# Mass Customisation within Male Grooming

## Human Factors Report

## Contents
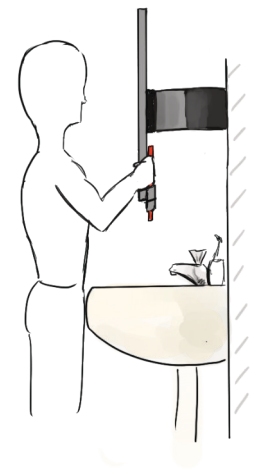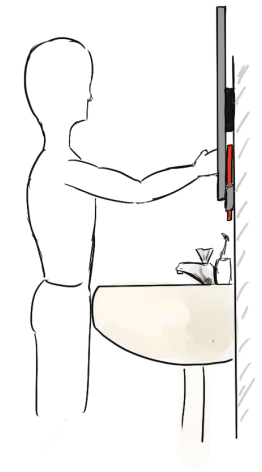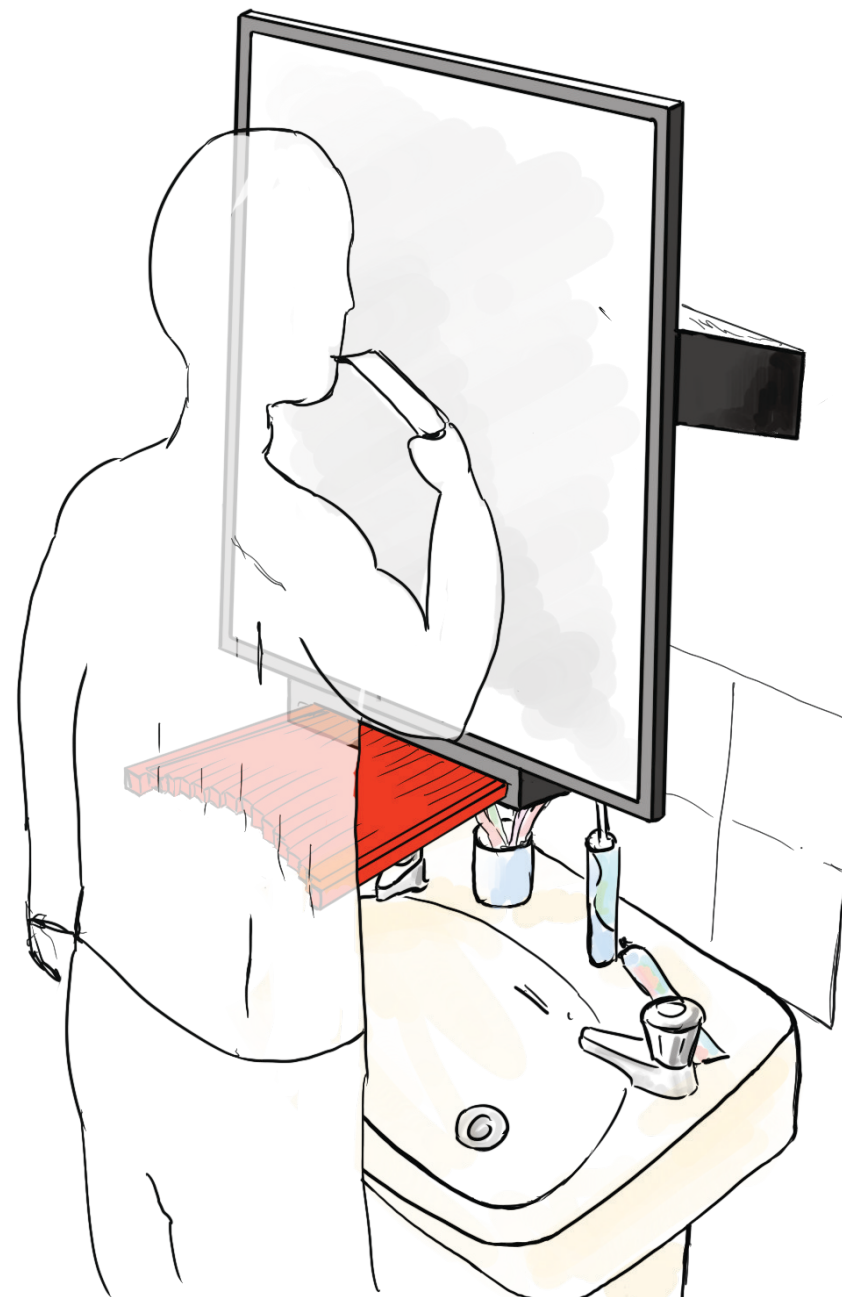
# Executive Summary

## Male Grooming

Male grooming is a process that is unique to everybody. There is no correct way to shave, and every shaving process uses varying methods and techniques, as users seek alternative styles and have their own unique preferences. With this level of individuality, male grooming products have a huge potential to optimise the user's experience by utilising mass customisation, especially whilst considering human factors methodology.

## User Group

For this re-design process, the targeted user group is male students and young professionals, that live in shared, probably rented accommodation. There are huge variations in approach across the population, as beard and shaving styles vary between fashion trends, occupations and even religions. This group was chosen due to its accessibility to me, which has considerably helped in the design process and using human factors methods.

## Human Factor Approach

Having close access to the user group enabled me to carry out in-person focus groups and task observations, which complemented the broader methods of research such as surveys, online research, and anthropometric analysis. It also enabled user testing and iterations within the design process.

## Key Insights

In this particular user group, shaving using an electric trimmer is used far more often than wet shaving. This is primarily due to the ease of use, the lack of need for shaving foam, and being generally less irritable for the skin. Trimmers often also use adjustable features that allow for styling of beards, a particular benefit for this user group.

The main issues as highlighted by the user were with the shaving process, and not directly related to their shaving products. These were:

**Mess caused by beard trimmings**
**Difficulty in viewing hard-to-reach places**

As way of solving this, users tend to contort themselves into strenuous positions so that the mess lands in the sink, and simultaneously get a close up of their face in the mirror.

## Re-design

My recommended re-design is that of the shaving environment and not a shaving tool. It takes the form of a mirror and, rather than being customisable from manufacture, is adjustable in situ. This adjustability allows different members of the user group, within the shared accommodation, to use the product for their own unique experience. The mirror itself is on an adjustable arm which enables the user to position it in a way that allows them to see their face clearly without any strain in their back or neck. Stored behind the mirror is an adjustable
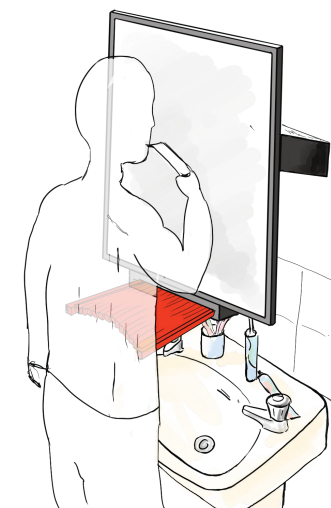


The problem, user testing and the proposed system.

fold out tray, which is made up of independent sections that allow a close fit to the user's body. Any beard trimmings will land directly on the tray rather than the floor. After shaving, the tray is wiped clean as it is pushed back into the mirror, depositing all trimmings into the sink, ready to be washed away.

# What is Human Factors?

Human factors is the study of people and their environment. In the context of product design, this involves the physical and psychological relationship between a user, a product and their surroundings. By utilising human factors methodology, the optimum experience can be designed for the user.

## Human Centred Design

A human factors based approach utilises tools that allow the designer to empathise and understand the user, which enables a human centred design process. The human centred design process prioritises the user's requirements throughout the process, utilising user and stake holder feedback in an iterative manner. I think Joseph Giacomin's explanation of the approach sums it up nicely.

*"Today's human centred design is based on the use of techniques which communicate, interact, empathise and stimulate the people involved, obtain an understanding of their needs, desires and experiences which often transcends that which the people themselves actually realised."* [1]

Giacomin, 2012

This understanding of the user provides you with the means to design intuitively. Ron McLeod's lecture on human factors design within high risk environments highlighted some examples where the design was anything but intuitive, and the consequences for error were huge. In these extreme situations, which employed a technology centred approach to system design, a lack of empathy for the user could have had catastrophic results.[2]

## Psychological

Ron McLeod also spoke about the psychological aspect of human factors and highlighted how the correct approach can provide the means for "cognitive compatibility" of a product. For example, modern trackpads and tablets have a cognitively compatible scroll function. The brain understands that as you swipe the screen down, you are also dragging the on-screen paper down.

There are other psychological factors that can be affected by a product. Margaret Hanson used the example of how a material texture like rubber or a matte finish can imply 'warmth'.[3] This can psychologically infer a sense of quality and comfort in a product or an experience.

## Physiological

This weekend, understudy George Russell stood in for Lewis Hamilton at the F1 Sakhir Grand Prix. Had it not been for a technical fault he would have one his first ever F1 race. What made this achievement even more impressive

was the fact that he was driving in a car designed for Hamilton. He had to squeeze his feet into shoes that were too small for him so that they fit inside the car, and after racing he needed ice treatment on bruises on his legs.[4] Ergonomics is about fitting the equipment or system to the user to optimise their experience, and uses sources such as anthropometric data to do this. The huge budget in F1 and the strive for marginal gains, results in such a bespoke system that another driver, a few inches taller, can't use it without causing injury. This is an extreme case, but the principle of ergonomic design and designing a system that is catered to the physiological needs of the user or user group, is an essential part of human factors.
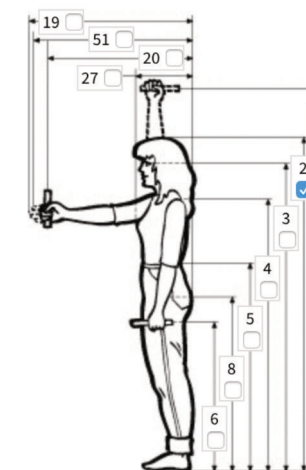


Online anthropometric database - DINED
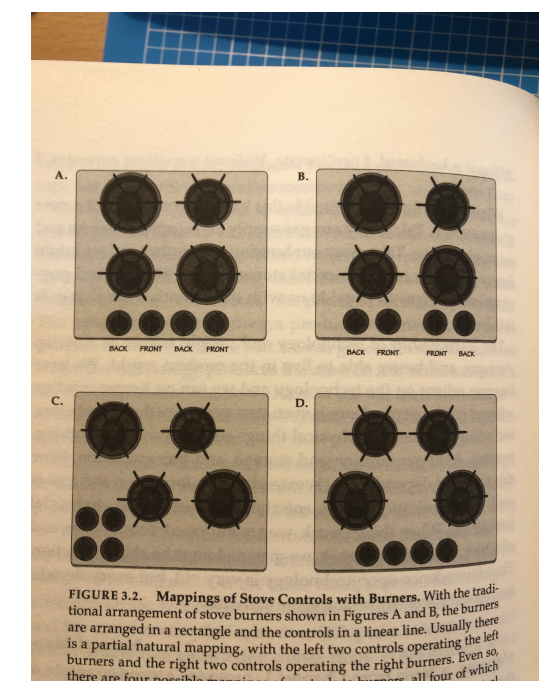


Cognitive compatibility (or lack of) demonstrated by Donald Norman in, *"The Design of Everyday Things"*

FIGURE 3.2. **Mappings of Stove Controls with Burners.** With the traditional arrangement of stove burners shown in Figures A and B, the burners are arranged in a rectangle and the controls in a linear line. Usually there is a partial natural mapping, with the left two controls operating the left burners and the right two controls operating the right burners. Even so, there are four possible mappings of controls to burners, all four of which

# Product Description

In this project I am exploring how mass customisation could be applied to male grooming. Shaving is a process that all men do, however everybody has different experiences with it. Reasons for shaving are unique from person to person; one might shave daily as their occupation demands it, such as in the military, whereas another might only trim their beard every once in a while.

Shaving is not restricted to the face, and there are a multitude of body hair removal products out there that reflect this. For the majority of men, however, shaving their face is by far the most common procedure, so this is the process that I am interested in.

Shaving is usually integrated into the morning routine. Some prefer to shave before showering and some after, depending on their style and approach. Shaving normally requires the use of a mirror and a sink, which encourages you to shave in the bathroom (however I have witnessed my father shave in the car on the way to work in a hurry...) Within male facial grooming there are two main categories: wet shaving with a straight razor blade, and beard trimming, which is usually performed with an electric trimmer. Both achieve different results and have a different process, with the former being the more 'traditional' shaving approach.

**How could mass customisation play a part?**

Shaving is a unique process as every user has different methods and techniques. There is no correct way to shave. Most men are taught initially, and then develop their own technique as they learn what works best for them. Every shaver has a different shaped face and neck with different skin sensitivities. Each shaver alters their facial hair to suit their own personal desires. Users also have varying psychologies around what they choose to buy, with some opting to choose recycled or sustainably manufactured products, whilst others are purely concerned with the aesthetics or comfort of the shave.

With this level of individuality, shaving products have a huge potential to optimise the user's experience by using mass customisation - especially using Human Factors methodology.

**Existing examples of mass customisation in shaving products**

There are a couple of examples of product customisation in this market already that can be learnt from. Gillette offers a selection of personalised 3D printed handles that are available for a significant mark-up in price. This customisation is purely aesthetic, and despite the customisation undoubtedly providing the user with some psychological rewards, it does not physically improve the user's experience. [5]

A different approach is taken by Cornerstone. Rather than offering the customer personalisation of the product itself, it allows them control over the rate at which they are resupplied with shaving consumables, such as razor blades and skin care products. [6]



Gillette 3D printed handles.
Image from https://formlabs.com/uk/b-log/gillette-uses-3d-printing-to-unlock-consumer-personalization/



Cornerstone subscription service.
Image available at https://www.cornerstone.co.uk

# The User Group

## General Population

Shaving is not performed exclusively by men. Many women shave just as frequently as men and there is a huge market, perhaps larger than for male grooming, dedicated to female hair removal. It is more unusual however for women to shave their face, so the user group for this project focus is immediately narrowed to men.

Most men start shaving in their teens. Some will start shaving much earlier than this, and some much later. According to Gillette: "76% of men shaved for the first time between 14 and 17." [7]

Shaving is a process that has distinct variations within the population. There is a generational difference as styles and trends have changed over time, a religious difference, and even an occupational difference. Older members of the population (although there is a growing trend amongst younger people) tend to prefer a more tradition technique, using a brush to apply shaving cream, and a safety razor with a single blade to achieve a close shave. As facial hair has trended back into fashion, more men are opting to drop their razors in favour for the faster and often more convenient beard trimmer.

Given the wide and variable shaving practices, choosing a specific user group is important for this project; it will allow a more in-depth understanding of the human factors relating to this environment.

## User Profile

The user group for this project has been influenced by what is available to me given the current pandemic.

The project requires analysis and re-design, which involves observation, user interaction and user testing, which are all made more possible if it is a user group accessible to me. I live in a flat of 5 men who can provide physical, in-person analysis, and many more are only a phone (or zoom) call away. This allowed the project to have an iterative design process and accelerated the process. All participants are friends of mine and were happy to contribute toward the project. Their profile is as follows:

**Age Range: 18-25**
**Gender: Male**
**Live in flat share**
**Student or young professional**
**Generally low disposable income**
**Generally environmentally conscious**
**Cognitively and physically able**
**No sensory impairments**
**Variety of shaving styles**

The participants have a variety of shaving and beard styles so are a good representation of the wider user group. This month coincided with the Movember charity effort, which expanded and altered the shaving experiences for a number of the participants.

As I have alluded to, shaving habits vary across the demographic. This particular user group has certain traits and requirements that are particularly relevant to their living environments.

It should also be noted that none of my participants are designers or doing design related degrees, and they are not immediately aware of the project's aims.
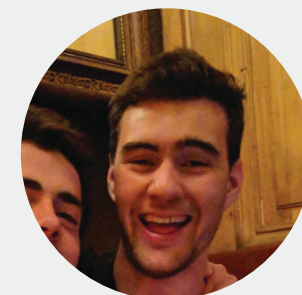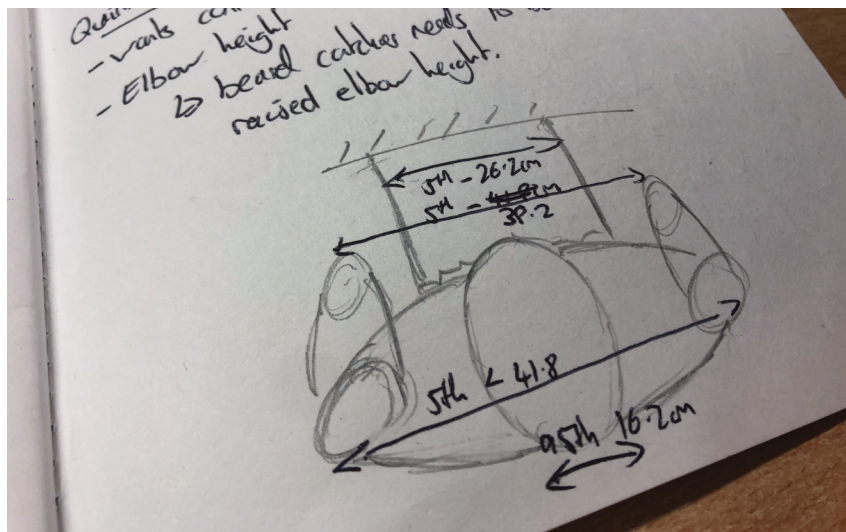
# HF Process and Methods





The focus group, ethnography and anthropometric analysis



## Online Research

Desk-based research is a useful starting point. It helped to familiarise myself with popular shaving trends, products and services, particularly when investigating how mass customisation might be incorporated into the re-design.

## Self Analysis

I am part of the user group myself, so analysing my own behaviour when shaving was useful in finding relevant areas of investigation to take further when engaging other members of the user group. It is a double edged sword being part of the user group; on one side it is useful having first hand experience, but on the other side you have limited scope and are less likely to challenge your initial ideas.

## Online Survey

My first engagement with the user group was through an online survey which can be found in appendix A. I did not share any information about my aims of the project prior to the survey, and the survey was designed so that it did not contain leading questions. This would achieve honest and real responses about the users experiences, and not tailored toward what I wanted to hear. The questions required a combination of qualitative and quantitative answers and provided insights into some of the more general issues such as what products the users own and their priorities when buying a new product.

## Focus Group

The group consisted of my 4 four flatmates and myself, who led the discussion. They are a combination of masters students and young professionals, and all relate directly to the user group. The questions asked where to prompt discussion about their shaving habits. I encouraged the group to create a self-led storyboard (appendix B) for both beard trimming and wet shaving, triggering lots of debate. I tried not to interfere with any opinions or emphasis that was made by the group. Despite many differences in the shaving process, the activity highlighted some common causes of inconvenience.

## Task Observations

As highlighted by Craig Bunyan, ethnography provides the opportunity to gain insights into how a user utilises the task environment and is most effective if you can resist being intrusive. [8] Observing the participants shaving enabled me to notice aspects of their routine that they were not aware of and would not have verbalised in a discussion.

## Anthropometric Analysis

Anthropometric analysis is a key part of the Human Factor process. This project has its roots in adapting the environment to the user, so this analysis is critical within the re-design phase, particularly when considering how mass customisation can be integrated.

# Summary of Issues and Insights

## Shaving Style

The majority of this user group chooses to use an electric trimmer over wet shaving for a number of reasons:

- It takes much less time and effort,
- It does not require any skin care products or shaving foam,
- It generally causes less skin irritation.

Among my participants, beards or close stubble is the fashion, and the adjustable length that is possible with some electric razors is desirable. Of my focus group, **all members choose to style their beards regularly with a trimmer**.

When choosing this topic, I had imagined that the user would find issue with some fine details of the razor or handle, allowing me to build on Margaret Hanson's lectures on optimising design for the musculoskeletal system. It became very apparent, however, that the issues with shaving were not to do with the product. This is not all that surprising given the scale of the industry that has been perfecting the product for years.

## Shaving Process

The vast majority of the user group identified shaving as a chore, and something they would rather not do if they had the chance. **The primary reason for the dissatisfaction was with the mess** created by shaving (which is always worse while trimming with an electric razor.) The clean-up

of hairs can take just as long as the shaving process itself. **Another issue for the users was getting a clear view of hard to reach areas of their face and neck in the mirror.**

Whilst observing the participants shave, the participants would bend their backs and arch their necks into a position that would allow all mess to fall directly into the sink, and in doing so would also help them get a good view of themselves as they shave. One participant described this contortion of their body as,

> *"It is just something you have to put up with..."*

## Shaving Environments

Shaving usually takes place in the bathroom, in front of a mirror and over a sink. As shown by these images of the user group's shared bathrooms, they all have variable aesthetics, dimension and limitations. The user will bend their body in a unique manner, dependant on the bathroom environment.



Ethnography of my flatmate, Quinn, shaving, and the mess he 'aimed' into the sink
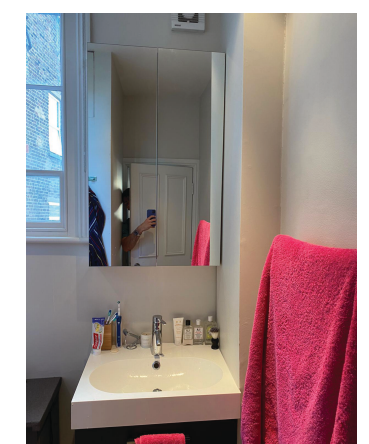
# Re-design i concept generation

The re-design process has been directed by the key insights from the research phase. Rather than re-designing the existing male grooming products, this process is applying a customisable approach to the way users interact with the task environment. The focus for this re-design is the human interface with the shaving environment.

## Priority Features

**The shaving environment must not induce any musculoskeletal strain.**

**The solution must allow a quick clean-up of the mess.**

**The solution must be customisable or adjustable for each member of the shared accommodation**

**The solution must be customisable for each bathroom environment.**

The initial solution was based around the concept of bringing the mirror to the user, in order to keep the body in a comfortable position. The optimal position is a 'neutral spine', in which your back and neck are placed under the least amount of stress. [11]
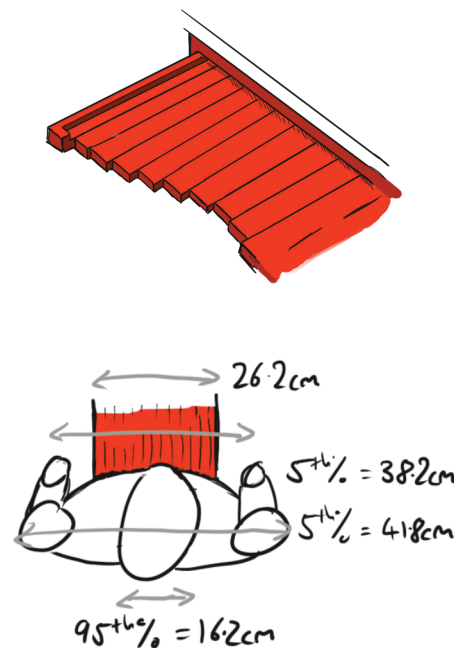
The fold out tray catches beard trimmings before they hit the floor. The tray is made up of independent adjustable length sections to create a close and unique fit around each user.

The surface will be 26.2cm wide, accounting for 5cm on either side of the 95th percentile head width. [12] **\***

This width is smaller than the 5th percentile shoulder and elbow width, which should allow the user ample space to reach all areas of his face whilst shaving.

Users have different eye height and focal lengths, so the mirror is adjustable in both height and distance from the wall.
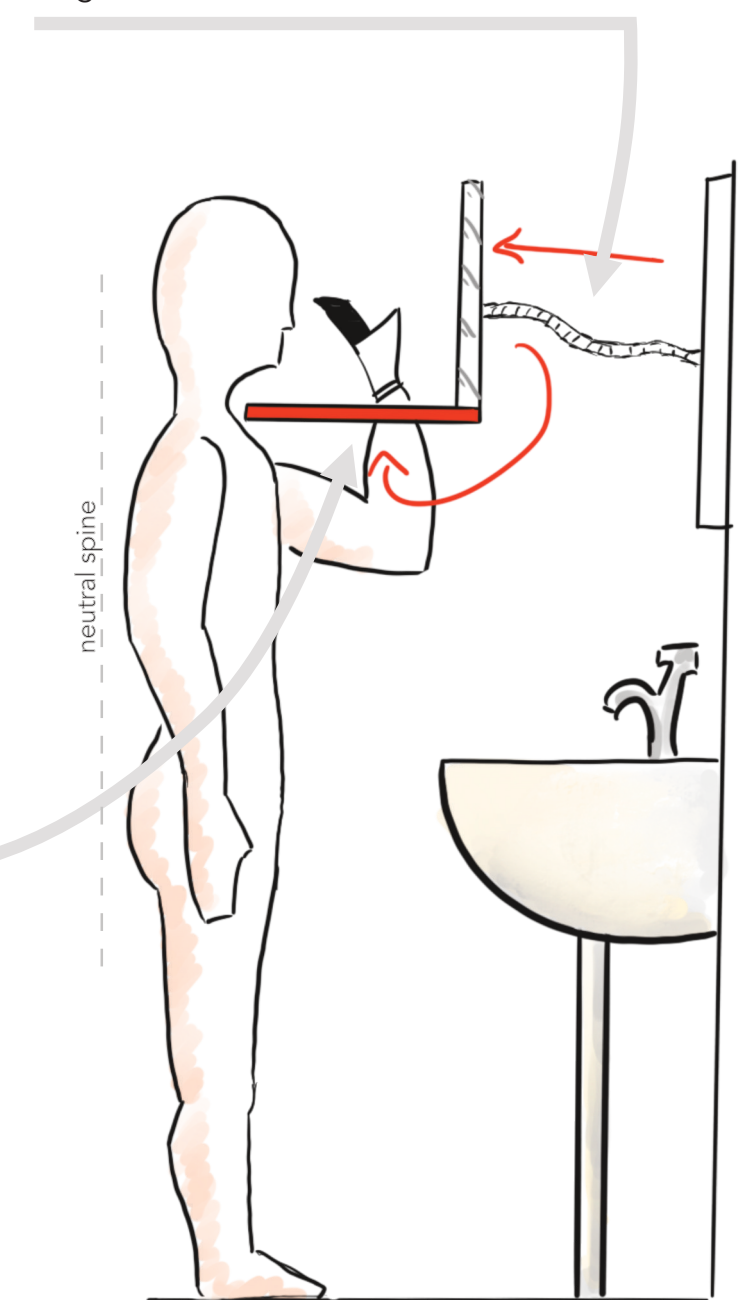


## Customisation vs Adjustability

Rather than being customisable from manufacture, the primary mechanism for creating a unique and bespoke solution relies on the capability for adjusting the product in situ. This adaptive approach is appropriate for a product that must perform differently on different occasions [9], for example if a product must have different configurations for each member of a shared

bathroom. This configuration, as Frank Pillar states, still "**exploits heterogeneities across the customer's needs**" [10], and in doing so allows the product to serve all users individually. The difference being that the customisation aspect is included within the user interaction of the product, rather than in the design and manufacture phase.

**\*** Data sourced from DINED anthropometric database, based on Dutch students between the age of 18-25, due to no access to PeopleSize. Measurements may differ to here in the UK, but the application of this data is identical.

# Re-design ii prototyping and testing



## User Testing

The users were generally enthusiastic about the concept, however there were a few issues highlighted with the design. The position of the folding tray was too high and, despite considerations taken into the width, it was still obstructive to the shaving process. Suggestions were made to make the tray lower.

Based on 5th percentile elbow height, the tray should have a fixed height of 100cm from the ground, allowing enough clearance for sink-based obstacles.

The users also raised the issue of how the tray is cleaned and suggested something that wipes the tray clean as it is pushed back into the mirror.
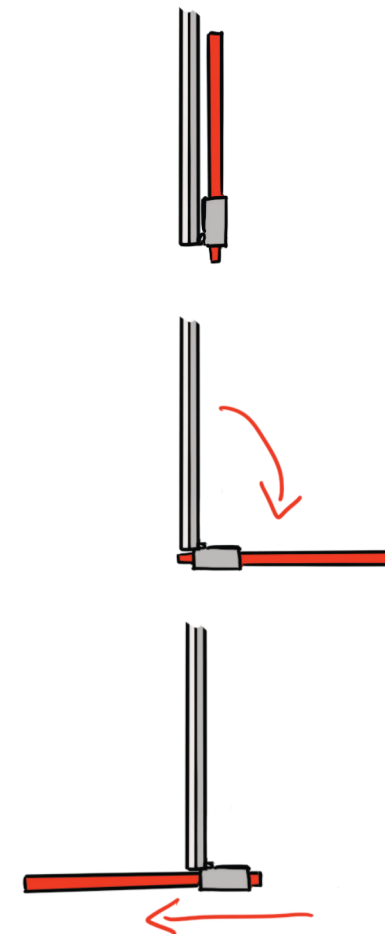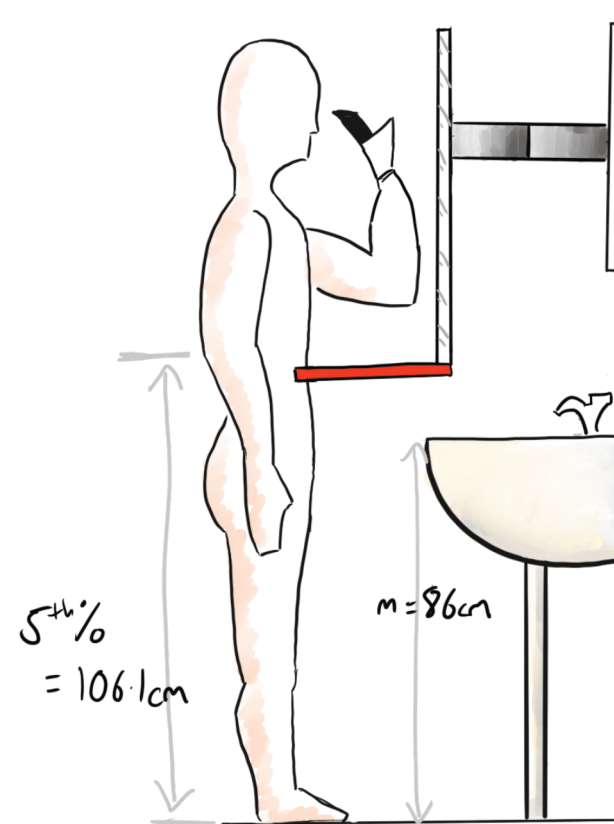
## Environment Integration

This solution is a complete mirror replacement, so there must be options to integrate the product aesthetically into the environment.

The mirror style and dimensions (without disrupting the tray height) should be selected to best fit the user's bathroom. This would be best suited to a selection of possible options when buying the product, either in store or online.

My bathroom has a red theme, so I have drawn these sketches with a red fold out draw.

# Re-design iii user scenario



The user selects an aesthetically and dimensionally appropriate mirror as a replacement to their current mirror.

The user pulls out the mirror from the wall to a position that they can see their face clearly whilst remaining in a neutral position.

The tray is flipped out from behind the mirror and pulled out so that it hits their front.

The tray is made of adjustable sections, each capable of independent length, creating a close fit to the body in order to catch all beard trimmings as the user shaves. The tray sits under elbow height ensuring free movement of their arm.

After shaving, the mirror is pushed back to a position above the sink. When the tray is pushed back into the mirror, a squeegee-like flap will sweep the collected hairs off the tray into the sink, ready to be washed away.

The product has been designed for able-bodied users, but the concept is applicable to a wider user group. With adaptions to the dimensions and the mechanisms, the product could offer a shaving solution for those with mobility impairments or those who are wheelchair bound.

In this process I have only shown the human interface of the product, but there are other recommendations that should be considered for it to be a viable solution.

## Material selection

Whilst the material of the mirror frame is important to the aesthetic integration of the product, the material choice of the tray is integral to the function of the product.

The tray needs to be made of a material that is resistant to hairs sticking to it, making the clean-up straightforward. A tightly woven fabric such as microsuede or microfibre (often used to repel pet hairs) could be used. [13]

## Installation

For this particular user, it is likely that they will be renting their accommodation. It is unlikely that they would be able to install a heavy-duty mirror, imbedded within the wall. The product solution should be easily mounted by the users themselves, without causing undue stress or damage to the wall.

# Application

Although this solution I have proposed in this process seems a little far-fetched, the process and the final outcome has been driven by human factors methods. The research and investigative stage led me down a very different route to that which I first imagined when choosing the area of male grooming. This same open-minded approach must be applied to my final year project.

My final year project is exploring an improved method of preventing pressure ulcers, which generally occur in the most vulnerable of the population. At this point in time, the solution is a wearable device that is used on particular areas on the body of high risk patients, hence there is a significant human factors aspect to this project. The NHS state human factors in healthcare as:

*"Enhancing clinical performance through an understanding of the effects of teamwork, tasks, equipment, workspace, culture and organisation on human behaviour and abilities and application of that knowledge in clinical settings."* [14]

This quote nicely sums up the task at hand, but it is true in any context. A broad understanding of the people, the task and environment is required to design a product that enhances performance.

This course has provided me with a much wider knowledge and appreciation of human factor considerations. My final year project will require design considerations for the physical attributes of the product, such as the specific anthropometrics of the pressure ulcer risk areas, the comfort of the wearable and the user interactions with it. However, due to the healthcare context and the user group, there are also significant psychological considerations. A patient who has already lost a great deal of independence is likely to object to a nappy-like device being placed on them, irrespective of whether it is what is best for them.

Critical analysis and research of the user and the environment is necessary. Techniques such as ethnography, which highlighted some of the primary issues in this process, will be especially useful when considering users who might not be able to verbalise their situation.

The lecture from Team Consulting, given by Kay Sinclair and Claire Young was particularly relevant. Although official risk assessment of the solution may be out of the scope of the project, considerations should definitely be made throughout the design process. One comment that stood out to me was:

*"Design should mitigate risk."* [15]

A thorough understanding of the human factors at play will facilitate this.
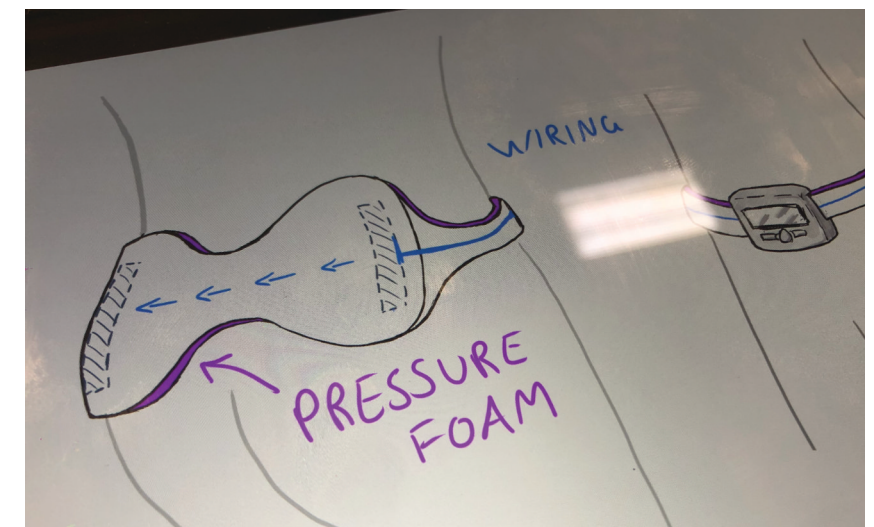
# References

[1]     Giacomin, J. (2012) 'What is Human Centred Design?'. P&D Design 2012

[2]     McLeod, R. (2020) HF & High Risk Contexts. Lecture notes.

[3]     Hanson. M. (2020) Anthropometric Data. Lecture notes.

[4]     BBC Sport. (2020) Fairytale Win Not To BE But Russell Still Sends Powerful Message. [online] Available at: <https://www.bbc.co.uk/sport/formula1/55210939> [Accessed 7 December 2020]

[5]     Gillette Uk. (2020) Gillette UK. [online] Available at: <https://www.gillette.co.uk/razor-maker.list> [Accessed 5 October 2020]

[6]     Cornerstone. (2020) [online] Available at: <https://www.cornerstone.co.uk> [Accessed 5 October 2020].

[7]     Gillette. (2020) How To Know When To Shave For The First Time | Gillette UK. [online] Available at: <https://www.gillette.co.uk/blog/how-to-shave/how-to-know-when-to-shave-for-the-first-time/> [Accessed 2 November 2020].

[8]     Bunyan C. (2020) HF for space travel - Seymour Powell. Lecture notes.

[9]     Gilmore, J. and Pine, B., (1997) The Four Faces of Mass Customisation. Harv Bus Rev, [online] Available at: <https://hbr.org/1997/01/the-four-faces-of-mass-customization> [Accessed 3 December 2020].

[10]     MC 01 Mass Customization (2015) [video] Directed by F. Pillar. RWTH Aachen TIM Group.

[11]     BackForever - The Movement to End Pain (2020) What Is A Neutral Spine?. [online] Available at: <https://backforever.com/blog/2019/05/13/neutral-spine/> [Accessed 2 December 2020].

[12]     Dined.io.tudelft.nl. (2020) DINED Anthropometric Database. [online] Available at: <https://dined.io.tudelft.nl/en/database/introduction> [Accessed 7 December 2020].

[13]     Brisk Pets. (2020) 7 Kinds Of Fabrics That Are Incredibly Resistant To Pet Hair – Brisk Pets. [online] Available at: <https://briskpets.com/best-pet-hair-resistant-furniture-clothes-fabric/> [Accessed 6 December 2020].

[14]     Catchpole (2010), cited in Department of Health Human Factors Reference Group Interim Report, 1 March 2012, National Quality Board.Available at: <http://www.england.nhs.uk/ourwork/part-rel/nqb/ag-min/> [Accessed 7 December 2020].

[15]     Sinclair, K and Young, C. (2020) User Testing. Lecture notes.

# Appendix A - Survey Questions

1. How often do you shave?

○ Every day

○ A few times a week

○ Less than once a week

2. Do you use a traditional straight blade razor, or a beard trimmer?
If both, please elaborate when and why you use one or the other.

○ Razor

○ Beard Trimmer

○ Both, please elaborate below

[                    ]

3. How may shaving appliances do you own?

○ One

○ Two

○ 3 or more

4. How much did you spend on your current shaving appliance?

○ Less than £10

○ £10-£20

○ £20-£30

○ £30 +

5. What do you **like** about your current shaving setup? If this is difficult, what single feature of it do you appreciate the most?

[                    ]

6. What do you **dislike** about your current shaving setup?

[                    ]

7. What aspects of the shaving experience do you not like, or you think could be improved?

[                    ]

8. If buying a new shaving appliance, what characteristics are important to you? Choose as many options as you want.

☐ Comfort

☐ Style

☐ Environmental impact

☐ Performance

☐ Other (please specify)

[                    ]

# Appendix B - Focus Group Output