Behavourial addiction
- App consultants → look Framework → be critical

Better Understanding of Context - Persona

↳ Early prediction, Harder to stop when.
Find a paper to support these

> NHS time frame for CBT.

> Who are other Stakeholders?
- ↳ Social context ↕ community
- ↓ Asking about an experiance.
- ↳ parents
- ↳ Perception of design
- ↳ G.P. / Doctors.

- Next methodology.

Research: · Questionnare. → boys.
· Interview →

Plan Evaluations

↳ Expand the questions.

↳ who will I be asking?

- SUS scale. (Even number).
- week 19 lecture.

Arth: Meeting. 30-3-2023

Keep it Basic. → ~~Premo~~ Primative evaluation.

Good way to evaluate future parts of the app + report at the end.

Heuristics → Score against the 10 elements. ↳ NO MORE THAN 5.

↳ Likert Scale (10) → Radar. spider diagram.

↳ Just 5 things.

- System status → Bluetooth + Battery life. (connection)

Next week.

- Evaluation → Presentation
- Heuristics.
- Manufacturing
- Branding – values (wellness)
- ★ Psycology Theory → what behaviour does change? → link between lit review and product.

★ Video ★ Report ★ Design. Two pages. ★ Viability

★ CMF → Stigma ↳ colour theory.

★ Trends of Jewellery. mood board

- Why the design was chosen (iteration) ↳ Evaluation. ★ Key ★
- User testing evaluation.
- Up Next:

Evaluation: Friday online

- (Friday next 7th)

does Thursday 30th.

Link with app + literature

↳ link lit to PRoduct

Need to make this a big deal.

Stigma. ↳ Mapfic

Jewellery

Multi model iteration

Fit within the normal.

Design the pendant / s maybe 3? women men unisex.

Arthi Meeting

Design the ring x1 → customisable.
? x2

Design the app → Evaluation → questions.

Work out what needs to be on each section.

> Double diamond layout.
4 sections.

- Email Hua for form.

"Brand + CAD Renderings" in board.
↳ + wireframes.

- Evidence of iteration, iteration ideation feedback.
↳ Ask Hua.

Talk about Nudge, Gamification, Haptics → important.
↳ Principles.
What Nudge + Why.
↳ combination.
↓
Evaluation.

→ Data Vis options.
↳ Emotion
↳ Data on demand - Hover over data.

→ Secondary interactions.

→ Dynamic... Island.

7.14 Appendix H - Secondary Interactions App

Notifications that pop up due to BFRBs. This shows the user on their home screen if they've been doing a BFRB action.

REWIRE

JACOB OSBORNE