07/01/2021
Vitality Squad

STUDENTS:
Yvonne A.D. Bruin 1235995
y.a.d.bruin1@student.tue.nl
Maud K.M. Oomen 1395726
m.k.m.oomen@student.tue.nl
Rick W. van Schie 1234438
r.w.v.schie@student.tue.nl

COACHES:
Carine Lallemand
Pepijn Verburg

VERSO

TABLE OF CONTENTS.

Word count: 10492

ABSTRACT.

Our current ‘always-on’ culture makes it difficult to mentally end a working day, especially when working from home. Disconnecting from work is key for stress recovery and well-being (Zijlstra & Sonnentag, 2006). Supporting healthy winding down routines can help restore the balance between professional and personal life (Scott, 2020; Walker, 2018).
The design described in this report, Verso, employs Slow Technology to trigger reflection about personal routines. A two-week deployment shows that the use of Verso has made participants more aware of what they are doing and the physical interaction helps to clarify the boundary between the work and non-work domain. This illustrates the effect of slowness on routines.
This project shows that Slow Technology can be used to design for routines and by doing so contribute to personal health. In contrast, a ‘fast’ technology could not have yielded the same result.

INTRODUCTION.

Have you heard of Slow Technology before? In consumer electronics retail, Slow Technology is not yet found, so it seems. But it has a lot of potential regarding offering reflection (Odom et al., 2019), the occurrence of memorable moments (Odom et al., 2014) and it can change the connection between owner/user and the device (Wakkary, Desjardins & Hauser, 2016).
But what does Slow Technology actually mean? Slow Technology is not a new technology on its own. It is a new way of implementing technology as we know it today. This new implementation is connected to slowness, hence slow objects. By slow is meant an object that reacts way later than initiated or an object that is only active for a couple of times a month, instead of every moment of every day. It is a contradicting technology movement regarding the always-available technology nowadays. People are used to constantly relying on the technologies they have and that those technologies work and react quicker and quicker. This is also known as the ‘always-on’ culture. Contradicting that, Slow Technology is more like a pet or a child with its own will, so it seems.
Finding a balance between work and private life using Slow Technology is the goal of this project. For this context iterations with several designs have been made which resulted in the design of Verso; A slow ambient artefact located on your desk. The user can physically turn a switch from work to relax and the other way around using the orientation of Verso. This data is being stored and shared back as average light to the user with a weekly interval. It is ghosting your routine of the past to guide you in finding a work-relax balance and creating a healthy winding down routine.
Having a proper routine helps with, for example, recovering from work and making yourself ready for the next working day (Zijlstra & Sonnentag, 2006; Scott, 2020). Today’s work involves connectedness but this also has a negative effect on the boundary between work and the non-work domain (Derks, van Mierlo & Schmitz, 2014). Winding down from work into your private life was usually distinguished by going back from work by car for example. Now that we are asked to work from home, this routine and barrier vanished completely. And it reveals that there might not have been a proper winding down and switch from work at all. Supporting healthy winding down routines can help restore the balance between professional and personal life.
This project contributes to the domain of Slow Technology since a two-week deployment gained insights into the effect of Slow Technology on the balance between the work and non-work domain. Next to that, this project shows the consumer electronics market that Slow Technology can be very interesting in retail.

RELATED WORK AND BENCHMARKING.

This project aims at combining Slow Technology in personal health, more specifically, healthy routines. This section gives an introduction to Slow Technology as a concept and benchmarks products from three scopes: Slow Technology, personal health, and routines. Characteristics and gaps of these fields form a guide for the design process.

Introduction to Slow Technology

Slow Technology is a term introduced by Hallnäs and Redström (2001). They define it as "a design agenda for technology aimed at reflection and moments of mental rest rather than efficiency in performance" (Hallnäs & Redström, 2001, p. 201). A more concrete description is given by Fass (2012), who says "Slow Technology is a way of thinking about human artefacts that emphasizes speed of operation, the pace of consumption and the length of time taken to obtain results" (Fass, 2012, p. 1). These definitions have been elaborated on by other authors, for example, by expanding the notion of the temporality of data as a result of the spaceless, placeless and formless nature of data (Chen, 2020; Odom et al., 2019; Vallgårda, 2014). This is a logical result in a society where efficiency and growing digital content creation are key phenomena, as illustrated in a variety of research on Slow Technology (e.g. Odom et al., 2014; Odom et al., 2019).

According to Hallnäs and Redström (2001), the difference between fast -and Slow Technology can be described as taking away time (fast tech) and supplying time (slow tech). They argue that we need to get time for reflection, rather than compress it.

Slow Technology designs: Characteristics and gaps

In the past years, several studies applied the notion of Slow Technology, using research-through-design to understand Slow Technology through making. These include design artefacts such as the table-non-table (Wakkary, Desjardins & Hauser, 2016), Olly (Odom et al., 2019), Slow games (Bertran, 2014), Long Living Chair (Pschetz & Banks, 2013), FutureMe (Odom, 2015) and Photobox (Odom et al., 2014). Figure 1 illustrates the relation between interaction possibilities and number of functions of some slow technology products.

Focus on reflection, simplicity, and autonomy

Interestingly, most of these designs include reflection directly, or as a result of, other main qualities. The user often has little to no influence on the actions of the object, making the object autonomous. What is more, all of the slow design artefacts have very limited, simple and often singular functionality (e.g. Pschetz & Banks, 2013; Odom et al., 2014; Odom et al., 2019; Hallnäs & Redström, 2001).

For example, table-non-table's main focus is "purposeful purposelessness", i.e. having a clear function (supporting objects, note-taking) without a clear end goal or purpose (Figure 2). Slowness is included by slow movements of the table which can ultimately lead to reflection of the layout of your home and placement of the table (Wakkary et al., 2016). Note that this reflection is only possible when user intervention possibilities are limited and time is given to reflect on the position of the table-non-table. If it were fast, it would never be "in the way". For this reason, it makes sense to use Slow Technology to design for reflection as a key quality.

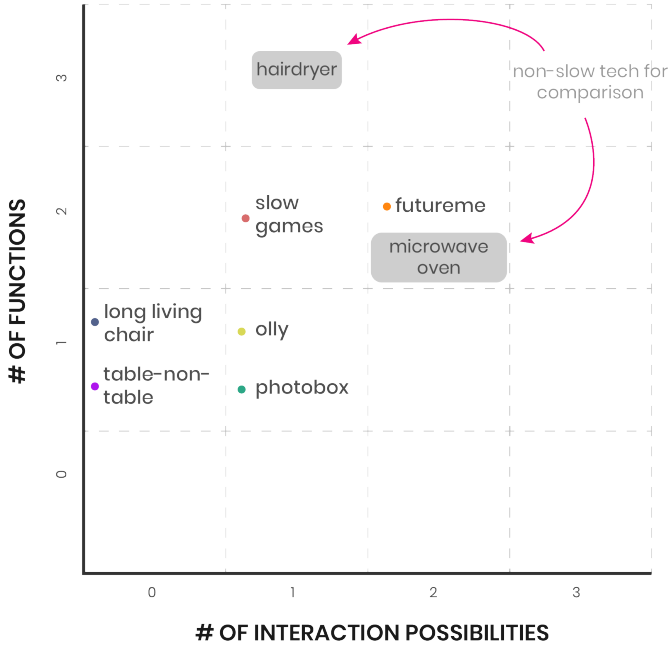

Figure 1. Number of function vs. number of interaction possibilities

RELATED WORK AND BENCHMARKING.

Re-experiencing personal activities

Figure 2. Table-Non-Table (Wakkary et al., 2016)

Another, more personal, application of Slow Technology is highlighted by Olly (Odom et al., 2019)(Figure 3) and Photobox (Odom et al., 2014)(Figure 4). These designs focus on re-experiencing or re-visitation of past activities, i.e. listening to music or the activity related to (taking) a photograph. They employ slowness to contrast with always-on and accessible technology (Odom et al., 2014), which in combination with the simple functionality and autonomy of the artefacts, creates new meaningful experiences (Odom et al., 2019; Odom et al., 2014). Both designs amplify the notion of autonomy by using randomness while selecting a song or photo.

Figure 3. Olly (Odom et al., 2019)

Figure 4. Photobox (Odom et al., 2014)

Commercial Slow Technology and trajectory of appreciation

Each of the aforementioned designs focuses on specific qualities of Slow Technology. Most, if not all, designs are research artefacts. It seems there are hardly any Slow Technology products on the market. Are these qualities just not suitable for commercial use? Fass (2012) suggests a possible explanation for this phenomenon, namely changing users with long-lasting technologies that inhibit long-lasting relationships with this technology. While this could be a reason, it is also not unlikely that the gap between fast and Slow Technology is simply too big to be accepted by consumers before the technology is disposed of. This hypothesis can be derived from the recurring "trajectory of appreciation" (Gaver et al., 2016), ranging from frustration to acceptance (Odom et al., 2014; Odom et al., 2019).

RELATED WORK AND BENCHMARKING.

Material and interaction qualities

Most of the physical slow artefacts spent much effort on the material qualities of the design, which could be the consequence of simple interaction, i.e. there is little opportunity for aesthetic interaction. The aesthetics are therefore mostly reliant on the looks. For example: "The choice was motivated by the widespread recognition of the Eames chair as a high quality and desirable object" (Pschetz & Banks, 2013, p. 2985).

A frequently used material (look) is wood (Figure 5), which matches with the common domestic application environment. Furthermore, the overall aesthetics of such an object should be integrated into the environment as a whole, like the architecture of a building (Hallnäs & Redström, 2001; Odom et al., 2019). These characteristics are summarized in Figure 6 in terms of key features and focus points of Slow Technology artefacts.

Application domain of Slow Technology

Slow Technology has widely been researched within the context of everyday life, where it can sustain a more permanent role than some fast, self-conscious products (e.g. Wakkary et al., 2016; Odom et al., 2019; Pschetz & Banks, 2013), though no application or research of Slow Technology within the (personal) health domain was found. This suggests an opportunity for the implementation of commercial Slow Technology in the domain of personal health.

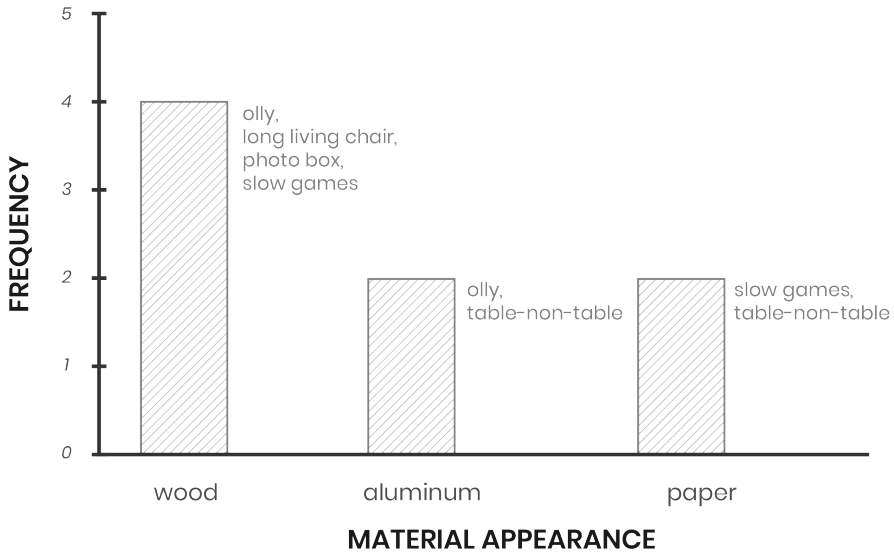

Figure 5. Graph showing used materials

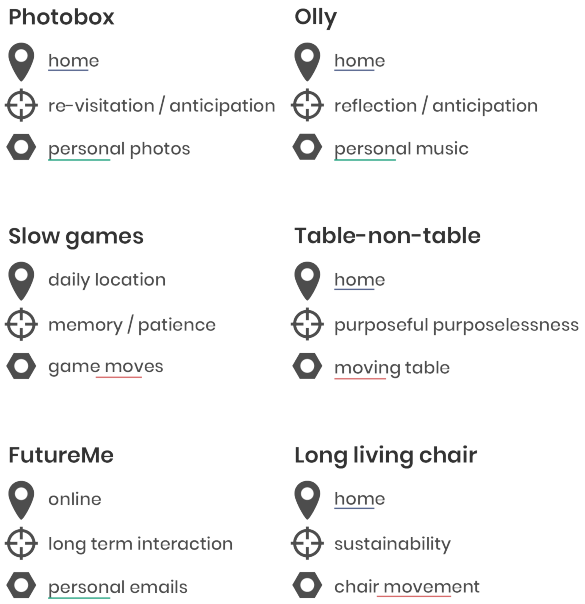

Figure 6. Usage location, main focus, and (inter)action mechanics of some Slow Technology products

RELATED WORK AND BENCHMARKING.

Personal health and wind-down routine design

Our interest within the scope of personal health was drawn to routines or rituals related to winding down after work or before bed. The reason being, routines need to be established over time (Gao, 2012; Scott, 2020), and therefore seem suitable for a Slow Technology intervention (Gao, 2012). Having a wind-down routine benefits your health in multiple ways, the most relevant being improving your sleep quality (Scott, 2020; Walker, 2018) and mental recovery from a workday (Zijlstra & Sonnentag, 2006; Scott, 2020). Especially the latter becomes increasingly problematic, as working from home becomes the status quo and some companies even adapt their policy to match an online environment. An example of such a company is Dropbox, that goes "virtual first" (Redactie MT.nl, 2020).

The goal of Verso is to trigger reflection about wind-down routines for restoring and supporting a healthy work-relax balance. Using reflection on personal health is not new. Gao (2012) uses reflection, rather than persuasion, as a way to achieve behaviour change. This approach is similar to that of Verso, although the application domain differs.

Efficient apps in the healthy routines domain

Focusing on similar application domains as Verso include Ritual (Houhgton, 2020), Headspace (Headspace inc., n.d.) and Mindler (Ferreira, Soares & Branco, 2019) and fitness apps in general. Striking is that these products are all apps. A tangible example is Timeular (Timeular, 2015), although it still relies on an app. What is more, these products usually encourage routine building by offering awards for streaks and daily goals, with immediate consequences when failing to achieve them. Slowness is an interesting approach, to contrast with the popular immediate punishing and rewarding strategy.

Personal routines without products

Other products, related to routines, include skincare, toothbrushes and alarm clocks. However, these do not focus on wind-down routines at all or offer very specific wind-down routines, while these are highly personal (Scott, 2020). This explains the gap in products aiming purely at winding down (see Figure 7). Linking routines with the work-relax balance is illustrated by Arneson (2020), who describes a fake commute to separate work from personal life. Another example is cleaning up your desk after work, but then again, none of these are products.

Wind-down routines benchmarking

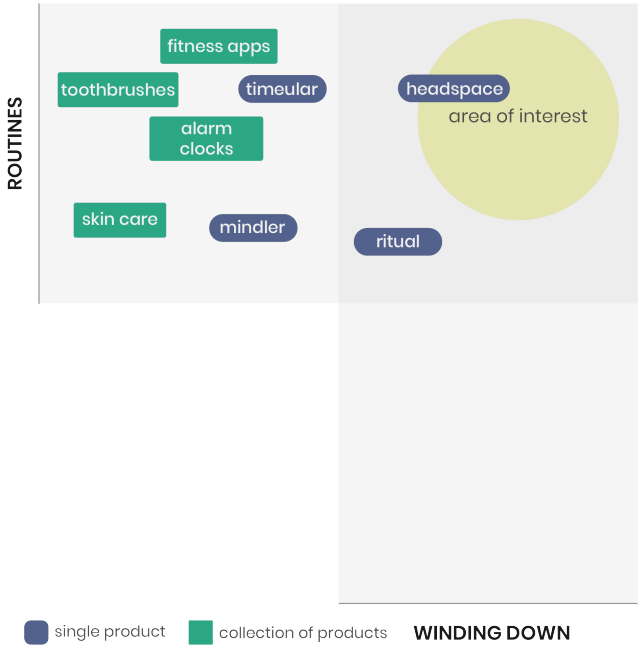

Figure 7. Plot of products related to winding down and routines

GRAPHICAL REPRESENTATION DESIGN PROCESS

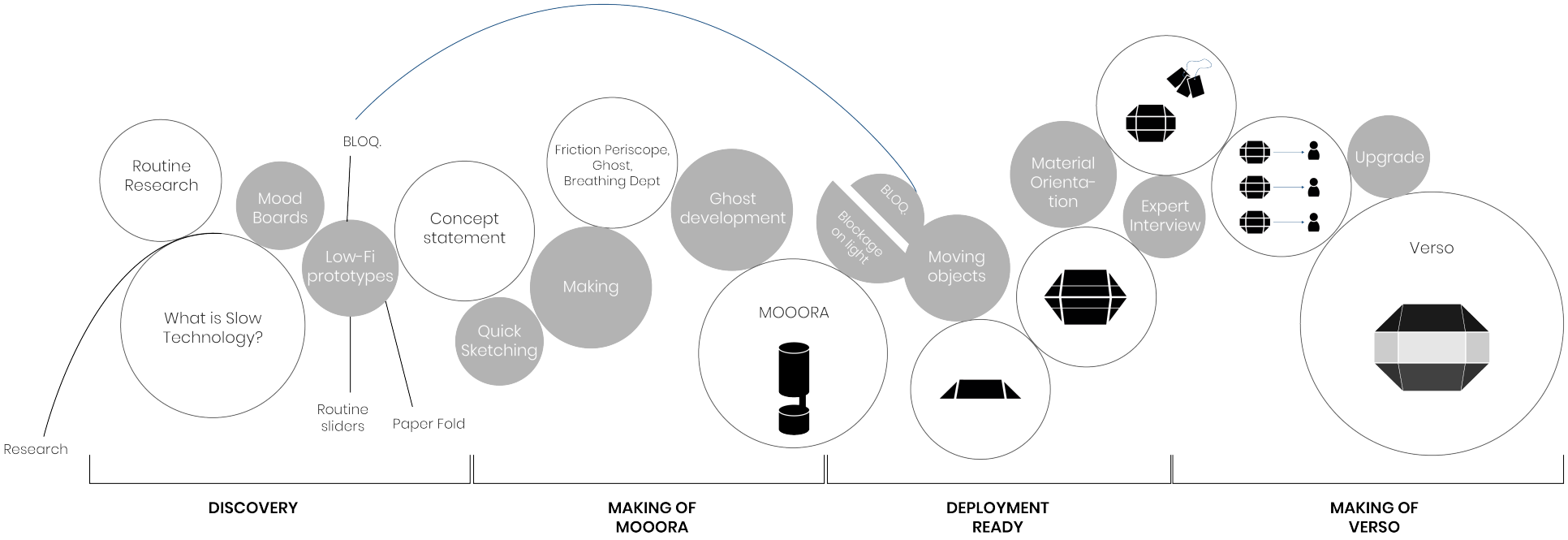

Figure 8. Design Process

DESIGN PROCESS

Discovery

The project started with the context of Slow Technology for Personal Health. To discover interesting aspects of Personal health for the project, personal routines were written down (Figure 9). This was to find a spot where a design intervention could add something positive to people's everyday lives. It was soon discovered that winding down routines missed in the routines. Especially since people work home a lot due to the COVID-19 pandemic, the boundary between the work and non-work domain is being blurred.

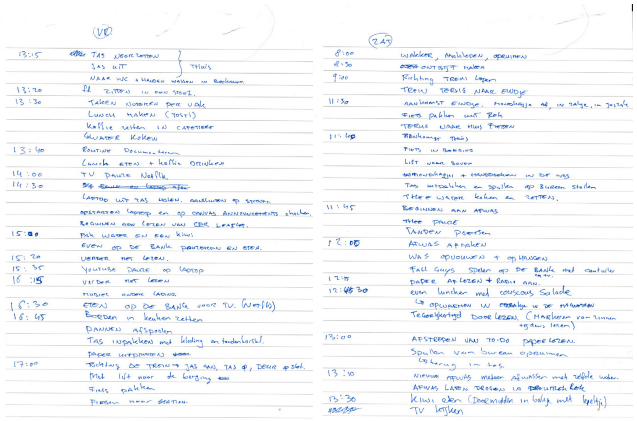

Figure 9. Personal Routine Diary

Though the context was clear, the Slow Technology aspect kept quite vague. Slow Technology was not heard of that much. Reading research about the concept in research gave insights into the concept itself, but also in how society could benefit from Slow Technology. Though it was still quite hard to come up with a completely slow device. By making over 100 sketches (Figure 10), combining the knowledge of Slow Technology with the context of winding down and a better balance in life, the idea of how Slow Technology could add to people's everyday lives got clearer. Interesting to see was that a lot of the sketches were devices that would slow the user, instead of being slow itself.

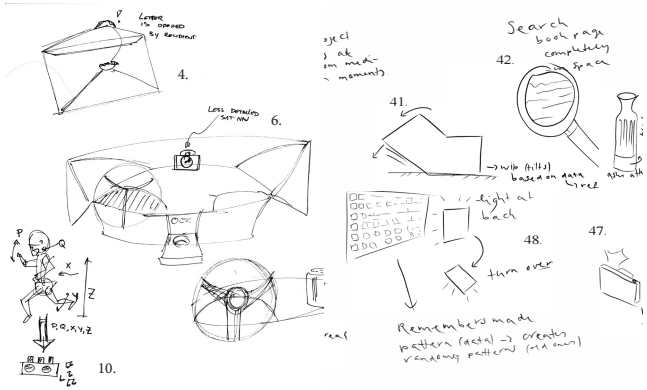

Figure 10. 100 sketches impression

After the first sketching round, which gave great insights and handhold, first mood boards were made together with low-fi paper prototypes (Figure 11, Figure 12, Figure 13). By making some of the sketches in a physical model, the ability and possibilities of such ideas and objects could have been measured. With important explorations upon how it would move, work and look.

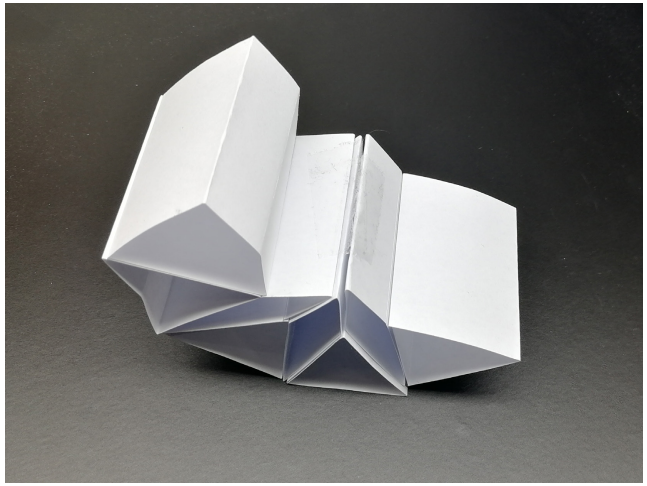

Figure 11. Folding object (low-fidelity)

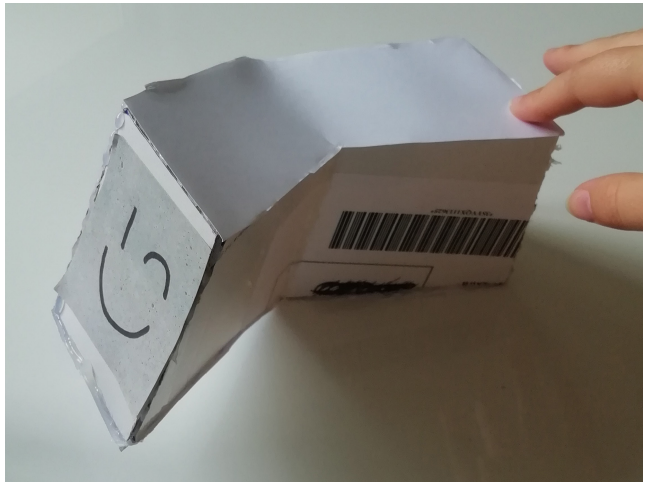

Figure 12. Moving object BLOQ. (low-fidelity)

DESIGN PROCESS

Figure 13. Routine visualizer (low-fidelity)

The true strength of Slow Technology is in a match with the application area, which was not there yet. Therefore, before going into more depth regarding the slowness of the concept, the context of use was specified. This happened through analyzing the personal routines again and taking inspiration from literature about sleep (Walker, 2018), work (Scott, 2020) and routines (Scott, 2020).
The following description was used as a new starting point: "Working from home is different from working at the office. The routines to end a workday change, making the dividing line between work and relaxation at home very thin. A clearer separation of work using an "after work ritual" would possibly help to improve sleep and productivity. Because people normally ride a bike or drive a car between work and home, this was seen as an "after work ritual". However, due to the current situation that "ritual" falls away and nothing remains. This makes it clear that a real ritual never existed." This specification led to another round of sketching and making.

Making of MOOORA

There were new sketches and prototypes on the table. Three concepts of the made sketches were thought out more specifically and made into low-fi prototypes for exploration. The first one was "The friction periscope" (Figure 14, Figure 15). Designed as an unaware object that could turn around, play sound and by its shape direct the sound to a specific part of the room. Enabling and disabling the user in the room to hear from and communicate with the design better or worse. It was still hard to connect this concept to the problem context.

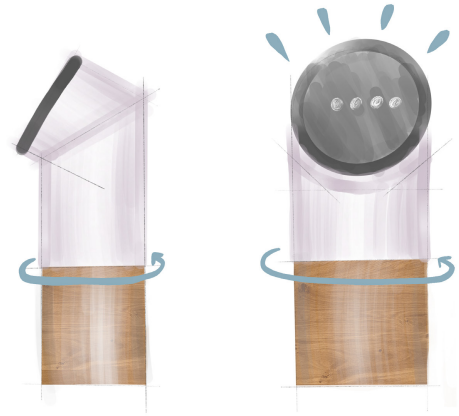

Figure 14. Friction Periscope sketch

Figure 15. Friction Periscope prototype

The second idea was "Ghost" (Figure 16, Figure 17). Ghost exists out of a table lamp, an alarm clock and a power switch. Three products that actuate with a delay between one day and a week, depending on the routine they visualize. Most promising is the low-impact table lamp. It has the most flexibility in usage and can be used to indicate the presence in either a work (desk) or a non-work (couch) location in the home. Either one will be an indication of work-relax balance.

DESIGN PROCESS

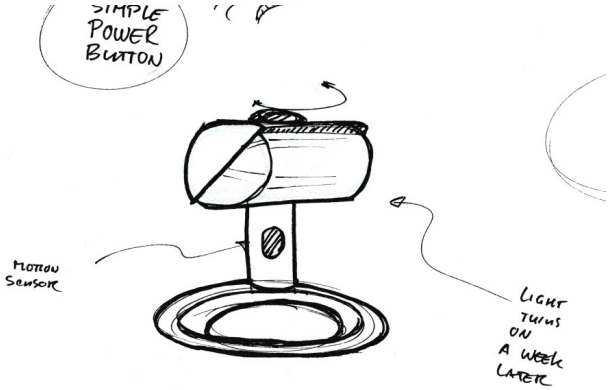

Figure 16. Ghost sketch

Figure 17. Ghost prototype

The final concept was "Breathing Dept" (Figure 18, Figure 19). This concept can help people to create a winddown routine. After a working day, the employee places his or her hand on the top of the object. At this moment the 'ball' in the object slowly starts to vibrate to the rhythm of a breath. The user can breathe along at this rhythm for a certain period based on these vibrations. When the object notices that there has been little or no interaction in the recent period, the object will slightly light up. With the result of reflection by the user. This last concept was too specific in the winding down routine already, though how to wind-down is different from person to person.

Figure 18. Breathing Depth sketch

The Ghost concept was decided upon to best fit the criteria of the context, together with the implementation of Slow Technology. Therefore, this concept has been developed into a high-fidelity prototype. A render of the design was made (Figure 20) and based upon that visualization, the physical prototype came to be (Figure 21, Figure 22). This prototype consisted of an aesthetic housing with working electronics on the inside for a full experience of the idea.

Figure 19. Breathing Depth prototype

The name "Ghost" had also been changed to "MOOORA". Mora means "delay" in Latin, which was thought to be a nice fit.

Figure 20. Ghost render

DESIGN PROCESS

Figure 21. Making MOOORA foot

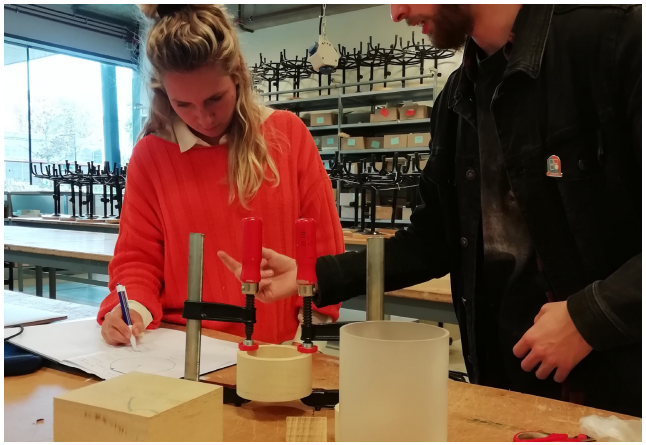

Figure 22. Making MOOORA measurements

MOOORA (Figure 23, Figure 24) is a motion-triggered lamp that automatically lights up with a delay of a whole day or week. Rather than offering an efficient light source, this "Slow Technology" evokes reflection and encourages the user to establish routines that include taking a break from work or stopping completely after six PM.

Figure 23. MOOORA in context (1)

Figure 24. MOOORA in context (2)

DESIGN PROCESS

Deployment ready

MOOORA had been presented during midterm Demoday (Video: https://vimeo.com/496582262). Visitors of the midterm Demoday were overall pleased with the design and especially with the quality of the prototype. Next to that people felt like the topic described was very knowledgeable and Slow Technology could mean something in this context. Especially because the control is moved from the user, though the user still can decide for their actions. Interesting to see too is that behaviour change might be a spillover effect of the design.

Interesting to hear were the thoughts on the reverse effect of MOOORA. By the use of light that could stay on longer, people might feel they should work longer. Next to that, providing just one perspective (working ór relaxing) there is no reflection on the actual balance. Another interesting mention is “why light?”. This was heard quite some and was something that had been thought of already when deciding to make MOOORA.

This last question kept popping up during all the following brainstorm sessions and maybe even blocked some of the creativity. There was quite some struggle to look at the deeper problem than just the light-medium. This blockage might also have been the result of the overwhelmingly positive feedback received, resulting in the question “how to make something better, nicer, etc?”.

A break-through of the blockage was by looking back at the beginning, where BLOQ. (Figure 25) had been thought of. A moving object that could open up questions and reflection. Low-Fidelity, cardboard objects were crafted (Figure 26, Figure 27), to discover and explore the idea of falling and moving objects instead of ‘just’ light. But still, the idea of light did not completely go away in our heads.

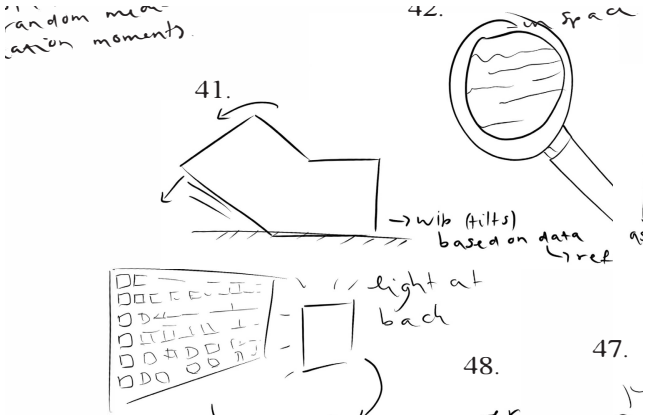

Figure 25. 100 sketches: BLOQ. (sketch 41)

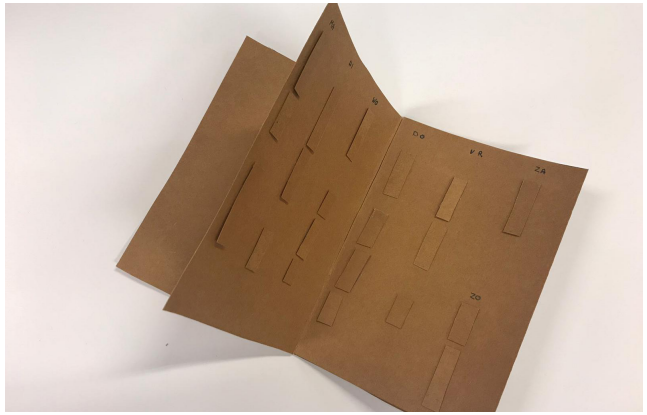

Figure 26. Moving calendar prototype

Figure 27. Moving Pen holder

With the inspiration of Google Home (Google, n.d.) in our minds, where light is also used but in another way (just for communication and presence), a cap shape looking like the top of a diamond had been folded (Figure 28). Followed by a digital sketch (Figure 29). This was the start of the new design. Together with an initial value proposition (Appendix A) a concept had been built and was followed by the first making of the shape from qualitatively better materials than cardboard (Figure 30, Figure 31).

DESIGN PROCESS

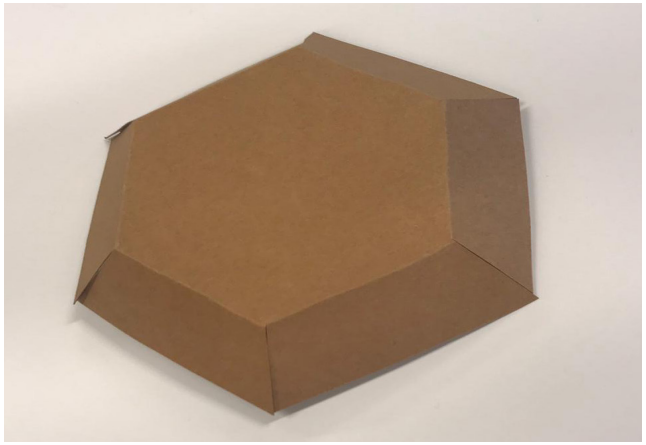

Figure 28. Folded diamond cap

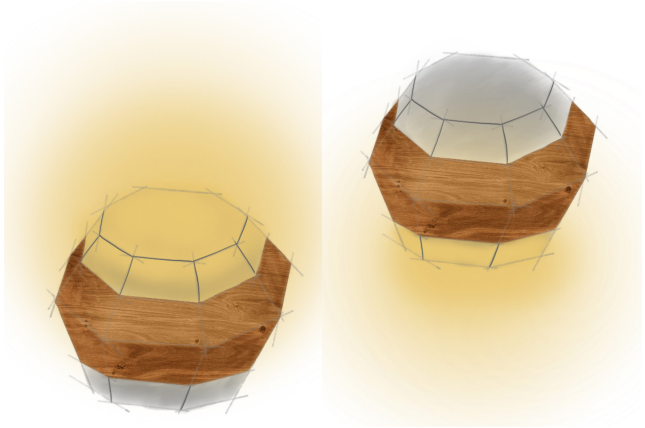

Figure 29. Digital sketch

Figure 30. Render of new shape

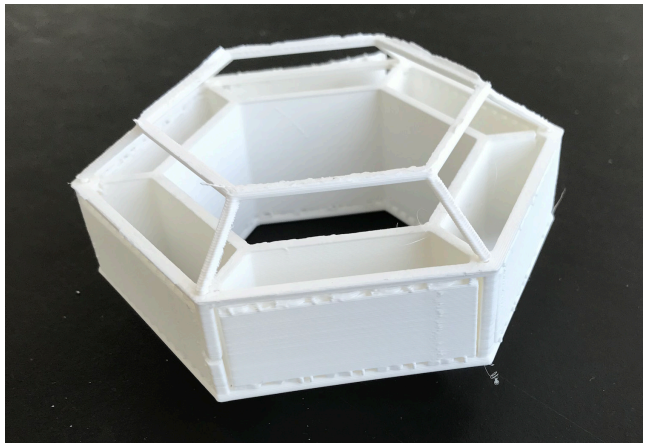

Figure 31. 3D print of new shape

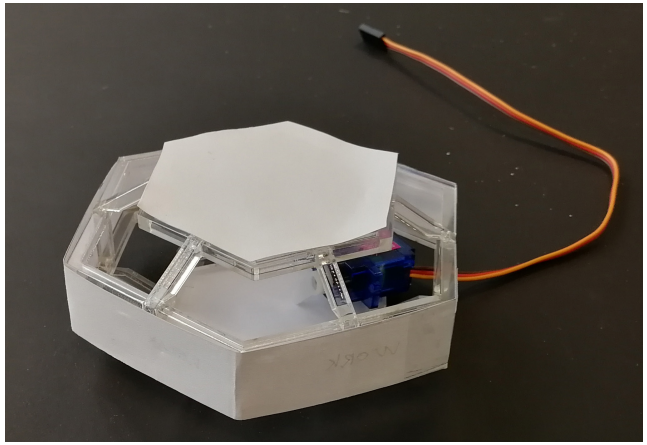

Figure 32. Perspex laser-cut with paper. Added electronics to test movement.

With a made frame and some basic coding, the idea of light and movement, together with the double diamond shape, could be explored (Figure 32). On the other side, different materials were being explored (Figure 33) to discover which materials together would fit the idea and aesthetics of this concept. Resulting in fabric and wood being a great combination for a warm homey feeling.

DESIGN PROCESS

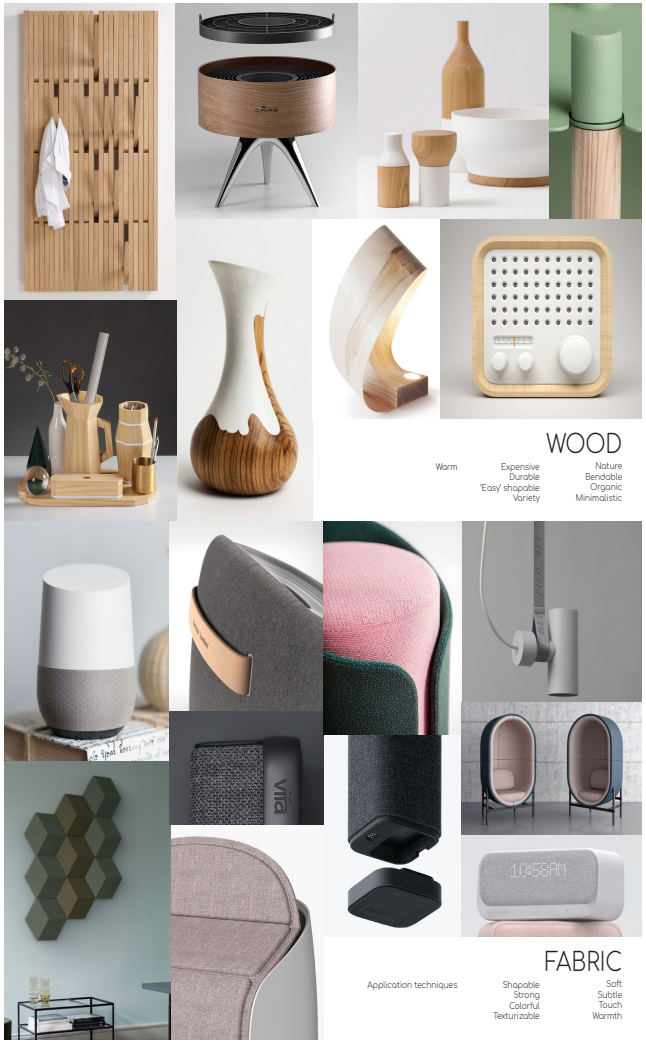

Figure 33. Material Quality mood boards (see all in Appendix B) [Images sourced from Pinterest (Reference List)]

For a slight validation of the current concept, Will Odom (Slow Technology researcher) had been asked for an expert interview. The concept was shown together with a made mood board that helped with visualizing the user flow. Will Odom mentioned the strong aspect of the design being an invitation rather than an alarm clock, which could result in a more positive effect on the user. This feeling could only be reached when treating the design as an invitation and not making it judge for example. An interesting mention was the option for multiple feedback layers into the design. This could be done by the current lights or even with the movement for example. A very interesting aspect was that the user lives together with the object.

Making of Verso

In the meantime, the concept had a name: Verso. Which is Latin for turn/turn often.
The interview with Will Odom created a boost of inspiration and energy to go on further with the concept and the design. The created mood boards and conclusion for fabric and wood were taken to the physical level. Samples of different wood finishes (Figure 34) and fabric options (Figure 35) were made to mix and match and to see the effect that could be resulted on the design. Two nice fabrics were found, where the inside and outside had a darker and lighter shade of the same color. This was very useful for the making of the prototypes in mind.

Figure 34. Samples of different wood finishes

DESIGN PROCESS

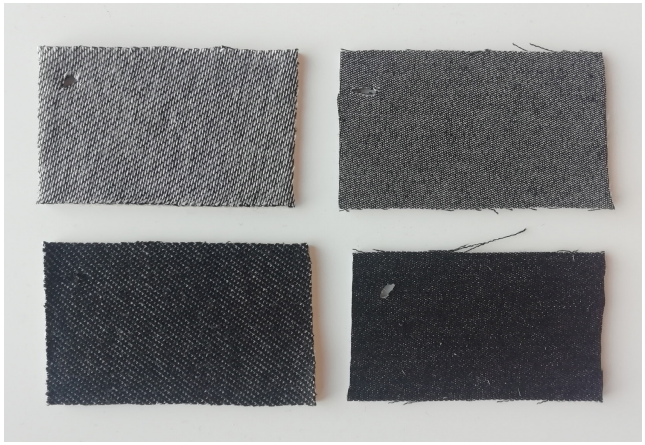

Figure 35. Samples of different fabric finishes

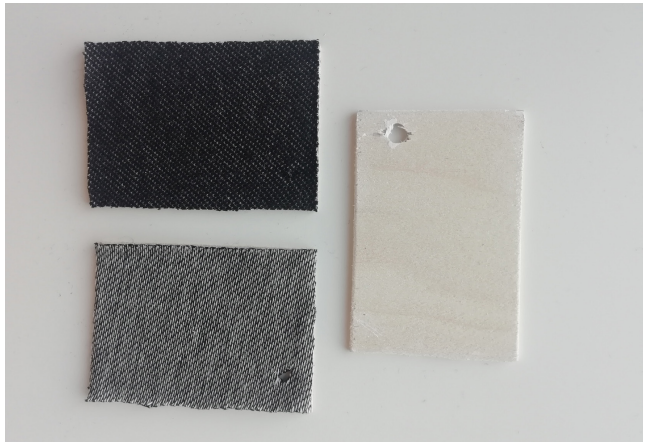

Figure 36. Example of validating different samples together

Since the idea was to make three prototypes for deployment, three different Versos were made (Figure 36, Figure 37). It was hard to choose the right border color of the wood and to discover that more each Verso had a different border color. Eventually a white, black, and natural wood finish were chosen. The fabric was denim-like stretch cotton that enabled easy covering of the frame, but also the possibility of movement since the movement was done by poking a foot through the fabric and lifting the object a little.
The three different (Figure 37), yet the same, Versos were deployed for two weeks. Each starting with an interview, having an intermediate interview and ended with an interview (Chapter Methodology). These two weeks were very exciting but also tensive because the prototypes should work correctly without the possibility of a constant check-up. Luckily this was made easier since the prototypes were connected to DataFoundry (https://data.id.tue.nl/) through OOCSI (Funk, 2019)(Chapter Final Design).
This deployment was used for validation and opened up new insights together with confirmations of the initial assumptions of how Verso would work (Chapter Results). Aesthetically seen, the different borders' look and feel resulted in: the white one being modern, yet a bit too cold; the black border being too dark in combination with the fabric; the natural wood one looked too cheap. It was eventually chosen to use more expensive, luxurious, and warm aesthetics using wood veneer for the border. The fabric remained the same (Figure 38). The deployment was also useful for a better business proposal (Chapter Commercializing Verso).

Figure 37. Three different, yet the same, Versos

FINAL DESIGN: Verso

Figure 38. Verso in context (1)

Figure 39. Verso in context (2)

FINAL DESIGN

Design of Verso

The problem space

People who work from home often struggle to recover from work-related stress, because they can't mentally and physically disconnect from work. The separation between the work and non-work domain is blurred by our 'always-on culture'.

What is Verso?

Verso is a slow ambient artifact located on your desk that allows people who are aware of lacking work-relax balance to become more conscious about their balance using (physical) orientation.

Orienting one side on top means work, the other means leisure, although the user is free to decide which side means what for themselves, and also to what extent, i.e. whether they include short breaks or not. In return, both sides light up according to the average orientation at a weekly interval (Figure 40). This divides the total amount of light over the work and leisure side. Leaving the unlit side on top will make Verso occasionally nudge you to flip it over.

The goal of Verso

The goal of Verso is to trigger reflection and encourage the user to stick to routines that restore the border between the work and non-work domain. Ideally, a user "follows the light" which is, in fact, an abstract representation of their past activities.

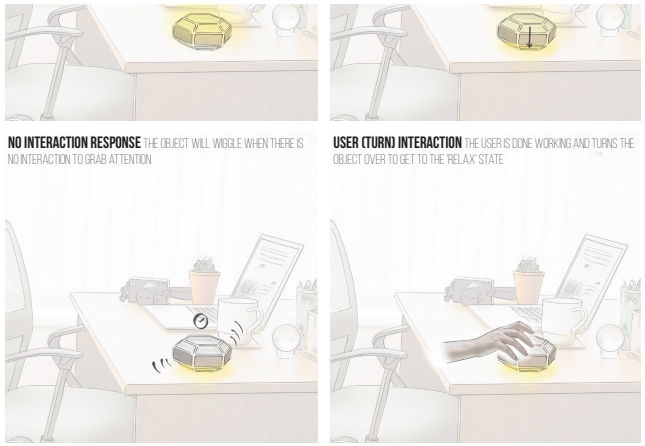

Figure 40. Impression of storyboard (full storyboard Appendix C)

Underlying design principles

Simplicity and ambiguity

An important element of Verso is the simple, but straightforward functionality and interaction, often present in Slow Technology, and ambiguous purpose. The functionality and interaction include recording the orientation and playing back the average over a weekly interval. The ambiguity can evoke personal relationships with technologies (Wakkary et al., 2015). It allows users to interact with Verso in a way that fits their personal routines best.

Autonomy

Another Slow Technology characteristic present in Verso is its autonomy. A user is not able to directly alter the behavior of Verso. Slowness is present in the speed of change in feedback, which can only be modified by continuous changes in orientation, i.e. routines.

Material qualities

To make up for the slow and simple interaction, and limited functionality, special attention is given to make the appearance interesting and aesthetic. Otherwise, the device could quickly become boring and may even be abandoned.
Most slow technologies are deployed in a domestic environment, because of long term relationships that can be built with everyday objects, and Verso is no different. To fit this environment, a warm and luxurious look is created with semi-dark wooden panels, which is a common material in the Slow Technology domain (Figure 41).

Figure 41. Wooden veneer border

FINAL DESIGN

According to Hallnäs and Redström (2001), slow material qualities should include "simplicity in material in combination with complexity of form" (p. 210). Therefore, we limited the number of materials to two. For the second material, a finely woven fabric was chosen, which is turned inside out for one side to make an equally grained, but slightly darker shade of gray (Figure 42).

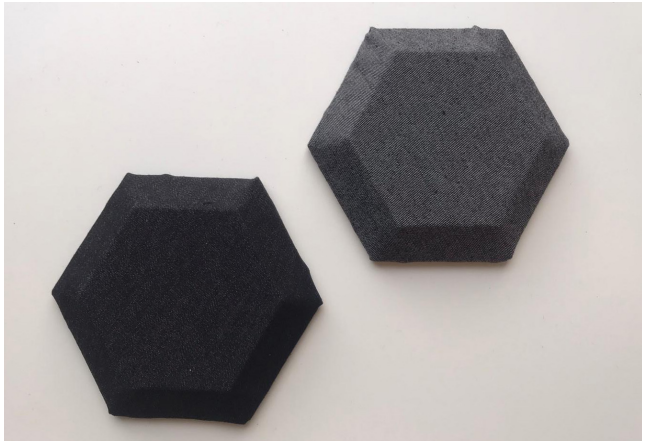

Figure 42. Fabric caps

The complexity in shape was achieved by making a hexagon shape. This makes the overall appearance more interesting while keeping two distinct sides for orientation clarified by dark and light grey fabric. The different shades don't mean anything specific. Meaning is given by the user.
Additionally, a user may even place Verso on its side (i.e. a wooden panel), in between the work and non-work orientation (Figure 43), for example, to record a break. This is an example of how simplicity and ambiguity may result in creativity and personal relationships.

Figure 43. Verso placed on side

Technology and Realization

Composition

The model of Verso exists out of three main parts: two top caps containing the LEDs which are clothed with light and dark grey fabric and a center part containing the rest of the electronics (Figure 44). The caps are attached to the main MDF body using Velcro. This made it easier to access the electronics and update the code later on (Figure 45).

Manufacturing technique

To make Verso, a quick manufacturing method was searched because multiple prototypes were required for the deployment. Therefore, we opted for laser cutting the parts and assembling Verso like a puzzle (Figure 46, Figure 47).

Figure 44. Verso with annotations

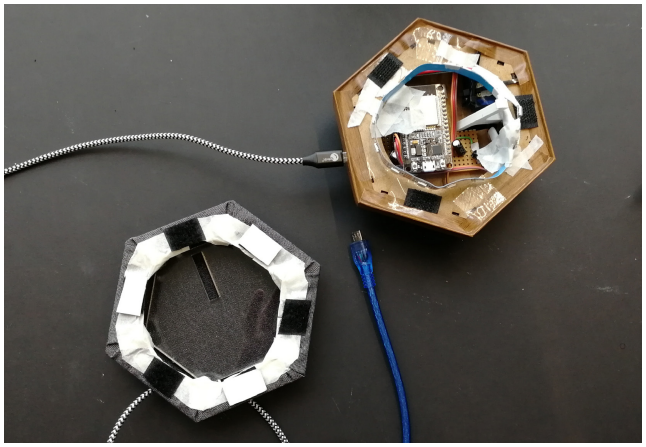

Figure 45.Velcro Connection

Figure 46. Unassembled laser-cut parts

Figure 47. Puzzling Verso together

Besides the speed, an important aspect of laser cutting was the availability of transparent material, in our instance acrylic. This allowed the lights to optimally shine through the fabric. The center parts are solid 2mm MDF to prevent light from shining to the other side (Figure 48).

Figure 48. White Verso at deployment

An additional measure to prevent light from shining through the edges was to 3D print the side panels for precise fitting to the main body. To still get the wood appearance, they are wrapped with a wood veneer (Figure 49).

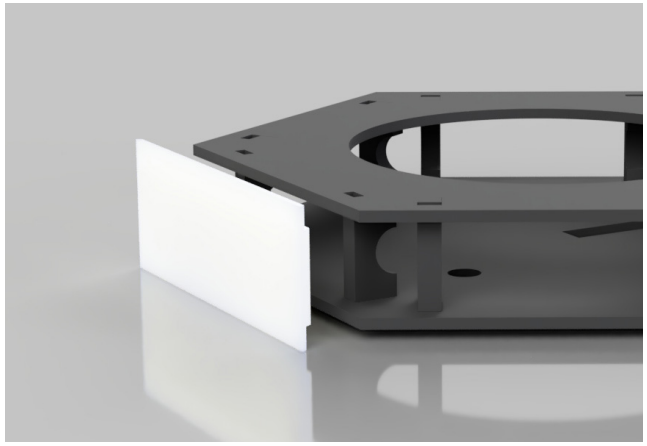

Figure 49. Printed side panels for wood veneer

Input and output components

The main input comes from two tilt switches angled at 45 deg concerning the horizontal panels (Figure 50). This is for two reasons. Firstly, it allows to track sideways orientation, instead of being limited to only binary orientation. Secondly, the input is more stable, since Verso needs to be flipped completely before a full orientation is recorded.

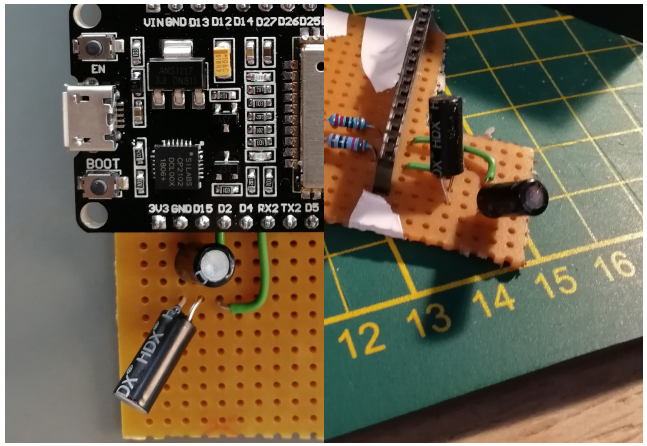

Figure 50. Angled tilt switches

The horizontal center panels include a slit for a 3D printed push arm to move through (Figure 51). This arm is connected to a 3.3V compatible servo motor (SG90 Mini Servo) and is connected to an ESP32 microcontroller (DOIT ESP32 devkit v1), which functions as the main processing unit.

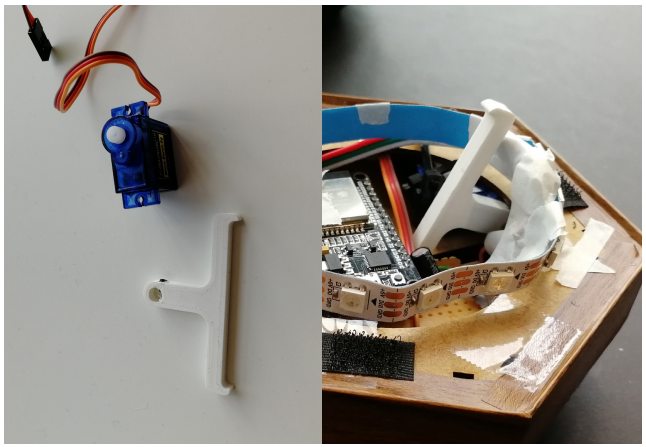

Figure 51. Pusharms of servo

Next to the servo motor, the ESP32 outputs to a WS2812B LED strip of 28 LEDs (14 per side) located underneath the fabric caps. To make transitions between the lighting states more fluent, an easing out function is used. The effect in brightness is depicted in Figure 52.

Connectivity

The ESP32 was used mainly for its ability to connect to wifi. OOCSI (Funk, 2019) was used to connect to an online IoT dataset on DataFoundry (https://data.id.tue.nl/) for data logging. Ultimately, data would also be read from the dataset, preventing the need for internally storing timestamps.

When using OOCSI to write to an IoT dataset on DataFoundry, a default attribute is a timestamp. However, this timestamp is formatted for better readability. Therefore, an additional UTP connection was set up to extract a UNIX timestamp (seconds since 00:00 UTC, 01-01-1970).

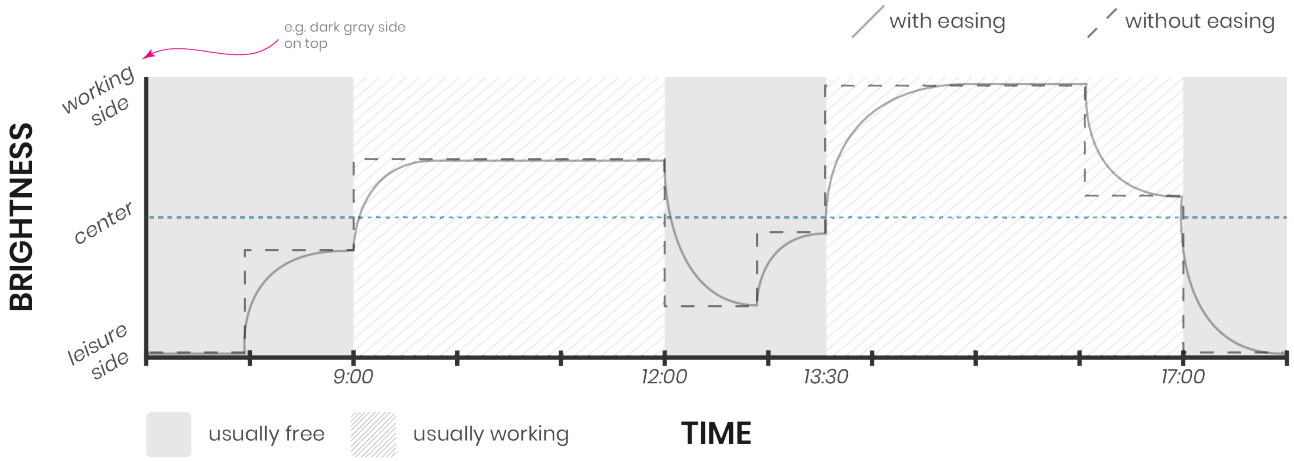

Figure 52. Easing out of LED brightness

A UNIX timestamp is easier for comparison than a formatted timestamp. For example, simply add 604800 (1 week in seconds) to delay a trigger by a week.

Lastly, a demo interface is made in Processing (Figure 53), which is connected to the ESP32 via OOCSI, allowing for showcasing every feature without the limitations of slowness.

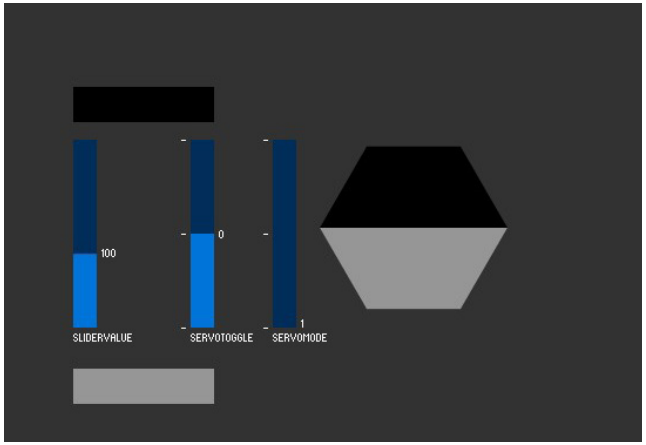

Figure 53. Demoday processing interface

COMMERCIALIZING VERSO

Since Verso is designed as a product and not a research object, together with the absence of Slow Technology in the current consumer electronic retail, it is interesting to look at the value proposition of Verso. To see whether there is a market potential for such objects. The context of the design is already defined (finding a balance between work and private life) and with that also slightly a target user and possible customer segments. With these ideas, we were able to create a value proposition and look through a business lens and see that Verso will have some market potential.

Customer segments

There are two interesting customers that might be interested in Verso. Since Verso is designed to recover the balance between work and private life, it could also support a good winding down. Resulting in employees' stress-relieves and a better work-performance the next day. Quality of work is interesting for employers since it will result in more money (sometimes even in a shorter amount of time). Companies can purchase Verso for their employees, to encourage them to find the right balance and eventually deliver better work.

Verso is also interesting for people that struggle with saying 'no' to their employers or who cannot stop working easily. Especially people who are aware of their unhealthy situation might be interested in purchasing Verso. As a guide and a help for a healthier life balance.

Value Proposition Canvas

In this Value Proposition Canvas (Figure 54) you can see the customer segment based on the actual user of Verso. Even if the customer that purchases Verso is different (individual or corporate), the value proposition for the user remains. Since for corporate organizations, the value will be provided to the corporation through the employees. The colored line shows an example of a good value stream: The user struggles with winding down (Pain), Verso guides in stopping with working and therefore helps in winding down (Pain Reliever). This is then followed by the providence of structure (Gain Creators), which will result in less or even no stress for the user (Gains). For corporations, providing this structure and stress relief, but also the effect of work productivity is interesting since it could result in more profit.

Business Model canvas

This Business Model Canvas (Figure 55) shows the activities and revenue streams in a structured way.

The overarching value that Verso delivers is: "Verso is a balancing tool that invites you to start and stop working and helps reflect on personal work-relax balance". Verso does not work as an annoying alarm, it invites the user to start or stop working.

Verso is being provided in several ways. For corporations, a package deal can be made, since they (probably) purchase in bulk. For the personal market, there are several options. They can purchase the 'basic' package. This means that they can buy a pre-designed Verso in a specific colorway. The next package is the 'personalized' Verso. Where the user can decide for themselves which colors will fit best. An example of the personalization interface is shown in Image 56. A user can choose what they prefer as a combination. Though, the system will also suggest color options that go well together. This personalization is possible for both the caps and the border. If the user wants more than the visualization on Verso itself and the nudging they can purchase the 'pro' version. With this version, they can get more insights into their own routines and the work-relax balance they currently have. Since this is not yet incorporated in the final design, this topic will be discussed in the Future Work (Chapter Discussion) section.

Although Verso is a high-quality product, it is for example possible that through usage the fabric of the caps is wearing. Through a repair service, Verso keeps the user satisfied. This is also a step in a sustainable direction since users only have to fix the fabric. The way Verso is being produced should therefore take this into account. If this reparation is within the warranty time, the user does not have to pay anything. When outside of the warranty time, operations like these will cost.

COMMERCIALIZING VERSO

VALUE PROPOSITION

CUSTOMER SEGMENTS

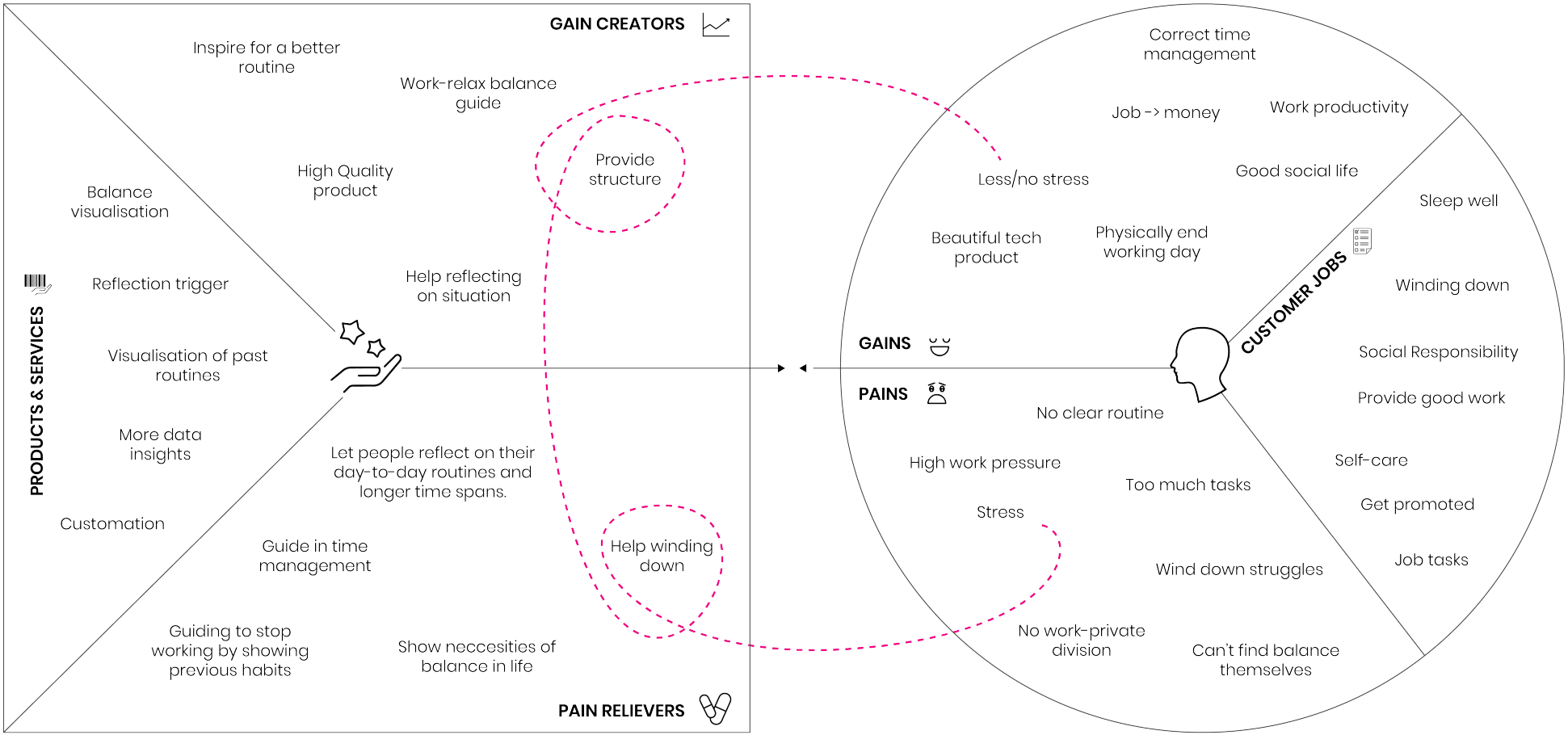

Figure 54. Value Proposition Canvas [Icons sourced from The Noun Project (Reference List)]

COMMERCIALIZING VERSO

KEY PARTNERS

Material Suppliers

Researchers

Production Factories

Advertisement Companies

Software Engineers

Electrical Engineers

KEY ACTIVITIES

Production

Make bug solving updates

User testing for proof of concept

Networking

Ideation on new products

KEY RESOURCES

Materials & Production

Software Engineers

Distribution

Intellectual Ownership (patents, data, e.g.)

VALUE PROPOSITION

Help and guide users in reflecting on their past/current routines by showing their past routines with a high quality device.

"Verso is a balancing tool that invites you to start and stop working and helps reflect on personal work-relax balance"

Help employees of businesses with their routines, which might result in better productivity.

CUSTOMER RELATIONSHIPS

Automated assistance

Customization

Warranty Assurance

Repair Service

CHANNELS

Website for products and information

Eventually, stores

Delivery Services (DHL)

After sales updates (E.g., newsletters, software)

CUSTOMER SEGMENTS

Users that are aware of their current routines and see their need of change to get a better work-life balance.

Businesses that find it important that their employees have the right productivity. Which comes from better winding down.

COST STRUCTURE

Production

Warranty

Safety Checks

Software Updates

Marketing

Website Hosting

REVENUE STREAMS

Customer Purchases

Ad-sense

Figure 55. Business Model canvas [Icons sourced from The Noun Project (Reference List)]

COMMERCIALIZING VERSO

Stakeholder Web analysis

As seen in the Business Model Canvas (Figure 55), there are quite some facets that are connected. To visualize the actual streams and what is being exchanged, this Stakeholder Web (Figure 58) shows the complexity in a more detailed way. Making a figure like this gives the possibility to see how Verso will be made and provided. Where revenue and value come from or are given. It also shows that, for example, the product is not just provided by the producers. There are more stakeholders involved who all need and give information to parties. A stakeholder map will also reveal unknown streams. This is very useful for a company to know since money is one of those streams. This is useful when deciding on prizes, etc.

SWOT analysis and conclusion

Like any other product, Verso also has strengths and opportunities (etc.). This is perfectly visible in this SWOT analysis (Figure 57). There are some design decisions made (e.g. the visibility of the light), that are not working completely as wanted yet. This will be elaborated on further in the Future Work (Chapter Discussion) section. This analysis also shows a lot of positive aspects of Verso, that are resulted from the business analysis of the previous canvases. For now, it can be concluded that Verso has some market potential. The cost streams are clear for a good price determination, the value streams are clear to see where Verso makes an impact, and the parts that need future work come to the surface. Verso is not yet ready to go to the market in its current state. Though this business analysis gives good insights into the current state of the design and can give a handhold for further development.

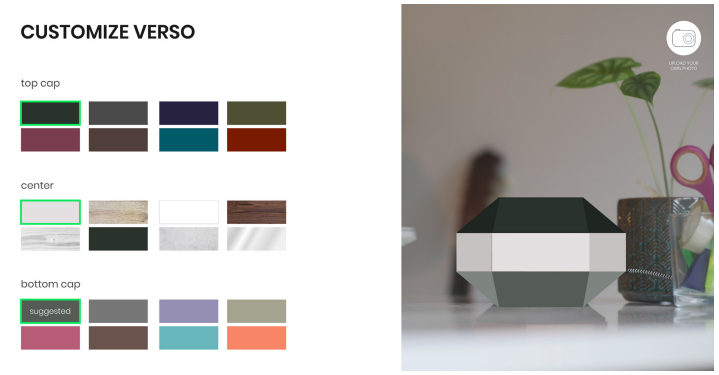

Figure 56. Personalization interface [Images sourced from Pexels (Reference List)]

Figure 57. SWOT analysis

COMMERCIALIZING VERSO

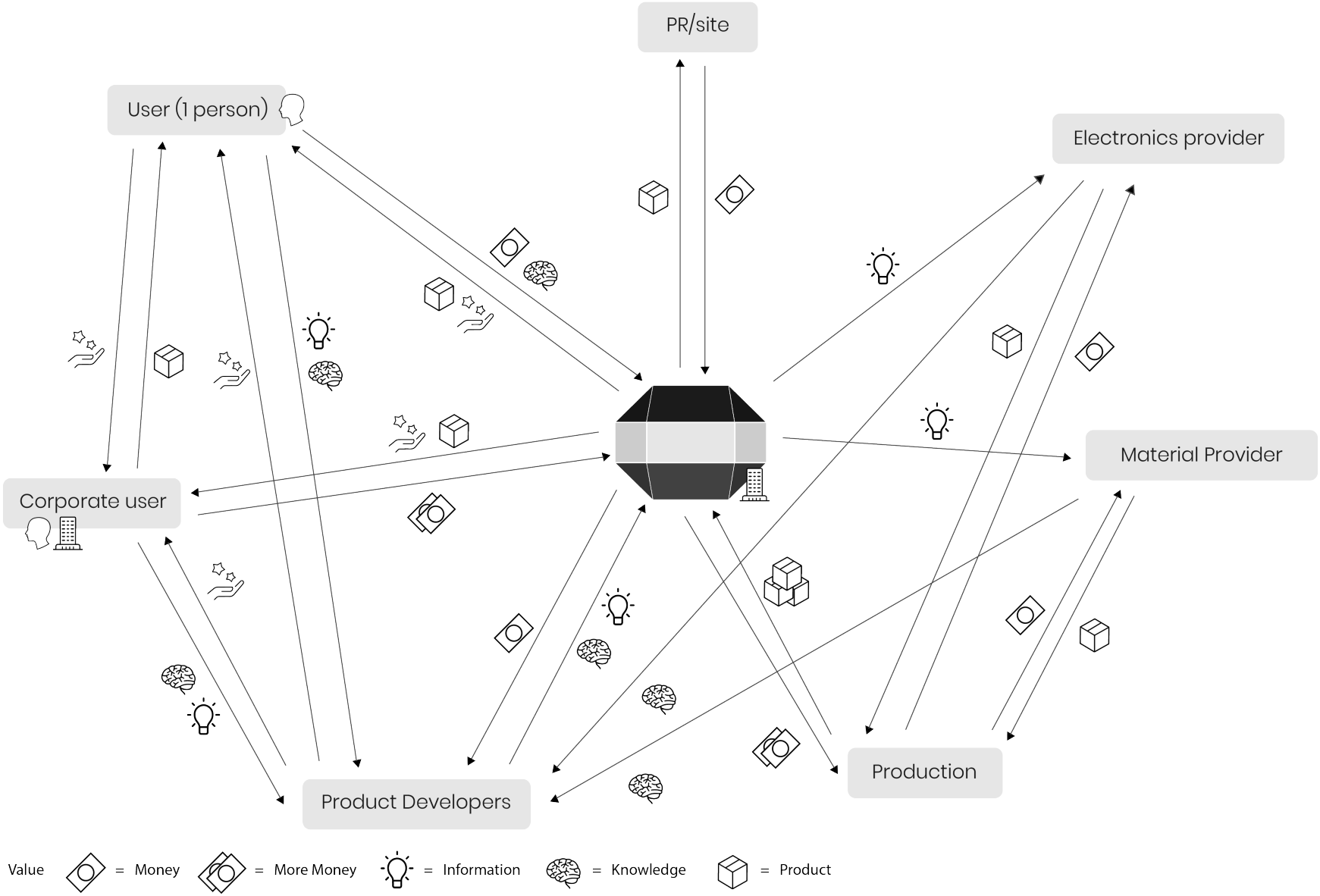

Figure 58. Stakeholder map [Icons sourced from The Noun Project (Reference List)]

ETHICAL CONSIDERATIONS

Designer's intention

In our current society employees are connected to their workplaces almost 24/7 (Derks, van Mierlo, & Schmitz, 2014). As a consequence, employees struggle to recover from work-related stress (Zijlstra & Sonnentag, 2006; Scott, 2020). To contribute to the solution of this problem, Verso has been designed. This design intends to stimulate reflection, create awareness about the work-life balance, and encourage users to stick to daily routines.

A positive consequence of Verso may be an increase in awareness of the work and non-work balance. A second positive consequence may be an increase in the number of moments of reflection about this balance, which can lead to users valuing daily routines more highly. A final positive consequence could be that users find a better work and non-work balance by creating a more solid boundary between work and private life through the use of Verso.

Potential unethical situations

For Verso to function, data on the orientation of the object must be stored. This data is used to calculate the average orientation at a weekly interval so that one of the two sides is lightened accordingly. A possible unethical situation can arise if this data is not stored safely. The insight of employers into the data of employees is not desirable. Since the data that Verso stores concern the balance between work and non-work, an employer should not be able to view data about this balance and in this way be able to judge employees' working hours. The purpose of Verso is therefore nullified as Verso aims for a healthy quality work-life balance and not for the quantitative work period.

A second unethical situation can arise when these data are made public. After all, the norm in society is still that a lot of work has to be done to be a good performing employee (Munch, 2020). Potential personal harm to users may arise if they become known in society as underperforming employees.

In addition to these potentially unethical situations, Verso can also have a possible negative effect on the user. Verso may unconsciously stimulate the user to make longer working days because the user used to do the same. In this case, if a user simply continues to follow the light pattern without a moment of reflection.

METHODOLOGY

To study how users interact with Verso, a deployment phase of two weeks was carried out. Central themes during this deployment phase were the relationship between the participants and Verso, the moments of interaction, the way of interaction based on the aesthetics, and the trigger of reflection.

Participants

The participants in this study were selected based on Non-Probability Purposive sampling. Based on one selection criteria (i.e. student or employee), three specific persons were invited to participate in this research. Of this group, all persons eventually participated in this research. All participants in this study are from the Netherlands and also speak Dutch. Of the three participants, one is female and two are male. Besides, the three participants are aged between 23 and 27. Two of them are working and one is studying (Figure 59) Before conducting the study, the ethical committee approved the research and all participants signed an informed consent form.

Material

The design artifact used in this study is Verso. During the deployment phase of 2 weeks, Verso was used to collect data about the orientation of the object itself. This data can then be used to gain insight into the physical interaction moments a user has with Verso.
Based on the design intentions behind Verso, three topic lists have been developed (Appendix D). One topic list was used for the interview before the deployment phase, one topic list was used for the interview after one week of the deployment phase, and one topic list was used for the interview after the deployment phase (Figure 60).
In addition to the topic list, a weekly planner (Appendix E) was used during the first interview. This weekly planner was developed to gain specific insight into the participant's work-relax balance. This specific insight is essential for Verso to function as the light moves to the other side of the object based on this data.

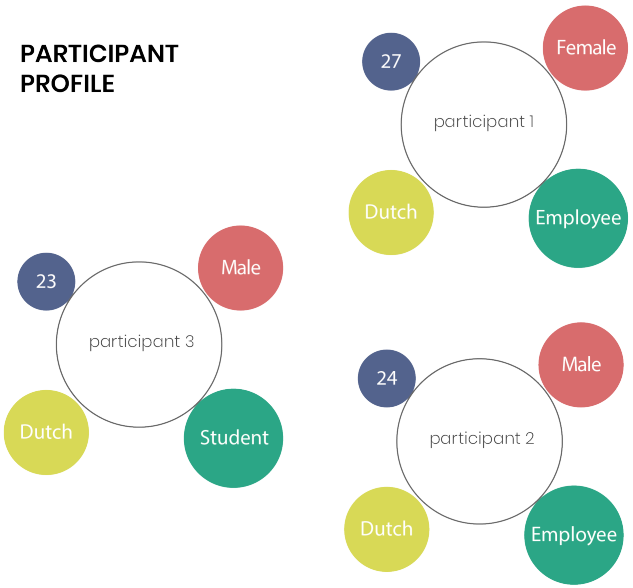

Figure 59. Participant profiles

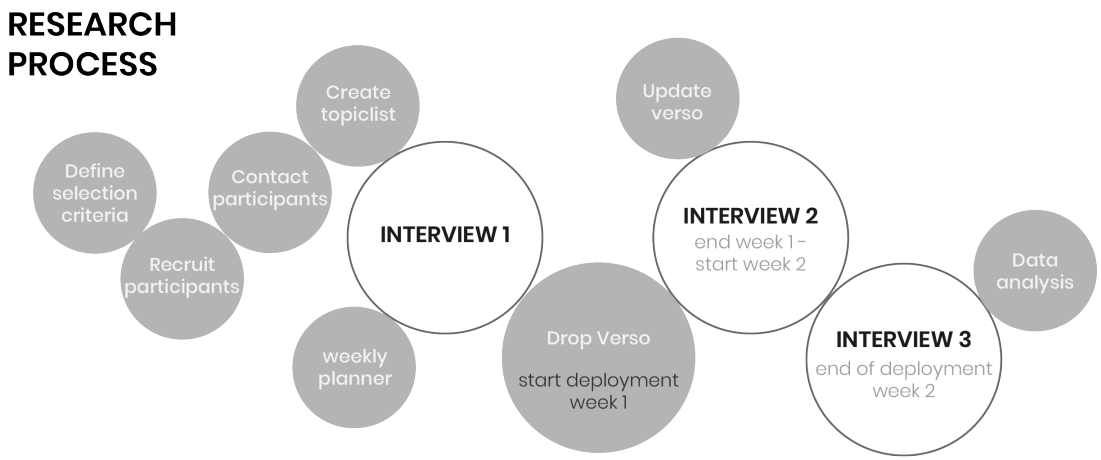

Figure 60. Deployment process

METHODOLOGY

Procedure

Initially, all three researchers sent a message to an acquaintance asking whether he or she knew someone who met the selection criteria (i.e. student or employee). These first messages resulted in three responses with contact details of the persons who met the selection criteria and wanted to participate in the study.

A first interview was scheduled with all three participants (Figure 60). These first interviews all took place at the individual participants' homes, lasted around fifteen minutes on average, and were audio-recorded. In these interviews, the first topic list (Appendix D) was used and after the interviews, the weekly planner was filled in. The participants were asked to reproduce the planning of the past week and to pay specific attention to the start time of the working day, the times he or she has taken a break, and the end time of the working day.

A few days later the three participants received Verso (Figure 60). They were told that Verso can be used to track the balance between work and private life. No further instructions were given to the participants. Based on the given instruction, the participants themselves determined Verso's place in the house.

After one week of deployment, the second interview took place at the individual participants' homes (Figure 60). Topic list two was used in these interviews (Appendix D), the average duration of these interviews was about fifteen minutes, and they were all audio-recorded. After the interviews, the new code of Verso, with the new timestamps, was added. Next, the purpose and the function of Verso have been explained to the participants. They were told that Verso can be used to keep track of when someone is working or not and that Verso keeps track of this using the orientation of the object itself. It was also explained to the participants that Verso does not use these data directly, but that there is a week's delay between the moment of turning the object over and seeing this event again in the shifting of the light.

After the second week of deployment, the last interview took place at the individual participants' homes (Figure 60). Topic list three was used in these interviews (Appendix D), the average duration of these interviews was about 20 minutes, and they were all audio-recorded. After these last interviews, the participants were thanked and the researchers took Verso back with them.

Data Analysis

The audio files of the nine interviews in total were transcribed (Appendix F) and a thematic analysis was used to code the qualitative data (Appendix G) and interpret the results.

The quantitative data includes data collected by the deployment prototypes. The data of each prototype is collected in a separate dataset. Gathered attributes are the orientation of the prototype, the side on which feedback is shown, and the time at which either one of those has changed. In an additional column, comments describe the meaning of each instance, i.e. feedback changed, orientation changed or the module was reset. These instances were later removed during cleaning, as they resulted in a copy of the attribute of interest.

Additionally, in a different dataset, a record is kept when the prototype was last connected to WiFi, to ensure data gathering went on continuously. See Appendix H for the raw data of these datasets.

Qualitative

All interviews were conducted in Dutch. The quotes used in this chapter have been translated into English.

Allocation of place

All participants allocated Verso a place near their desk that has not changed during the deployment phase of two weeks. Two participants indicated that they placed Verso on their desk and one participant indicated that Verso was placed next to the couch. "He was on my desk, right next to me." (#P2), "So most of the time I just left it on my desk." (#P3), "Now I have deliberately chosen to leave it there [next to the sofa] but if I had it by default, I would put it in my workplace." (#P1).

Figure 61. Allocation P1

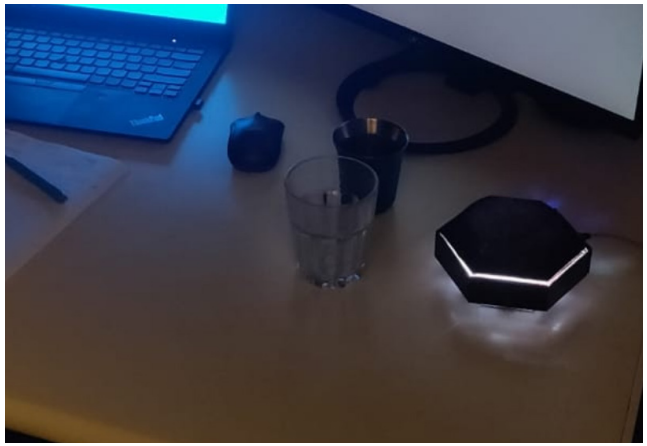

Figure 62. Allocation P2

Figure 63. Allocation P3

Physical interaction

During the first week of the deployment phase, two participants did physically interact with Verso and one did not. "Because I had not really used it the first week." (#P1), "Almost nothing, just turned around when I finished work and when I started." (#P2). Besides, during this first week of the deployment phase, one participant noticed a change in the location of the light. Conversely, two did not notice this change. "No, I did not see anything as a change. He was just white." (#P1), "Well, they [the LEDs] were actually just on all the time. So not very much." (#P3).

During the second week of the deployment phase, all participants physically interacted with Verso. They all indicated that they liked Verso to be a physical product and that the physical interaction was an extra trigger to completely stop working at the end of the working day. "That action, however, as a substitute for driving home normally contributes to the fact that I really have to do something physical in order to stop." (#P2), "It is nice to, now it is turning a device or even if it is to hit a red button, I do not care that you just 'hop' now it is really done." (#P1), "That... it does feel like when I turn it over, then it is really like, I have stopped working now, so I physically put it aside as well." (#P3). Two participants indicate that this moment of physical interaction took place when starting to work or study, and after stopping to work or study. "While working, it is not that I look at it all the time, it is more like starting and stopping work." (#P2), "Well as soon as I start working [...] I turn it towards the lighter side. That is the beginning for me now. And then when I stop, I turn it back to the dark side." (#P3).

RESULTS

Awareness

After two weeks of using Verso, the participants indicated that the use of Verso has made them more aware of 'what' they are doing. "So the fact that I had to turn that thing over every time makes me think about what I am going to do now. So it is a conscious choice, so to speak. It becomes even more conscious that you are going to work and that you are taking time off." (#P3), "I think a bit more consciously. If I start around half past 9 it should be so that I finish around half past 6 and I have reasoned that more than before." (#P2).

They indicated that Verso is a reminder to focus on work and study or their private life and not on both parts at the same time. One participant described this as a promise to oneself. "It is kind of an extra reminder of 'now you are focused, now you are at work." (#P1), "You make a kind of promise, at least I, I made a kind of promise to myself so whether I am working or not. I am already thinking about that, and when I say yes, okay, I really have to work now, so I turn it around. And then I am really going to work on that task." (#P3).

One participant also indicated that Verso created awareness of the time one had already worked. When the light had already changed location and it was only noticed later, the participant indicated that this created awareness about the longer working day at that moment. "I think that if you are still busy and you see that the lamp has already been changed, that says something, oh this was actually a longer working day." (#P2).

Non-intrusive

After using Verso, one participant indicated that it was nice that Verso was in the background and did not require a lot of attention. "I like it is a bit in the background now." (#P2). However, two participants also indicated that it would sometimes be useful if Verso could show more noticeably that the light is going to change location. "Suppose he is linked to my laptop and gives a pop-up when he switches, that might work." (#P2), "So in that sense, it could have asked a bit more attention by doing something with lights or something like that." (#P3), "Or a buzzer, who knows. Could have been. That it vibrates for a moment, briefly, like a telephone." (#P3).

More data

All participants have indicated that they would like to have more insight into the data in combination with the location of the light. In this way, they would like to know more about their routines and statistics. "That kind of concept, like a smartwatch, can see what the statistics were. That the possibility is there." (#P2), "That you really get an overview of the whole week, rather than just at that moment, that you see oh I really work too much, or too little perhaps." (#P3).

The participants indicated that they would like to get these insights using an application on their phone or the computer. "Then I would like it if I could perhaps have an insight into my routines, but I can do that online." (#P1), "Yes, on a computer. Or yes, it might as well be on an app, yes." (#P3). In this application, they would like to see the averages of their routines. "But I would rather have some sort of average of my routine." (#P1).

Also, one participant indicated that this average value should not always be displayed on Verso. One indicated that it is important that Verso remains simple. "Yes, but I do not want that on the physical thing. It has to remain a bit simple. It is meant to indicate my routine." (#P1).

Physical appearance

After having used Verso for two weeks, one of the participants indicated to be happy to have Verso on the desk. One liked the size. Another participant indicated Verso was too big for the desk. "It is not too big, it does not get in the way so there is no reason not to put it on your desk". (#P2), "But I would make it a bit smaller if it were a real product. Because it takes up a lot of space on your desk." (#P3).

Two participants also found the cable with which Verso is plugged into the wall socket impractical. The participants have indicated that this cable makes it less pleasant to interact with Verso. "The string then, that's not very handy. That makes it less practical to turn it over." (#P1), "Yeah, maybe that cable or something?" (#P3).

Quantitative

Visualized results

The three main attributes of the cleaned datasets, i.e. orientation (tilt state), feedback state, and timestamp, are plotted for each prototype in Figure 64, 65, and 66 using Microsoft Excel. The background color indicates the orientation of Verso, e.g. a bar in the dark grey (or positive) side means this side was on top. The height of the bars indicates whether the feedback was in line with the orientation, e.g. a tall bar (2 or -2) means the LEDs were lit on the top side. Ideally, a user would "follow the light" meaning that shortly after a bar shrinks in size because the feedback state changes, Verso is flipped over and is again in line with the feedback, shown by a tall bar on the other side of the graph. These visualizations show the orientation and feedback at once, rather than having to compare two different graphs.
Additionally, each time the feedback state has changed and was followed by a change in orientation, an excerpt is taken from the raw data and the time difference between changing feedback and flipping the prototype is calculated. The results are shown in figures 67, 68, and 69. Red cells indicate a mismatch between feedback and orientation.

Amount of engagement

Most striking from the visualizations is the difference in engagement between each participant. Participant 1 did not interact with Verso for a week after the first deployment day (23/11/2020). In the second week, more interaction is visible. This was after the concept was explained in more depth (28/11/2020). Participant 3 shows much more interaction, though the feedback did not change accordingly. Moreover, those instances are recorded within a few seconds. The other graphs show similar, but fewer of such patterns.

Amount of engagement in relation to feedback

A second observation is a relation between orientation (tilt state) and feedback. The prototype seems to be flipped more often than there are pre-programmed feedback changes. The first and last days of participants 1 and 2 illustrate this. The orientation keeps changing, making the orientation alternate between corresponding and opposing the feedback.
Other periods show less engagement than feedback, for example, 24/11 until 30/11 of participant 1. The orientation alters between corresponding and opposing the feedback without changing feedback (the dark grey side was kept on top).

Relation between orientation and feedback

An ideal relation between the orientation and feedback would have been visualized by a recurring pattern in the data showing a change in feedback quickly followed by a change in orientation, or the other way around. However, this relation is not directly visible in the data. For participant 2 there does seem to be a reasonably quick action after changing feedback, shown in Figure 68. Whereas participant 1 shows very little interaction overall (Figure 67), and participant 3 shows irregular orientation concerning the feedback, indicated by the red cells in Figure 69.

RESULTS

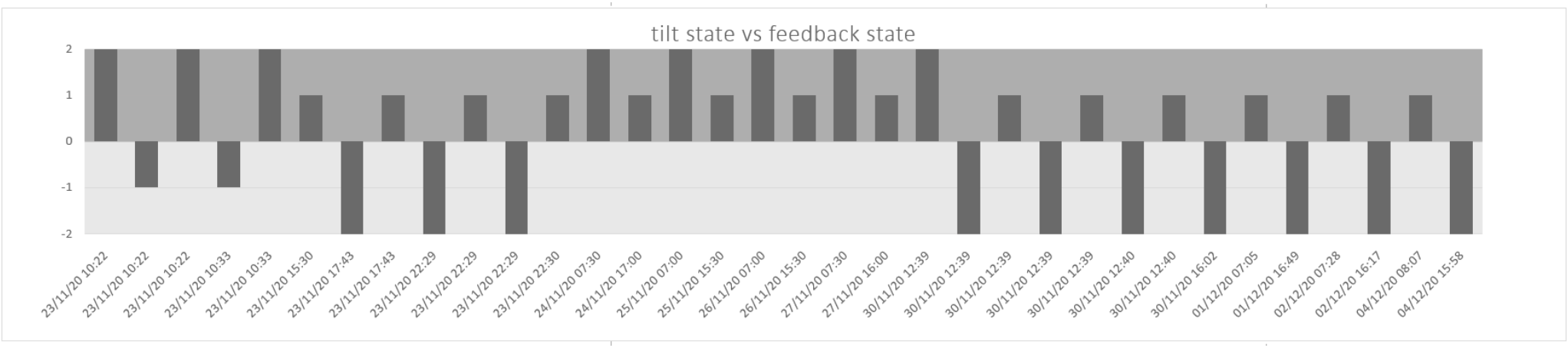

Figure 64. Tilt state vs. feedback state P1

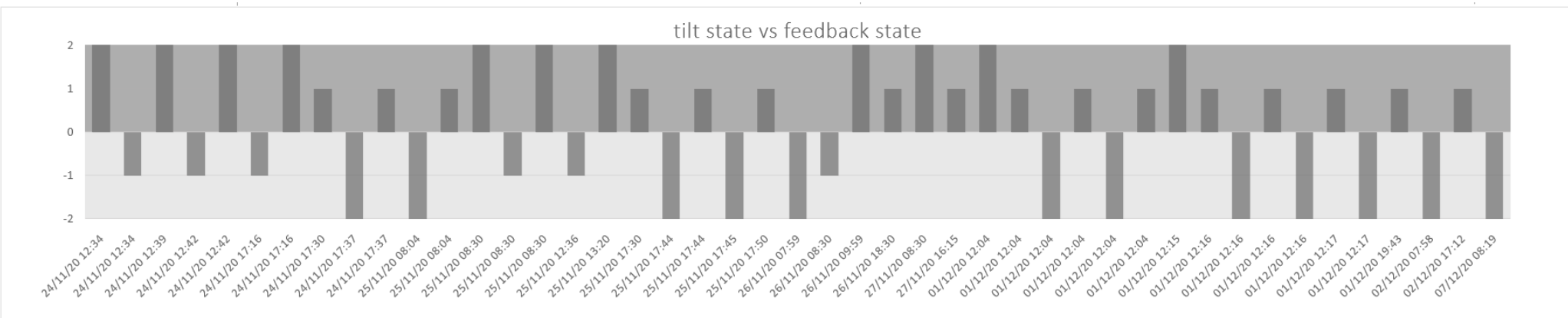

Figure 65. Tilt state vs. feedback state P2

RESULTS

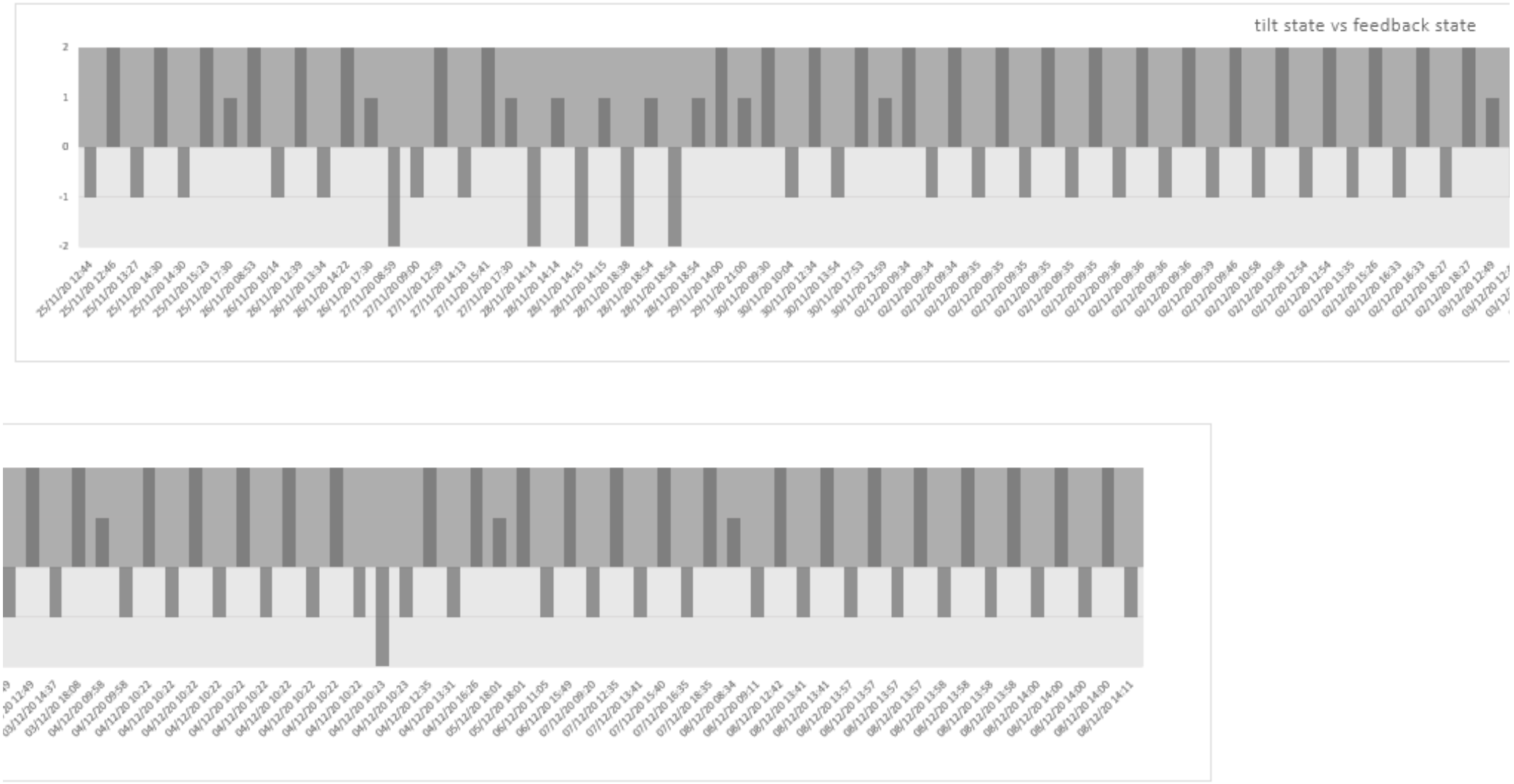

Figure 66. Tilt state vs. feedback state P3

RESULTS

timestamp	comment	feedback state	tilt state	time diff
2020-11-23T15:30:01.031	CHANGE FEEDBACK STATE	FALSE	TRUE	8027
2020-11-23T17:43:48.901		FALSE	FALSE	
2020-11-30T12:39:14.433	CHANGE FEEDBACK STATE	TRUE	TRUE	2
2020-11-30T12:39:16.964		FALSE	FALSE	
2020-12-01T21:06:28.733	CHANGE FEEDBACK STATE	FALSE	FALSE	37333
2020-12-02T07:28:41.376		FALSE	TRUE	

Figure 67. Raw data with difference in feedback and interaction time P1

timestamp	comment	feedback state	tilt state	time diff
2020-11-24T17:30:01.129	CHANGE FEEDBACK STATE	FALSE	TRUE	433
2020-11-24T17:37:14.518		FALSE	FALSE	
2020-11-25T08:30:01.011	CHANGE FEEDBACK STATE	TRUE	TRUE	12
2020-11-25T08:30:13.825		TRUE	FALSE	
2020-11-25T17:30:01.023	CHANGE FEEDBACK STATE	FALSE	TRUE	894
2020-11-25T17:44:55.643		FALSE	FALSE	
2020-11-26T08:30:01.025	CHANGE FEEDBACK STATE	TRUE	FALSE	5394
2020-11-26T09:59:55.420		TRUE	TRUE	
2020-12-01T12:04:23.699	CHANGE FEEDBACK STATE	FALSE	TRUE	4
2020-12-01T12:04:27.825		FALSE	FALSE	
2020-12-01T12:16:00.146	CHANGE FEEDBACK STATE	FALSE	TRUE	2
2020-12-01T12:16:02.237		FALSE	FALSE	

Figure 68. Raw data with difference in feedback and interaction time P2

timestamp	comment	feedback state	tilt state	time diff
2020-11-26T09:30:01.598	CHANGE FEEDBACK STATE	TRUE	TRUE	2672
2020-11-26T10:14:33.765		TRUE	FALSE	
2020-11-26T17:30:01.034	CHANGE FEEDBACK STATE	FALSE	TRUE	55785
2020-11-27T08:59:46.225		FALSE	FALSE	
2020-11-27T09:00:01.314	CHANGE FEEDBACK STATE	TRUE	FALSE	14398
2020-11-27T12:59:59.646		TRUE	TRUE	
2020-11-27T17:30:01.120	CHANGE FEEDBACK STATE	FALSE	TRUE	74685
2020-11-28T14:14:47.007		FALSE	FALSE	
2020-11-30T09:30:01.042	CHANGE FEEDBACK STATE	TRUE	TRUE	2054
2020-11-30T10:04:15.137		TRUE	FALSE	
2020-12-02T09:34:20.755	CHANGE FEEDBACK STATE	FALSE	TRUE	28
2020-12-02T09:34:48.105		TRUE	FALSE	
2020-12-03T12:49:05.635	CHANGE FEEDBACK STATE	FALSE	TRUE	17
2020-12-03T12:49:23.002		TRUE	FALSE	
2020-12-04T09:58:13.638	CHANGE FEEDBACK STATE	TRUE	FALSE	1438
2020-12-04T10:22:11.072		TRUE	TRUE	
2020-12-04T10:23:20.148	CHANGE FEEDBACK STATE	TRUE	FALSE	7912
2020-12-04T12:35:11.199		TRUE	TRUE	
2020-12-06T11:05:12.478	CHANGE FEEDBACK STATE	TRUE	TRUE	8
2020-12-06T11:05:20.566		TRUE	FALSE	
2020-12-08T08:34:11.491	CHANGE FEEDBACK STATE	FALSE	TRUE	2261
2020-12-08T09:11:53.323		TRUE	FALSE	

Figure 69. Raw data with difference in feedback and interaction time P3

DISCUSSION

Findings

The goal of the deployment was to discover how participants would use Verso in a real-life context and whether they used Verso the way it has been designed for. Insights already started at the beginning of the deployment, where the participants decided to place Verso on their desk or the place where they work. Only one participant did not decide to do this. Interesting to see is that the light switching had not been noticed often or at all, but still Verso had been oriented differently. This is also visible in the received data. Especially the second week, Verso had been used for its purpose. It is interesting to see that the data from Verso as well as from the interviews indicate a difference in usage. An example is the multiple orientation changes that did not correspond with the light state changes.
The participants sometimes reacted to the change in location of the lights by orienting Verso on the opposite side. This physical interaction was seen as a trigger to really stop or start working since it was a reminder and made the users aware of what they were doing. The participants were able to better differentiate between work and non-work time. The physical switch was the main reason for this, though it would have been nice if the indicator of the light was better visible. Sometimes the change of orientation was directly after the light change. This could indicate a structured routine, a follow of the light or a coincidence. This can not be stated that strict, since the participants mentioned that the light was not visible very well.
The first week required some guessing from the participants for how to use Verso, though the second week shows a significant difference in usage (from both the interviews as from the logged data). This is caused by the briefing between the two weeks where the concept was explained. This is not a bad thing, since Verso is a design object which could be purchased. When people purchase something the user probably knows what to use it for. The second week's data shows that Verso had been used the way Verso was designed for. Interesting to hear is the fact that the personal effects of usage glimpse towards the designed purpose.

Divergence of results

Some results, especially in the data gathered by Verso that could have been a result of something else than initially mentioned. Multiple orientation switches could be the cause of a lot of switches in a routine of course, but it could also be the result of Verso being lifted a lot of times to examine the design. Participant 3 did indicate during an interview to pick up the prototype and examine it, during which many orientations may have been recorded. What's more, participant 1 did indicate during the intermediate interview to have interacted with the prototype very little. Different data points could also be the result of oversensitivity or restarting after a reset, which some of the participants did daily to shut down the LEDs manually.

Significance and limitations

The study has been conducted with three participants. To be able to validate the results from this study, more participants are mandatory. Next to that, a longer deployment period would have a drastic effect on the significance of the gathered data.
A limitation that influences the significance too is the quality of the electronics. The electronics were not quite stable. At first, this means that the gathered data would not have automatically been able to create the ghosting effect. Therefore, the data for the first week had to be hard-coded for the second week. The quality of the electronics might also have caused a lot of different switches in tilt states. Therefore the qualitative results can be used as a backup and confirmation of the found data.
The final limitation refers to the participants mentioning that the cable was unpleasant for the usage of Verso. This cable was required by limitations in technical possibilities at the time. But it could also influence the way the participants have used Verso.
The significance and limitations are mainly focused on the deployment, though there are also some issues coming from the design process. There was a great ambition towards the process and the desired results. This ambition caused a lot of growth within the work and lifted

DISCUSSION

the design to the next level. Nevertheless, the ambition also caused the feeling of 'wanting to deploy'. This, merely at the beginning of the process, caused some lost time. For the design, some concessions have been made due to time or knowledge constraints. Throughout the iterations, a lot have been upgraded already, but the lights (for example) are still not clearly visible. Despite this lack of visibility, the results were still as desired regarding the deployment.

Future Work

Recommendations for future research and development of the prototype

For the deployment of Verso for a longer period, the data must be automatically used to create ghosting behavior. This will make the deployment more realistic and adaptive since Verso's behavior is directly influenced by the interaction with it. Secondly, it is necessary to only have participants completely fitting the target audience. Though, different users might sometimes also profit from a design that is not specially designed for them specifically.

The electronics require improvement to be able to make the prototypes more robust and easy to update. The casing of a new prototype deployment should meet the looks of the final iteration of the design, with better visible lights.

Concept Expansion

To improve Verso further, some relevant aspects are highlighted. The first aspect has been mentioned earlier; the removal of the cable. This could be solved by using wireless charging in (one of) the side panels of the border. To be able to charge Verso, a docking station is required. Charging should not often be necessary if the battery inside the device is large enough to log data and display feedback for a longer period.

All participants indicated that it would be nice if there is a possibility to get more insights into the data together with the current light states to be able to see the current balance or past routines. Though, they mentioned the importance of Verso being simple like it is now. With this in mind, two quick new concepts have been thought of. The first concept is that the insights can be gathered in the docking station (Figure 70). When connecting Verso to charge, the information will be 'uploaded' to the station, followed by displaying the balance of the past days, months, years. Also, more detailed information about the specifics could be seen. The second idea is to be able to open up Verso by lifting the cap (Figure 71). This way the user can literally 'see' where the data is coming from, presenting an overview for more insights.

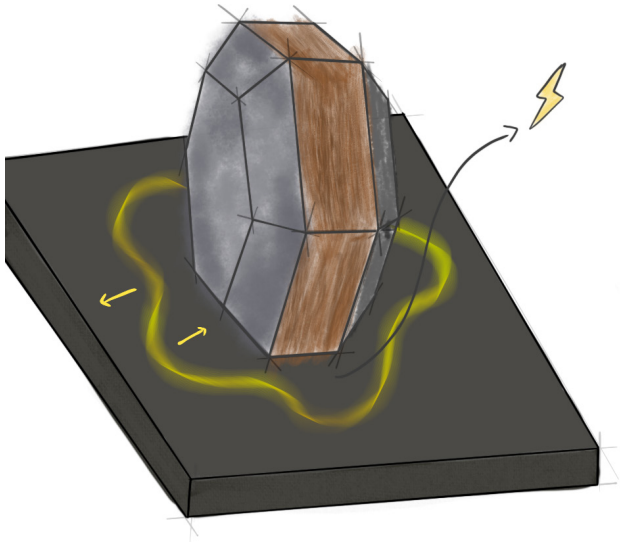

Figure 70. Docking station sketch

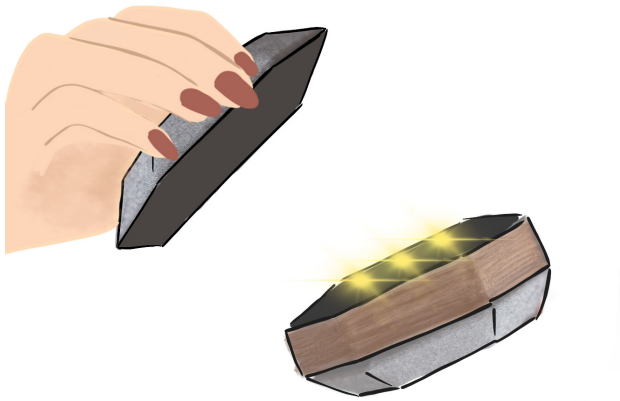

Figure 71. Cap lifting sketch

CONCLUSION

The main challenge of this project was to design for Slow Technology in the domain of personal health. This challenge was specified to focus on the increasingly important work-relax balance. Relaxing becomes more and more difficult as working from home becomes the status quo.
Over a period of 18 weeks, Verso was designed. It slowly adapts its behavior to its orientation over time, requiring a solid routine (interaction) for feedback to become clearly visible. Interacting with Verso should evoke reflection about the user's routines and restore the balance between working and relaxing.
A two-week deployment provided contextualized insights into the effect of using a slow product related to sustaining routines. Findings suggest that having a physical interaction to close off your day does contribute to restoring the balance, but it's unclear to what extent due to the rather short deployment period. Additionally, the aesthetical qualities and simple interaction are essential in keeping Verso interesting over a longer period, with the possible expansion to include more detailed insights.
Finally, this project shows that Slow Technology can be used to design for routines and by doing so contribute to personal health. Too many products rely on direct feedback-action responses and try to capture as much of our attention as possible. Especially within the domain of work, this is undesirable and thus a great opportunity to deploy more slow products. Within the relax domain, slowness is appropriate as it gives the user some breathing room to actually wind-down and not feel obligated toward a product, risking a penalty for breaking a streak for example.

ACKNOWLEDGEMENTS

Carine Lallemand & Pepijn Verburg
During this project, we were coached by Carine and Pepijn. They provided guidance and support during the project and were always enthusiastic and ready to help. We received much feedback, tips, and tricks which made us motivated to keep pushing the project to a higher level. The supportive coaching atmosphere made us more confident to try out new things and step out of our comfort zones -and expertise, allowing us to learn not only from our coaches but also from each other. Thank you for your support, you are excellent coaches who highly contributed to the success of this project and our personal development as designers.

Will Odom
Secondly, we had the chance to discuss our design with an expert in the field of Slow Technology. We expanded our knowledge and improved our concept based on the discussion with Will Odom. We want to thank you for your interest, time, and effort you spent on our project during the expert review.

Squad coaches and students
Besides our project coaches, we also received much help and feedback from other coaches as well as students from the Vitality squad, which we appreciate. Thank you for your help and critical perspectives on our design process.

Participants
Finally, we want to thank all of the participants who took part in the two-week deployment. Without your help, there would have been a large gap in this project, so thank you for participating.

REFERENCES

Arneson, K. (2020, October 7). How 'Feierabend' helps Germans disconnect from the workday. BBC. https://www.bbc.com/worklife/article/20200929-how-feierabend-helps-germans-disconnect-from-the-workday

Bertran, I. (2014). Slow games. Ishback. http://ishback.com/slowgames/

Chen, Amy Yo Sue. (2020). Giving Form to Temporality: Extending Design Practices and Methodologies for 'Slow' Interaction. 10.1145/3334480.3375024.

Derks, D., van Mierlo, H., & Schmitz, E. B. (2014). A diary study on work-related smartphone use, psychological detachment and exhaustion: Examining the role of the perceived segmentation norm. Journal of Occupational Health Psychology, 19, 74 – 84. http://dx.doi.org/10.1037/a0035076

Fass, John. (2012). Designing for Slow Technology: Intent and Interaction.

Ferreira, C., Soares, C., & Branco, N. (2019, June 17). Mindler. Behance. https://www.behance.net/gallery/81313843/Mindler?tracking_source=search_projects_recommended%7Cwind%20down%20routine

Funk, Mathias. (2019, May). OOCSI. Zenodo. http://doi.org/10.5281/zenodo.1321220

Gao, Feng. (2012). Design for reflection on health behavior change. 10.1145/2166966.2167053.

Gaver, W., Bowers, J., Boucher, A., Law, A., Pennington, S., and Villar, N. (2006). The History Tablecloth: Illuminating Domestic Activity. In Proceedings of the 6th Conference on Designing Interactive Systems (DIS '06). ACM, New York, NY, USA, 199–208. https://doi.org/10.1145/1142405.1142437

Google. (n.d.). Google Home. Retrieved January 5, 2021, from https://store.google.com/product/google_home_mini_first_gen

Hallnäs, L., Redström, J. Slow Technology – Designing for Reflection. Personal Ub Comp 5, 201–212 (2001). https://doi.org/10.1007/PL00000019

Hanington, B., & Martin, B. (2012). Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions. Rockport Publishers.
Headspace inc. (n.d.). Meditation and Sleep Made Simple. Headspace. Retrieved October 20, 2020, from https://www.headspace.com/

Houghton, G. (2020, September 28). Ritual - Mobile App Concept. Behance. https://www.behance.net/gallery/105068169/Ritual-Mobile-App-Concept?tracking_source=search_projects_recommended%7Cwind%20down%20routine

Kinnunen, U., Feldt, T., de Bloom, J., Sianoja, M., Korpela, K., & Geurts, S. (2017). Linking boundary crossing from work to nonwork to work-related rumination across time: A variable- and person-oriented approach. Journal of Occupational Health Psychology, 22(4), 467.

Munch, E. (2020). Social norms on working hours and peak times in public transport. Time & Society, 0961463X20905478.

Odom, William & Sellen, Abigail & Banks, Richard & Kirk, David & Regan, Tim & Selby, Mark & Forlizzi, Jodi & Zimmerman, John. (2014). Designing for slowness, anticipation and re-visitation: A long term field study of the photobox. Conference on Human Factors in Computing Systems - Proceedings. 10.1145/2556288.2557178.

Odom, William. (2015). Understanding Long-Term Interactions with a Slow Technology. 575-584. 10.1145/2702123.2702221.

Odom, W., Wakkary, R., Hol, J., Naus, B., Verburg, P., Amram, T., & Yo Sue Chen, A. (2019). Investigating slowness as a frame to design longer-term experiences with personal data: a field study of olly. In CHI 2019 - Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems [34] Association for Computing Machinery, Inc. https://doi.org/10.1145/3290605.3300264

Pschetz, Larissa & Banks, Richard. (2013). Long living chair. 2983-2986. 10.1145/2468356.2479590.

Redactie MT.nl. (2020, October 20). Dropbox maakt van thuiswerken de norm en dit is wat het betekent voor de organisatie. MT/Sprout. https://mtsprout.nl/management-leiderschap/dropbox-maakt-van-thuiswerken-de-norm-en-dit-is-wat-het-betekent-voor-de-organisatie

Scott, E. (2020, August 28). How to Stop Taking Your Work

REFERENCES

Home With You. Verywell Mind. https://www.verywellmind.com/how-to-relieve-job-stress-after-work-4144874

Timeular. (2015). Timeular. https://timeular.com/

Vallgårda, A. (2014). Giving form to computational things: developing a practice of interaction design. Personal Ubiquitous Comput. 18, 3 (March 2014), 577–592. DOI:https://doi.org/10.1007/s00779-013-0685-8

Wakkary, R. L., Desjardins, A., & Hauser, S. (2016). Unselfconscious interaction: a conceptual construct. Interacting with Computers, 28(4), 501-520. https://doi.org/10.1093/iwc/iwv018
Walker, M. (2018). Why We Sleep. Penguin Books Ltd.

Zijlstra, F. R., & Sonnentag, S. (2006). After work is done: Psychological perspectives on recovery from work. European journal of work and organizational psychology, 15(2), 129-138.

Links of used images and Icons

Moodboard Concrete Links

https://nl.pinterest.com/pin/555209460317202669/
https://nl.pinterest.com/pin/663155113876404616/
https://nl.pinterest.com/pin/34973334594504215/
https://nl.pinterest.com/pin/103653228912020544/
https://nl.pinterest.com/pin/138063544806840819/
https://nl.pinterest.com/pin/258745941079470288/
https://nl.pinterest.com/pin/161214861650665241/
https://nl.pinterest.com/pin/122441683606991923/

Moodboard Fabric Links

https://nl.pinterest.com/pin/329888741459713985/
https://nl.pinterest.com/pin/97601516907340714/
https://nl.pinterest.com/pin/AcjwtnvtHOU80TnkSeZrvdExWPnbr9OAtZeVjuUwewyrb-noFImSS5A/
https://nl.pinterest.com/pin/38491771792057973/
https://nl.pinterest.com/pin/432275264237116527/
https://nl.pinterest.com/pin/111393790773296529/
https://nl.pinterest.com/pin/302867143695585524/
https://nl.pinterest.com/pin/373728469083334182/
https://nl.pinterest.com/pin/129689664258769962/

Moodboard Plastic Links

https://nl.pinterest.com/pin/41517627802752811/
https://nl.pinterest.com/pin/290974825931793540/
https://nl.pinterest.com/pin/1970393574192637/
https://nl.pinterest.com/pin/114278909281919250/
https://nl.pinterest.com/pin/55098795430037459/
https://nl.pinterest.com/pin/749356825489927026/
https://nl.pinterest.com/pin/7107311899207374/
https://nl.pinterest.com/pin/499547783642362585/
https://nl.pinterest.com/pin/120893571235015813/
https://nl.pinterest.com/pin/38491771800052741/

Moodboard Metal Links

https://nl.pinterest.com/pin/329255422752330935/
https://nl.pinterest.com/pin/30891947434423526/
https://nl.pinterest.com/pin/323696291960009452/
https://nl.pinterest.com/pin/8725793006966716/
https://nl.pinterest.com/pin/126171227039692013/
https://nl.pinterest.com/pin/13862711339330935/
https://nl.pinterest.com/pin/74942781283346115/
https://nl.pinterest.com/pin/138274651034668069/
https://nl.pinterest.com/pin/38491771792011205/

Moodboard Transparency Links

https://nl.pinterest.com/pin/96827460725541490/
https://nl.pinterest.com/pin/36451078223510732/
https://nl.pinterest.com/pin/358810295313115906/
https://nl.pinterest.com/pin/138063544815908641/
https://nl.pinterest.com/pin/288511919884042429/
https://nl.pinterest.com/pin/348747564889555421/
https://nl.pinterest.com/pin/410531322289517149/
https://nl.pinterest.com/pin/98586679321339902/
https://nl.pinterest.com/pin/220043131779000372/
https://nl.pinterest.com/pin/143130094392735399/

Moodboard Rubber Links

https://nl.pinterest.com/pin/2181499797354343/
https://nl.pinterest.com/pin/3377768442964572/
https://nl.pinterest.com/pin/138696863509081829/
https://nl.pinterest.com/pin/88242473924769187/

REFERENCES

https://nl.pinterest.com/pin/125186064632198349/
https://nl.pinterest.com/pin/17170042306967576/
https://nl.pinterest.com/pin/3588874690977903/
https://nl.pinterest.com/pin/78179743517867539/
https://nl.pinterest.com/pin/363454632434414103/
https://nl.pinterest.com/pin/363947213629128880/
https://nl.pinterest.com/pin/3518505948640419/

Personalization panel links
https://www.pexels.com/photo/board-bright-design-fabric-235994/
https://www.pexels.com/photo/background-boards-brown-carpentry-518245/
https://www.pexels.com/photo/grey-wall-2117937/
https://www.pexels.com/photo/close-up-of-wooden-plank-326311/

The Noun Project icon links
https://thenounproject.com/search/?q=barcode&i=2247079
https://thenounproject.com/search/?q=value&i=2573769
https://thenounproject.com/search/?q=pills&i=2060917
https://thenounproject.com/search/?q=graph+line&i=765544
https://thenounproject.com/search/?q=head+side&i=1175803
https://thenounproject.com/icon.cheese/collection/emoji-line/?i=2937172
https://thenounproject.com/icon.cheese/collection/emoji-line/?i=2937320
https://thenounproject.com/search/?q=checklist&i=1791725
https://thenounproject.com/search/?q=light+bulb&i=1175577
https://thenounproject.com/search/?q=brains&i=685337
https://thenounproject.com/search/?q=link&i=1781072
https://thenounproject.com/search/?q=check&i=1271976
https://thenounproject.com/term/label/2944421/
https://thenounproject.com/search/?q=hands+form+heart&i=680244
https://thenounproject.com/search/?q=money+circle&i=2907040 + https://thenounproject.com/search/?q=dollar&i=1107078
https://thenounproject.com/search/?q=network inspiration