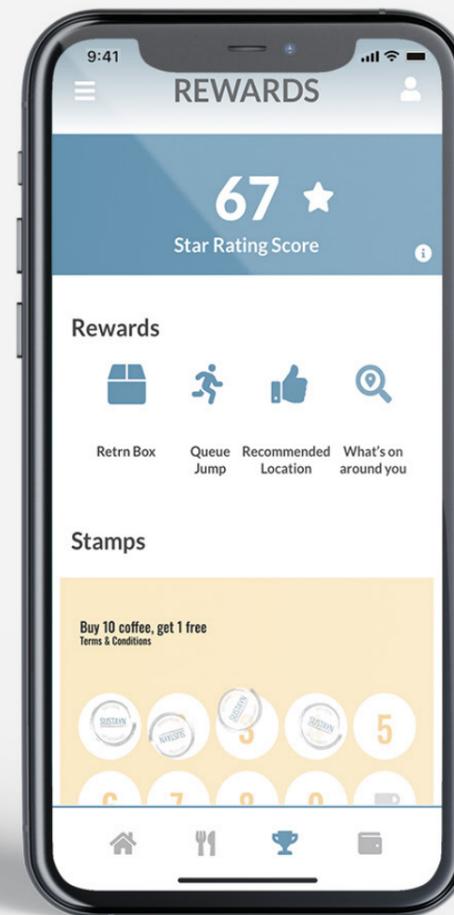
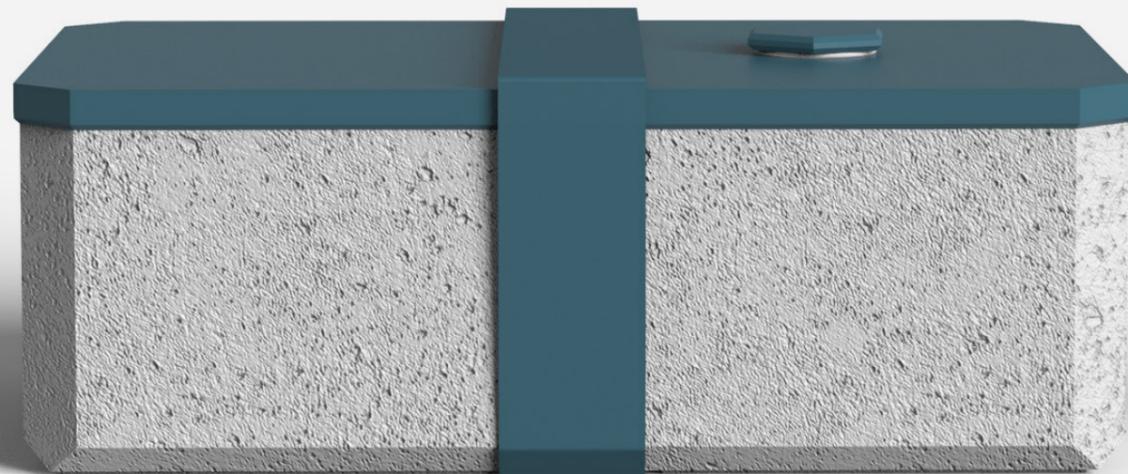

←RETRN

JOSH BUNN





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BRIEF

Retrn is a project focusing on the ever-increasing amount of single-use plastic being used and discarded. During research, it was discovered that men are not playing their part in reducing our plastic problem. The aim of Retrn was to give men a way of getting involved in something that will make a difference through eating more sustainably and earning rewards while doing it.

Retrn has been developed as a product within a system, the product is the Retrn box. The box has been designed to be appealing to men while having sustainable characteristics. The box was developed to allow the user to easily pick up or transport the food they wish to eat whether that is from home or a local outlet. However, when the user combines the Retrn box and application they have the ability to find new and exciting food outlets nearby.

When collected food the owner can gain points and rewards, these points are dictated by how sustainable the outlet is and these points can then be used to enhance their limited lunchtime experience.

Together Retrn is hoping to make people more aware of the plastic they are producing and encouraging outlets to become more sustainable.

PRODUCT DESIGN SPECIFICATION

The information below presents all of the necessary requirements and constraints the new design must adhere to. It can also be said the PDS outlines what the market demands of the product and often involves detailed market research (Suliman Shah, 2012)

Useful

Usable

PDS

The product must have the volume of 190mm x 120mm x 67mm to store and transport food.

The product must allow for all food particulates to be removed within 10 seconds and while only applying minimal force.

The system must have at least the visual threshold of 20/20 from a distance of 500mm to reduce visual demand.

The maximum number of steps to perform any action must not exceed 7.

The product must not give the user discomfort whilst carrying for a minimum duration of 1 hour.

The user must be confident in the products ability to store/transport food without leaking.

JUSTIFICATION

Through user testing a subjective metric was used to calculate the perceived volume that will store the correct quantity of food. However, further research needs to be performed to understand if this perceived volume is the appropriate size.

While performing user testing using takeaway/ lunch products it was clear that the cleaning of the product affects the level of efficiency. Additionally, an easy to clean product has a higher potential life-span as the user has a higher level of satisfaction.

The application will commonly be used on a phone, because of this an average distance between eye and device was taken and applied to the threshold calculation. This will ensure there is a high visual acuity increasing efficiency.

As George A. Miller stated, the short-term memory only had the capacity to store 7 ± 2 stimuli. Because of this it was important to monitor the amount of information being presented to the user and ensure that there were never more than 7 stimuli at once.

While investigating user journeys the act of carrying was a key feature in use. Additionally, most users store the product in their bags while transporting. However, on the chance they decide to carry the product, the average commute in London is 57.1 minutes. Because of this the product needs to be designed to reduce prolonged discomfort (ONS, 2015).

As the product can be used to transport food between home and the workplace its likely to be stored in a bag with other items, if the product leaks these other items could be ruined and cause the user to stop using the product all together.

TESTING

The product will be tested by creating a subjective metric to ensure the users feel a level of satisfaction with both the actual capability and the perceived capacity of the product.

This requirement was tested through washing the box both by hand and in a dishwasher. The effectiveness of this process will be recorded and developments made according to the results and pain-points.

This requirement will be tested against existing recommendations for size as well as recording user ease and speed of recognition.

This requirement was tested by performing user tests and recording the number of stimuli registered and specifically what they were. After this the application was modified.

The product was designed using anthropometrics. User testing will also be performed and discomfort measured, recording the strain from prolonged pinch grip holding.

Several tests were performed to understand the strength of the seal. An example of this is the product being filled with food and dropped to understand how it would react to sudden forces.

PRODUCT DESIGN SPECIFICATION

Meaningful

Desirable

PDS

All click-able buttons must have at least an area of 44x44 pixels as to mitigate against errors.

The product must encourage others to participate by making the process of on-boarding as easy as possible, by only asking for minimal personal details and steps to join.

The product must be universally useful across multiple outlets and cuisines

The system must allow the user to gain rewards through repetitive loyal use.

The product must present a combination of masculine and sustainable characteristics, including a rough texture, angular shapes, dark colours, organic shapes and minimalist design.

JUSTIFICATION

By mitigating user errors the user will have a higher level of satisfaction with the product and therefore reduce the chance of frustration through error.

The product is designed to be a social and local experience so the ability to add friends and get others involved will enhance the experience.

The product will be used by different users in different ways so it is crucial to have the ability of store a wide variety of foods. Without this universal usefulness the user would be limited to the potential uses.

With the concept embodying Maslow's Hierarchy it is important to reward and promote self-actualisation behaviour so that the action will be repeated and long lasting.

Based on research, the product needs to incorporate masculine and sustainable characteristics. With products being an extension of oneself this product will signal information about its owner. The product also needs to fit into the market of sustainable/ environmental products.

TESTING

An representative user will be given several tasks and after each they will feedback on the level of ease for completing each task and the number of errors made.

This theory is supported widely in literature but will be supported by tasking a representative user to invite a friend to use the application, this task will be monitored to ensure efficiency.

A variety of different cuisines will be prepared with differing textures to test the product/dividers functionality.

This requirement will be tested by giving representative users the product and tasking them to visit a store and buy food. After this the user will be given a reward and the feeling/ emotions will be recorded.

The product was tested by both comparing it to existing competitors as well as incorporating features and characteristics connected to these styles, additionally, the product will be tested against mood-boards to ensure the desired aesthetic was met.

.01 AESTHETICS (form)

Desirable: The product must present a combination of masculine and sustainable characteristics, including a rough texture, angular shapes, dark colours, organic shapes and minimalist design

Due to the product being for a male market and with the intention of encouraging them to participate in more environmentally sustainable habits it was important to design the form of the product with a balance of masculine and sustainable characteristics

Masculine Design

When investigating **gendered products** in the current market there are a variety of techniques used to express or attract one gender rather than another. Pat Kirkham believes that the “relationships between objects and gender are formed and take place in ways that are **so accepted as ‘normal’ as to become ‘invisible’**” (Kirkham, 1999. 1). This is not to say they cannot be identified and used to aid design.

Some key characteristics were identified by researching Semin & Palma's. They identified: **heavy weighted, rough-textured, angular shaped and dark coloured** as the main indicators. These have been ingrained into our culture and have become expected in masculine products.

It was discovered that gender-typical products are used by both sexes as a **secondary sexual characteristic**. Additionally, “products have been compared to extensions of individuals, that signal information about their owners” (Borau & Bonnefon. 2, 2019). This point is supported by the work of Curtis Newbold as he concluded that these characteristics can be **used to exploit women's and men's insecurities about sex, gender, and their personal perceptions** (Newbold, 2017). However, ‘understanding gender preconceptions and predispositions is just a starting place, not a set of hard and fast rules’ (Cousins, 2017).

During further research, it was discovered that males are more concerned with their **personal ‘image’** and this ‘image’ can be affected by the products they buy/use. As Brough et al state, “men tend to be more concerned than women with **gender-identity maintenance**” (Brough et al, 2016). The product was therefore designed using a range of the characteristics mentioned previously but it was crucial to incorporate sustainable characteristics to affirm the user in their masculinity whilst also encourage the image that sustainability is masculine.

Sustainable Design

Sustainability and sustainable design have some clear characteristics as well as some which are more difficult to notice. These clear/visible characteristics are said to have a direct impact on the success of the product, Kate Fletcher indicates that in the wider sustainability market “aesthetics are important...because **they act as a great social attractor**” (Fletcher, 2014).

As Debra Lilley discusses with relation to the **3 pillars of sustainability**. Environmental and economic issues are being targeted. However, there is an opportunity to design sustainable products more in-line with society (people) (Lilley, 2009). This concept is supported by Clark et al as they suggest that sustainable design is **more than just making products ‘green’** and we should be focusing on “how to meet consumer needs in a more holistic, sustainable way” (Clark et al., 2009). However, **previous efforts have failed** to reduce consumption so is designing a product to change behaviours the answer? (Lilley, 2009). With this in mind, the development will be shaped by the key characteristics as much as the needs and desires of the user.

To identify the necessary physical characteristics Delong & Martinson were researched as they believed they had identifies some of the key elements that shape a sustainable product. These are **organically shaped, being minimalistic, containing recycling symbols** (figure 3), **having a soft hue, looking modern and having a rough texture**. These characteristics along with the masculine characteristics will be combined as much as possible. There are some clear conflicting elements that will need to be mitigated.

As well as the physical elements that affect the form of the design, sustainability has now become interwoven with much more than the aesthetics, it is dictated by the materials and manufacturing techniques that are used to produce a product. Ensuring it is simple to produce and has the end of life in mind (cradle to cradle).

Application

Through the ideation process a concept design was identified which allowed for the combination of the masculine characteristics; **angular external shapes and dark colours** as well as the sustainable elements; **organic internal shapes and minimalist design** (figure 1 & 2). Fortunately, the use of rough texture was identified for both design styles so this was a crucial feature in the design. (figure 4).

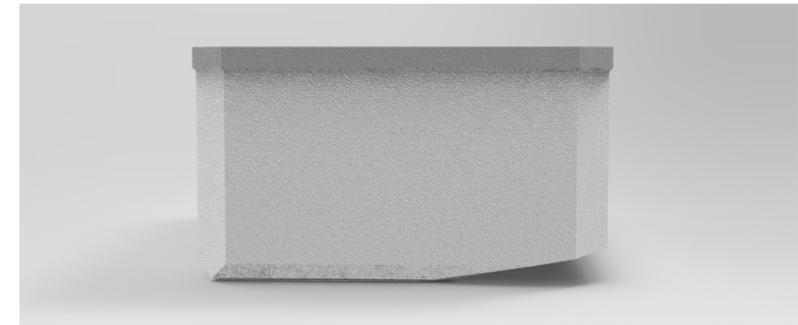


Figure 1: A side on view of the box to demonstrate the angular shapes.



Figure 2: A side on view displaying the minimalistic style taken to designing the box



Figure 3: The appropriate symbols located on the bottom of the box to indicate the material and safety restrictions

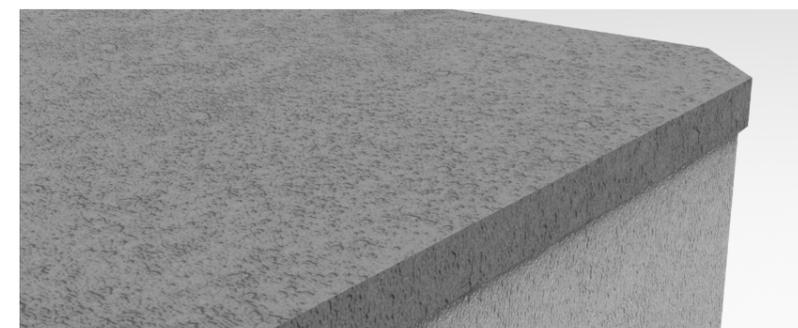


Figure 4: A visualisation of the rough texture used on the exterior of the box to meet the desired aesthetics

The characteristics that were incorporated into the design were tested by creating mood-board containing a wide variety of products from both of the desired markets. These mood-boards were then used to confirm the selected characteristics along with allowing the product to be placed within a range of possible competitors to recognise if they matched the desired style. These mood-boards can be found in the appendix.

This testing process identified that the characteristics designed into the product were expressing the correct aesthetics and making it desirable to both the masculine and sustainable market.

.02 AESTHETICS (colour)

Desirable: The product must present a combination of masculine and sustainable characteristics, including a rough texture, angular shapes, dark colours, organic shapes and minimalist design

Colour Theory

As Wheeler stated, “colour is second only to shape in cognition and is recognised before content” (Wheeler. 89, 2003). With this in mind, it was crucial to find the correct colour for the product. Colour theory is crucial in product development “color theory informs the design of color schemes, aiming at aesthetic appeal and the effective communication of a design message on both the visual level and the psychological level” (The Interaction Design Foundation, 2008). Mário S. Ming Kong and other researches suggested that “**colour communicates meanings** at three levels: ideational, interpersonal and textual” (Mário et al, 2017). All of these levels are important to convey the desired message but the interpersonal level will be most appropriate for this product, this being when colour is used to provoke and cause a reaction. As stated previously the aesthetics of a sustainable product are social attractors so the colours used need to attract the target user.

Colour theory is known for being cryptic, Kress & Leuwen raise an explanation for why determining the meaning behind colours can be so difficult. They discuss “the connection of meaning and colour seems obvious, natural nearly; on the other hand, it seems idiosyncratic, unpredictable and anarchic.” (Gunter Kress and Theo Van Leuwen, 2002. 1). It was important to keep in mind that **colour theory is objective, the same colour doesn't mean the same to everyone**. “Color perception can change based on gender and culture” (Cousins, 2017).

Colour Palettes

To understand the colours associated with masculine and sustainable products competitor analysis was performed. The same mood-boards used to test the form characteristics were used to generate colour palettes to gain a better idea of colours currently associated with their respected markets. The decision was made to **remove 'green'** from any colour palettes. Green has a very strong association with the environment but this is only 1 of the 3 aspects within sustainability. In addition, ‘**green-washing**’ is on the rise, this is the process of companies **misleading consumers about the environmental benefits** of their product, this concept does not only apply to green coloured products but there is a growing association. Because of this green was removed as an option. (Delmas & Burbano,. 2011).

Colour Application

Further research was made to understand alternative colours and the associations they have. Kauppinen-Räsänen, H. and Luomala, H.T performed interviews with 252 students to understand the role of packaging colours as a source of product meanings. After examining their findings it was decided that blue would be a more appropriate primary colour for the product (figure 5). Their research showed that blue is described as **effective, cures, trustworthy and strong**. This is supported by the **increasing number of businesses like logos/ branding with blue** as the main colour. In addition, there is an appropriate association between a product that is aimed at reducing plastic waste and the ocean that is being filled with it.

Once blue was focused on a shade of blue was identified that would look appropriate on both masculine and sustainable products (figure 6). This shade was found by comparing the blues found in the mood-board palettes and isolating a colour.

Testing

A **contrast checker** was used to ensure the colour would allow users to easily decipher the information. The initial colour choice failed to record a ratio high enough as WCAG 2.1 state that “the visual presentation of text and images of text **has a contrast ratio of at least 4.5:1**”. Because of this, a development had to be made to increase the contrast ratio (figure 7). This colour was then compared back to the original colour palettes to ensure it would still be an appropriate colour.



Figure 5: A preliminary render of the product using the desired colour to ensure the product met the desired aesthetic appearance



Figure 6: Initial colour choice

Figure 7: Developed colour choice



Figure 8: The full colour palette created for the application

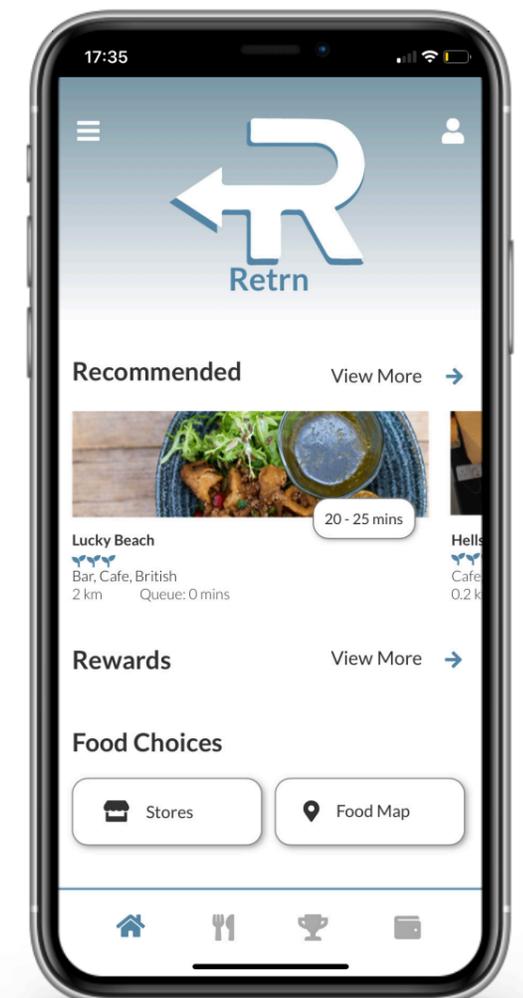


Figure 9: The chosen palette applied to the home page of the application

.03 COMFORT

Usable: The product must not give the user discomfort whilst carrying for a minimum duration of 1 hour

User Research

The first topic of research was the desired carrying style. Market research and user testing identified that when the product is not being transported in a bag it is **carried in one hand to the side** of the individual.

User journeys showed that when users currently transport food they most commonly put in into their bags. However, there are occasions where they carry the product due to lack of space or convenience. Additionally, it was discovered that the average time taken to **commute to work in London is 57.1 minutes** (ONS, 2015). Because of this, the product needs to be comfortable in the hand for a prolonged time.

Neutral Wrist Position

The neutral position for the wrist is straight and in line with the rest of the arm, this is simply dictated by the anatomy of the body as it allows for maximum blood flow and allows **“the least tension to the muscles and tendons of the hand”** (B.I.D, 2019). Research performed by the Journal of Bio-mechanics expressed that this ‘neutral’ position is not only more comfortable but more forceful. During a test, all participants stated that while carrying a box-style product, they carry it in one hand (**typically the dominant hand**) and then letting the arm and wrist hang naturally allowing the wrist to be neutrally positioned.

User Testing

This carrying position was identified as a **pinch grip**. The associated anthropometric data is referred to as the **‘hand Spread, Digit One to Two, 2nd Phalangeal Joint’** (figure 10). With this measurement a model was created and tested, users were given boxes with different heights and comfort was recorded (figure 11). This data was used to determine a comfortable height. This height was then compared against the **anthropometric data**. The **5th percentile height** of the anthropometric data was used to ensure the maximum amount of people could use the product, this measured at **76.2mm**. With this in mind, the test data was lower at **67mm**, despite this difference the recorded data was taken forward as users found this more comfortable.

Increasing Comfort

The external texture was developed and exaggerated, to enhance user experience. Fortunately, **‘rough’ texture** was previously identified as a **desirable feature**. By increasing the friction co-efficient it was possible to make the product **feel more secure in the users’ hands**. Also, **‘meso’ adjustments** (small grooves) were applied to the base of the product (figure 13 & 14). These adjustments further increased the users’ ability to grip the product, the reasoning for the adjustments are so the user has a ledge for purchase. They can interlock their fingers with the product. The groove height was determined by researching the **distal interphalangeal crease** (where the finger-tip bends), this resulted in a **groove height of 1mm**. This also increases the surface contact between the product and the individual.

Hand Spread, D1 to D2, 2nd Phal. Joint {37}

Mean	5%ile	95%ile
104.14	76.2	132.08

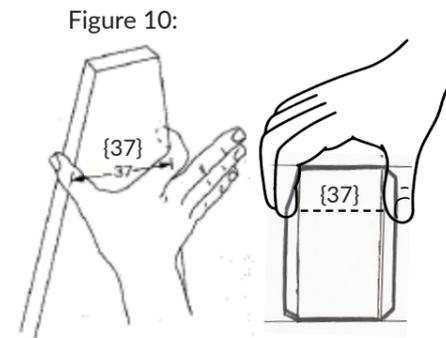


Figure 11: Anthropometric testing to understand the comfortable grip height for the product

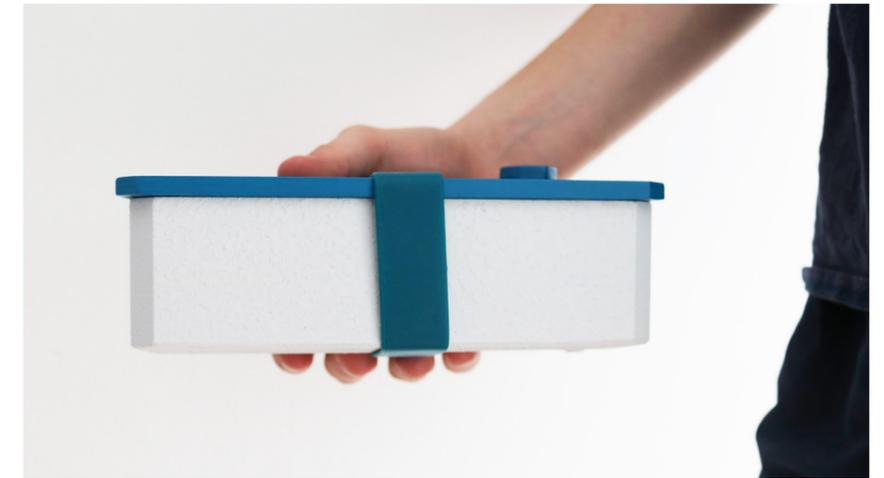


Figure 12: Final prototype being testing by representative users for comfort and grip



Figure 13: The meso adjustments made to the underside of the container

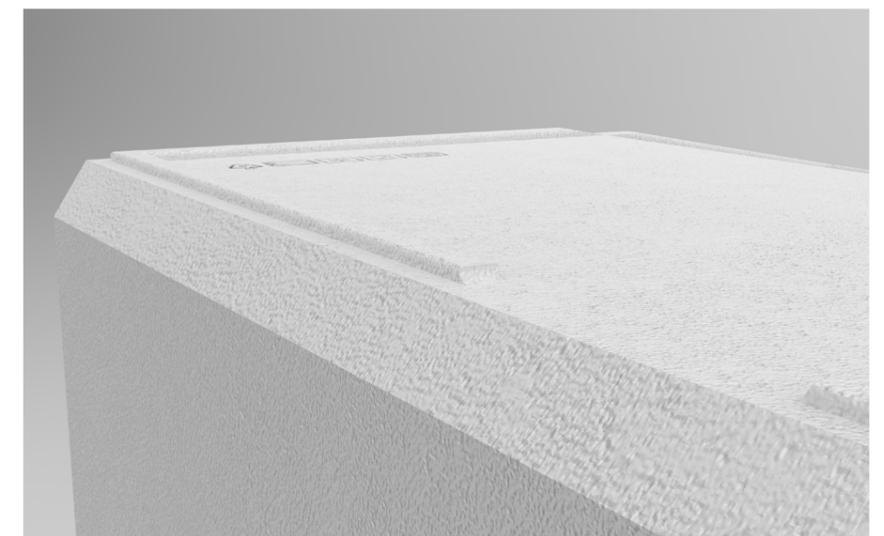


Figure 14: Fillets were applied to the edges of the grooves to ensure they would be easily located by the users fingers when not in sight

.05 CLEANING

Useful: The product must allow for all food particulates to be removed within 10 seconds and while only applying minimal force

While performing an empathy map (see full map in the appendix) it was identified that the cleaning of the product is a **dramatic arc** and therefore an area of the experience to be improved (figure 19). It was important to **make the action of cleaning as easy as possible**, curves and organic shapes were already incorporated into the design due to the desired aesthetic.

Washing/ Material Choice

As the cleaning process was time-consuming and the aim for the product is to allow the user to make more effective use of their time, the decision was made to investigate how easily the product could be **machine washed**. The immediate issue was the material choice, for the product to be capable of withstanding **repeated washing** the material would need to be able to be heated and cooled **without causing structural damage**.

Additionally, the material needed to be **food-safe** for obvious reasons, with regards to **Regulation (EC) No 1935/2004** it was crucial to find a product that did not 'release their constituents into food at levels harmful to human health'. There were a number of factors that needed to be considered when deciding an appropriate material for the product. One of these involved being the ability to be **recycled/ reused**. This factor was chosen as it will have a direct impact on the users' opinion of the product, the product is being **designed to promote sustainable behaviour** and this would negatively affect that. With all of this in mind, the material chosen was **Polypropylene (PP)**.

Testing

After manufacturing a full-size prototype several tests were performed to see how easily food particles were removed by hand and machine washing. The initial test showed that the box could be cleaned with relative ease but developments could be made. There were some difficulties removing food particulates from the corners of the box. Because of this, a small modification was made to increase the filleting on the corners making it easier to clean (figure 20). This reduced the force required to clean the product making the product more likely to be used repeatedly.

ADAPTABLE

Meaningful: The product must be universally useful across multiple outlets and cuisines

Customisable

With the simplicity of the box, it was important to incorporate ways for the user to **customise and connect with the product**. The development of the divider allows users to interact and use the box in different ways and more importantly allows them to store/transport a wider variety of cuisines (figure 21). This development was discovered when investigating the actions and processes that the user would most commonly be completing. With this in mind, Fossdal & Berg states, how "the relationship between the product and the user can be used as a learning process to create a friendly attitude towards sustainable design" (Fossdal & Berg, 2016).

Increasing Cuisine Selection

This development was also identified as an area to benefit the users experience due to the **increasing variety of international cuisines** on our door-step. As stated by the 'local data company' "the public awareness of world cuisines now extends far wider than just the standard Chinese, Indian and Italian options of yesteryear" (www.localdatacompany.com, 2019). This is supported by the works of Nathan Schiff as he suggests "that (the) geographic concentration of a population leads to a greater number of cuisines" (Schiff, 2014). With the target users being frequently based in cities this would directly apply to them and the cuisines that are available to them.

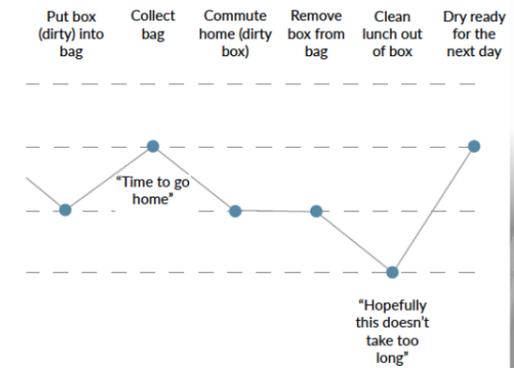


Figure 19: As shown the cleaning is a negative experience associated with using the product so must be made as easy as possible.

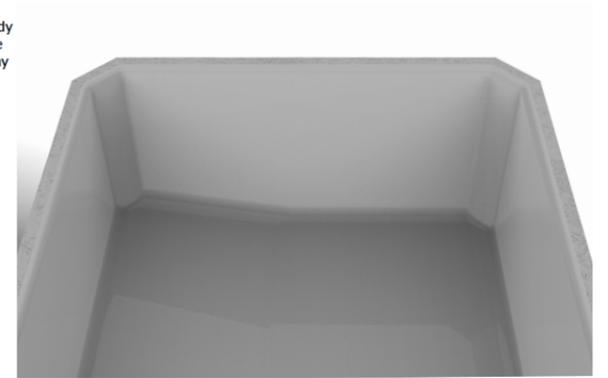


Figure 20: Internal fillets allowing for easier removal of food

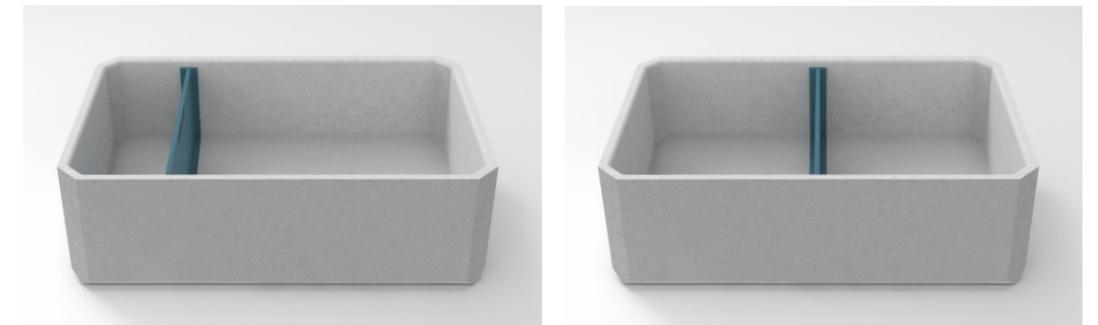


Figure 21: These show the flexibility and customisation possible with the divider

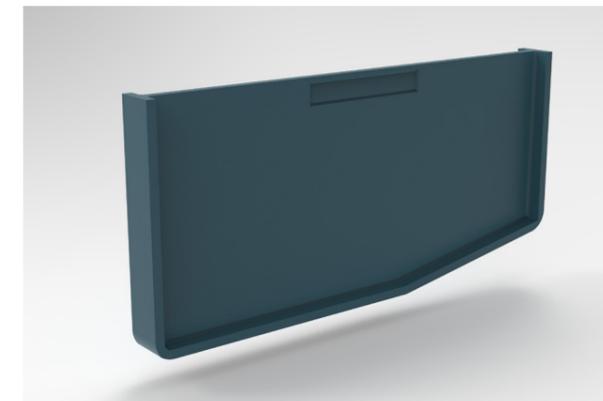


Figure 22: A close up view of the box divider, showing the meso adjustment and contoured shape to allow for a secure fit

Application

The divider was designed to be **easily inserted and removed** depending on the users' preferences. **Competitor analysis** was performed to understand how other products ensured the divider was **secure and stable** when positioned. The external shape was **contoured to the internal shape of the box allowing for a 0.5mm tolerance**. This allows the item to move when needed but the friction holds the divider in place. Additionally, developments were made to increase the contact areas of the item to further increase the **friction co-efficient**. During product testing, it was identified that with this increased friction the divider became more difficult to manoeuvre, to combat this an adjustment was made to allow the user to gain purchase at the top of the divider. These developments can be seen in figure 22 (above).

.06 LEAK-PROOF

Usable: The user must be confident in the products ability to store/transport food without leaking

User Research

While performing user testing and journey mapping it was established that the user needs a **feeling of confidence that the product will not leak or open accidentally**. As the product will be transported frequently, whether that is in the hand of the user or their bag the product cannot leak or malfunction in any way. If the product were to leak in either of these situations **this would immediately create a negative association** with the product that may result in the user never using it again. Because of this, several developments were made to ensure that the product would not leak but more importantly the user feels confident and secure in its performance.

Silicone Seal

While researching existing food containers they all featured a **silicone seal (o-ring)** (figure 23). This is located around the edge of the lid and creates a **water-resistant seal** around the lip of the container while closed. The addition of this **aids the confidence of the user**. This silicone seal was designed to be removable from the lid, this gives the user the ability to take the component off when cleaning. Additionally, if the user wishes to machine wash the product as discussed previous, silicone can have issues but alternatively can be easily removed and washed by hand.

Valve

Early in development, the steam valve was identified as an important component due to the wide variety of foods being consumed. The initial mechanism requiring the user to **click open the valve**, however, this valve was attached to the lid and would cause the user **difficulty when cleaning**. Also, through testing, this mechanism was prone to wear and after a short time could affect functionality. Because of this a different mechanism was introduced, this valve involved the **rotating of a thread**. The valve works by turning the bolt/valve to open and then once fully turned in reverse the box was sealed. The design of the valve was with an existing process in mind as well as allowing the value to be completely removed if needed, this allows further **flexibly when cleaning and minimal frustration**. The sizing of the valve was determined using anthropometric data. To ensure the box is as leak-proof as possible the knob needs to be easily tightened and released. Therefore, the anthropometric data dictates that the diameter of the valve head was **at least 38mm** (The Measure of Man and Woman, 1993). However, this data is for 'high torque knobs' and as much as this knob will be under a level of torque it is not 'high'.

Silicone Strap

An additional **silicone strap** was added to the design (figure 24). The silicone strap was designed to fit with **minimal tolerance around the box**. The silicone was selected due to its level of elasticity. The band aids in keeping the box leak-resistant but the main addition to the product is **the appearance of security**, the strap surrounding the box gives the user a **recognisable element of insurance** as this is a feature in a number of products.

Application

With this in mind, the decision was made to size the **valve head at 23mm** (figure 25). Additionally, to aid with the gripping of the valve a **hexagonal shape** was used to increase friction and allow the user to perform the task with less force. The threading of the valve was increased to make the act of open/ closing as easy as possible. By increasing the thread of the bolt the number of rotations to rotate or remove the valve were decreased.



Figure 25(i)

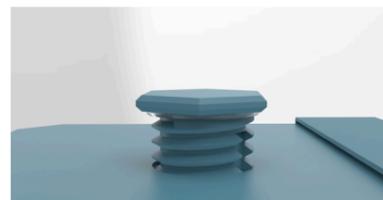


Figure 25(ii)

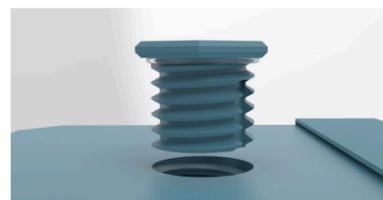


Figure 25(iii)

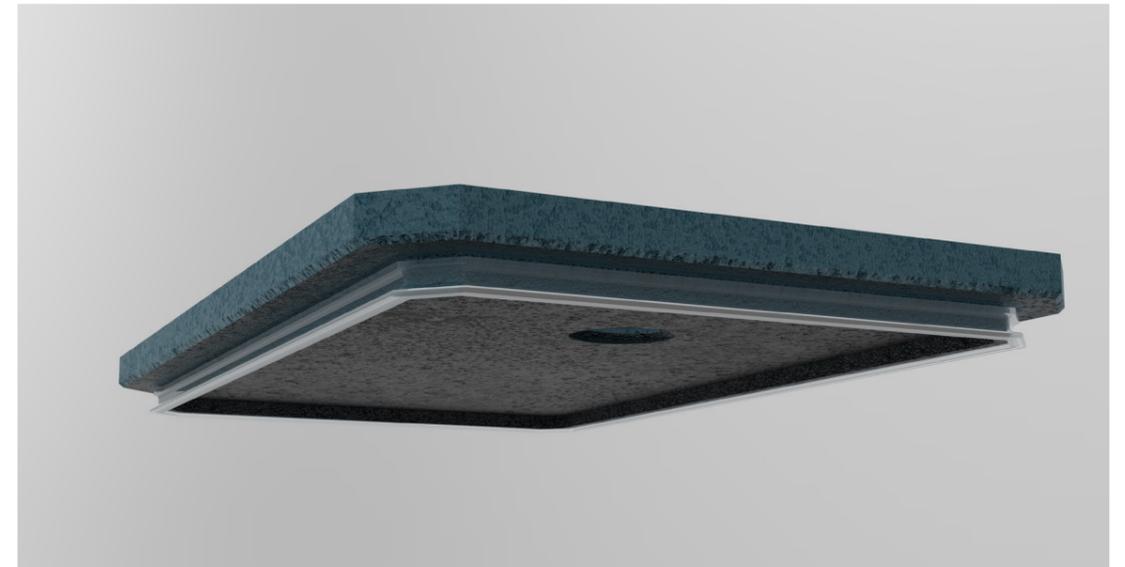


Figure 23: The underside of the lid with the silicone seal attached

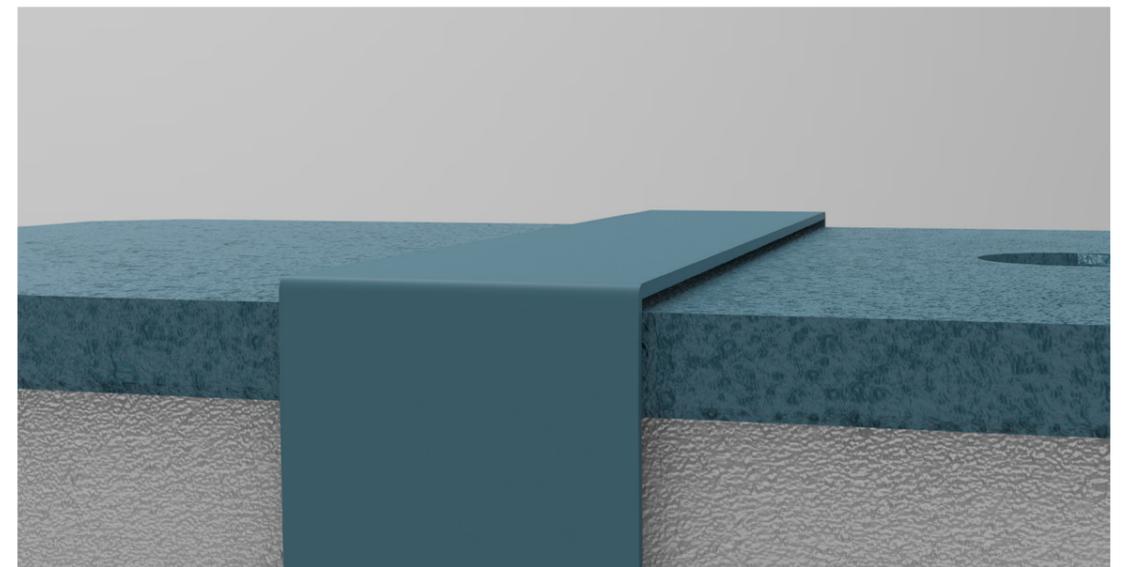


Figure 24: The silicone strap wrapping around the container

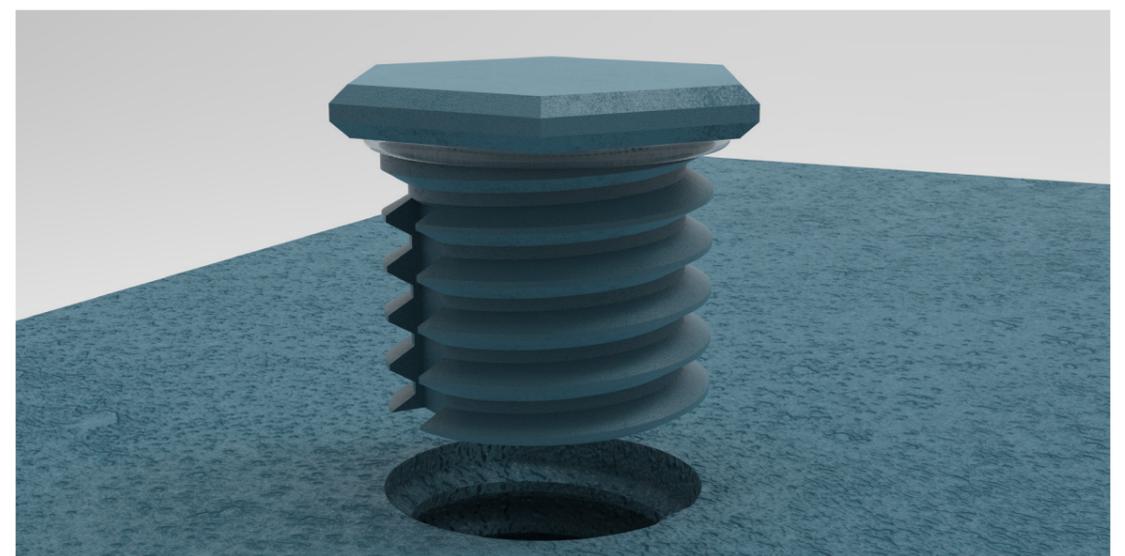


Figure 25: An exploded view of the valve to show the threading

.07 VISUAL ACUITY

Useful: The system must have at least the visual threshold of 20/20 from a distance of 500mm to reduce visual demand

Visual Threshold

For the application to be readable it was important to understand the necessary visual acuity. This being the **clarity or sharpness of vision** to see fine detail such as text, graphics, symbols, markings, etc. The visual threshold of the user will be studied as to ensure the visual demand on the individual is kept as low as possible and therefore making them **more effective when performing tasks and producing fewer errors**.

The **visual threshold was needed to calculate the sizing of the application font**. It was important to determine the distance the user will most commonly be from the device. A test was carried out which involved measuring the distance between the device and the potential users' eyes. The results showed that **individuals were typically holding their phones at a distance of 500mm**. This information was then compared against **'BS EN ISO 9241-303:2011'** which is the standards relating to **electronic visual displays**. The requirements state that the recommended viewing distance of a display depends on the task being performed. However, they specify that the view distance **"shall not be less than 300mm"** (BS EN ISO 9241-303:2011). As to ensure that the application had a higher level of accessibility the decision was made to design the visual threshold for a distance of 500mm.

It was necessary to find the 20:20 visual threshold from a distance of 500mm. The process of this can be seen below:

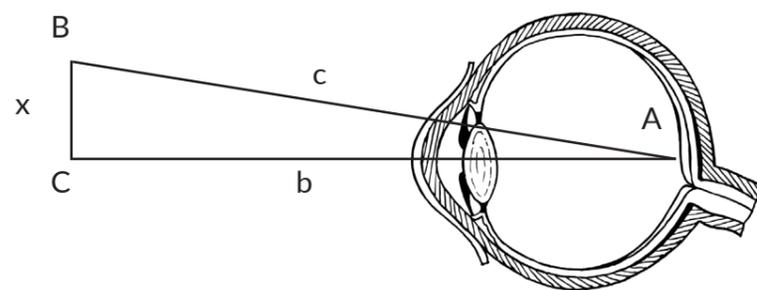


Figure 26: The calculation used to determine visual threshold

60 minutes of arc in 1 degree $\therefore 1/60$ degrees = 0.01666667
 $A - 0.01666667$ $b - 500\text{mm}$
 $\therefore \tan A = \text{opposite}(x)/\text{adjacent}(b)$
 $\therefore \tan A \times \text{adjacent}(a) = \text{opposite}(x)$
 $\therefore \tan(0.01666667) \times 500 = 0.145$

Therefore 0.145 equals 1 degree of arc at 500mm and to calculate 20/20 vision we have to multiply this by 5.

$\therefore 20/20$ vision from 500mm is font with a height and width of **0.73mm³**

Testing

Tests involving representative users completing tasks was performed to confirm the font sizing. This font size was unpleasant and uncomfortable for the users while performing these tasks. While researching standards related to font size it was discovered that British Standards also states that **"the minimum 'Latin' character height shall be 16' of arc"** (BS EN ISO 9241-303:2011), this was also stated in the works of J. Smith et al. When the visual threshold of this is calculated the minimum letter size is **2.33mm³**. With this in mind, both of these font sizes are well below the recommended font sizes provided by leading companies such as **Google (16pt) and Apple (17pt)**.

Application

With all of this information considered the decision was made to set the minimum font size to 14pt (3.6mm). This font was determined to aid visual recognition and reduce chances of error. A selection of font sizes were chosen to differentiate the content (these can be seen below).

Icon Sizing

As to ensure the whole application was readable it was important to investigate the sizing of icons. Josh Clark expresses that the smallest icon should be at least 30x30 pixels (Clark, 2010). As Aurora Harley states, the icon should be as small as possible whilst conveying the correct information (Harley, 2014). Because of this, the majority of icons used were 30x30 pixels with others being increased to 40x40 if they possessed greater value on the page. In addition, to ensure the icons had a high level of clarity a test was performed which involved reducing the icon down to 15x15 pixels, this tested scalability and readability.

Font Style

With the font and icon size resolved, it was important that the chosen font style would not affect the readability of the information. To determine an appropriate style the desired aesthetics needed to be considered. It was determined that sans-serif font are the leading style for websites and applications. With this in mind, the chosen font was Lato (the same font style as this report). This was decided upon as Lato is described as a humanist sans-serif. Meaning 'Lato' is a modern (humanist) and minimalist (sans-serif) font, making the font appropriate for this product.

HEADLINE	32pt
	30 x30 pixel
SUB-HEADING	18pt
SUB-HEADING	18pt
	40 x 40 pixel
BODY TEXT	14pt
SUB-HEADING	18pt

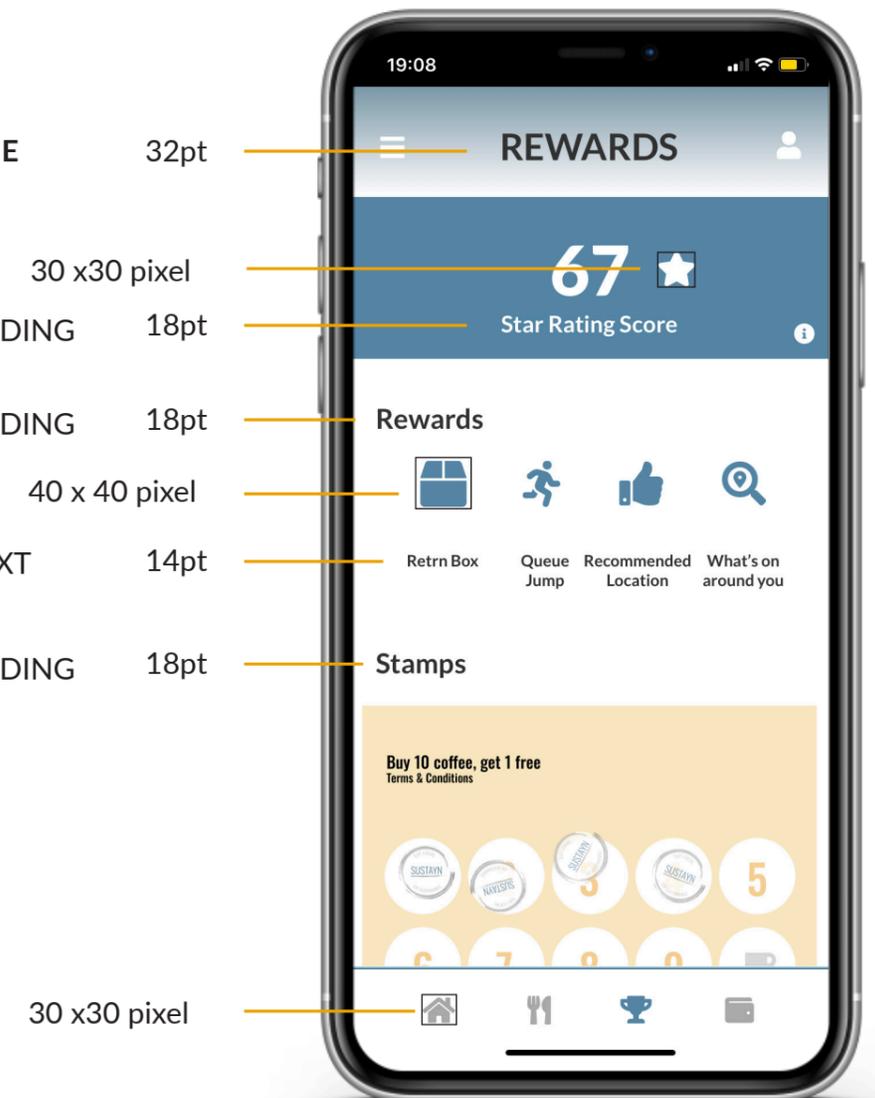


Figure 27: An image captured of the rewards page within the application

.08 ACCESSIBILITY

Usable: All click-able buttons must have at least an area of 44x44 pixels as to mitigate against errors

Clickable Areas

When developing the content of the application it was important to understand how easily it can be navigated. With this in mind, the approach taken to buttons was a mixture of Josh Clark's and Steve Krug's work. Josh Clark suggests that **all click-able areas are at least 44x44 pixels**. This was developed with several factors in mind, the first being **human error**, they accidentally click somewhere they didn't mean to and because of this find themselves somewhere unexpected. This was the driving force for all click-able areas being at least 44x44 pixels. This does not indicate that all buttons must be this size but the click-able area that surrounds these buttons must be.

Hick's Law

Krug's states in his book 'Don't make me think' that, as a user "**I should never have to devote a millisecond of thought to whether things are click-able or not**" (Krug, 2014. 15). This was kept in mind throughout the planning and development of the interface. Hick's Law describes "**the time it takes to make a decision increases with the number and complexity of choices**" (lawsuffix.com). It was important to ensure the user was **not overloaded with cognitive demands, this can commonly result in errors**. This is supported by Krug as he states, "every question mark adds to our cognitive workload, distracting our attention from the task at hand" (Krug, 2014. 15).

Hicks law is important when designing the homepage for an application. As Mads Soegaard states, "the landing page (homepage) is a **make-it-or-break-it chance to create an impression**" (Mads Soegaard, 2020). By using Hicks law the page can limit the number of possible choices for the user and make the experience more effective (figure 28). While navigating the application it is also important to understand how the user wishes to use the platform and making it as easy as possible to complete tasks. Therefore, it was important to **create a hierarchy of content**, this hierarchy will allow for the organization of content so that high priority content is shown first (Mads Soegaard, 2020).

Hierarchy

The most important content was discovered while **performing card sorting**. Participants were given cards with a variety of different areas, believed to be important to the application. The individuals were also given plain cards and pens to ensure that areas were not forgotten. This process also identified if any of the language being used was confusing to users and therefore needed to be re-phrased. They were then asked to organise these areas into categories, these categories were ranked according to importance to create the hierarchy. (Martin & Hanington, 2012).

While communicating with target users the ability to have **recommended restaurants**, whether these are old favourites or new 'gems' held high value. Additionally, the **potential rewards** from using the application were of high importance. Further questioning showed that the rewards were **vital in encouraging the user to reuse the application as well as promoting others to download it**. With this in mind, the rewards needed to be easily accessed and shared.

Rule of Thumb

With the content structured and ranked it was then possible to apply other techniques such as the 'rule of thumb' which as demonstrated below involves the **reachability of content** using the thumb. It is also recommended that "software developers should **avoid placing any useful buttons, input fields, features in top left or right corners** (top area)" (Kirhenstein, 2015). This is because users find it difficult to reach those areas of their devices.

Application

All of this data was recorded and applied to the application with regards to the ranking of content. The implementation aided in the users' identification of prominent elements as Krug states, when a visual hierarchy is performed poorly "we're reduced to the much slower process of scanning the page for revealing words and phrases and then trying to form our own sense of what's important" (Krug, 2014. 35).

As the majority of phone users are right-handed (roughly 85%) and hold the phone in one hand (uxmatters.com) the bottom right corner was used as the epicentre of accessibility, with the most 'important' content located in thumbs reach (bottom left) and so forth (figure 29).

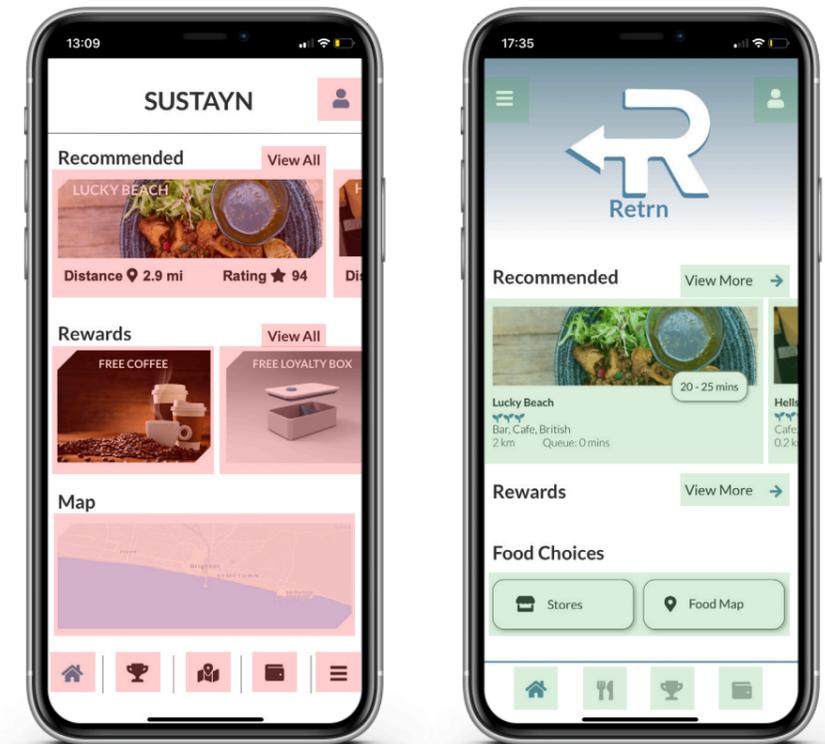


Figure 28: These are the initial and developed home-pages, initially the home page felt cluttered with information and caused confusion for users as to where priority content could be found. The develop involved reducing the new of stimuli on the page to increase response time (Hick's Law).

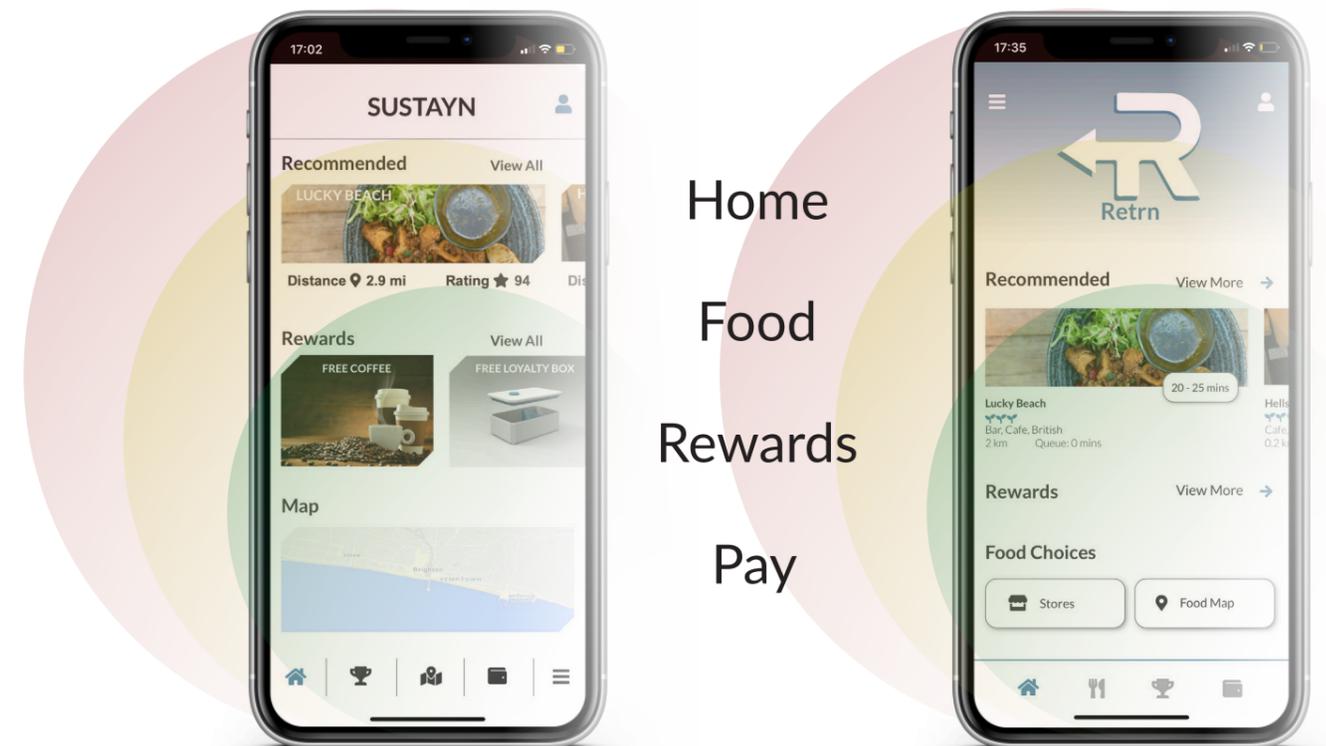


Figure 29: The layout of the homepage was edited after realising that there was a large amount of content that was difficult to reach. Because of this the crucial content was lowered making it more reachable and accessible.

.09 PROCESSING

Usable: The maximum number of steps to perform any action must not exceed 7

Miller's Law

This product requirement was chosen to ensure the **users are not overloaded with cognitive demands while performing tasks**. The first and most important cognitive theory related to short term memory (immediate memory) is that the **capacity is 7 +/- 2 stimuli**. This was a theory initially suggested by George Miller. He stated that "the span of immediate memory and absolute judgment were both limited to around **7 pieces of information**" (Miller, 1956). It was important to recognise the number of choices and stimuli's being presented to the user and minimising them where possible.

Chunking

In connection with reducing the number of stimuli, it is also possible to reduce the cognitive load through chunking. Chunking is described as "**the function of grouping information together related by perceptual features**" (McCollough and Vogel, 2010). Once a hierarchy was created it was feasible to **group similar information together**. This grouping of stimulus reduces the decision time for users. Chunking has been performed in several areas of the application the first and most important was the home bar located at the bottom of each page. **This chunking of vital information gives the user a control centre where they can more easily navigate the application**. Similarly, the content that can be found in the burger menu (located in the top left) is content, not frequency required.

Gestalts Principle of Proximity

In relation to the grouping of information Gestalt's principles were considered. There are several elements to this theory such as **closure, common fate and symmetry** but the principle that is focused on is the proximity of content. "**Objects that are near, or proximate to each other, tend to be grouped together**" (lawsuffix.com). This theory is supported by Krug as he states that, "**things that are related logically are related visually**" (Krug .2014, 34). This was incorporated into the layout of the pages to further decreases the processing requirements of the user. Like topics were grouped together making it more efficient for the user to complete their desired task (figure 30). This concept of quick recognition is supported by William Hudson as he states, "users must be able to understand what they see—and find what they want—at a glance" (www.interaction-design.org, 2020).

Creating Schema's

These theories and principles have been researched to ensure that when performing a new task the steps required are clear and do not cause any unnecessary confusion. Krug discusses that as designers we must remove any question marks whether that is 'where am I?' or 'where did they put that?' (Krug, 2002). Question marks only result in processing time and errors. Another reason for these developments was for users to create their own schema regarding the steps required to complete the chosen task. **Once this schema is created** it can be encoded into the long-term memory meaning if the task needed to be repeated the user can simply retrieve the needed information by **de-coding it from the long-term memory**.

Jakob's Law

Further steps were taken to ensure user processing was minimal. **Jakob Nielsen** stated that "**users spend most of their time on other sites**" (Nielsen, 2017). With this in mind, features and elements that users recognise from existing apps should be incorporated. By doing this "you are giving the user familiar elements which they already understand" (Jon Yablonski, 2015). From this, an investigation was made into which apps the target group use frequently. 8 applications were identified and analysed (**Uber, Just Eat, Deliveroo, Instagram, Gmail, Spotify, Forest and AirBnB**). These applications were then used to extract the prevalent features, the most frequently occurring features were:

- **Menu options located in the top left corner (burger)**
- **Profile/ Account is located in the top right corner**
- Click-able buttons are indicated by either a different colour or the use of a shadow to emulate a real button
- Arrows are used to show the direction in which more information can be found
- As you progress into the application you are either directed downwards or to the right with left being moving backwards
- Icons used are very simple, image association is crucial in efficiency
- The most important content is located to the bottom left

Icon Association

In addition to these features, Aurora Harley discusses universal icons. There are very few icons that are truly universal apart from home, print and search. This means all others have a level of ambiguity, other than the 3-bar burger menu that is pushing to become universally recognised (Harley. 2014). Where appropriate these icons were applied and all others were determined through testing associations with representative users. This caused some changes to the style of icons used throughout the application (Figure 31).

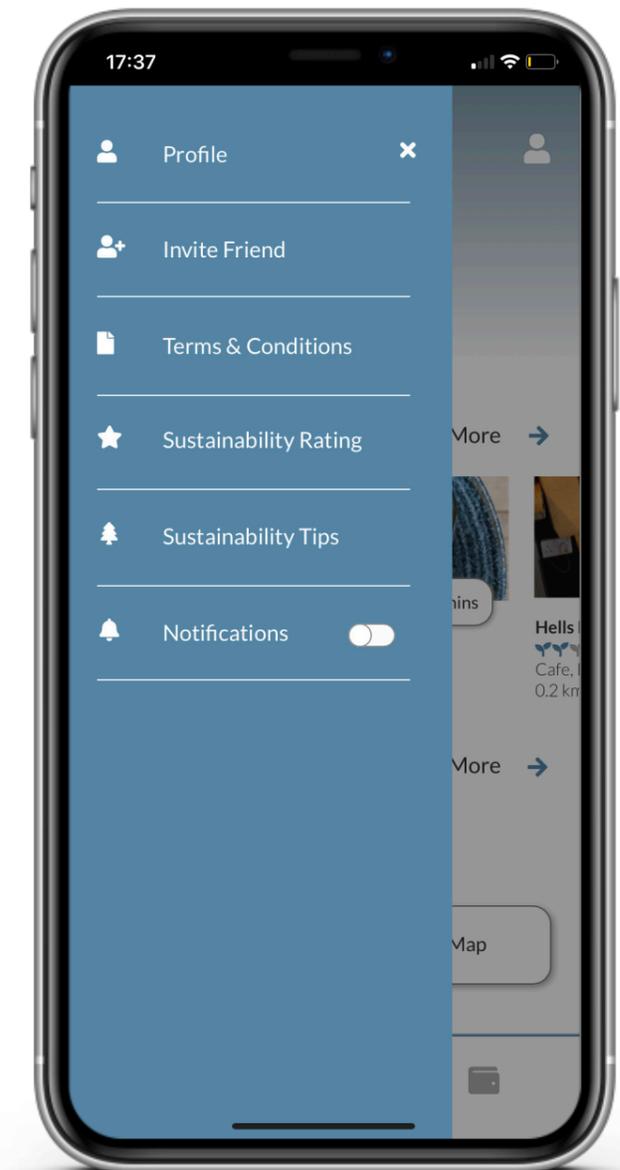


Figure 30: This demonstrates the grouping of information in the burger menu, these are all areas that the user will benefit from but are not required frequently.



Figure 31: While performing user tests it was identified that the initial icons used were successful in portraying where the icon would lead, however, they were not cohesive in their style. Efforts were made to find a new style that still showed the user the vital information whilst showing more coherence.

.10 ON-BOARDING

Meaningful: The product must encourage others to participate by making the process of on-boarding as easy as possible, by only asking for minimal personal details and steps to join

Shared Experiences

The product is designed to be a social and local experience, therefore, the ability to add friends/ get others involved will enhance the users' experience. The concept of a **shared experience** was researched thoroughly, the overwhelming conclusion was that experiences are intensified. Unfortunately, Boothby et al discuss that **both positive and negative shared experiences are amplified** (Boothby et al. 2014). Ergo, it was crucial to ensure the process of on-boarding and involving others was as easy and pleasant as possible.

Simplicity

As Josh Clark expresses "nearly half of all apps are downloaded based on a friend's recommendation" (Clark. 2014, 10). This supports the development of the on-boarding process to be simple. When exploring the important elements within on-boarding the main criteria was **not asking the user for unnecessary information** when first signing in (figure 33). **This immediately creates a barrier between the user and the application**, because of this the sign-in process was kept to only asking for a name and an email address as a form of contact details. **To benefit fully from the application further information will be needed** from the user but this can be added at a later date. Many successful apps only require minimal information at first but through customisation and editing, the user becomes more attached. Additionally, the user can access the application without creating an account or signing in (figure 32), however, they experience will be limited as they need an account to gain rewards.

Sharing

It was also important to develop effective ways for users to share aspects of the applications (figure 34 & 35). Through user testing, 2 areas were discovered where the user is most likely to want to share information with other (friends). The first being **when creating their profile and wishing to encourage their friends to join**. A number of sharing methods were integrated, the first was the ability to **search existing members** to determine if a friend had already signed up. The second was **utilising existing social media platforms**. This is a process used by a majority of apps as it takes advantage of an existing network of users. With regards to the platforms suggested they are the most widely used applications and have a history of being used to share information. It was important to also **incorporate the ability to send a 'link'** that would direct new users to the application store in-case the existing user wanted to share their positive experience via another means of communication.

Sustainable Change

With the product being aimed at promoting a more sustainable lifestyle the concept of **sharing and encouraging others is critical**. As Matt Adams suggests, there are 3 main responses when confronted with environmental information, there are; **distal defences** (unconsciously reduce & contain anxiety), **denial defences** (consciously reduce & contain anxiety) and **recognition defences** (Adams. 2017). Only the recognition defences are beneficial to making change and therefore will be focused on. Adams then expresses how the only real way to develop **social and individual change is through dialogue/ social support**. Without these we are not having the desired effect, therefore allowing users to promote their own sustainable actions and being supportive towards others doing the same is our best approach to make a lasting difference.

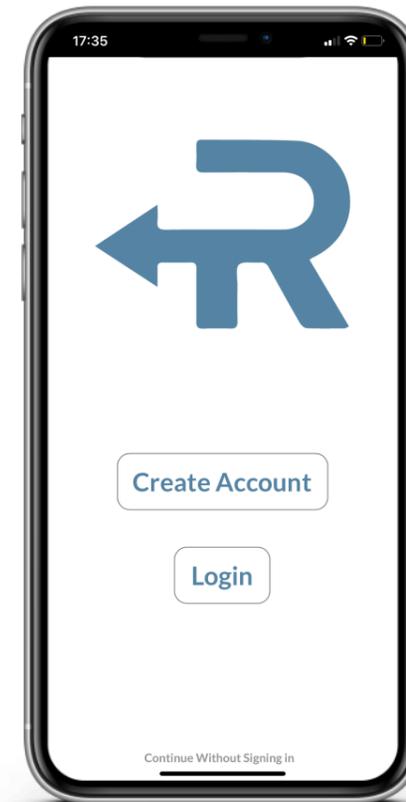


Figure 32: The first page users encounter when using the application

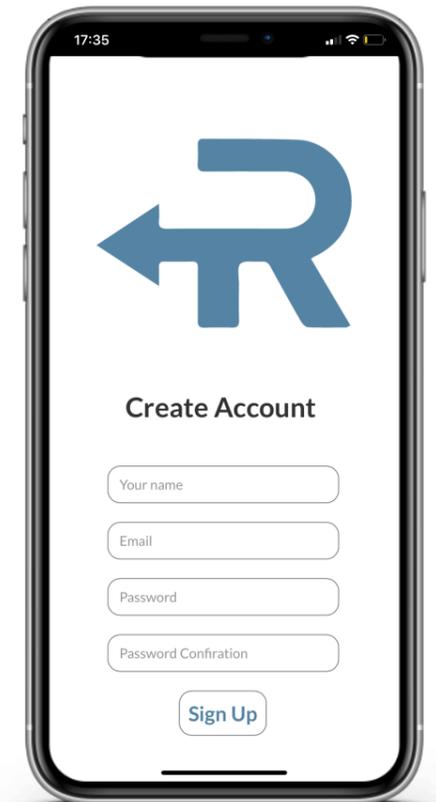


Figure 33: Users can create an account on this page by inputting basic information about themselves

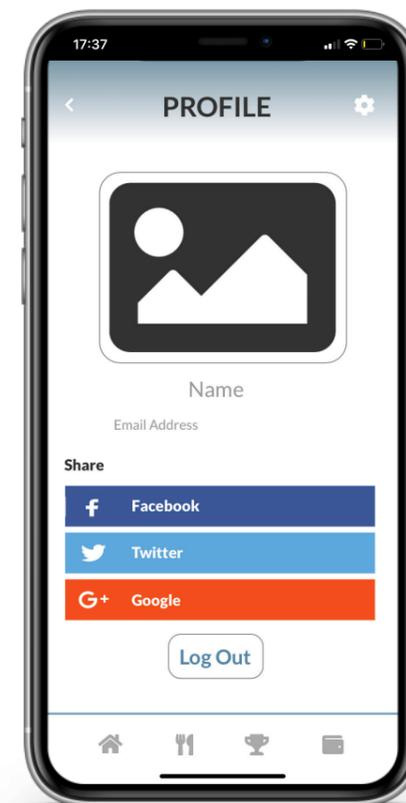


Figure 34: This is the profile page, users can view their own profile from here or share their experience with others

When first loading into the application the content is as simple as possible. Allowing the user to login, create an account or simply enter the application without having an account.

To ensure the positive experience is easily shared it was important to make the user aware of possible sharing methods and platforms that can be used to spread the word.

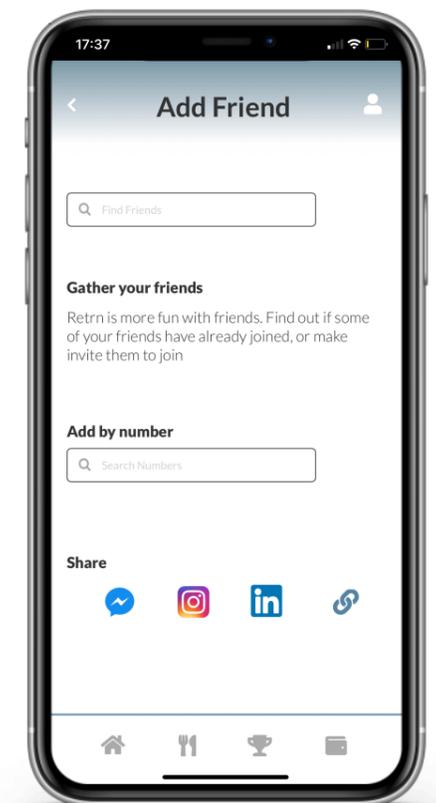


Figure 35: This page was specifically designed to make the sharing and inviting process as easy as possible

.11 REWARDS

Meaningful: The system must allow the user to gain rewards through repetitive use and loyalty

Reward System

The system is calculated by relating the users' store choices against the 'Food Made Good' sustainability criteria. Each of the stores on the application will be given a rating that states how sustainable they are. The star rating of the outlet will then be the determining factor in the number of points rewarded. Initially, the reward system was star orientated but through testing, it was discovered that stars are more associated with 'customer reviews' and therefore the system was used.

This system was created to reward users that make conscious choices to eat at more sustainable outlets and therefore these individuals deserve rewarding.

Promoting Sustainable Outlets

By using this system the application can highlight the good work that is already being carried out by restaurants and encourage other restaurants to improve. Food Made Good have created both a questionnaire and tips to improve companies. The hope is that this questionnaire can be used to measure and rate the level of sustainability of restaurants that wish to be promoted on the application.

Meaningful Rewards

After performing journey and empathy mapping it was identified that the best rewards for the users will be to enhance their lunchtime experience. This is a limited time for the user and having rewards that allow them to better experience this precious time will create a positive connection between them and the product. Clark expresses this as designing for an economy of time. The next steps were identifying how this 'time' could be enhanced and made more meaningful.

From the journey mapping, there was a negative experience when waiting for their order to be taken/ food to be prepared. With their time being limited and special the reward of queue jumping was developed. This reward will give the user the ability to order their chosen meal beforehand and pick it up at their desired time.

The element of the community is crucial in the operation of the product it was decided that other members could recommend local areas. These areas could be recommended for a number of reasons, whether its a quiet location, a seat with a view, etc. This would allow the user to potentially find somewhere new to enjoy their meal.

Similarly, it was identified that the user could benefit from finding out if any event were occurring around them during their lunch break. This could be something as exciting as a street performer or simply someone playing an instrument but both would elevate their experience.

Maslow's Hierarchy

To fully understand the rewards that would have the greatest meaning to the user it was important to identify the users' key values. Maslow's hierarchy was implemented for the product to be more meaningful. The concept of 'self-actualisation' was critical in understanding what would benefit the user. Maslow believed that 'individuals possess a set of motivation systems unrelated to rewards or unconscious desires' (McLeod, 2007). With this in mind, the rewards needed to be fulfilling for the user rather than simply being given something for free as Clark Buckner discusses "brands should be strategic in choosing their rewards" (Buckner, 2014). As pleasant as receiving something free is, the user will gain greater loyalty and pleasure from a reward targeted to them.

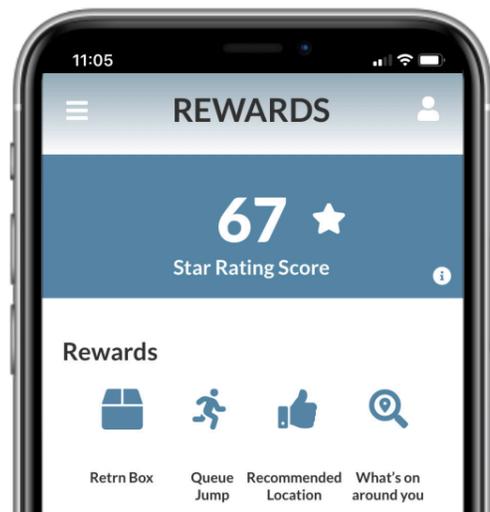


Figure 36: This is the reward page where users can see the points they have accumulated and the rewards associated

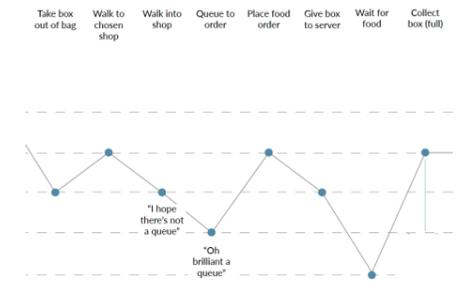


Figure 37: As shown the 2 lowest points in the journey/ empathy map are when the user is waiting for their food



Figure 38: This is the recommended location page, here the user can find unique and pleasant areas near by to enjoy their break or lunch

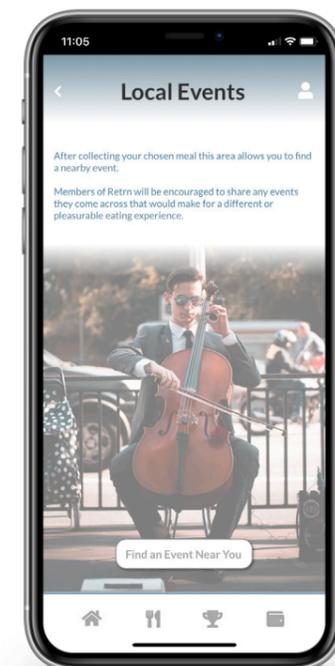
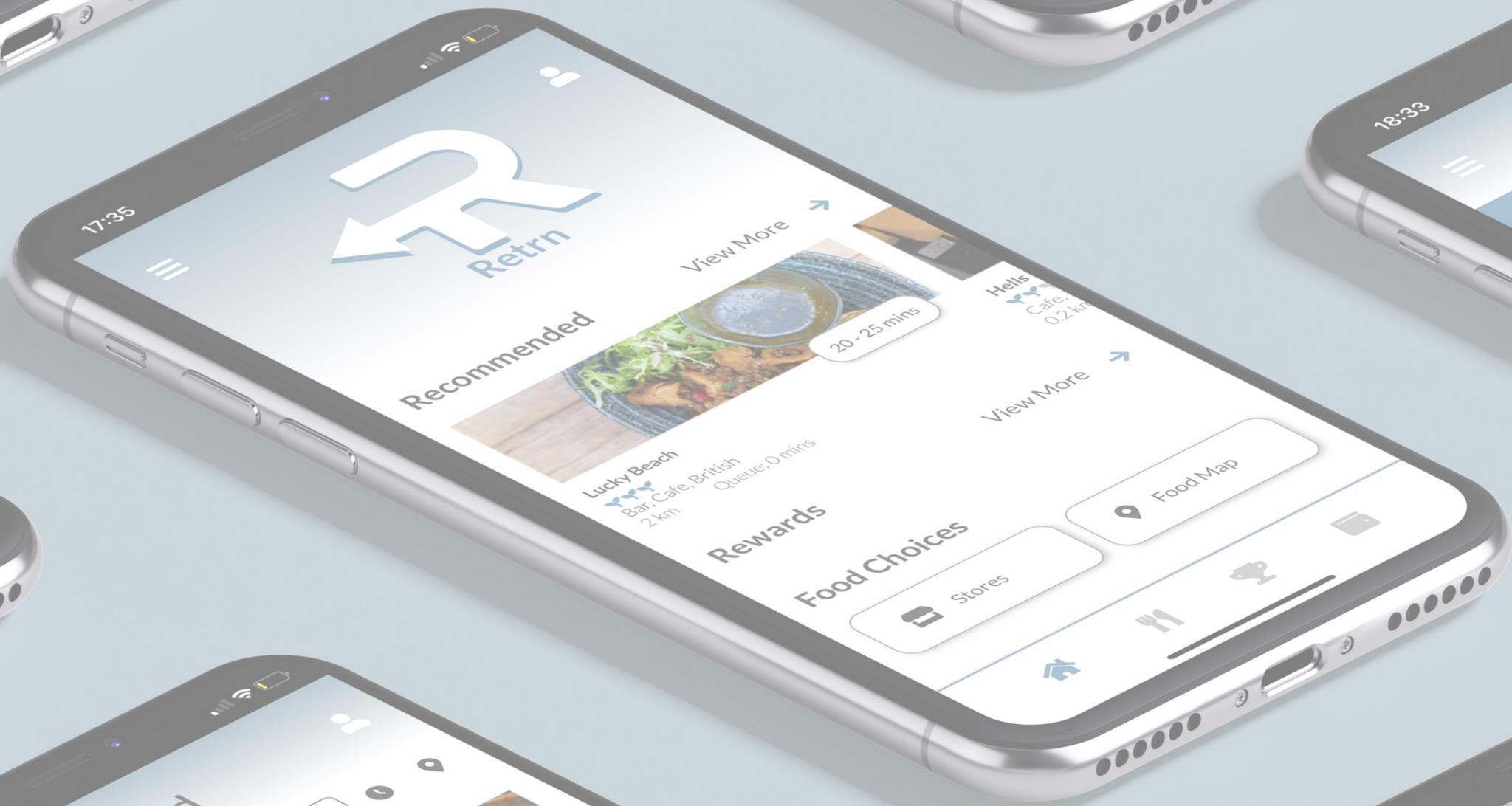
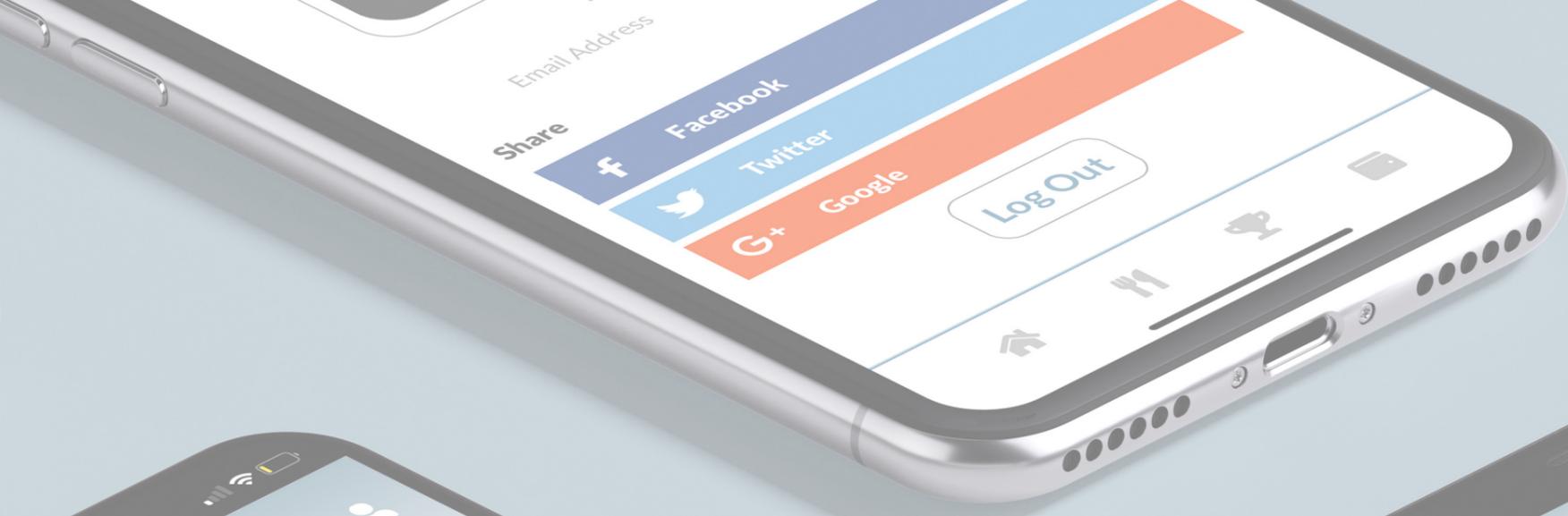


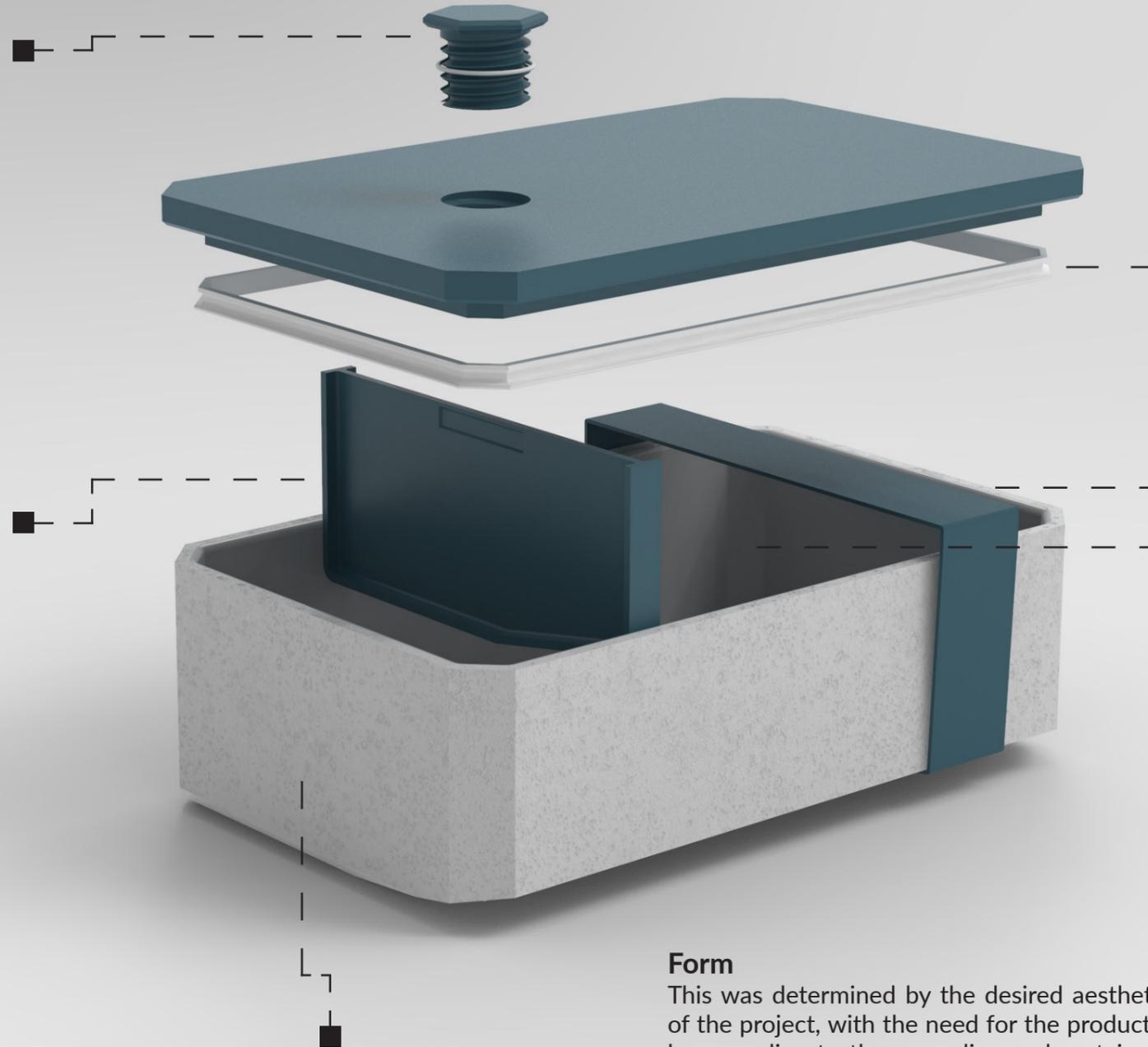
Figure 39: From this page it is possible to locate local entertainment that will bring a level of excitement and joy to the user



.13 FINAL RENDER

Valve

The need for a valve within the product was diagnosed early in development, the valve allows users to have more flexibility with the foods stored inside as steam can be released if necessary. Additionally, the mechanism chosen was due to the associated characteristics with the desired aesthetics. The valve is easily identified and previous interaction knowledge exists so users have no problem using this feature.



Divider

The divider was designed to be easily inserted to allow the user or a server to separate foods if needed. This development gives the ability for customisation as well as increasing the number of foods that can be stored within. Competitor analysis was performed to understand how other products effectively separate foods. The external shape was contoured to the internal shape of the box allowing for a 0.5mm tolerance. This allows the item to move when needed but the friction will hold the divider in place when needed.

Comfort

It was discovered that users may have to carry/transport the product for around an hour, therefore it was important to ensure it was comfortable to hold for a prolonged period in the desired carrying position (assuming it is not transported in a bag). Because of this the height of the box was investigated using anthropometrics and user testing to ensure the box is pleasing to 95% of men (whilst keeping the capacity as large as possible) (ONS, 2015) (B. I.D, 2019).

Texture

The rough texture of the product was chosen as it was identified as desirable by both target markets, also the texture was used to increase the friction co-efficient making the product easier to carry.

Form

This was determined by the desired aesthetics of the project, with the need for the product to be appealing to the masculine and sustainable market it was decided to make the box have angular shapes on its exterior, with a rough texture and dark colours. Whilst to appeal to the sustainable market the product has a minimalist/modern style with a soft hue. (Semin & Palma, 2014) (DeLong & Martinson, 2012).

Colour

The colouring was dictated by the desired aesthetics, to ensure success in the market mood-boards were created to understand the common colours within the chosen fields. It was decided to remove green from the palettes as it was found to be overused in the sustainable market. Additionally, blue was determined to be effective, trustworthy and strong and therefore was taken forward into testing and eventually used in the product. (Kauppinen-Räsänen, H. and Luomala, H.T, 2010).

Leak-Proof

Whilst understanding the users' journey, the confidence in the products ability to not leak was identified. Several developments were made to increase the security of the container, including a silicone seal surrounding the lid and a silicone band that encompasses the product creating a watertight seal.

Cleaning

This is a major pain point within the users' journey and because of this, the box was developed to be as easy to clean as possible. The main development was the increased fillets on the internal edges of the box, this allowed the user to remove more food particulates with less force. Additionally, the material choices were made to not only be food-safe but also ensure the user could machine wash the product if they wished to (Regulation (EC) No 1935/2004).

.14 FINAL RENDER

Accessibility

All click-able areas were given at least 44x44 pixels (Josh Clark). This allowed users a field of error and therefore made it more effective for users to complete their desired task.

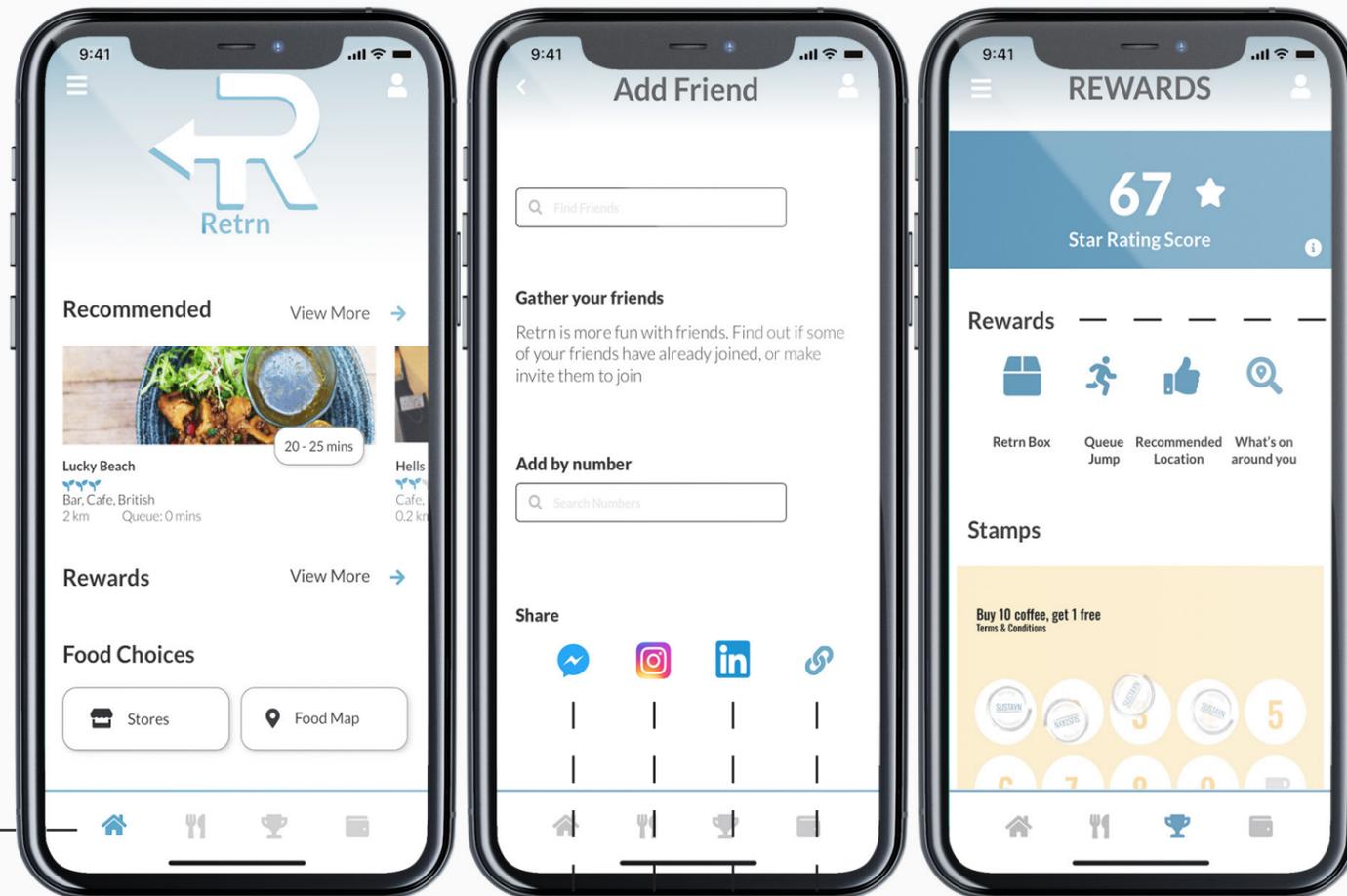
To ensure user could find what they wanted more efficiently and effectively a hierarchy was created. This hierarchy allowed for the organization of content so that high priority content is shown to the user first (Mads Soegaard, 2020).

To further the ease of use and reachability a concept known as the rule of thumb was implemented, this dictated that the bottom right region of the application is the epicentre with the most important content being located within a thumbs reach.

Processing

It was important not to overload the user with cognitive demands. Because of this, steps were taken to reduce the number of stimuli presented to the user through chunking. Gestalt's principle of proximity was also used to organise content "objects that are near, or proximate to each other, tending to be grouped together" (lawsofux.com).

"Users spend most of their time on other sites" (Nielsen, 2017). With this in mind, the content of the application was also structured through researching competitors. This process raised the awareness for the menu options always being located in the top left corner (burger-menu) and the profile/ account section is located in the top right corner. In connection with the icons and symbols used. Testing was completed to ensure the icons chosen portrayed the correct connections as well as implementing universal icons such as home and search.



On-Boarding

The product is designed to be a social and local experience, therefore, the ability to add friends/ get others involved will enhance the users' experience. As stated by Josh Clark "nearly half of all apps are downloaded based on a friend's recommendation" (Clark . 2014, 10). Therefore, it was crucial to make the product as easy to share and invite others as possible, this was done by implementing existing platforms where users can communicate and share.

Visual Acuity

To ensure users could easily understand and decipher the information on the application it was important to understand the visual threshold of users. It was identified the minimum visual threshold at 20/20 visual from 500mm was text with a height of 0.73mm³ (BS EN ISO 9241-303:2011). This was then cross-referenced with UX recommendations and guidelines and from this, it was decided that the minimum font size should be 14pt (3.6mm³).

As to align with the desired aesthetics 'Lato' was chosen as it is described as a humanist sans-serif style font. This means that the font is modern (humanist) and minimalist (sans-serif), making the font appropriate for this product. As well as sans-serif fonts being recommended for use in applications.

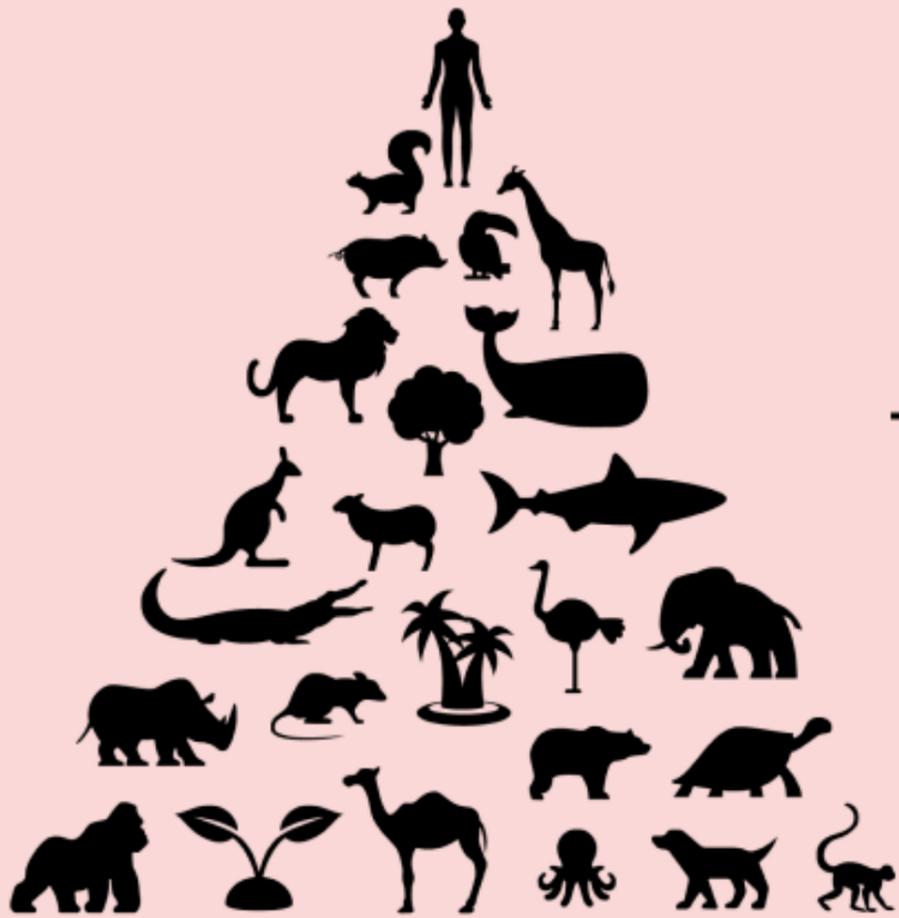
It was important to size the logos and icons on the application to be easily understood. Because of this, the icons were sized at a minimum of 30x30 pixels (BS EN ISO 9241-303:2011).

Rewards

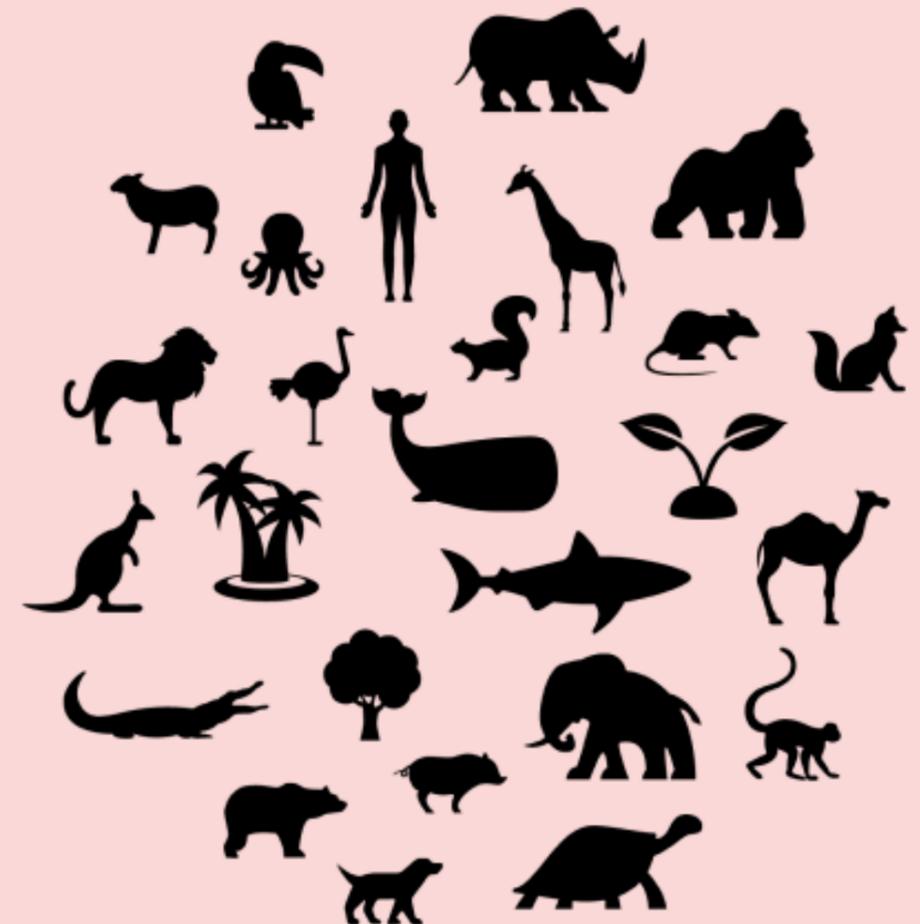
This system was created to reward users that make conscious choices to eat more sustainably and therefore these individuals deserve rewarding. It was key that the rewards were meaningful to the user. It was identified that the target users have fast-paced lives and therefore would benefit from rewards that enhanced and made their limited time more pleasurable. Furthermore, the time taken while ordering and waiting for food is wasted time, this was the reason for including a reward that allows the user to jump the queue and place their order for a time that suits them.

.15 PERSONAL DESIGN PHILOSOPHY

When starting university I stated that I had a genuine interest in how more effective design can influence lives, be that cost reduction, availability to broader groups, sustainability or multifunctional use. I felt that product design was going to have to change and that I want to be part of that change so that we can create more effective, sustainable solutions to future problems. 4 years on I believe a lot of the same things, sustainability has never been so pressing and a designer is either naïve or selfish not to consider all of the elements of sustainability when producing a concept. Throughout my schooling, there has been an emphasis on design with the user in mind (user-centred design). However, I postulate that one of the ways design needs to change is this outlook. Designing for the user is, of course, important without fully understand your user it is impossible to design a product that will be meaningful on more than just a surface level. Additionally, the studying and investigation of a user's life is where the truly brilliant moments of innovation come from. As Dana Ferrante states, "the goal is to build empathy with the end-user" (Ferrante, 2019). Nevertheless, the weighting of importance is correctly shifting, the user cannot be the only aspect of design, a modern designer has to have an educated grounding in user-centric design but also an understanding of how this product is going to affect our planet in a bigger picture. Because of this, I am a strong believer that all designers need to embrace 'environment-centred design', this is not stating that the user is not important, for example, I am fascinated by the psychology and power behind colour theory, how the subtle changing of colour can mean so much to different people. But we need to start developing concepts with all living beings in mind. In some instances, I would even promote making user-centred design a secondary function, this would be in the hope that by not designing to benefit the user initially, a product would be designed to benefit the broader view. Whether that is environmental, social or economical it is becoming more and more pressing to design for behaviour change. R. Wever et al suggest that "until now most sustainability approaches have focused on fulfilling functions in a more sustainable way" (Wever, van Kuijk and Boks, 2008), however, this approach will not cause the change required. Sadly, the only effective style for changing sustainable behaviour currently is making a process as easy as possible, this can be seen in my latest project, to encourage people to think more sustainably it was necessary to reward them but this can only be done for so long. I believe that in the near future design should be primarily directed at positively affecting the planet with the user being shaped and changed to benefit the environment (not the other way around). Its widely believed that design has shaped the world into what it is today and if this is true design needs to be shaping the world in a new, better direction.



HUMAN-CENTERED
DESIGN



ENVIRONMENT-CENTERED
DESIGN

